Development Economics 1

Lecture 3: Workers

Stefano Caria

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Plan

We will review the key stylized facts on workers in low and middle income countries (LMIC).

This will motivate two questions:

1. Can labor-market policy boost employment?

2. Can labor-market policy boost productivity?

Roadmap

Stylised Facts

What determines the equilibrium level of employment?

Experimental Evidence on Frictions

Reading

Bandiera et al. (2022)'s Jobs of the World: a key resource to do your own exploration

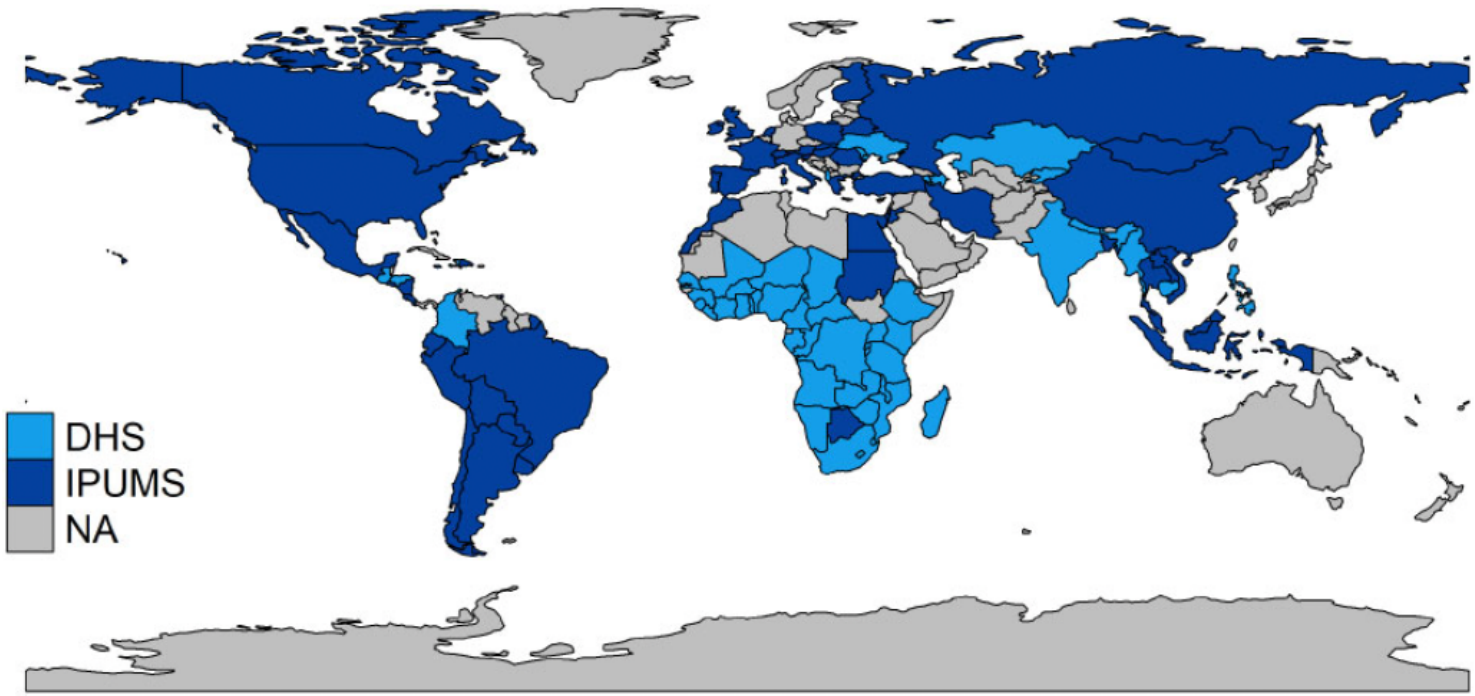


FIGURE 1. Countries in JWD.

