

8 August 2019



Gross monthly earnings per employee (Social Security – Data analysed by Statistics Portugal)
June 2019

Gross monthly earnings per employee have increased, in June 2019, 3.4% compared to the same period of 2018

The gross monthly earnings per employee (per job) have increased, in June 2019, 3.4% compared to the same period of 2018, as well as the regular monthly earnings.

In real terms, taking into account the inflation effect during the period under analysis, the gross monthly earnings per employee increased by 2.9% and its regular component increased by 2.8%.

In the last five years, the Minimum Wage got closer to the regular gross monthly earnings, starting by representing 55.9% of the latter in the 1st semester of 2014, to 63,0% in the 1st semester of 2019, and surpassing 80% in some economic activities, as in the Administrative and support service activities; in the Agriculture, farming of animals, hunting and forestry; and in the Accommodation and food service activities.

1. Introduction

Based on the data from the Monthly Statement of Earnings (DMR – *Declaração Mensal de Remunerações*) sent by enterprises to the Social Security, Statistics Portugal started in May the release of [statistics on gross earnings](#) from 2014 to the 1st quarter of 2019. These data concern around 400 thousand enterprises and nearly 3.6 million of employees.

These data are already being used by Statistics Portugal in other surveys with the purpose of replacing similar information usually collected by means of a survey using administrative data.

The data are received every month from Social Security, and the monthly values only stabilised in the fourth version, i.e., three months after submission of the first version. In fact, there is a non-negligible share

of DMR not yet submitted or still subject to further corrections by the enterprises. This fact led to the development of a statistical methodology aiming at anticipating the final versions. Thus, in this second edition, for the computation of the results for the 2nd quarter of 2019 machine learning technics (Support Vector Machine) were used.

Simulation studies conducted on a monthly series of moving quarters ending in the reference month, from January 2017 to March 2019, led to the conclusion that the average of absolute relative deviation between provisional and definitive values is reduced almost to half when the provisional values are subject to the abovementioned statistical treatment (imputation analysis), as shown in the table below. For more details about this methodology, see the Technical note in the end of the Press release.

Average of absolute relative deviation between provisional and definitive values (January 2017 to March 2019)

	Without imputation	With imputation
Number of enterprises	0.27%	0.23%
Number of employees	0.40%	0.11%
Regular gross earnings per employee	0.21%	0.11%
Total gross earnings per employee	0.08%	0.04%

2. Gross monthly earnings per employee and its components

In June 2019 (quarter ended in June 2019)¹, the gross monthly earnings per employee recorded a year-on-year increase of 3.4% (Figure 1), increasing from €1.141 in June 2018 to €1.180 in June 2019. This change corresponds to a slightly acceleration, of 0.1 percentage points (pp), of the growth observed in March 2019 (3.3%).

The regular gross monthly earnings per employee, which exclude, among other earnings components, the Christmas and Holidays allowances and, thus, have a less seasonal behaviour², showed a year-on-year increase of the same magnitude (3.4%), increasing from €923 in June 2018 to €954 in June 2019. This component has also registered an acceleration, stronger, compared to March 2019 (more 0.3 pp), continuing the acceleration trend started in December 2017.

In real terms, that is, taking into account the inflation effect measured by the Consumer Price Index (CPI), the total earnings registered a year-on-year increase of 2.9% (Figure 2) and the regular earnings recorded a year-on-year increase of 2.8% (Figure 3).

Figure 1: Year-on-year change of gross monthly earnings per employee (total and regular)

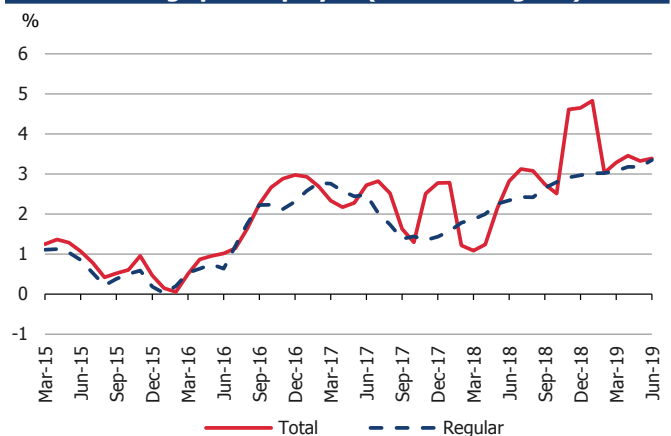
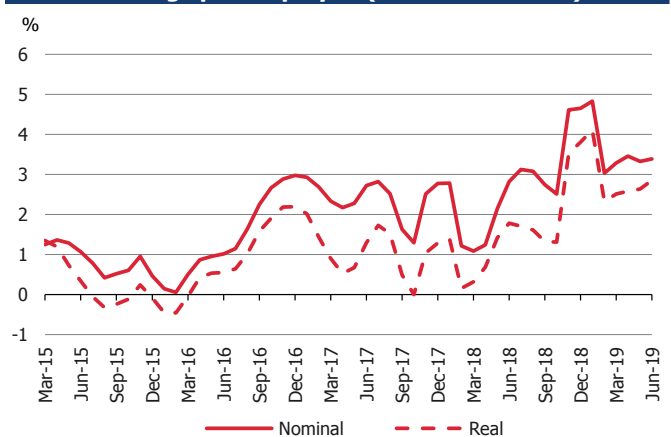


