BABANIYI OLANIYI

Growth and Development Problem Set 1

Data Description:

The LSMS-ISA project is supporting the design and implementation of the Uganda National Panel Survey (UNPS), with a focus on expanding the agricultural content of the UNPS as well as ensuring comparability with other surveys being carried out under the LSMS-ISA project in Sub-Saharan Africa. The emphasis is to ensure that information on agriculture and livestock, and data on food and nutrition security inter alia, are mainstreamed into the UNPS, and that the quality and relevance of these data is further improved and made sustainable over time. For this problem set, we use the household and agriculture data set collected from 2013 – 2014 for Uganda.

Sampling and Survey Design

The UNPS sample is approximately 3,200 households, all of whom had been previously interviewed as part of the 2005/2006 Uganda National Household Survey (UNHS). The sample also includes a randomly-selected share of split-off households that were formed after the 2005/2006 UNHS. The UNPS is representative at the national, urban/rural and main regional levels (North, East, West and Central regions). For the agriculture dataset, areas of all owned and/or cultivated agricultural plots were measured via GPS and farmer-supplied area estimates have been validated. Crop cards were used to better quantify the production of continuously harvested as well as staple crops.

Trimming strategy

Level-trimming: trim top and bottom 1% of all components of income, transfers and consumption by residency then construct household aggregates, then trim top and bottom 1% of the household aggregates.

Correcting inflation

For this dataset, I did not correct for inflation, however, I converted the Ugandan shillings to its dollar equivalent of 2586.89 according to 2013 exchange rate.

Definition of variables

My **consumption** measure includes: Food consumption, Utilities (from subsidies), Housing Service: rent, Childcare, Medical care, Semi-durable Supplies: appliances, electronic devices, kitchenware, durable and non-durable foods, gifts.

My **wealth** measure includes: Estimated value of assets such as land equipment.etc.

My **income** measure includes: Income from agriculture such as livestock and crops, labor, business, transfers, gifts.

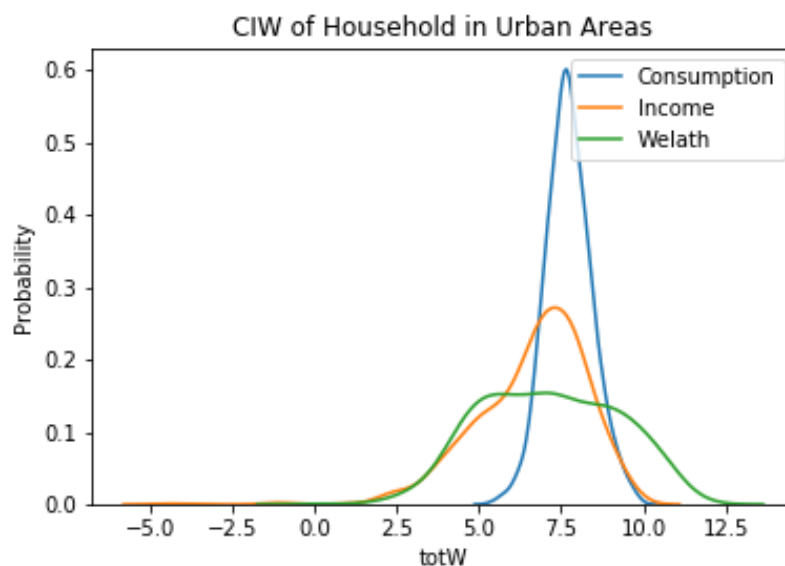**Question One**

Household in Urban Areas (N = 774)

	Consumption	Income	Wealth
Mean	**2920**	**1822**	**7070**
Std	2413	2540	14739
Min	228	-876	0
25%	1432	212	241
50%	2216	943	1242
75%	3517	2320	6628
Max	19055	16733	147533

Household in Rural Areas (N = 2340)

	Consumption	Income	Wealth
Mean	**1609**	**818**	**2072**
Std	1161	1413	6421
Min	197	-561	0
25%	895	83	163
50%	1336	368	445
75%	1986	968	1569
Max	20729	16700	133817

Full Household (N = 3114)

	Consumption	Income	Wealth
Mean	**1934**	**1067**	**3314**
Std	1667	1814	9465
Min	197	-876	0
25%	976	105	176
50%	1469	449	545
75%	2306	1214	2062
Max	20729	16733	147533

CIW of Household in Rural Areas

CIW of all Household in Uganda
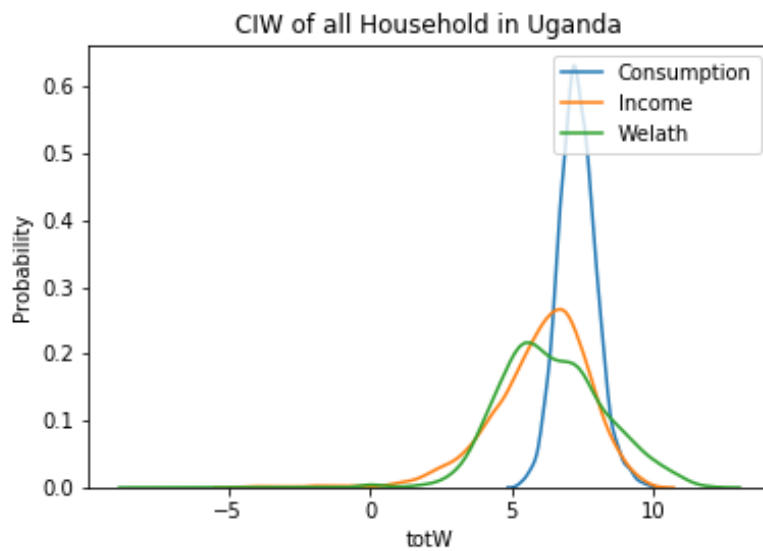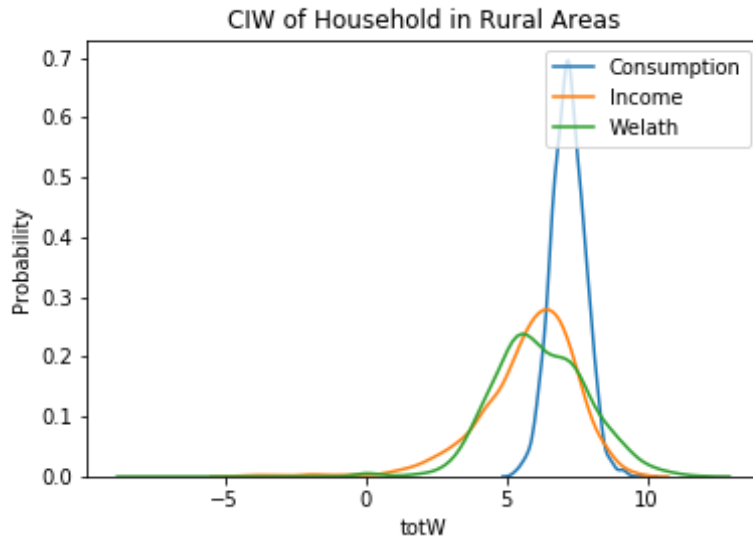
Question Two: CIW inequality: (1) Show histogram for CIW separately for rural and urban areas; (2) Report the variance of logs for CIW separately for rural and urban areas.

| Var. of logs	Rural	Urban	Full
Consumption	0.36	0.49	0.44
Income	3.11	2.78	3.15
Wealth	2.89	4.34	3.40
Inequality ratios			
Consumption/Income	0.12	0.18	0.14
Wealth/Income	0.93	1.66	1.08

Consumption inequality is 12% that of income and Wealth inequality is 1.6 times that of income in urban areas compared to rural areas where it is 12% and 93% respectively. Wealth refers to the stock of assets held by a person or household at a single point in time. Income refers to money received by a person or household over some period. Income includes

wages, salaries, and cash assistance from the government. In some ways, wealth is more important for understanding social inequality because wealth generates income, so income inequality depends in part on wealth inequality.

