

Quantitative Macroeconomics - PS1

Sergi Quintana Garcia

September 27, 2020

(1) Compute and plot the times series of monthly employment rate in the U.S

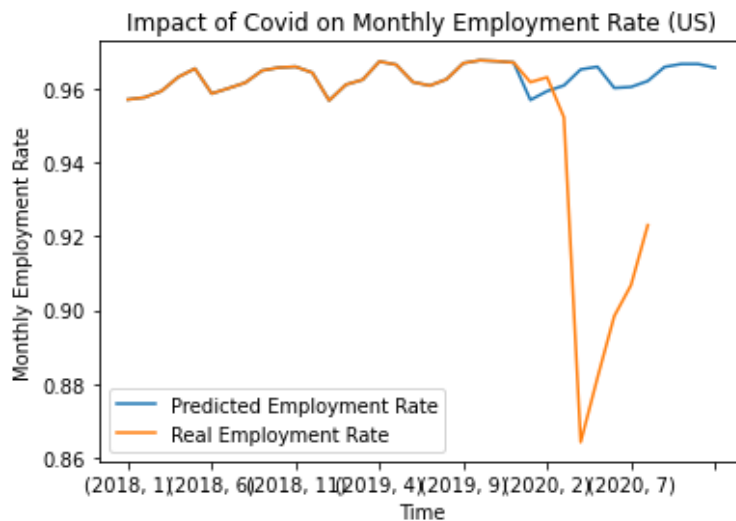


Figure 1: **Impact of COVID-19 on Monthly Employment Rate (US)**

The following graph shows the monthly employment rate of the US economy from 2018 till the more recent data. As we can see, the impact of covid produced a huge drop on the employment rate following by a recovery. This is because since the world is very globalized the first months of confinement in some places of the world stopped the world economy, and even if the US did not apply very strict measures its economy was affected by its trade partners producing a drop on the employment rate. Still, we can see that the economy is recovering in a strong trend, and if it follows this trend it will recover its previous levels soon.

(1.1) Redo by Education level

Figure 2 shows the impact in different education groups. Since we have data in our disposal, I have included one more group than requested. This is Less Bachelor Degree and it contains people with more than High School and less than a Bachelor Degree. There are two main things to mention in this graph.

1. Initial employment rate is higher the higher your education level is. This is an already known fact, since is people with a higher human capital and are in more specific work places.
2. The decline is higher the lower your education group. This is because individuals with lower education levels are easily to replace from they work place, so you can fire them easily as well. Another reason is that individuals with higher education levels are difficult to replace. The difficulty to replace relies

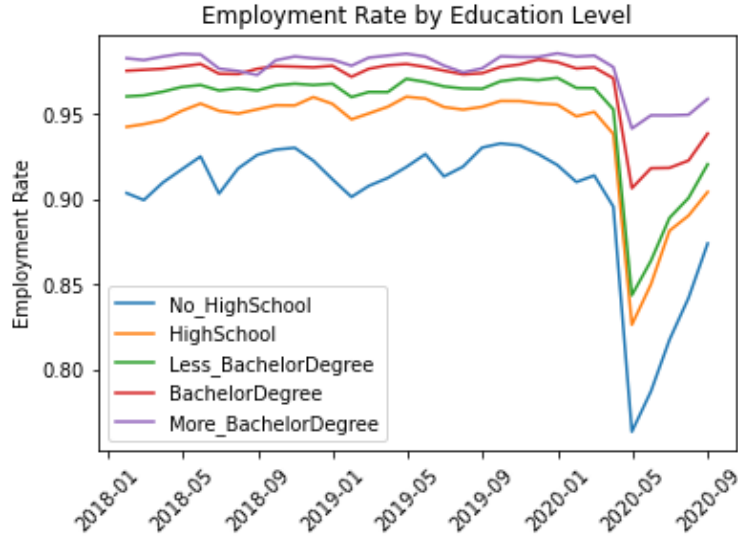


Figure 2: **Impact of COVID-19 on Monthly Employment Rate by Education group (US)**

on two conditions. The first is that they are more difficult to be found. The second is that the more important your position the better contract you have, so this protects you against being fired.

