



Übung zur Empirischen Wirtschaftsforschung

X. Einkommensfunktion II

6.1 [Overview of Egypt Labor Force Sample Surveys](#)

6.2 [Comparison between ELMPS 2012 & SOEP 2012](#)

6.3 [Data in Workfile Übung10.wf1](#)

6.4 [The Econometric Model](#)

Literatur

Assaad, R., Krafft, C., (2013), *The Egypt Labor Market Panel Survey: Introducing the 2012 Round*. *Economic Research Forum (ERF) Working Paper Series 758*.

Hyclak, T., Johnes, G., Thornton, R. (2005), *Fundamentals of Labor Economics*, Houghton Mifflin Company, Boston.

Ikram, K. (2006), *The Egyptian Economy, 1952-2000: Performance, policies, and issues*. London & New York, Routledge, 2006.

Polachek W. (2007), *Earnings Over the Lifecycle: The Mincer Earnings Function and Its Applications*. IZA discussion paper 3181, Bonn.

Wikipedia, the Free Encyclopedia, *List of Countries by Population*. Access date: 6/7/2014

6.1 Overview of Egypt Labor Force Sample Surveys

The Central Agency for Public Mobilization and Statistics (CAPMAS) is the only governmental body responsible for conducting national wide surveys in Egypt. CAPMAS has conducted Labor Force Sample Surveys (LFSS) since the 1960s. The goal of these surveys was to gather in depth data on Egypt's labor market situation. However, the survey methodology was not constant throughout the years. To allow researchers to make reliable research across time, the Egypt Labor Market Survey was initiated in 1998 in cooperation with the Economic Research Forum (ERF) with the goal of collecting labor market and demographic information about households and individuals over time.

Two additional panel surveys were conducted since 1998, which are the Egypt Labor Market Panel Survey (ELMPS) 2006 and the ELMPS 2012. The three panel surveys replicated the same methodology and variable definitions to allow for comparison over time. All the surveys contain an individual survey and a household survey. We will use the ELMPS 2012 for our analysis. The ELMPS 2012 succeeded to interview 77% of those interviewed in 2006, in addition to a new sample of 20,416 of individuals. The categories covered by the survey include:

- Basic Characteristics
- Housing, Service & Durables
- Parents and Siblings Characteristics
- Education
- Paid and Nonpaid Work
- Employment and Unemployment
- Job Characteristics of Primary and Secondary jobs
- Formality of job
- Earnings
- Household Enterprises
- Migration, Transfers and Non-labor income

We will use some variables from the ELMPS 2012 to estimate earning functions for Egyptian wage workers. The variables are found in the work file Übung10.wfi. All variables are calculated for a reference period of the last three months prior to the survey. But first we will compare ELMPS 2012 with SOEP 2012 in the next section.

6.2 Comparison between ELMPS 2012 & SOEP 2012

The Vocational education system (Ausbildungssystem) in Germany is one of the most advanced systems in the world, and is much more developed relative to that of Egypt. Therefore the SOEP has questions that enquire about the type of Ausbildungsabschluss and training level.

SOEP is a socio-economic survey while ELMPS is a labor market survey. Therefore SOEP covers many social dimensions such as the level of happiness and satisfaction with various life aspects, opinions about social and economic matters, and future prospects of respondents, which is not covered in ELMPS:

- The breadth of the survey depends on the level of economic development of a country. Germany is more developed in various economic, social, and institutional measures relative to Egypt. Therefore issues such as the level of happiness, personal wellbeing inside and outside work, and opinions in political and social matters is also measured, in addition to labor market measures.
- Egypt suffers from illiteracy rates of 34% among women and 17.5% among men. In addition, over 65% of working females work in agricultural farms with their families in order to survive (i.e. unpaid family workers). In terms of employment, many small firms in the private sector of Egypt do not provide their employees with job contracts or social security. Consequently, ELMPS targets to collect more 'basic' information relative to SOEP. For example, ELMPS collects information about illiteracy, school interruptions, subsistence work of women and unpaid family work, and the formality of the job (whether an employee has a work contract or social security), among others.

