The Apprenticeship-to-Work Transition: Experimental Evidence from Ghana

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March 12, 2020

High Youth Unemployment

- Youth unemployment major economic & social problem in Africa
  - Official unemployment estimates range from 12% (ILO) to 25% (AfDB)
  - Often masks high levels of vulnerable employment
- In Ghana, youth ages 15–24 are much less likely (52%) to be working than adults 25–65 (89%)
  - Large gaps persist even after accounting for schooling
  - Gender dimension is important: Female unemployment rate is 50% higher than male rate (World Bank, 2018)

Apprenticeships to Address Youth Unemployment?

Traditional apprenticeships in Ghana

- Apprentices work in firm of training provider
- Obtain skills through learning by doing in unstructured environment
- Pay an entry and exit fee
- No toolkit provided
- Average duration of 3 years
- Duration ultimately determined by trainer
- Typically receive small wages or "chop money"

Apprenticeships Promising Avenue?

Apprenticeships use existing firms to provide training

- **Potentially relevant training**, especially for informal sector
  - In Ghana, 88% of males and 95% of females in (low-productivity) informal sector (World Bank Development Indicators, 2017)
  - Frazer (2006) argues apprentices basically replicate firms' business
- Yet, **concerns about quality of training** - relies on informal sector firms with traditional (outdated) technology (Darvas and Palmer, 2014)
  - Quality of training limited by firm owner's knowledge and skill
  - Firms may focus on "firm-specific" rather than "general" training
  - Firm owners may not devote enough time/effort to training
  - Lack of standards and quality assurance

Apprenticeships Promising Avenue? Not Clear.

- Common pathway for training in developed countries (e.g. Germany, Switzerland)
- Common in West Africa (Teal, 2016)
  - In urban Ghana, 40% of self-employed and 25% of wage employed workers had undertaken an apprenticeship (World Bank, 2016)
  - Apprenticeship training in Ghana responsible for training almost 4x as many individuals as all other (formal) alternatives (Darvas and Palmer, 2014)

- Despite their importance, **limited evidence on effectiveness of apprenticeships in African contexts**
  - Observational studies: Frazer (2006); Monk, Sandefur and Teal (2008)
  - RCTs: Cho et al. (2013); Alfonsi et al. (2017); Crepon and Premand (2019)
  - Larger literature in developed countries, especially from Germany (e.g. Acemoglu and Pischke, 1998, 1999)

This Evaluation

- Examines **effects of apprenticeship** training program in Ghana
  - Nationwide, government-sponsored program
  - Designed to address high youth unemployment
  - Alleviates credit constraint barriers to accessing training
- **Main outcomes:** short-run labor market outcomes

  $\rightarrow$ Exploit *randomized access* to apprenticeship program
- **Mechanism of interest:** training quality

  $\rightarrow$ Exploit *randomized matching* with trainer

The National Apprenticeship Program (NAP) in Ghana

- National-scale, government training program with decentralized implementation (urban & rural)
- Essentially abolished entrance and exit fee
  - NAP and traditional apprenticeships are similar
- Intended to target low-income unemployed young people (age 15–30)
- Needed to complete application form and attend in-person interview
- Selected applicants:
  - 75% female; 22 years (median); 7.4 years of schooling; 31% married
  - 45% working (mostly unpaid family work and self-employment)
  - Conditional on working: 22h/week; 46 GhC/month ($\sim$ 11 USD today)

The National Apprenticeship Program (NAP) in Ghana

- Youth applicants placed into small informal sector firms
  - Average number of workers (paid or unpaid): 0.7 (median: 0)
  - Average number of apprentices: 2.8 (median: 2)
  - Average number of customers last month: 20.6 (median: 15)
  - ▸ More summary statistics
- Construction (Masonry, Welding, Carpentry), Garment-making, Cosmetology $\rightarrow$ Sorting by gender
- Trades chosen by Council for Technical and Vocational Education and Training (COTVET); NOT in response to market demand

