Development Economics: Homework 1

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1 Inequality in consumption, income and wealth.

1.1 Average of CIW.

Table 1: CIW in Uganda, 2013-2014

	Uganda	Rural Uganda	Urban Uganda
Income per housedold	1,485	1,073.422	2,746.722
Income per capita	374.891	236	800.73
Consumption per household	740.16	640.92	1,044.38
Consumption per capita	182.4529	153.3254	271.74
Wealth per household	2,517.757	1,661.28	5,143.33
Wealth per capita	595.8125	373.48	1,277.38
Sample size	3,011	2,247	764

Table 1 shows the results for average levels of annual consumption, income and wealth in Uganda, using LSMS-ISA data for the year 2013-2014. The numbers have been converted to represent 2019 USD. Even if I dropped those outliers that made no sense (i.e. households with a ridiculous amount of consumption compared to their income level), there are still some important outlier in urban areas that yield very high results for income and wealth. However, given that most of the sample is rural, the averages for overall Uganda do not suffer so much from this.

Comparing to the results for Uganda in 2010, the main difference arises in consumption. This is most likely due to the fact that I am using the constructed consumption-regional price adjusted variable provided by the World Bank. In spite of the outliers, which are probably due to my data-cleaning process, the results seem to be in line with what we saw in class.

First of all, the Rural-Urban divide is also present in Uganda and consumption, income and wealth are much lower in rural areas. However, the most striking difference is that, in the 2010 data, consumption per household and per capita is always greater than income, both for Malawi, Tanzania and Uganda. However, here we see the opposite. Given the plausibility of the rest of my results (except for the urban outlier), I believe this should be due to the consumption measure used. Alternatively, this could be pointing to a market failure that prevents households from consuming more than their income at any point, and thus they are forced to save and this could, partially, explain the levels of wealth. Furthermore, notice also that urban households consume a lower share of their income (38% vs 59%) which could be suggesting that rural households have other ways of insuring themselves (i.e. gifts and help by neighbours) that allows them to consume more of their income. The same happens for per capita consumption. Once again, this could be due to the measure of consumption used but, given the data, the above explanation does not seem entirely wrong.

1.2 Inequality in CIW

Figure 1: Log(CIW)

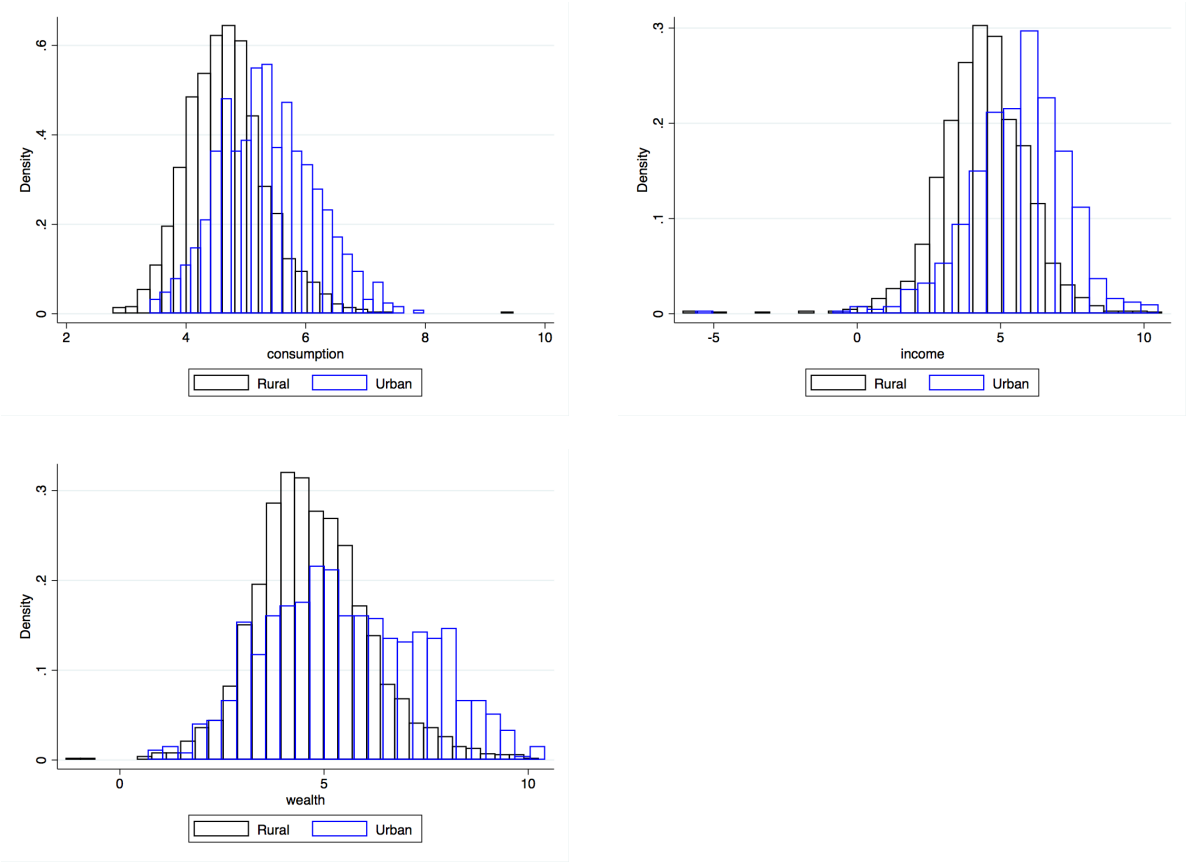


Figure 1 represents the histogram for Log(CIW) per capita in Uganda 2013-2014. From them, it is visible that I have some important outliers I have not been able to spot yet. Nevertheless, the results are quite similar to those for Malawi. Particularly the one for consumption, which, as in Malawi, shows both a higher mean and more dispersion in urban areas. The pattern is the same in income. However, the highest dispersion with respect to the rural areas is found on wealth. This is in line with our class discussion: in urban areas there is more inequality. The next table confirms this finding with the variance of logs.

