Measuring The Selection and Incentive Effects of Career and Financial Incentives

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Motivation

- Hiring productive workers and motivating them to be productive are an ultimate holy quest for HR managers
- Two common work incentives
  - Financial incentive: high salary and cash bonus
  - Career incentive: promotion, future job prospect, favorable recommendation letter, etc.

Research questions

- How do career and financial incentives affect job performance?
- Do career incentives attract more productive workers than financial incentives? (selection effect)
- Do career incentives motivate workers to become more productive than financial incentives? (incentive effect)

Identification Challenge

- Job take-up is endogenous

$Corr$(incentives, $labor\ productivity$) =

$selection\ effect$ (worker sorting)+ $incentive\ effect$ (treatment)

- We design and implement a two-stage randomized controlled trial in a naturally occurring setting

Research Context

- Hiring enumerators for a population census in rural Malawi
- Population 16.4 mil.; Per capita GDP US$ 230 (182th out of 185)

Research context (continued)

- Africa Future Foundation (AFF), our collaborating NGO, has been running public health and education projects in rural Malawi
- AFF were hiring about 150 enumerators to conduct a population census in Chimutu for over a month
- Chimutu is a catchment district (23,000 households and 90,000 household members) near Lilongwe, the capital city of Malawi

Experimental Design: 1st stage randomization

- Each individual is randomly assigned to one of 3 groups
- Internship group
  - Short-term unpaid internship offer for a census enumerator job
  - Attractive career incentives
- Wage group
  - The same short-term temporary census enumerator job
  - BUT, it is a paid job offer w/o career incentives
- Control group: no job offer

Experimental Design: 2nd stage randomization

- Once study subjects accept a job offer and completes the mandatory job training, the 2nd stage randomization kicks in

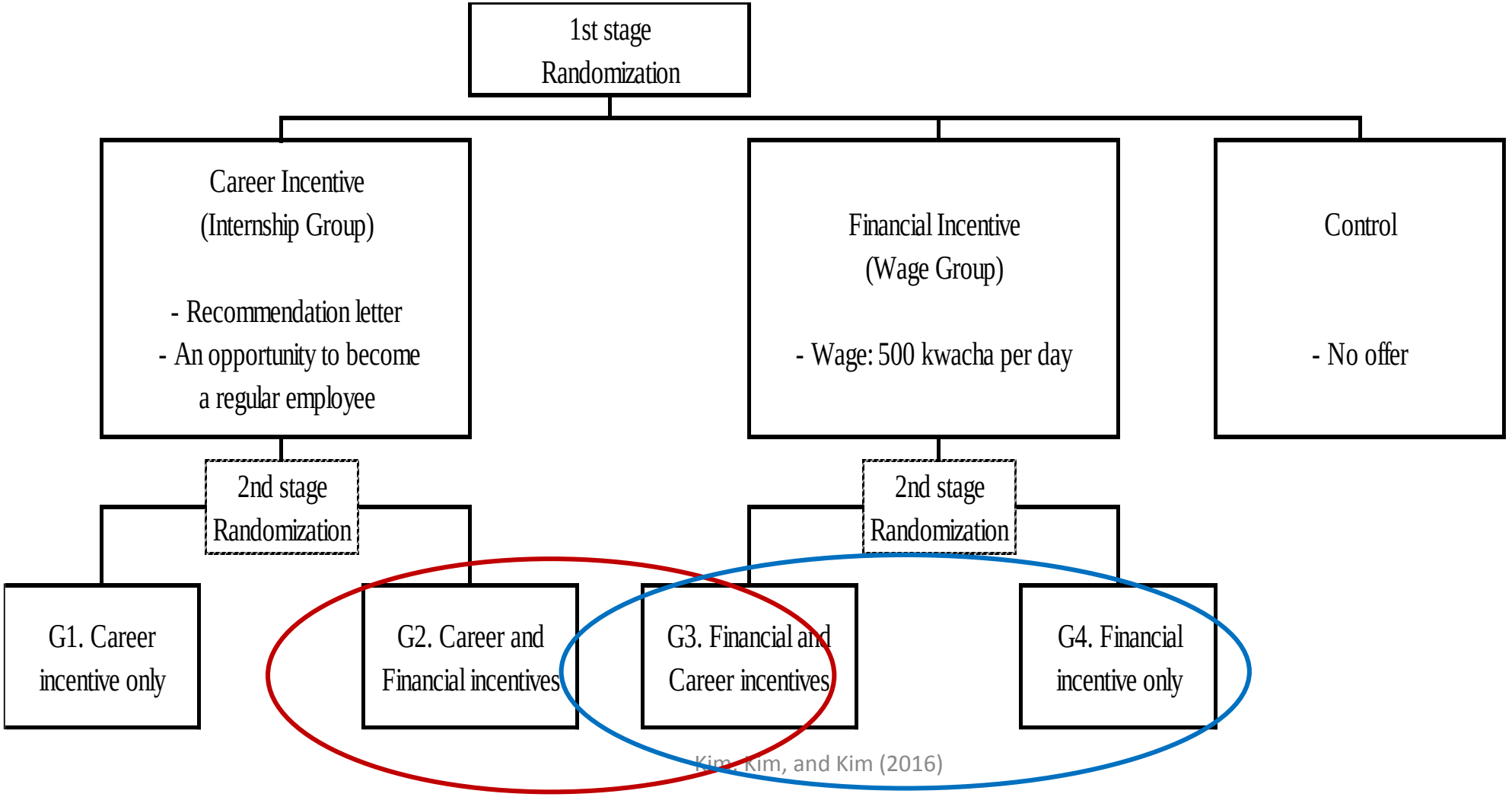
- Randomly chosen **half** of the internship group receives the same financial incentive of the wage group

