ECON 102: Second Assignment

Saturday, November 22, 2020

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Wage(7).csv

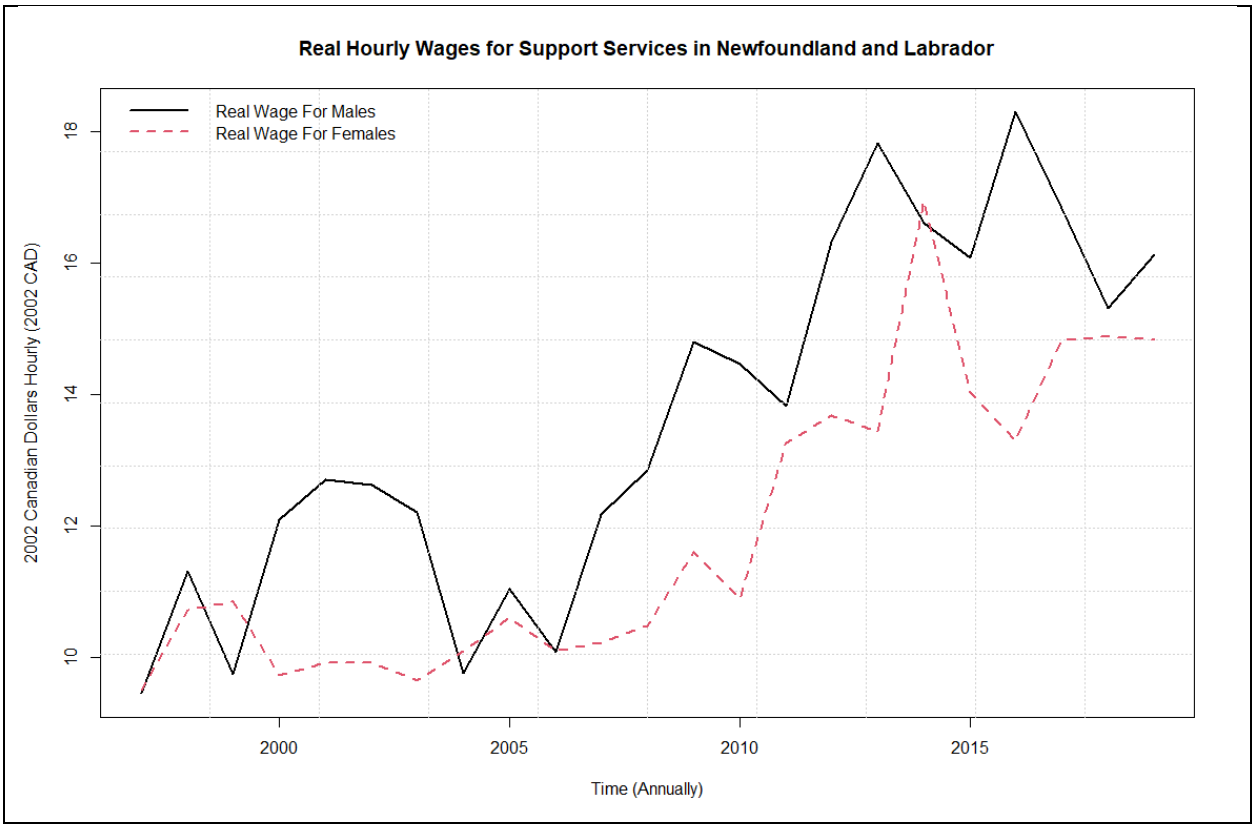
Part A: The Cost of Living

Q1) Plot the evolution of the hourly nominal wage for males and females on the same chart. Interpret what you see: what kind of trending behaviour, is there a difference between males and females in terms of trends or fluctuations, etc.

The trending behaviour is positive for both male and female hourly wages. However, this does not mean that they are equal as female nominal wages are almost always lower than male nominal wage. Only in 5 years (1997, 1999, 2004, 2006, 2014) out of 23 years is the female hourly wage greater than the male hourly wage. Across the 23 years the average nominal female wage was 13.87 which is 12% less then the average nominal male wage of the time (which is 15.87). The graph shows that for the two groups the rate of growth for support services is high.

As well we notice that the peaks of female hourly wages are often 1-2 years behind the peaks of male hourly wages. We see this as in 2006 to 2009 there is an extreme growth in male wages of 50%, the corresponding female wage growth happens in 2010 to 2011 where the rate is 21%. Its also noticeable visually that the peaks for female hourly wage are smaller than the peaks for male hourly wages. We notice that male hourly wages are more volatile whereas female hourly wages have more consistent annual growth.

Q2) Plot the evolution of hourly real wage in dollars of 2002 for males and females on the same chart. Interpret what you see and compare this chart with the one you obtained in the previous question. Which chart between this one and the one produced in the previous question provides a better picture of the evolution of the standard of living of individuals working in that industry? Explain.

