

Does Doing an Apprenticeship Pay Off? Evidence from Ghana

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To survey or to experiment?

- A war has broken out between the Randomistas and their opponents.
- In the more extreme claims of the Randomistas only random allocation can allow us to infer causality.
- The lack of progress in development policy (on which almost all can agree) are the fault of those who fail to understand selection and its effects.
- This paper is based on a survey and not an experiment so nicely complements the first paper in this session.
- So who should the World Bank fund: the surveys or the experiments?
- I think it is useful to have a question the audience will want an answer to.

What have we learnt from our survey?

- While skills training in Ghana occurs in both the private and public sectors by far the most important institution which provides such training in the private sector is the traditional apprenticeship system.
- Apprentices are young men and women who undertake highly sector-specific training. Some of these apprentices then go on to form their own businesses, others go on to work in the firm in which they were apprentices as masters/mistresses, some move to other firms or occupations.
- While much is known about the institution in terms of its structures and forms, we know much less about how well apprenticeship pays relative to other forms of training and relative to more academic education.
- Finding out more is the purpose of this paper.

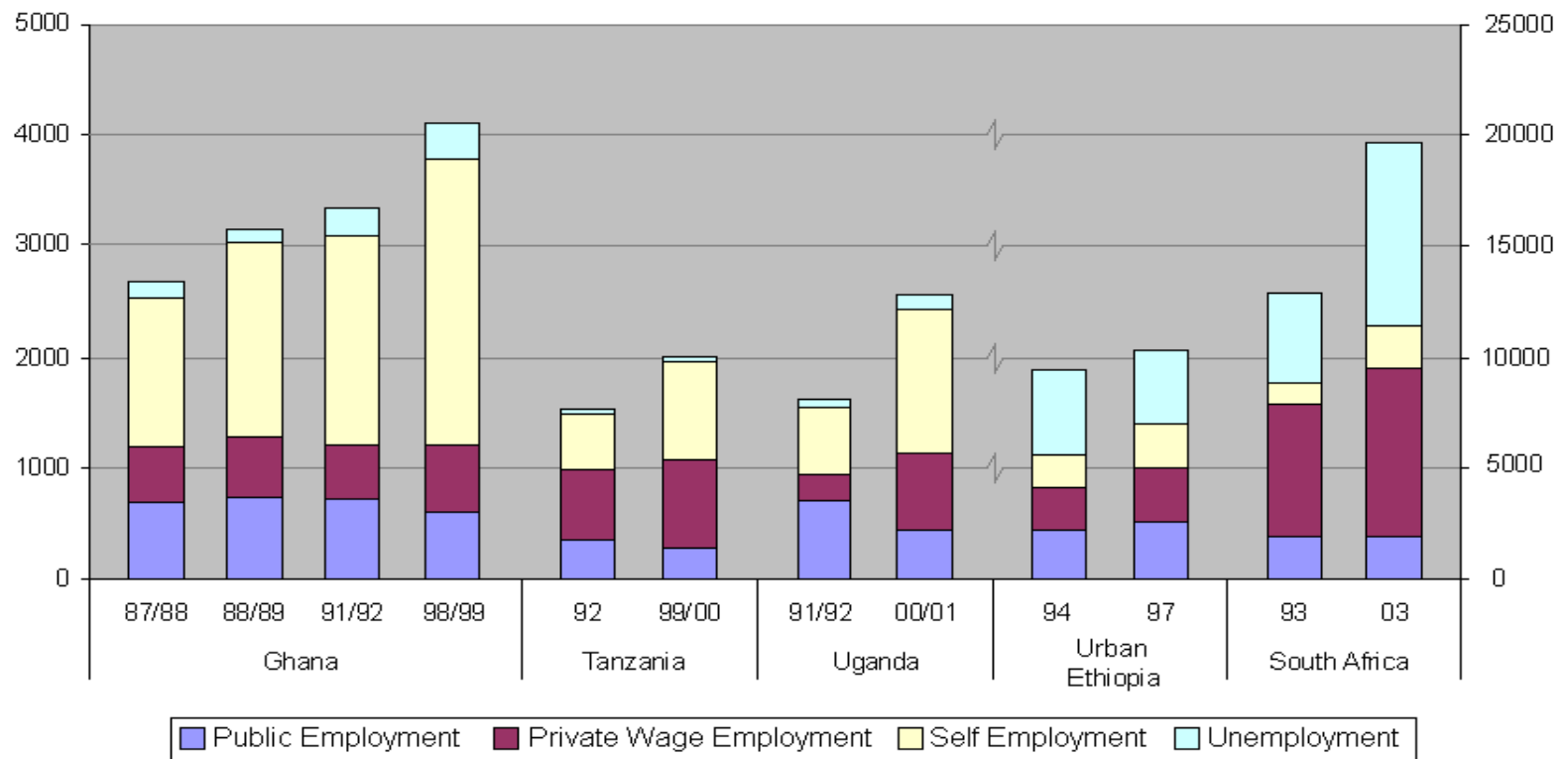
Three questions

- Why should we be interested in the apprenticeship system in Ghana?
- How can we measure its returns?
- Is any apprenticeship effect causal?
 - It is this last question which lies at the core of the battles between the experimenters and the surveyors

Why should we be interested in apprenticeship?

- As we will see most of the trainees in this system end up working in what is usually referred to as the informal sector.
- We will also show that apprenticeship training is by far the most common form of training in urban Ghana
- Moreover, we have lots of evidence in sub-Saharan Africa that the informal sector is growing in importance.
- In light of the rise in the importance of the informal sector in providing job opportunities in urban areas and the accompanying dominance of apprenticeship as the training option in this sector, the questions regarding the size of the returns to apprenticeship are all the more relevant.