1. Employment

Poor countries have average/high employment rates

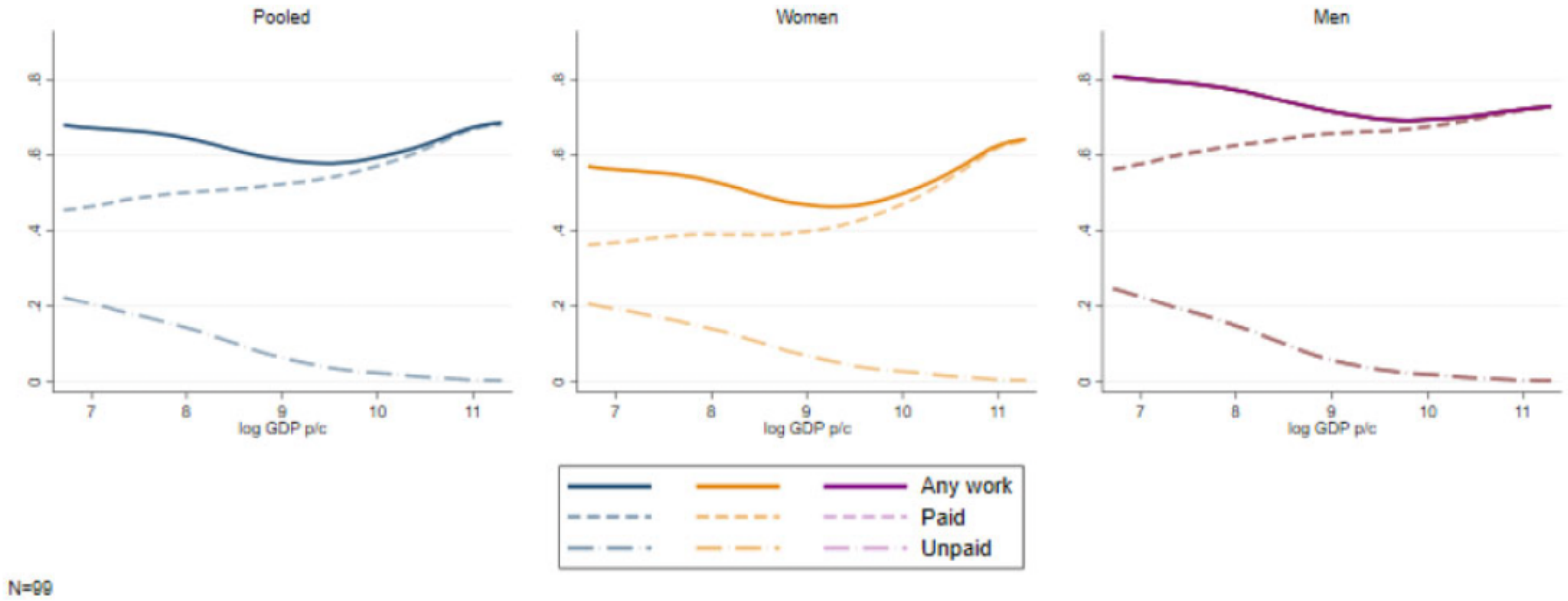
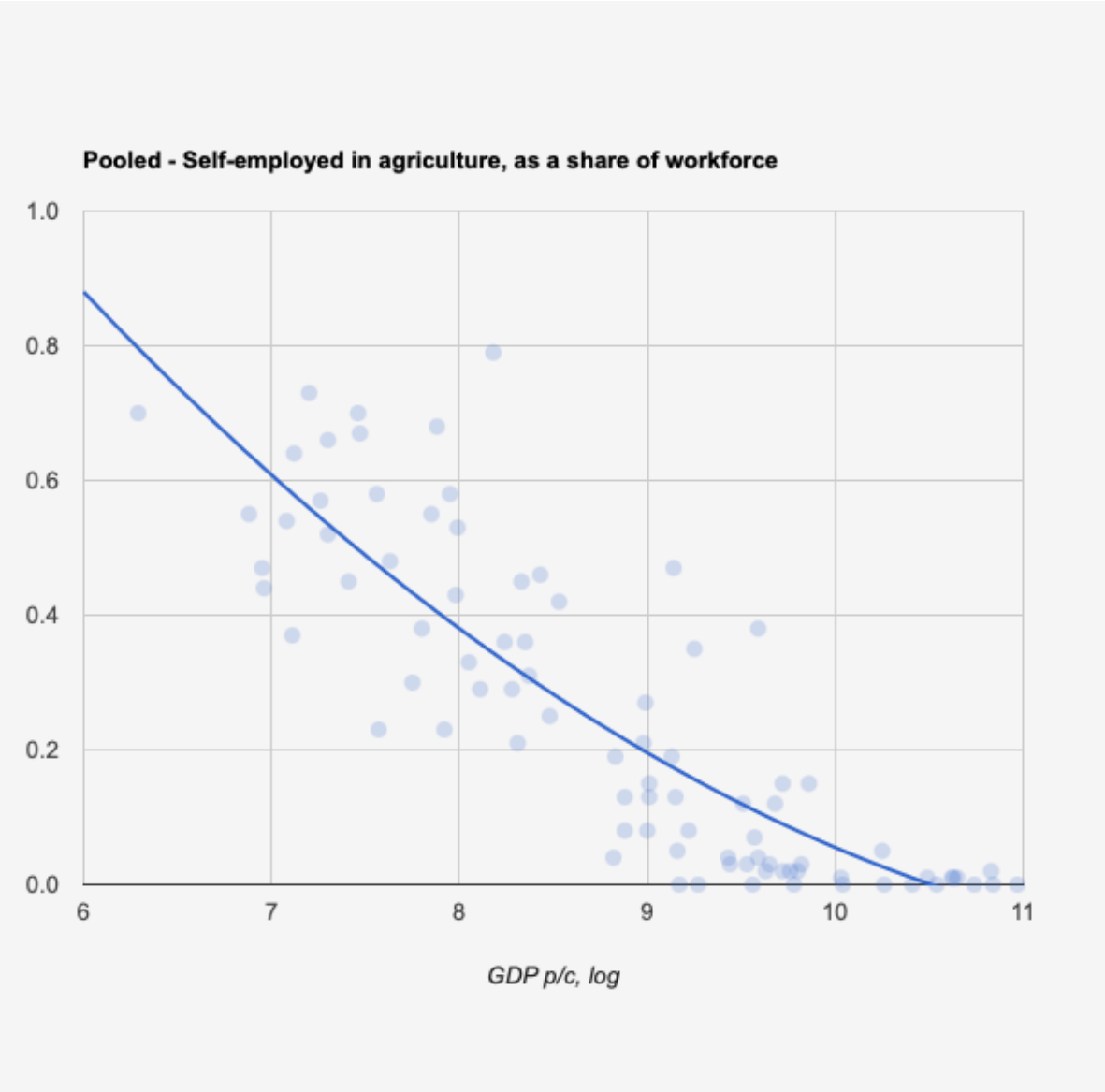