Comparison to Malawi and US (2010)

	Uganda			Malawi			US
Average	**Rural**	**Urban**	**Full**	**Rural**	**Urban**	**Full**	
Consumption	1609	2920	1934	1569	1623	1601	
Income	818	1822	1067	1314	1453	1384	
Wealth	2072	7070	3314				
Var. log Inequality ratio							
C/I	0.12	0.18	0.14	0.42	0.35	0.46	0.81
W/I	0.93	1.66	1.08	1.52	2.90	1.80	2.18

It is evident from the table above that Uganda's yearly CIW is on average greater than that of Malawi.
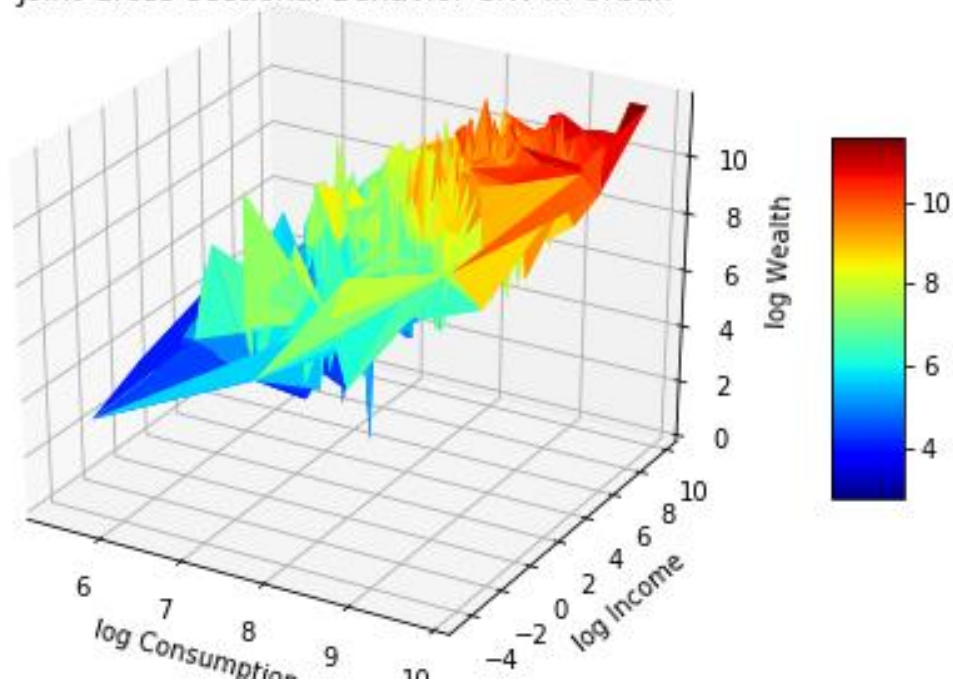
Wealth
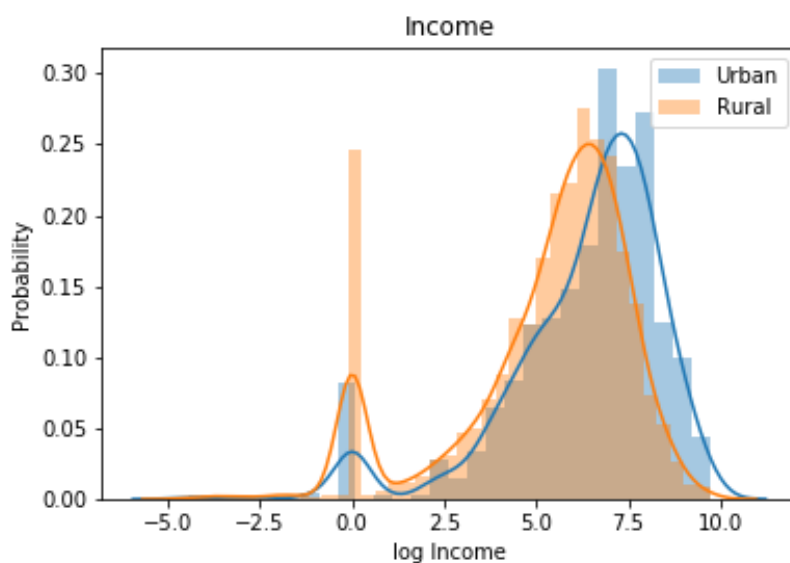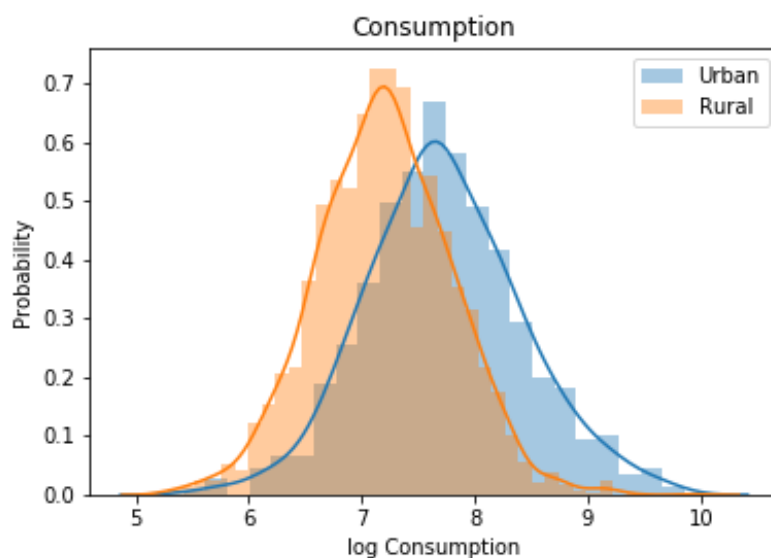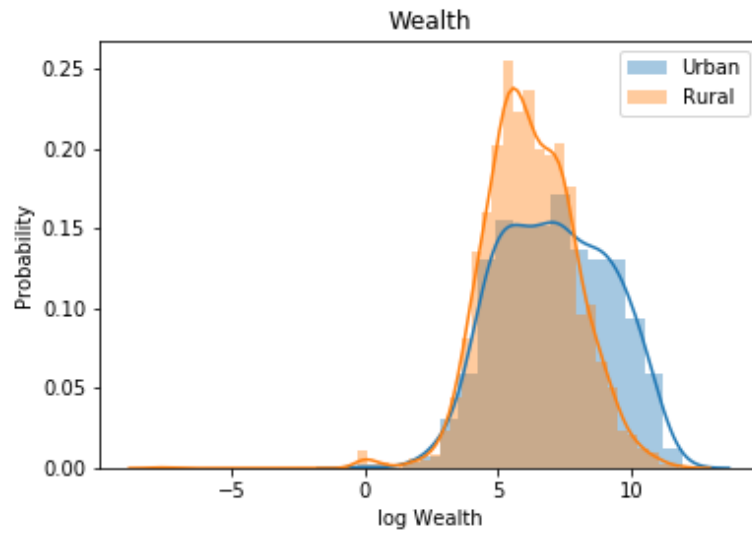
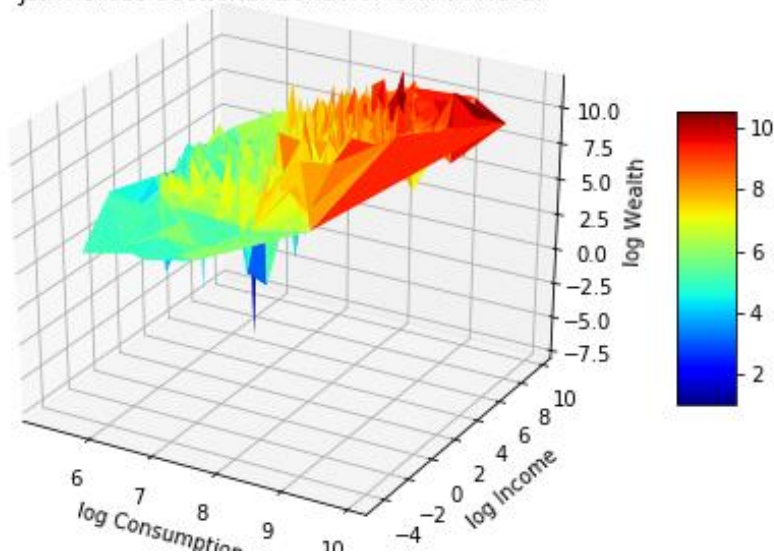**Question Three:** Description of the joint cross-sectional behavior of CIW