The SOEP has a set of questions about immigrants living in Germany, while ELMPS includes a section inquiring about Egyptian emigrants. This is again due to country specific needs:

- For Germany, immigrants represent an important human resource given that Germany suffers from the lowest fertility rate in Europe (1.45 births per mother). In turn, it is important to collect in-depth information about immigrants' characteristics, opinions and degree of integration in the German society.
- Egypt has a fertility rate of 2.9 and suffers from high population concentration in its three largest cities of Cairo, Alexandria and Suez due to the concentration of economic activities there. Therefore, many people migrate from rural to urban regions, or outside Egypt, to find better work opportunities. These persons represent a major source of income for the rest of the household, as they provide them with money transfers. The questionnaire thus inquires about household members who emigrated, the location of their emigration and the amount of money they send to the household (i.e. Remittances).

What is the replacement fertility rate (i.e. fertility rate that keeps a country's population stable)?

- In developed countries the replacement rate is 2.1, in developing countries it is 2.3 or more due to worse health care leading to a higher probability of death before the age of 15. In turn Germany's fertility rate means that the population size will shrink over time.

What is the total population size of Egypt as compared to Germany?

Rank	Country (or dependent territory)	Population	Date	% of world population
1	 China ^[8]	1,365,480,000	July 9, 2014	19
2	 India	1,246,420,000	July 9, 2014	17.4
3	 United States	318,355,000	July 9, 2014	4.44
4	 Indonesia	252,164,800	July 1, 2014	3.51
5	 Brazil	202,823,000	July 9, 2014	2.83
6	 Pakistan	188,020,000	July 1, 2014	2.62
7	 Nigeria	178,517,000	July 1, 2014	2.49
8	 Bangladesh	156,591,000	July 9, 2014	2.18
9	 Russia ^[9]	146,048,500	May 1, 2014	2.04
10	 Japan	127,090,000	June 1, 2014	1.77
11	 Mexico	119,713,203	July 1, 2014	1.67
12	 Philippines	99,833,600	July 9, 2014	1.39
13	 Vietnam	89,708,900	July 1, 2013	1.25
14	 Ethiopia	87,952,991	July 1, 2014	1.23
15	 Egypt	86,770,500	July 9, 2014	1.21
16	 Germany	80,716,000	September	1.13

http://en.wikipedia.org/wiki/List_of_countries_by_population

However the relevant measure here is the population growth rate. It is quite different between Germany and Egypt!

- In 2013, it was 0.2% for Germany and 1.6% for Egypt.

6.3 Data in Workfile Übung9.wf1

WW 1 if respondent is a wage worker, 0 otherwise

Y Net basic income per 3 months in EGP

XYR Years of experience in the labor market

HRS Average number of work hours per day

F 1 if respondent is female, 0 if male

ILLITERATE 1 if cannot read or write, 0 otherwise (Reference Group)