(1.2) Redo by Occupation group

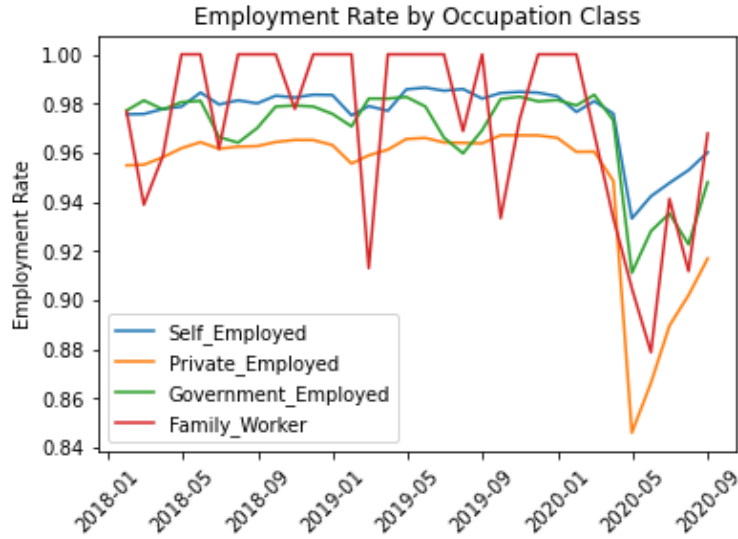


Figure 3: **Impact of COVID-19 on Monthly Employment Rate by Occupation group (US)**

Figure 3 shows the evolution of employment rate by occupation group. Notice that the data on family workers seems to be missing for some periods so we will not comment it, but still it gives an idea on the impact of COVID-19. As before, there are two important things to mention:

1. Initial levels of employment are higher for self-employed, which makes sense since the most likely thing is that if a self-employed person stops working, stops being self-employed. The second most employed group is government employees and the third is private employees.

2. The drop is higher the lower the initial employment group was. This makes sense, since self-employed will try to work as much as possible because they are their own source of income. On the other hand, private employed individuals are more likely to be fired since a company might do reestructurations. Government employees should be protected to suddenly shocks but still, we observe a important decline.

(1.3) Redo by Industry group

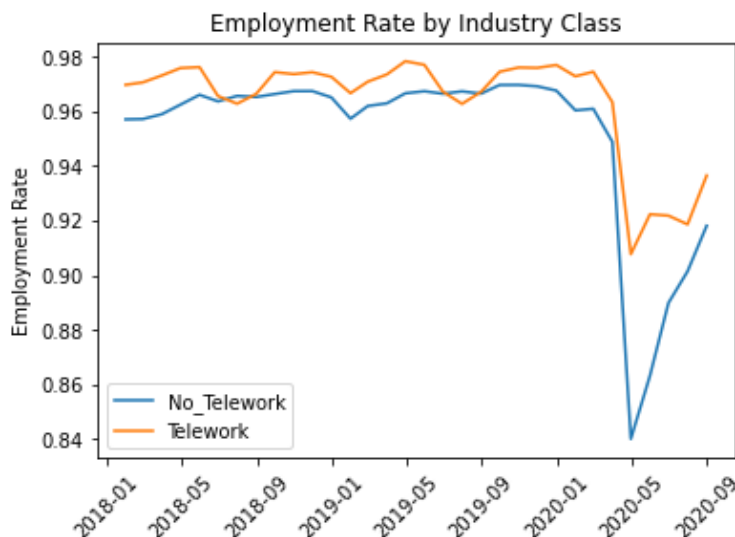


Figure 4: **Impact of COVID-19 on Monthly Employment Rate by Industry group (US)**

Figure 4 shows the employment rate according to the ability to telework of the industry individuals are. Notice that I created this group by myself so it can be that I considered that an industry is able telework and it is not true. The opposite might also happen. Still, the results I found seems consistent so I believe the classification is at least illustrative of the real situation. As before, there are two important things to consider:

1. Industries that are able to telework have a higher initial employment rate.
2. The employment decline is higher in industries that are not able to telework, as expected. Still, there is an important decline in industries that can telework. This is because the global shock that created the COVID pandemic was both a supply and demand shock, therefore, even if some industries are able to work, they might lack demand and therefore they also face difficulties.

