QUESTION 1

As a brief methodological note, apart from the multiple assumptions taken to build the dataset, which hopefully are clearly explained in the code for the final data, we assume an exchange rate of c. 2500 Ugandan shilling per US dollar, we don´t allow neither for negative income households nor for households with a bigger consumption than their reported income and wealth. The rationale behind this assumption is that we understand that all types of gifts, received and given, have been considered for the building of the final database. Thus, any observation which presents a consumption bigger than the addition of its wealth and income is dropped only for this part of the analysis.

1.1. Report average CIW per rural and urban household

As expected, wealth is bigger than income, and income is larger than consumption. However, the proportions are a bit larger than the ones studied in class for Malawi. In contrast to the latter, on average, higher wealth accumulation is present in the case of Uganda (almost 4 times the amount consumed). This phenomenon is even more intense in urban Uganda than in rural Uganda, which adds to the fact that mean figures for consumption, income and wealth are larger in the more urbanised regions of the country.

Figure 1. Mean CIW, total, rural and urban Uganda

	Total	Rural	Urban
Consumption	1.034,7	899,4	1.424,1
Income	1.822,6	1.235,7	3.162,8
Wealth	3.252,1	2.433,3	5.609,6

1.2. Histograms and variance of the logs of CIW

The histograms show a series of patterns (figure 2):

a) Although with a smaller mean, the distribution of consumption is less dispersed than the distribution of wealth and, income is also less dispersed than wealth.
b) The distribution of income and wealth are downward sloping, that is, most of the mass is accumulated in the very lower values. If we apply logs (check code for histograms), they present, as usual, a hump shape.
c) In any of the CIW categories, the urbanised regions present higher means but also higher dispersion

After applying logs, we can compute variances. As it happened in the case of Malawi, log variance of wealth is larger than that of income and the variance of log income is larger than the variance of consumption (figure 3). Not surprisingly, consumption variance is very small, but income and wealth variance present higher values, which could point to higher levels of insurance in Uganda.

Figure 3. Variance of log CIW, total, rural and urban Uganda

	Total	Rural	Urban
Consumption	0,46	0,39	0,47
Income	1,73	1,47	1,85
Wealth	2,43	2,03	3,29

Figure 2. CIW histograms for rural and urban Uganda
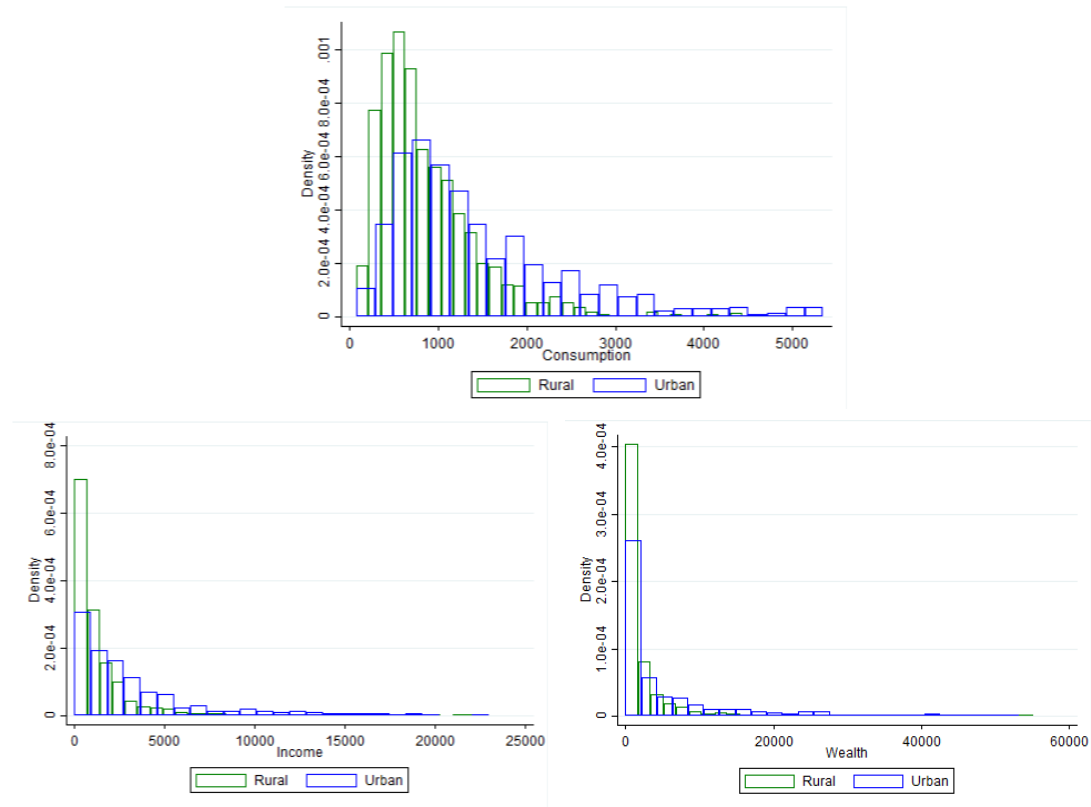
1.3. Cross-sectional behaviour of CIW

Figure 4 shows that the correlation between consumption and wealth and income is stronger in the case of Uganda than in the case of Malawi, which could point to less redistribution. However, the correlation between income and wealth is still reduced, which could suggest that positive income shocks are not sustained in time and therefore, wealth accumulation effect does not dominate.