Joint distribution of Urban HH

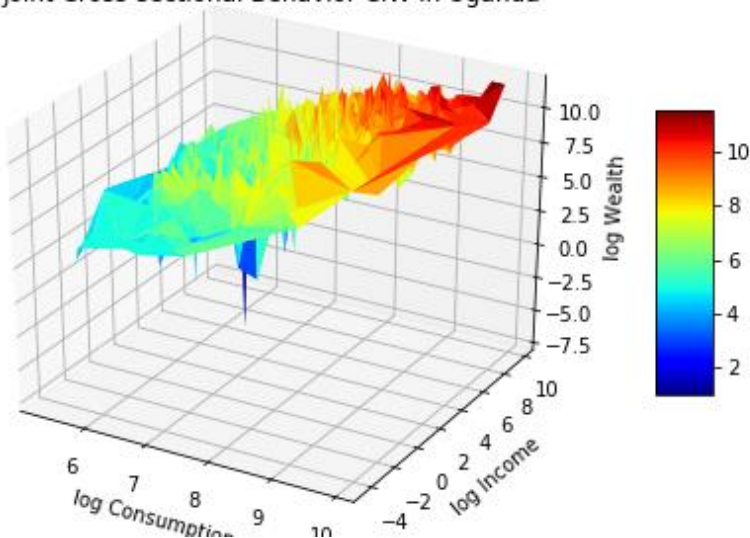|	Rural		Urban		Full	
	C	**I**	**C**	**I**	**C**	**I**
I	0.42	.	0.50	.	0.47	.
W	0.53	0.30	0.61	0.41	0.58	0.36

Joint Cross-sectional Behavior CIW in Urban

Joint Cross-sectional Behavior CIW in Rural

Joint Cross-sectional Behavior CIW in Uganda


Comparison to Malawi and US

- The correlation between I and W is 0.57 in the US (SCF). In rural Malawi it is 0.17 and in urban it is 0.40 (driven by the top).
- The correlation between I and C is 0.37 in rural areas and 0.60 in urban. In the US the correlation is 0.68 (PSID).
- The correlation between C and I in urban areas of Uganda is 0.5 while in rural areas it is weaker 0.42. The correlation between I an W in urban areas is 0.41 and 0.30 in rural areas and it is 0.36 for the whole sample.

Comments:

For all households, there is a strong positive relationship between consumption and income. In other words, as the income of a household increases, their consumption increases proportionally. The relationship between consumption and consumer expectations concerning future economic conditions tends to be a form of self-fulfilling prophecy. Consumers are likely to be more willing to spend money when they are optimistic about the future. If consumers expect economic conditions to worsen, they will cut their

consumption—and economic conditions will worsen! Political leaders often try to persuade people that economic prospects are good. In part, such efforts are an attempt to increase economic activity by boosting consumption.

Question Four: Description of the CIW level, inequality over the lifecycle

Lifecycle Consumption

Lifecycle Income
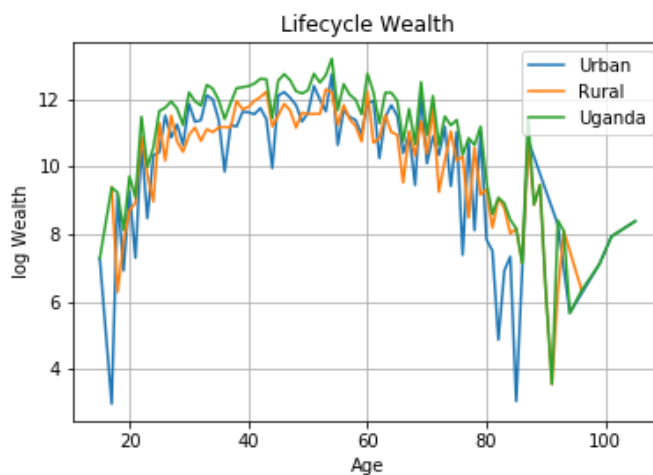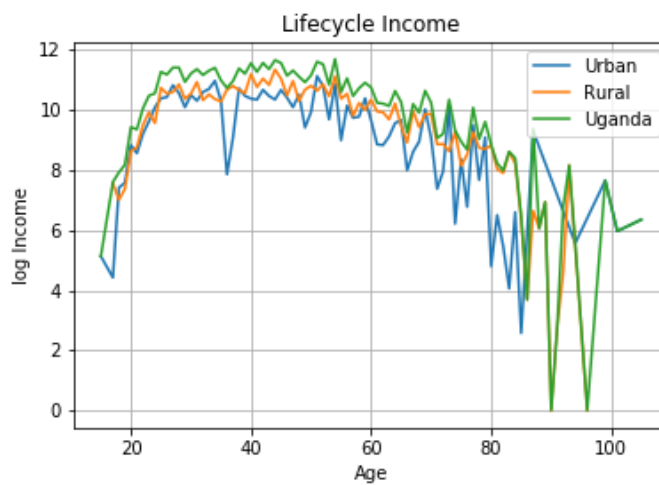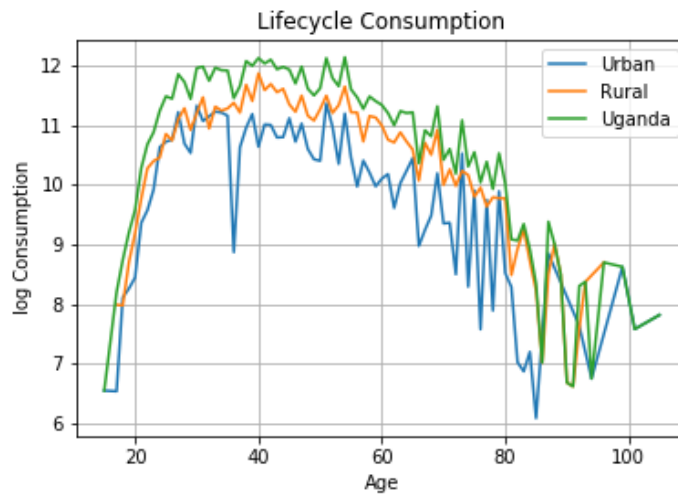
Lifecycle Wealth

Comments: It is evident form the lifecycle plots that households in rural areas smooth consumption, income and wealth over their lifecycle compared to households in urban areas.

Although urban households in Uganda's consumption, income and wealth are higher than that of rural households and they decay quickly compared to rural households on the long run.

Question 5: Rank your households by income and discuss the behavior of the top and bottom of the consumption and wealth distributions conditional on income.

Descriptive Statistics of the Income (log) of the Bottom 20% households

	C	I	W
N	623	623	623
mean	**6.88**	**1.71**	**5.55**
std	0.56	1.86	1.60
min	5.27	-4.45	0.00
25%	6.54	0.00	4.44
50%	6.85	2.11	5.46
75%	7.22	3.54	6.59
Max	9.20	4.23	10.37

Descriptive Statistics of the Income (log) of the Top 20% households

	C	I	W
N	623	623	623
mean	**7.87**	**8.03**	**7.72**
std	0.61	0.55	1.78
min	5.75	7.33	3.14
25%	7.46	7.58	6.47
50%	7.85	7.88	7.67
75%	8.25	8.37	8.98
Max	9.39	9.72	11.90