Overview of Evaluation Design

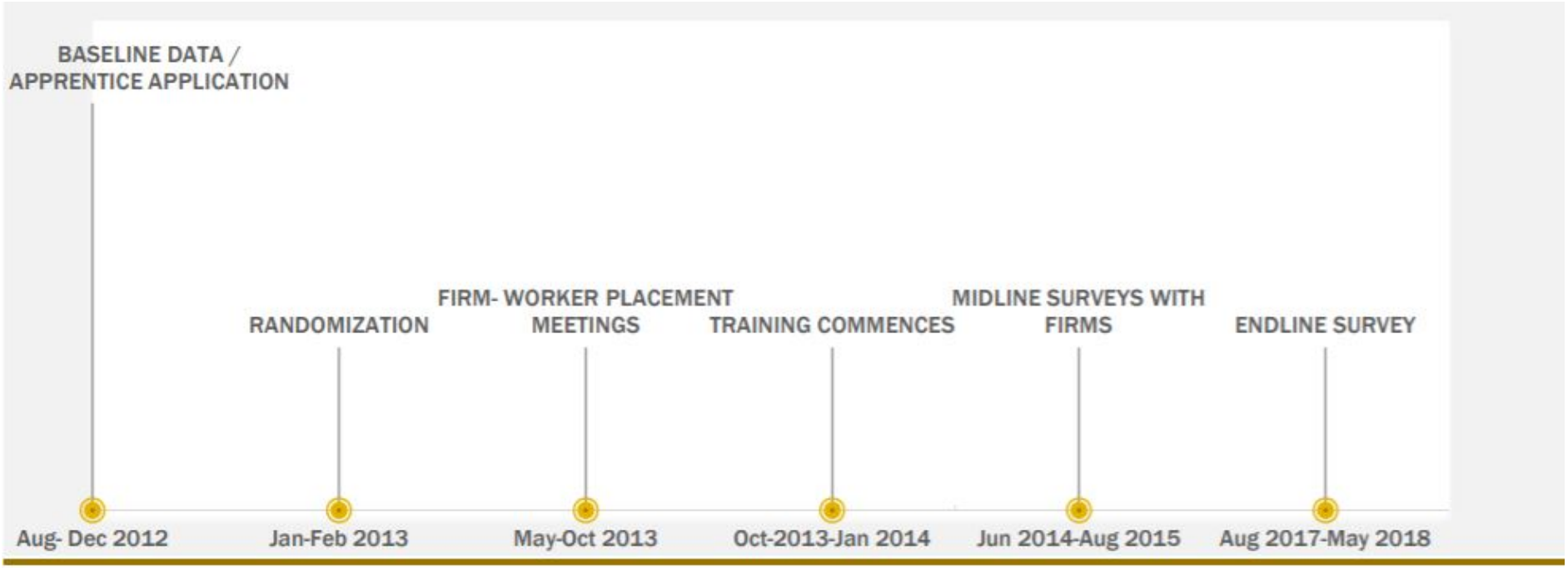
- RCT of National Apprenticeship Program in Ghana
  - Uses existing infrastructure, unlike often-evaluated NGO programs
- $\backsim$ 4,000 study participants from 32 districts across all regions
- Unique design: two sources of apprentice-level random variation
  1. Randomized access to apprenticeship program
  2. Randomized match between apprentices and training providers (conditional on distance) ▸ Details
- Successful randomization: balanced baseline characteristics
  ▸ Full Sample ▸ Males in Construction ▸ Females in Cosmetology ▸ Females in Garments
- High follow-up rates: 91% after 5 years and balanced attrition ▸ Table

Evaluation Design: Match Meetings

- Selected applicants and potential training providers come together
- Trade-specific meetings within each district
- *Trainers* briefly introduce themselves and their firms
  - Location, training experience, trade, and summary of firm
- *Apprentice applicants* list trainers they are interested in training with (conditional on walking distance) $\rightarrow$ preference set
- Given preference set, trainer randomly assigned

▸ Number of trainers ranked by apprentices ▸ How often were trainers ranked

Timeline


BASELINE DATA / APPRENTICE APPLICATION
RANDOMIZATION
FIRM- WORKER PLACEMENT MEETINGS
TRAINING COMMENCES
MIDLINE SURVEYS WITH FIRMS
ENDLINE SURVEY
Aug- Dec 2012
Jan-Feb 2013
May-Oct 2013
Oct-2013-Jan 2014
Jun 2014-Aug 2015
Aug 2017-May 2018

What Do We Find?

Apprenticeships lead to occupational shift and lower earnings

Apprenticeship offer leads to:

- More training ▸ Regression table
  - 35% more likely to start apprenticeship
  - 97% more likely to complete (conditional on starting)
  - 52% longer duration (conditional on starting)

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  - 97% more likely to complete (conditional on starting)
  - 52% longer duration (conditional on starting)
- Less employment and shift out of wage work ▸ Regression table
  - 4% less likely to work (3 ppt)
  - 4% less likely to be in wage employment (4 ppt)
  - Limited (and insignificant) increase in self-employment

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  - 4% less likely to work (3 ppt)
  - 4% less likely to be in wage employment (4 ppt)
  - Limited (and insignificant) increase in self-employment
- Lower earnings as loss of wage income is not offset ▸ Regression table
  - 12% reduction in total earnings (11 GhC)
  - 35% decline in earnings from wage employment (15 GhC)

What Do We Find?

Apprenticeships lead to lower earnings for all trade subgroups

- Occupational shift most pronounced for females in cosmetology
  - ▸ Regression table
    - No significant change in probability of working
    - 34% less likely to be in wage employment (5 ppt)
    - Offset by 22% increase in self-employment (7ppt)

What Do We Find?

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- Occupational shift most pronounced for females in cosmetology
  - ▸ Regression table
    - No significant change in probability of working
    - 34% less likely to be in wage employment (5 ppt)
    - Offset by 22% increase in self-employment (7ppt)
- However, no increase in business profits
  - 33% reduction in earnings from wage employment (11 GhC)
  - Statistically insignificant increase in business profits of 7 GhC

▸ Earnings reduction most pronounced for construction ▸ Earnings also fall for garment-making

Quality of Training Provider Seems to Matter

Higher earnings when training with most profitable or most experienced trainers

Characteristics of training provider matter:

- Assigned to most profitable firms [business performance]:
  - 24% more likely to work (16 ppt) ▸ Regression table
  - In part driven by 88% increase in wage employment (10 ppt)
  - Leads to 78% increase in total earnings (63 GhC) ▸ Regression table
  - Appears to be in part driven by wage earnings (but insignificant)

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  - Leads to 78% increase in total earnings (63 GhC) ▸ Regression table
  - Appears to be in part driven by wage earnings (but insignificant)
- Assigned to firms that trained most apprentices [training experience]:
  - Limited effects on labor supply ▸ Regression table
  - 76% increase in total earnings (65 GhC) ▸ Regression table
  - Primarily driven by 127% increase in wage earnings (43 GhC)

Implications for Program Design

Is popularity a revealed measure of trainer quality? No.