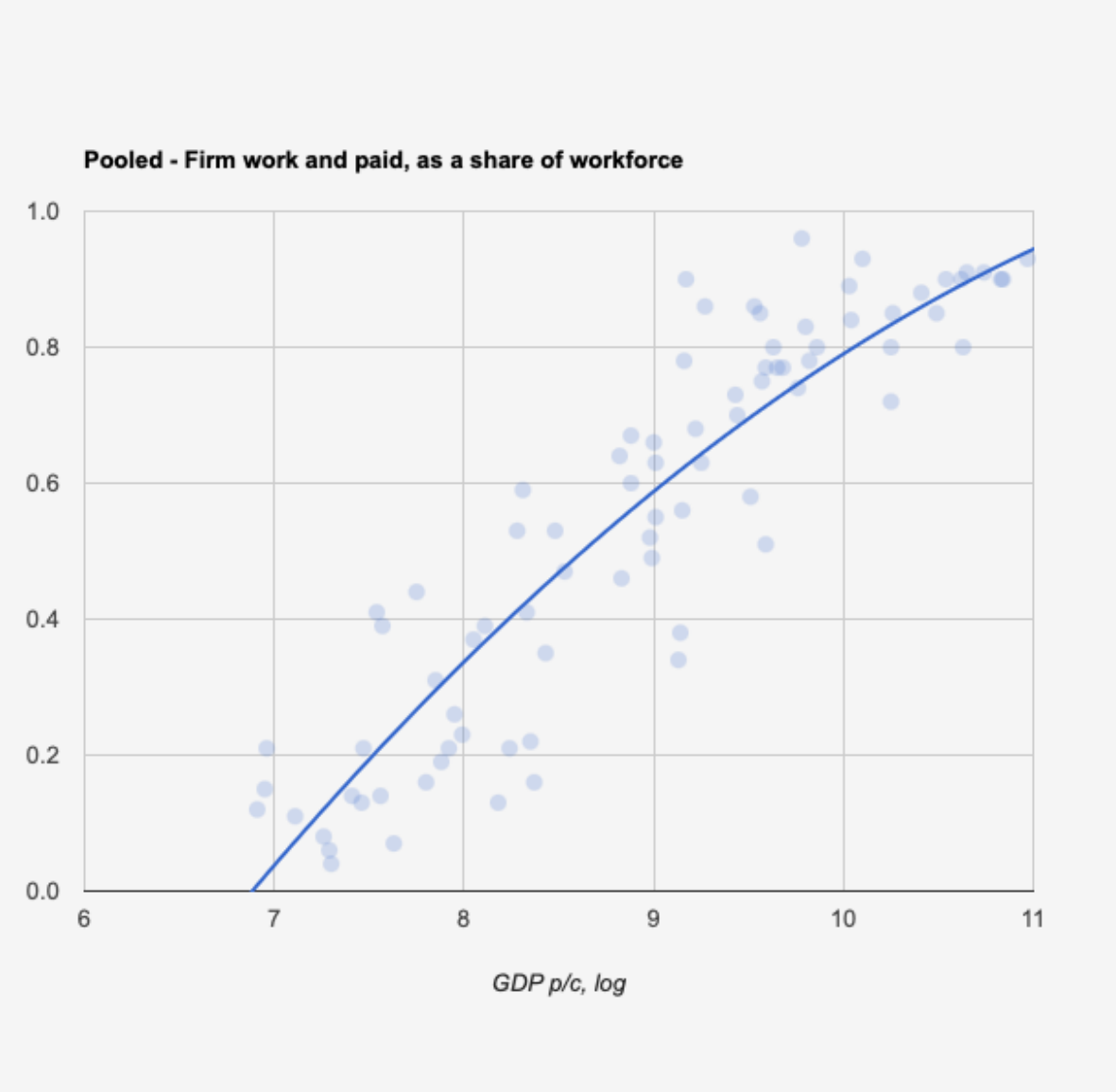
FIGURE 3. Paid and unpaid work against log GDP per capita by gender.