Based on Income of Bottom 20%

Based on Income of Top 20%
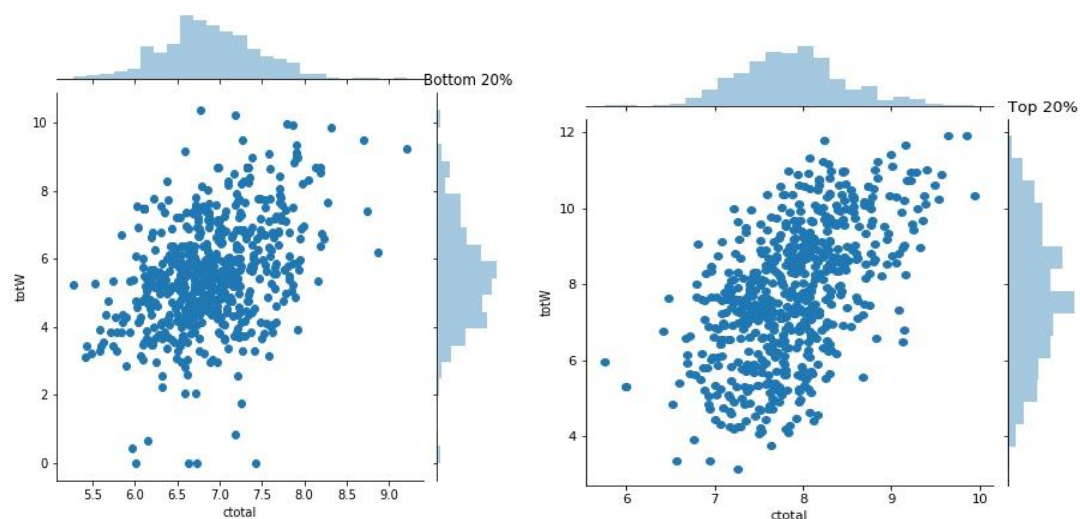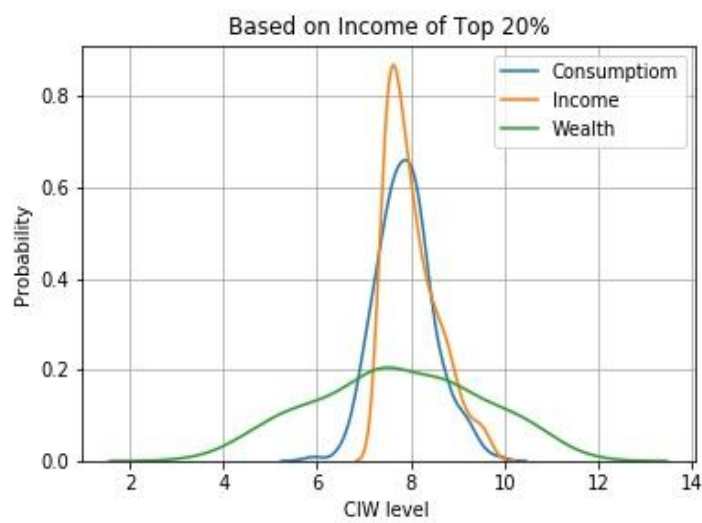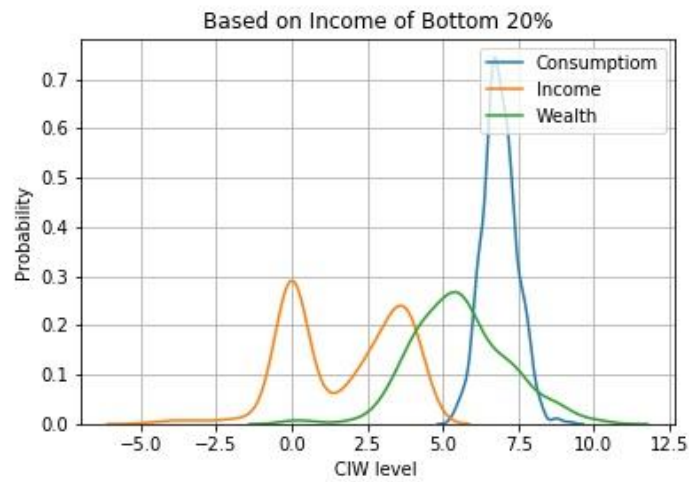
Comments: As expected, the CIW of the top 20% are clearly higher than that of the bottom 20%. Interestingly, for the top 20% income households, there is a stronger association between CIW compared to the bottom 20%. In addition, the probability of increasing consumption as income increases is greater for the top 20% compared to the bottom 20%.

PART TWO

Q1: Redo Question 1 for intensive and extensive margins of labor supply.

The employment rate as the fraction of all adults that report being employed or have positive hours worked: **e** = E/N where E is the total number of employed adults, and N the total number of adults.

The hours per worker as the average hours worked in all jobs in the reference week among all those who are employed: **h** = H/E where H is total hours supplied by employed adult workers.

Where '**eh**' is the hours worked per adult in a household and is derived by **e*h** (recall adult does not infer working adult that brings in income to the household, for further details read the lecture notes by Raul page 82 onwards on Growth and Development). From the table below, we see that the average number of hours per worker in Uganda is 62 hours and this is close to the result of From Besamuscka, Tijdens (2012), which says the hours per worker is 60 hours per week.

https://wageindicator.org/main/Wageindicatorfoundation/publications/2012/wages-in-uganda-wage-indicator-survey-2012

Average	Rural	Urban	Full
Hours per adult (eh)	13	20	15
Hours per worker (h)	57	74	62
	N = 2340	N =774	

Average	Men	Women
Hours per adult (eh)	15	14
Hours per worker (h)	66	53
	N = 2140	N = 973
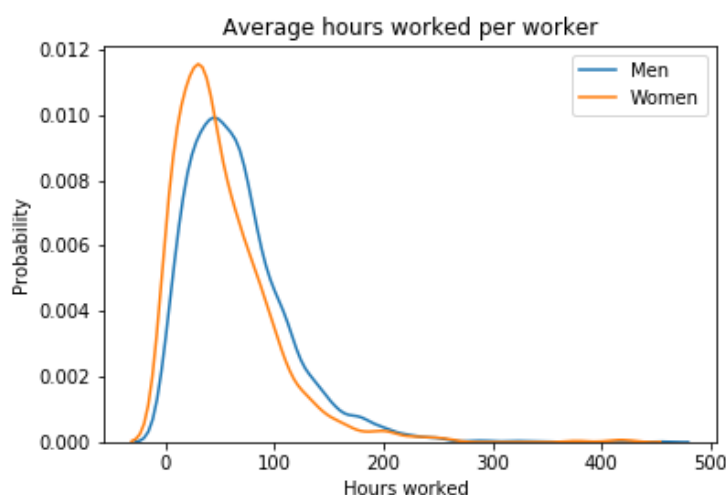
Average	No formal educ.	Less than Pry educ.	Compl Pry educ.	Compl. Sec & Higher
Hours per adult (eh)	12	15	13	19
Hours per worker (h)	56	59	59	61
	N = 67	N =70	N = 32	N = 45

Average hours worked per worker
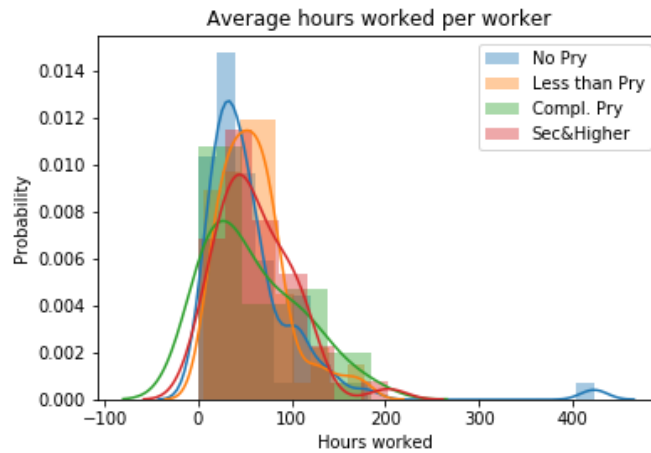
Q2. Redo separately for women and men, and by education groups (less than primary school completed, primary school completed, and secondary school completed or higher).

Male (N = 2140)

Male	C	I	W
Mean	**2031**	**1208**	**3623**
Std	1751	1943	10532
Min	197	-876	0
25%	1034	153	188
50%	1560	548	602
75%	2437	1414	2207
Max	20729	16733	147533

Female (N = 973)

Female	C	I	W
Mean	**1724**	**758**	**2639**
Std	1445	1445	6491
Min	209	-825	0
25%	885	51	151
50%	1336	281	449
75%	2062	880	1796
Max	15702	16700	61116

Var. of logs	Male	Female
Consumption	0.44	0.42
Income	4.96	6.19
Wealth	3.26	3.65
Inequality ratios		
Consumption/Income	0.089	0.068
Wealth/Income	0.66	0.59

It is evident the inequality ratios between men and women is very small and not well-pronounced.