READ&WRITE 1 if can read and write but without any certificate, 0 otherwise

PRIMARY 1 if has primary certificate, 0 otherwise

PREPARATORY 1 if has preparatory certificate, 0 otherwise

VOCATIONALSECONDARY 1 if has vocational secondary certificate, 0 otherwise

GENERALSECONDARY 1 if has general secondary certificate, 0 otherwise

DIPLOMA 1 if has diploma, 0 otherwise

UNIVERSITY 1 if has university certificate, 0 otherwise

PRIVATE 1 if respondent works in private sector, 0 if works in the government

URBAN 1 if respondent living in Urban area, 0 if lives in Rural area

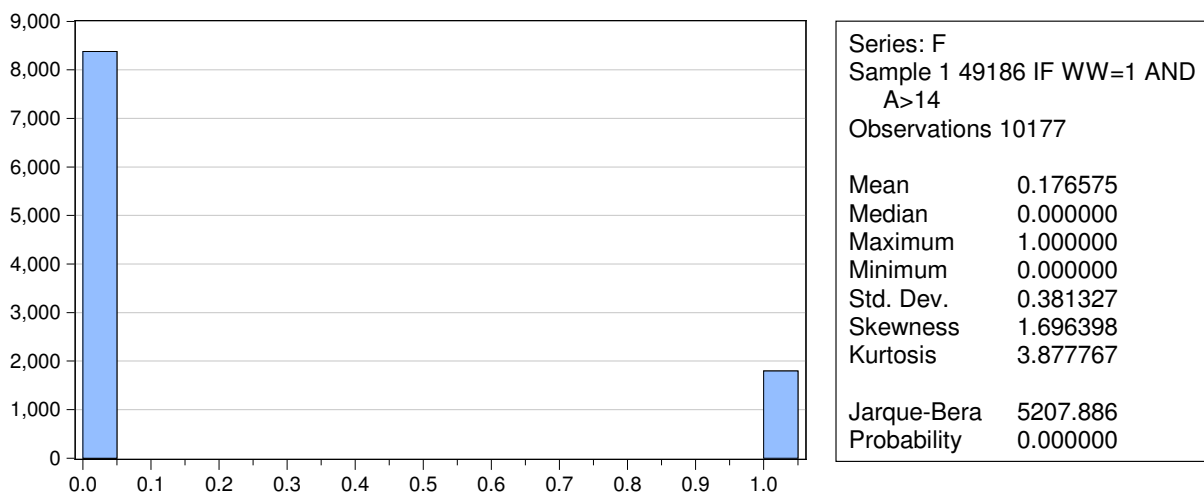
- The educational dummies refer to the *highest* educational certificate earned by an individual. Primary is finishing Grade 1 to 6, Preparatory is finishing Grades 7 to 9 and Secondary is finishing Grades 9 to 12. General Secondary is similar to 'Abitur'. Vocational Secondary and Diploma refer to the 'Ausbildung' track.

6.4 The Econometric Model

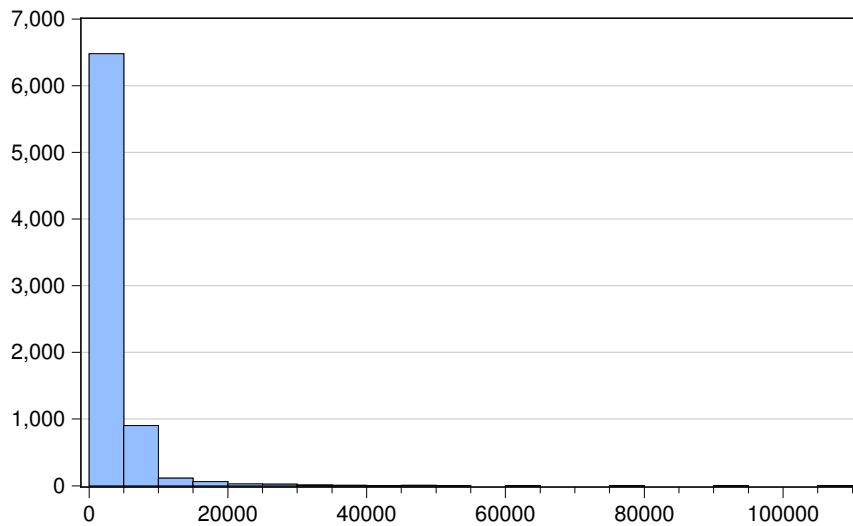
We will estimate a function that includes the basic Mincerian components of schooling, which are dummies in our case, HRS, XYR polynomial, the female dummy F, in addition to URBAN dummy and PRIVATE dummy. Our reference group for the educational dummies is ILLITERATE.

$$\ln(y_t) = \beta_0 + \beta_1 \ln(Hrs) + \beta_2 Xyr + \beta_3 Xyr^2 + \beta_4 Read\&Write + \beta_5 Primary + \beta_6 Preparatory + \beta_7 VocationalSecondary + \beta_8 GeneralSecondary + \beta_9 Diploma + \beta_{10} Uni + \beta_{11} F + \beta_{12} Urb + \beta_{13} Private + \varepsilon_t \quad (1)$$

Let us first examine some descriptive statistics of the data.