(2) Compute and plot times series for Average Weekly Hours Worked

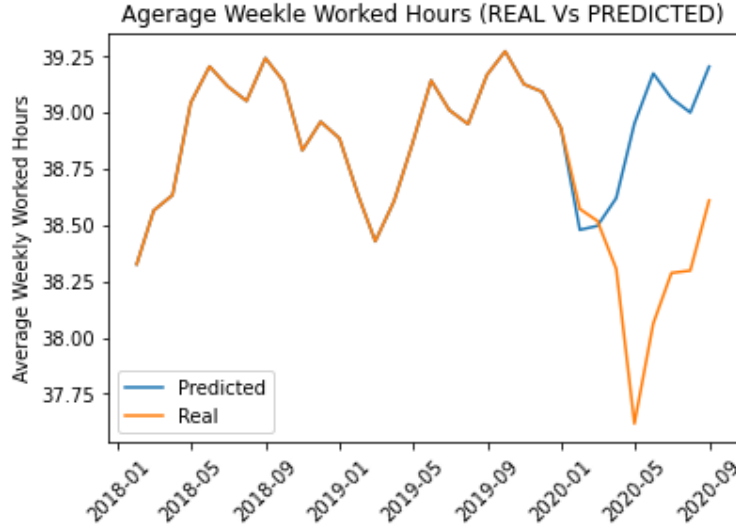


Figure 5: **Impact of COVID-19 on Average Weekly Hours Worked (US)**

Figure 5 shows the difference in the expected and the real value of the average weekly hours worked in the US economy. It is very similar to Figure 1 and it shows the same phenomena. It is very interesting to see that the only difference is the decline in April 2020, because afterwards it seems that the trends are very similar for the predicted and the real. This means that on April there was a bigger decline than expected but afterwards the economy is following the usual working.

(2.1) Redo for Education levels

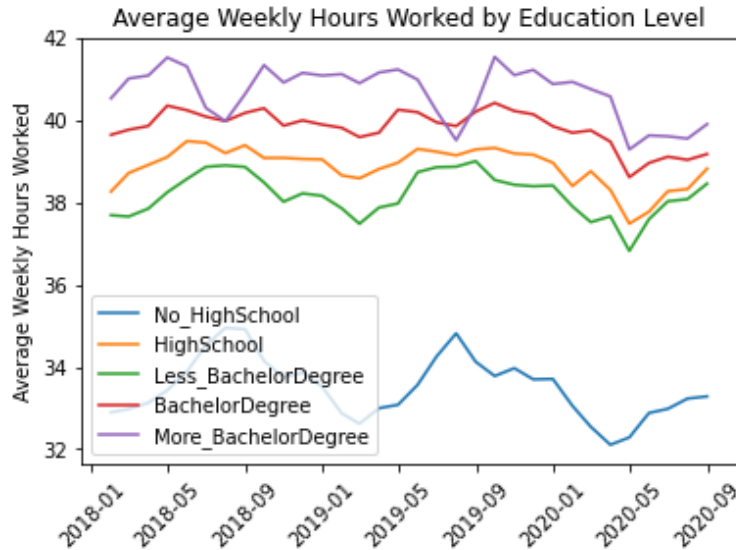


Figure 6: **Impact of COVID-19 on Average Weekly Hours Worked by Education group (US)**

Figure 6 shows the average weekly hours worked by education group. As we can see it seems that the more education level the higher weekly hours worked on average. Furthermore, the impact seems to be the

same in all education levels, in contrast with the employment rate that seems to affect more the groups with less education.

(2.2) Redo for Occupation class

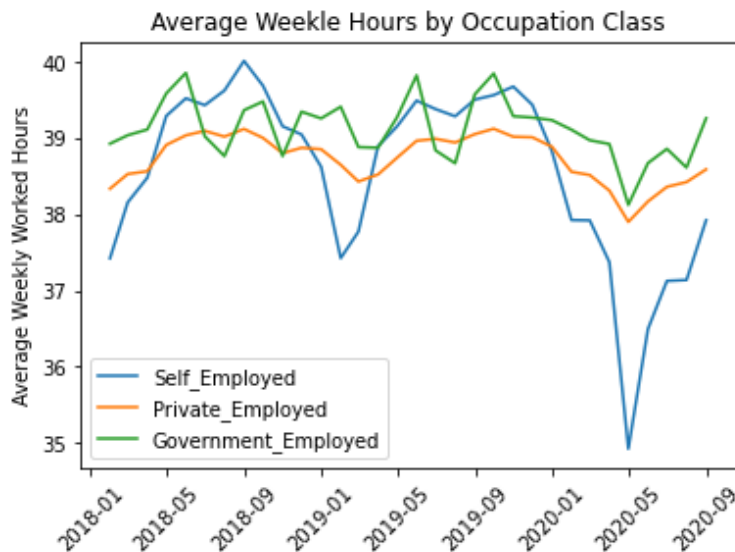


Figure 7: **Impact of COVID-19 on Average Weekly Hours Worked by Occupation group (US)**

Figure 7 shows the evolution of average weekly hours worked by occupation class. I have not include the occupation group family member in this graph. Notice that there are two important things to mention:

1. Depending on the occupation group the hours worked have a very different variance. Clearly, the variance of self-employed is the higher. The other is not clear, but it might be government and then private employees.
2. The most affected group was self-employed and then government and private employees seems to be affected in the same way.