- Randomly chosen **half** of the wage group receives the same career incentives of the internship group

Experimental design recap

- In the 1st stage, individuals receive randomized job offers and make a job offer take-up decision
- Only those who accept a job offer proceed to the second stage
- In the 2nd stage, randomly chosen half of job offer takers receive additional incentives by surprise
  - These individuals have both types of career and financial incentives
  - Those who do not receive additional incentives have only one kind of incentives

Experimental Design



Related Literature

- Impacts of incentives on labor productivity through selection of workers at the recruitment stage
    - Career incentive (Ashraf et al. ,2014)
    - Financial incentive (Dal Bo et al., 2014; Deserrano, 2015)
- Impacts of incentives on labor productivity through *incentive effect* at work
    - Financial incentive (Shearer, 2004; Lazear, 2000)
    - Comparing financial and social incentives (Gine, Mansuri, and Shrestha, 2015)

Contribution to the literature

- Two-stage experimental design to control for self-selection (Ashraf et al., 2010; Beaman et al., 2014).
  - Does not require artificial/imperfect inference on reservation wage (Guiteras and Jack, 2014)
  - Does not require employee panel data and a rare HRM policy change (Lazear, 2000)
- First study on the role of internships on worker selection and job performance
  - Descriptive studies outside economics (Brooks et al., 1995, D'abate et al., 2009, Friedman and Roodin, 2013, Liu et al., 2014)
  - Fake resume study (Nunley et al., 2016)

Contributions to the literature (continued)

- Importance of non-cognitive skills in labor market outcomes (Park, 2015; Deming, 2015; Kautz et al., 2014; Heckman et al., 2006; Osborne-Groves, 2004; Heckman and Rubinstein, 2001)

Preview of the results

- Career incentives provided through internships attract more productive workers
- Importance of hiring skilled workers via a self-selection channel
- Importance of non-cognitive skills in explaining the job performance differences for those attracted by career incentives
- Incentives matter differently at the recruitment stage and during the work stage
  - Hiring via career incentives + motivating via financial incentives work best

Baseline survey

Kim, Kim, and Kim (2016)

Pilot census survey

Kim, Kim, and Kim (2016)

Pilot census survey

Actual census survey in the field

Project Chronology

- Phase 1: Recruitment (Jan 2015)
  - Approached 536 representative study subjects from a pool of males who graduated from secondary schools on Aug 2014 in rural Malawi
  - 82.6% (443 out of 536) successfully completed a baseline survey
    - Non-participants: unreachable (45.2%), in school (32.2%), currently working(9.7%), and refusal (12.9%).

Project Chronology (continued)

- Phase 2 : First-stage randomization
  - Career incentive: a job offer with recommendation letter and a long-term job opportunity at the NGO
  - Wage incentive: a job offer with a fixed wage of 10,000 MK for 20 working days (MK 500 per day, MK 500 = US $1.3)
  - Control group: no job offer

- Phase 3 : Training (1 week)
  - Enumerator training for survey procedures and field logistics
  - A quiz test on the understanding of the census survey and enumerator tasks and a mock survey
  - A cutoff to qualify enumerators with minimum level of skills evaluated by the test and the mock survey

Project Chronology (continued)

- Phase 4 : Second-stage randomization
  - On the first working day, we announce the additional incentives by surprise
  - Contract document specifying the incentive provision and performance measurements signed

- Phase 5: Field work (Feb – Apr 2015)
  - Randomly assigned to 52 areas
    - Stratified by population and land size of each area
    - Each area has workers with the same incentive

Research stages and sample composition

Experimental stage		Number of individuals						
		G1 (internship only)	G2 (internship and wage)	G3 (wage and internship)	G4 (wage only)	Control	P-value	Total
A	Original target subjects	220		220		96		536
B (B/A)	Participated in the baseline survey	186 (84.6%)		176 (80.0%)		81 (84.4%)	.402 (F-stat)	443
C (C/B)	Accepted the conditional job offer	74 (39.8%)		74 (42.0%)		-	.663 (t-stat)	148
D	Failed training	11		0		-	-	11
E (E/B)	Hired as enumerators	63 (33.9%)		74 (42.0%)		-	-	137
		33	30	35	39			

Note: The proportion of individuals remaining at each stage is in parentheses.

