



PORTUGAL'S EDUCATIONAL SYSTEM

A COMPARISON BETWEEN TEACHERS FROM THE PUBLIC AND PRIVATE SECTOR

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Abstract

The current challenges that education faces, particularly in the follow-up of multiple Covid-19 lockdowns motivates a deeper understanding on the differences of public vs private teachers. Such understanding is for sure crucial in developing policies that can target the identified issues and improve the Portuguese educational system, based on our findings. Thus, in this study we have compare multiple variables in order to analyse the differences between the public and private sector teachers from 2006 to 2016, in Portugal. Overall, our results have always been according to the literature, something relevant since it adds strength to the data. We compare private and public school teachers regarding gender, age, qualifications, turnover, tenure, type of contract, working hours and wages. It is of most importance to be aware of these statistics, in order to implement well thought and efficient policies.

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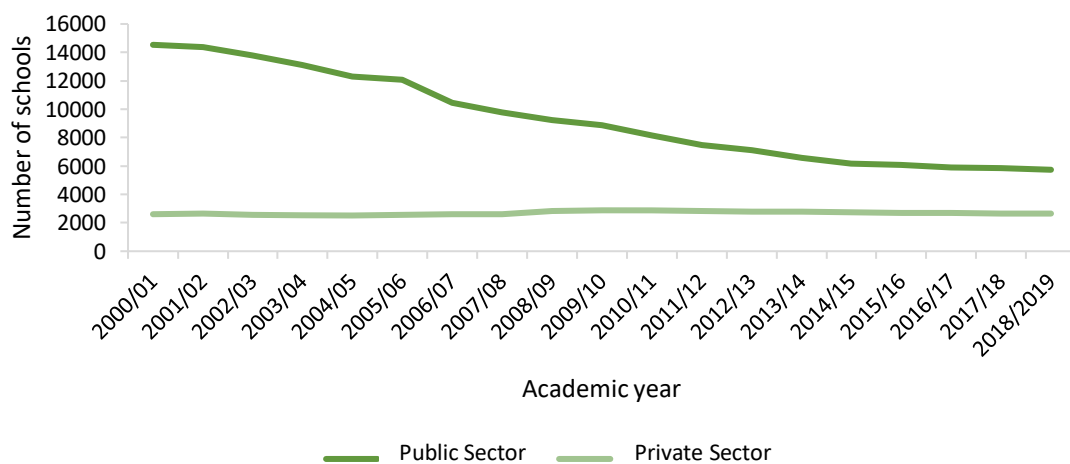
1. Introduction

The education system in Portugal is regulated by the state through the Ministry of Education and the Ministry of Science, Technology and Superior Education. The public system is the most used one with 79.82% of the students studying in public institutions in 2018/2019 (EDUSTAT, 2020), including all levels of education a value that has been quite stable throughout the years. However, in general, the top-ranking schools regarding exam results tend to be the private ones (Expresso, 2020).

The mandatory education in Portugal can be divided into primary school, middle school and high school, which are the levels of education this study is going to focus on.

According to DGEEC statistics, since 2007/2008 school year, there has been a decreasing trend in middle school students and a slightly increasing trend on high school students. Regarding teachers, there was a decrease after 2010/2011 until around 2014/2015, which may be explained by the demographic drop observed in those years. Additionally, the ageing tendency of teachers is becoming clearer and clearer with an average age in 2018/2019 rounding 50 years across the three main levels of education on focus. This ageing tendency of teachers together with the aforementioned increasing trend on high school students that contrasts with the decreasing one in what regards middle school students is a great illustration of Portugal's current almost inverted age pyramid. Moreover, the share of female teachers dominates in every schooling year but decreases with the increasing schooling year (DGEE and DSEE, 2020).

Graph 1 - Number of schools

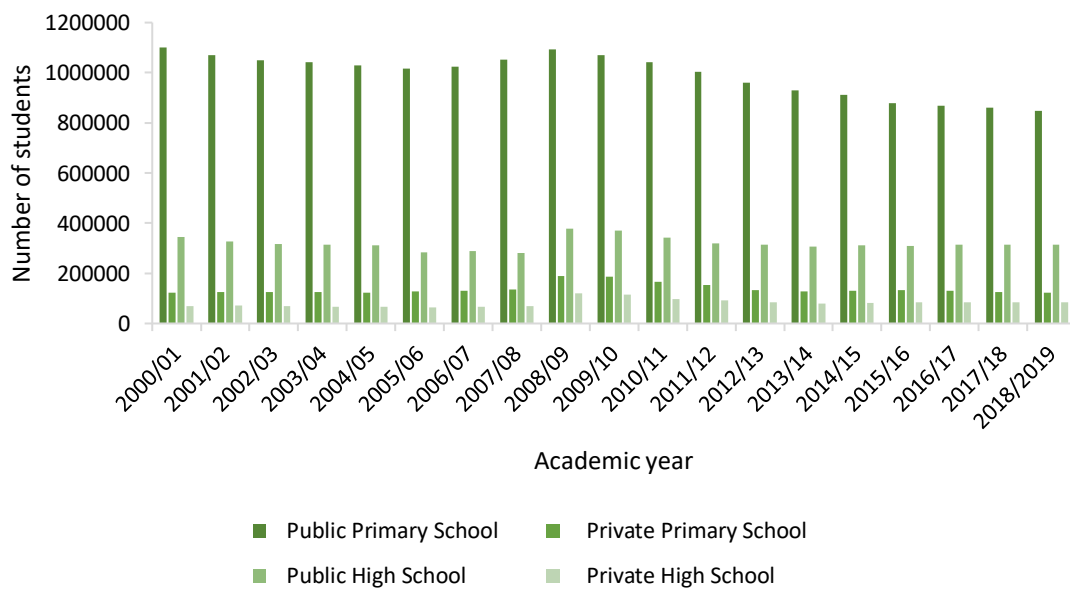


More specifically, regarding private schools there were 2632 schools of this type in 2018/2019 and this number has been quite stable since 2005/2006. In contrast, although public schools are the ones that prevail, they show a decreasing trend from 2000 to 2019, being 5735 in 2018/2019, as it is seen in graph 1.

Number of teachers in private sector, with the exception of the primary school, show a decreasing trend from 2010/2011 onwards, contrasting with the public education numbers that started to increase again after 2014/2015. The average age of teachers in private schools is verified to be lower than in public schools in every level of education.

Regarding the number of students attending private schools, in 2018/2019 there were 121519 students in basic education, contrasting with a much higher value in public schools 848710. The same pattern is followed in what comes to high school, with 84683 students in private schools and 314703 students in public schools in 2018/2019. The evolution of these numbers has been quite stable as it is seen in the graph 2 bellow. The student per teacher ratio in the private sector has been always higher than the one in the public education, for all levels of education.

Graph 2 - Number of enrolled students



Adjusted Pisa scores regarding 2018 show that private schools did better in all subjects evaluated than public schools, which have also happened in 2015. However, in 2015 results were overall better.

Table 1 – Pisa Scores (2015 v. 2018)

	All Schools		Public Schools		Private Schools	
	2015	2018	2015	2018	2015	2018
Reading						
PISA	499,2	492,4	496,8	492,8	533,3	489,9
Adjusted	493,1	488,6	489,9	487,6	512,3	495,5
Maths						
PISA	492,5	493,9	488,9	493,5	543,2	496,4
Adjusted	487,2	489,7	481,8	487,7	520,3	502,8
Science						
PISA	502,2	492,6	499,1	492,3	546,1	493,8
Adjusted	497,2	488,9	492,5	487,3	525,8	499,6

Having pointed out some of the main characteristics of the Portuguese educational system, the general aging tendency of teachers and so the upcoming renewal of these professionals is one of the features that stands out. This, in addition with the so different performances and characteristics of public and private education, makes the comparison between the labor force of both sectors an important tool to allow for policies aiming to correct the major differences between the two, resulting in a better performance of Portuguese educational system.

The main value added of this study is the data used to conduct the comparisons: Quadros de Pessoal for what regards the private sector and MISI anonimizada in what comes to public sector. These data bases contain information about every teacher from 2006 to 2017, which makes the content of this project richer and the policy making based on it accurate.

This work is structured as follows: In the next section, some background is given from existing papers regarding the matter of education and the Portuguese educational system itself. Section 3 details the data used and specifies the methodology. In section 4 an analysis of the obtained statistics is done, consisting fundamentally of the comparison between public and private sector's teachers' characteristics, such as their age, sex, qualifications. Section 5 concludes about the main differences between the labor force of the two sectors, while giving some insights about possible paths for policy making in this matter.

2. Literature Review

Education systems are a complex subject that nations find difficult to manage and improve. Decisions about curriculums, teachers per students or teacher's careers must be measured, sustained on evidence, and should aim at achieving the most efficient outcomes. Such work can be seen, for instance, using the Portuguese system as a case study, in projects as that of P. Mucharreira et al (2019), where evidence that there are benefits to be gained from reducing class sizes was found, alongside evidence that the associated costs are typically overestimated. Moreover, and most importantly, such measurements and studies are done to find ways to contribute to student's outcome. In this regard, teachers' contributions and of the utmost relevance. This can be seen in increasing relevance of the measurement of teacher value-added (TVA) and other forms of evaluating teacher quality (Kane and Staiger, 2008), (Kane et al., 2013), (Chetty et al., 2014a) and (Chetty et al., 2014b).