The reason why self-employed have the higher variance and where the most affected by the pandemic is probably the same. They are more sensitive to shocks than the other groups. Not only sensitive but they have a higher capacity to adapt. From Figure 3 we show that they were the less affected in terms of employment, but they are the more affected in hours worked. This is because they "fight" for their job in some sense, they are able to reduce production without losing their job, not because they want but because it is their only source of income. This is a peculiarity that we will not observe in other groups. Also because the decision of being fired depends on themselves, in contrast with other group employees.

(2.3) Redo for Industry groups

Figure 8 shows the evolution of average weekly hours worked by Industry class. Notice that it seems industries that are able to telework work on average more hours. Furthermore, notice that in contrast with employment rate the decline here seems to be very similar for both groups.

This is because the shock on demand. Those who are able to keep their employment, no matter where they work, they face less work since the economy is facing a shock on aggregate demand. Notice that this will in fact create that those companies lacking demand, supply less and demand less from others. This is how the economy is interconnected.

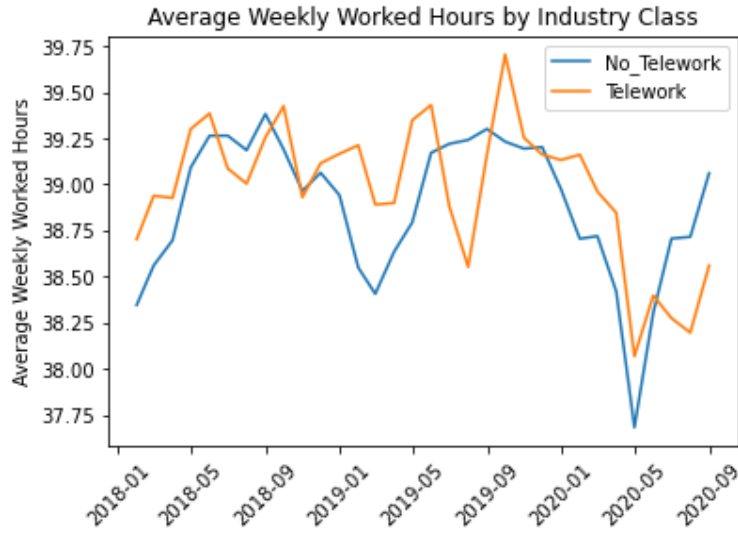


Figure 8: **Impact of COVID-19 on Average Weekly Hours Worked by Industry group (US)**

Therefore, even if those individuals that work in an industry that is able to telework are able to keep their jobs, they will work less hours because of the lack of demand. In contrast, industries that are not able to telework are hit harder, since they have lost more workers and the ones that remain work less hours.

(3) Compute and plot times series for Income

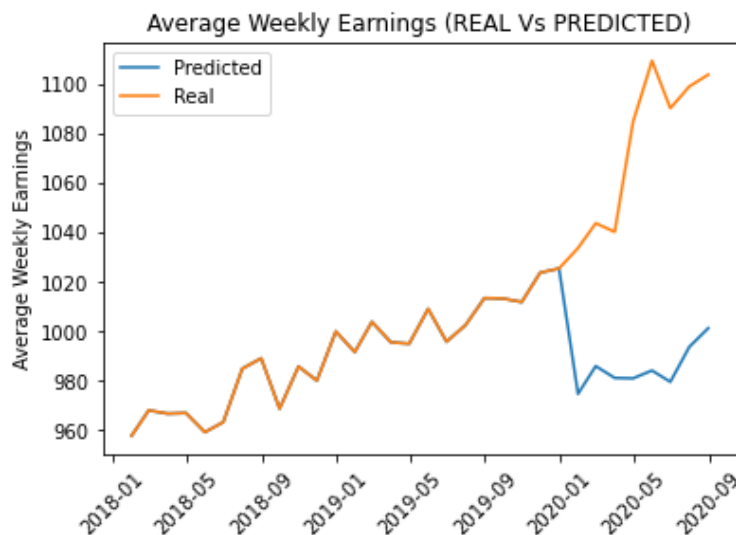


Figure 9: **Impact of COVID-19 on Average Weekly Earnings (US)**

The variable used to measure income is average weekly earnings. Figure 9 shows the evolution of this variable and shows the contrast between the predicted and the real value. Notice that the phenomena here is very interesting, weekly earnings have increased after the COVID-19 pandemic. The potential reason is the following: The more affected are those with less education and with worse salaries, therefore, since the higher number of unemployed is there, the ones that remain working are in the higher groups, for this reason the average earnings is higher, because the ones that remain working are those with higher salaries.