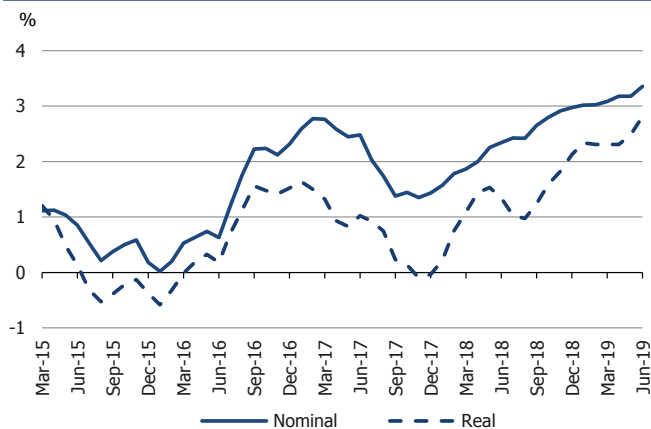
Figure 2: Year-on-year change of total gross monthly earnings per employee (nominal and real)



¹ The monthly data analysed in this Press release refer to moving quarters ended in the reference month. Unless otherwise stated, the rates of change correspond to year-on-year ones (compared to the same moving quarter of the previous year). The year-on-year change series of the indicators under analysis are shown in the tables in the Annex.

² For a more detail description of the earnings components included in the total and in the regular gross monthly earnings, see the Technical note.

Figure 3: Year-on-year change of regular gross monthly earnings per employee (nominal and real)



3. Gross earnings by economic activity of the enterprise

The earnings change substantially according to the economic activity of the enterprise.³ In June 2019, the total earnings varied between €787 in the activities of *Agriculture, forestry and fishing* (section A), and €3,372 in the activities of *Electricity, gas, steam and air conditioning supply* (D).

In turn, the regular earnings varied between €653 in the *Administrative and support service activities* (N), and €2,521 in the activities of *Electricity, gas, steam and air conditioning supply* (D).

Compared to the same period of 2018, the major change in total earnings were observed in activities of *Education* (P; 6.0%), followed by the activities of *Transportation and Storage* (H; 4.8%) and *Accommodation and food service activities* (I; 4.3%) (Figure 4). On the other hand, the total earnings in *Financial and insurance activities* (K) and in the

activities of *Electricity, gas, steam and air conditioning supply* (D) remained almost unchanged (0.2%).

Figure 4: Year-on-year change of total gross monthly earnings per employee by economic activity (NACE-Rev. 2) in June 2019

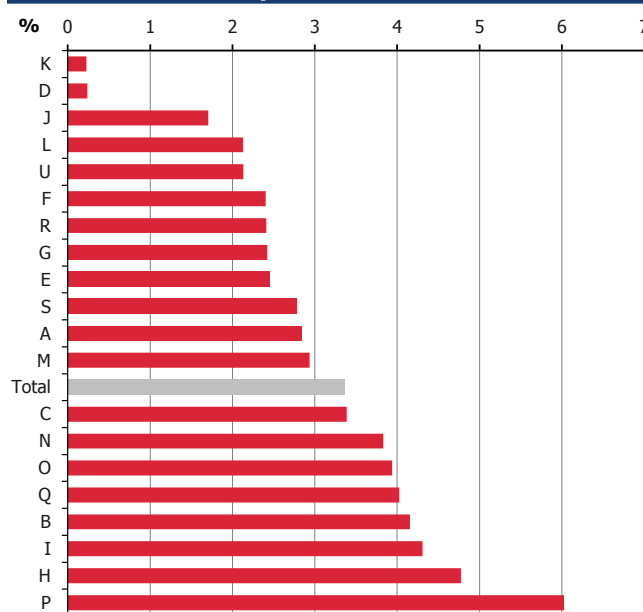
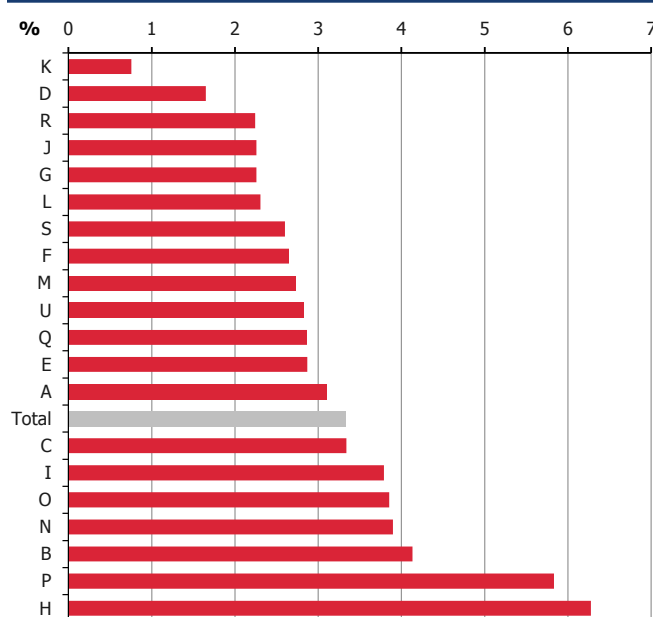