Given how impactful the best teachers may be to student's outcomes, it becomes important for schools to attract those teachers. That is why attracting the best teachers is relevant and understand the characteristics of the teacher market is necessary. Moreover, even though there are significant differences between the American educational system and the Portuguese one, Vedder and Hall (2000), using a sample of over 600 Ohio school districts, concluded how a higher private school competition would result in higher salaries for public school teachers. According to the aforementioned authors, the US National Centre for Educational Statistics (1997) does show that private school teachers wages are, on average, 40% lower than their public counterparts. Accordingly, Chambers and Bobbitt (1996) found that public school teachers earn significantly higher wages than private ones with similar traits. They also found the existence of some compensating salary differentials for teachers in large class settings, using data from the USA. Complementing these findings, Chambers Jay G. (1985) found evidence that public school teachers earn more than teachers in non-public schools. Teachers in parochial schools are the lowest paid, while teachers in non-sectarian private schools are the highest paid among non-public schoolteachers. Non-public schoolteachers sacrifice somewhere between 10 and 40% (\$2000 to \$9000, depending on subsector among non-public schools) of the public-school teacher salary to work in

the non-public sector, using data collected from 105 US' public schools and 168 private ones, which account to approximately 2500 teachers in each sector.

Another interesting feature is whether higher salaries are associated with any qualitative improvement in teaching. Figlio (1997) argues in favour of that, while authors as Ballou and Podgursky (1997) argue against it. Moreover, evidence from Guarino et al. (2006) and Hanushek et al. (2004) suggests that students' characteristics have a high influence on the type of teachers in the respective school and their willingness to remain there. There are, on average, lower qualified teachers in poorer schools, as Lankford et al. (2002) identifies. Also, the highest qualified teachers who work at lower-performing students' schools tend to move to better schools, when given the opportunity to do so, as evidence from Hanushek and Rivkin (2004) and Hanushek et al. (1999) also suggests.

Given these multiple findings in the literature, we now focus our analysis on the teacher's side, exploring the different characteristics among private and public-school teachers. The current challenges that education faces, particularly in the follow-up of multiple Covid-19 lockdowns also motivate a deeper understanding on the differences of public vs private. Such understanding is for sure crucial in developing policies that can target the identified issues and improve the Portuguese educational system, based on our findings.

3. Data and Methodology

This project is about analysing and comparing descriptive statistics of professors from the 1^o to the 12^o grade in the Portuguese educational system, while commenting on the main differences between the public and the private sectors. Having that in mind, the team used 2 different datasets, one for the public sector and the other for the private and combined the two in order to study the following variables: gender, age, qualifications, turnover, tenure, type of contract, working hours and wages.

The first dataset, "Quadros de Pessoal", which we were given access by Gabinete de Estratégia e Planeamento (GEP) do Ministério do Trabalho, Solidariedade e Segurança Social (MTSSS), Portugal, separately contains the information of all Portuguese enterprises, establishments, and workers in the private sector from 1985 to 2016. Afterwards, we cleaned the data by removing every worker which was not a professor from the 1st grade to the 12th grade, according to the Classificação Portuguesa das Actividades Económicas (CAE), which can be seen in the appendix.

The second dataset, "MISI Anonimizada", which we were given access by DGEEC - Direção-Geral de Estatísticas da Educação e Ciência, is another very rich dataset which contains every professor in the public sector, from 2006 to 2012. The only thing the team had to do was to restrain the data in order to just contain professors from the 1^o grade to the 12^o grade, just as we did with the private sector.

With two clean datasets, one for the public sector and the other one for the private, the team polished the variables in such way that they were comparable from one database to the other. On both sets, we created the variable Turnover by developing a code that counted how many times that specific worker changed establishments within the time period. On the public sector dataset, we created dummy variables according to each level of qualification, so it would match the private sector dataset. Also, on the public sector dataset, we inferred the wage and weekly worked hours depending on the rank of each professor so it would be comparable with the private sector.

Lastly, we merged the two datasets together, in order to have one and only file to work with, easily extracting out the relevant data from it.

What follows is a table that demonstrates the differences between our dataset and DGEEC's dataset which is available data published on a yearly basis on their website.

Table 2 – Differences between the dataset used and DGEEC's data

Years	DGEEC		Our Dataset		Differences			
	Public	Private	Public	Private	Public	Private	Total	Total in %
2006	149013	14207	276570	11452	127557	-2755	124802	176%
2007	141591	14059	144237	14031	2646	-28	2618	102%
2008	143571	14666	145199	15851	1628	1185	2813	102%
2009	144589	15166	147330	16459	2741	1293	4034	103%
2010	146171	15405	145250	19845	-921	4440	3519	102%
2011	141424	15245	136616	17530	-4808	2285	-2523	98%
2012	131094	14453	123568	9442	-7526	-5011	-12537	91%
2013	119359	13813	119353	13433	-6	-380	-386	100%
2014	111742	13365	117773	12374	6031	-991	5040	104%
2015	111954	13241	117573	12266	5619	-975	4644	104%
2016	113487	13424	120957	12478	7470	-946	6524	105%

Due to a problem with the data, the year 2006 has many more observations of the public sector than the rest of the years, however, this error is not critical to our conclusions since we have close values to the DGEEC's dataset throughout the rest of the time period. Besides, our conclusions are based on the evolution of the relevant variables within 2006 and 2016 which is why we decided to include it in the data regardless. Because the team had to use different data from 2012 to 2016, this initial year (2012) also demonstrates a greater difference in observations when compared to DGEEC's dataset.

All in all, our data seems very close to DGEEC's data given that there are around 150.000 observations per year, so we don't believe the differences between the datasets to be relevant.

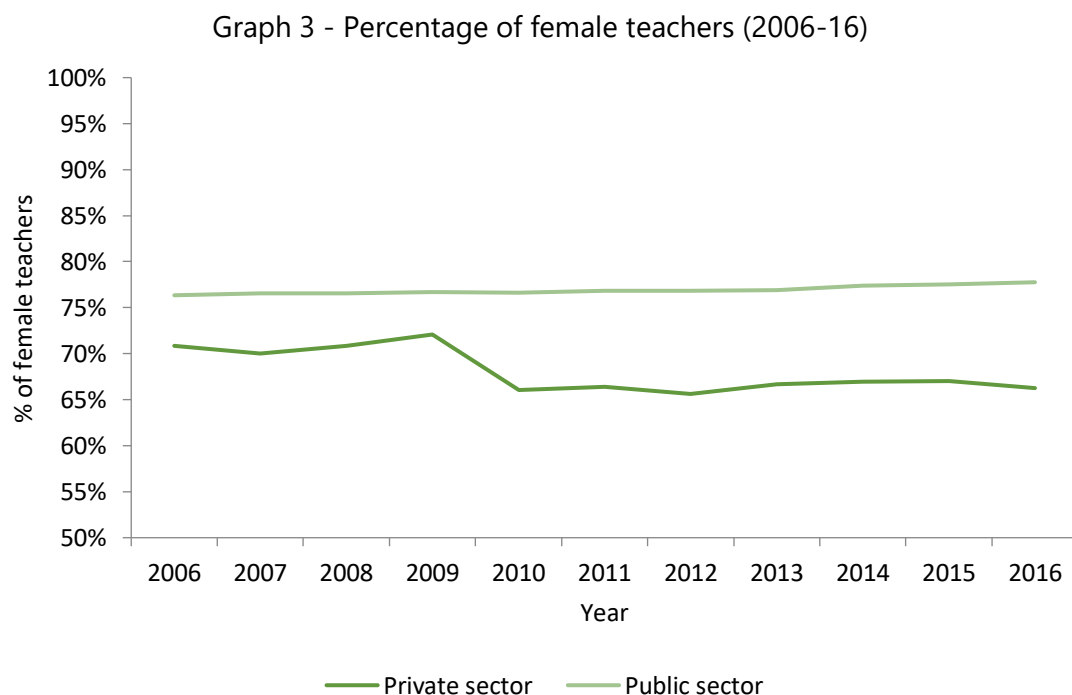
4. Results

As explained in the previous sections, the current study is focused on exploring the differences between private and public-school teachers in Portugal, between 2006 and 2016. It is also relevant to try to find explanations for the observed features of the data, while also analysing the possible implications in the Portuguese education system and on the necessary public policies.