1st stage randomization balance

Variable	Internship group	Wage group	Control group	Mean difference (p-value) Internship vs Wage	Mean difference (p-value) Internship vs Control	Mean difference (p-value) Wage vs Control
	(1)	(2)	(3)	(4)	(5)	(6)
Age	20.5	20.4	20.0	.065	.427**	.362
	(.120)	(.126)	(.159)	(.707)	(.033)	(.076)
Height	164.5	164.7	164.0	-.241	.486	.727
	(.625)	(.556)	(.714)	(.774)	(.949)	(.423)
BMI (kg/m²)	19.7	19.8	19.7	-.070	-.002	.068
	(.165)	(.151)	(-.002)	(.756)	(.995)	(.801)
Number of siblings	4.60	4.17	4.48	.430**	0.12	-0.31
	(.132)	(.134)	(.224)	(.022)	(.675)	(.264)
Level of parental support	15.3	15.5	15.7	-0.2	-0.4	-0.2
	(.360)	(.338)	(.542)	(.766)	(.537)	(.675)
Asset score	1.09	1.19	1.22	-.102	-.134	-.134
	(.066)	(.067)	(-.134)	(.282)	(.275)	(.275)
Currently working	.097	.074	.100	.023	-.003	-.026
	(.022)	(.020)	(.034)	(.436)	(.936)	(.505)

1st stage randomization balance

Variable	Internship Group	Wage group	Control group	Internship vs Wage	Internship vs Control	Wage vs Control
	(1)	(2)	(3)	(4)	(5)	(6)
Self-esteem (Rosenberg scale 0 ~ 30)	19.4	19.3	20.0	.100	-.600	-.700
	(3.86)	(3.51)	(.413)	(.683)	(.220)	(.119)
Intrinsic motivation (1 ~ 4)	3.10	3.09	3.10	.010	0	-.010
	(.330)	(.351)	(.038)	(.644)	(.949)	(.783)
Extrinsic motivation (1 ~ 4)	2.84	2.84	2.81	0	.030	.030
	(.281)	(.285)	(.031)	(.896)	(.480)	(.548)
Extroversion (1 ~ 7)	3.61	3.47	3.44	.140	.170	.030
	(1.12)	(1.20)	(.136)	(.237)	(.310)	(.872)
Agreeableness (1 ~ 7)	5.13	5.10	5.42	.030	-.290	-.320*
	(1.41)	(1.37)	(.157)	(.835)	(.104)	(.072)
Conscientiousness (1 ~ 7)	5.69	5.68	6.17	.010	-.480***	-.490***
	(1.34)	(1.36)	(.147)	(.908)	(.005)	(.004)
Emotional stability (1 ~ 7)	5.08	5.06	5.31	.020	-.230	-.250
	(1.49)	(1.42)	(.164)	(.905)	(.261)	(.222)
Openness to experiences (1 ~ 7)	5.39	5.32	5.76	.070	-.370**	-.440**
	(1.35)	(1.36)	(.150)	(.664)	(.029)	(.012)
Cognitive ability index	-.019	.049	-.068	-.068	.049	.117
	(.047)	(.049)	(.073)	(.314)	(.571)	(.184)
Number of Observations	186	176	81	-	-	-

2nd stage randomization balance

Variable	Mean difference (p-value) G2 (n=30) vs. G1 (n=33)	Mean difference (p-value) G3 (n=35) vs. G4 (n=39)
Age	-.200	-.207
	(.629)	(.520)
Height	1.64	1.88
	(.343)	(.256)
BMI (kg/m^2)	-.097	.234
	(.868)	(.590)
Number of siblings	5.00	-.158
	(.315)	(.650)
Level of parental support	4.30**	-.790
	(.003)	(.415)
Asset score	.133	.048
	(.489)	(.799)
Currently working	.036	-.006
	(.514)	(.913)

Variable	Mean difference (p-value) G2 (n=30) vs. G1 (n=33)	Mean difference (p-value) G3 (n=35) vs. G4 (n=39)
Self-esteem (Rosenberg scale 0 ~ 30)	.441	-.768
	(.662)	(.341)
Intrinsic motivation (1~4)	.033	-.075
	(.642)	(.372)
Extrinsic motivation (1~4)	.031	.004
	(.646)	(.956)
Extroversion (1~7)	.055	-.246
	(.851)	(.393)
Agreeableness (1~7)	-.165	-.268
	(.651)	(.408)
Conscientiousness (1~7)	.094	-.054
	(.778)	(.850)
Emotional stability (1~7)	.064	-.190
	(.866)	(.591)
Openness to experiences (1~7)	.441	-.016
	(.187)	(.958)
Cognitive ability index	.092	.001
	(.556)	(.995)
Quiz score	**.221**	**.101**
	(.638)	**(.816)**
Mock survey error	**-.036**	**.001**
	(.409)	**(.965)**

Worker sorting

- We compare the characteristics of individuals who self-selected into a job
- Career incentive vs financial incentive

Worker characteristics after self-selection

Variables	Internship	Wage	Difference
Age	20.8	20.7	.162
Height	165.0	164.7	.368
BMI	19.9	19.5	.413
Asset score	.932	1.05	-.122
Number of siblings	4.86	4.46	.405
Level of parental support	15.7	15.3	.369
Currently working	.081	.054	.027
Self-esteem (Rosenberg scale)	19.1	18.6	.521
Intrinsic motivation	3.05	3.08	-.029
Extrinsic motivation	2.78	2.83	-.046
Extroversion	**3.67**	**3.27**	**.405****
Agreeableness	5.08	5.10	-.019
Conscientiousness	5.67	5.87	-.196
Emotional stability	4.94	5.12	-.182
Openness to experiences	5.35	5.52	-.171
Cognitive Ability Index	**-.199**	**-.077**	**-.122**
Number of observations	**74**	**74**	**148**

Training performance

- We estimate the following equation:

$$Training_i = \alpha + \beta Career_i + \delta Demog_i + \gamma Cog_i + \theta NonCog_i + \omega_i$$