Trend in much of urban Africa toward self-employment



Why is Ghana of interest?

- While we address questions specific to Ghanaian apprenticeship, the analysis links to the long history in Ghana, and elsewhere, of the relative value of academic relative to vocational education.
- Let a consultant loose in a country and the probability of them recommending an increased focus on training by the public sector is close to one. So how does the private supply of training occur and how does it compare with the public?
- The Ghanaian apprenticeship system is an example of the market supplying training. Do the poor benefit? Who pays and why do we see such an extensive system of privately supplied training?
- These are questions of policy relevance well beyond Ghana.

How can we measure its returns?

- Measuring these economic returns to apprenticeship is a difficult undertaking for three reasons.
- First, the data requirements are quite important; as apprenticeship is most commonly a form of skill acquisition which pays off in self-employment if the apprentice acquires sufficient capital to start their own business.
 - Thus to establish the effect of apprenticeship it is essential to observe individuals in both the wage and self-employment sectors.
- Secondly, the endogeneity of education caused by omitted unobservables must be addressed.
 - We are interested in the interplay between education and apprenticeship and must explicitly allow for the potential importance of the returns to education being convex.
- Finally, we have to deal with the endogeneity issues surrounding apprenticeship inherent in our non-experimental data..

The data and endogeneity

- We use data from the CSAE/GSO's Ghana Urban Panel Household Survey (GUPHS) that includes detailed information on training for individuals and measures the incomes of the self-employed with as much accuracy as possible in a manner that allows incomes to be compared across the formal and informal sectors.
- The main reason why endogeneity would be an issue is an omitted variables problem due to ability: people who are more able are more likely to earn a high return from apprenticeship and earn a high income.
- Alternatively it may be true that less able people choose apprenticeship over education more often than high ability people, or less able individuals have difficulty finding jobs and therefore go into an apprenticeship.