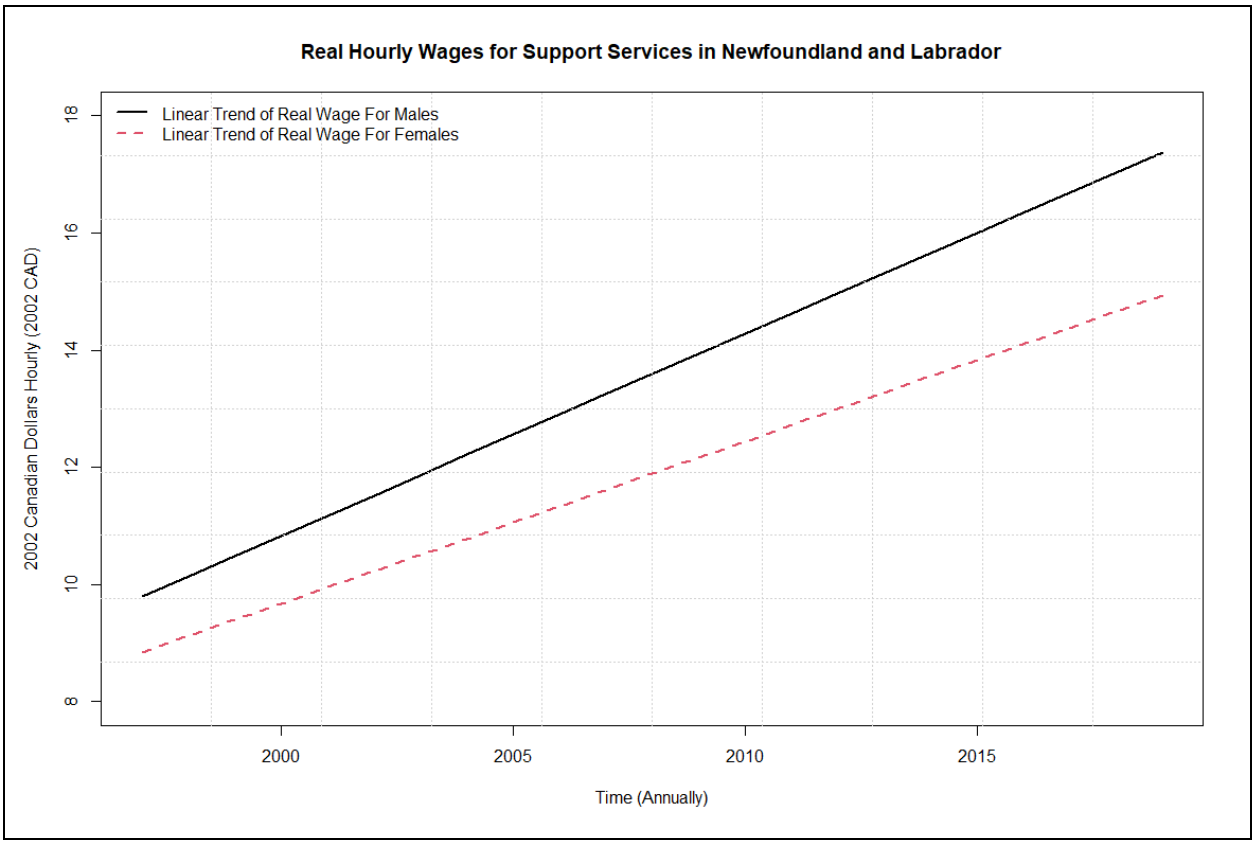


The first difference that we notice is that the annual real growth of male and female wages looks positive but much flatter what the nominal graph shows. For example, we see in the years from 1997 and 2006 that the real hourly female is roughly consistent, but the nominal graph shows consistent growth during that period. As well the nominal graph shows a larger difference between annual male and female wages (1.7) than the real graph (2).

Logically and graphically, the real wage graph provides a better picture for standard of living in the service industry as it adjusts for inflation. This is important as inflation increases the price of living as well as the price of wages. This makes understanding hourly wages from the nominal graph unreliable as its hard to tell what wage growth is due to inflation.

If wage growth is due to inflation, it is an unreliable measure of standard of living as your corresponding costs (food, house, loans) will increase as well. Therefore, the real graph without inflation is a much better indicator of standard of living as it shows absolute income growth.

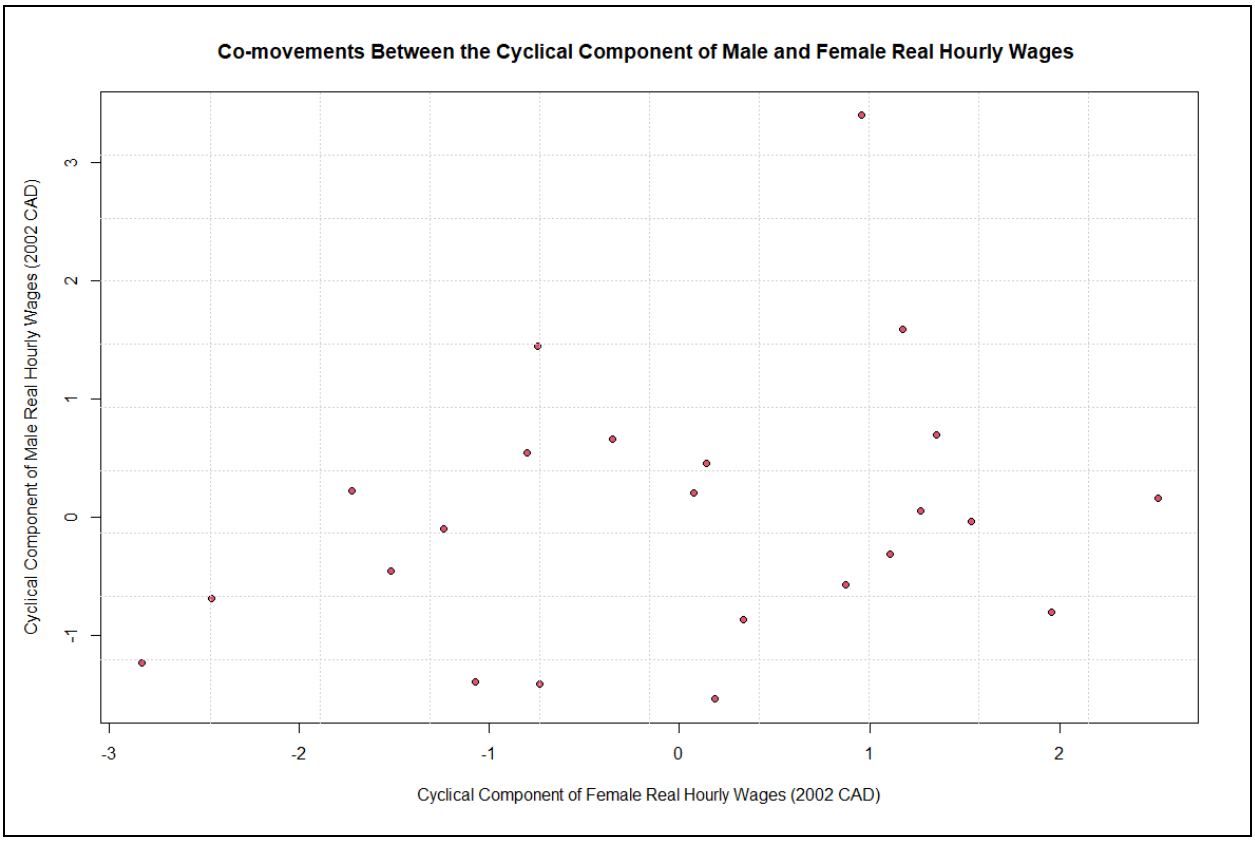
Q3) Fit a linear trend to both real wage series and plot the two trends on the same graph. Interpret what you see: is the wage gap changing on average? What is the annual change on average over that period for males and females? Discuss (Hint: To answer the question, you can look at the coefficient of time of the trend equations or compute the average of annual differences).