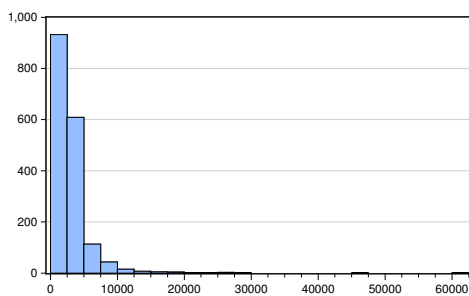


The figure shows that 17.6% of the total sample of wage workers are females, while 82.4% are males. This shows that wage work is not the primary work type for the majority of females, as most females work as unpaid family workers. On the other hand, wage work is the main work type for males in Egypt.

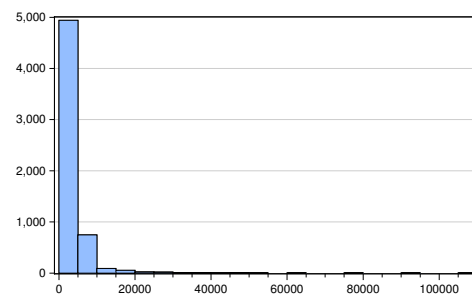


Series: Y	
Sample 1 49186	
Observations 7643	
Mean	3604.149
Median	2700.000
Maximum	105000.0
Minimum	240.0000
Std. Dev.	4244.579
Skewness	8.283404
Kurtosis	118.7399
Jarque-Bera	4353387.
Probability	0.000000

The mean earnings for all sample is 3,604 EGP per 3 months. There is a very big difference between the minimum and maximum wage value. The standard deviation from the mean is 4,656 EGP.

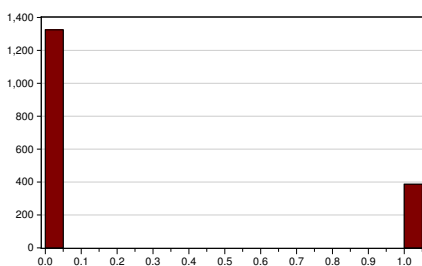


Series: Y	
Sample 1 49186 IF F=1	
Observations 1737	
Mean	3045.822
Median	2400.000
Maximum	60000.00
Minimum	240.0000
Std. Dev.	3131.649
Skewness	7.186271
Kurtosis	95.48478
Jarque-Bera	634005.3
Probability	0.000000

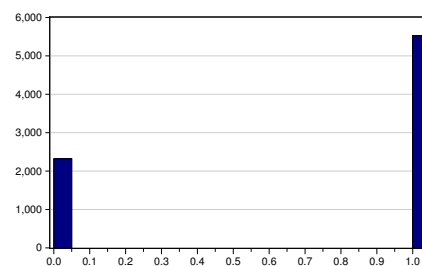


Series: Y	
Sample 1 49186 IF F=0	
Observations 5906	
Mean	3768.358
Median	2700.000
Maximum	105000.0
Minimum	300.0000
Std. Dev.	4507.134
Skewness	8.189206
Kurtosis	113.4718
Jarque-Bera	3069216.
Probability	0.000000

Looking at earnings per gender, the average wages of females are much lower than those of males, with a difference of 723 EGP per 3 months. The maximum income value for female wage workers are also lower than that for males, at 60,000 relative to 105,000, respectively. Comparing the number of observations highlights the much higher number of males engaged in wage worker relative to females.



