



# Schooling and early work experience in Uganda

*Draft*

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prepared for the World Bank



## Introduction



## Outline

- Background
- The data
- Results on educational participation
- Results on labor market participation
- Conclusion



## Disclaimer

The results presented here are still preliminary  
The views expressed herein are attributable only to the author(s) and do not represent the views of the World Bank, Cornell University, or data providers.



## Background

- Why invest in educational system?
  - ◆ Private returns to citizens
  - ◆ Societal returns are greater
  - ◆ Classical public good
- What kind of problems can there be with educational system?
  - ◆ Primary education too expensive?
  - ◆ Secondary education too expensive?
  - ◆ Too much demand for education ?
  - ◆ Too little for educated workers?



## Uganda

- Among the more educated countries in Africa
- 1997 Universal Primary Education - reduced cost of primary education
- Uganda Bureau of Statistics conducts regular large-scale surveys
- Statistical analysis of past and recent past



## Approach

- Educational participation
  - ◆ by age
  - ◆ by cohort
  - ◆ several subgroups: by gender, for household heads, urban/rural
- Incentive structure of the labor market
  - ◆ Here: returns to primary/secondary education
- Labor market activity
  - ◆ Participation
  - ◆ Type of employment/ job creation



## Reducing cost of education



## Spill over effects

- UPE: Reduction in cost of primary education
- Let's assume constant earnings opportunities
- Higher primary education participation
- Larger fraction of educational budget available for secondary education
- Higher secondary education participation as indirect effect
- This effect can show up
  - ◆ over time, as current elementary students continue longer in the educational system
  - ◆ contemporaneously, as a direct income effect (siblings stay longer)



## Data



## Uganda National Household Surveys

- 1992, 1996, 1999, 2002 available
- Some data processing issues
  - ◆ No weights in 1996
  - ◆ No way to connect labor market activity with education in 1996
  - ◆ Change in the way the survey was administered in 2002 (*will be solved by final version*)
- Some data standardization issues: possible answers/categories differ across years
  - ◆ Education
  - ◆ Activity sub-categories
  - ◆ Industry/occupation (*unsolved*)
  - ◆ Earnings



## Measuring education

- Some differences across surveys → standardization
- Grouping into simple categories:
  - ◆ No participation in educational system
  - ◆ Some primary level completed
  - ◆ Some secondary level completed
- Formally:
  - ◆  $EDUC_{it}(1) = I(EDUCATION_{it} \in \{P1 - P7\})$
  - ◆  $EDUC_{it}(2) = I(EDUCATION_{it} > P7)$
- For some analysis, we create household-level aggregations of these for members of household other than the head:

$$EDUC_{ht}(k) = \frac{\sum_{i \in h, i \neq HEAD} I(EDUC_{it} = k)}{N_h - 1}$$



## Measuring income and earnings

- Some differences across surveys →standardization
- Income and earnings in the past 12 months, both cash and in-kind
- 1992: Earnings reported on main activity and two secondary activities, as well as 'other activities'
- 1999: Labor earnings reported on main activity and one secondary activity, as well as 'other activities'
- 1999: Non-labor earnings only reported on a household level (with a per-enterprise serial number) ▶



## Measuring labor market activity

- Significant differences across surveys →standardization
- 10 categories, including “not interested” and “other” ▶
- Flow of questions may impact comparability somewhat
- Choices were different in some years, may impact comparability



## Participation in education



## Cross-sectional results

Table 5, men:

	1992	2002
<b>(a) primary education</b>		
Male		
5-10	39.87	53.40
10-15	85.25	90.59
15-20	70.05	58.09
20-25	59.57	52.15
<b>(b) secondary education</b>		
Male		
15-20	20.44	37.45
20-25	28.41	41.52
25-30	28.45	35.01
30-35	26.55	33.11
35-40	23.74	29.48
40-45	21.54	30.31

	1992	2002
<b>(c) some education</b>		
Male		
5-10	39.87	53.40
10-15	87.00	95.45
15-20	90.49	95.54
20-25	87.98	93.67
25-30	86.69	91.37
30-35	85.84	91.52
35-40	84.60	88.34
40-45	80.35	83.63