  - $Demog$ is a vector of demographic and socioeconomic characteristics.
  - Cog is a cognitive ability index variable.
  - $NonCog$ is a vector of non-cognitive traits.
- Training performance is measured by
  - Quiz score
  - Mock survey error rate

Training outcome:
Quiz score

Training outcome:
Error rate in mock survey

Job performance regression

- Job performance is measured by
  - Survey error rate
  - Survey speed
  - Work attitude

- We estimate the following equation:

$$Performance_{ijkt} = \alpha + \beta Career_j + \delta Demog_j + \gamma Cog_j + \theta NonCog_j + \sigma_t + \emptyset Z_k + \psi_{ijkt}$$

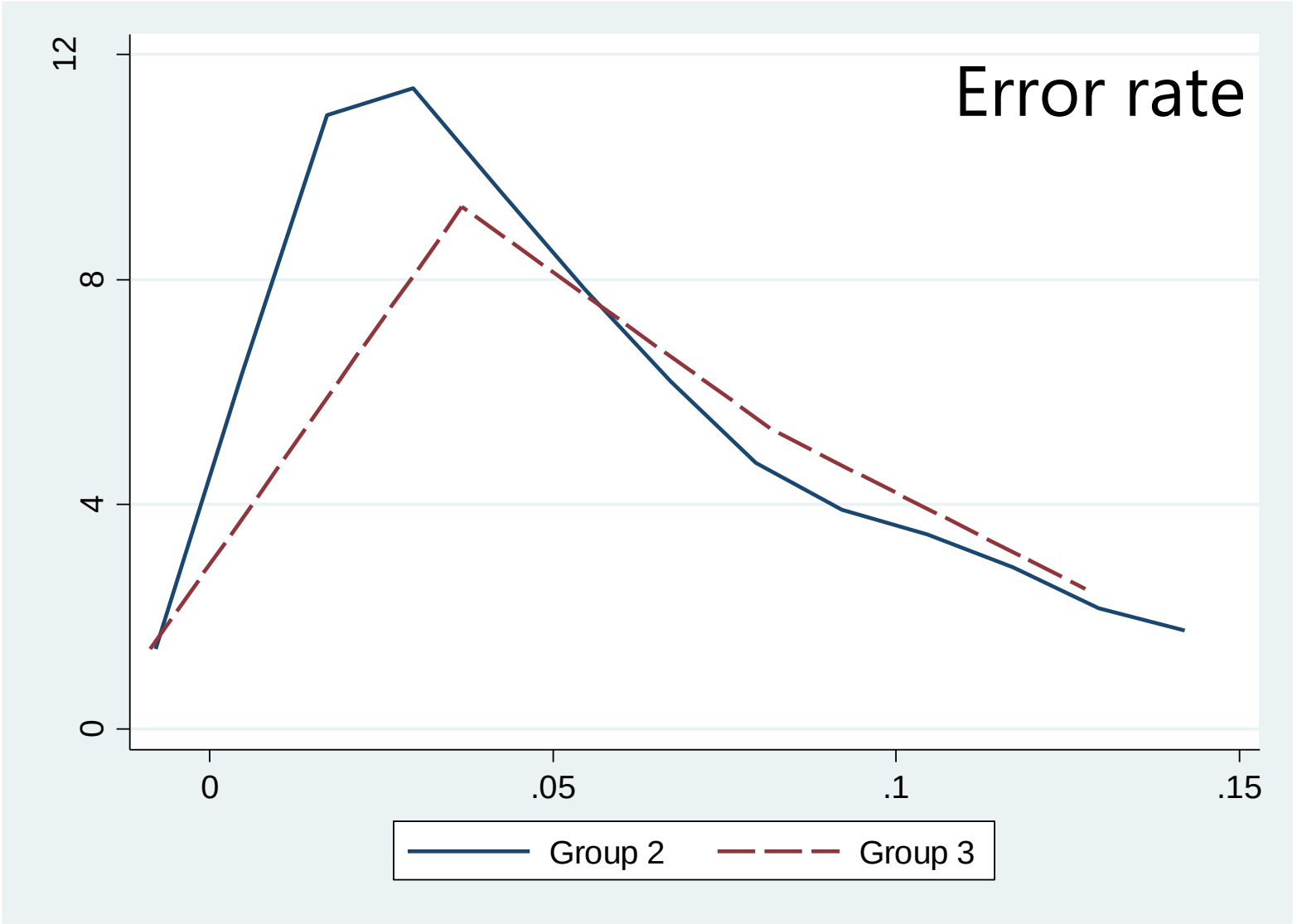
- Survey sheet *i*, enumerator *j, survey date t,* survey village *k,*