Our controls and endogeneity

- We control for ability by including scores on skills tests and the score on the Raven's test.
- An additional source of endogeneity may be a specific "aptitude for apprenticing" which makes certain individuals benefit much more from this type of training than others.
- To address endogeneity caused by ability bias (that remains unobservable after the Raven's test) and this so-called aptitude bias, we also pursue an instrumenting strategy, using a treatment effects (IV) approach as well as a control function in the first stage. The control function offers the advantage over the IV that allows for heterogeneity across the education spectrum, which proves to be crucial.

Is any apprenticeship effect causal?

- After any paper based on experiments the questions focus on two issues (a) did they do it right and (b) so what? Unless we know if the results generalise and **why** they come about we are little the wiser.
- After a paper based on a survey questions focus on one issue: your instruments.
- They are invalid/unconvincing/implausible and (if you are lucky) the survey was a complete waste of time as there is no genuine exogenous variation as you did not choose to experiment.

What does our data show?

- I am now going to focus on what we found.
- Defend what I think are the most plausible results.
- Then come back to the important policy issues I touched on in the beginning.
- Finally suggest that peace is possible between the randomistas and the rest.

Table 1: Manufacturing Employment in the Population Census

	1984		2000		Growth
	Empl.	Share	Empl.	Share	Rate
Wage Employees					
Public	27,172	4.6	34,275	4.3	1.5
Private	65,931	11.2	100,174	12.7	2.6
Apprentices	25,332	4.3	78,834	10.0	7.1
Other	18,684	3.2	15,873	2.0	-1.0
Total Employed	137,119	23.3	229,156	29.1	3.2
Self-Employed					
Without Employees	430,029	73.1	490,276	62.2	0.8
With Employees	21,270	3.6	68,636	8.7	7.3
Total Self-Employed	451,299	76.7	558,912	70.9	1.3
Total	588,418	100.0	788,068	100.0	1.8

Source: Author's calculations based on published statistics from the Ghana Statistical Service census reports (Ghana Statistical Service, 1984, 2005).

Table 2: Training among working age Ghanaians, 1998-99, GLSS 4

	Urban		Rural		All	
	No.	Share	No.	Share	No.	Share
Total Sample						
Current Apprentices	364	2.7	380	2.8	744	5.6
Past Apprentices	1,008	7.5	1,473	11.0	2,481	18.5
No Apprentice Training	3,472	25.9	6,706	50.0	10,178	75.9
Total	4,844	36.1	8,559	66.4	13,403	100.0

Source: Author's calculations based on the GLSS 4. Sample excludes those under age 15 and over age 65 and those who did not report apprenticeship status.

Table 3: Training and Apprentices in Ghana, 2006, GUPHS

	No.	Share
Apprentices		
No Formal Training	1,078	65.6
Current Apprentices	122	7.4
Past Apprentices	317	19.3
Any Other Vocational/Technical Training	126	7.7
Total	1,643	100.0
Training Events		
Current Apprentices	122	15.4
Past Apprentices	317	40.1
Current vocational trainees	16	2.0
Past vocational trainees	112	14.2
Current on-the-job trainees	40	5.1
Past on-the-job trainees	158	20.0
Trained teacher/nurse	25	3.2
Total number of training events	790	100.0

Source: Author's calculations based on the GUPHS. Total number of training events does not account for double counting, e.g. one person with vocational and apprenticeship training counts as two events.

Table 4: Educational Background, 2006

	No.	Share
Total Sample		
No education (years<6)	226	13.7
Primary (years between 6 and 9)	218	13.3
Middle/JSS (years 9 or 10)	896	54.5
Secondary	283	17.2
Post-Secondary	13	0.8
Polytechnic	7	0.4
Total	1,643	100.0
Past Apprentices		
No education (years<6)	29	9.1
Primary (years between 6 and 9)	32	10.1
Middle/JSS (years 9 or 10)	233	73.5
Secondary	23	7.3
Post-Secondary	0	
Polytechnic	0	
Total	317	100.0

Source: Author's calculations based on the GUPHS.