(3.1) Redo for Education levels

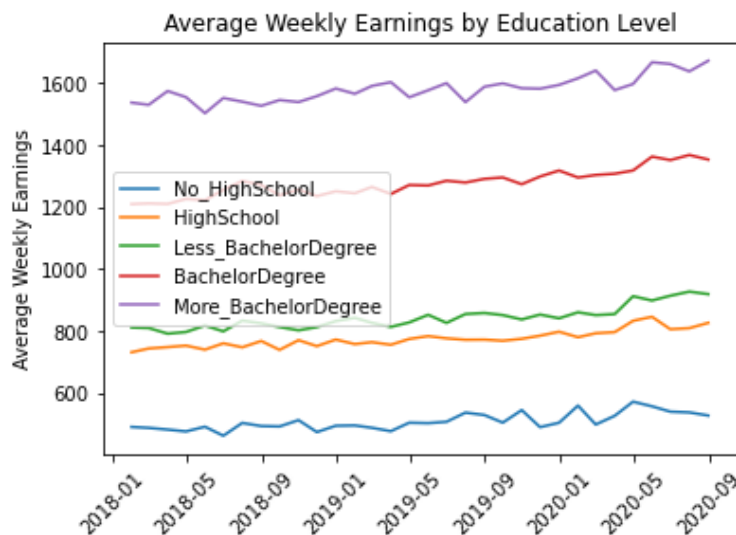


Figure 10: **Impact of COVID-19 on Average Weekly Earnings by Education group (US)**

Figure 10 shows the evolution of average weekly earnings by education level. There are two important

things to mention:

1. The higher the education level the higher the average weekly earnings. This is already a well-known phenomena.
2. All groups follow the same path, with a soft upward trend that seems to be higher after COVID.

As consistent with the previous findings, the average weekly earnings by education group seems not to have increased as much as the aggregate, which imply that there are less individuals in the lower groups such as no high school or just high school degree. This is aggregate average upwards, since by group the trend is not that strong.

(3.2) Redo for Occupation groups

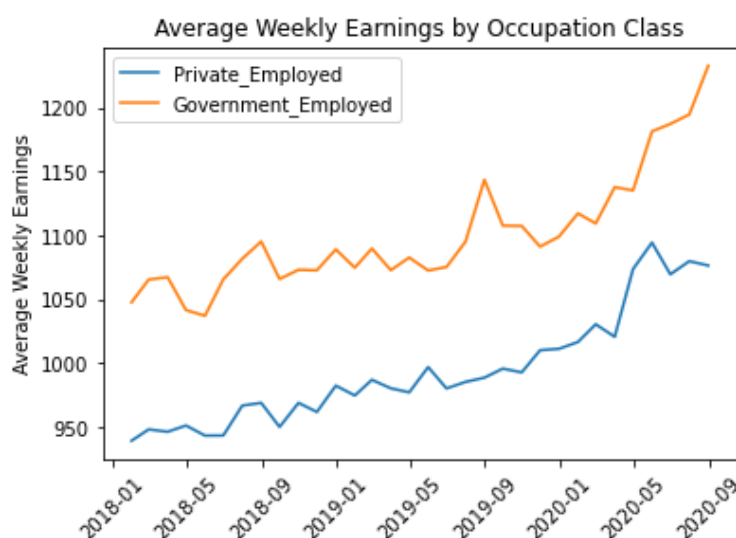


Figure 11: Impact of COVID-19 on Average Weekly Earnings by Occupation group (US)

Figure 11 shows the average weekly earnings by occupation group. I have not included self-employed here because of a matter of data. Notice that the trend is the same in both groups, upwards. As explained before, those with worse salaries in both groups have lost their jobs and the ones that remain are more educated with higher income individuals, moving the average upwards.

(3.3) Redo for Industry groups

Figure 12 shows the evolution of average weekly earnings by industry class. Notice that those in industries able to telework have higher initial average earnings. The trend is the same as in the aggregate, upwards. As explained before, those individuals with lower education and salaries have lost their jobs, no matter in which industry they were. Therefore, the average salary is now higher as a consequence of those that remain in the industry.