Selection effect of career incentives on job performance

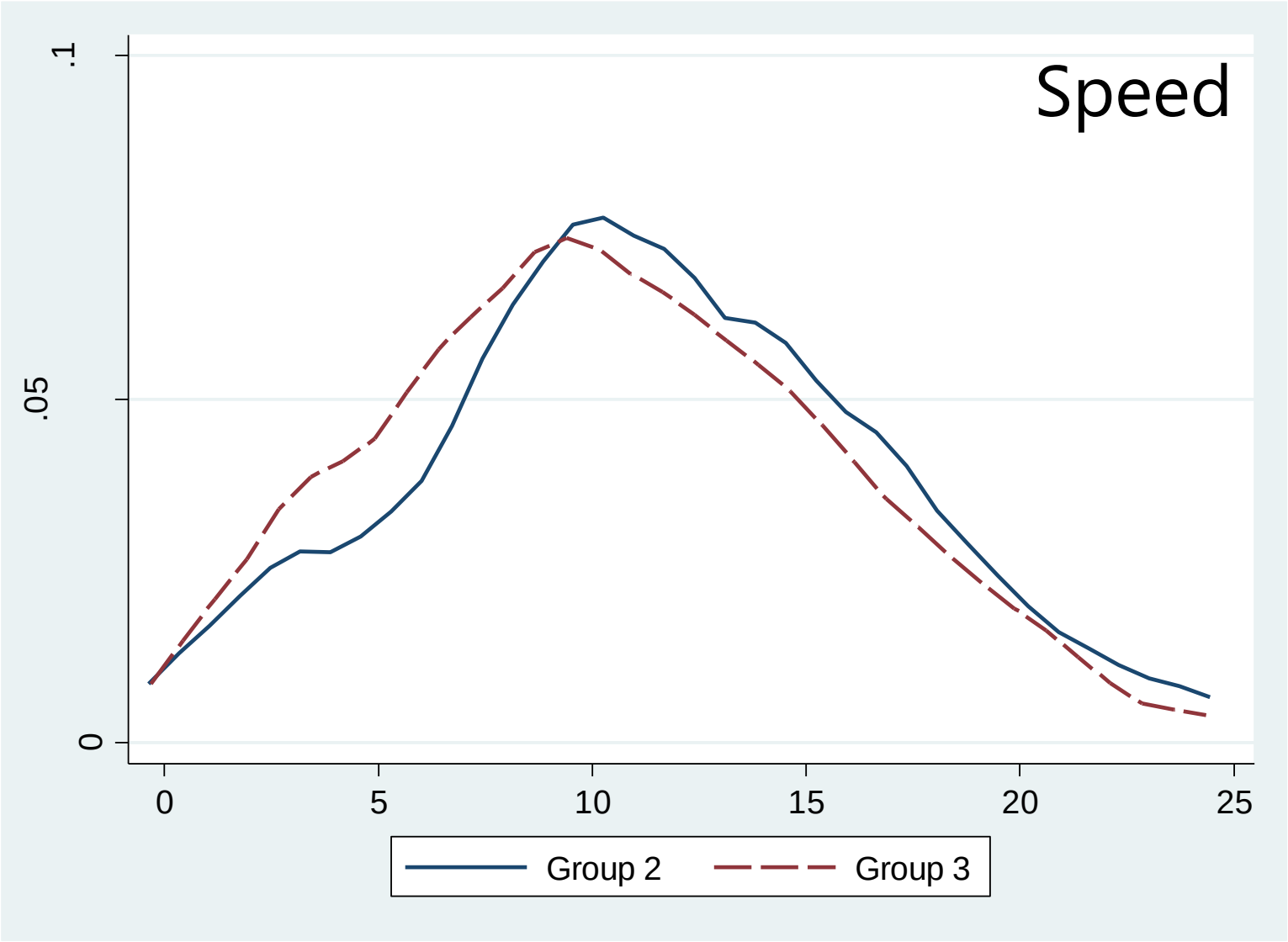
- Do career incentives attract more productive workers?

- To isolate the selection effect of career incentives, we restrict the sample to G2 and G3.
  - G2: Enumerators attracted to accept a job due to career incentives of the unpaid internship offer
  - G3: Enumerators attracted to accept a job due to a financial incentive of the short-term paid job offer
  - Both have the same incentives but the selection channel is different

Job performance: selection effect



Job performance: selection effect



VARIABLES	Error rate					Speed					Attitude				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Group 2	**-.021***	**-.018***	**-.020****	**-.015**	**-.009**	**.577**	**.673**	**.582**	**.424**	**.706**	**-.045**	**.010**	**-.042**	**-.108**	**-.069**
	(.012)	(.011)	(.010)	(.011)	(.008)	(.479)	(.507)	(.488)	(.432)	(.441)	(.101)	(.126)	(.100)	(.101)	(.137)
Constant (Group 3)	.092**	.099**	.077**	.061	-.063	7.65***	8.44***	7.62***	9.67**	12.1**	.165	-.007	.165	1.06**	.803
	(.044)	(.046)	(.036)	(.097)	(.087)	(2.25)	(2.64)	(2.25)	(4.26)	(4.70)	(.528)	(.562)	(.527)	(.516)	(.635)
Observations	11,134	11,134	11,134	11,134	11,134	1,003	1,003	1,003	1,003	1,003	65	65	65	65	65
R-squared	.093	.165	.179	.135	.263	.128	.141	.128	.146	.163	.383	.491	.386	.501	.606
Mean (SD)	.072(.071)					11.1(5.50)					.796(.171)				
Work Day FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Catchment area control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Demographic	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES
Cognitive ability	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES
Non-cognitive ability	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES

Note: Standard errors clustered at enumerator level are reported in parentheses. ***, **, * denote the significance level at 1%, 5%, and 10% respectively. All specifications include work day FE, and controls for catchment area characteristics