Figure 5: Year-on-year change of regular gross monthly earnings per employee by economic activity (NACE-Rev. 2) in June 2019



³ The economic activity designations can be found in Table 2 of the Annex.

The larger changes of the regular earnings were observed in the activities of *Transportation and storage* (H; 6.3%) and of *Education* (P; 5.8%), while the smaller change was registered in the *Financial and insurance activities* (K; 0.8%) (Figure 5).

4. Development of the gross earnings and of employment over the past five years

Between the 1st semester of 2014 and the 1st semester of 2019, the total earnings increased by 10.2% in nominal terms and by 6.1% in real terms (Figure 6). In the 1st semester of 2014, the total earnings were €1,024, having increased to €1,128 in the 1st semester of 2019.

In the same period, the regular earnings increased by 9.9% in nominal terms and by 5.8% in real terms (Figure 7). In the 1st semester of 2014, the regular earnings were €867 and, in the 1st semester of 2019, they were €952.

From the 1st semester of 2014 to the 1st semester of 2019, the number of employees (number of jobs, as explained in the Technical note) increased by 23.2%. In the same period, the total earnings increased by 10.2% (Figures 7 and 8).

Figure 6: Change of total gross monthly earnings per employee by economic activity (NACE-Rev. 2) between the 1st semester of 2014 and the 1st semester of 2019

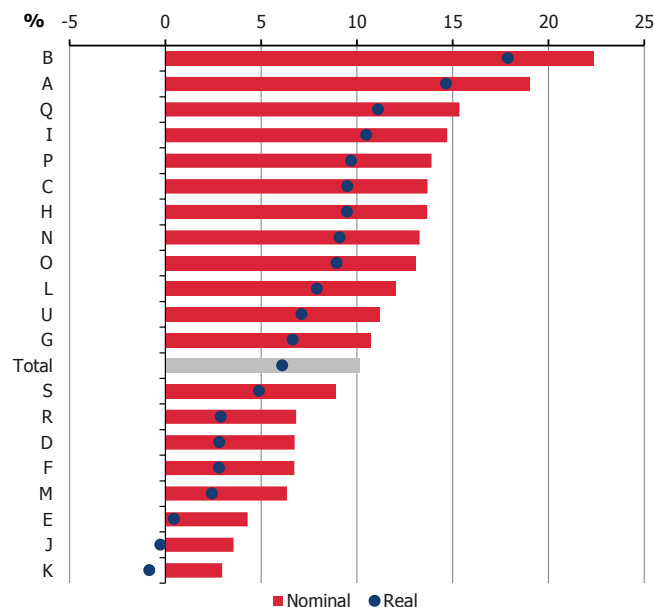
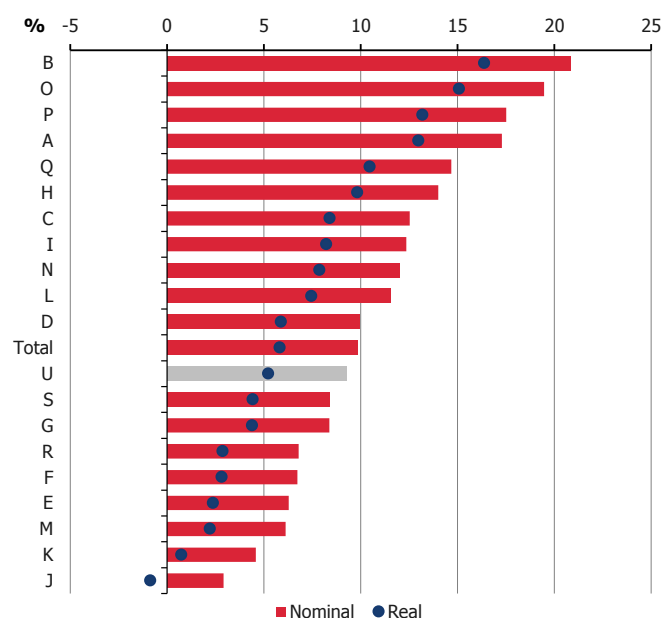


Figure 7: Change of regular gross monthly earnings per employee by economic activity (NACE-Rev. 2) between the 1st semester of 2014 and the 1st semester of 2019