Table 2: CIW inequality Uganda, 2013-2014

Var. of Logs	Uganda	Rural Uganda	Urban Uganda
Consumption	.54	0.46	0.79
Income	2.59	2.29	3.52
Wealth	2.47	1.96	3.99

The results in Table 2 confirm that the inequality in consumption, income and wealth is much higher in urban areas than in rural areas. All are per capita variables. The values do seem a bit large as compared to what would be expected, but given the sensitivity of the variance of logs to outliers, I believe this is due to the presence of the spotted outliers in the histogram. This makes

difficult to compare the situation to the US as we did in class, since with these numbers both income inequality and wealth inequality are much higher than in the USA. Given this problem, I am not confident enough with my results to compare them to the USA. Thus, take these results with a pinch of salt because even if the direction of the variances seems in line with what would be expected, the number themselves can be slightly biased because of my data-cleaning procedure.

Nevertheless, the main finding in this part is that, urban areas are more unequal than rural areas. Furthermore, it is striking that in rural areas there is much more inequality in income than in wealth, whilst the opposite is true for urban areas. The only reason I can think off is that in rural Uganda, agricultural income must vary a lot (i.e. farms of different sizes, productivity of the soil...) even if households are more similar in terms of wealth. And this is at odds with the finding for Malawi: in both cases wealth inequality was larger.

1.3 Joint Cross-Sectional Behavior of CIW

Table 3: Log(CIW) correlations Uganda, 2013-2014

(a) Uganda

	C	W	I
C	1		
W	0.57	1	
I	0.61	0.47	1

(b) Rural Uganda

	C	W	I
C	1		
W	0.53	1	
I	0.51	0.41	1

(a) Urban Uganda

	C	W	I
C	1		
W	0.56	1	
I	0.67	0.45	1

Table 3 shows the correlations between the log of CIW. The correlation between income and consumption follows the similar pattern as in Malawi. The correlation is much higher in urban areas than in rural areas. The same happens for the correlation between income and wealth and consumption and wealth. Maybe, this could be in line with our discussion of section 1.1. Take for instance the correlation between income and consumption, which tells us that in urban areas consumption and income move in the same direction by more than in rural areas. AS a result, urban residents do not smooth so much their level of consumption. For instance, if they experience an increase in income they will increase their consumption by more than in rural areas.

1.4 Discussion over the life-cycle

Figure 2 represents the evolution of log Consumption, Income and Wealth over the life-cycle. The figures shown represent the mean values of this variables for each each group. Given the presence of outlier, it is very difficult to interpret the results from these graphs. However, if we try to focus on the trend, it does seems that the variables follow the expected pattern. Wealth is the one that can be more easily seen: wealth increases with age. Also, income increases with age but falls in the final years. The same seems to happen with consumption, whilst wealth would seem to increase with age. Hopefully, this will seem more clear with the correlations shown in Table 4.