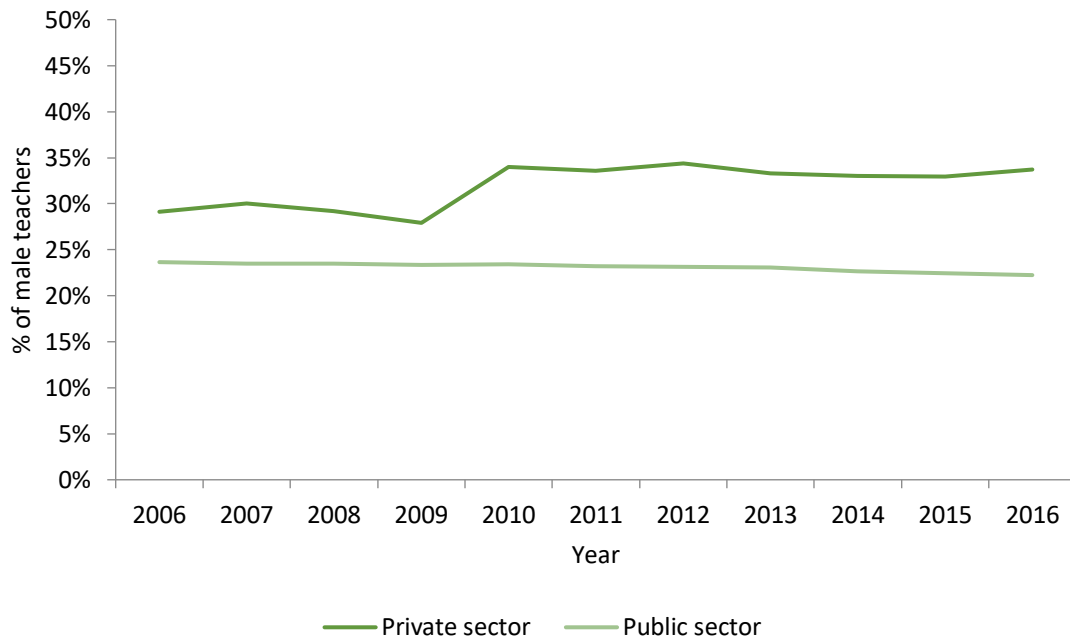
Therefore, in this section we shall present the results of our analysis. We will be discussing the main differences found between public and private school teachers, while also commenting on the evolution of the variables throughout the years in analysis. The characteristics analysed and compared refer to gender, age, qualifications, turnover, tenure, type of contract, working hours and wages.

Gender

We begin by looking at the distribution of teachers regarding gender. It is a well-known stylized fact that there are more female than male teachers in Portugal, in the schooling years we are analysing. Accordingly, graphs 3 and 4 below assert those common-sense assumptions.



Graph 4 - Percentage of male teachers (2006-16)



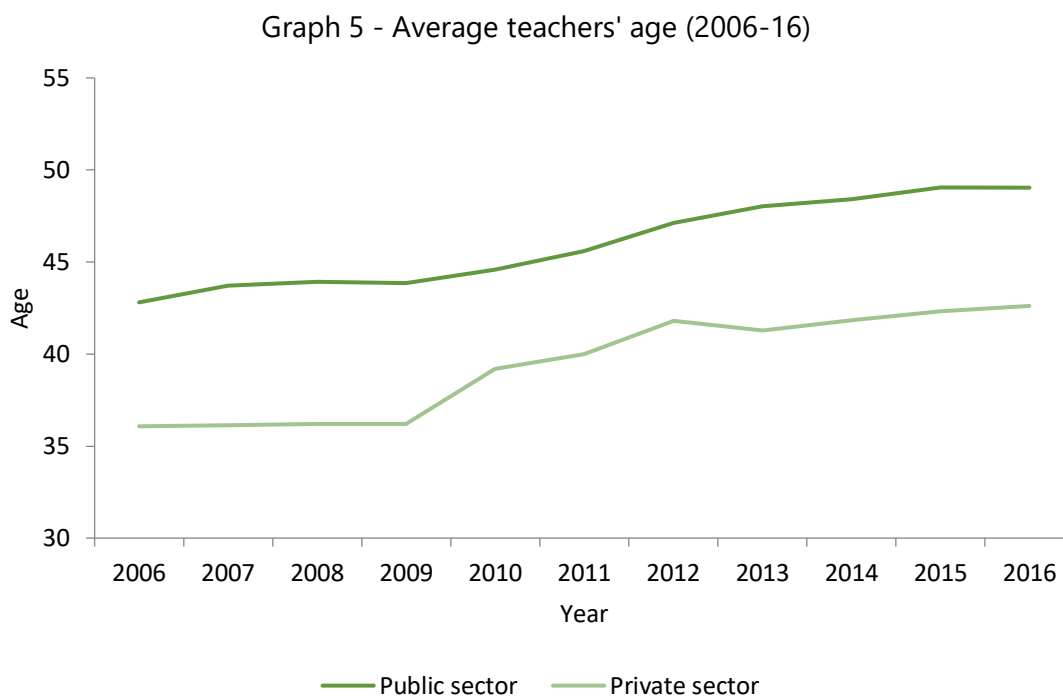
Graph 3 shows the percentage of female teachers that has been relatively stable in the public sector and has been decreasing the private. Reciprocally, graph 4, which shows the percentage of male teachers, presents a stable trend in the public sector and an increasing one in the private sector.

Since there are, in relative terms, slightly more female teachers in the public sector than in the private one, the first thing that stand out is that the private sector has a more even distribution between gender than the public one. However, there were still around 2 female teachers for each male teacher in the private sector, in 2016. This is, nonetheless, a slight improvement in comparison with the first year of analysis, when there were around 71% female teachers as opposed to 29% male.

This being said, not only are the differences between the public and the private sector quite negligible in terms of gender, but also the evolution throughout time. There seems to be no strong evidence suggesting that the private sector significantly hires more male than female teachers in comparison with the public sector. The differences are quite small and since, overall, there are around two times as many female than male teachers, the percentages in the different sectors do not deviate too much from the mean.

Age

We now turn our analysis to age. Another well-known stylized fact is the ageing of the teaching labour force. This is a situation that poses significant challenges for the stability of the teaching population and that will require a high renewal of the labour force in the future. Graph 5 below shows the average teachers' age between 2006 and 2016 in the public and private sectors.

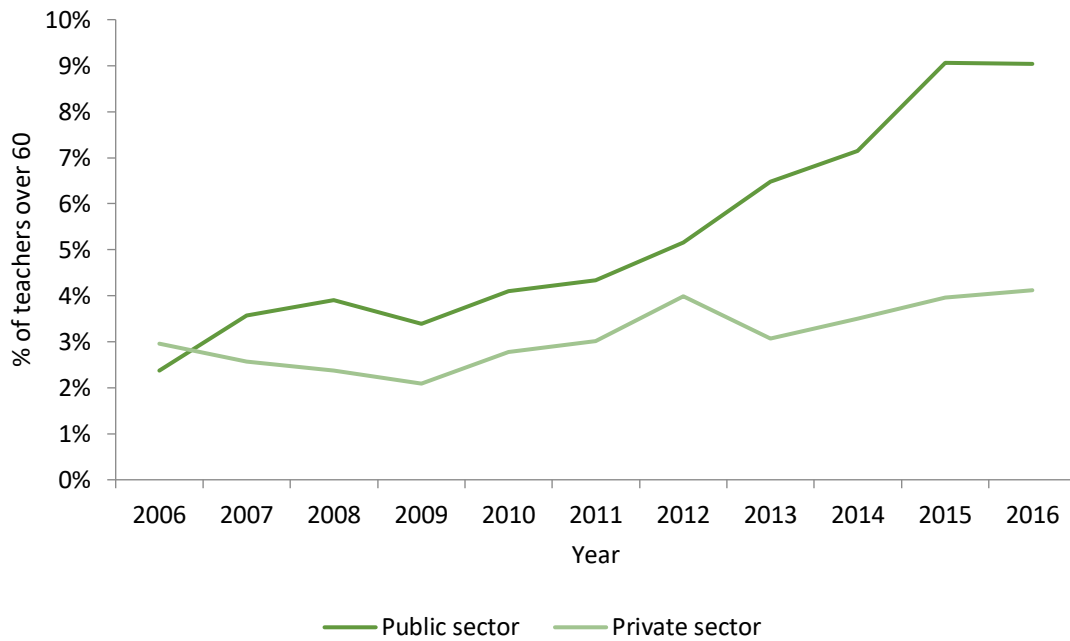


From the analysis of the graph, two main features stand out. Firstly, both in the private and public sector the average age of teachers is increasing. Secondly, public school teachers are, on average, older than private school teachers.