Visually we can see that the trend of male real wage is steeper then the female trend of real wage, this means that annually on average the male income in the support service industry will grow at a larger rate than the female income in the support service industry. In the data this is shown as real wages for men grow at an average rate of 0.34 annually whereas the real wages for women grow at an average rate of 0.28 annually,

We also see that linear trend of female wages starts at a lower point (8.8) than the male trend's starting point (9.8). This means that on average in 1997 females make 10% less then what their male counter part makes in the support service industry. Because the male trend grows faster on average then the female trend the gap between them has gotten larger. The women trend ends in 2019 with a real average hourly wage of 14.93 where as men end with a real average of 17.38, this results in the gap widening to the point where in 2019 females make 18% of what their male counterparts make in the same industry,

Q4) Detrend the real wage series using the linear trends computed in the previous question. Since the series are annual, the detrended series are the cyclical components. Using a scatter plot, analyze the co-movement between the two cyclical components. Try to explain your results: e.g. why there is a positive, negative or no co-movement between the two variables?



We do not notice a notice any co-movement between the variables, this is because no matter how the cyclical component of female real hourly wages changes the corresponding cyclical component of male real hourly wages shows no constant change. We can see this visually as the corresponding y value simply fluctuates and shows no real trend as we increase along the x value.

We can also see that if we take the average of the y values (Female Cyclical Component) for the corresponding 5 smallest x values (Male Cyclical Component) we get 0.57 and if we take the y values (Female Cyclical Component) for the 5 largest x values (Male Cyclical Component) we get 0.03. This should mean that there should be a negative co movement, but from the graph this is not clear as we see the largest peaks happening when the female cyclical component is positive.

There is probably no co-movement as the female trend lags the male trend which results in the data trends not being comparable.

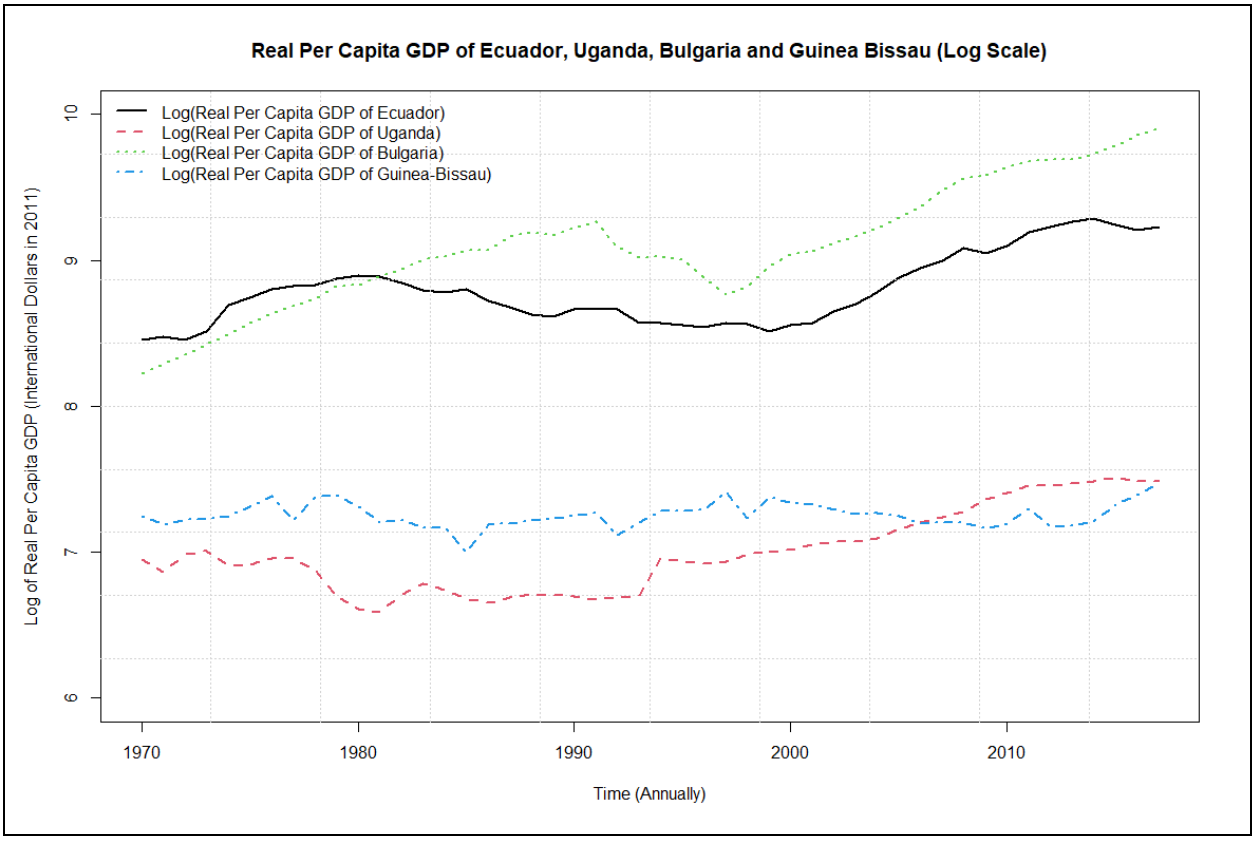
Part B: Business Cycle, Growth, and Inequality