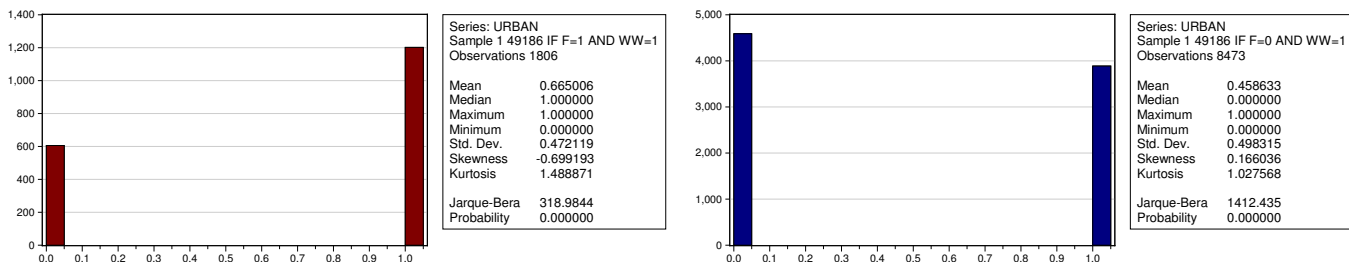
Series: PRIVATE	
Sample 1 49186 IF F=1 AND WW=1	
Observations 1710	
Mean	0.225731
Median	0.000000
Maximum	1.000000
Minimum	0.000000
Std. Dev.	0.418185
Skewness	1.312095
Kurtosis	2.721593
Jarque-Bera	496.1765
Probability	0.000000



Series: PRIVATE	
Sample 1 49186 IF F=0 AND WW=1	
Observations 7835	
Mean	0.704403
Median	1.000000
Maximum	1.000000
Minimum	0.000000
Std. Dev.	0.456340
Skewness	-0.895896
Kurtosis	1.802629
Jarque-Bera	1516.142
Probability	0.000000

Examining sector of employment by gender shows that males are much more concentrated in the private sector relative to females. More specifically, 70.4% of total male wage workers are employed in the private

sector, relative to 22.5% of females. In turn, 77.5% of female wage workers are employed in the government sector.

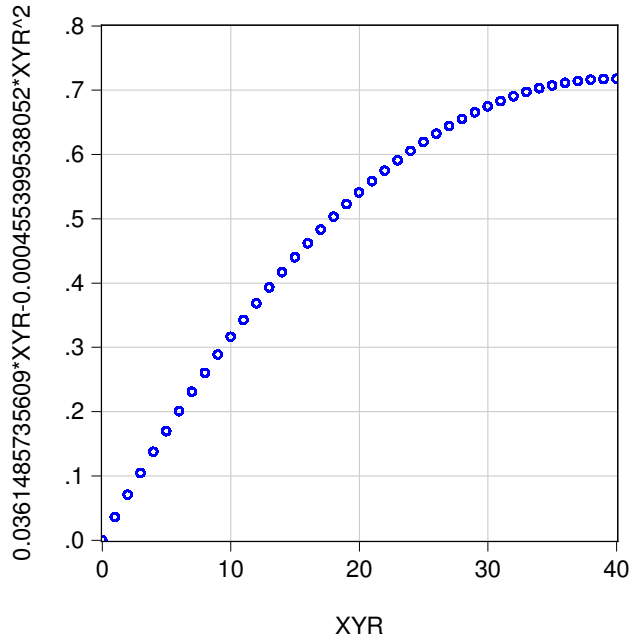


Around 46% of males wage workers live in urban regions, relative to 66.5% of female wage workers. Hence, the majority of females wage workers live in urban regions relative to male wage workers, who are more evenly distributed across both regions.