## Viewed as cohorts

Table 6, men:

Age	Observed in		Age	Observed in	
in 1992	1992	2002	in 1992	1992	2002
<b>(a) primary education</b>					
Male					
5-10	39.87	58.09	5-10	39.87	95.54
10-15	85.25	52.15	10-15	87.00	93.67
15-20	70.05	56.36	15-20	90.49	91.37
20-25	59.57	58.42	20-25	87.98	91.52
<b>(b) secondary education</b>					
Male					
5-10	0.00	37.45	25-30	86.69	88.34
10-15	1.75	41.52	30-35	85.84	83.63
15-20	20.44	35.01			
20-25	28.41	33.11			
25-30	28.45	29.48			
30-35	26.55	30.31			



## Urban-rural differential

Table 8:

	1992	1996	1999	2002
<b>(a) With some primary education</b>				
Male				
Rural	59.99	.	63.41	63.24
Urban	51.85	.	50.97	50.69
Female				
Rural	48.32	.	56.00	60.32
Urban	56.71	.	54.92	52.24
<b>(b) With primary or secondary education</b>				
Male				
Rural	70.75	.	76.81	80.49
Urban	86.77	.	89.16	90.52
Female				
Rural	53.19	.	63.43	70.81
Urban	81.29	.	85.36	87.64

- Much stronger improvement in rural areas
- Catch-up of women



## Returns to education



## Measuring returns to education

- Mincerian wage equation:

$$\log E_{ht} = \beta_0 + \beta_1 f_1(\text{demographics}) + \beta_2 f_2(\text{age}) + \beta_3 f_3(\text{education})$$

$$f_3(\text{education}) = \gamma_1 EDUC_{it}(1) + \gamma_2 EDUC_{it}(2)$$

- Return to secondary education:  $\gamma_2 - \gamma_1$
- ♦ Quadratic in age
- if  $E$  are wages: classical Mincerian wage equation
- if  $E$  are household earnings: household production function



## Base result, wage regression

### Wage regression, positive labor income

Year	$R^2$ (N)	Married	Age	Age <sup>2</sup>	Female	Education:	
						Primary	Secondary
1992	0.271 (3148)	0.393 *** (0.038)	0.066 *** (0.007)	-0.084 *** (0.009)	-0.235 *** (0.044)	0.359 *** (0.051)	0.874 *** (0.052)
1999	0.385 (3038)	0.367 *** (0.042)	0.055 *** (0.007)	-0.066 *** (0.008)	-0.193 *** (0.044)	0.521 *** (0.058)	1.598 *** (0.057)

- Fairly similar coefficients across years
- Somewhat flattened age profile
- Significant changes in the returns to education
  - ◆ The premium to some kind of education has increased at all levels
  - ◆ The (expected) return to a secondary education has doubled.



## Gender, household heads

### Wage regression, by gender

Gender	Year	$R^2$ (N)	Married	Age	Age <sup>2</sup>	Education:	
						Primary	Secondary
Male	1992	0.293 (2427)	0.504 *** (0.044)	0.053 *** (0.008)	-0.070 *** (0.010)	0.410 *** (0.056)	0.910 *** (0.060)
		0.358 (2312)	0.471 *** (0.050)	0.048 *** (0.007)	-0.058 *** (0.009)	0.344 *** (0.068)	1.405 *** (0.068)
Female	1992	0.230 (729)	0.054 (0.073)	0.103 *** (0.016)	-0.130 *** (0.021)	-0.010 (0.121)	0.635 *** (0.107)
		0.457 (734)	0.074 (0.082)	0.090 *** (0.020)	-0.112 *** (0.026)	0.812 *** (0.122)	1.882 *** (0.116)