CIW of Men

CIW of Women

Consumption
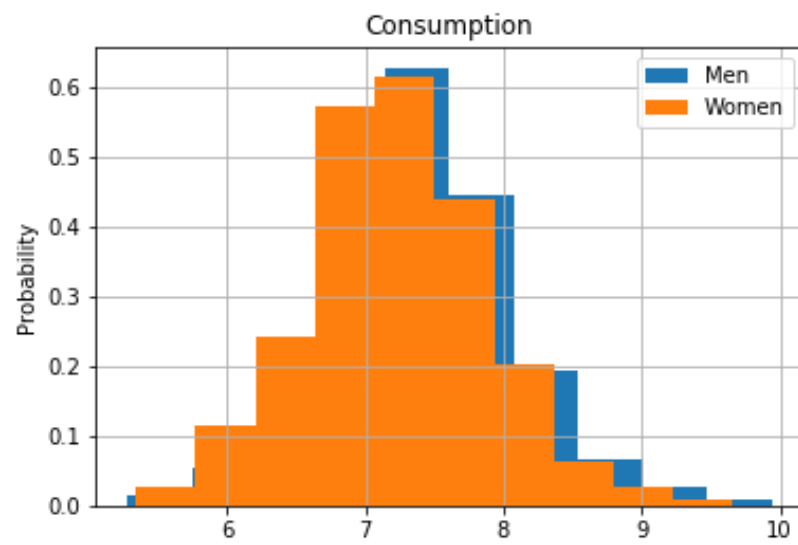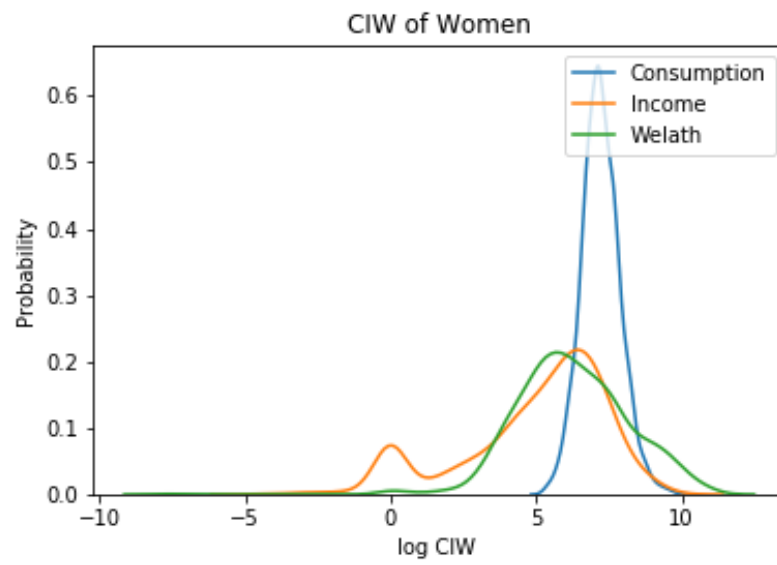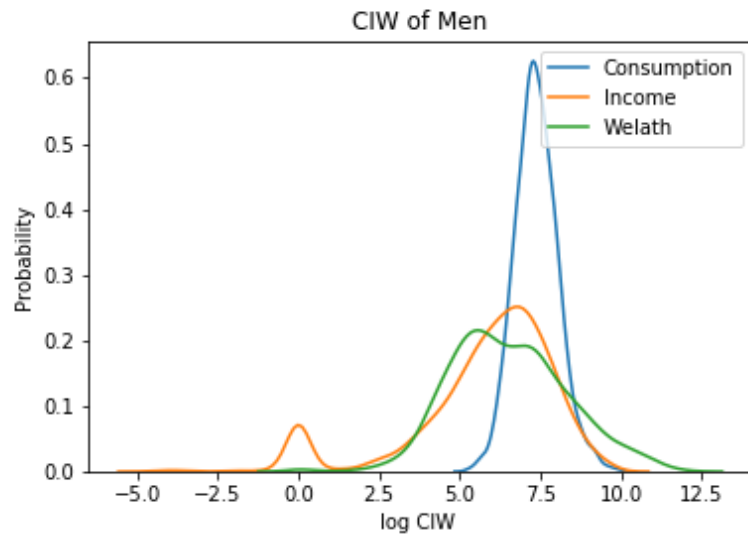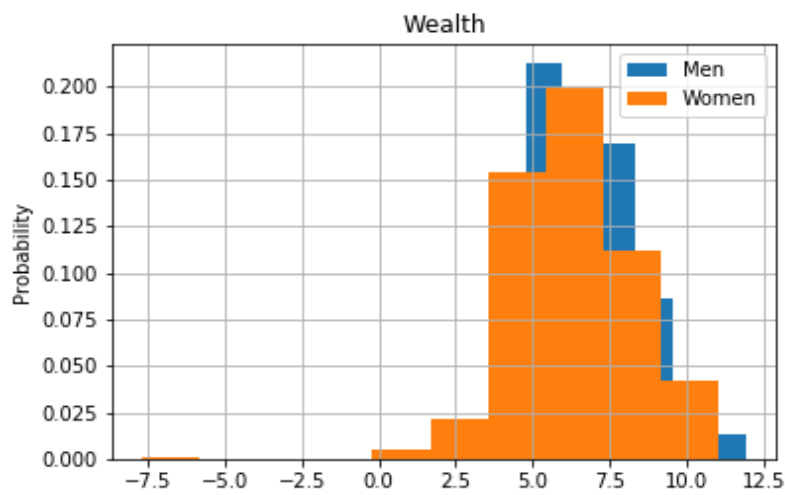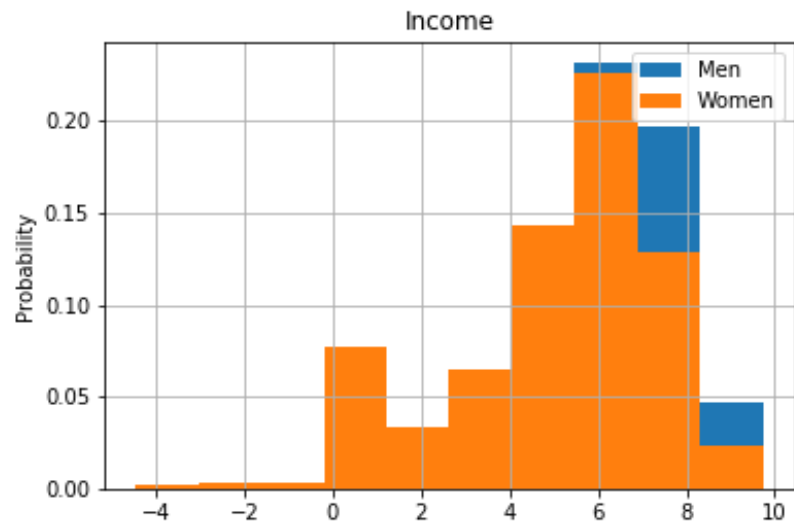
Income

Wealth

Joint Cross-Sectional Distribution (Correlation matrix)

	Male		Female	
	Csp	**Income**	**Csp**	**Income**
Income	**0.46**	.	**0.48**	.
Wealth	**0.60**	**0.37**	**0.53**	**0.33**