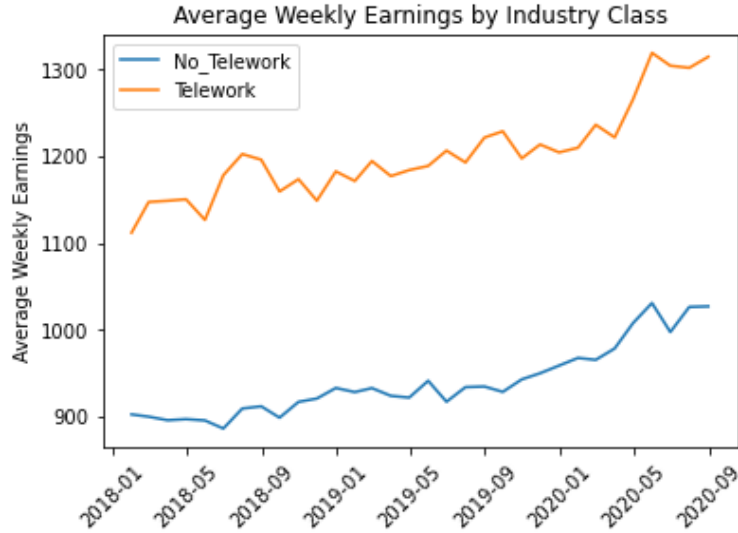


Figure 12: Impact of COVID-19 on Average Weekly Earnings by Industry group (US)

(4) Industry Analysis

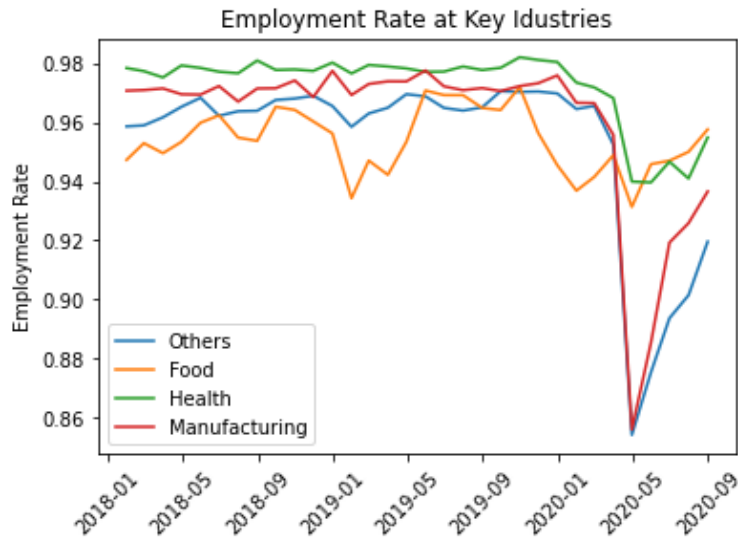


Figure 13: Impact of COVID-19 on Average Weekly Earnings by Industry group (US)

Since I already had the data I was curious about the impact on employment on different industry groups and on different races. For this reason I have produced Figures 13 and 14.

Figure 13 shows the evolution of employment rate of different industries and we can see that the impact on health and food related industries is much more soft than on manufacturing or other industries. This is the result I expected since food is a basic need, together with health in the middle of a global pandemic. For this reason, the employment impact in those groups has been less, because they were very needed.

On the other hand, Figure 14 shows the evolution of employment rate by race. There are two important things to mention:

1. Asian and White individuals have a similar pattern, but Asians faced a higher shock than white indi-

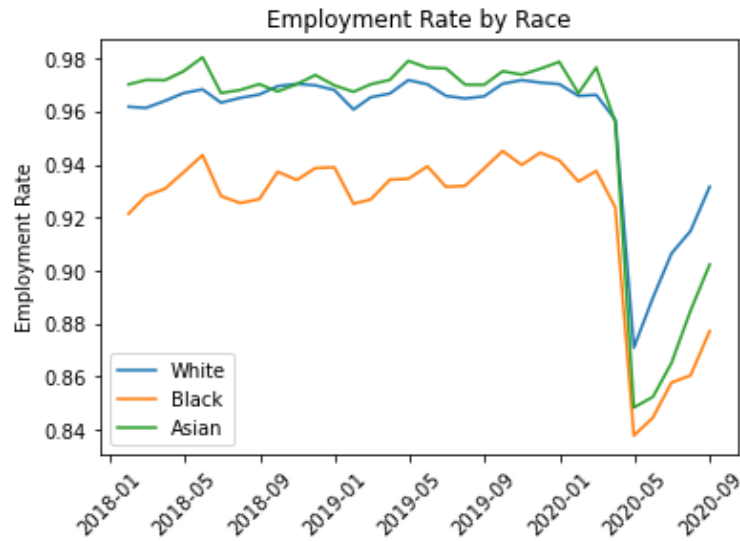


Figure 14: **Impact of COVID-19 on Employment Rate by Industry group (US)**

viduals. On the other hand, Black individuals have the same impact but their initial employment rate is lower.