From Bandiera et al. (2022)

However, most workers are self-employed in agriculture

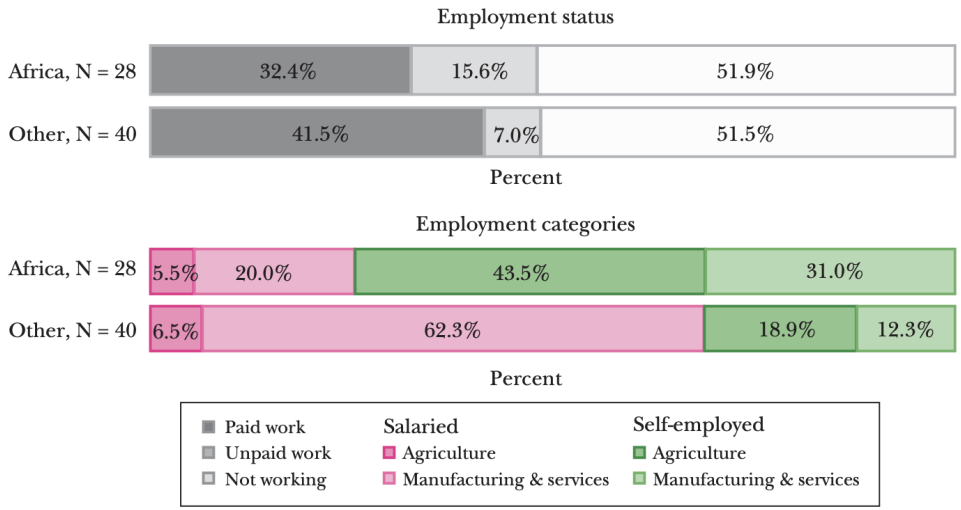


Only a small share are paid workers in a firm



These issues are more pronounced for youth

Figure 2
Occupational Structure of the 18–24 Year-Old Population



Source: Demographic and Health Surveys and IPUMS, harmonized via the Jobs of the World Project.
Note: Regional aggregates for the 18–24 year-old population in 68 low-income countries (28 countries from Africa and 40 countries from the rest of the world) constructed from the latest sample available for each country in the set of Demographic and Health Surveys and IPUMS censuses that contain the relevant labor outcomes for our exercise. The top panel plots the relative shares of three "extensive margin" categories: fraction of individuals aged 18–24 (i) working for pay, (ii) in unpaid work, and (iii) not working. The bottom panel plots the relative shares of four employment categories (defined according to sector and type of work), restricting the sample to working individuals (paid and unpaid). Regional averages are computed using countries' population size as weights; for the unweighted version, see Figure A2 in the online Appendix. For figures that disaggregate these results by gender, see Figure A3 in the online Appendix.

