

# Benefits and Costs of (Dual) Apprenticeship in an Informal Setting\*

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## Abstract

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## 1 Introduction

Formal institutions and enterprises are not equipped to absorb this massive influx of youth into the labor market. Young men and women privileged enough to finish secondary school compete for scarce but lucrative public-sector jobs, while the vast majority of low-income youth searching for work opportunities are forced to turn to the informal (unregistered) sector at an early age.

Participation in the informal sector is almost universally initiated with apprenticeships.

In the West, apprenticeships are seen as a key to reducing youth unemployment rates (in particular in German-speaking countries). In countries in which apprenticeship traditionally plays a lesser role in the education system, apprenticeship is being explored as a means to counteract youth unemployment and skills mismatch.

In lower-income Sub-Saharan African countries, most employment opportunities are found in the informal sector. Shifting from a focus on formalization, policymakers have begun to explicitly integrate the informal sector into national employment strategies. Informal jobs are overwhelmingly the first work experiences for youth entering the labor market, and young workers represent a significant part of the informal sector.

Early experimental evidence suggests that informal apprenticeships have positive impacts on both the trainee and the firm. McCasland and Hardy (2016) randomly match apprentices to firms, and find that the firms increase in size and profitability. Each assigned apprentice increases firm size by about half a worker, and firm revenues and profits increase by 5-15% per apprentice. Firms not assigned an apprentice did not hire new workers, suggesting screening costs for firms are high. Alfonsi et al. (2020) find that training firms in Uganda become 11% more profitable, though they do not increase in size.

Apprenticeship policy in developing countries generally involves a choice between three models: classroom-based vocational education and training (VET), “traditional” apprenticeships with a master craftsman, and a combination of the two, the so-called dual system model. While classroom VET is prone to challenges regarding market linkages (i.e. the relevance of acquired skills on the labor market) and state sponsorship of traditional apprenticeship is often met with the challenge of limited oversight and standardization, the dual system is equipped to address both challenges by providing both a channel for standardized curricula and a direct linkage to the labor market. However, the costs of dual training can be prohibitive for both microenterprises and cash-strapped governments, and many dual system programs, including the CQP, are reliant on external financing. Crépon and Premand (2019) study a subsidized dual apprenticeship program in Côte d’Ivoire and report positive net displacement effects (i.e. subsidizing apprenticeships increase the training capacity of firms). Subsidized apprentices also receive more training, suggesting that subsidies may help address both the financial constraints facing apprentices and commitment failures on the part of firms.

Alfonsi et al. (2020) compare outcomes for vocationally trained workers and traditional apprentices, and find increases in earnings and employment rates for both tracks. Traditional apprentices find employment more quickly and have higher earnings after graduation, but VET graduates catch up over time and outperform FT workers on average. The authors suggest that VET training increases graduates ability to “climb the job ladder” when moving between employers, whereas earnings are relatively stagnant for graduates of traditional apprenticeship, who are more likely to become self-employed as opposed to working for a wage.

For low-income countries seeking to formalize their economy, a potential downside of sponsoring apprenticeships in the informal sector is that graduates are more likely to turn to self-employment in informal firms upon graduation, as reflected in the findings of Alfonsi et al. (2020). In another experimental study of informal apprenticeship focusing on the National Apprenticeship Program (NAP) in Ghana, Hardy et al. (2019) find that informal apprenticeships shift youth out of wage work and into self-employment, resulting in wage reductions of 3%. However, they do note a correlation between trainer experience and profitability and future apprentice earnings.

In this paper, we raise three questions:

1. Does participation in informal apprenticeship and/or dual training improve the skills and competencies of youth?
2. Do informal firms benefit, in terms of firm size, profits and/or revenues, from training apprentices or sending their trainees to the CQP program?
3. Do the benefits of informal apprenticeship in general and CQP dual training specifically outweigh their total costs to the training firm and, for the case of the CQP, the state sponsors?