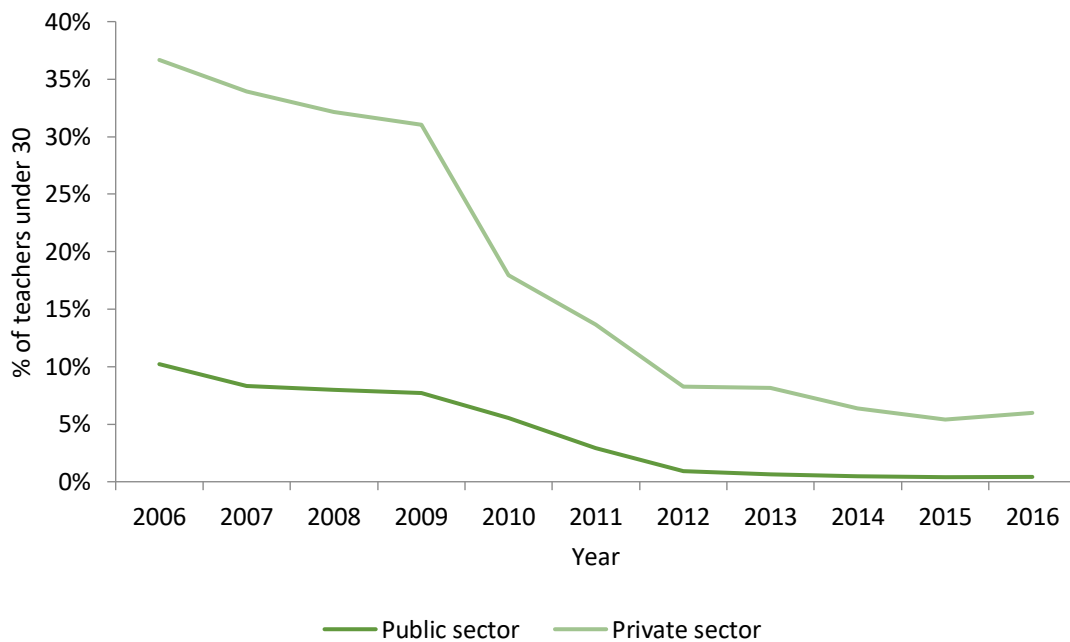
In fact, the average teacher's age in 2006 was of around 36 years in the private sector and of around 43 years in the public sector – a difference of 7 years. In 2016, the average was 43 years in the private sector and 49 in the public one – a difference of 6 years. Thus, the difference between private and public has slightly shortened.

However, the increase in the average age is quite large. The private sector increased 7 years and the public sector 6 years, in only a decade. To gain further insights on these dynamics, graphs 6 and 7 show the percentage of teachers in the two extremes of the age distribution.

Graph 6 - Percentage of teachers over 60 years old (2006-16)



Graph 7 - Percentage of teachers under 30 years old (2006-16)



Graph 6 shows the percentage of teachers over 60 and graph 7 the percentage of teachers under 30. The findings from these graphs are, of course, in accordance with the initial findings of looking at the average age.

In the public sector we witnessed an increase in the percentage of over-60 teachers from around 2% in 2006 to 9% in 2016, with the increasing trend speeding up between 2012

and 2015. In the private sector the situation was a bit more stable. The percentage started slightly above the public sector at 3% in 2006, and ended up at 4% in 2016, being largely surpassed by the public sector.

Regarding the under-30 teachers, the evolution is even more interesting. In 2006, they represented 37% of the labour force in the private sector and only 10% in the public sector. In 2016, they were only 6% in the private sector and almost 0% in the public. This decrease was faster in both sectors between 2009 and 2012, and both sectors show, more recently, very low numbers of younger teachers, with the private sector experiencing a huge decrease.

Therefore, from the analysis of these different indicators there are two main conclusions to take from it. First, that the teachers' labour force is significantly older in the public sector than in the private one. And secondly, that the labour force is getting significantly older throughout the years in both sectors.

This has significant implications for the future. Many teachers will be retiring quite soon, and many new teachers will be necessary to replace them. The issue seems to be greater in the public sector, which is even a greater concern, given that the public sector is much larger than the private one, and therefore involves much more teachers and students.

We can take different approaches looking at this. On one hand, older teachers are more experienced than younger ones. On the other hand, younger teachers may bring new and fresher teaching methodologies that could be better than the older ones. To discuss on which of these effects is stronger, is out of the scope of our project.

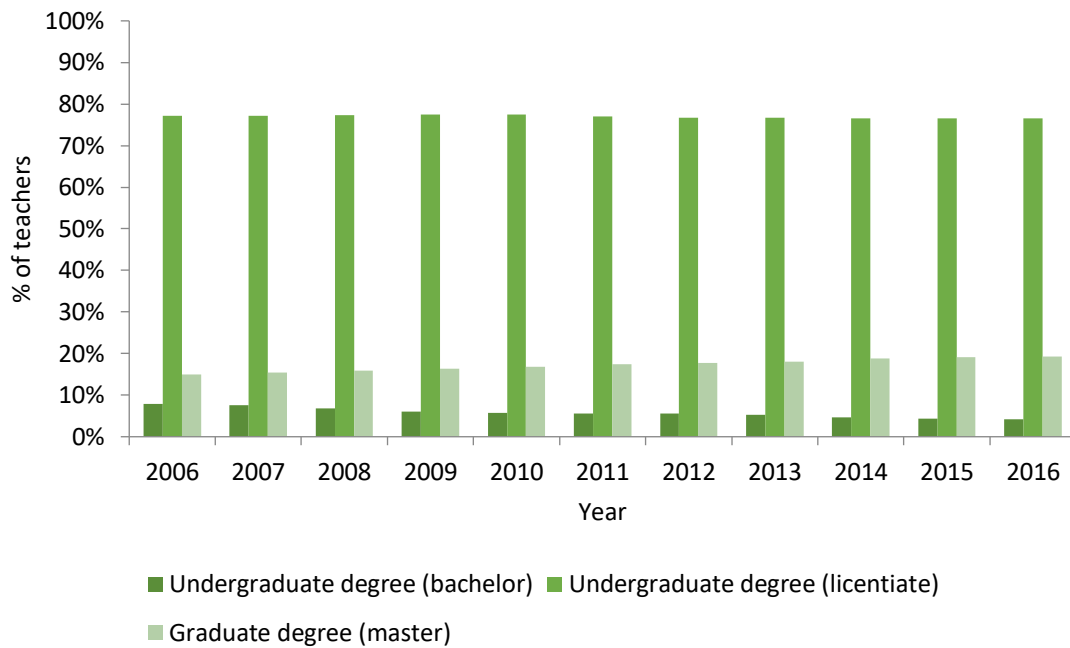
Nonetheless, if no new public policy is taken to keep older teachers working more time (which may not even be optimal due to high labour disutility and tiredness), the teacher labour force will require a huge renewal. It is to be seen if there are enough unemployed or recently graduated teachers to enter the labour force to replace the retired.

All in all, this is a situation to which policy makers should be aware and begin to analyse which type of public policies are necessary to tackle this situation that is quite evident in the data we present in this study.

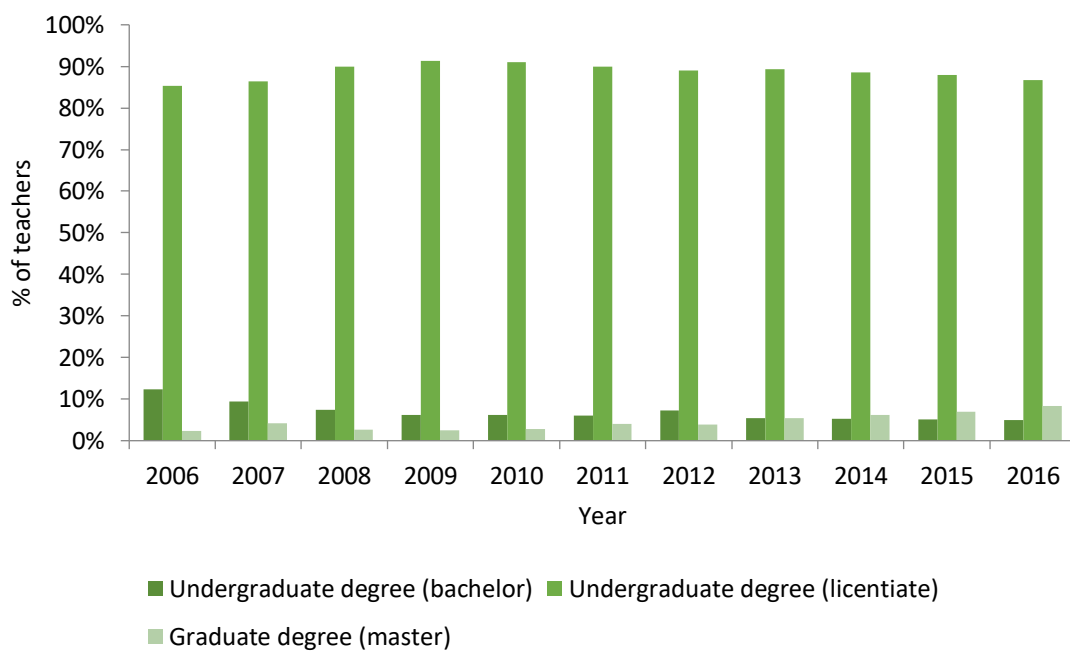
Qualifications

We now look at the qualifications of the teaching labour force. In particular, we analyse below in graphs 8 and 9, the evolution between 2006 and 2016 of the highest academic degree hold by public and private school teachers, respectively.

Graph 8 - Highest academic degree of public school teachers



Graph 9 - Highest academic degree of private school teachers



It is important first to remember the evidence from the literature. Both in Hanushek and Rivkin (2004) or Hanushek et al. (1999) it was showed that public school teachers had higher qualifications than private school ones. Accordingly, the Portuguese system seems to be no exception.

Our data shows that, in fact, public school teachers have higher qualifications than private ones. Moreover, the qualifications also seem to be increasing throughout the years. Both in the private and public sector, the share of teachers with only an undergraduate degree is decreasing and the share of them with a graduate degree is increasing. Nonetheless, in the last year of analysis, private school teachers were still lower-qualified than public school teachers – 8% and 19%, respectively, hold a graduate degree.