We now show the estimation results from equation 1 (modell1):

Dependent Variable: LOG(Y)				
Method: Least Squares				
Date: 07/07/15 Time: 15:53				
Sample (adjusted): 10 49176				
Included observations: 6711 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.596652	0.070700	93.30544	0.0000
LOG(HRS)	0.197666	0.028586	6.914695	0.0000
XYR	0.036149	0.002393	15.10817	0.0000
XYR^2	-0.000455	5.70E-05	-7.988838	0.0000
READWRITE	0.099972	0.048792	2.048952	0.0405
PRIMARY	0.129070	0.037179	3.471637	0.0005
PREPARATORY	0.247016	0.044159	5.593748	0.0000
VOCATIONALSECONDARY	0.381044	0.029916	12.73705	0.0000
GENERALSECONDARY	0.393233	0.054655	7.194791	0.0000
DIPLOMA	0.482467	0.043823	11.00938	0.0000
UNI	0.698814	0.032129	21.75060	0.0000
URBAN	0.134074	0.015764	8.505237	0.0000
PRIVATE	0.071246	0.018864	3.776728	0.0002
F	-0.231771	0.019772	-11.72214	0.0000
R-squared	0.166317	Mean dependent var	7.887643	
Adjusted R-squared	0.164698	S.D. dependent var	0.680897	
S.E. of regression	0.622304	Akaike info criterion	1.891309	
Sum squared resid	2593.498	Schwarz criterion	1.905519	
Log likelihood	-6332.287	Hannan-Quinn criter.	1.896216	
F-statistic	102.7713	Durbin-Watson stat	1.452240	
Prob(F-statistic)	0.000000			

- Analyzing the HRS coefficient shows that a one percent higher work hours leads to around 0.20% higher earnings.
- The experience and experience squared coefficients are significant and have the expected signs. This shows that experience profiles of wage workers are inversely U-shaped, as explained by human capital theory. We can plot the *total effect* of experience on income to allow for graphical visualization:



- Returns to experience are 30% for a person having ten years of experience, but then the rate of increase falls as the years of experience increase. For example, the following ten years of experience provide an increase in returns of 26%, and with thirty years of experience the rate of increase is only 13%.
- Looking at the educational dummy results in model 1, all coefficients are statistically significant and positive, which shows that returns to education for all groups are significantly higher than the ILLITERATE group.
- Wage workers with a PRIMARY certificate earn 12.9% higher than the Illiterate group, while wage workers with a PREPARATORY certificate earn 24.7% higher than the Illiterate group.
- The educational dummies show that earnings are positively related to education level, where the the highest earnings are for those with a UNI certificate, with around 70% higher earnings relative to the Illiterate group.
- Wage workers living in URBAN regions earn 13.4% higher earnings relative to those living in rural regions. This is because urban regions have much better development, infrastructure, and job opportunities due to the large concentration of economic activity in these regions.
- Working in the PRIVATE sector provides 7% higher earnings relative to working in the government sector.
- Females earn 23% less than what is earned by males, which shows a possible discrimination effect by gender. Given that this F coefficient is large and significant, it is a good idea to estimate earning functions for males and females separately. We do this in the coming estimations.

The R^2 of the model is only 16.6% although we considered the most important human capital variables. What does this mean economically? How is this result different to that of Germany?

We now estimate equation 1 for males and females separately. We start by estimating model 2 for females (i.e. $f=1$).