Figure 4. Correlations between CIW, total, rural and urban

TOTAL	Consumption	Income	Wealth
Consumption	1,0000		
Income	0,5542	1,0000	
Wealth	0,5750	0,3080	1,0000

RURAL	Consumption	Income	Wealth
Consumption	1,0000		
Income	0,5432	1,0000	
Wealth	0,5002	0,2244	1,0000

URBAN	Consumption	Income	Wealth
Consumption	1,0000		
Income	0,5574	1,0000	
Wealth	0,5791	0,2781	1,0000

1.4. Lifecycle levels and variances for CIW

Due to the lack of sufficient observations for ages greater than 60 (the average life expectancy in Uganda is 59 years) and smaller than 20, we will drop those observations in the following analysis. Additionally, we need to consider that ages are determined by the head of the household, consequently, it is likely that old households´ income comes from the work of the younger generations attached to the household. These two factors contribute to the absence of the typical hump pattern in terms of consumption and income. However, figure 5 clearly shows that, while young, household income is low, and it barely provides sufficient resources to maintain consumption. It is with the ageing of the household (which will likely suppose a bigger family, and sons that can contribute with their labour) that its income and wealth increases. In this case, although levels tend to be higher in the urban regions, the pattern of mean lifecycle consumption, income and wealth is very similar in urban and rural regions.

In terms of inequality (figure 6), for income and wealth it mostly remains constant over the lifecycle, which could be related to the explanation previously given about the permanent effects of income: as income presents a negligible permanent component, dispersion over the lifecycle is linked to the transitory shock, which is not dependant on the age of the household head. Thus, although wealth levels may increase, its dispersion will not change with age. Consumption inequality slightly increases in rural areas, which resembles the pattern of some developed economies, contrasting with the previously given explanation.

1.5. Wealth and consumption of the top and bottom 10% of the income distribution

As it was the case for Malawi, consumption and wealth differences between the bottom and top 10% of the income distribution are relatively close. In the case of Uganda the top 10% have almost 4 times more consumption and wealth than the bottom 10%, which clearly contrasts with the proportions shared in multiple developed countries.

Figure 7. Mean consumption and wealth of the top and bottom 10% of the income distr.