Figure 2: CIW over the lifecycle

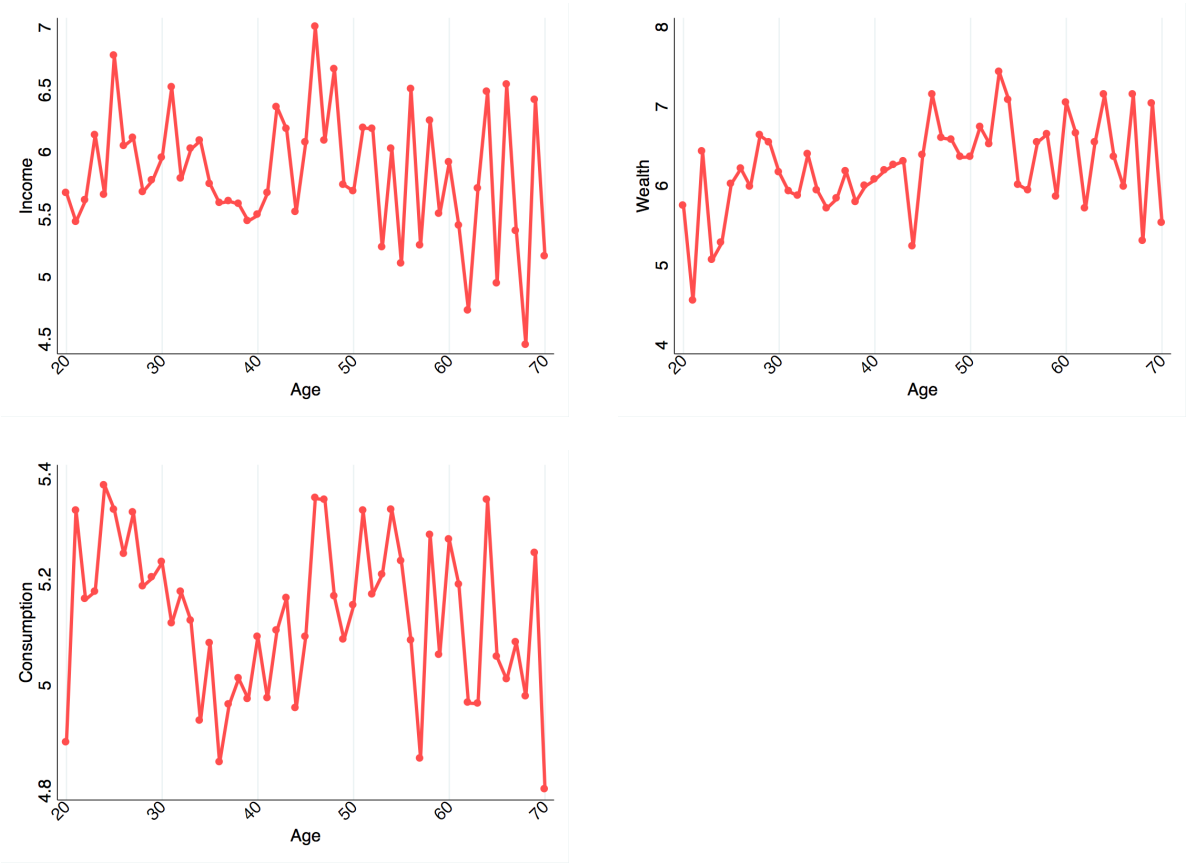


Table 4 shows the correlations betweeen log(CIW) and age. Any difference with Table 3 are due to the fact that this table only uses individuals ages 20-70. Now, for overall Uganda, it does seem that consumption falls slightly with age. However, this is nos true for rural vs urban. In rural Uganda, the correlation is positive whilst in urban areas it is negative. This can be done to our previous discussion regarding consumption smoothing in urban vs. rural areas. However, from Figure 1, the spotted outlier for consumption is actually rural, thus, it may be that it is confounding the results. However, the values are relatively small which would suggest a high degree of consumption smoothing and, at most, a small fall with age. As in the case of Malawi, it seems that wealth tends to increase with age, and this phenomenon is even higher in urban areas. In any case, the increase in wealth with age is much lower than for the US.

Table 4: Log(CIW) correlations Uganda, 2013-2014

(a) Uganda

	C	W	I	Age
C	1			
W	0.57	1		
I	0.0.63	0.47	1	
A	-0.0166	0.1512	-0.1108	1

(b) Rural Uganda

	C	W	I	A
C	1			
W	0.53	1		
I	0.5226	0.41	1	
A	0.0639	0.1617	-0.0827	1.0000

(a) Urban Uganda

	C	W	I	A
C	1			
W	0.56	1		
I	0.67	0.46	1	
A	-0.09	0.21	-0.11	1

Finally, Figure 3 shows the evolution of log CIW along the life cycle. Again, given the peaks and trough it is difficult to make a certain assessment. However, it does seem that inequality in consumption increases with age and then falls and the degree of inequality is much lower than for income and wealth. For these two, there does not seem to be big changes and there is probably an increase during prime age and a slight decrease after.

Figure 3: CIW over the lifecycle

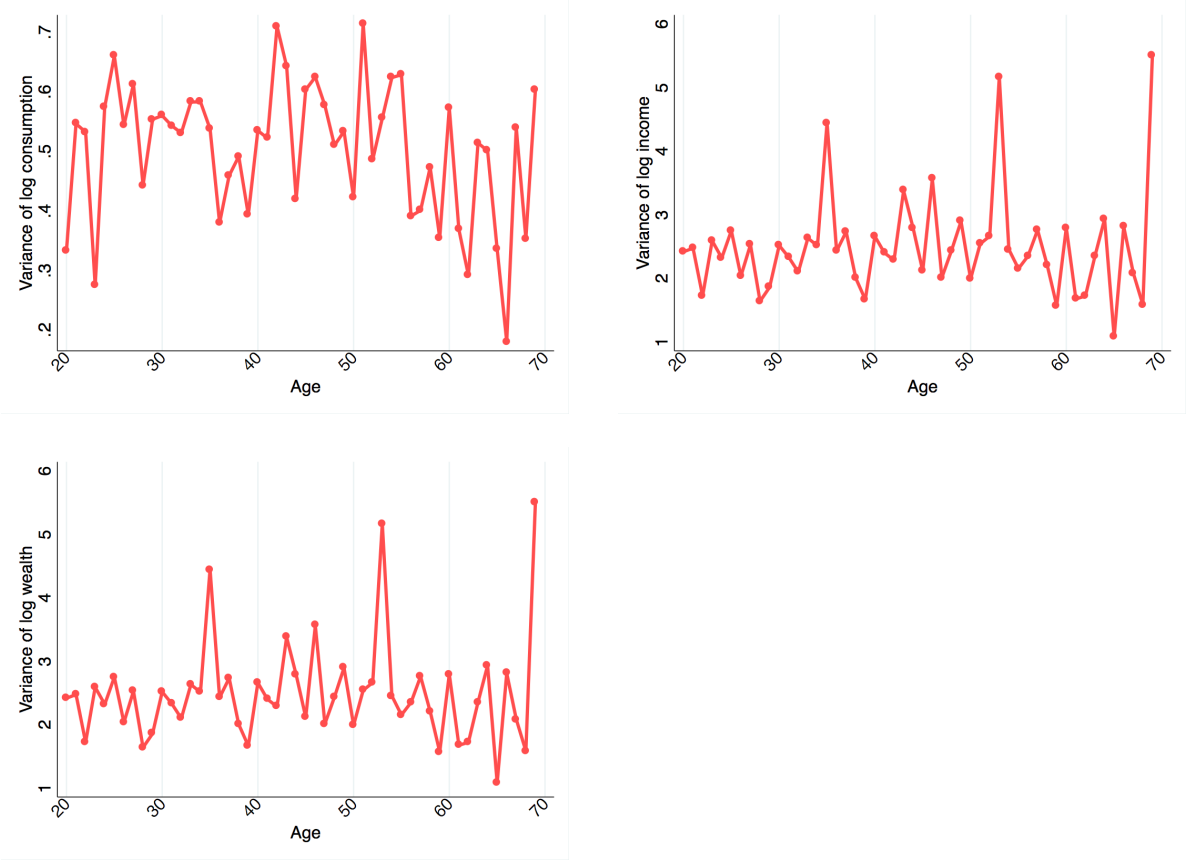


Table 5: Income distribution

	Bottom (%)			Quintiles					Top (%)		
	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1
Consumption	1. 5	4.6	2.5	11	12	14	20	42	13	14	4
Wealth	1.7	1.8	1.13	6	6.4	11	19	57	14	20	8