Dependent Variable: LOG(Y) Method: Least Squares Date: 07/08/15 Time: 12:25 Sample: 1 49186 IF F=1 Included observations: 1596				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.160947	0.156619	39.33712	0.0000
LOG(HRS)	0.202568	0.063904	3.169869	0.0016
XYR	0.047688	0.005274	9.042193	0.0000
XYR^2	-0.000556	0.000145	-3.839423	0.0001
READWRITE	0.238837	0.175177	1.363405	0.1729
PRIMARY	0.563841	0.140730	4.006551	0.0001
PREPARATORY	0.305581	0.139267	2.194210	0.0284
VOCATIONALSECONDARY	0.455261	0.086154	5.284280	0.0000
GENERALSECONDARY	0.477096	0.127068	3.754661	0.0002
DIPLOMA	0.550645	0.102161	5.389955	0.0000
UNI	0.780320	0.085914	9.082556	0.0000
URBAN	0.144187	0.033637	4.286594	0.0000
PRIVATE	-0.067444	0.045709	-1.475513	0.1403
R-squared	0.272931	Mean dependent var	7.746657	
Adjusted R-squared	0.267419	S.D. dependent var	0.707441	
S.E. of regression	0.605506	Akaike info criterion	1.842606	
Sum squared resid	580.3863	Schwarz criterion	1.886389	
Log likelihood	-1457.399	Hannan-Quinn criter.	1.858866	
F-statistic	49.51956	Durbin-Watson stat	2.034996	
Prob(F-statistic)	0.000000			

Comparing the results to the first estimation, we note that the second estimation provides a better fit given by R^2 . Additionally the values of the coefficients and their statistical significance has also changed relative to model 1:

- The HRS coefficient shows that one percent higher work hour leads to 0.20% higher earnings.
- The experience polynomial is significant and has the expected signs of a positive linear term and a negative polynomial term. This shows that females face an inverse U-shape earnings experience profile.
- Female wage workers with READWRITE do not receive significantly higher earnings relative to the illiterate group.
- All other educational levels provide significantly higher earnings. The highest earnings are for females with UNI certificate, which provides 78% higher earnings relative to the reference group.
- Living in an URBAN region provides 14% higher earnings relative to living in a rural region,
- Working in the PRIVATE sector does not provide significantly higher returns relative to working in the GOVERNMENT sector.

Let us now show the results of model 3 for males:

Dependent Variable: LOG(Y) Method: Least Squares Date: 07/08/15 Time: 12:25 Sample: 1 49186 IF F=0 Included observations: 5115				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.755098	0.079913	84.53035	0.0000
LOG(HRS)	0.178276	0.031888	5.590652	0.0000
X _{YR}	0.027645	0.002782	9.937818	0.0000
X _{YR} ²	-0.000321	6.38E-05	-5.030666	0.0000
READWRITE	0.082314	0.050826	1.619532	0.1054
PRIMARY	0.089600	0.038810	2.308694	0.0210
PREPARATORY	0.225767	0.046590	4.845832	0.0000
VOCATIONALSECONDARY	0.335249	0.032385	10.35203	0.0000
GENERALSECONDARY	0.350625	0.061199	5.729291	0.0000
DIPLOMA	0.445186	0.050028	8.898765	0.0000
UNI	0.664382	0.035355	18.79167	0.0000
URBAN	0.127487	0.017796	7.163866	0.0000
PRIVATE	0.086455	0.020751	4.166207	0.0000
R-squared	0.127769	Mean dependent var	7.931634	
Adjusted R-squared	0.125718	S.D. dependent var	0.666392	
S.E. of regression	0.623097	Akaike info criterion	1.894308	
Sum squared resid	1980.848	Schwarz criterion	1.910929	
Log likelihood	-4831.692	Hannan-Quinn criter.	1.900127	
F-statistic	62.28090	Durbin-Watson stat	1.530542	
Prob(F-statistic)	0.000000			

- The HRS coefficient shows that one percent higher work hour provides around 0.18% higher earnings, 2% lower than that earned by females.
- The experience polynomial is significant and with the expected signs. Comparing the polynomial to that of females shows that females have higher returns to experience than males. This could be due to the fact that female wage workers are much more concentrated in the government sector, where income is more dependent on seniority level.
- The education dummies show a similar trend to that shown for females. However females seem to benefit more per education level relative to the reference group compared to males.
- Males working in the PRIVATE sector earn 8.6% higher than those working in the GOVERNMENT sector. This shows that the private sector provides an earnings advantage for males, but not for females.
- The estimation quality for the males earning function shows a low explanatory power, given by an R^2 of only 12.7%. What does this result show compared to the females' result?