Characteristic	Baseline, N = 432	Endline, N = 372
Selection for CQP		
Selected	149 (34%)	221 (59%)
Not Selected	109 (25%)	64 (17%)
Did Not Apply	174 (40%)	87 (23%)
Participation in CQP		
CQP	258 (60%)	285 (77%)
Non-CQP	174 (40%)	87 (23%)

<sup>1</sup> n (%)

Characteristic	CQP, N = 258	Non-CQP, N = 174
Male	254 (98%)	147 (97%)
Age	22.0 (3.4)	20.1 (3.2)
Highest Level of Schooling		
None	1 (0.4%)	9 (5.9%)
<Primary	16 (6.2%)	46 (30%)
Primary	67 (26%)	26 (17%)
Secondary	163 (63%)	68 (45%)
Technical	5 (1.9%)	3 (2.0%)
Tertiary	6 (2.3%)	0 (0%)

<sup>1</sup> n (%); Mean (SD)

Characteristic	Selected, N = 149	Not Selected, N = 109
Years of Schooling	12.21 (2.76)	11.23 (2.94)

<sup>1</sup> Mean (SD)

## 2 Context: Dual Apprenticeship in Benin

### 2.0.1 History of apprenticeship

### 2.0.2 History of CQP

### 2.0.3 Stakeholders; firms, FODEFCA

### 2.0.4 Recruitment, qualifications

### 2.0.5 Benefits, lack of wages, stipulations

### 2.0.6 A bit of theory

## 3 Data

## 4 Methodology

In the absence of random assignment, we compare apprentices who submitted an application dossier to the CQP program but were not admitted (called nonparticipants) to those who and were admitted. All applicants were taken from the 2018 cohort. Trainers were also invited to answer questions about one apprentice who did NOT apply to the CQP. These apprentices were not interviewed themselves, as our sample for the youth interviews consisted of applicants to the CQP.

To estimate the benefits in terms of productivity, we **assume** that apprentice productivity is an increasing step function. Productivity increases with experience. For the first two years, we assume apprentices are as productive as paid family workers

## 5 Results

### 5.1 Benefits to apprentice

Benefits for apprentice are primarily measured in human capital gains (skills and experience) over time, as well as wages, allowances, and other material benefits from participating in apprenticeship.

#### 5.1.1 Skills

Gains in apprentice trade-related knowledge were measured with a battery of questions drawn from the relevant CQP curriculum for each trade. Knowledge questions were multiple choice, trade-specific, and designed to test familiarity with the tools and techniques directly related to the day-to-day performance of their craft. They included, for instance, the visual identification of a multimeter for electrical technicians or recalling the proper proportion of ingredients in a cement mixture for masons.

Across all trades, apprentices answered 76.76% of knowledge questions correctly at baseline and 81.41% at endline, an increase of 4.65%. Differentiating between trades, we find that plumbing apprentices improved the most, with a 12.03% change in percentage of question correctly answered, followed by electrician apprentices with a 3.03% improvement, masons with 9.33%, carpenters with 5.43%, and metalworkers with 4.05%.

**Table 1:** Apprentice Performance on Knowledge Questions

Characteristic	Baseline	Endline	p-value
Total	0.77	0.81	0.048*
Electrical Installation	0.90	0.93	0.7
Masonry	0.76	0.85	0.042*
Carpentry	0.91	0.96	0.4
Plumbing	0.52	0.64	0.001**
Metalwork	0.85	0.89	0.069

<sup>1</sup> Mean

<sup>2</sup> Wilcoxon rank sum test

Table 1 reports the endline-to-baseline improvement for each trade.

## 5.2 Competencies

**Table 2:** Master Assessment of Apprentice Competencies

Characteristic	Baseline	Endline	p-value
Total	0.76	0.92	<0.001***
Electrical Installation	0.80	0.95	<0.001***
Masonry	0.75	0.90	<0.001***
Carpentry	0.76	0.93	0.012*
Plumbing	0.73	0.92	<0.001***
Metalwork	0.75	0.86	0.002**

<sup>1</sup> Mean

<sup>2</sup> Wilcoxon rank sum test

## 5.3 Experience

## 5.4 Benefits (to firm)

Benefits accrued to firm include training fees and apprentice productivity.

Fees Question: Did fees increase over the three years? Pay attention to wording of questions - some fees may have already been paid off.