1.5 Behavior of bottom and top 1%

2 Inequality in Labor Supply

2.1 Average Labor Supply

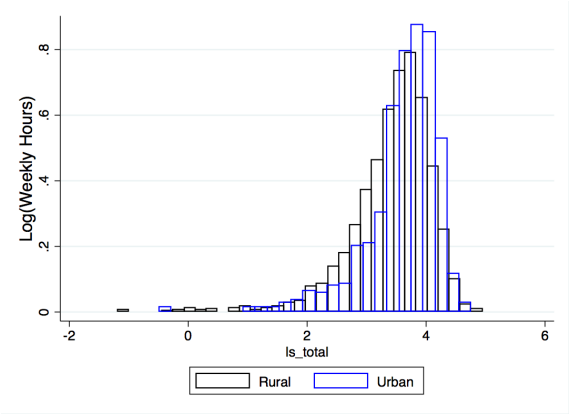
Table 5 shows the mean weekly hours worked for household-heads aged 15-70. Labor supply has been computed as the addition of agricultural labor supply (i.e. hours worked in their plots) and non-agricultural labor supply. The results are similar to the ones discussed in class. In Uganda, hours worked are much higher than in high income countries, and they are much higher in urban areas. The numbers are high as compared to the ones discussed in class, probably because I am considering both agricultural and non agricultural hours worked. It is also worth noting that inequality, as measured by the variance of log weekly hours, is slightly higher in urban areas. The reason could be that in rural areas, the agricultural work is the main labor supply and the required amount of time required is not so different. Notice the high numbers of the extensive number, since I am computing the share only with respect to household heads and not overall population.

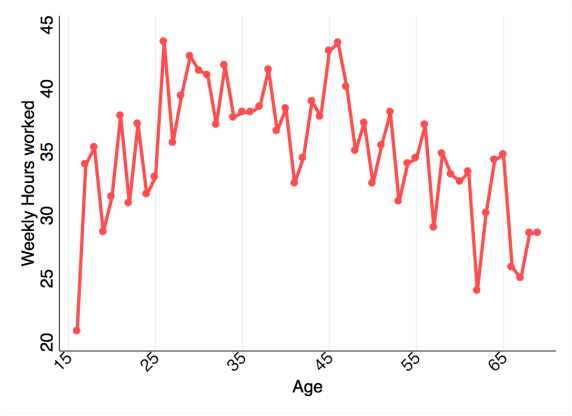
Table 6: Labor supply in Uganda, 2013-2014

	Uganda	Rural Uganda	Urban Uganda
Weekly hours	37	36. 87	38. 82
Extensive Margin	0.91	0.97	0.91
Variance of logs	0.44	0.44	0.46
Sample size	2,843	2,088	755

Figure 4 plots the density of log weekly hours (left), the life cycle profile of weekly hours worked (right) and inequality in weekly hours in the life cycle (bottom). First of all, regarding the distribution, one can see that the distribution is much more disperse in urban areas and it is also centered at a higher mean. For the labor-supply along the life-cycle, the pattern is fairly standard: hours work increase with age, until 50 years old more or less and then they start falling. As for inequality, it seems to increase slightly with age and peak at the end of working life.

Figure 4: Labour Supply





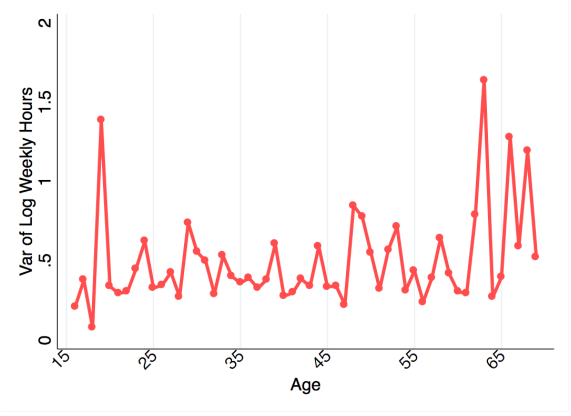


Table 6 shows the correlations between log CIW, log weekly hours and age. It is worth noting that for overall Uganda, both wealth and income are positively correlated to Labor supply, suggesting a positive income effect on the labour supply, probably because income and wealth are low and the substitution effect dominates. Notice also that labour supply is negatively correlated with age, but much more in urban areas. This might be due to the fact that in rural areas, no matter the age, people may still work in agriculture or their own plots. It is also worth noting that wealth is negatively correlated with labor supply in Urban areas and the correlation with income is slightly lower, so it might be that in urban areas with a higher level of income and wealth, the

income effect is lower. Notice that the rest of correlations are slightly different from before since now we have a different sample.