Q1) What are the complete names of the four countries that are represented by the three-letter codes? In the following questions, refer to the countries by their full names, not by their codes

As I have the 7th data file, my corresponding country codes are:

Country 1 (ECU): **Ecuador**	Country 2 (UGA): **Uganda**
Country 3 (BGR): **Bulgaria**	Country 4 (GNB): **Guinea-Bissau**

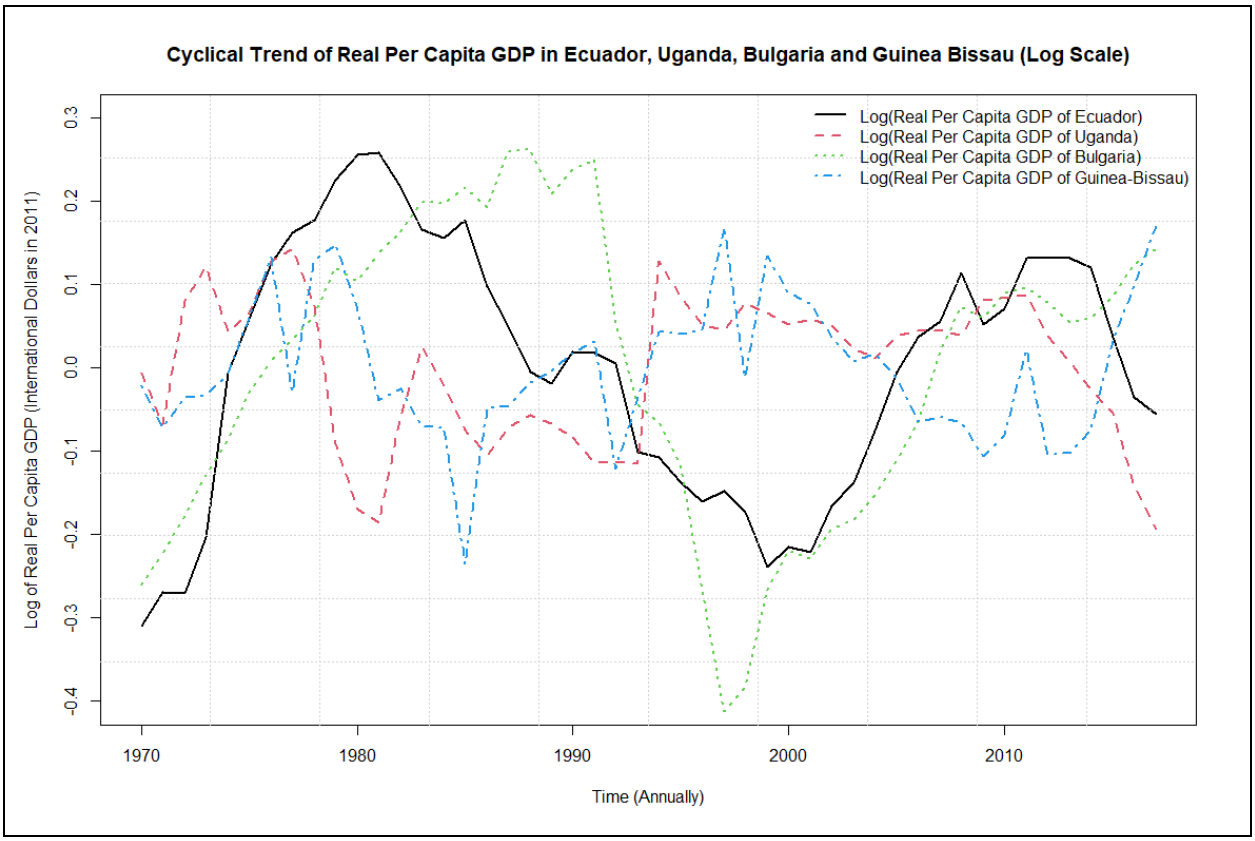
Q2) Plot the evolution of the real per capita GDP of the four countries on the same chart using the log-scale. Describe the differences and similarities that you observe.



In general, we notice that Ecuador, Uganda, and Bulgaria all have slightly upwards sloping curves which reference the fact that the GDP per capita for each is upwards trending. This is further supported by the fact the average annual GDP per capita growth for Ecuador, Uganda and Bulgaria is: 1.8%, 1.4% and 3.8% respectably. On the other hand, we see that Guinea-Bissau's slope is very flat (even getting over taken by Uganda in 2006), looking at its annual GDP growth we see it differs from the rest of the group as Guinea-Bissau's GDP per capita is 0.48%.

We see that the countries are split into two major groups, on the high end we have Ecuador and Bulgaria and on the lower end we have Uganda and Guinea-Bissau. We notice from before that the countries with the largest starting GDP per capita also have the largest growth rate. Furthermore in 1999 we notice that almost every country has its GDP per capita start to climb. We also see the Bulgaria and Ecuador share positive co-movements past 1999 as both have annual growth that seems compatible to each other. Guinea-Bissau and Uganda share negative co-movements in 1999 as when the GDP per capita of Guinea Bissau is increasing the GDP of Uganda is decreasing.