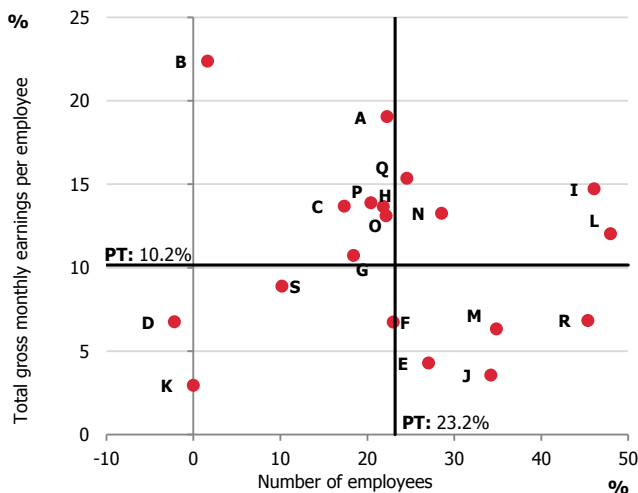


The economic activities that recorded increases above the total economy, on both the total earnings and on the number of employees, were the *Real estate*

activities (L) and the *Accommodation and food service activities* (I), with increases of 48.0% and 46.1% in the number of employees, respectively (Figure 8). In a lesser extent, come the *Administrative and support service activities* (N) and the *Human health and social work activities* (Q).

The economic activities whose changes in earnings and in the number of employees were simultaneously below the national averages were the activities of *Electricity, gas, steam, cold and hot water and cold air* (D), the *Financial and insurance activities* (K) and, in a lesser extent, the *Other service activities* (S).

Figure 8: Change of the number of employees and of the total gross monthly earnings per employee by economic activity (NACE-Rev. 2) between the 1st semester of 2014 and the 1st semester of 2019



5. Relation between the regular earning and the Minimum Wage

Given the importance of the Minimum Wage (MW) and taking advantage of the fact that Statistics Portugal disposes of granular data received from the Social Security, Statistics Portugal proceed with an analysis, by

sector of economic activity, of the relation between the MW and the regular earnings.

Between the 1st semester of 2014 and the 1st semester of 2019, the MW registered a nominal increase of 23.7% (from €485 to €600) and a real increase of 19.2%, while the regular earnings increased by 9.9% in nominal terms and by 5.8% in real terms.

The relation between the MW and the regular earnings reveals a great heterogeneity among economic sectors, which is also characterized by a strong temporal persistence. Some economic sectors have average earnings that are closer to the MW, while others have average earnings equivalent to more than four times the MW.

A well-known indicator to evaluate this relation is the Kaitz Index, which relates the MW with the average or the median earnings. Although the median earnings are more commonly used, the data received from the Social Security, at the enterprise level, do not allow computing estimates for the median earnings directly, and therefore Statistics Portugal used the average earnings. Besides that, the computation considered the regular earnings, excluding non-monthly components like the Holidays and Christmas allowances, as it is described in the Technical note.

In the last five years, the Kaitz Index has increased in Portugal, bringing the MW closer to the average regular earnings of the economy. In fact, in the 1st semester of 2014, the MW corresponded to 55.9% of the average regular earnings, having this proportion increased to 63.0% in the 1st semester of 2019 (Figures 9 and 10).

In the 1st semester of 2019, there were three economic activities for which the MW corresponded to more than

4/5 of the average regular earnings: the activities of *Administrative and support service activities* (N; 92.1%); the *Agriculture, farming of animals, hunting and forestry* (A; 89.8%); and the *Accommodation and food service activities* (I; 87.4%). On the other hand, for three economic activities the MW corresponded to less than 2/5 of the regular earnings: the *Electricity, gas, steam, cold and hot water, and cold air* (D; 23.9%), the *Financial and insurance activities* (K; 29.3%) and the *Information and communication activities* (J; 37.5%). This pattern also generically applies to what has happened five years ago.

The economic activities that experienced a higher increase in this proportion were the *Construction* (F; +10.4 pp), the *Water collection, treatment and distribution; sewage, waste management and remediation activities* (E; +9.0% pp), and the *Administrative and support service activities* (N) and *Other service activities* (S; +8.7 pp in both cases), the *Wholesale and retail trade; repair of motor vehicles and motorcycles* (G; +8,4 pp) and the *Accommodation and food service activities* (I; +8.0 pp) (Figure 11). These were also the economic activities where the MW was closer to the regular earnings in the 1st semester of 2019 (proportion above the global average). The ones which recorded the lower increases were the *Mining and quarrying* (B; +1.2 pp) and the *Public administration and Defence; Compulsory Social Security* (O; +1.9 pp).