Table 7: Correlations Uganda, 2013-2014

(a) Uganda

	LS	C	I	W	A
LS	1				
C	0.17	1			
I	0.25	0.64	1		
W	0.1235	0.5635	0.4864	1	
A	-0.0610	0.01	-0.0729	0.1837	1

(b) Rural Uganda

	LS	C	I	W	A
LS	1				
C	0.16	1			
I	0.26	0.58	1		
W	0.16	0.5143	0.4288	1	
A	-0.03	0.08	-0.05	0.19	1

(d) Urban Uganda

	LS	C	I	W	A
LS	1				
C	0.08	1			
I	0.19	0.68	1		
W	-0.0242	0.559	0.4790	1	
A	-0.12	0.04	-0.4	0.2422	1

2.2 Labor Supply: Male and Female

Table 6 shows the weekly hours and variance of logs for males (left) and females (right). First of all, males work more hours than females. However, the difference is much lower between rural areas (37 for male vs 35 for women) and the highest difference is in urban areas (41 vs 33). Moreover, inequality is much higher for females, particularly in urban areas.

Table 8: Labor supply in Uganda, 2013-2014

(a) Males

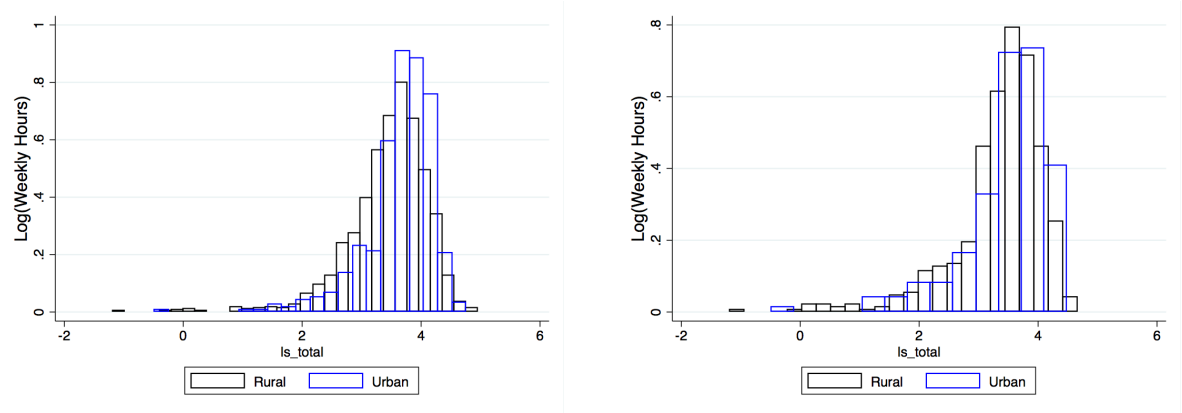
	Uganda	Rural Uganda	Urban Uganda
Weekly hours	38	37	41.36
Variance of logs	0.40	0.44	0.39
Sample size	1,977	1,454	523

(b) Females

	Uganda	Rural Uganda	Urban Uganda
Weekly hours	34	35	33.4
Variance of logs	0.54	0.52	0.61
Sample size	866	634	232

Next, we show the distribution of log weekly hours for males (left) and females (right). The histograms seem to show that hours in urban areas are much more dispersed, but this dispersion is certainly higher for females than for males, as discussed with the variance of logs. One reason might be that, in rural areas, agricultural female work is similar to males. However, there might be more differences in the kind of work done in urban areas that can lead to such a big difference among women. Furthermore, given reciprocity mechanisms it might also be that it is easier for women to work more in agricultural areas (i.e. other people in the village may be taking care of the kids).

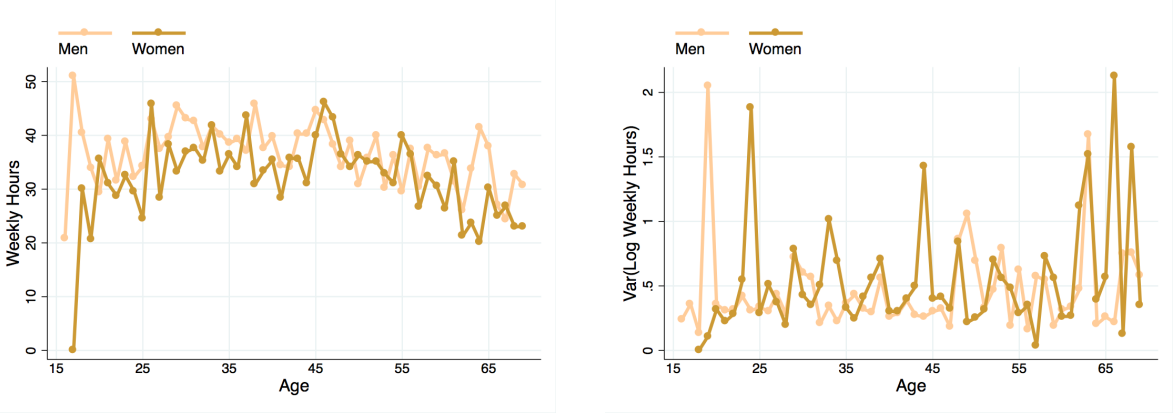
Figure 5: Labour Supply for males and females



The following figure shows the behavior of labor supply and inequality for males and females along the life cycle. First, hours worked along the lifecycle follow a similar pattern both for males

and for females, with the difference that hours for females tend to be slightly lower. On the other hand, the variance of logs seems to behave similarly for men and female, but it is higher for females.