Table 5: Occupational Outcomes, 2006

	No.	Share
Total Sample		
Self-Employed	549	33.4
Small Firm (<10 employees)	272	16.6
Large Firm (≥ 10 employees)	197	12.0
Public Sector	64	3.9
No Earned Income	561	34.1
Total	1,643	100.0
Past Apprentices		
Self-Employed	181	57.1
Small Firm (<10 employees)	54	17.0
Large Firm (≥ 10 employees)	30	9.5
Public Sector	8	2.5
No Earned Income	44	13.9
Total	317	100.0

Source: Author's calculations based on the GUPHS. Current apprentices are considered wage employees even if their earned income is zero.

Table 6: Summary Statistics

$N = 931$	Past Apprentices		Non-apprentices	
	Mean	St. Dev.	Mean	St. Dev.
Male (=1 if male)	0.48	(0.50)	0.43	(0.50)
Age (years)	34.1	(9.5)	36.1	(10.8)
Raven's Score (out of 20)	4.13	(4.48)	4.73	(4.96)
Education (years)	8.56	(2.83)	8.08	(4.39)
Experience (years)	16.7	(9.6)	21.9	(12.4)
Monthly earnings (in 2006 cedis)	750,597	(604,817)	929,207	(945,326)
Ln(monthly earnings)	11.15	(0.86)	11.26	(0.99)
N	268		663	

Median earnings by education and gender

No academic education ($N = 136$):

Monthly earnings	800,000	480,000
Monthly earnings if female	686,000	420,000
Monthly earnings if male	1,600,000	500,000

Any academic education ($N = 795$):

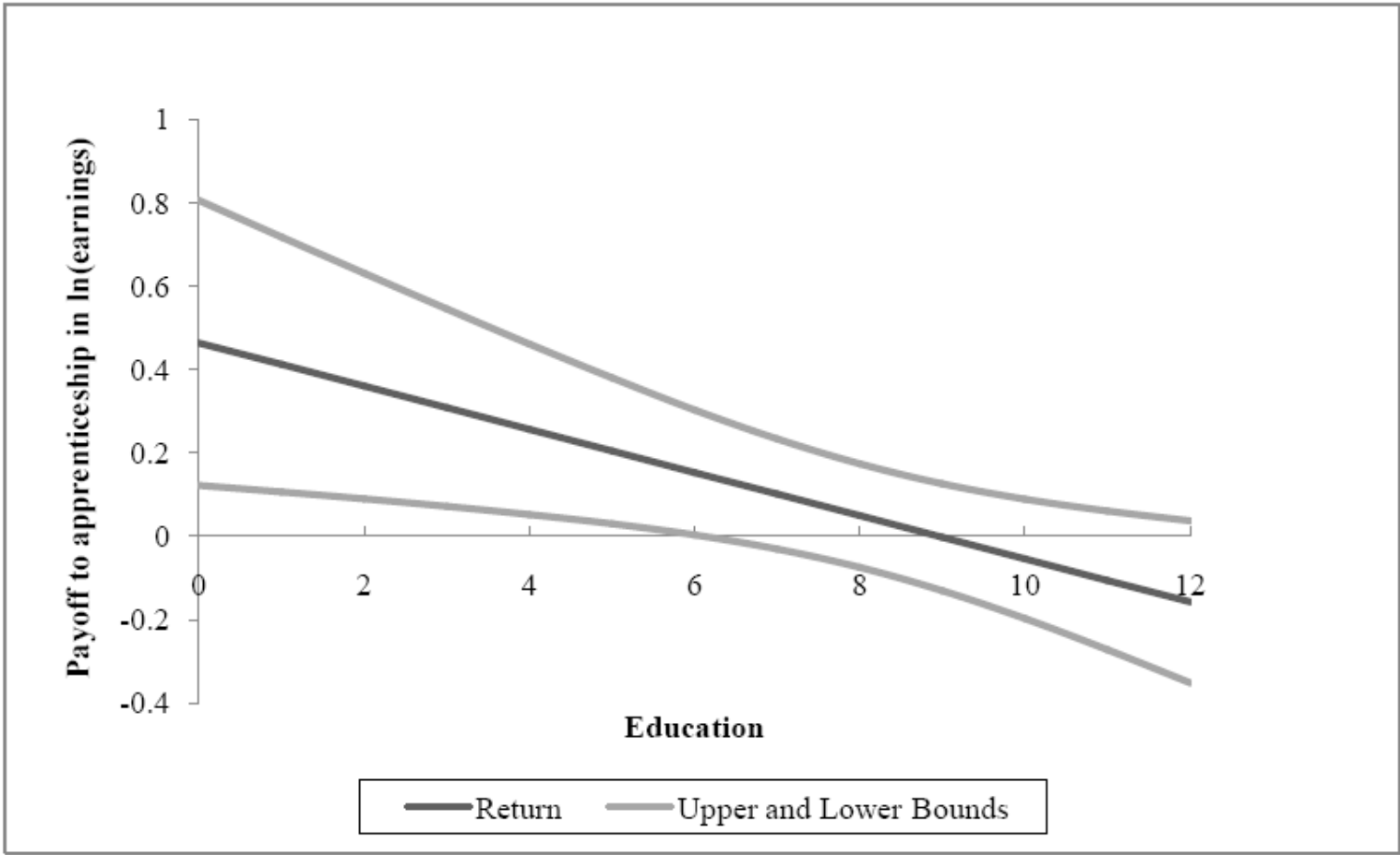
Monthly earnings	600,000	700,000
Monthly earnings if female	400,000	500,000
Monthly earnings if male	800,000	800,000