	Bottom 10%	Top 10%
Consumption	548,3	2.045,3
Wealth	1.939,3	8.411,7

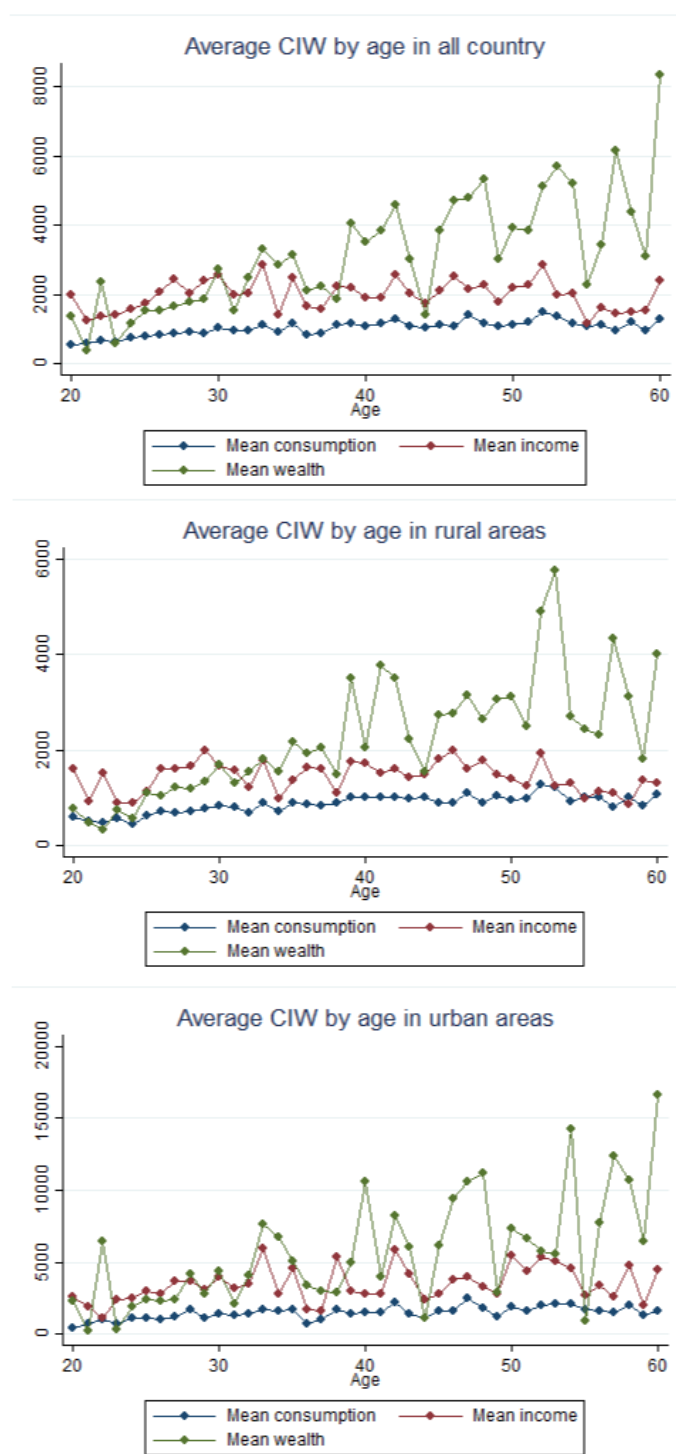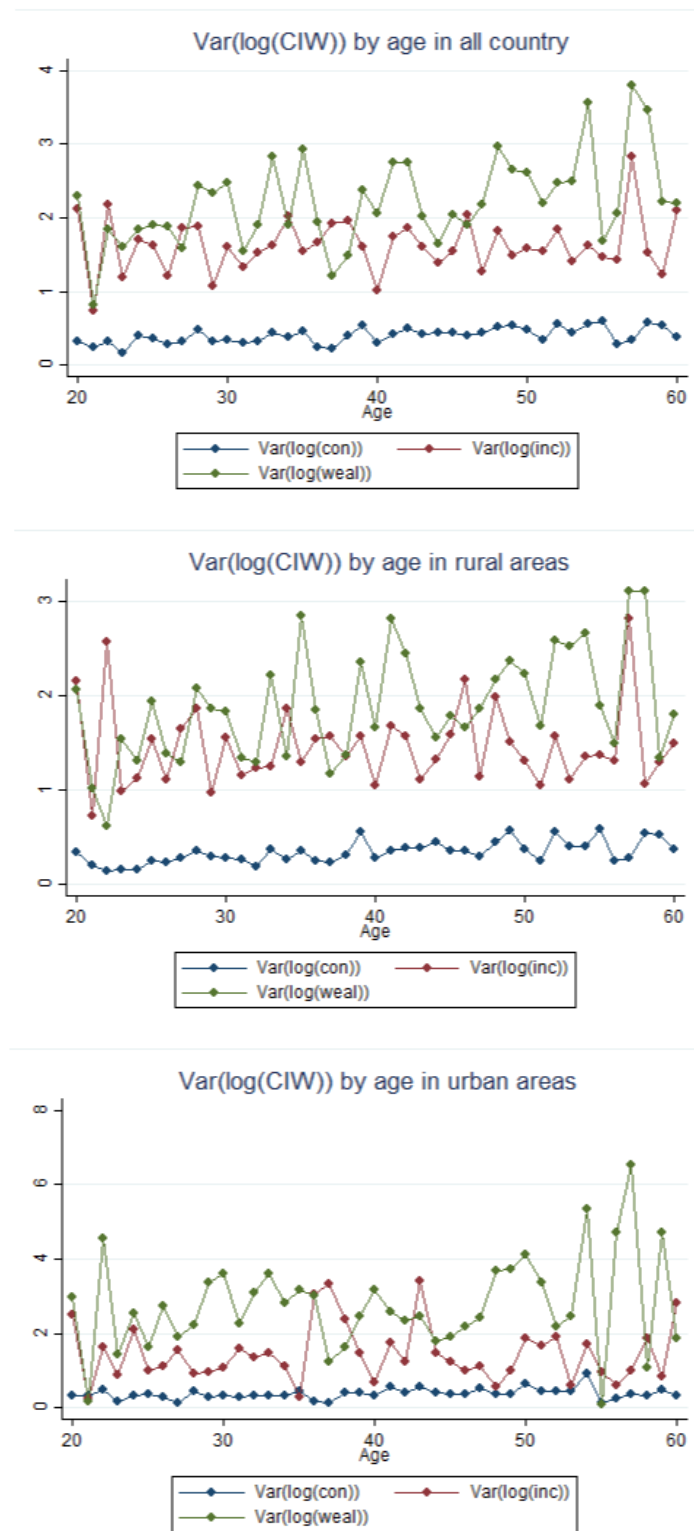*Figure 5. Mean CIW by age, total, rural and urban*

Figure 6. Variance of log CIW, total, rural and urban

QUESTION 2

In order to avoid the inconsistencies linked to the imputation of the hours dedicated to farming activities, we will focus the following analysis in the labour supply for the main and second job and, in particular, in the intensive margin (measured in yearly hours) of the household.