Job performance: selection effect

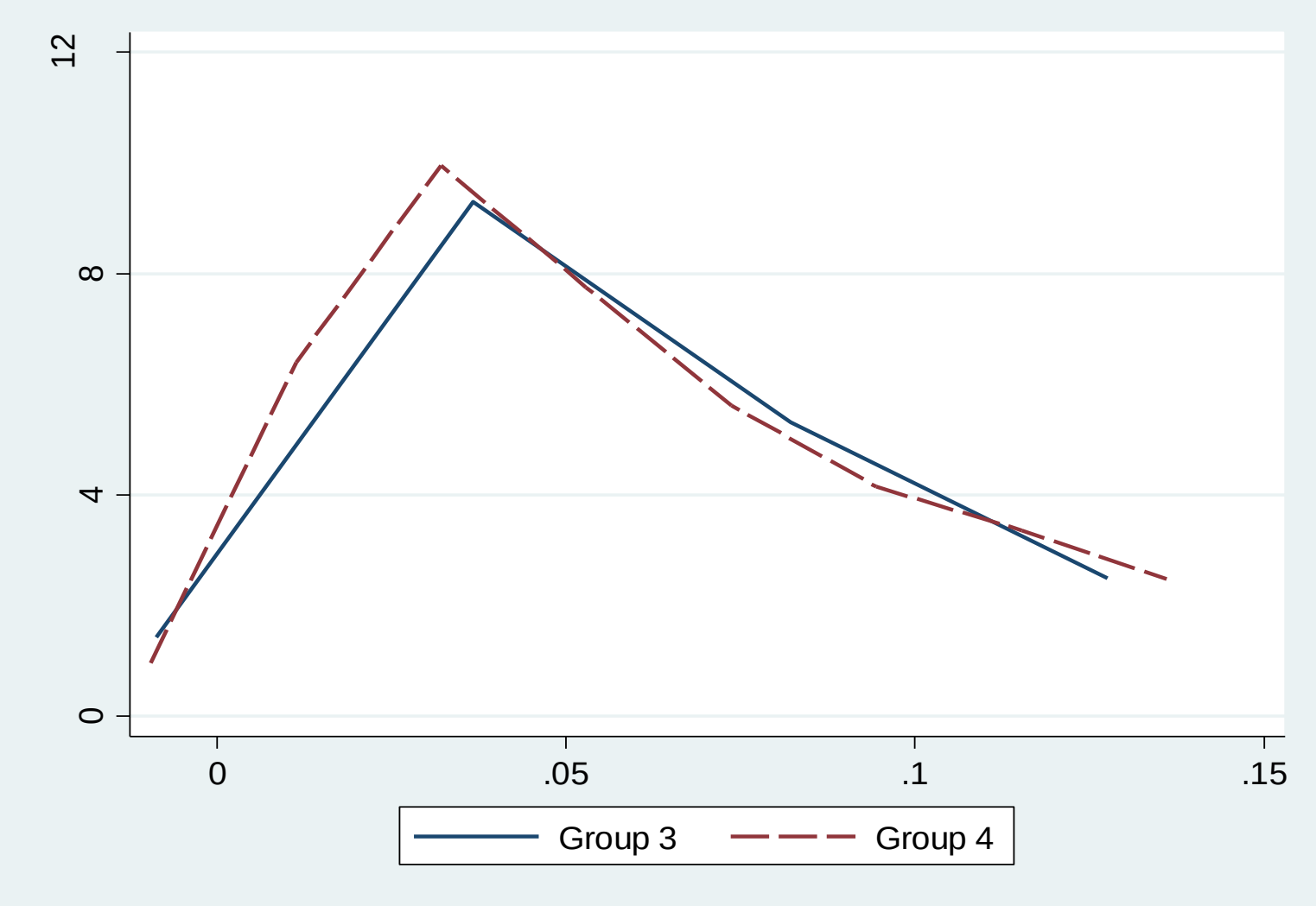
- Selection effect (for survey accuracy) goes down by 28.6% due to the inclusion of non-cognitive traits.
  - individuals with a more suitable non-cognitive trait such as extroversion were more responsive to internship offers than wage offers.
- Column (5) indicates that 41% of the original selection effect in column (1) is due to the unobservables.
  - screening via the observables might be imperfect and thus it is important to devise a recruitment to attract workers with strong unobservable skills via self-selection.
- No evidence for speed and work attitude