Figure 6: Labour supply for males and females, life cycle



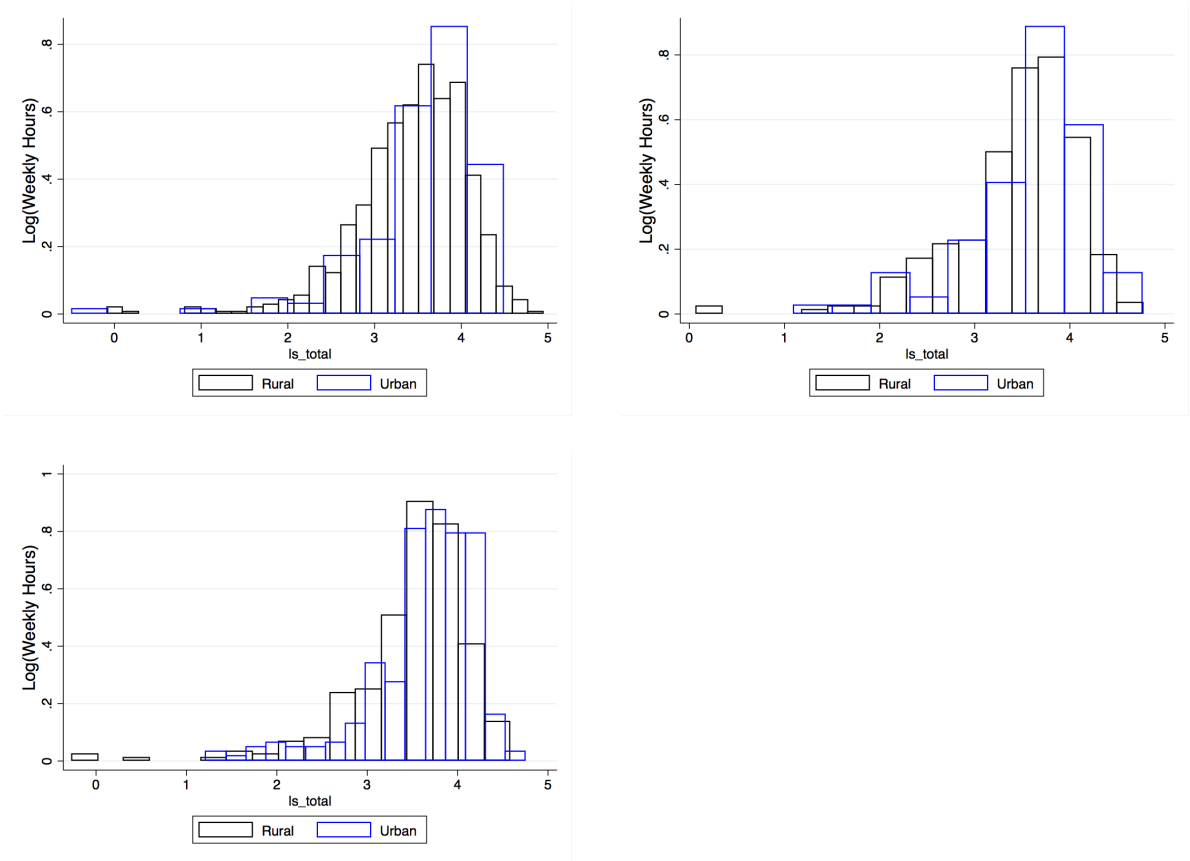
2.3 Labor supply: education groups

This section describes the behavior of labor supply and its inequality by education groups. The education groups are the following: less than primary school (highest grade attained is lower than the last primary school year), primary school but less than high school completed, high school completed and more. For the three education groups, hours worked are higher in urban areas than in rural. Moreover, mean weekly hours worked increase with the educational level. However, the group in which hours worked is more unequal is for the less educated one, in particular in urban areas. The histograms shown in Figure 7 (left less than primary school, right some high school, bottom more than high school) confirm the result, an also that is likely influenced by the presence of outliers.

Table 9: Labor supply in Uganda, 2013-2014

(a) Less than primary school				(b) Some High school				(c) High school and more			
	Uganda	Rural Uganda	Urban Uganda		Uganda	Rural Uganda	Urban Uganda		Uganda	Rural Uganda	Urban Uganda
Weekly hours	37.56	37	38.64	Weekly hours	39	38.32	41.83	Weekly hours	39.4	38.8	40
Variance of logs	0.42	0.41	0.472	Variance of logs	0.38	0.37	0.43	Variance of logs	0.38	0.36	0.37
Sample size	1,008	844	164	Sample size	422	322	100	Sample size	616	316	300

Figure 7: Distribution of log(weekly hours)