Correlogram of CIW by Men

Correlogram of CIW by Women

Lifecycle Income

Lifecycle Consumption

Lifecycle Wealth
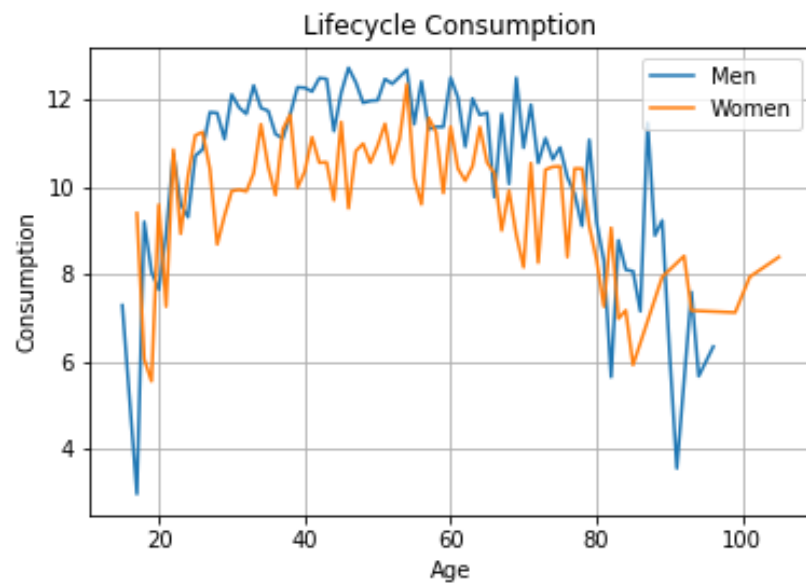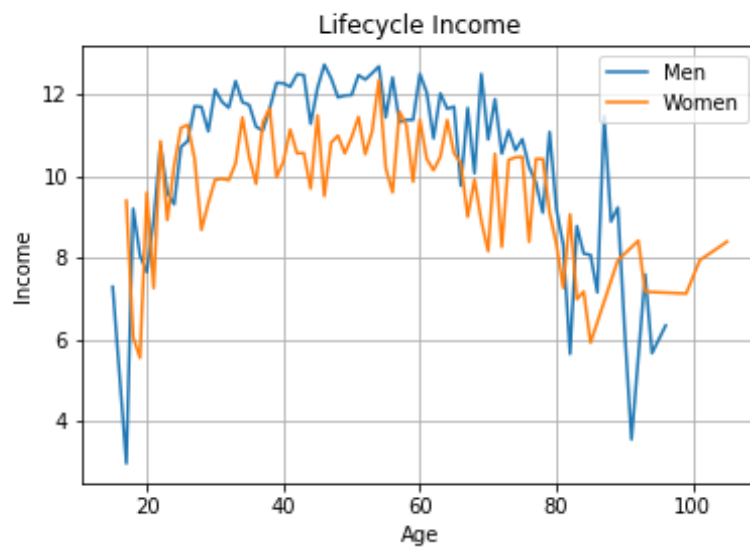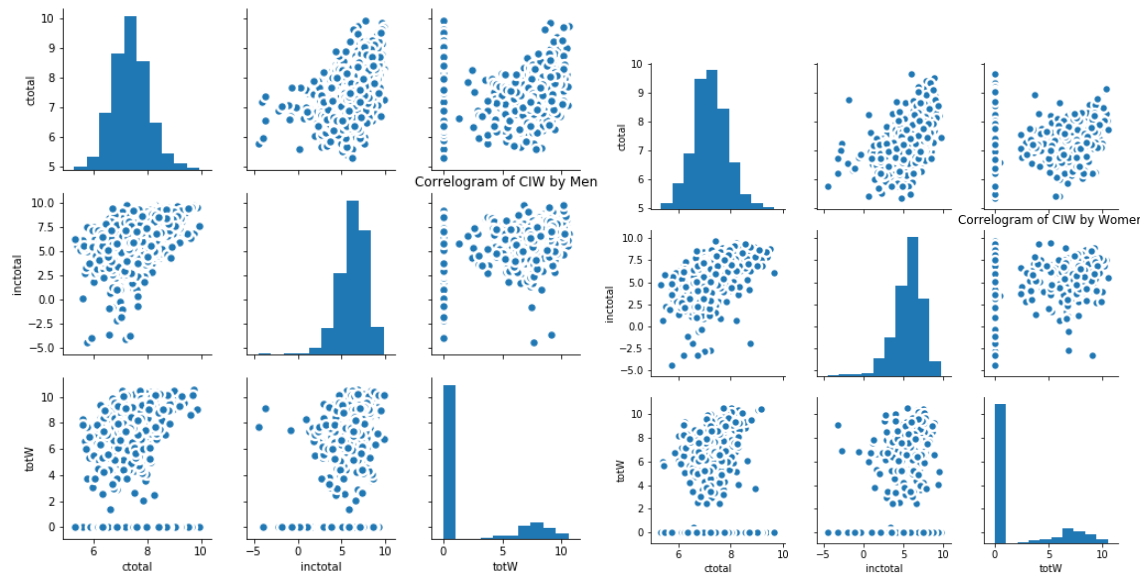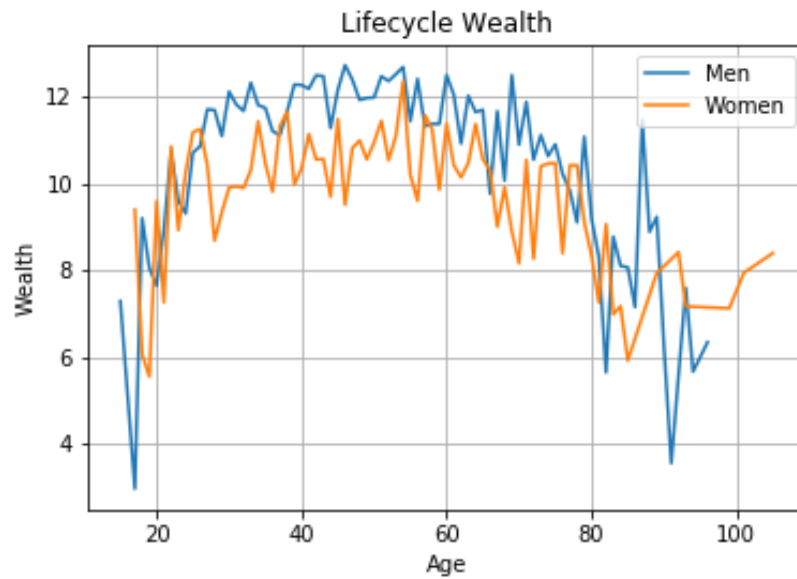
Comments: The lifecycle plot of men and women tells us that the CIW of men are higher than that of women and the CIW of women decays faster than men. In addition, the joint correlation between CIW for both genders are roughly the same as CIW is positively correlated.

EDUCATIONAL STATUS

No Formal Educ. N = 67	C	I	W
Mean	**1460**	**615**	**2424**
Std	1063	873	5876
Min	329	-264	7
25%	876	109	115
50%	1207	361	2306
75%	1654	717	1308
Max	6774	5317	28262

Less than Primary N = 70	C	I	W
Mean	**1626**	**1062**	**1931**
Std	1144	1428	4493
Min	374	-11	0
25%	918	171	108
50%	1351	387	458
75%	1939	125	940
Max	6870	6696	26144

Completed Primary N = 32	C	I	W
Mean	**1761**	**1908**	**3906**

Std	1233	3220	10001
Min	425	-561	43
25%	841	111	125
50%	1466	634	418
75%	2096	2376	1043
Max	6285	12929	45808

Secondary & higher N = 45	C	I	W
Mean	**2738**	**2008**	**5342**
Std	1931	2349	10398
Min	701	-29	26
25%	1266	141	323
50%	2043	1191	1417
75%	3581	2970	5838
Max	9254	8582	60150

Var. of logs	No formal education	Less than primary	Completed Primary	Completed Sec. and higher
Consumption	0.3	0.4	0.4	0.5
Income	1.8	2.2	6.9	3.2
Wealth	3.5	3.6	3.5	3.0
Inequality ratios				
Consumption/Income	0.17	0.18	0.06	0.16
Wealth/Income	1.94	1.64	0.51	0.94

From the tables, we can infer that as the educational status of the house head increases (that is, as he gets more educated) his consumption, income and wealth increases. In addition, the wealth and consumption inequality are more pronounced in household with no formal and less than primary education.