- Characteristics of trainer appear to matter for apprentices' outcomes
- But how can "good" trainers be identified in practice?
- Is popularity a revealed measure of trainer quality?
  - ▸ Details on trainer popularity
- No, trainer popularity has no impact on labor outcome ▸ Regression table
  - No change in working, wage employment, or self-employment
  - No change in earning outcomes
  - Similar for trainer of first choice ▸ Evidence

Conclusion

- Overall, limited evidence that apprenticeships improved average labor market outcomes in the short run (1 year after apprenticeship)
- Characteristics of trainer matter for apprentices' outcomes
- Suggests training programs can be made more effective through better recruitment of trainers
- However, scale-up might be limited by availability of good trainers
- Apprentices do not seem to be able to identify good trainers

APPENDIX

Main Difference NAP Apprenticeships: Lower Fees

After January 2013 ▸ Back	**Entrance fee** (GhC)	**Exit fee** (GhC)	**Firm size** (#)	**Satis-faction** (0/1)	**Travel time** (min)
Treatment (0/1)	-91.542***	-60.503***	0.194	-0.021	-0.571
	(14.907)	(23.026)	(0.254)	(0.025)	(1.475)
Adjusted p-value	0.000	0.072	0.845	0.845	0.845
Mean Control	207.767	117.121	3.193	0.887	24.992
Observations	978	629	992	994	987

	Toolkit (0/1)	**Practice materials** (0/1)	**Written materials** (0/1)	**Testimonial** (0/1)	**Exam** (0/1)
Treatment (0/1)	-0.032	0.053	0.034	-0.082	0.166**
	(0.037)	(0.036)	(0.026)	(0.071)	(0.079)
Adjusted p-value	0.845	0.628	0.659	0.738	0.223
Mean Control	0.463	0.551	0.135	0.516	0.440
Observations	994	994	994	315	315

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Summary Statistics of Trainers

▸ Back	All Trades	Construction	Cosmetology	Garments
Workers (#)	3.48	4.50	3.26	3.06
Paid workers (#)	0.53	1.44	0.22	0.24
Current apprentices (#)	2.78	2.72	2.93	2.70
Apprentices ever trained (#)	10.47	5.37	12.86	11.61
Profits (GhC)	336.96	656.52	262.90	207.42
Wage bill (GhC)	184.84	501.82	60.16	79.93
N	1,074	268	353	453

Balance of Baseline Characteristics

Full Sample ◂ Back		N	Mean Control	Treatment
Demographics				
(1)	Age (yrs)	3,468	23.14	0.045
(2)	Years of schooling	3,387	7.25	0.092
(3)	HH size (adults+children)	3,299	6.70	0.083
(4)	Mother: years of schooling	2,900	3.83	-0.339*
(5)	Father: years of schooling	2,596	6.23	-0.216
Labor				
(6)	Started an apprenticeship (0/1)	3,600	0.25	-0.002
(7)	Working (0/1)	3,600	0.43	0.011
(8)	Wage empl. (0/1)	3,600	0.05	-0.003
(9)	Self-empl. (0/1)	3,600	0.18	0.019
(10)	Total hours (hrs)	3,600	8.97	0.625
(11)	Wage empl. (hrs)	3,600	2.29	-0.082
(12)	Self-empl. (hrs)	3,600	6.68	0.707
(13)	Total earnings (GhC)	3,600	14.92	3.249
(14)	Wage empl. (GhC)	3,600	2.39	-0.443
(15)	Self-empl. (GhC)	3,600	8.52	-0.254
Ability				
(16)	Vocabulary score (z-score)	2,556	0.00	0.080*
(17)	Math score (z-score)	3,346	0.00	0.018
(18)	Digits score (z-score)	3,490	0.00	0.034
(19)	Ravens score (z-score)	3,486	0.00	0.018
Other				
(20)	Asset score (z-score)	3,345	0.00	0.028
(21)	Married (0/1)	3,600	0.31	-0.006
(22)	Children (0/1)	3,600	0.45	-0.013
(23)	Close family works in Govt/GES/DA (0/1)	3,600	0.30	-0.009
(24)	Urban (0/1)	3,326	0.77	0.002
(25)	Top 10 + District Capitals (0/1)	3,473	0.53	0.021
	F-test statistic	1,457		0.600

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Balance of Baseline Characteristics

Males in Construction ◂ Back		N	Mean Control	Treatment
Demographics				
(1)	Age (yrs)	721	24.46	-0.006
(2)	Years of schooling	713	7.95	0.377
(3)	HH size (adults+children)	688	7.96	0.296
(4)	Mother: years of schooling	612	2.80	0.495
(5)	Father: years of schooling	599	5.95	-0.867
Labor				
(6)	Started an apprenticeship (0/1)	727	0.42	-0.051
(7)	Working (0/1)	727	0.61	-0.113**
(8)	Wage empl. (0/1)	727	0.13	-0.012
(9)	Self-empl. (0/1)	727	0.23	0.031
(10)	Total hours (hrs)	727	13.49	1.431
(11)	Wage empl. (hrs)	727	5.13	0.424
(12)	Self-empl. (hrs)	727	8.36	1.007
(13)	Total earnings (GhC)	727	47.05	13.940
(14)	Wage empl. (GhC)	727	9.43	-2.647
(15)	Self-empl. (GhC)	727	19.09	-6.015
Ability				
(16)	Vocabulary score (z-score)	567	0.00	0.008
(17)	Math score (z-score)	713	0.00	0.031
(18)	Digits score (z-score)	727	0.00	-0.005
(19)	Ravens score (z-score)	727	0.00	-0.087
Other				
(20)	Asset score (z-score)	705	0.00	-0.032
(21)	Married (0/1)	727	0.34	-0.008
(22)	Children (0/1)	727	0.32	-0.064
(23)	Close family works in Govt/GES/DA (0/1)	727	0.31	0.029
(24)	Urban (0/1)	689	0.68	-0.010
(25)	Top 10 + District Capitals (0/1)	720	0.52	-0.028
	F-test statistic	362		1.188