2.1. Redo question 1 for intensive and extensive margin

Probably because rural areas allocate a larger (both in intensive and extensive terms) fraction of the workforce to farming activities, both the intensive and the intensive margins of labour supply are bigger in the urban than in the rural areas (figure 8)

Figure 8. Intensive and extensive margin, total, rural and urban

|	**Total**	**Rural**	**Urban**
Intensive Margin (hours)	1.781,1	1.474,8	2.481,9
Extensive Margin (%)	49	46	59

In relation to the increasing importance of labour income in the total income of urbanised regions, figure 9 shows that urban regions present a stronger correlation between the number of hours worked and total income earned by the household.

Figure 9. Correlation between Intensive Margin and CIW

|	Total	Rural	Urban
Consumption	0,26	0,14	0,24
Income	0,56	0,48	0,59
Wealth	0,12	0,05	0,07
Intensive Margin	1,00	1,00	1,00

In what refers to the distribution of working hours, in figure 10 it can be seen that, while urban regions show something close to a double hump shape (most of the households work close to 0 hours but there is an important mass accumulation in the 2.000 yearly hour region), urban regions present a clearly decreasing trend, which is consistent to the fact that rural regions rely more on the farming activities and urban regions start to present a working class whose main activity is non-agricultural.

Figure 10. Intensive margin histogram
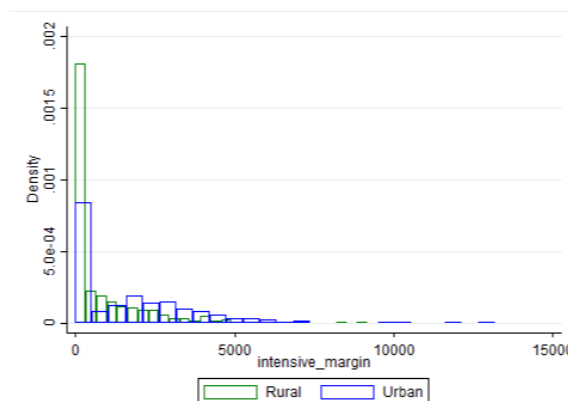
Finally, as showed in figure 11, the average intensive margin does not vary considerably over the lifecycle, if anything, it rapidly increases for young households and stabilises around 1.400 hours and then decreases slightly with age.

Figure 11. Intensive margin lifecycle
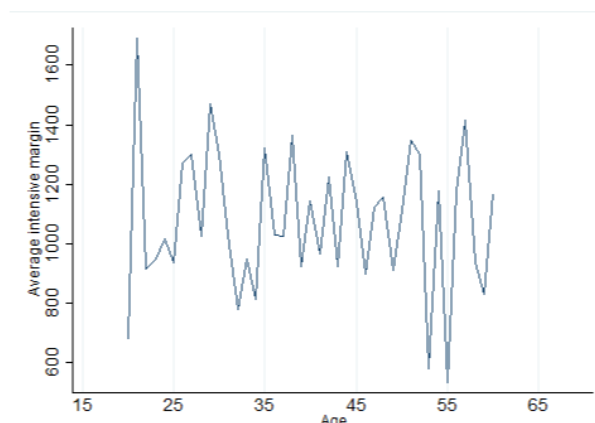
2.2.1. Gender based analysis

For this analysis we eliminate all those observations in which the sex of the head of the household is not defined. As a result, there are differences in the levels previously presented, while consumption remains similar, income increases and wealth decreases.

On average, males present larger consumption, income and wealth, both in rural and urban areas. However, in contrast to popular knowledge, differences are small: only in the case of wealth they are c. 10% bigger for males than for females. In order to interpret this data, we need to highlight that the unit of measure is the household and, consequently, from this analysis little can be extracted in terms of differences by sex. That is, although the head of the household could be a female, the main contributors to income could be males (her sons, for example) and so, little can be said about genre inequality from this analysis.