My conclusion is that the effect of the COVID does not depend on your race but on your class. If you are a low income with low education individual you are more likely to be hit by the shock.

(5) Is the behavior of aggregate hours driven by employment or by average weekly hours. Decompose using percentage deviations from the predicted value of these items. Discuss your results.

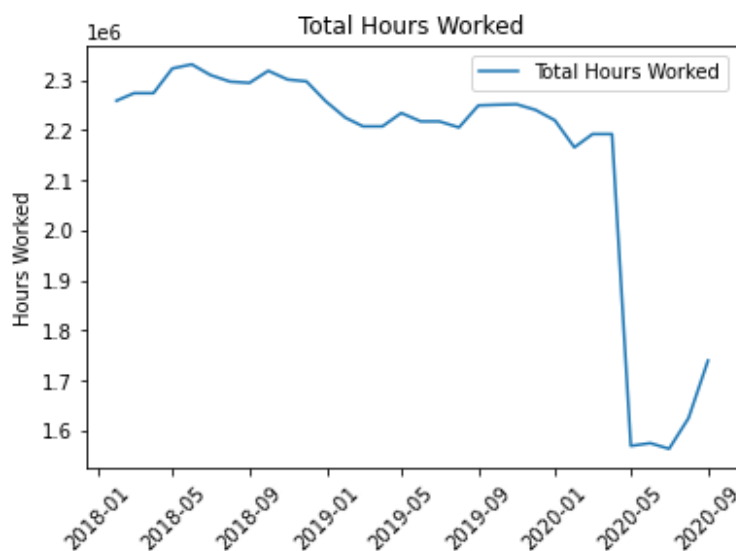


Figure 15: **Aggregate Hours Worked (US)**

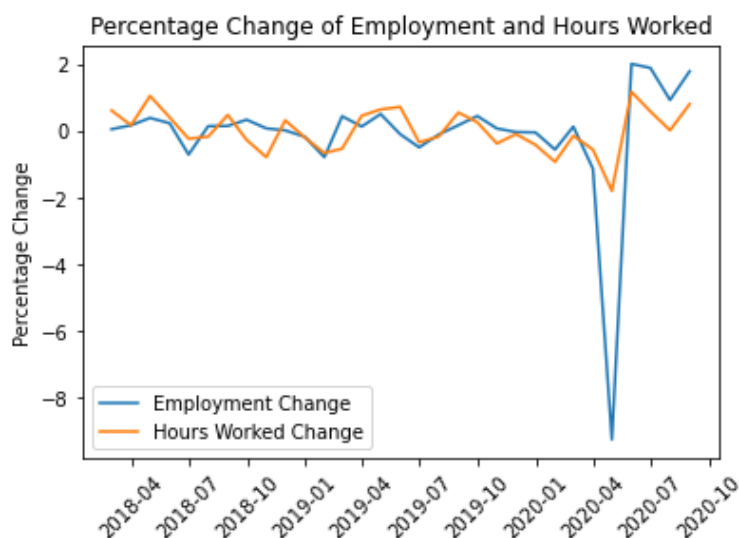


Figure 16: **Percentage change of employment and worked hours (US)**

Figure 15 shows the evolution of total hours worked, computed multiplying average hours worked by number of employed individuals on each month. As we can clearly see there is a very important decline on April 2020 which is when the world hardest reacted to COVID-19.

On the other hand, Figure 16 shows the percentage change on employment and on worked hours. It is very clear that the decline on total hours worked is driven by employment rather than average weekly hours worked. This means that the fact that individuals have lost their jobs is driven total hours down. It is true that average worked hours have also decrease but relatively much less than employment.

(6) Redo for your country

In my case, my country is Spain. After searching data for a while I can now say that the data of my country is way much poorer than the US one. In fact there are fewer categories and data is trimestral rather than monthly. Still I was able to do some of the graphs.

The first two data sets "spain1" and "spain2" are obtained from Eurostat data base. "spain1" has the employment data without any classification and "spain2" has the data for education levels. The data set "spain3" was obtained from the Spanish statistical service INE and contain average weekly hours.