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Balance of Baseline Characteristics

Females in Cosmetology ▸ Back		N	Mean Control	Treatment
Demographics				
(1)	Age (yrs)	1,194	23.05	-0.165
(2)	Years of schooling	1,158	7.47	-0.219
(3)	HH size (adults+children)	1,119	6.01	0.322
(4)	Mother: years of schooling	969	4.87	-0.891***
(5)	Father: years of schooling	820	7.42	-0.513
Labor				
(6)	Started an apprenticeship (0/1)	1,203	0.24	0.014
(7)	Working (0/1)	1,203	0.41	-0.012
(8)	Wage empl. (0/1)	1,203	0.05	-0.003
(9)	Self-empl. (0/1)	1,203	0.18	-0.004
(10)	Total hours (hrs)	1,203	9.55	-1.317
(11)	Wage empl. (hrs)	1,203	2.58	-0.609
(12)	Self-empl. (hrs)	1,203	6.96	-0.708
(13)	Total earnings (GhC)	1,203	10.94	-2.069
(14)	Wage empl. (GhC)	1,203	1.42	-0.328
(15)	Self-empl. (GhC)	1,203	7.68	-1.070
Ability				
(16)	Vocabulary score (z-score)	872	0.00	0.093
(17)	Math score (z-score)	1,148	0.00	0.041
(18)	Digits score (z-score)	1,200	0.00	-0.004
(19)	Ravens score (z-score)	1,198	0.00	0.018
Other				
(20)	Asset score (z-score)	1,145	0.00	0.005
(21)	Married (0/1)	1,203	0.27	-0.004
(22)	Children (0/1)	1,203	0.51	-0.043
(23)	Close family works in Govt/GES/DA (0/1)	1,203	0.31	-0.038
(24)	Urban (0/1)	1,144	0.80	0.018
(25)	Top 10 + District Capitals (0/1)	1,199	0.50	0.032
	F-test statistic	453		0.877

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Balance of Baseline Characteristics

Females in Garment-making ‣ Back		N	Mean Control	Treatment
Demographics				
(1)	Age (yrs)	1,400	22.94	-0.010
(2)	Years of schooling	1,364	6.90	0.111
(3)	HH size (adults+children)	1,348	6.90	-0.164
(4)	Mother: years of schooling	1,184	3.35	-0.138
(5)	Father: years of schooling	1,052	5.68	-0.151
Labor				
(6)	Started an apprenticeship (0/1)	1,410	0.22	-0.003
(7)	Working (0/1)	1,410	0.42	0.069***
(8)	Wage empl. (0/1)	1,410	0.04	-0.008
(9)	Self-empl. (0/1)	1,410	0.18	0.036*
(10)	Total hours (hrs)	1,410	7.50	1.999*
(11)	Wage empl. (hrs)	1,410	1.46	-0.014
(12)	Self-empl. (hrs)	1,410	6.04	2.013**
(13)	Total earnings (GhC)	1,410	9.36	2.915
(14)	Wage empl. (GhC)	1,410	1.65	-0.636
(15)	Self-empl. (GhC)	1,410	6.44	1.413
Ability				
(16)	Vocabulary score (z-score)	1,001	0.00	0.073
(17)	Math score (z-score)	1,340	0.00	-0.016
(18)	Digits score (z-score)	1,409	0.00	0.089*
(19)	Ravens score (z-score)	1,407	0.00	0.059
Other				
(20)	Asset score (z-score)	1,351	0.00	0.075*
(21)	Married (0/1)	1,410	0.36	-0.003
(22)	Children (0/1)	1,410	0.50	0.023
(23)	Close family works in Govt/GES/DA (0/1)	1,410	0.29	0.007
(24)	Urban (0/1)	1,347	0.78	-0.001
(25)	Top 10 + District Capitals (0/1)	1,401	0.57	0.017
	F-test statistic	573		0.601

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

High Follow-Up Rates and Balanced Attrition

Outcome: Completed Endline Survey (0/1)

▸ Back

	Full Sample	Males Construction	Females Cosmetology	Females Garment-making
Treatment (0/1)	0.002	0.006	0.022	-0.024*
	(0.010)	(0.030)	(0.017)	(0.014)
Mean Completion Rate	0.909	0.926	0.907	0.918
Mean Completion Control	0.906	0.914	0.897	0.930
Mean Completion Treatment	0.911	0.929	0.917	0.906
Observations	3,600	740	1,240	1,438
Controls	No	No	No	No
Strata FE	No	No	No	No

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

How Many Trainers Did Apprentices Rank on Average?

Back

	Unconditional		*Conditional (≥2 Trainers)*	
	N	**Number of Trainers Ranked (#)**	**N**	**Number of Trainers Ranked (#)**
All Trades	1,002	2.06	567	3.03
Males in Construction	282	1.93	164	2.78
Females in Cosmetology	304	2.12	169	3.12
Females in Garment-making	373	2.13	213	3.15

Sample of apprentices who received an apprenticeship offer (treatment), showed up at match meeting and were surveyed at endline. Unconditional = any number of trainers ranked. Conditional = ranked at least 2 trainers.

By How Many Apprentices Were Trainers Ranked?

Back

	All Trainers		*Not Most Popular*		*Most Popular*	
	N	**Rankings** (#)	**N**	**Rankings** (#)	**N**	**Rankings** (#)
All Trades	1,074	2.52	648	1.82	426	3.59
Construction	268	2.44	77	1.57	191	2.79
Cosmetology	353	2.55	245	1.71	108	4.46
Garment-making	453	2.55	326	1.97	127	4.04

Average number of times that trainers were ranked by apprentices who had been offered an apprenticeship.