Income by Education group

Wealth by Education group
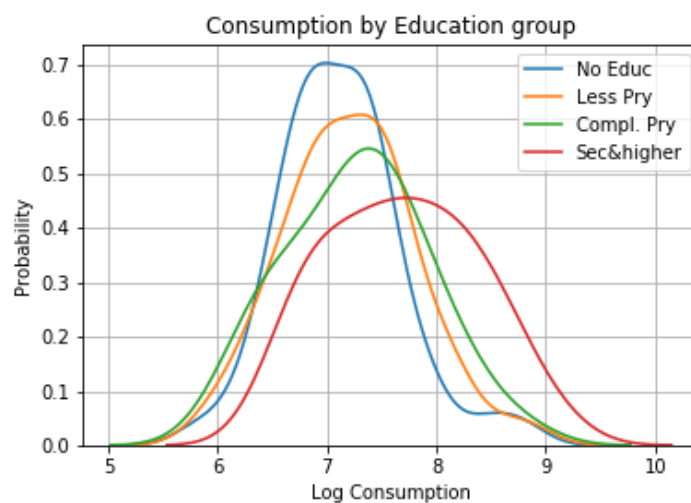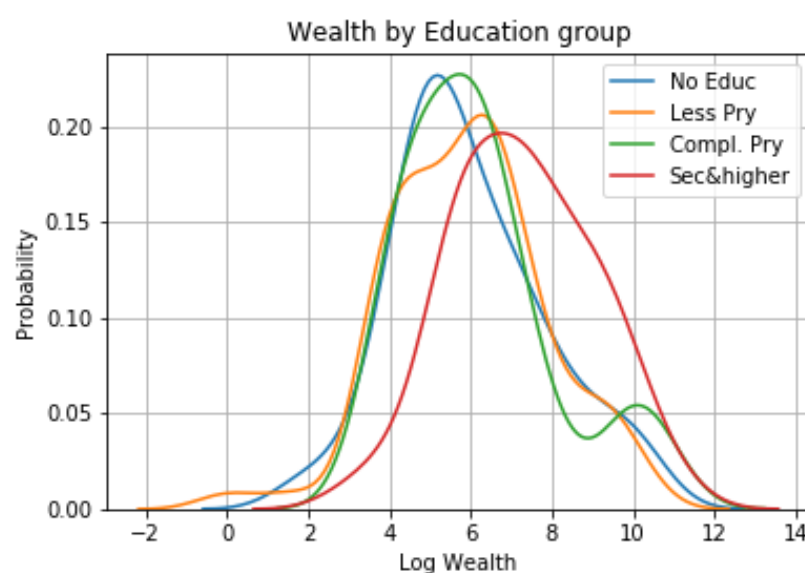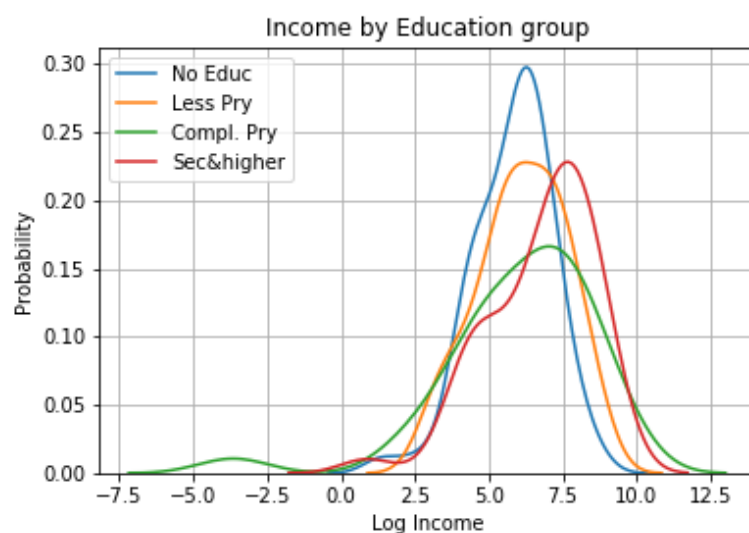
Joint Cross-Sectional Distribution across educational groups

	No formal education		Less than primary		Completed Primary		Completed Sec. and higher	
	C	I	C	I	C	I	C	I
I	0.39	.	0.43	.	0.75	.	0.56	.
W	0.61	0.21	0.54	0.34	0.61	0.68	0.53	0.034

We see that the CIW are strongly positive correlated except for the income and wealth of house heads (0.034) who have completed secondary school and higher.

Lifecycle Consumption of Education groups

Lifecycle Income of Education groups

Lifecycle Wealth of Education groups
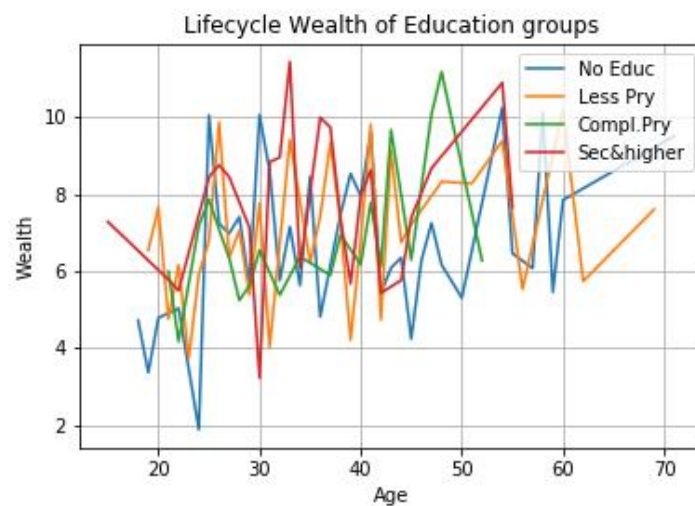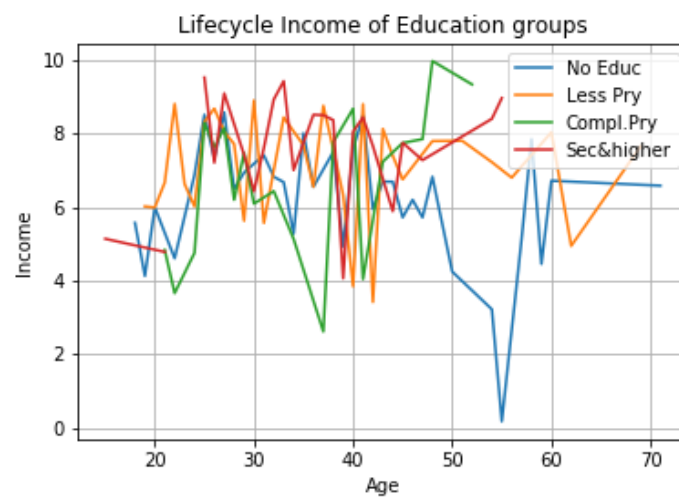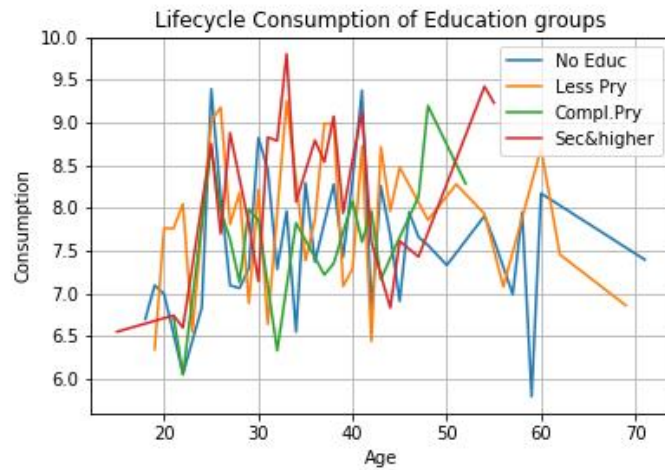
Comments: The CIW of house heads that has no formal education and less than primary education is lower, and decays more quickly compared to those who completed primary, secondary and higher education.

INEQUALITY ACROSS SPACES

Q1: Plot the level of CIW and labor supply by zone (or district) against the level of household income by zone.