The question that follows these findings is whether or not this is somehow significant in any terms. The returns to education could be simplistically summarized in two mains views. First, the human capital model suggests that individuals have a collection of skills that can be improved through the acquiring of more education. This would suggest that higher qualified teachers have more skills. The other view is the screening model that suggests that education only serves to distinguish high-skill from low-skill individuals, and it does not necessarily increase the skill level of individuals. Regardless of that, the conclusion would be the same – public school teachers since they have higher qualifications, they should be more skilled.

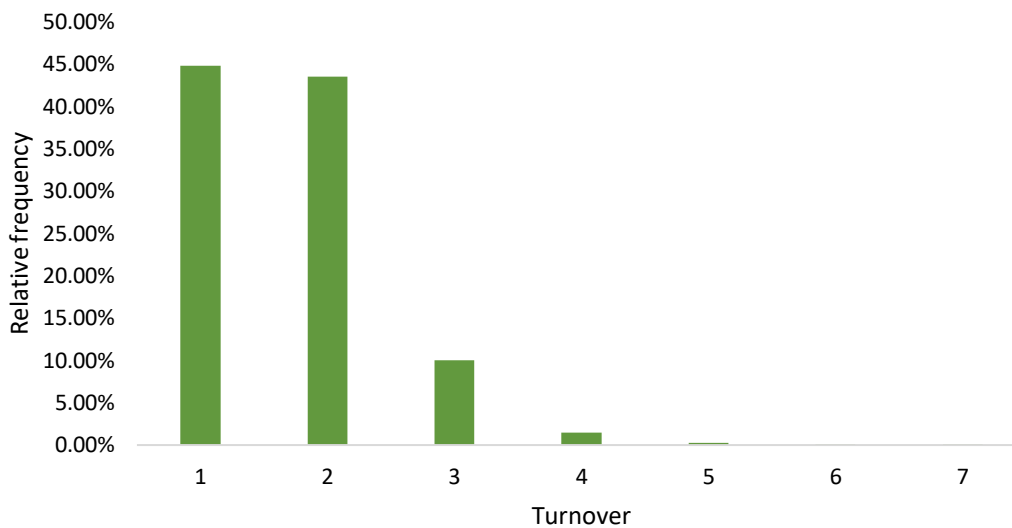
However, we often find that students in the private sector tend to perform better than students in the public sector. Does that contradict our finding? Not necessarily, since many other factors can contribute to that difference in student performances, besides the qualifications of the teachers. Anyway, to discuss that is out of the scope of this project.

All in all, the main takeaway from here is that, regardless of the implications for the educational system of higher or lower qualified teachers, the facts are that, on average, public school teacher are higher qualified than private school teachers and that, on both sectors, the qualification levels are increasing throughout time.

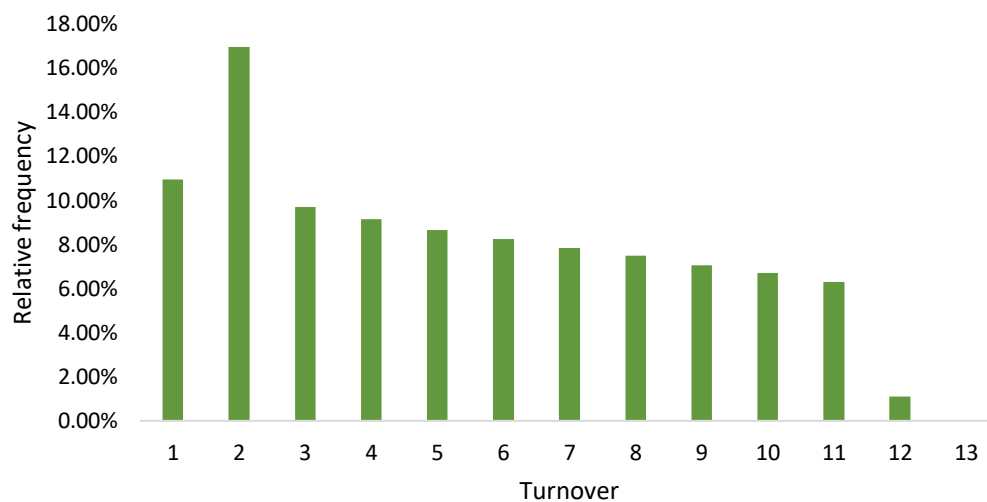
Turnover

The variable turnover represents the number of times a given teacher has changed school during a given year. This variable is important as it may give a sense of how stable teacher's lives is in both the private and public-school systems. Moreover, given the way teachers are allocated in the public system and recruited in the private one, significant differences in job security and ability to perform may exist.

Graph 10 - Turnover in the Private Sector



Graph 11 - Turnover in the Public Sector



Starting with the private sector, one may take that almost 45% (see graph 10) all the private sector teachers sampled have changed school only 1 time in the analysed period. Moreover, almost 44% of those has changed twice, with these two categories making the

bulk of the teachers sampled. This is significant as it gives an image of a pretty stable working life, in which teachers work in the same schools for long periods of time. On the other hand, looking to the case of the public sector, the general situation is much different, having a much less concentrated distributed (see graph 11). The category of two times has now only a relative frequency of approximately 17% and all the other categories, from 1 to 11 times have a frequency higher than 6%. Additionally, the maximum number of times teachers changed school during the analysed period in the public sector is much higher than its counterpart in the private sector (13 and 7 times respectively). This clearly illustrates that teacher in the public sector have a relatively unstable career over time as more than 30% of all the public sector teachers changed school more than 2 times during the 10 years considered in our analysis.

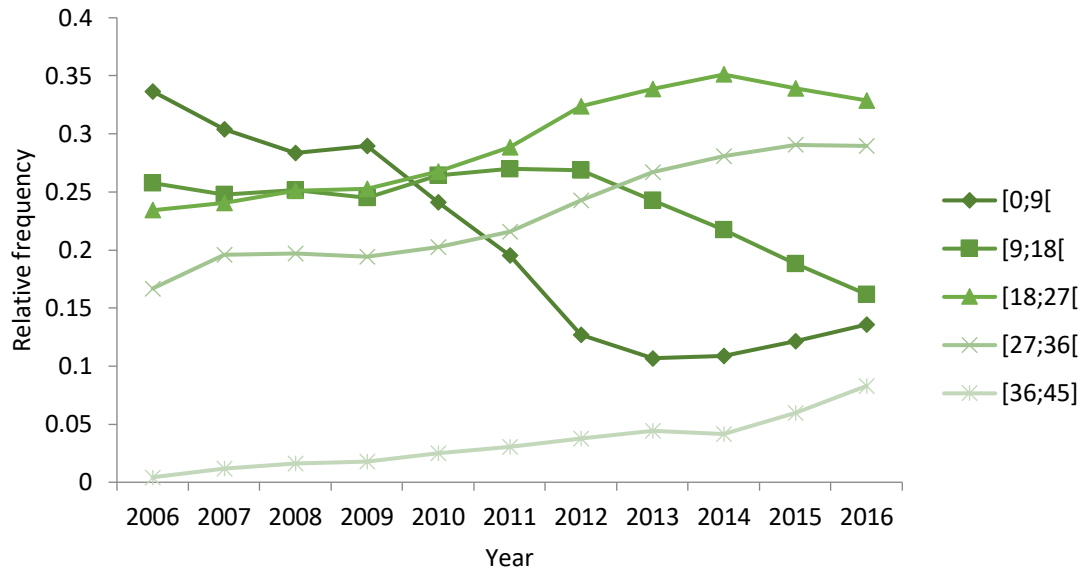
Overall, and considering a *ceteris paribus* analysis, big differences exist regarding teacher's turnover. Ignoring possible differences between both sectors, while in the private sector data shows a highly concentrated distribution around the category 1 and 2, in the public sector the data is much more distributed, both in terms in maximum number of changes registered, but also in terms of how spread observations are (categories 1 and 2 accounts for only slightly more than one quarter of all registered observations considered). Therefore, and considering that the period analysed correspond to 10 years, one may see radical differences in terms of stability between both systems. Many reasons for such departure may be pointed, however, the structural aspect is of concern. Private schools employ teachers as a private sector firm, while the public sector employs teacher and latter allocate them to schools in a contest-based allocation system, leaves room for a big number of school changes in public teacher's early careers. As such, the results obtain from the direct comparison in data should be analysed on the light of this significant departure among sectors.