Source: Author's calculations based on the 2006 GUPHS. Experience is labour market experience, defined as (Age - Education - Training time - 6). Training time is self-reported time (in years) spent in vocational training and/or apprenticeship. Earnings for the self-employed are based on self-reported profits.

Table 7: Full sample - dependent variable: $\ln(\text{earnings})$

	Model 2a				
	(1)	(2)	(3)	(4)	(5)
$\ln(\text{hrs worked per week})$.186 (.064)***	.166 (.065)**	.168 (.066)**	.177 (.066)***
Male		.429 (.058)***	.381 (.059)***	.362 (.065)***	.363 (.066)***
Experience (years)		.028 (.010)***	.031 (.010)***	.028 (.011)**	.027 (.011)**
Experience ² (years ² /100)		-.030 (.021)	-.034 (.021)	-.019 (.030)	-.018 (.030)
Education (years)		-.066 (.024)***	-.071 (.024)***	-.028 (.061)	-.025 (.060)
Education ² (years ² /100)		.917 (.159)***	.843 (.165)***	.839 (.168)***	.795 (.167)***
Educ Control				-.044 (.058)	-.031 (.057)
Past apprentice	-.107 (.065)	-.002 (.063)	.028 (.064)	.025 (.062)	.037 (.062)
App x (Ed-Ed)					-.052 (.020)***
Raven's score			.020 (.008)**	.018 (.008)**	.019 (.009)**
App Control					
Obs.	931	931	931	931	931
R^2	.007	.167	.182	.182	.188
Education Control Function	no	no	no	yes	yes
Apprentice Treatment Effect	no	no	no	no	no
Apprentice Control Function	no	no	no	no	no
Method	OLS	OLS	OLS	IV	IV

Figure 1: Returns to Apprenticeship, based on Table 7 Model 2a.



What do we find

- We find that controls for observable ability do change the return to undertaking apprenticeship to be positive but it remains low (and insignificant).
- By far the most important factor affecting the return to apprenticeship is the level of formal education of those undertaking the apprenticeship.
- Our most conservative estimate implies that for currently employed people, who did apprenticeships but have no formal education, the training increases their earnings by 50%. The return declines as education rises.
- It is possible these education levels are closely related to what we have termed general ability. Those who enter apprenticeship with no formal education may well be atypically able while those who enter it with junior high school are generally low ability.