Consumption against income by zone

Wealth against income by zone

Labor supply against income by zone
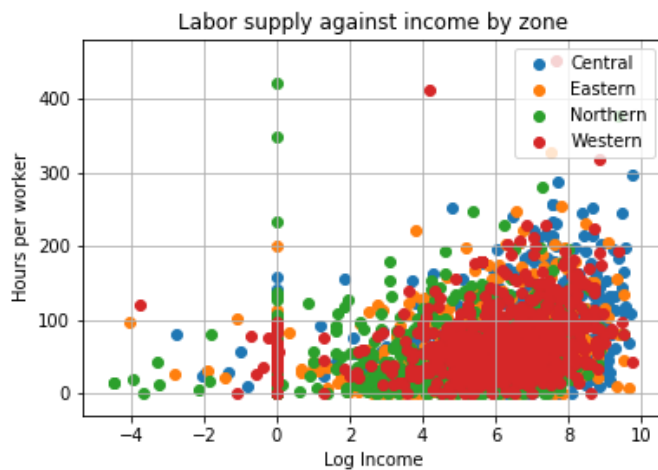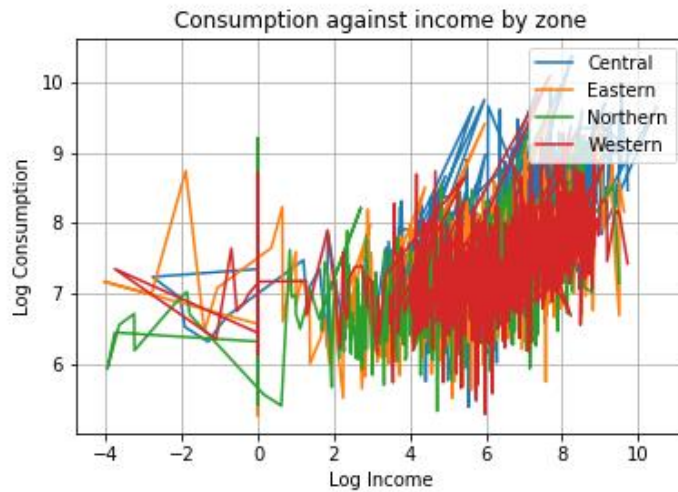
Q2: Plot the inequality of CIW and labor supply by zone (or district) against the level of household income by zone.
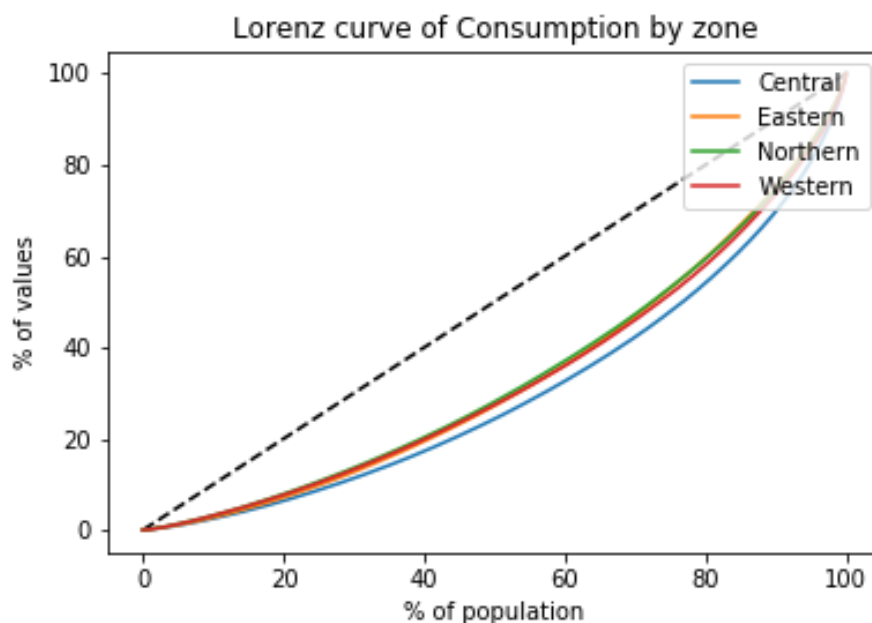
The Gini Coefficient, which is derived from the Lorenz Curve, can be used as an indicator of economic development in a country. The Gini Coefficient measures the degree of income equality in a population. The Gini Coefficient can vary from 0 (perfect equality) to 1 (perfect inequality). A Gini Coefficient of zero means that everyone has the same income, while a Coefficient of 1 represent a single individual receiving all the income.

The Gini Coefficient is equal to the area between the actual income distribution curve and the line of perfect income equality, scaled to a number between 0 and 100.

Gini Index			
	Consumption	Income	Wealth
Central region	0.39	0.62	0.77
Eastern region	0.33	0.70	0.75
Northern region	0.32	0.69	0.83
Western region	0.34	0.63	0.79

The Lorenz Curve (the actual distribution of income curve), a graphical distribution of wealth developed by Max Lorenz in 1906, shows the proportion of income earned by any given percentage of the population. The line at the 45° angle shows perfectly equal income distribution, while the other line shows the actual distribution of income. The further away from the diagonal, the more unequal the size of distribution of income.

The more bowed out a Lorenz Curve; the higher is the inequality of income in the country.

Lorenz curve of Income by zone

Lorenz curve of Wealth by zone

Covariance matrix plot

Covariance matrix of Central region

Covariance matrix of Eastern region

Covariance matrix of Nothern region

Covariance matrix of Western region
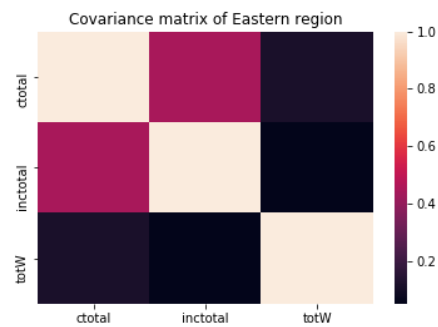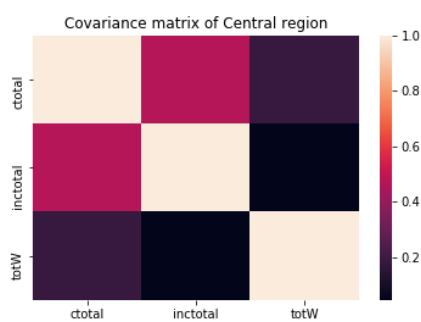
Q4: Reproduce the Bick et. al (2018) analysis between individual vs. country income, and individual hours-wage elasticity by country in Uganda. Instead of "country" use districts/zones in Uganda.

We fit a regression with log hours worked weekly as the dependent variable and age, age square, log weekly wage, regions are independent variables. Region 1,2,3,4 are Central, Eastern, Northern and Western regions respectively.
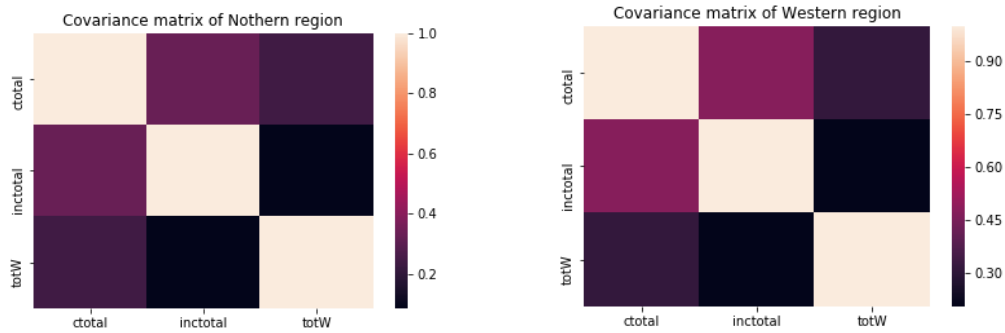
Elasticities of Hours to aggregate and individual income

	Coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	2.6828	0.144	18.638	0.000	2.401	2.965
ln(weekly wage)	0.0421	0.003	12.935	0.000	0.036	0.048
Age	0.0525	0.006	8.891	0.000	0.041	0.064
Age square	-0.0005	5.77e-05	-9.471	0.000	-0.001	-0.000
region2	-0.2299	0.049	-4.677	0.000	-0.326	-0.134
region3	-0.4438	0.049	-9.096	0.000	-0.539	-0.348
region4	0.0980	0.049	1.996	0.046	0.002	0.194
Observations	3113	3113	3113	3113	3113	3113
Degrees of freedom 6						

We see that all the variables are significant except region4(western region). For a given hour worked weekly, the weekly wage increases by 0.042 keeping other variables constant. We conclude that high individual wage correlates significantly with high hours worked per worker across the entire income distribution

APPENDICE: SUMMARY STATISTICS

Food consumption

	Food	Durable food	Food gift	Non-durable
Mean	1934.0	1959.0	167.0	766.0
Std	1667.0	1690.0	313.0	1083.0
Min	197.0	197.0	0.0	26.0
25%	976.0	987.0	25.0	265.0
50%	1469.0	1494.0	93.0	463.0
75%	2306.0	2347.0	203.0	831.0
Max	20729.0	20876.0	9453.0	16398.0

Income

	Income	Wages	Business profit	Agriculture profit	Livestock profit
Mean	1067.0	1509.0	98.0	180.0	73.0
Std	1814.0	1990.0	539.0	447.0	173.0
Min	-876.0	7.0	-2342.0	-756.0	-56.0
25%	105	372	0.0	0.0	0.0
50%	449.0	928.0	0.0	40.0	0.0
75%	1214.0	1856.0	53.0	167.0	58.0
Max	16733	16700	12827	5185	1945.