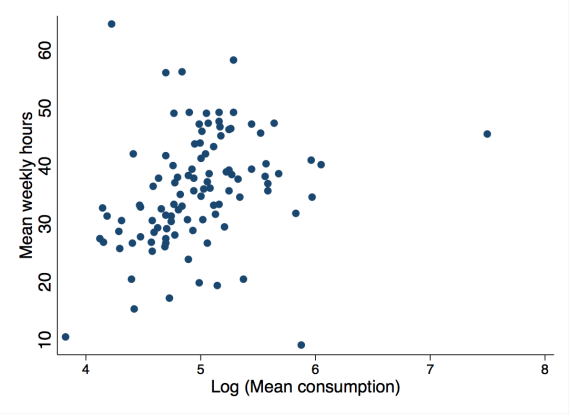


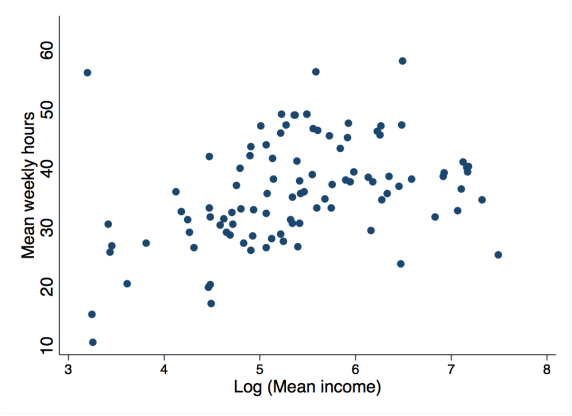
3 Inequality Across Space

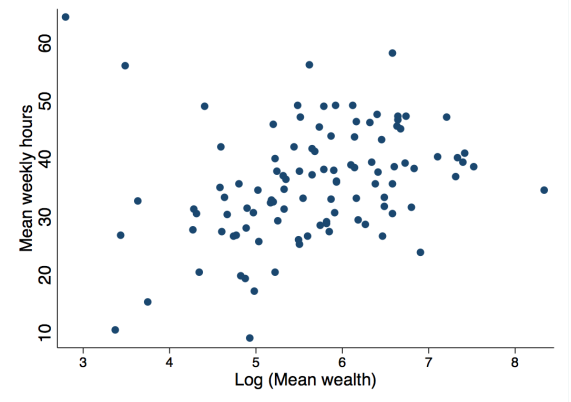
3.1 Levels across space

Figure 8 shows the relationship of mean weekly hours agains log mean CIW by district in Uganda. For consumption, there seems to be a positive relationship between both of them, that is, areas with higher levels of consumption also have higher levels of labour supply. However, this is not so easy for income and wealth. Both of them seem to showing the "labour supply that goes backwards" since from low levels of mean income to slightly highers, there seems to be an increase in hours worked, however, after some point in mean income this pattern reverses suggesting the negative income effect dominates (i.e. you are richer and demand more leisure and work less). This seems to be in line with our class discussion that in richer counties (here richer districts) hours worked are lower. It is not so clear to see in the graph from wealth, but a similar pattern seems to appear.

Figure 8: Labour Supply



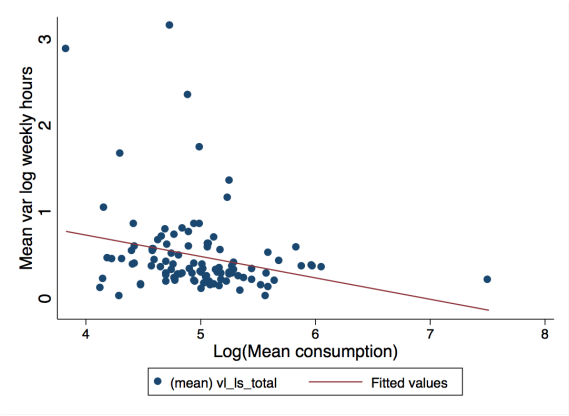


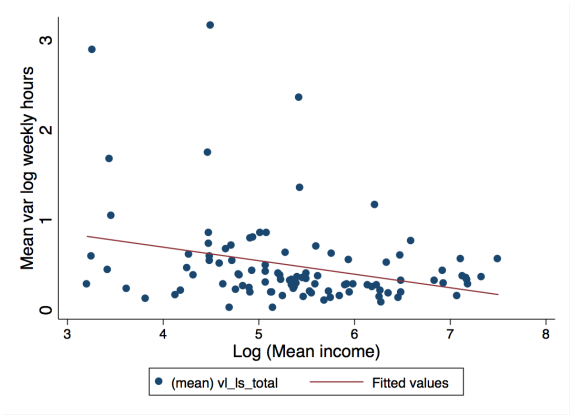


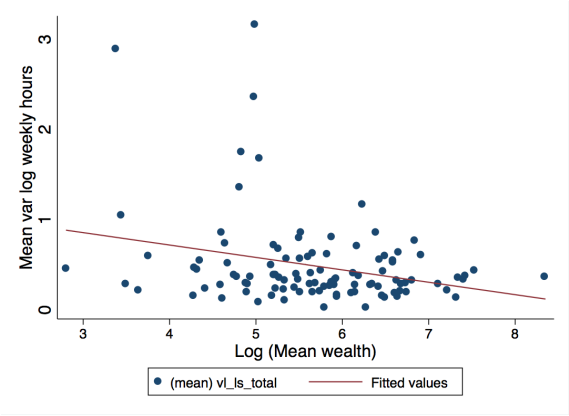
3.2 Inequality across space

Figure 9 shows the mean of the variance of logs of weekly hours worked for household heads, aged 20-70, against log mean CIW, by district. It is difficult to get any clear relationships from the graphs. In fact, there does not seem to be any clear relationship between consumption, income and wealth and inequality in hours worked. At most, one could say that there seems to be less dispersion in inequality for high levels of CIW, since for these levels, inequality levels seem to be less dispersed. The fitted lines seem to point to a weak decreasing relationship, so higher levels of log mean CIW would be associated with lower inequality in labour supply.