Tenure

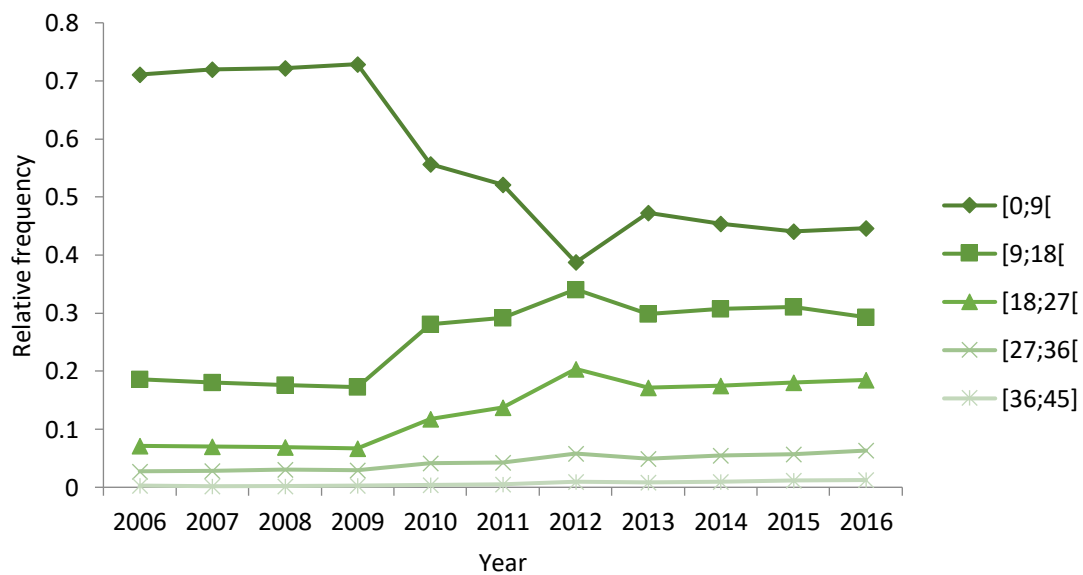
Tenure stands for the number of years a given teacher has of activity. That is, for a given year, this variable indicates the number of career years a teacher already has. This variable is relevant to be measured because, when analysing its evolution over time, it gives a complementary view to that of the variable age over the demographic aspect of both

sectors. Moreover, a teacher's tenure also gives us an insight into teacher's accumulated experience, which may possibly affect quality of teachings through learning curve gains.

Graph 12 - The evolution of Tenure in the Public Sector



Graph 13 - The evolution of Tenure in the Private Sector



To evaluate this variable in the most efficient way, observations were divided in 5 categories: [0;9[; [9;18[; [18;27[; [27;36[and [36;45] years. This was done not only to facilitate analysis, but also to make it easier to spot trends and changes in behaviour in this groups.

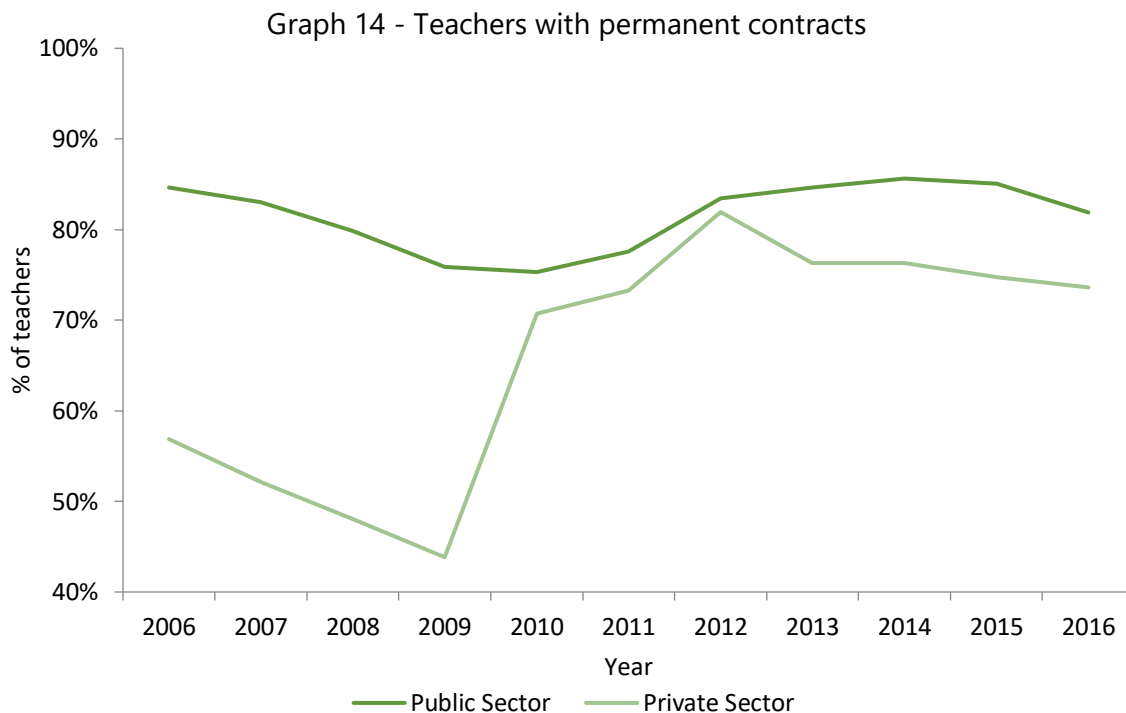
Starting with the public sector (graph 12), there is a clear increase over time in the categories with higher years of experience: [18;27[; [27;36[and [36;45] years. This may imply that the teachers in this sector are growing older and more experienced in the 10 years analysed. Moreover, the negative tendency in the classes of smaller experience ([0;9[; [9;18[years) gives an additional insight: not only are teachers getting more experienced over time, but also the percentage of teachers with lower levels of experience, less than 18 years, was decreasing in relative terms. This is a clear example of a workforce that is becoming older and that is not being much renovated. A note should be made, though, that since 2013 the class with the smallest experience started to show a slightly increase. This may represent an effort to introduce new teachers into the public sector. Additionally, the significant decrease in the [0;9[years categories in the period between 2010 to 2013 may represent consequences of the financial and public sovereign crisis.

Moving on to the private sector (see graph 13), the various categories demonstrate a much more stable behaviour, which may be surprising. Teachers in the private sector with more than 9 years of experience have undergone a small increase over the considered period, with the biggest changes being experienced in the period between 2010 to 2013. Apart from those years, those categories behave in a pretty stable way, showing only small variations. Inversely to these behaviours, the category of teachers with the smallest years of experience suffered a significant decrease over the 10 years considered. This decrease is most significant again in the period between 2010 to 2013. Once again, the period between 2010 to 2013 is significant as variations in this period may be a consequence of the changes caused by the crisis.

Overall, teachers in both sectors are growing more experienced and thus older over time. However, a big departure exists: while the public sector may be about to face a serious problem related with the non-refreshing of its workforce, the categories in the private sector are much more stable, which means there may be a constant refreshing done, even if not as big as it once was. Some conclusions may be drawn from this: (1) the workforce in the private sector is more constantly refreshed and (2) teachers in their early career may find more opportunities in the private sector.

Type of contract

The analysis proceeds and now the focus is on another relevant variable: the percentage of teachers with a permanent contract. Having a permanent contract offers stability and security to the worker in question and so it is important to understand how the labour force in both private and public sectors is characterized in what comes to this matter. Graph z bellow shows the percentage of teachers with permanent contract between 2006 and 2016 in both public and private sectors.



By looking at graph 14, the first feature that stands out is the fact that in public schools the percentage of permanent teachers has always been higher than in private schools, which led to the conclusion that stability is more easily achieved by teachers in the public sector. This might be explained by the fact that teachers have a different statute in each sector and so the law applicable to each differ in some aspects, namely in what regards firing, being more flexible for the private sector.

Furthermore, the percentage of permanent teachers in public sector has been quite stable from 2006 to 2016, always around 75% to 86%, which enforces the high degree of stability verified in public sector in what comes to permanent teacher's contracts, with this type of contract being the prevalent one.

It is also observable that from 2006 to 2009, the percentage of permanent teachers in private schools have decreased from around 56% to 43%, a reduction of more than 10 percentage points, which made permanent contracts the less celebrated ones in this sector. However, from 2009 to 2012 a tendency for this percentage to increase in private sector was observed, almost reaching the same level registered in public sector in 2012, which can be translated into positive effects in what comes to the labour security in this sector. From 2012 onwards a slight tendency for the percentage of permanent teachers in private sector to decrease is verified, although it was still more than 70% in 2016, remaining the most celebrated type of contract in private sector.

Overall, teachers with permanent contracts are the majority in both sectors, which is favourable from labour conditions viewpoint. However, public sector is the one that presents less oscillations along the evolution of the percentage of teachers with a permanent contract. Furthermore, in this sector, this percentage has been always higher than in private sector. Therefore, these two features suggest that public sector can better assure stability for teachers regarding their labour conditions, which may be explained by the more restrictive law applied to teachers of the public sector, compared with the private one.