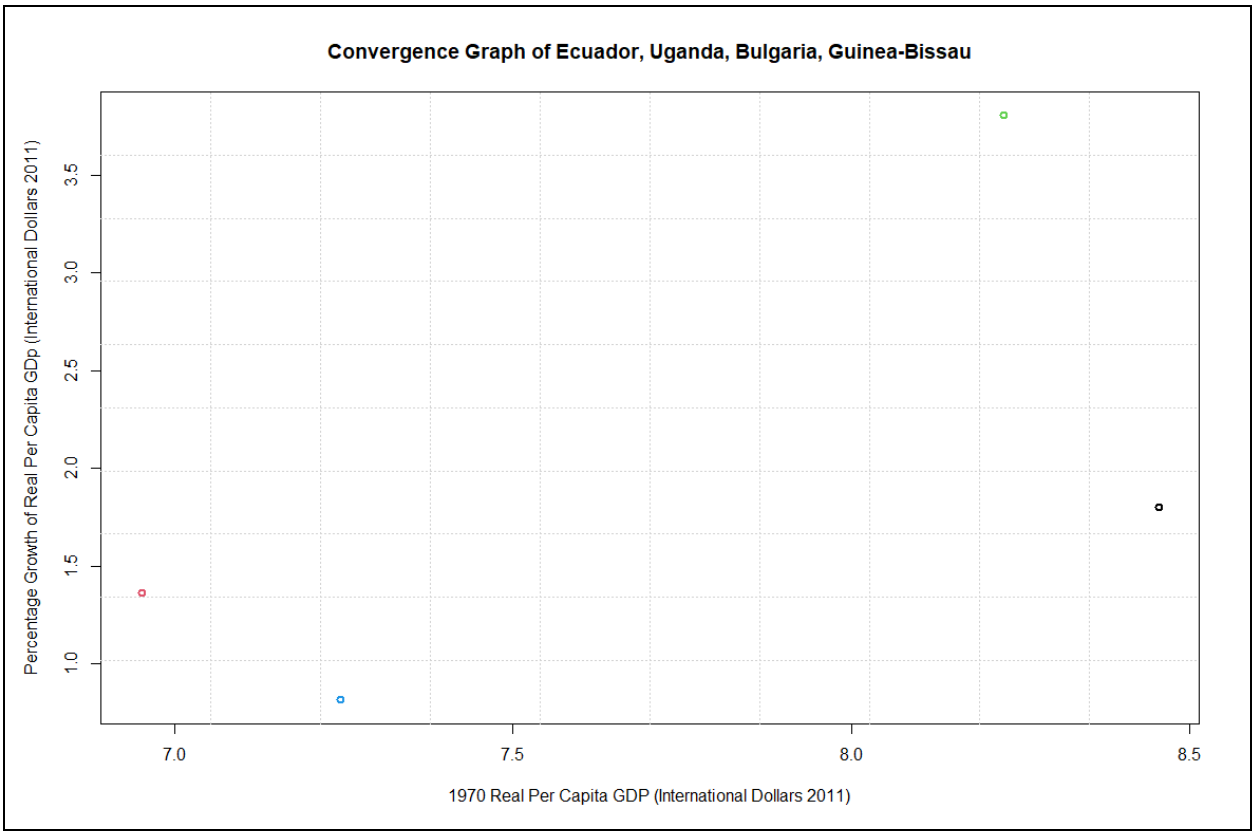
Q3) Compute the cyclical component of each series expressed in logs using a quadratic trend and plot them on either 4 different line charts or on the same one. The choice is yours and it depends on which option provides a clearer approach to compare the cycles.



We see that there is a positive co-movement within the cyclical trend of Ecuador and Bulgaria. This is seen as they both have upwards sloping curves from 1970-1980, 2000-2010 and downwards trending curves from 1990-1998. There is a positive co-movement within the cyclical trend of Uganda and Guinea-Bissau, they are lower than average from 1978-1990 and are above average from 1995-2001. Therefore, we can see that Uganda and Guinea-Bissau have positive co-movements with each other and negative co-movements with Ecuador and Bulgaria.

There were no universal drops across all 4 countries, but we do see a major drop in 1998, which could be due to the Asian financial crisis. This would have heavily effected Ecuador and Bulgaria as some of there biggest trade partners (Russia and Brazil) saw their economies go into a free fall. On the other hand, Uganda and Guinea-Bissau were relatively unaffected as their major trade partners were in the African continent and were not nearly as affected. Looking at the WTO website we see that all 4 countries WTO members but only Ecuador and Bulgaria share an RTA (EU – Colombia and Peru), whereas Uganda and Guinea-Bissau do not.

Q4) Compute the average annual growth rate between 1970 and 2017 for all four countries. Then, produce a scatter plot with the 1970 real per capita GDP's expressed in logs on the x-axis and the average growth rates on the y-axis (you should have four points).