Figure 9: Variance of logs weekly labour Supply



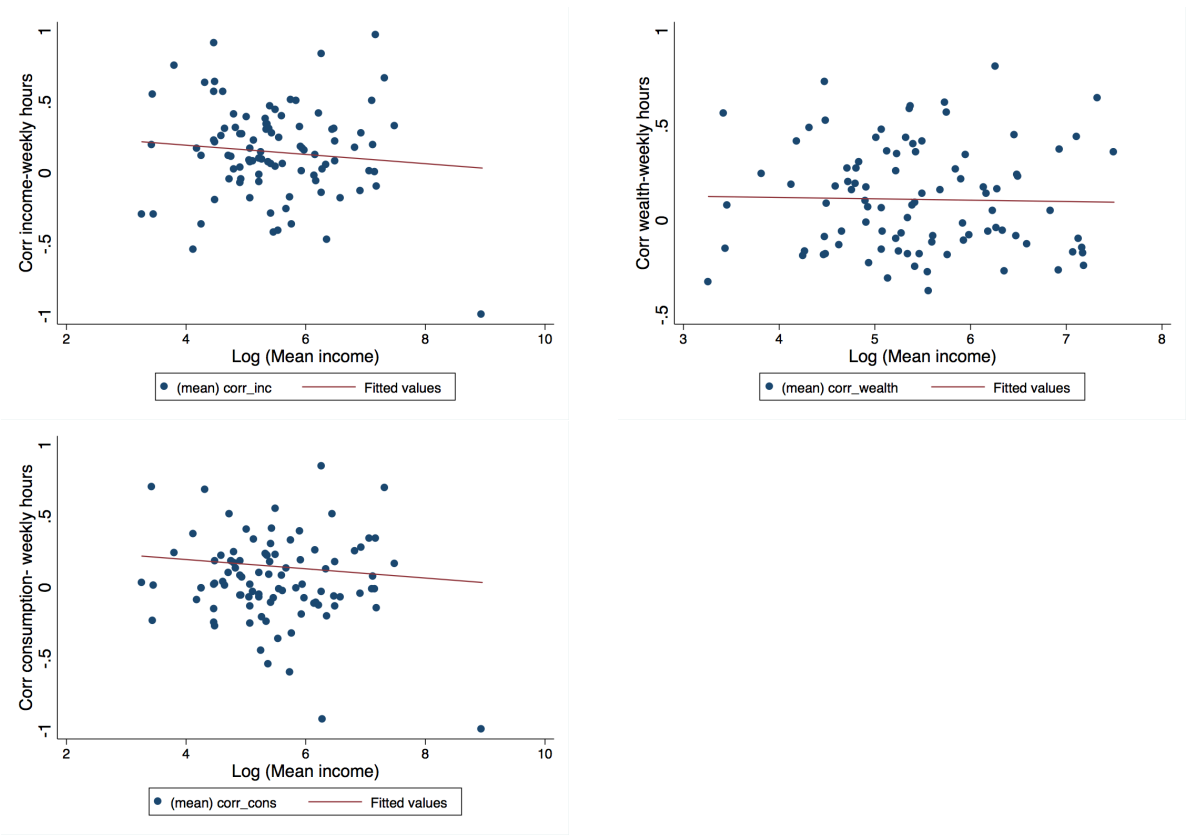




3.3 Correlations across space

Figure 10 plots the correlation between CIW and weekly labor supply by district against the log of mean income of the district. As in the previous Figure, it is difficult to see any relationship and the fitted lines would seem to point at a slightly decreasing relationship for the correlation between income and weekly hours and for the correlation between consumption and labour supply. These could be related to how the income and substitution effects change with income, as briefly discussed before. There does not seem to be a relationship at all for the correlation of wealth and labour supply.

Figure 10: Correlation weekly labour Supply



3.4 Bick et al. (2018) analysis

Table 10: Elasticities of hours to aggregate and individual income

VARIABLES	(1) (log) Hours	(2) (log) Hours	(3) (log) Hours	(4) (log) Hours
(log) GDP_{ph}	0.0420		0.0148	
	(0.0742)		(0.0661)	
(log) W_{ph}		0.177***	0.176***	0.126***
		(0.0242)	(0.0288)	(0.0421)
Observations	2,672	694	690	694
Adjusted R-squared	0.050	0.104	0.104	0.193
District FE	NO	NO	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results replicate the analysis of Bick et al. (2018). All the regressions include age and age square and consider only household heads aged 15-70. The dependent variable is the log of annual hours worked in the business sector, without including agriculture and assuming individuals worked 52 weeks. GDP per hour is the sum of income per capita per district over population in the district. The wage per hour has been directly obtained from the question (GSEC8) and it is the result of the addition of payments (in kind included) of the main and secondary job. The results do not look at all as the ones of Bick et al. In fact, we get the opposite. GDP per hour is never significant whilst the wage per hour is positive and highly significant in any of the specifications, suggesting a positive substitution effect (higher wages = leisure is more expensive so individuals work more). In fact, given the third specification, it seems that both effects, income (even if this is not significant) and substitution, work in the same direction. This does not seems entirely crazy given our previous discussion of the relationship between working hours and a positive income effect and substitution effect. Notice that observations are different because I lost some when matching the wage data to the income data (i.e. people who only had agricultural labour data).

The next two figures replicate the analysis of individual hours-wage by district. Given the small number of observations in some of the districts, I also loose those observations. The regression computed was annual labour supply in the business sector on log annual wage, age and age square for each district. The graphs represent the regressor on log annual wage against log mean income per capita in each district. The results for males are depicted on the left and the ones for females on the right. My results hardly resemble the ones discussed in class. Most of my elasticities are positive and they do not follow any kind of pattern. The only thing worth noting is that for females they seem to be around zero or slightly positive no matter the income level, and there is a very big outlier. If this were right, it would be suggesting that own wage elasticity does not change much with income per capita in Uganda, so in richer districts higher wages trigger a similar effect on wages: a small increase in labour supply.

Important Unless otherwise stated, all the variables are in per capita terms (divided by the household size). I know the graphs for consumption, income and wealth look much nicer using household level data, but I did it dividing by household size. All the data has been converted to 2019 USD. Labour supply, except for the last section always considers agricultural labour supply and has only been computed for household heads. Age, sex and education variables are the ones for household heads.

Figure 11: District specific elasticities of hours to wages