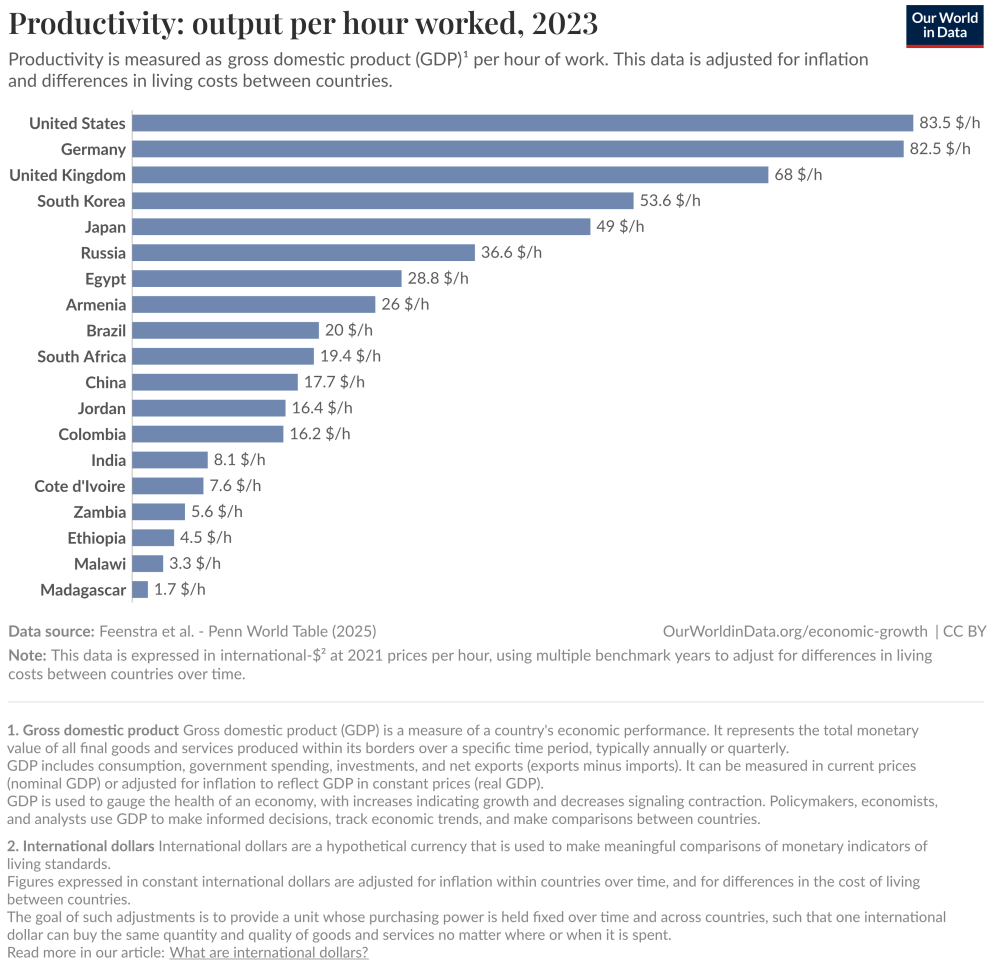
Bandiera et al. 2022b

Is this efficient?

Can governments raise employment through ALMPs?