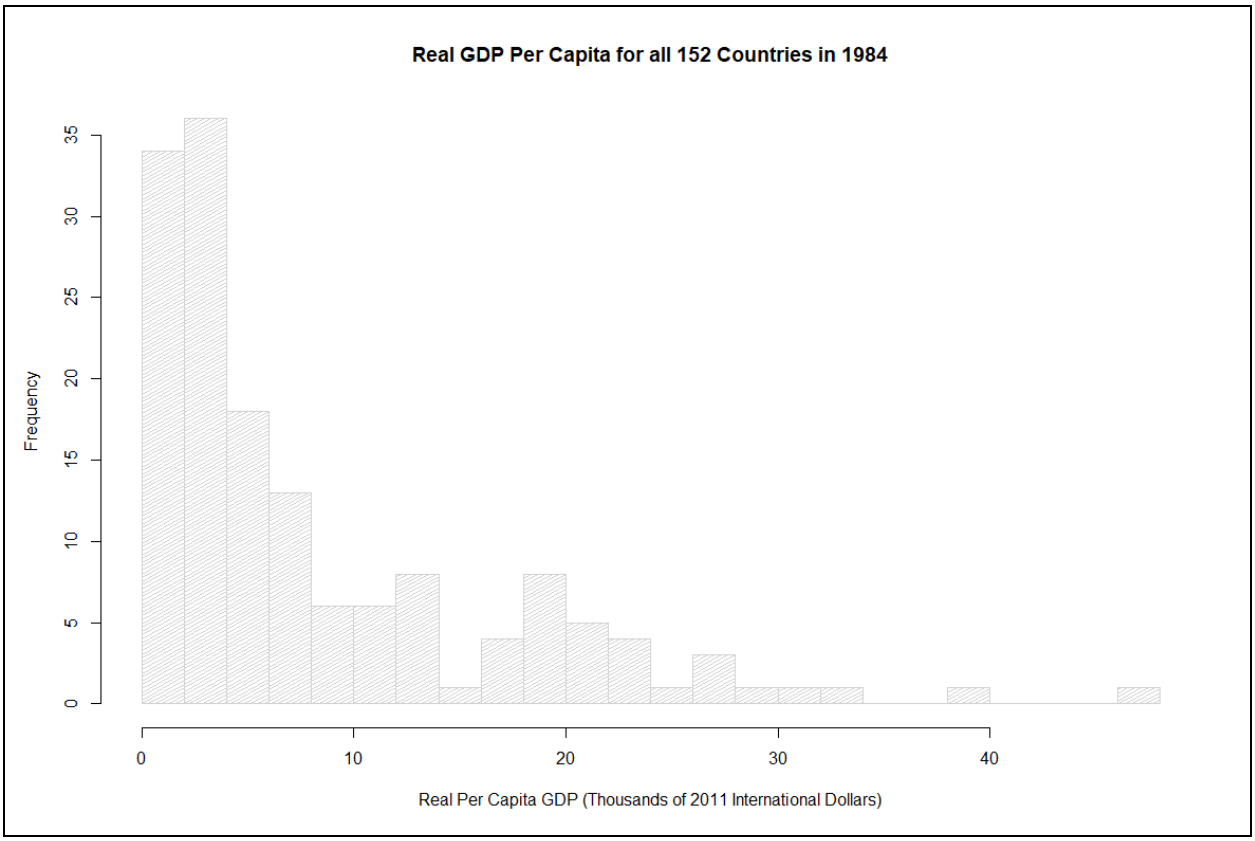


The four countries are not converging together, we do however notice that within the first group (Ecuador and Bulgaria) and second group (Uganda and Guinea-Bissau) that some conditional convergence is happening. We see this as in each group the country with the higher starting GDP in 1970 (Ecuador and Guinea-Bissau) have smaller growth rates than their counter parts. For instance, Bulgaria has an average annual growth rate of 3.8% (compared to Ecuador's 1.8%) and Uganda had an average annual growth of 1.4% (compared to Guinea-Bissau 0.8%).

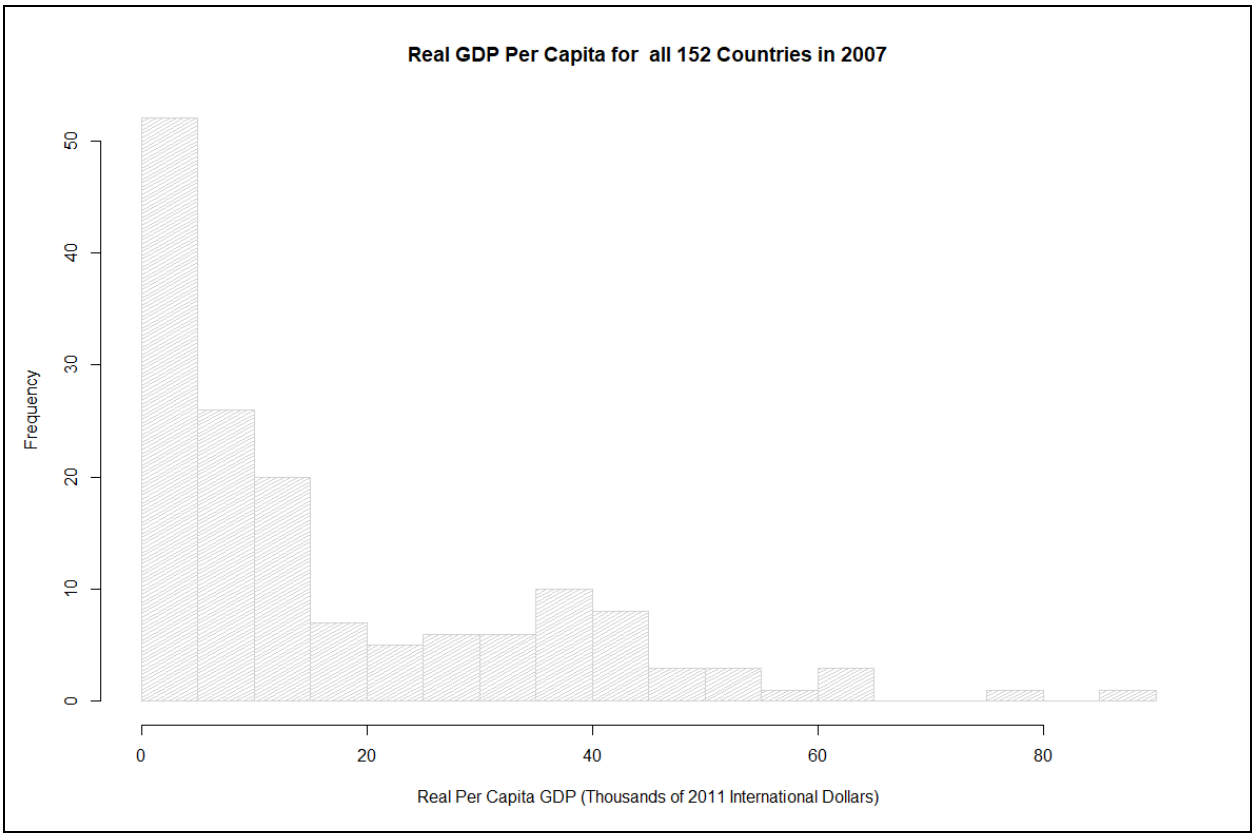
The reason that this converge could be happening is that Bulgaria has a higher life expectancy and level of literacy then Ecuador. Bulgaria has a life expectancy of 71.8 years compared to Ecuador's 66.9 years and a literacy rate of 98% which is greater than Ecuador's 92%. These factors will result in Bulgaria having a higher growth rate which over time will result in its real per capita GDP being roughly equal to Ecuador.