Working hours

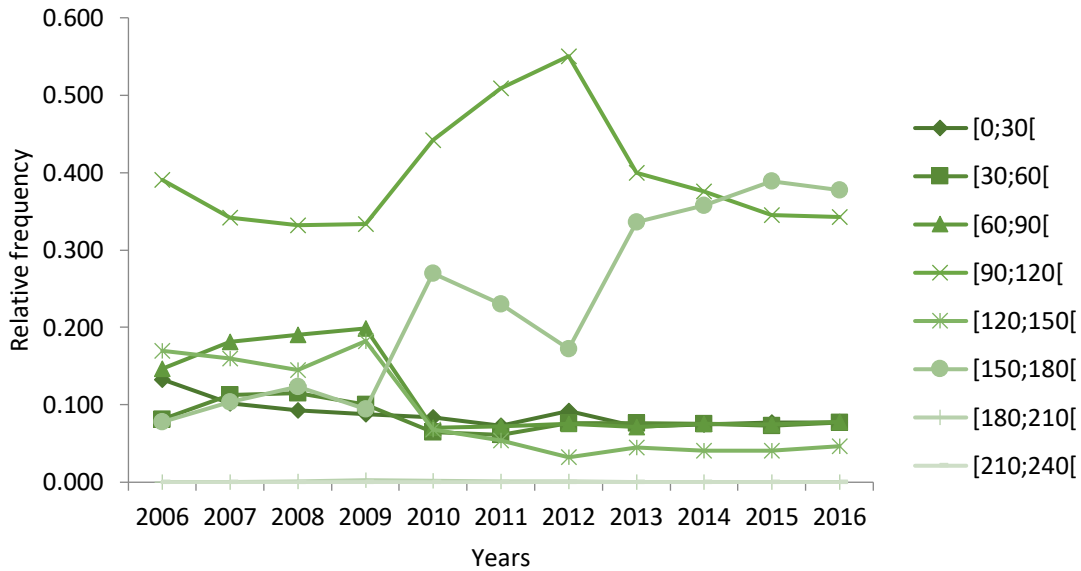
Another interesting variable to be analysed is the number of hours worked by both teachers from public and private sectors.

It is known that number of hours weekly worked by public education teachers is defined by a law published in "Diário da República" that applies to all public workers. Therefore, the number of weekly hours worked is expected to be more stable throughout the years for the public sector. Actually, nowadays the law defines 35 weekly working hours for public workers, amounting to 140 monthly working hours, value that hasn't changed in the time period in analysis in this work (2006-2016), except from the years 2013 until 2016, when it increased to 40 weekly working hours.

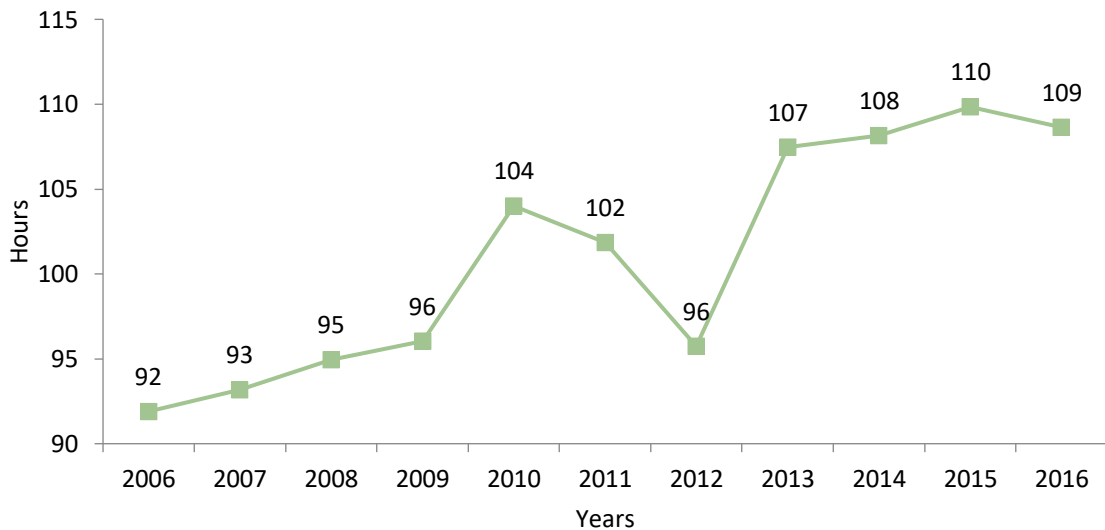
Regarding now the private sector, two graphics were constructed. Graph 15 shows the evolution from 2006 to 2016 of the monthly working hours of private teachers, which

were divided into classes to provide a better analysis. Then, graph 16 shows the evolution from 2006 to 2016 of the average monthly working hours of private teachers.

Graph 15 - Evolution of monthly working hours in the private sector



Graph 16 - Evolution of the average monthly working hours in the private sector



By looking at graph 15 it is quite clear that the prevailing class of monthly working hours is (90;120) until 2014, year when (150,180) class of monthly hours worked starts to be the most observed one. In fact, this last class shows an increasing trend since 2006. It can also be seen that the remaining classes, which correspond to the ones with lower numbers of monthly working hours, have been quite stable from 2006 to 2016 and represent a small share of monthly working hours of private teachers.

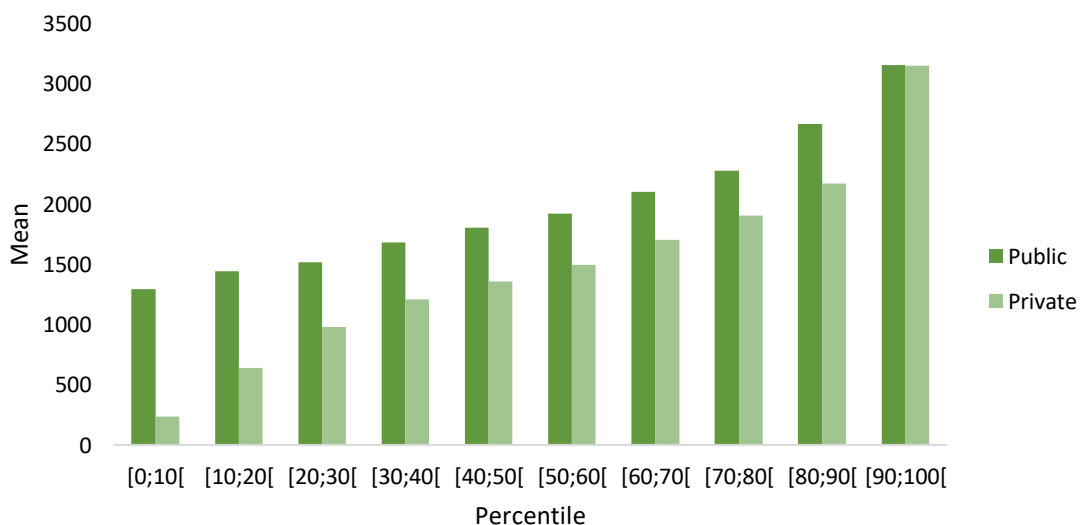
Regarding the average of this variable in private sector, it becomes obvious by looking at graph 16 that it shows an increasing trend from 2006 to 2016, although it has decreased from 2010 to 2012. Furthermore, it can be said that the average monthly working hours of private teachers has increased 17 hours from 2006 to 2016.

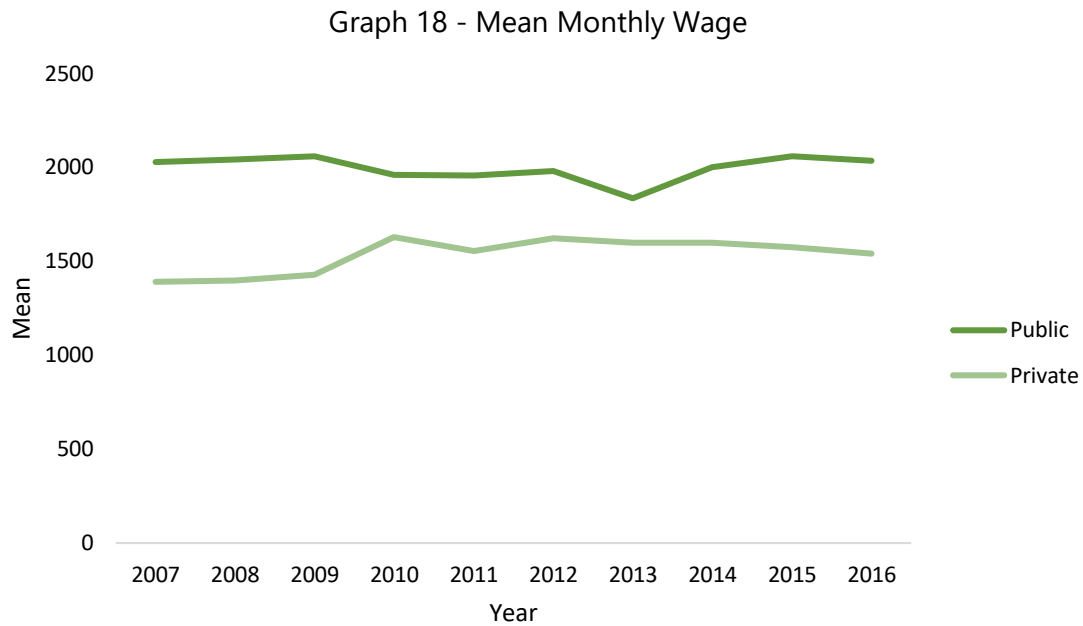
Overall, there are some differences in what regards monthly working hours of public and private teachers. From 2006 to 2013, when monthly working hours of public teachers were 140, the majority of private teachers worked monthly between 90 and 120 hours, way below the value expected from public teachers. Furthermore, the average of monthly working hours of private sector from 2006 to 2013 was always lower than 140. However, from 2014 to 2016, which corresponds to a period when monthly working hours of public sector increased to 160, private sector seemed to have accompanied this tendency, with majority of monthly working hours of private teachers increasing from values between 90 and 120 to values between 150 and 180.