Figure 9: Relation between the Minimum Wage and the regular gross monthly earnings per employee by economic activity (NACE Rev. 2) in the 1st semester of 2014 and in the 1st semester of 2019

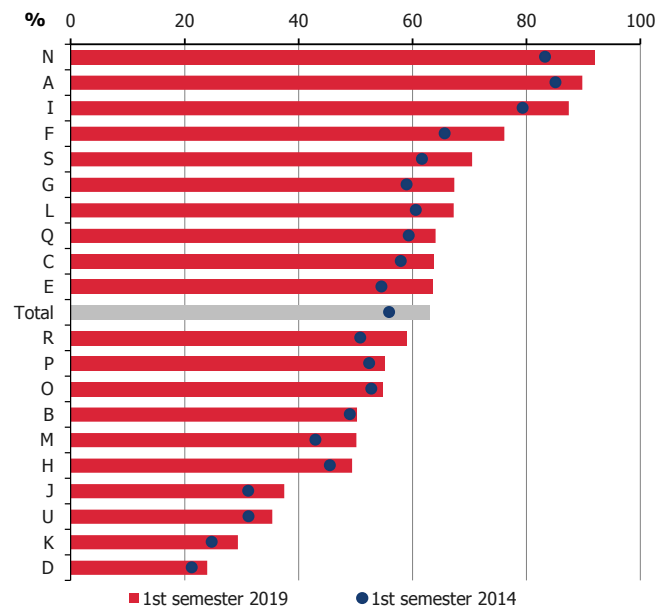


Figure 10: Relation between the Minimum Wage and the regular gross monthly earnings per employee by economic activity (NACE-Rev. 2) in the 1st semester of 2014 and in the 1st semester of 2019

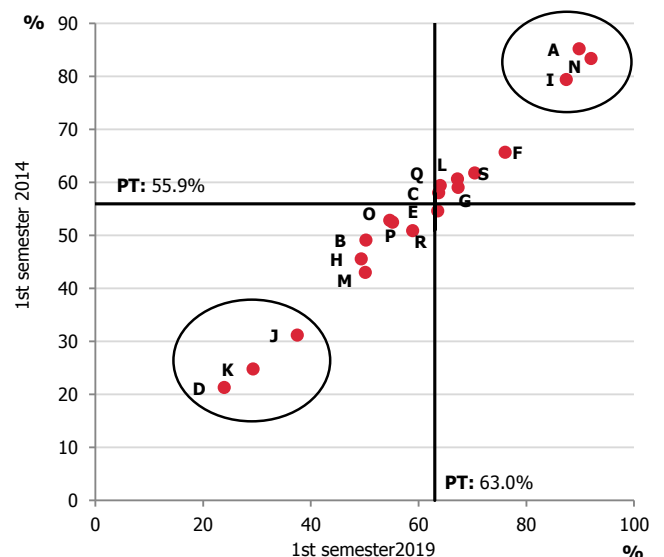


Figure 11: Relation between the Minimum Wage and the regular gross monthly earnings per employee by economic activity (NACE-Rev. 2) in the 1st semester of 2019 and its variation in relation to the 1st semester of 2014

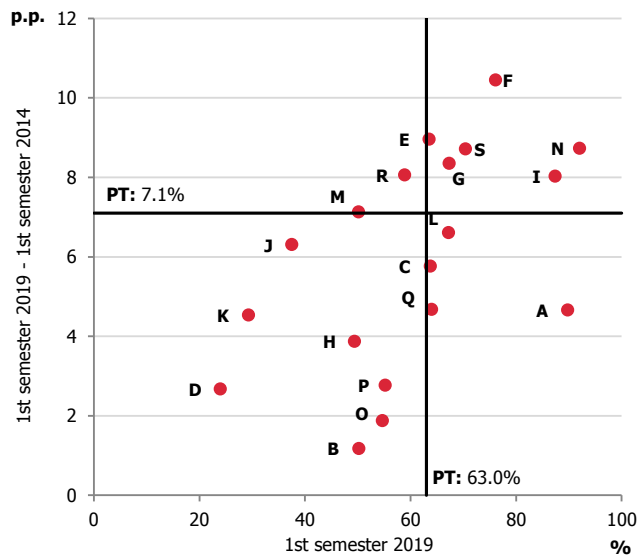


Table 1: Number of employees and gross monthly earnings per employee (total and regular)