At the same time the same thing is happening with Guinea-Bissau and Uganda just at a slower rate. While Uganda has greater literacy rates (69% compared to 35%) and life expectancy (50 years to 47), this means it will grow at a faster rate than Guinea-Bissau but not at a rate comparable to more developed countries.

Q5) For this question, you have to compare the distribution of real per capita GDP across all 152 countries in 1984 and 2007 expressed in thousands of international dollars of 2011 (the choice of units is to make the x-axis labels more readable). Create two histograms (with 20 to 25 bars), one for each year and interpret what you see. Do you see a difference in terms of inequality? Do you see a change in the proportion of poor countries?



In the first graph we notice a large skew to the left side, where almost half the countries are below 4 thousand international dollars per capita in real GDP. At the same time, we see only a handful of countries (roughly 15) around the 20 to 30 range, and the country with the highest real per capita GDP is Cayman Islands at 48. The mean of the histogram tells us that the average country in 1984 has only 8.32 thousand international dollars per capita in real GDP. Let's compare this to the histogram in 2007:



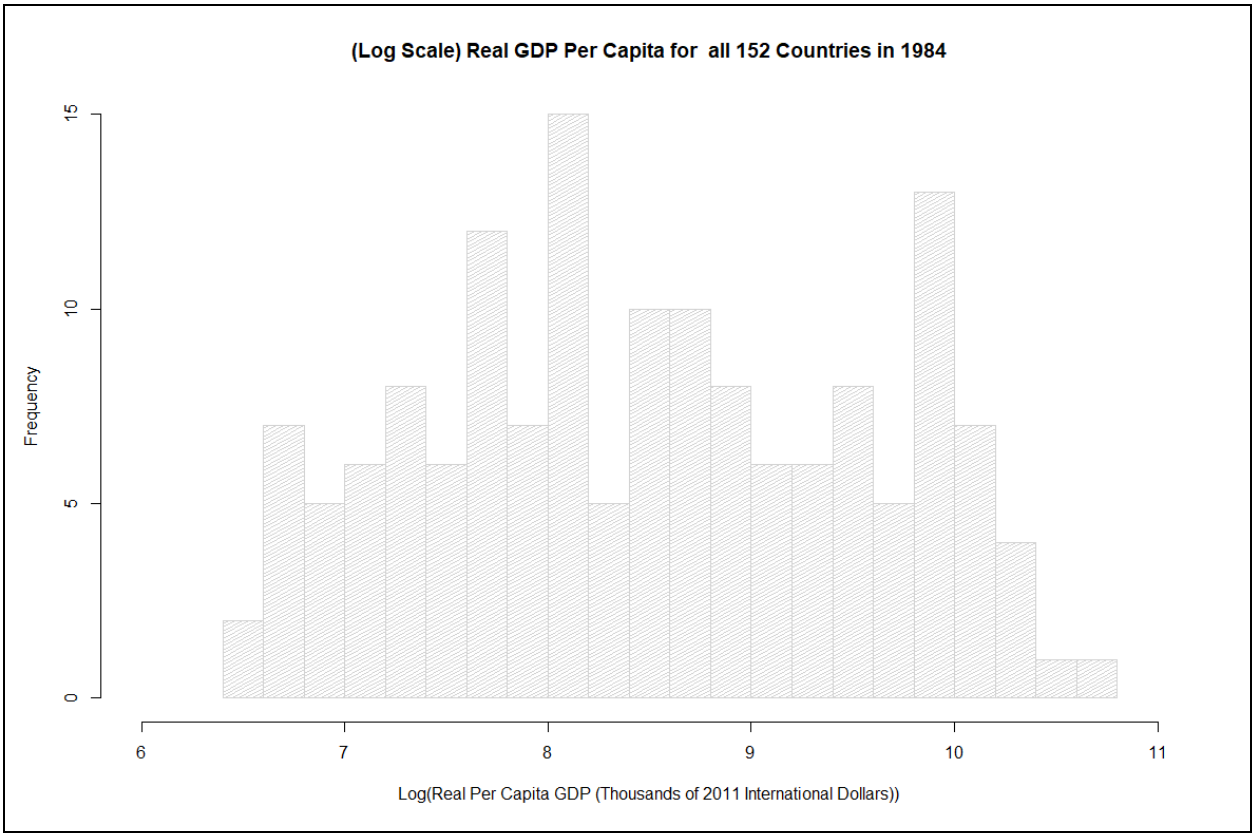
The first thing we notice about the histogram in 2007 is that there is a much larger quantity of countries within the 20 to 60 range (roughly 40). As well in comparison to 1987 now half the countries are below 9 thousand of 2011 international dollars. We also see that the upper bound has increased from 48 all the way to 87.3 by Luxemburg.