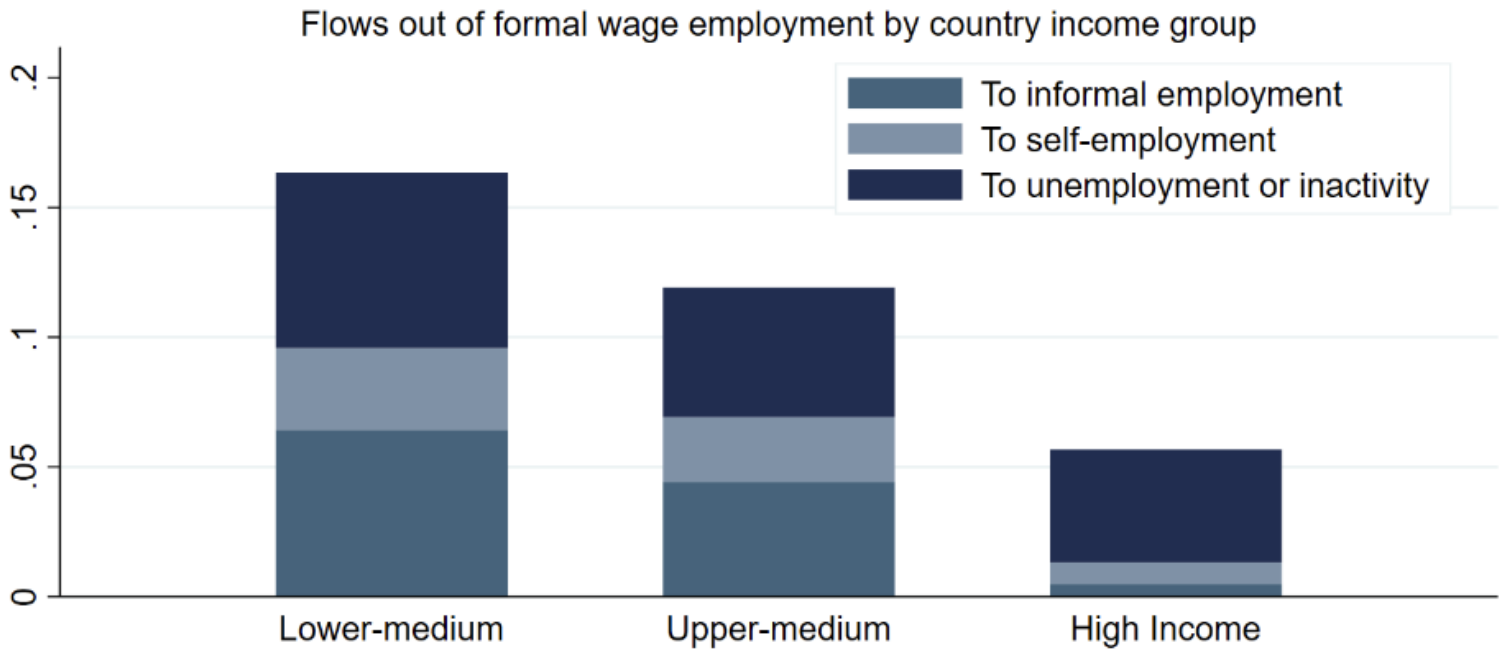
2. Productivity

Output per worker is considerably lower in LMICs



This (likely) remains true after accounting for differences in physical capital and schooling (Hall and Jones 1999, Caselli 2005).