Most popular trainers = trainers ranked by the most apprentices within a district x trade.

Apprenticeship Offer Leads to More Training (First Stage)

After January 2013

	Started apprenticeship? (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
Treatment (0/1)	**0.088*** (0.017)**	**0.062*** (0.011)**	**3.230*** (0.544)**
Adjusted p-value	0.000	0.000	0.000
Mean Control	0.255	0.064	6.263
Observations	3,270	3,270	3,270
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

▸ Back ▸ Ever ▸ First stage: Heterogeneity ▸ Compliance rates by trade

Apprenticeship Offer Leads to More Training (First Stage)

▸ Back

	Started apprenticeship? (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
Treatment (0/1)	0.133***	0.099***	4.088***
	(0.017)	(0.017)	(0.742)
Adjusted p-value	0.000	0.000	0.000
Mean Control	0.626	0.249	18.608
Observations	3,270	3,270	3,270
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

Barriers to Training Lowered for Poorer Applicants

After January 2013 ▸ Back	**Started apprenticeship?** (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
		Assets	
Treatment (0/1)	0.091***	0.036**	0.756
	(0.017)	(0.015)	(0.738)
Poor (z-score)	0.013	-0.037***	-2.796***
	(0.014)	(0.012)	(0.599)
Treatment x Poor	0.037**	0.009	1.356*
	(0.017)	(0.014)	(0.712)
		Ability	
Treatment (0/1)	0.090***	0.037**	0.833
	(0.017)	(0.015)	(0.739)
Ability (z-score)	-0.015	0.024**	1.073**
	(0.011)	(0.010)	(0.517)
Treatment x Ability	0.012	-0.009	-0.413
	(0.012)	(0.011)	(0.524)
		Network	
Treatment (0/1)	0.095***	0.026	0.835
	(0.020)	(0.017)	(0.849)
Network (0/1)	0.032	-0.018	0.293
	(0.026)	(0.023)	(1.202)
Treatment x Network	-0.016	0.038	-0.096
	(0.036)	(0.031)	(1.607)
Mean Control	0.255	0.064	6.263
Observations	3,270	3,270	3,270

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Heterogeneity in Compliance Rates by Trade

After January 2013 ▸ Back	**Started apprenticeship?** (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
	Males in Construction		
Treatment (0/1)	0.181***	0.035	6.283***
	(0.047)	(0.024)	(1.685)
Mean Control	0.157	0.025	4.788
Observations	685	685	685
	Females in Cosmetology		
Treatment (0/1)	0.078***	0.068***	2.443***
	(0.028)	(0.020)	(0.824)
Mean Control	0.249	0.088	5.851
Observations	1,129	1,129	1,129
	Females in Garment-making		
Treatment (0/1)	0.098***	0.069***	4.012***
	(0.026)	(0.016)	(0.817)
Mean Control	0.282	0.057	6.642
Observations	1,327	1,327	1,327

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Shift Out of Wage Work

▸ Back	**Working** (0/1)	**Wage empl.** (0/1)	**Self empl.** (0/1)	**Own farm** (0/1)	**App' ship** (0/1)	**Unpaid work** (0/1)
Treatment (0/1)	**-0.030***	**-0.040*****	**0.027**	**-0.023****	**0.019**	**-0.005**
	(0.017)	**(0.013)**	**(0.017)**	**(0.010)**	**(0.012)**	**(0.011)**
Adjusted p-value	0.079	0.006	0.315	0.076	0.315	0.629
Mean Control	0.713	0.158	0.297	0.089	0.118	0.094
Observations	3,270	3,270	3,270	3,270	3,270	3,270
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993. ▸ Hours Worked

Shift Out Of Wage Work

▸ Back	**Working** (hrs)	**Wage empl.** (hrs)	**Self empl.** (hrs)	**Own farm** (hrs)	**App' ship** (hrs)	**Unpaid work** (hrs)
Treatment (0/1)	-1.243	-6.783***	5.241	-2.734**	2.840	0.098
	(3.820)	(2.593)	(3.207)	(1.228)	(2.506)	(1.784)
Adjusted p-value	0.755	0.038	0.301	0.098	0.356	0.943
Mean Control	117.247	28.241	44.759	9.476	23.191	11.965
Observations	3,270	3,270	3,270	3,270	3,270	3,270
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

Loss of Wage Income Not Offset

▸ Back

	Total (GhC)	**Wage empl.** (GhC)	**Self empl.** (GhC)	**Own farm** (GhC)	**App' ship** (GhC)
Treatment (0/1)	**-10.998***	**-14.950*****	**-0.680**	**2.201**	**0.721**
	(5.727)	**(4.842)**	**(4.315)**	**(2.045)**	**(0.955)**
Adjusted p-value	0.055	0.010	0.861	0.617	0.669
Mean Control	89.19	42.17	41.52	3.21	3.97
Observations	3,270	3,270	3,270	3,270	3,270
Controls	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

Shift Into Self-Employment for Females in Cosmetology

Back

	Working	Wage empl.	Self empl.	Own farm	App' ship	Unpaid work
	Outcome: Labor Supply (0/1)					
Treatment (0/1)	**-0.015**	**-0.053*** **	**0.069** **	**-0.021***	**-0.002**	**0.006**
	(0.029)	**(0.020)**	**(0.029)**	**(0.013)**	**(0.017)**	**(0.017)**
Mean Control	0.670	0.156	0.317	0.057	0.082	0.075
	Outcome: Labor Earnings (GhC)					
Treatment (0/1)	**-2.253**	**-11.233** **	**7.430**	**1.766**	**-0.396**	
	(7.687)	**(5.303)**	**(6.103)**	**(2.082)**	**(0.630)**	
Mean Control	73.205	33.623	36.141	1.777	1.866	
Observations	1,129	1,129	1,129	1,129	1,129	1,129
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Earnings Reduction Most Pronounced for Construction