Instruments

- Our instrumenting procedure is designed to allow for the possibility that unobserved general ability, not fully captured by the education variable, may be biasing down the returns to apprenticeship.
- However we have noted that if the unobserved ability in the data is what we have termed "an aptitude for apprenticing" then the bias in the estimate on the apprenticeship dummy will be upwards.
- While we cannot reject the hypothesis that apprenticeship is exogenous we interpret the evidence as showing that the OLS estimates with controls for formal education are a lower bound for the return to apprenticeship.
- The first stage regression can be given an interpretation as showing a role for credit constraints in the decision to undertake apprenticeship, although its importance relative to the roles of general ability and aptitude remains an open question.
- We conduct a rate of return analysis which provides a check on the point estimates and shows that the regression results imply rates of return of up to 20% if we are willing to accept the point estimates from instrumenting.

The role of gender

- In addition, we find that men who do apprenticeships earn higher returns than women who do them, though this difference is not significant.
- The increment in earnings is only one aspect of the return to apprenticeship and these other aspects, an increased probability of a job and its social role, may be more important for women than men.
- Our analysis has shown that for some choosing the apprenticeship route can yield a high return.

So does apprenticeship pay?

- We are not able to model here the feedback effects that mean that apprentices are still not "succeeding", in terms of earnings, in the overall labour market.
- There is something else that then causes their low earnings. Poor earnings for apprentices may result from two factors: unobservable individual characteristics and unobservable workplace characteristics.
- We have explored the first factor in this paper as an explanation for selection into the apprenticeship system. The second factor depends on how trained apprentices move through the labour market. Entering the apprenticeship system puts workers on a path to the informal sector and shuts them out of more lucrative formal sector jobs. Indeed, qualitative studies find that apprentices tend to be isolated from formal wage employment.
- This issue raises further questions about the effect of apprenticeship on occupational choice as well as questions as to what causes the market segmentation that is so characteristic of labour markets in Africa.

Changes in the Size Distribution of Manufacturing Firms in Ghana

Size	1987				2003			
	Firms	%	Emp.	%	Firms	%	Emp.	%
1-4	2,884	35	7,400	5	14,352	55	35,834	15
5-9	3,391	41	21,264	14	7,829	30	48,982	20
10-19	1,101	13	14,306	9	2,427	9	30,784	13
20-29	310	4	7,235	5	541	2	12,405	5
30-49	232	3	8,594	5	401	2	14,538	6
50-99	191	2	13,116	8	287	1	18,270	8
100-199	114	1	15,866	10	124	0	16,819	7
200-499	74	1	22,596	14	87	0	26,240	11
500+	52	1	46,707	30	40	0	39,644	16
Total	8,351	100	157,084	100	26,088	100	243,516	100
Ave. Size	19				9			

Source: Ghana Statistical Service, *National Industrial Census 1987, Phase I Report*, and *2005 National Industrial Census Bulletin No. 1*.

Note: Size categories and average size refer to employees per establishment.

A summary

- Apprenticeship is, on the basis of our survey and other Ghanaian data sources, by far the most important form of training in urban Ghana.
- Of the training events our survey identified, over half were either current or past apprenticeships.
- The vast majority of apprenticeships are undertaken by those with junior high school or less.
- Given the prevalence of apprenticeship as a form of training in Ghana, as well as its important role in the growing informal sector, a natural question is whether apprenticeship pays off for those people who undertake it.
- Our earnings data suggest that those who did an apprenticeship earn less than those with no training. This apparent paradox is suggestive of a selection story.

Policy and the Randomistas

- It will not have escaped your attention that this paper mirrors the first one (possibly by organisational design).
- Can we be sure apprenticeship is exogenous and that heterogeneity over education is the key?
 - Clearly not.
- Could we learn from an experimental element.
 - Clearly yes.
- Have we learnt something from the survey of importance without an experiment?
 - Clearly yes. Not least that apprenticeship does *not* pay.
- Possibly peace is possible.