### Wage regression, by gender, household heads only

Male	1992	0.269 (1886)	0.392 *** (0.052)	0.023 ** (0.010)	-0.039 *** (0.011)	0.317 *** (0.064)	0.834 *** (0.067)
		0.365 (1830)	0.489 *** (0.060)	0.048 *** (0.010)	-0.061 *** (0.011)	0.295 *** (0.076)	1.385 *** (0.076)
Female	1992	0.263 (370)	0.113 (0.112)	0.054 ** (0.023)	-0.078 *** (0.027)	0.277 (0.179)	0.879 *** (0.158)
		0.384 (318)	0.240 (0.150)	0.163 *** (0.033)	-0.202 *** (0.041)	0.489 *** (0.184)	1.539 *** (0.180)



## Household heads, by cohort

Gender	Year	$R^2$ (N)	Married	Age	Age <sup>2</sup>	Education:	
						Primary	Secondary
20-30	1992	0.077 (641)	0.098 (0.082)	-0.095 (0.251)	0.212 (0.484)	0.554 *** (0.120)	0.789 *** (0.119)
30-40	1999	0.290 (642)	0.276 ** (0.126)	0.721 * (0.382)	-1.001 * (0.536)	0.396 ** (0.158)	1.528 *** (0.152)
30-40	1992	0.154 (602)	0.279 ** (0.113)	0.074 (0.338)	-0.094 (0.477)	0.394 *** (0.146)	0.997 *** (0.145)
40-50	1999	0.301 (341)	0.711 *** (0.192)	0.268 (0.700)	-0.302 (0.765)	0.073 (0.182)	1.196 *** (0.183)



## Household production function

### Household heads' labor income, own education

Gender	Year	$R^2$ (N)	Married	Age	Age <sup>2</sup>	Education:	
						Primary	Secondary
Male	1992	0.269 (1886)	0.392 *** (0.052)	0.023 ** (0.010)	-0.039 *** (0.011)	0.317 *** (0.064)	0.834 *** (0.067)
Male	1999	0.365 (1830)	0.489 *** (0.060)	0.048 *** (0.010)	-0.061 *** (0.011)	0.295 *** (0.076)	1.385 *** (0.076)
Female	1992	0.263 (370)	0.113 (0.112)	0.054 ** (0.023)	-0.078 *** (0.027)	0.277 (0.179)	0.879 *** (0.158)
Female	1999	0.384 (318)	0.240 (0.150)	0.163 *** (0.033)	-0.202 *** (0.041)	0.489 *** (0.184)	1.539 *** (0.180)

### Household income, household heads' education

Male	1992	0.210 (6510)	0.583 *** (0.030)	0.043 *** (0.004)	-0.047 *** (0.004)	0.267 *** (0.027)	0.732 *** (0.034)
Male	1999	0.293 (7884)	0.587 *** (0.028)	0.041 *** (0.003)	-0.037 *** (0.003)	0.228 *** (0.025)	0.893 *** (0.029)
Female	1992	0.191 (2284)	0.124 *** (0.043)	0.075 *** (0.008)	-0.084 *** (0.009)	0.255 *** (0.047)	0.922 *** (0.070)
Female	1999	0.307 (2818)	0.216 *** (0.036)	0.050 *** (0.005)	-0.048 *** (0.005)	0.355 *** (0.036)	0.960 *** (0.052)



## Household production function

### Household income, household heads' education

Gender	Year	$R^2$ (N)	Married	Age	Age <sup>2</sup>	Education:	
						Primary	Secondary
Male	1992	0.210 (6510)	0.583 *** (0.030)	0.043 *** (0.004)	-0.047 *** (0.004)	0.267 *** (0.027)	0.732 *** (0.034)
Male	1999	0.293 (7884)	0.587 *** (0.028)	0.041 *** (0.003)	-0.037 *** (0.003)	0.228 *** (0.025)	0.893 *** (0.029)
Female	1992	0.191 (2284)	0.124 *** (0.043)	0.075 *** (0.008)	-0.084 *** (0.009)	0.255 *** (0.047)	0.922 *** (0.070)
Female	1999	0.307 (2818)	0.216 *** (0.036)	0.050 *** (0.005)	-0.048 *** (0.005)	0.355 *** (0.036)	0.960 *** (0.052)