Figure 12. Mean CIW and labour supply by sex and region

|	Total		Rural		Urban	
	Male	Female	Male	Female	Male	Female
Intensive Margin	1.692,3	1.686,3	1.425,7	1.370,68	2.353,1	2.290,6
Extensive Margin	0,495	0,503	0,46	0,46	0,59	0,591
Consumption	1.094,8	1.028,7	964,9	849,14	1.416,8	1.372,6
Income	2.210,4	2.084,7	1.686,4	1.508,4	3.508,8	3.188,3
Wealth	2.694,7	2.852,3	2.133,5	2.012,1	4.085,2	4.461,3

In what refers to the distributions of CIW and labour supply, they are fairly similar for female and male (check code and histograms by gender). If anything, it is remarkable that the 2 peak shape previously described for intensive margin in urban areas is even more clear in the case of males (figure 13). The main story I can come up with is that, while male-headed households are fully employed or unemployed (the dad has a yearly 2.000-hour job or does not have any job), female-headed households are willing to accept smaller jobs that ensure a certain amount of work and income.

Figure 13. Intensive margin histogram in urban areas. Gender analysis
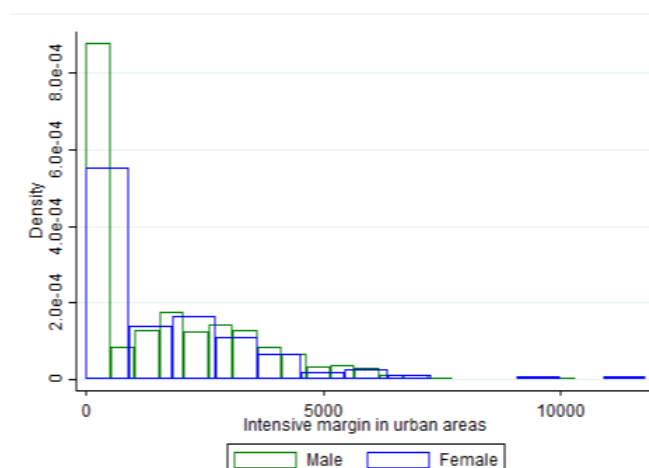
Finally, in terms of lifecycle effects (figure 14), we can now clearly see how female consumption over time remains much more stable while male consumption rapidly increases until the age of 40 and then stabilises. It is remarkable, however, that we are not able to identify the typical hump pattern. The reason is that, as life expectancy is very short (age 60), there is no decrease linked to retirement effects and decreases in income.

Figure 14. Consumption. Gender analysis
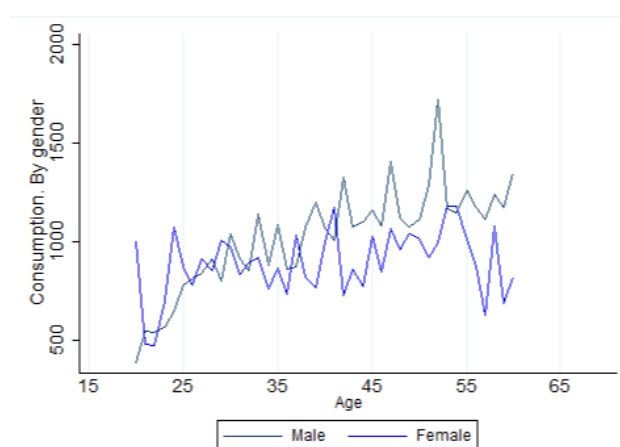
2.2.2. Education based analysis

For this analysis we eliminate all those observations in which the education level of the head of the household is not defined. As a result, there may be small differences with the measures presented in previous analysis. On the other hand, because of the lack of sufficient observations in each education category we will focus the following analysis in terms of levels more than in terms of inequality.

We consider three education levels: Educ I (less than primary studies), Educ II (between primary studies and high school studies) and Educ III (high school studies or more).

From figure 15 it can be addressed the relation between education, location (urban/rural) and CIW and labour supply. As it can be clearly seen, higher levels of education pay-off more (in terms of income and wealth) in urban regions than in rural regions. Probably due to the fact

that higher education levels translate into higher wages in non-agricultural labour but not so much in farming jobs, individuals with high school studies present a much larger income increase in the city than in rural areas

Figure 15. Mean CIW and labour supply by education and region

	Total			Rural			Urban		
	Educ I	Educ II	Educ III	Educ I	Educ II	Educ III	Educ I	Educ II	Educ III
Intensive Margin	1.433,9	1.730,0	2.193,8	1.261,1	1.420,5	1.832,6	2.200,2	2.417,1	2.550,9
Extensive Margin	0,48	0,50	0,52	0,46	0,46	0,46	0,59	0,59	0,59
Consumption	927,0	1.140,6	1.450,9	876,9	1.038,1	1.172,2	1.149,3	1.367,9	1.726,4
Income	1.593,2	2.424,4	3.358,6	1.377,5	2.028,4	2.375,4	2.549,8	3.303,6	4.330,5
Wealth	1.766,5	3.080,3	4.807,1	1.499,8	2.471,1	3.909,8	2.949,2	4.432,9	5.694,1

The lifecycle analysis presents some hints aligned with this story: the households with the highest education levels are the ones working higher hours in non-agricultural activities (figure 16), this specialization results in consistently higher income levels, which is key for the larger wealth accumulation. Those households with intermediate education levels or no education levels present much closer values, both in terms of hours worked (figure 16) and total income (figure 17).