▸ Back	Working	Wage empl.	Self empl.	Own farm	App' ship	Unpaid work
	Outcome: Labor Supply (0/1)					
Treatment (0/1)	-0.056	-0.059	-0.044	-0.091**	0.131***	-0.012
	(0.041)	(0.048)	(0.038)	(0.043)	(0.042)	(0.030)
Mean Control	0.849	0.296	0.189	0.220	0.132	0.094
	Outcome: Labor Earnings (GhC)					
Treatment (0/1)	-47.354*	-59.362**	-16.396	11.115	5.691	
	(28.558)	(27.387)	(21.858)	(10.314)	(5.532)	
Mean Control	197.648	126.969	67.7736	0.182	11.755	
Observations	685	685	685	685	685	685
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Earnings Also Fall for Females in Garment-making

▸ Back	Working	Wage empl.	Self empl.	Own farm	App' ship	Unpaid work
	Outcome: Labor Supply (0/1)					
Treatment (0/1)	-0.032	-0.024	-0.005	-0.003	0.025	-0.009
	(0.026)	(0.017)	(0.026)	(0.014)	(0.019)	(0.016)
Mean Control	0.706	0.121	0.313	0.072	0.135	0.111
	Outcome: Labor Earnings (GhC)					
Treatment (0/1)	-10.951	-8.089*	-5.188	0.666	0.821	
	(6.695)	(4.244)	(5.375)	(2.829)	(0.787)	
Mean Control	71.886	25.250	39.837	4.864	2.048	
Observations	1,327	1,327	1,327	1,327	1,327	1,327
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Effect of Training Quality/Trainer Characteristics

- Four attributes hypothesized to influence quality of training:
  1. Math test score: proxy for cognitive ability & education of trainer
  2. Profits: proxy for business performance of firm
  3. Apprentices trained: proxy for training experience
  4. Wage bill: proxy for firm size and skill of wage workforce
- Trainers ranked on each attribute within their district and trade
- *"Treatment"* - Matched with first or second top ranked trainer

▸ Apprentice characteristics balanced ▸ No additional impact on compliance

▸ Back

Match: Balance of Apprentice Baseline Characteristics

		MCP Math		MCP Profits	
		Mean "Control"	Match "Treatment"	Mean "Control"	Match "Treatment"
Demographics					
(1)	Age (yrs)	22.90	0.856	23.31	0.140
(2)	Years of schooling	7.30	0.273	7.84	0.050
(3)	HH size (adults+children)	8.02	-1.101	7.87	0.273
(4)	Mother: years of schooling	3.14	-1.187*	3.07	-1.041*
(5)	Father: years of schooling	5.10	-0.207	5.17	-0.663
Labor					
(6)	Started an apprenticeship (0/1)	0.29	0.004	0.27	-0.091
(7)	Working (0/1)	0.49	0.002	0.50	0.009
(8)	Wage empl. (0/1)	0.05	0.038	0.06	-0.001
(9)	Self-empl. (0/1)	0.23	0.014	0.23	0.016
(10)	Total hours (hrs)	10.13	1.340	10.71	1.568
(11)	Wage empl. (hrs)	1.46	2.719	2.41	1.354
(12)	Self-empl. (hrs)	8.67	-1.379	8.31	0.215
(13)	Total earnings (GhC)	19.45	2.265	19.98	-0.640
(14)	Wage empl. (GhC)	2.28	1.546	2.06	1.494
(15)	Self-empl. (GhC)	11.55	1.982	10.89	3.089
Ability					
(16)	Vocabulary score (z-score)	0.00	0.171	0.00	0.054
(17)	Math score (z-score)	0.00	-0.206	0.00	-0.014
(18)	Digits score (z-score)	0.00	-0.010	0.00	0.121
(19)	Ravens score (z-score)	0.00	0.135	0.00	-0.108
Other					
(20)	Asset score (z-score)	0.00	-0.077	0.00	-0.027
(21)	Married (0/1)	0.34	0.128**	0.36	0.067
(22)	Children (0/1)	0.48	0.000	0.46	0.123*
(23)	Close family works in Govt/GES/DA (0/1)	0.29	0.015	0.33	-0.103
(24)	Urban (0/1)	0.70	0.023	0.71	0.024
(25)	Top 10 + District Capitals (0/1)	0.53	0.037	0.52	0.056
	F-test statistic	258	2.774	258	2.104
	Observations	567		567	

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Match: Balance of Apprentice Baseline Characteristics