### Household income, household heads' and other members' education

Gender	Year	$R^2$ (N)	Heads's education:		Other education:	
			Primary	Secondary	Primary	Secondary
Male	1992	0.238 (5763)	0.181 *** (0.028)	0.502 *** (0.037)	0.325 *** (0.031)	0.935 *** (0.061)
Male	1999	0.324 (7192)	0.135 *** (0.026)	0.613 *** (0.032)	0.410 *** (0.030)	1.049 *** (0.049)
Female	1992	0.183 (1813)	0.126 ** (0.052)	0.701 *** (0.079)	0.284 *** (0.063)	0.728 *** (0.111)
Female	1999	0.341 (2262)	0.223 *** (0.038)	0.738 *** (0.058)	0.267 *** (0.049)	0.841 *** (0.079)



## Labor market participation



## Employment status, by age group

Age	1992			1999		
	Salaried	Employer	Overall	Salaried	Employer	Overall
<b>Male</b>						
15-20	22.51	68.19	90.70	25.03	67.78	92.81
20-25	21.05	73.15	94.20	20.90	75.40	96.29
25-30	24.20	70.27	94.46	24.34	71.60	95.94
30-35	24.11	71.64	95.75	25.32	70.90	96.22
35-40	23.85	72.06	95.91	22.93	73.52	96.45
40-45	25.71	67.62	93.33	16.20	79.30	95.51
<b>Female</b>						
15-20	22.69	47.94	70.62	13.11	69.92	83.03
20-25	17.77	57.78	75.56	18.38	60.78	79.16
25-30	16.97	65.82	82.79	14.22	71.50	85.72
30-35	9.80	73.25	83.05	11.63	71.09	82.72
35-40	13.13	70.77	83.90	7.75	78.12	85.86
40-45	7.06	76.16	83.22	10.56	74.83	85.39



## Employment status, viewed by cohort

Age	1992			1999		
	Salaried	Employer	Overall	Salaried	Employer	Overall
<b>Male</b>						
15-20	22.51	68.19	90.70	25.03	67.78	92.81
20-25	21.05	73.15	94.20	20.90	75.40	96.29
25-30	24.20	70.27	94.46	24.34	71.60	95.94
30-35	24.11	71.64	95.75	25.32	70.90	96.22
35-40	23.85	72.06	95.91	22.93	73.52	96.45
40-45	25.71	67.62	93.33	16.20	79.30	95.51
<b>Female</b>						
Age in 1992	1992			1999		
	Salaried	Employer	Overall	Salaried	Employer	Overall
<b>Male</b>						
15-20	22.51	68.19	90.70	24.78	71.65	96.43
20-25	21.05	73.15	94.20	23.45	72.10	95.54
25-30	24.20	70.27	94.46	25.83	71.21	97.05
30-35	24.11	71.64	95.75	20.14	76.03	96.17
35-40	23.85	72.06	95.91	15.85	79.72	95.57
40-45	25.71	67.62	93.33	19.58	74.83	94.42



## Choice of employment type: salaried or not

- Only consider choice of “sector”:
  1. Self-employed with or without employees
  2. Wage-employed in private or government sector
- Model the probability of being self-employed



## Choice of employment type: salaried or not

1992						
Parameter	Estimate	Standard Error	95% Confidence Limits		$\chi^2$	$Pr > \chi^2$
demo_age	-0.0108	0.0014	-0.0135	-0.0080	58.82	<.0001
demo_age2	0.0055	0.0022	0.0012	0.0097	6.42	0.0113
cat_primary	-0.0144	0.0033	-0.0209	-0.0078	18.44	<.0001
cat_secondary	-0.7771	0.0037	-0.7844	-0.7698	43351.7	<.0001

  

1999						
Parameter	Estimate	Standard Error	95% Confidence Limits		$\chi^2$	$Pr > \chi^2$
demo_age	-0.1096	0.0015	-0.1125	-0.1067	5447.94	<.0001
demo_age2	0.1751	0.0023	0.1707	0.1796	5974.30	<.0001
cat_primary	0.0708	0.0036	0.0638	0.0778	396.27	<.0001
cat_secondary	-0.6149	0.0038	-0.6223	-0.6076	26851.4	<.0001