Portugal	Quarter ended in the month			Year-on-year change		
	Number of employees	Total gross earnings	Regular gross earnings	Number of employees	Total gross earnings	Regular gross earnings
	Thousands	Euro		%		
2019						
June	3,704.3	1,180	954	4.0	3.4	3.4
May	3,679.8	1,096	954	4.4	3.3	3.2
April	3,649.1	1,080	954	4.5	3.5	3.2
March	3,623.1	1,076	950	4.4	3.3	3.1
February	3,614.8	1,150	943	4.3	3.0	3.0
January	3,626.1	1,283	934	4.2	4.8	3.0
2018						
December	3,634.3	1,269	928	4.1	4.7	3.0
November	3,632.1	1,179	924	4.2	4.6	2.9
October	3,614.5	1,060	924	4.2	2.5	2.8
September	3,611.3	1,111	923	4.3	2.7	2.7
August	3,606.8	1,195	922	4.5	3.1	2.4
July	3,592.1	1,187	922	4.5	3.1	2.4
June	3,555.4	1,139	923	4.4	2.7	2.3
May	3,523.3	1,060	925	4.5	2.1	2.3
April	3,493.2	1,044	924	4.7	1.2	2.0
March	3,470.6	1,042	922	4.9	1.1	1.9
February	3,467.0	1,116	915	5.0	1.2	1.8
January	3,480.8	1,224	907	5.1	2.8	1.6
2017						
December	3,489.6	1,212	901	5.2	2.8	1.4
November	3,487.3	1,127	898	5.2	2.5	1.3
October	3,468.5	1,034	899	5.1	1.3	1.4
September	3,461.5	1,082	899	5.2	1.6	1.4
August	3,451.8	1,159	900	5.8	2.5	1.7
July	3,437.6	1,151	900	6.4	2.8	2.0
June	3,406.7	1,110	902	6.7	2.7	2.5
May	3,371.0	1,038	905	6.5	2.3	2.4
April	3,335.4	1,031	906	6.2	2.2	2.6
March	3,309.8	1,030	905	6.0	2.3	2.8
February	3,301.9	1,102	899	5.8	2.7	2.8
January	3,311.5	1,191	893	5.6	2.9	2.6
2016						
December	3,317.9	1,180	888	5.4	3.0	2.3
November	3,315.9	1,100	886	5.2	2.9	2.1
October	3,301.7	1,021	886	5.0	2.7	2.2
September	3,291.6	1,064	887	4.7	2.2	2.2
August	3,264.0	1,131	885	4.0	1.6	1.8
July	3,231.5	1,120	882	3.4	1.1	1.2
June	3,192.6	1,081	880	2.9	1.0	0.6
May	3,164.9	1,015	883	2.9	1.0	0.7
April	3,139.4	1,009	883	2.9	0.9	0.6
March	3,121.3	1,007	881	3.1	0.5	0.5
February	3,120.9	1,074	875	3.0	0.1	0.2
January	3,135.5	1,157	870	3.2	0.1	0.0
2015						
December	3,149.3	1,146	868	3.2	0.5	0.2
November	3,151.2	1,069	867	3.3	1.0	0.6
October	3,143.4	994	867	3.4	0.6	0.5
September	3,142.6	1,041	867	3.5	0.5	0.4
August	3,138.0	1,112	869	3.5	0.4	0.2
July	3,126.3	1,107	872	3.3	0.8	0.5
June	3,103.6	1,070	875	3.2	1.1	0.9

Source: Calculations by Statistics Portugal using the Social Security Monthly Statement of Earnings (DMR).

Table 2: Number of employees and gross monthly earnings per employee (total and regular) by economic activity (NACE Rev. 2) in June 2019

Portugal	Quarter ended in the month			Year-on-year change		
	Number of employees	Total gross earnings	Regular gross earnings	Number of employees	Total gross earnings	Regular gross earnings
	Thousands	Euro		%		
Total	3,704.3	1,180	954	4.0	3.4	3.4
A - Agriculture, forestry and fishing	86.0	787	674	3.6	2.8	3.1
B - Mining and quarrying	8.8	1,466	1,196	0.9	4.2	4.1
C - Manufacturing	695.5	1,130	946	1.4	3.4	3.3
D - Electricity, gas, steam and air conditioning supply	11.9	3,372	2,522	2.3	0.2	1.7
E - Water supply; sewerage, waste management and remediation activities	27.6	1,256	946	6.0	2.4	2.9
F - Construction	272.2	921	792	7.5	2.4	2.7
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	648.7	1,128	892	2.9	2.4	2.3
H - Transportation and storage	170.0	1,566	1,214	4.4	4.8	6.3
I - Accommodation and food service activities	310.9	801	687	6.2	4.3	3.8
J - Information and communication	111.6	2,002	1,605	10.0	1.7	2.3
K - Financial and insurance activities	78.6	2,401	2,049	2.6	0.2	0.8
L - Real estate activities	44.4	1,032	894	8.8	2.1	2.3
M - Professional, scientific and technical activities	177.3	1,442	1,203	8.2	2.9	2.7
N - Administrative and support service activities	328.3	838	654	1.2	3.8	3.9
O - Public administration and defence; compulsory social security	143.4	1,466	1,101	9.3	3.9	3.9
P - Education	137.5	1,358	1,095	3.6	6.0	5.8
Q - Human health and social work activities	322.6	1,248	938	4.1	4.0	2.9
R - Arts, entertainment and recreation	37.9	1,244	1,016	7.8	2.4	2.2
S - Other service activities	84.8	1,017	853	1.4	2.8	2.6
U - Activities of extraterritorial organisations and bodies	1.2	2,026	1,712	- 1.5	2.1	2.8

Source: Calculations by Statistics Portugal using the Social Security Monthly Statement of Earnings (DMR).