**Table 3: Apprentice Experience**

Characteristic	Baseline	Endline	p-value
Total	0.73	0.92	<0.001***
Electrical Installation	0.77	0.96	<0.001***
Masonry	0.72	0.91	<0.001***
Carpentry	0.73	0.98	<0.001***
Plumbing	0.66	0.90	<0.001***
Metalwork	0.72	0.85	0.005**

<sup>1</sup> Mean<sup>2</sup> Wilcoxon rank sum test**Table 4: Fees**

Characteristic	CQP Apprentices		Non-CQP Apprentices	
	Baseline	Endline	Baseline	Endline
Total	248,382 (258)	128,246 (285)	306,638 (174)	200,920 (87)
Initiation	7,216 (255)	10,440 (142)	6,831 (172)	5,202 (62)
Training	52,421 (254)	61,472 (141)	124,070 (172)	131,089 (62)
Graduation	19,014 (251)	31,679 (131)	23,750 (168)	11,290 (62)
Materials	60,471 (255)	61,793 (138)	69,244 (172)	50,645 (62)
Contract	78,844 (253)	41,696 (140)	51,191 (170)	39,476 (62)
Application	35,010 (251)	56,321 (140)	36,691 (170)	44,234 (62)

<sup>1</sup> Mean (N)<sup>2</sup> All fees are in FCFA, as reported by the master trainer.

#### 5.4.1 Allowances

**Table 5: Allowances**

Characteristic	CQP Apprentices		Non-CQP Apprentices	
	Baseline	Endline	Baseline	Endline
Total	525 (141)	608 (72)	489 (127)	748 (33)
Food	439 (65)	366 (54)	365 (65)	354 (25)
Transportation	793 (31)	249 (20)	590 (37)	380 (10)
Pocket Money	641 (99)	1,186 (26)	662 (80)	1,212 (18)
Other	NA (0)	NA (0)	238 (2)	0 (1)

<sup>1</sup> Mean (N)<sup>2</sup> All allowances in FCFA per week, as reported by the patron.

#### 5.4.2 Skills

#### 5.4.3 Experience

### 6 Agreement between master and apprentice

How do apprentices and master's rate each others' performance? Are they in agreement about fees paid, conditions of apprenticeship, allowances, basic firm characteristics such as firm size and ...?

#### 6.1 Comparing Competencies

**Table 6:** Master Assessment of Apprentice Competencies

Characteristic	CQP Apprentices			Non-CQP Apprentices		
	Baseline	Endline	p-value	Baseline	Endline	p-value
Total	0.82	0.95	<0.001***	0.68	0.84	<0.001***
Electrical Installation	0.90	0.97	0.004**	0.68	0.91	<0.001***
Masonry	0.79	0.94	<0.001***	0.71	0.79	0.15
Carpentry	0.81	0.95	0.046*	0.68	0.85	0.3
Plumbing	0.79	0.92	0.005**	0.61	0.90	0.11
Metalwork	0.79	0.92	<0.001***	0.69	0.73	0.7

<sup>1</sup> Mean

<sup>2</sup> Wilcoxon rank sum test

<sup>3</sup> All ratings given on Likert scale from 1 (very poor) to 5 (very good).

#### 6.2 Comparing Experience

#### 6.3 Comparing Ratings

Apprentice's ratings of firm and master trainer qualities. Responses did not differ significantly between baseline and endline (see Appendix).

### 7 Appendix Section



**Table 7: Master Assessment of Apprentice Experience**

Characteristic	CQP Apprentices			Non-CQP Apprentices		
	Baseline	Endline	p-value	Baseline	Endline	p-value
Total	0.78	0.94	<0.001***	0.65	0.87	<0.001***
Electrical Installation	0.88	0.97	<0.001***	0.65	0.93	<0.001***
Masonry	0.76	0.93	<0.001***	0.66	0.85	0.021*
Carpentry	0.77	0.99	0.003**	0.68	0.95	0.077
Plumbing	0.72	0.90	0.002**	0.54	0.90	0.040*
Metalwork	0.75	0.89	0.002**	0.68	0.75	0.6

<sup>1</sup> Mean<sup>2</sup> Wilcoxon rank sum test<sup>3</sup> All ratings given on Likert scale from 1 (very poor) to 5 (very good).**Table 8: Master Ratings of Apprentice Performance**

Characteristic	CQP Apprentices			Non-CQP Apprentices		
	Baseline	Endline	p-value	Baseline	Endline	p-value
Total	4.22	4.29	0.2	4.09	4.02	0.6
Discipline	4.16	4.18	0.3	4.02	4.03	0.8
Teamwork	4.16	4.27	0.034*	4.04	4.19	0.094
Efficiency	4.16	4.26	0.2	3.98	3.92	0.8
Work Quality	4.15	4.27	0.058	4.01	3.95	0.8
Learning Speed	4.18	4.26	0.3	4.05	3.85	0.2
Respect	4.50	4.48	>0.9	4.43	4.18	0.085

<sup>1</sup> Mean<sup>2</sup> Wilcoxon rank sum test<sup>3</sup> All ratings given on Likert scale from 1 (very poor) to 5 (very good).