Incentive effect of career incentives on job performance

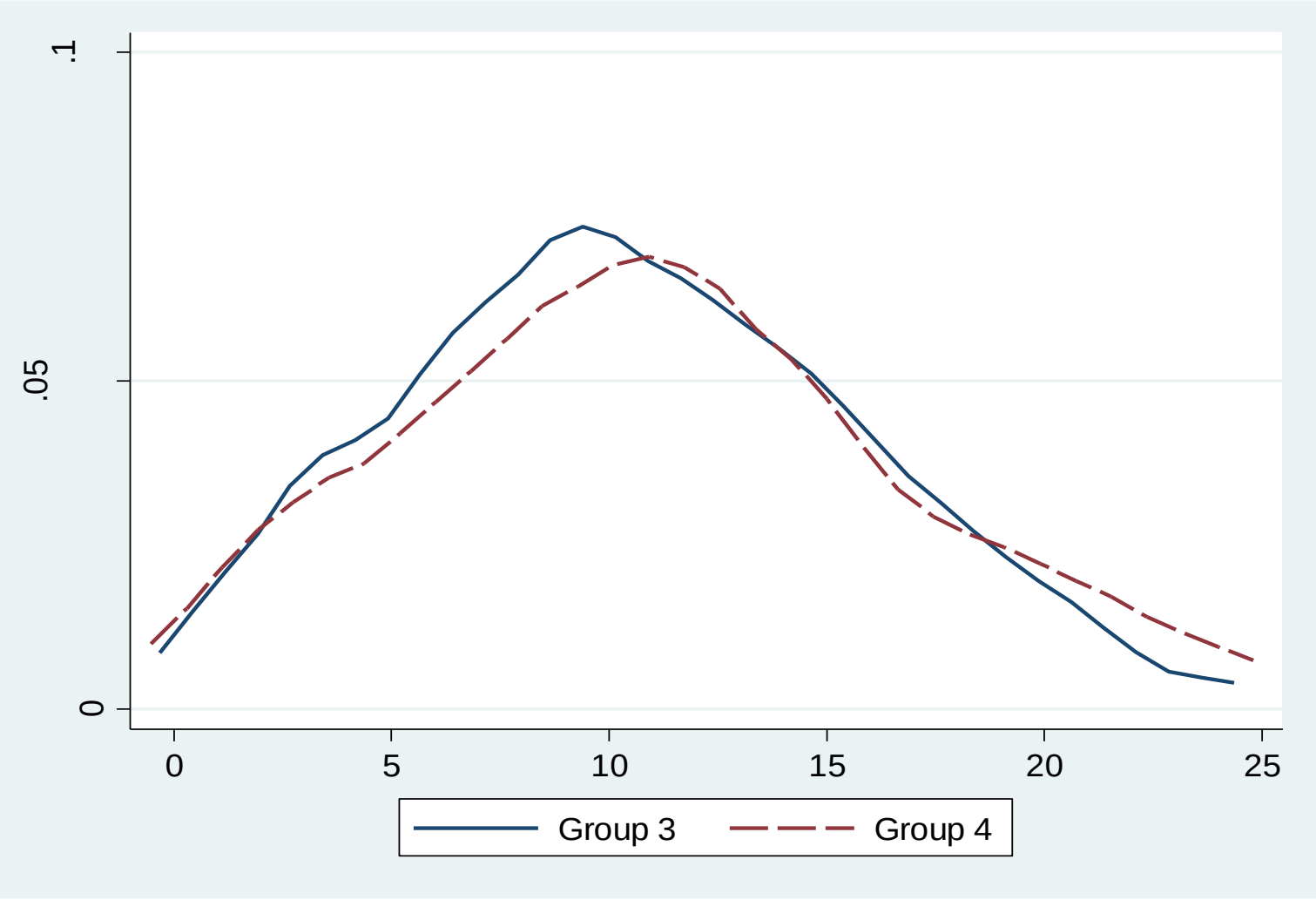
- Do career incentives motivate workers to become more productive?

- To isolate the incentive effect of an internship, we restrict the sample to G3 and G4.
  - G3: Enumerators attracted to accept a job due to career incentives of the unpaid internship offer
  - G4: Enumerators attracted to accept a job due to a financial incentive of the short-term paid job offer
  - Both groups attracted to accept a job offer through the same channel but only G3 has additional career incentives.

Job performance: incentive effect



Job performance: incentive effect



VARIABLES	Error rate					Speed					Attitude				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Group 3	.006	.006	.007	.007	.006	-1.08	-.905	-1.07	-1.35*	-1.25*	.240***	.241***	.238***	.244***	.238***
	(.013)	(.012)	(.012)	(.013)	(.012)	(.698)	(.619)	(.698)	(.700)	(.666)	(.047)	(.047)	(.049)	(.054)	(.054)
Constant (Group 4)	.052	.065	.035	-.005	-.005	6.03*	9.50**	6.19*	-1.67	2.71	.102	.644**	.080	.214	.647
	(.041)	(.058)	(.041)	(.087)	(.109)	(3.24)	(3.81)	(3.27)	(5.40)	(6.10)	(.289)	(.262)	(.293)	(.379)	(.552)
Observations	11,775	11,775	11,775	11,775	11,775	1,063	1,063	1,063	1,063	1,063	74	74	74	74	74
R-squared	.137	.167	.158	.182	.215	.113	.136	.113	.136	.159	.617	.699	.620	.634	.731
Mean (SD)	.080(.076)					11.1(5.92)					.709(.194)				
Work Day FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Catchment area control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Demographic	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES
Cognitive ability	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES
Non-cognitive ability	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES

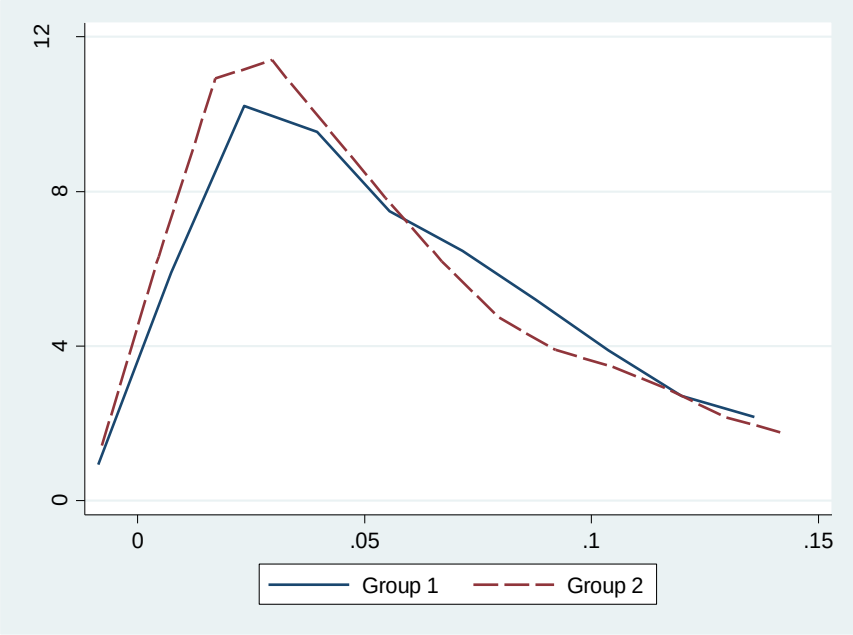
Note: Standard errors clustered at enumerator level are reported in parentheses. ***, **, * denote the significance level at 1%, 5%, and 10% respectively. All specifications include work day FE, and controls for catchment area characteristics

Job performance: incentive effect of career incentives

- Additional career incentives should act as a pressure to perform well
- Internship benefits motivate workers to improve their work attitude by 34%.
  - the observed improvement in work attitude is driven mostly by unobservable factors
- No effect on survey accuracy and reduced survey speed

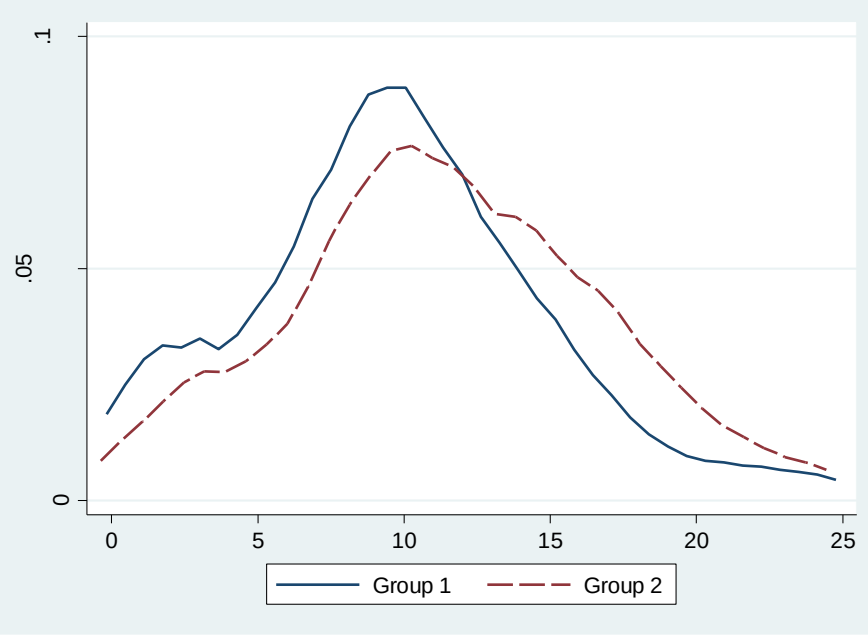
Incentive Effect of Financial incentive (G1 vs G2)

Error rate



Mean (SD)	Group 1	.075 (.068)
	Group 2	.066 (.060)

Speed



Mean (SD)	Group 1	9.84 (5.19)
	Group 2	11.6 (5.52)

Incentive Effect of Financial incentive (G1 vs G2)

VARIABLES	Error rate					Speed					Attitude				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Group 2	-.003	-.0004	-.005	-.002	-.002	2.10***	2.26***	2.10***	1.71***	1.81***	.048	.054	.049	.086	.107
	(.010)	(.010)	(.007)	(.010)	(.008)	(.545)	(.598)	(.545)	(.557)	(.635)	(.061)	(.084)	(.063)	(.081)	(.101)
Constant (Group 1)	.235*	.267***	.192**	.260*	.126	13.5***	14.3***	13.6***	12.9***	10.5	2.02***	2.46***	2.02**	3.31**	3.12*
	(.122)	(.089)	(.095)	(.146)	(.095)	(2.96)	(3.78)	(3.10)	(4.85)	(6.32)	(.751)	(.837)	(.766)	(1.29)	(1.59)
Observations	9,785	9,785	9,785	9,647	9,647	914	914	914	899	899	63	63	63	62	62
R-squared	.160	.260	.253	.187	.348	.169	.182	.169	.191	.208	.366	.441	.367	.482	.576
Mean (SD)	.070(.064)					10.7(5.42)					.770(.164)				
Work Day FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Catchment area control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Demographic	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES
Cognitive ability	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES
Non-cognitive ability	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES

Note: Robust standard errors clustered at enumerator level are reported in parentheses. Supervisor fixed effect variable is dummy variable of each supervision team who visited enumerators. ***, **, * denote the significance level at 1%, 5%, and 10% respectively.

Job performance: incentive effect of financial incentives

- Additional financial incentives might not necessarily well
- Unexpected salary motivates workers to improve speed
- No effect on survey accuracy and attitude

Concluding Remarks

- Career incentives provided through internships do attract more productive workers
- Importance of hiring skilled workers via a self-selection channel
- Importance of non-cognitive skills
- Incentives matter differently at the recruitment stage and during the work stage
  - G2 performs best in general
  - Hiring via career incentives + motivating via financial incentives work best