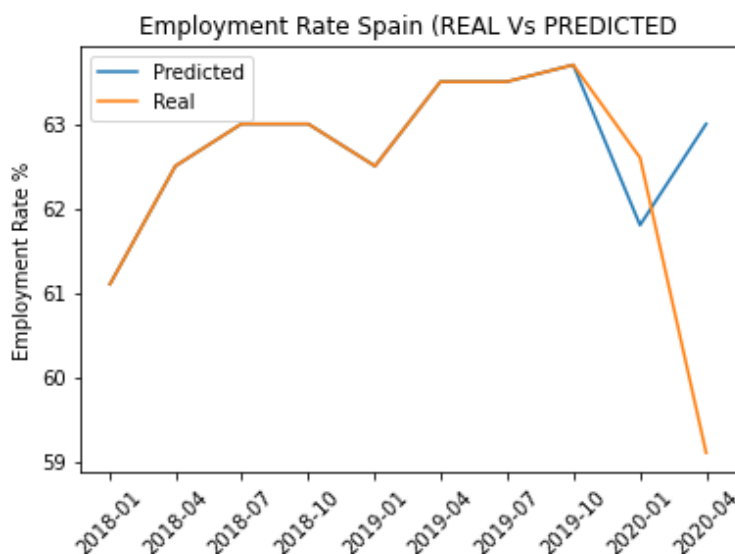


Figure 17: **Employment Rate Spain**

Figure 17 shows the evolution of the Spanish employment rate together with the prediction for 2020. Notice that as in the case of the US, the impact of COVID-19 generated a decline in the employment rate higher than expected.

(6.1) Redo by Education levels

Figure 18 shows the evolution of the Spanish employment rate for different education groups. As we can see, the more educated the higher the initial employment rate. Furthermore, all groups seem to follow the same trend with the primary education level being the most affected.

(6.2) Redo by Average Weekly Hours

Figure 19 shows the evolution of the average weekly hours worked together with the predictions for Spain. The data match all the previous results that the COVID had a negative impact on the number of hours worked, which is what we expected to find.

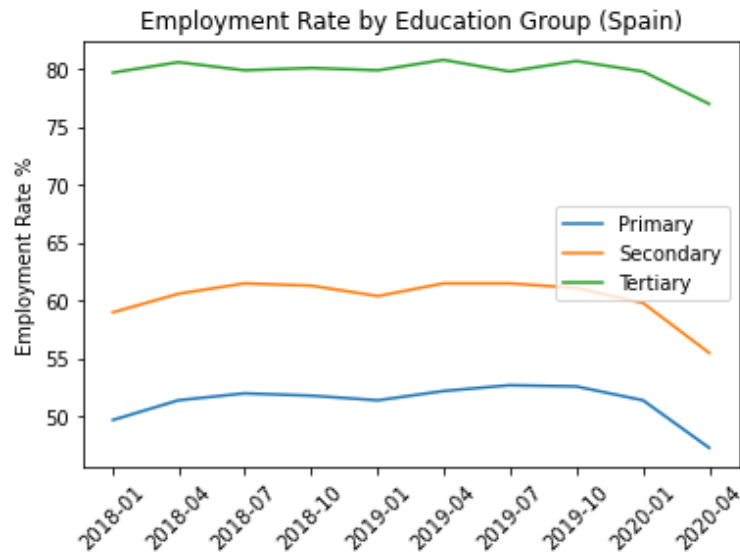


Figure 18: Employment Rate by Education Levels Spain

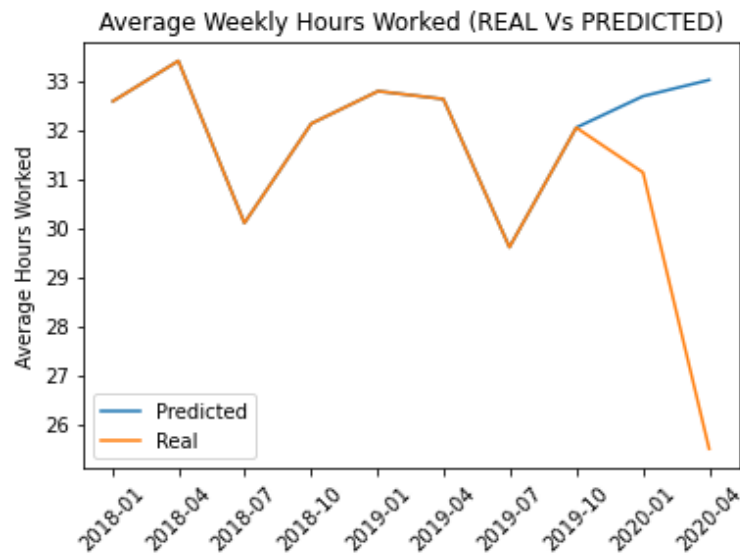


Figure 19: Average Weekly Hours Worked Spain