Wages

Wages are of the utmost relevance to analyse. It not only constitutes one of the major incentives for the teacher’s productivity, but it is also related with other variables, such as hours worked or the qualifications of teachers. To see how this variable changed over time and compare across sector, we will look to the wage data on two different ways: (1) monthly data and (2) hourly data.

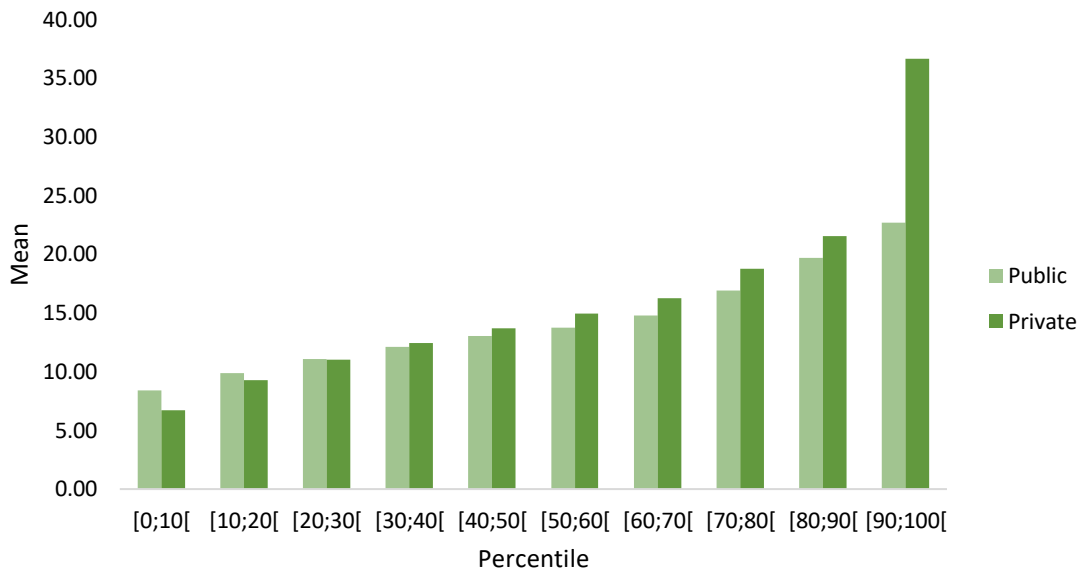
Graph 17 - Monthly Mean Wage per percentile



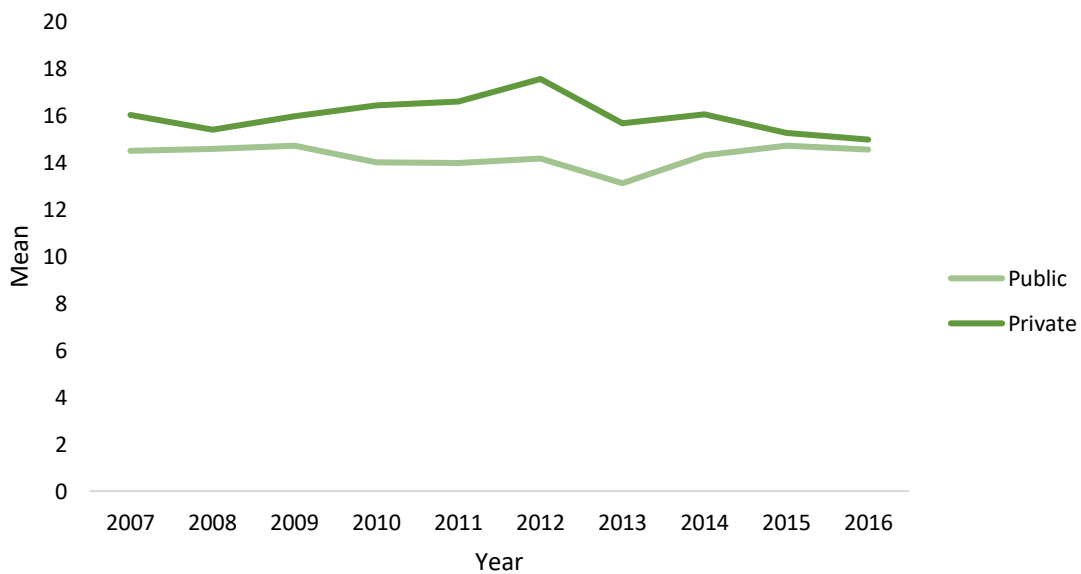


Starting with monthly data (see graph 17 and 18), interesting results arise. On the one hand, the annual mean monthly wage is relatively constant over the years analysed (the year of 2006 was excluded due to changes in organization and sampling of data that provoked distortions). Moreover, it is clear that during all the 9 years analysed teachers in the public sector received a higher mean monthly wage than their counterpart in the private sector (this can be seen in graph 18). Complementary, looking at graph 17, one may arrive to the same conclusions as the mean monthly wage in the public sector is superior to that of the private sector in all percentiles of wage, except for the last one, in which the values are very similar (3153 € in the public sector and 3152€ in the private). Furthermore, this data seems to go along the results of previous works, as those of Chambers and Bobbitt (1996), Vedder and Hall (2000) or Chambers Jay G. (1985), in which it was pointed that wages on the public sector were higher than those of the private sector. It is also important to note that looking at graph 18 one may conclude that there were only small net gains in terms of Annual Mean Monthly Wage for both sectors. The Annual Mean Monthly Wage moved only from 2029€ in 2007 to 2035€ in 2016 in the public sector. Similarly, the private sector suffered a similar fate, with the mean monthly wage slightly increasing from 1391€ in 2007 to 1541€ in 2016. Accounting for the inflation in this period, these variations may even amount to net losses.

Graph 19 - Hourly Mean Wage per percentile



Graph 20 - Mean Hourly Wage



Moving on to the hourly data, the results may be a bit surprising. Firstly, the annual mean hourly wage is bigger in the private sector in all analysed years (see graph 20). The maximum value registered in the public sector was of 14.71 € per hour in 2015 while that of the private sector was 17.55€ per hour in 2012. Moreover, both followed a similar trend and suffered small variations. By the end of the analysed period little was gain in real terms in both cases. The public sector registered a particularly small increase, moving from 14.49€ per hour in 2007 to 14.54€ per hour in 2016 and the private sector has even suffered a losse as the mean hourly wage moved away from 16.03€ in 2006 to only 14.97

€ in 2016, only slightly higher than the value registered in the public sector. Nevertheless, graph 19 presents an interesting result. The hourly mean wage in the private sector seems to be bigger in all percentiles of wages except for the smaller ones. The top 10% of the smallest hourly mean wages are higher in the public sector than in the private one, for instance.

Such disparity in results may have multiple reasons. One of them, and probably the most impactful one, is the fact that there is a difference in the amount of worked hour in both sectors. As seen in a previous section, the public sector works on average more hours per month than the private sector. This shades a light on the differences between monthly and hourly wages. Additionally, the public sector teachers tend to be more qualified than those in the private sector. This may explain both the fact that the monthly mean wage in the public sector is bigger than that of the private counterpart and the hourly mean wage in the public sector is bigger in the first percentiles.

Overall, from this results, two main points may be made. Firstly, the public sector received on average higher wages and, secondly, the private sector tends to receive a higher mean hourly wage.

5. Conclusion

Throughout this study, we have compared various variables in order to analyse the differences between the public and private sector teachers from 2006 to 2016 and, overall, our results have always been according to the literature review, as it was mentioned along this work. This is relevant because it adds strength to the data, it shows that Portuguese data within this period is according to data in other countries, which may result in a safer and wiser implementation of policies in this much important sector in the country.

Following the same order established before, we have seen that the total number of teachers have decreased from 2006 to 2016 (in the private sector as in the public sector).

When it comes to gender, there are significantly more female teachers than their male counterparts in both sectors, though this ratio is higher in the public sector.

As seen previously, the average age of teachers (regardless of the sector) has been increasing from 2006 to 2016. Moreover, there are more teachers above 60 and less teachers below 30 in the public sector when comparing with the private. With all of this information available, it is of great importance to guarantee a renewal of teachers within the upcoming years.

Regarding qualifications, we have seen that, on average, throughout all schooling years analysed within this period, public sector teachers were more qualified than their private sector counterparts.

When looking at Turnover, it was shown that, on average, public sector teachers moved from school to school more often than the private sector, representing a somewhat less stable career path within their current school.

However, when analysing the types of contracts, there is a higher percentage of public sector teachers that have a permanent contract when compared to the private sector.

Additionally, we have also demonstrated with this data that, teachers in both sectors are growing more experienced and thus older over time, though, there is a more constant refresh of the workforce in the private sector.

Lastly, we've seen that public sector teachers receive higher wages, on average, however, private sector teachers receive more per hour worked, meaning that public sector teachers work more hours.

The team believes that this data, though it had some differences with the DGEEC's dataset, was well put together is sufficiently good enough to take significant conclusions out of it.

All in all, some of these results are surprising, at least, when we put them into graphs and compare them, besides, it is of most importance to be aware of these statistics, in order to implement well thought and efficient policies.

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