Back

		Apprentices Trained		Wage Bill	
		Mean "Control"	Match "Treatment"	Mean "Control"	Match "Treatment"
Demographics					
(1)	Age (yrs)	23.25	-0.036	23.31	0.194
(2)	Years of schooling	7.65	0.539	7.82	-0.435
(3)	HH size (adults+children)	7.89	-0.409	7.96	-0.411
(4)	Mother: years of schooling	3.01	-0.671	3.34	-2.385***
(5)	Father: years of schooling	5.07	0.299	5.35	-1.213
Labor					
(6)	Started an apprenticeship (0/1)	0.25	0.105*	0.28	-0.002
(7)	Working (0/1)	0.52	-0.137*	0.52	-0.096
(8)	Wage empl. (0/1)	0.06	-0.023	0.06	0.006
(9)	Self-empl. (0/1)	0.23	-0.044	0.24	-0.078
(10)	Total hours (hrs)	10.73	-3.475	11.28	-2.235
(11)	Wage empl. (hrs)	2.37	-1.180	2.87	-0.018
(12)	Self-empl. (hrs)	8.36	-2.295	8.41	-2.217
(13)	Total earnings (GhC)	17.77	4.511	19.87	0.202
(14)	Wage empl. (GhC)	2.03	1.087	2.31	2.539
(15)	Self-empl. (GhC)	12.04	-1.178	9.39	9.702
Ability					
(16)	Vocabulary score (z-score)	0.00	0.022	0.00	0.176
(17)	Math score (z-score)	0.00	-0.095	0.00	0.435***
(18)	Digits score (z-score)	0.00	-0.053	0.00	0.088
(19)	Ravens score (z-score)	0.00	0.003	0.00	-0.025
Other					
(20)	Asset score (z-score)	0.00	-0.086	0.00	0.062
(21)	Married (0/1)	0.35	0.067	0.35	0.049
(22)	Children (0/1)	0.46	-0.050	0.47	0.066
(23)	Close family works in Govt/GES/DA (0/1)	0.34	-0.160**	0.32	0.016
(24)	Urban (0/1)	0.71	0.037	0.73	0.030
(25)	Top 10 + District Capitals (0/1)	0.54	-0.055	0.54	-0.005
	F-test statistic	258	0.766	258	0.739
	Observations	567		567	

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Trainer Attributes No Additional Impact on Compliance

Trainer Attributes ▸ Back	**Math Score** (z-score)	**Profits** (GhC)	**Apprentices Trained** (#)	**Wage Bill** (GhC)
	Outcome: Started Apprenticeship (0/1)			
Matched with 1st or 2nd ranked trainer (0/1)	0.025	0.134**	-0.027	-0.036
	(0.069)	(0.067)	(0.072)	(0.066)
Adjusted p-value	0.957	0.097	0.698	0.740
	Outcome: Completed Apprenticeship (0/1)			
Matched with 1st or 2nd ranked trainer (0/1)	0.020	0.050	-0.062	-0.066
	(0.051)	(0.046)	(0.049)	(0.043)
Adjusted p-value	0.957	0.277	0.426	0.288
	Outcome: Apprenticeship Duration (months)			
Matched with 1st or 2nd ranked trainer (0/1)	-0.920	3.782	-2.452	0.228
	(2.297)	(2.392)	(2.359)	(2.299)
Adjusted p-value	0.957	0.192	0.426	0.912
Observations	567	567	567	567

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Trainer Characteristics and Labor Supply

Trainer Attributes ▸ Back	**Math Score** (z-score)	**Profits** (GhC)	**Apprentices Trained** (#)	**Wage Bill** (GhC)
	Outcome: Working (0/1)			
Matched with 1st or 2nd ranked trainer (0/1)	**-0.064 (0.061)**	**0.164*** (0.060)**	**0.015 (0.065)**	**0.043 (0.062)**
Adjusted p-value	0.302	0.007	0.816	0.490
	Outcome: Wage Employment (0/1)			
Matched with 1st or 2nd ranked trainer (0/1)	**-0.010 (0.044)**	**0.099* (0.052)**	**0.080 (0.050)**	**0.007 (0.053)**
Adjusted p-value	0.957	0.095	0.209	0.887
	Outcome: Self-Employment (0/1)			
Matched with 1st or 2nd ranked trainer (0/1)	**-0.008 (0.060)**	**0.072 (0.058)**	**0.075 (0.063)**	**0.061 (0.061)**
Adjusted p-value	0.957	0.200	0.217	0.529
Observations	567	567	567	567

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Trainer Characteristics Matter for Labor Earnings

Trainer Attributes ▸ Back	**Math Score** (z-score)	**Profits** (GhC)	**Apprentices Trained** (#)	**Wage Bill** (GhC)
	Outcome: Total Earnings (GhC)			
Matched with 1st or 2nd ranked trainer (0/1)	**-13.101**	**62.738****	**65.106*****	**45.553***
	(21.411)	**(25.270)**	**(22.080)**	**(26.680)**
Adjusted p-value	0.541	0.013	0.003	0.089
	Outcome: Wage Earnings (GhC)			
Matched with 1st or 2nd ranked trainer (0/1)	**-8.978**	**38.237**	**42.521****	**14.131**
	(19.906)	**(25.986)**	**(17.517)**	**(25.163)**
Adjusted p-value	0.867	0.287	0.037	0.598
	Outcome: Business Profits (GhC)			
Matched with 1st or 2nd ranked trainer (0/1)	**7.098**	**18.523**	**13.830**	**25.306**
	(15.147)	**(15.008)**	**(15.347)**	**(17.012)**
Adjusted p-value	0.867	0.287	0.349	0.291
Observations	567	567	567	567

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993. Controls: Yes. Strata FE: Yes. Wave FE: Yes.

Popular Trainers

Popular trainer: ranked by most apprentices within district x trade

- Popular trainers differ on observable characteristics ▸ Evidence
- Experienced trainers are popular trainers ▸ Evidence
- Successful apprentice-level random variation ▸ Balance table
- No difference in compliance rates of apprentices (first stage) ▸ Evidence

▸ Back

Experienced Trainers are Popular Trainers

Predictors of: 1st or 2nd Most Popular Trainer (0/1)

Top ranked on math score (0/1)	0.047
	(0.031)
Top ranked on profits (0/1)	0.042
	(0.036)
Top ranked on apprentices trained (0/1)	0.108***
	(0.037)
Top ranked on wage bill (0/1)	0.047
	(0.038)
Observations	1,074
Controls	No
Strata FE	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1.