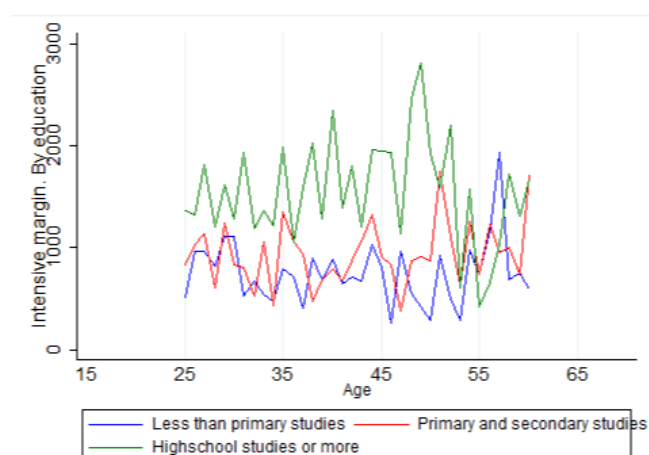*Figure 16. Mean intensive margin, lifecycle by education*

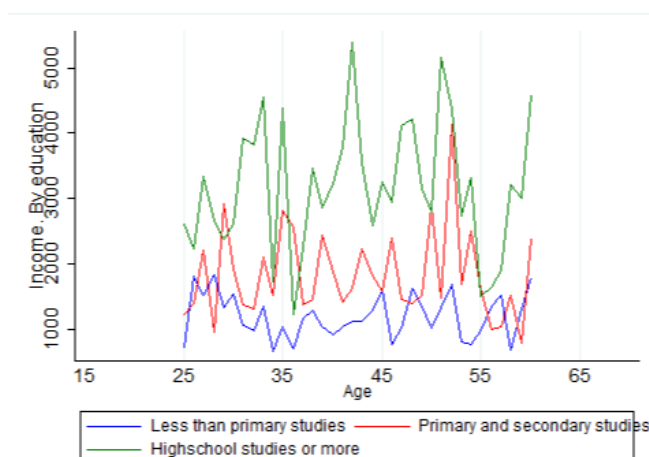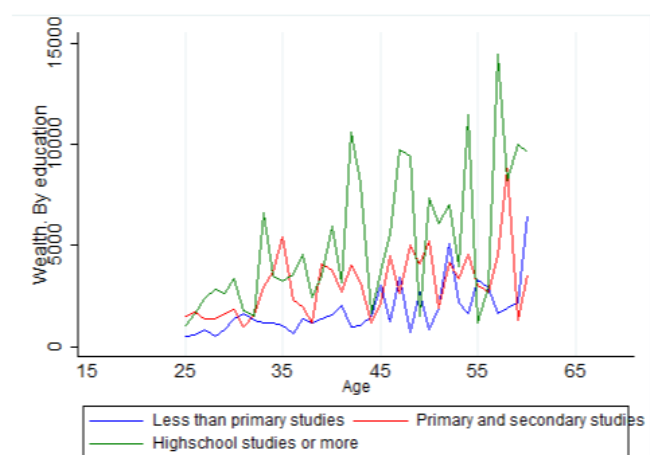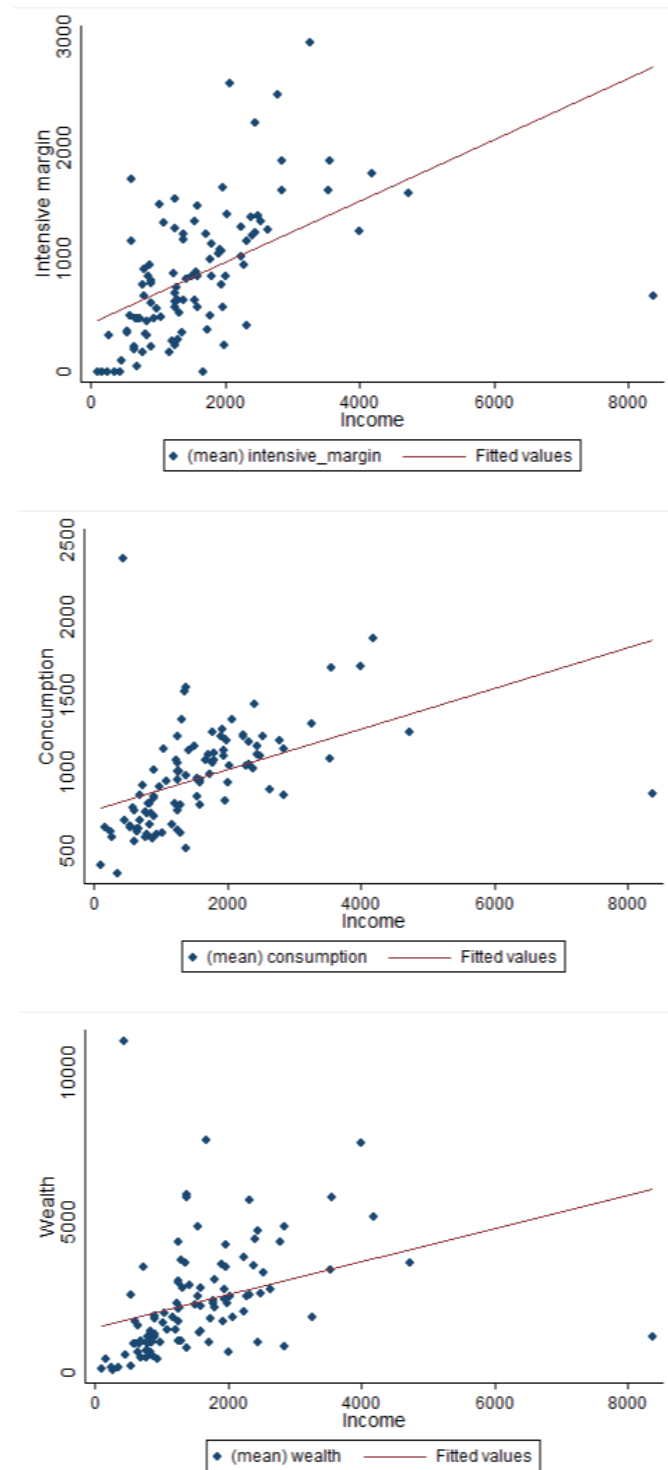*Figure 17. Mean income, lifecycle by education*