**Table 9:** Apprentice Ratings of Firm and Master Trainer Qualities

Characteristic	CQP	Non-CQP
Physical Safety	3.98 (315)	3.95 (130)
Master's Knowledge	4.31 (315)	4.58 (130)
Treatment by Master	4.21 (315)	4.36 (130)
Salary	3.92 (13)	4.25 (8)
Working Hours	4.01 (315)	3.95 (128)
Quality of Training	4.25 (313)	4.38 (124)
Equipment and Machinery	4.09 (314)	4.17 (130)
Work Colleagues	4.71 (307)	4.46 (125)

<sup>1</sup> All ratings given on Likert scale from 1 (very poor) to 5 (very good).

**Table 10:** Apprentice Ratings of Firm and Master Trainer Qualities

Characteristic	Baseline		Endline	
	Selected	Not Selected	Selected	Not Selected
Physical Safety	3.95 (149)	3.95 (109)	4.0060 (166)	3.9048 (21)
Master's Knowledge	4.49 (149)	4.57 (109)	4.15 (166)	4.62 (21)
Treatment by Master	4.36 (149)	4.39 (109)	4.07 (166)	4.19 (21)
Salary	4.09 (11)	4.25 (8)	3.0000 (2)	NA (0)
Working Hours	4.10 (149)	4.02 (107)	3.93 (166)	3.57 (21)
Quality of Training	4.41 (148)	4.39 (105)	4.12 (165)	4.32 (19)
Equipment and Machinery	4.19 (148)	4.17 (109)	4.01 (166)	4.19 (21)
Work Colleagues	4.50 (145)	4.48 (105)	4.91 (162)	4.40 (20)

<sup>1</sup> Mean (N)<sup>2</sup> All ratings given on Likert scale from 1 (very poor) to 5 (very good).

**Table 11**

	Firm Size			
Number of Apprentices	0.85*** (0.02)	0.85*** (0.02)	0.86*** (0.02)	0.99*** (0.04)
Firm ID	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0002)
Endline		-0.13 (0.36)	-0.10 (0.37)	1.40** (0.61)
Total Fees			0.05 (0.10)	-0.23 (0.19)
Apprentice Knowledge				0.18 (1.50)
Constant	1.60*** (0.25)	1.60*** (0.29)	1.50*** (0.41)	0.61 (1.20)
Observations	354	354	354	91
R <sup>2</sup>	0.78	0.78	0.79	0.90
Adjusted R <sup>2</sup>	0.78	0.78	0.78	0.90
Residual Std. Error	3.40	3.40	3.40	2.90
F Statistic	640.00***	426.00***	319.00***	160.00***

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

**Table 12**

	Apprentice Competencies			
cqp_dummy	0.15*** (0.02)	0.13*** (0.02)	0.13*** (0.02)	
FS1.2	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
waveEndline		0.14*** (0.02)	0.14*** (0.02)	0.07*** (0.03)
total_fees			0.0000 (0.0000)	
weekly_hours				-0.001 (0.001)
Constant	0.72*** (0.02)	0.69*** (0.02)	0.67*** (0.02)	0.85*** (0.03)
Observations	599	599	599	292
R <sup>2</sup>	0.10	0.17	0.17	0.03
Adjusted R <sup>2</sup>	0.09	0.17	0.17	0.02
Residual Std. Error	0.22	0.21	0.21	0.19
F Statistic	32.00***	41.00***	31.00***	3.00**

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

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**Table 13**

	Apprentice Skills			
SELECTEDNot Selected	0.05** (0.02)	0.05** (0.02)	0.05** (0.02)	0.05** (0.03)
FS1.2	-0.0000** (0.0000)	-0.0000** (0.0000)	-0.0000** (0.0000)	-0.0000* (0.0000)
waveEndline		0.04* (0.02)	0.04* (0.02)	0.02 (0.04)
total_fees			0.00 (0.0000)	
weekly_hours				-0.001 (0.001)
Constant	0.77*** (0.01)	0.75*** (0.02)	0.75*** (0.02)	0.79*** (0.03)
Observations	364	364	364	272
R <sup>2</sup>	0.03	0.04	0.04	0.03
Adjusted R <sup>2</sup>	0.02	0.03	0.03	0.02
Residual Std. Error	0.20	0.20	0.20	0.21
F Statistic	4.90***	4.60***	3.40***	2.10*

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01