## Conclusion



## Education and incentive structure

- Educational attainment has increased dramatically
  - ◆ Not only for the cohorts directly affected by UPE
  - ◆ Older cohorts are obtaining more education than their elders
- Changes in the economy's incentive structure
  - ◆ Flattening of the cross-sectional age profile
  - ◆ Steepening returns to secondary education for younger cohorts
  - ◆ (to some extent) decrease in gender wage gap
  - ◆ However, little change in the household-level earnings function



## Employment

- Small changes in choice of employment type
  - ◆ Youngest men (by age or cohort) more likely to be found with wages
  - ◆ Opposite true for the youngest women?
  - ◆ Men 40-45 dramatic decline in salaried employment
- Model of employment choice
  - ◆ Shift in the likelihood of individuals with primary education to enter/start a business
  - ◆ Job creation policies successful?



## Thank you

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## Measuring income and earnings

X

- 1992: Earnings reported on main activity and two secondary activities, as well as 'other activities'
  - Identify activities associated with salary, parse out, identify as wage income
  - Sum all earnings to household level to obtain household income
- 1999: Labor earnings reported on main activity and one secondary activity, as well as 'other activities'
- 1999: Non-labor earnings only reported on a household level (with a per-enterprise serial number)
  - Use reported wage earnings when reporting salaried activity
  - Sum all other earnings to household level to obtain labor household income
  - Sum all non-labor earnings to household level to obtain non-labor household income, sum with labor household income



## Standardizing status

- 0 = "Too young, too old"
- 1 = "Disabled"
- 2 = "Student"
- 3 = "Own account worker"      "self-employed"
- 4 = "Employer"      "self-employed"
- X 5 = "Gov't employee"      "wage-employed"
- 6 = "Private employee"      "wage-employed"
- 7 = "Unpaid family worker"
- 8 = "Not working/unemployed"
- 9 = "Not interested in work"
- 99 = "Other"



## Full probit results, 1992, men

X

Parameter	DF	Standard		95% Confidence		Chi-Square	Pr > ChiSq
		Estimate	Error	Limits	Limits		
Intercept	1	0.7186	0.0216	0.6762	0.7610	1103.45	<.0001
cat_married	1	0.5299	0.0033	0.5235	0.5363	26402.3	<.0001
demo_age	1	-0.0108	0.0014	-0.0135	-0.0080	58.82	<.0001
demo_age2	1	0.0055	0.0022	0.0012	0.0097	6.42	0.0113
cat_region2	1	0.2583	0.0029	0.2525	0.2641	7680.99	<.0001
cat_region3	1	0.4985	0.0037	0.4911	0.5058	17675.1	<.0001
cat_region4	1	0.0905	0.0029	0.0847	0.0962	946.42	<.0001
urban	1	-0.8272	0.0030	-0.8331	-0.8214	76529.6	<.0001
cat_primary	1	-0.0144	0.0033	-0.0209	-0.0078	18.44	<.0001
cat_secondary	1	-0.7771	0.0037	-0.7844	-0.7698	43351.7	<.0001



## Full probit results, 1999, men

X

Parameter	DF	Standard		95% Confidence		Chi-Square	Pr > ChiSq
		Estimate	Error	Limits	Limits		
Intercept	1	2.2341	0.0234	2.1884	2.2799	9146.62	<.0001
cat_married	1	0.4985	0.0034	0.4919	0.5051	21891.0	<.0001
demo_age	1	-0.1096	0.0015	-0.1125	-0.1067	5447.94	<.0001
demo_age2	1	0.1751	0.0023	0.1707	0.1796	5974.30	<.0001
cat_region2	1	0.1100	0.0029	0.1043	0.1157	1418.64	<.0001
cat_region3	1	0.1904	0.0035	0.1835	0.1974	2884.78	<.0001
cat_region4	1	0.0414	0.0031	0.0354	0.0475	179.08	<.0001
urban	1	-0.9521	0.0028	-0.9576	-0.9466	116331	<.0001
cat_primary	1	0.0708	0.0036	0.0638	0.0778	396.27	<.0001
cat_secondary	1	-0.6149	0.0038	-0.6223	-0.6076	26851.4	<.0001