*Figure 18. Mean wealth, lifecycle by education*

QUESTION 3.

3.1. Plot the level of CIW and labor supply by zone (or district) against the level of household income by zone.

Mean intensive margin, consumption and wealth increase in those districts in which average household income is larger

3.2. Plot the inequality of CIW and labour supply by zone (or district) against the level of household income by zone.

While consumption and wealth inequality remain similar among all districts (or at least the don´t show any clear relation with the level of income of each district), the inequality in the number of hours worked and in income itself increases with the average income level.
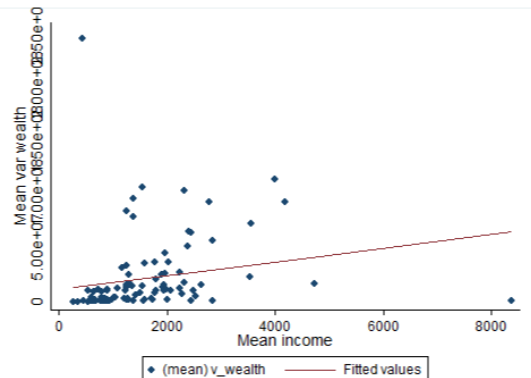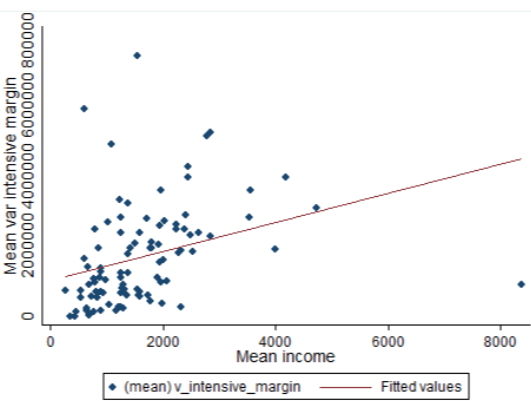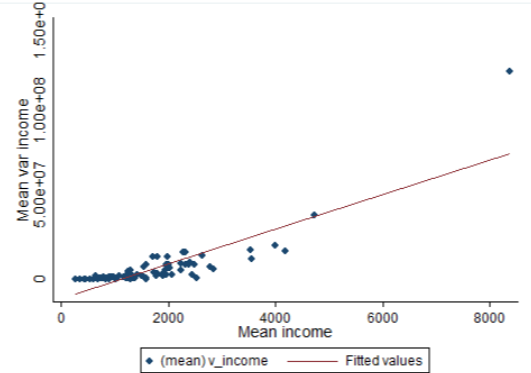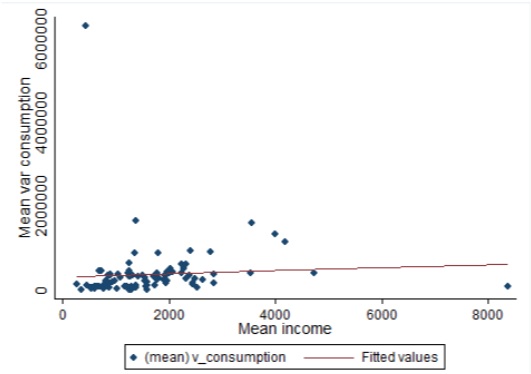
3.3. Plot the covariances of CIW and labour supply by zone (or district) against the level of household income by zone.