▸ Back

Popular Trainers Differ on Observable Characteristics

Back

		All Trainers (#)	Mean "Not Most Popular"	Match "Most Popular Trainers"
Demographics and Ability				
(1)	Age (yrs)	1,067	35.70	0.481
(2)	Years of schooling	1,071	8.65	0.622**
(3)	Digits score (z-score)	1,073	0.00	0.076
(4)	Math score (z-score)	1,070	0.00	0.140*
Training Experience				
(5)	Current apprentices (#)	1,074	2.62	0.895***
(6)	Apprentices trained (#)	1,070	9.81	5.741***
Business Performance				
(7)	Sales (GHC)	1,065	489	170.839*
(8)	Profits (GHC)	1,066	256	38.108
Business Size				
(9)	Total assets (GHC)	1,074	6,220	1,969**
(10)	Workers (#)	1,071	3.11	0.929***
(11)	Wage bill (GHC)	950	95.47	35.160*
(12)	Paid workers (#)	1,071	0.32	0.090
Other				
(13)	Firm age (years)	1,072	11.01	1.013*

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1. Each row represents a separate regression (trainer-level).

Match "Treatment": being first or second most popular trainer within district x trade.

Balance of Baseline Characteristics

Back

		N	Mean "Control"	Match "Treatment"
Demographics				
(1)	Age (yrs)	553	23.37	-0.034
(2)	Years of schooling	545	7.64	0.131
(3)	HH size (adults+children)	526	7.83	-1.029
(4)	Mother: years of schooling	485	3.10	-0.369
(5)	Father: years of schooling	419	5.09	1.000
Labor				
(6)	Started an apprenticeship (0/1)	559	0.27	0.040
(7)	Working (0/1)	567	0.49	0.021
(8)	Wage empl. (0/1)	560	0.06	-0.020
(9)	Self-empl. (0/1)	560	0.21	0.025
(10)	Total hours (hrs)	567	10.84	-1.980
(11)	Wage empl. (hrs)	567	2.93	-1.603
(12)	Self-empl. (hrs)	567	7.91	-0.378
(13)	Total earnings (GhC)	567	20.43	-5.748
(14)	Wage empl. (GhC)	567	2.94	-2.721
(15)	Self-empl. (GhC)	567	12.64	-5.899
Ability				
(16)	Vocabulary score (z-score)	428	0.00	0.204
(17)	Math score (z-score)	545	0.00	-0.120
(18)	Digits score (z-score)	560	0.00	0.024
(19)	Ravens score (z-score)	560	0.00	-0.192
Other				
(20)	Asset score (z-score)	537	0.00	0.089
(21)	Married (0/1)	557	0.37	0.029
(22)	Children (0/1)	567	0.49	-0.004
(23)	Close family works in Govt/GES/DA (0/1)	567	0.38	-0.123*
(24)	Urban (0/1)	539	0.72	0.011
(25)	Top 10 + District Capitals (0/1)	550	0.53	0.048
	F-test	258		1.152

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

No Differences in Compliance Rates (First Stage)

After January 2013 ▸ Back	**Started apprenticeship?** (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
Matched with 1st or 2nd most popular trainer (0/1)	0.047 (0.065)	-0.003 (0.045)	-0.141 (2.217)
Adjusted p-value	0.763	0.998	0.998
Mean "Control"	0.449	0.146	13.805
Observations	567	567	567
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

Trainer Popularity No Impact on Labor Outcomes

▸ Back

	Working	Wage empl.	Self empl.
	Outcome: Labor Supply (0/1)		
Matched with 1st or 2nd most popular trainer (0/1)	**0.057 (0.056)**	**-0.063 (0.044)**	**0.048 (0.059)**
Adjusted p-value	0.310	0.261	0.407
Mean Control	0.690	0.129	0.307
	Outcome: Labor Earnings (GhC)		
Matched with 1st or 2nd most popular trainer (0/1)	**5.347 (24.295)**	**5.375 (18.282)**	**-7.542 (17.867)**
Adjusted p-value	0.826	0.886	0.886
Mean Control	80.157	31.115	44.289
Observations	567	567	567
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

Controlling for choice set size and average characteristics of choice set (math, profits, apps trained, wage bill).

Trainer Choice No/Negative Impact on Labor Outcomes

▸ Back	Working	Wage empl.	Self empl.
	Outcome: Labor Supply (0/1)		
Matched with 1st trainer choice (0/1)	0.061	-0.065**	-0.015
	(0.043)	(0.032)	(0.045)
Adjusted p-value	0.151	0.084	0.719
Mean "Control"	0.690	0.162	0.294
	Outcome: Labor Earnings (GhC)		
Matched with 1st trainer choice (0/1)	-12.440	-9.917	-11.192
	(16.010)	(14.326)	(11.372)
Adjusted p-value	0.438	0.593	0.593
Mean "Control"	97.134	46.269	44.891
Observations	567	567	567
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1 ▸ First Stage

Controlling for choice set size and average characteristics of choice set (math, profits, apps trained, wage bill).

With Choice Trainer More Likely to Start Apprenticeship

After January 2013 ▸ Back	**Started apprenticeship?** (0/1)	**Completed apprenticeship?** (0/1)	**Apprenticeship duration** (months)
Matched with 1st trainer choice (0/1)	0.114**	-0.022	1.693
	(0.048)	(0.034)	(1.676)
Adjusted p-value	0.049	0.520	0.491
Mean "Control"	0.405	0.148	12.187
Observations	567	567	567
Controls	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes

Robust standard errors in parantheses. *** p<0.01; ** p<0.05; * p<0.1

P-values adjusted for multiple hypothesis testing provided. Method: Westfall and Young 1993.

Controlling for number of trainers ranked and average characteristics of choice set (math, profits, apps trained, wage bill).