Absolute wealth of all countries is higher in 2007 then there were in 1984, this is for two reasons. The first is that the country average real per capita GDP in 2007 (16.8) is higher than the country average real per capita GDP in 1984 (8.32). The second reason is that the median is 9.4 in 2007 and 4.5 in 1984, which means that now half of the countries transitioned from being above 4.5 (1984) thousand in 2011 international dollars to being above 9.4 (2007). This doesn't portray inequality of income, so to start we will get the cumulative income share by quintile:

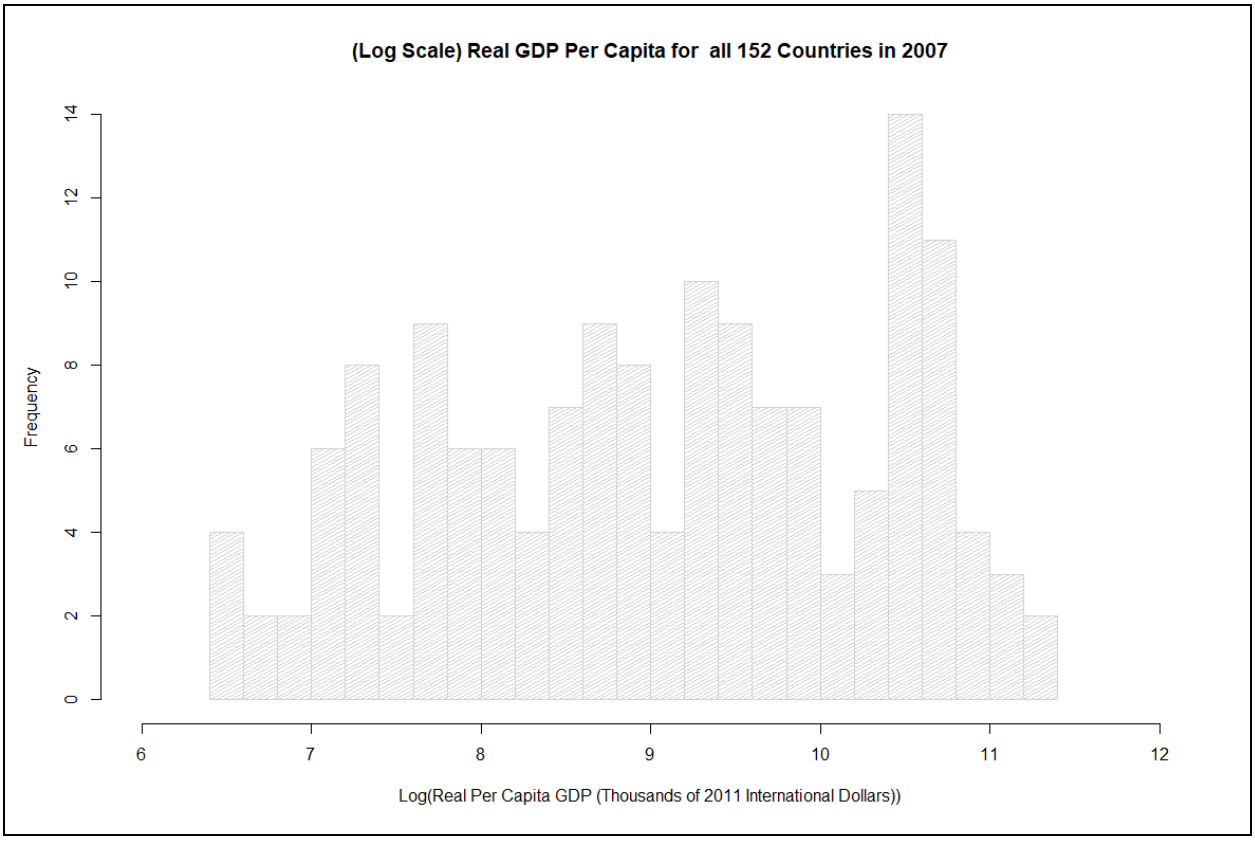
	1st Quintile	**2nd Quintile**	**3rd Quintile**	**4th Quintile**	**5th Quintile**
1984	1.42%	5.65%	13.14%	27.96%	100%
2007	0.74%	3.60%	11.03%	26.94%	100%

The Gini coefficient for 1984 is 0.607 whereas the Gini coefficient for 2007 is 0.63. The lower the Gini coefficient the more income equality there is, which means that we had higher income inequality back in 1984 then in 2007. So, while the absolute wealth might be going up, the gap between the 1st, 2nd and 4th,5th Quintile is only increasing as time goes on.

Q6) For this question, you must compare the distribution of real per capita GDP across all 152 countries in 1984 and 2007 expressed logs. Create two histograms (with 20 to 25 bars), one for each year and interpret what you see. Do you see a difference in terms of inequality? Do you see a change in the proportion of poor countries? Also, explain why the histograms are different when the real per capita GDP's are expressed in logs



The first thing that we notice about this histogram is that it seems to be centered around 8, rather then at one of the ends. We also see a relatively even distributions on the left (less then 7.5) and right (greater than 10). When reading this graph its important to note that unlike a normal graph, the difference between two bars depends not only on distance but also on location. For example, the logarithm of 4 minus the logarithm of 2 will give a much smaller answer then the logarithm of 10 minus the logarithm of 8. Moving on to the graph for 2007.



Between 1984 and 2007 the graph shifted slightly to the right, we notice a new peak at 10.5, which was not there at 10.5. We also can see that the farthest value on the right side in 2007 is almost one space away from what it was in 1984 which implies that it is double the size of what existed before. Its hard to say if there are fewer number of poor countries from 1984 to 2007 as while the graph seems to have shifted to the right, its slope seems to have become more flat and the first quintile is getting better.

Log can work on this data set to provide a new graph then what was given in question 5. Log hardly effects small numbers but massively reduces huge numbers which means that our graph can depict a graph that better shows of then in question 5.