Although multiple correlations could be plotted, we will focus on 3: the correlation between consumption and income, the correlation between consumption and wealth and between intensive margin and consumption. In all three cases, correlation intensity increases with the average household income. However, the correlation between consumption and income (and the intensive margin and consumption) is negative for some poor districts, which makes the overall effect close to 0. This could suggest that insurance in the poorest regions is stronger than in those relatively richer.
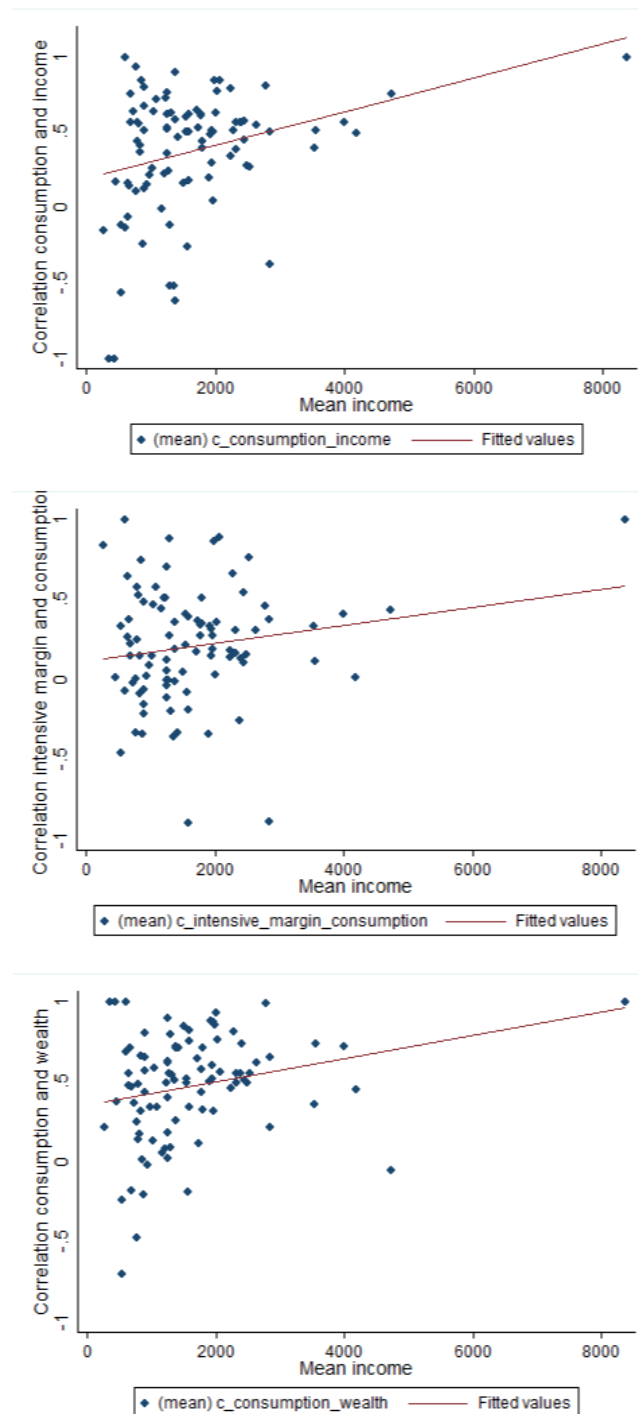
3.4. Reproduce the Bick et. al (2018) analysis between individual vs. country income, and individual hours-wage elasticity by country in Uganda. Instead of "country" use districts/zones in Uganda

My feeling is that income from agricultural sources (farming, hoarding, keeping, etc.) is more unpredictable than income from conventional jobs. However, the number of hours it commands is nothing but small. Intuitively, this could distort the intended analysis about the hours-wage elasticity. As a result, I propose an alternative exercise focused only on wages or labour income from the main and secondary jobs and the hours invested in those jobs (see code). The results show a positive relation between average wage per district and total hours worked per district. However, in the 95% it cannot be rejected that the elasticity is 0.