Table 3: Number of employees and gross monthly earnings per employee (total and regular) by employment size class in June 2019

Portugal	Quarter ended in the month			Year-on-year change		
	Number of employees	Total gross earnings	Regular gross earnings	Number of employees	Total gross earnings	Regular gross earnings
	Thousands	Euro		%		
Total	3,704.3	1,180	954	4.0	3.4	3.4
From 1 to 9 employees	911.2	833	746	2.5	4.0	3.7
From 10 to 49 employees	892.8	1,084	907	3.6	3.0	3.0
From 50 to 249 employees	811.2	1,291	1,028	4.8	2.9	3.0
From 250 to 499 employees	251.6	1,452	1,120	9.8	1.6	1.5
From 500 to 999 employees	198.9	1,496	1,157	2.9	2.6	3.6
1000 employees and over	638.6	1,463	1,094	4.1	3.8	3.6

Source: Calculations by Statistics Portugal using the Social Security Monthly Statement of Earnings (DMR).

TECHNICAL NOTE

The statistics on “Gross monthly earnings per employee” published with this Press Release are the result of the calculations and analysis performed by Statistics Portugal on the information from the Monthly Statement of Earnings (DMR – *Declaração Mensal de Remunerações*) from Social Security following a protocol celebrated between the *Instituto de Informática, I.P.* and Statistics Portugal. These statistics are stored in the StatsLab area of the Statistics Portugal website, where new statistical resources that give useful information for economic and social analysis are published.

The information received from the DMR includes the sum of earnings reported by enterprises to the Social Security by “Social Security Contributory Scheme” and “Earnings Components.”

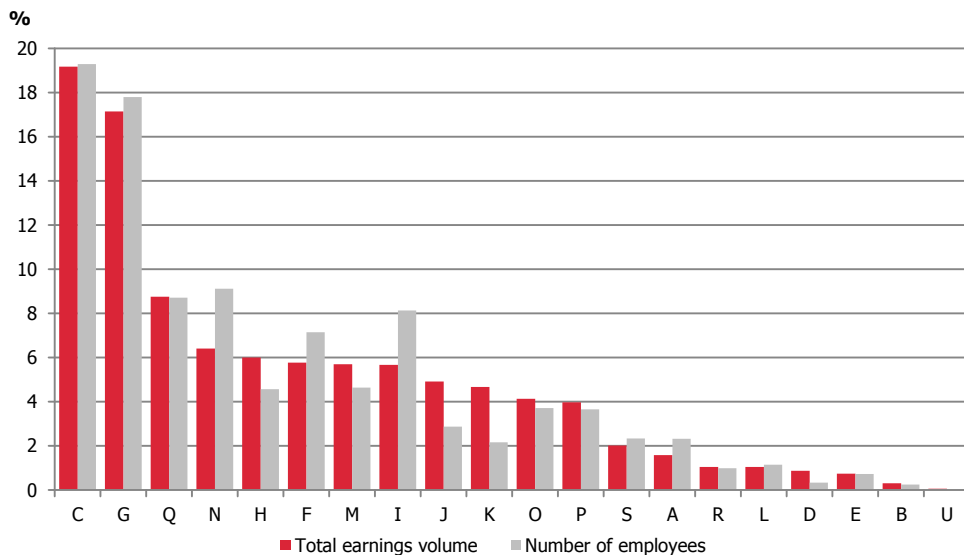
The **gross monthly earnings per employee** correspond to the ratio between the sum of the all earnings paid by the enterprises and the total number of employees in those enterprises. Hence, its evolution reflects changes in the amount of earnings paid (for example, the payment of bonuses, holiday allowances or overtime work), but also in the number of employees and its composition, namely in terms of non-observed characteristics in this dataset (part-time versus full-time workers; educational level; occupation; years of experience; hours worked; among others).

In the calculations by **enterprise’s economic activity** (NACE-Rev. 2), were excluded the records where it was not possible to match the enterprise with its record on the enterprises’ economic activity file compiled by Statistics Portugal (FUE – *Ficheiro de Unidades Estatísticas*), which corresponds to 0.7% of enterprises and 0.1% of employees in 2018.

Each employee is counted as many times as the **number of jobs** reported to the Social Security. For example, an employee with two jobs in two different enterprises is counted twice. Therefore, the total number of employees corresponds to the total number of jobs. Besides employees, ship-owners, teachers that own educational institutions, members of statutory bodies, and domestic workers are also included.

In the figure below, it is presented the percentage distribution of total gross monthly earnings paid by enterprises (volume) and the number of employees by economic activity sector (NACE-Rev. 2) in 2018.

Distribution of total earnings paid by employers (volume) and of the number of employees by economic activity (NACE-Rev. 2) in 2018



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Earnings components: correspond to the classification of earnings according to its nature, which cover the following:

- Transport and daily allowances
- Bonuses and other monthly benefits
- Commissions
- Compensations owed for termination of the employment contract
- Holiday allowance
- Fees for rendering services due to the accumulation of positions/duties
- Compensation in intermittent employment contracts
- Regular monthly allowances
- Christmas allowance
- Bonuses and other non-monthly benefits
- Base salary
- Meal allowance
- Overtime work
- Night-time work
- Regular non-monthly allowances
- Armed forces
- Variable earnings
- Paid untaken holidays
- Earnings statements corrections
- Temporary work in higher positions
- Promotions

Total gross monthly earnings

The total gross monthly earnings correspond to the sum of all gross earnings (before taxes and contributions to the Social Security) paid by enterprises and subject to withholding taxes and contributions to the Social Security. Thus, it does not include the amounts exempt from tax withheld and contributions to the Social Security as, for example, meal allowances up to €4.77 or €7.63, if paid in cash or meal cards. It includes all components of the variable "Earnings components".

Regular gross monthly earnings

The regular gross monthly earnings corresponds to the sum of all gross earnings (before taxes and contributions to the Social Security) paid by enterprises on a regular and monthly basis and subject to withholding taxes and contributions to the Social Security. It only includes the components "Base salary", "Meal allowance", "Regular monthly allowances" and "Bonuses and other monthly benefits" of the variable "Earnings components". In 2018, it corresponded to 80.9% of the total gross monthly earnings.

On year rate of change

The on year (year-on-year) change compares the level of the variable in the current quarter/month with that of the corresponding quarter/month of the previous year. This rate of change, considering a seasonal stable pattern, is not affected by this type of fluctuation, but may, however, be influenced by specific effects in a given quarter/month.

Annual rate of change

The annual change compares the level of the variable in the last year over the level of the variable in the previous year.

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Revisions

The data base of DMR is in continuous updating, always existing some share of non-delivered earnings statements, mainly in the last 4 months.

The information published with this Press Release that regards the last 3 reference months (moving quarters ended in those months) will be subject to revisions in the next months. These revisions result from the integration of data sent later by some enterprises.

The impact of these revisions, measured by the difference between the levels of earnings and the year-on-year changes that are now released and the ones published in the Press Release of March of 2019, are the following:

Revision of the estimates of the 1 st quarter of 2019 - major indicators -				
	Unit	January 2019	February 2019	March 2019
Number of enterprises	Thousands	0.3	0.9	2.6
Number of employees		1.5	4.5	14.8
Regular gross monthly earnings per employee	Euros	0	0	-1
Total gross monthly earnings per employee		0	2	8
Number of enterprises		0.1	0.2	0.7
Number of employees	%	0.0	0.1	0.4
Regular gross monthly earnings per employee		0.0	0.0	-0.1
Total gross monthly earnings per employee		0.0	0.2	0.8
Number of enterprises (y-o-y)		0.0	0.2	0.7
Number of employees (y-o-y)	pp	0.1	0.2	0.4
Regular gross monthly earnings per employee (y-o-y)		0.0	0.0	0.0
Total gross monthly earnings per employee (y-o-y)		0.0	0.1	0.8

Nota: y-o-y - Year-on-year rate of change

Answers' imputation to reduce the revisions level of the values published for the most recent months

In order to reduce the level of revisions of the values published for the most recent months, the DMR data were imputed in two situations: 1) of enterprises that are systematically late in sending the information; and 2) of enterprises that, also systematically, do substantial corrections the values reported in previous months.

In the first case, the detection process for missing enterprises only targets those with 10 or more employees. An enterprise is considered as missing if there was an answer in month m-1, but not in month m (m being the last reference month).

In the second case, it is considered that a company has made a substantial correction of the values already reported when the correction is worth €10,000 or more. The detection of these companies is ensured by a combination of two methods: an *ad hoc* criterion and through the supervised Machine Learning algorithm in the form of the Support Vector Machine (SVM).

A given enterprise meets the *ad hoc* criterion if it meets at least one of two conditions: (i) it has made at least 9 corrections in the past 12 months; or ii) it has made at least 3 corrections in the past 4 months.

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The SVM algorithm allows the identification of enterprises that systematically correct information through an optimization process. In this procedure, we use a set of training data (records of enterprises that correct information and of enterprises that do not) to which the SVM algorithm is applied in order to obtain a classification model that maximizes the distinction between the two groups of enterprises, i.e., a model with maximum success rate (accuracy) in identifying enterprises that correct the information submitted previously. Although most enterprises are identified simultaneously by both methods (*ad hoc* and SVM), each allows identifying fringes of enterprises that the other does not. By using both, it is guaranteed that a greater number of enterprises are identified.

Once the enterprises that need imputation of answers are identified, the earnings volume is imputed by enterprise and earnings component. The imputation process is different according to the earnings component. For regular earnings components, such as "Bonuses and other monthly benefits", the "Base salary", the "Meal allowance" and the "Night-time work", the amount reported in the previous month is used. For non-regular components, such as the "Bonuses and other non-monthly benefits", the "Holyday allowance" and the "Christmas allowance", the values of the last year are used multiplied by the year-on-year change of the regular earnings of the previous month. For the remaining earnings components, the median values of the last 12 months are used, provided there are at least 6 observations. Otherwise, the value of the last month is used.

Due to rounding, the totals in tables and figures do not always match the sum of parts.

The present Press Release includes data received on 19 July 2019.

Next Press Release: 7 November 2019.