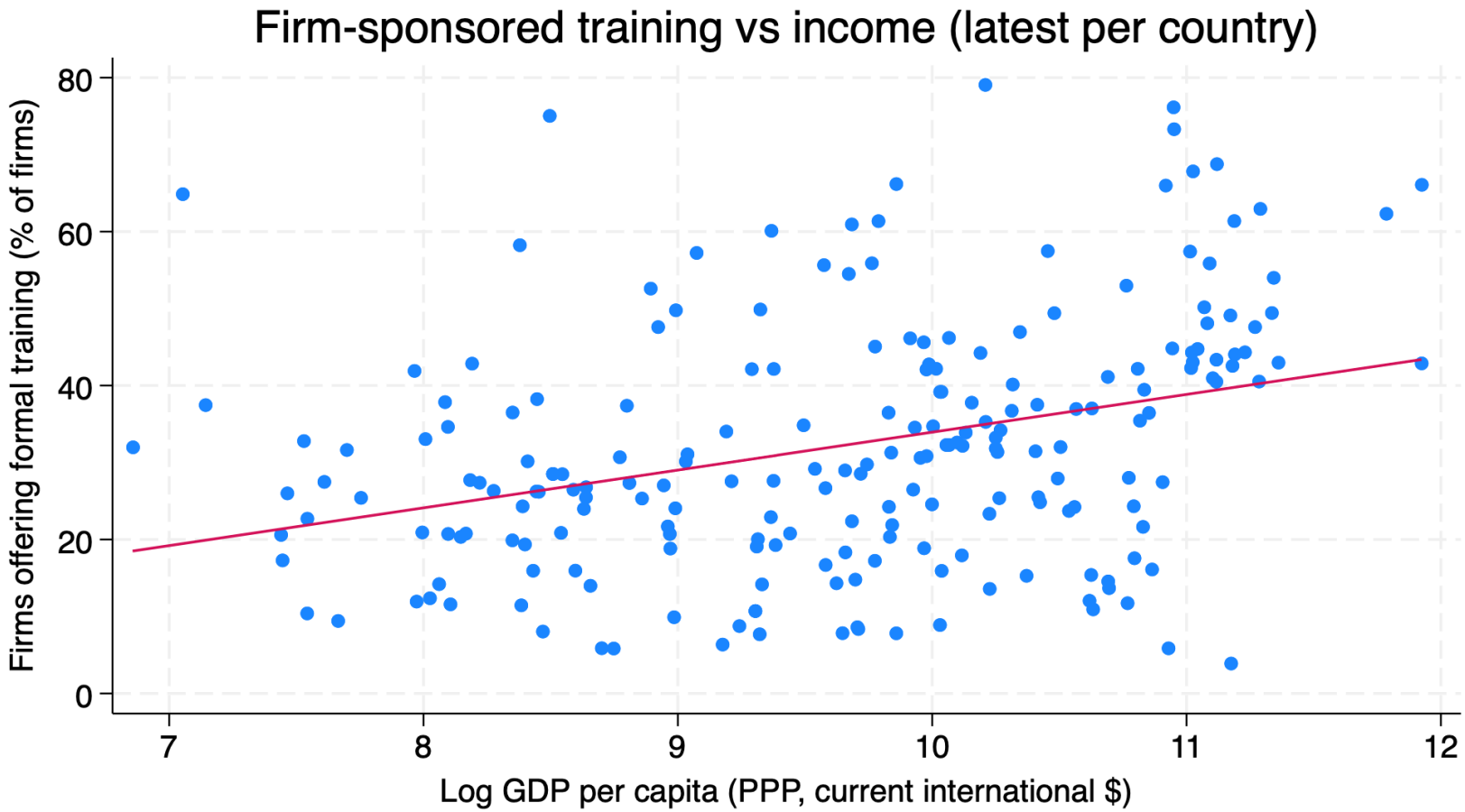
Job instability is high



Data from Donovan et al. (QJE 2023) (caveat: no low-income country)

Donovan et al. 2023

Firms' training is limited



Source: World Bank WDI via wbopendata (IC.FRM.TRNG.ZS; NY.GDP.PCAP.PP.CD). Latest available year per country.

Earning growth is slow

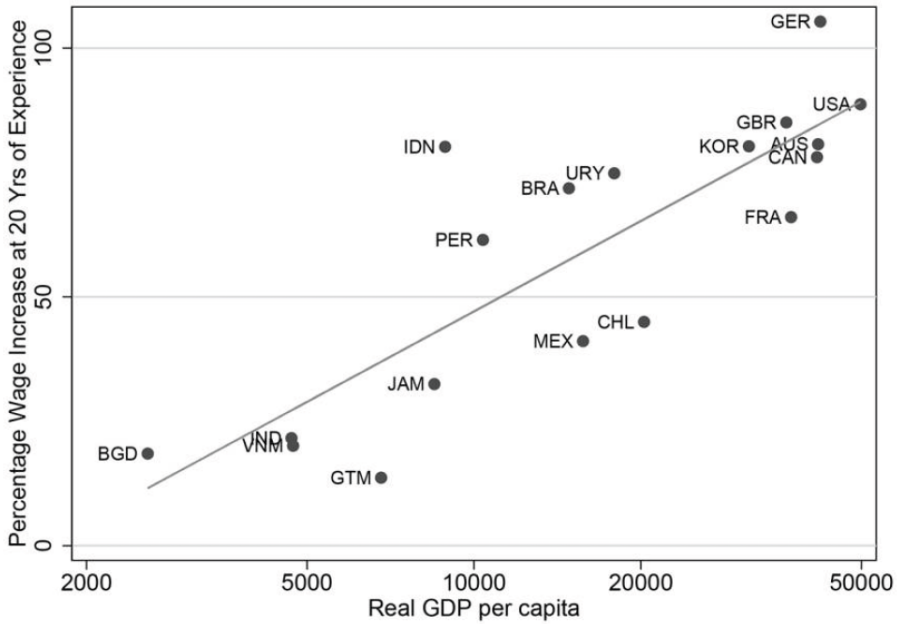


FIG. 3.—Percentage wage increase at 20–24 years of experience by GDP per capita. This figure plots the heights of the cross-sectional experience-wage profiles by 20–24 years of potential experience relative to 0–4 years of potential experience against GDP per capita at PPP in 2011. Experience-wage profiles are for full-time males working in the private sector and are calculated using all available years of data for each country. Potential experience is defined as the number of years elapsed since a worker finished schooling or turned 18, whichever is smaller. The wage is defined to be earnings divided by hours worked. For each country and year, we compute the ratio of average wages for workers in each 5-year experience bin relative to the average wages of workers with less than 5 years of experience. The experience-wage profiles used in the figure are the unweighted average wage ratios by experience across all years.

From Lagakos et al. (2018)

Do labour market dynamics hold productivity back?

Can active labor market policies raise productivity?

Roadmap

Stylised Facts

What determines the equilibrium level of employment?

Experimental Evidence on Frictions

Reading

A model of random job search

I will follow the exposition in Pissarides (2000) *Equilibrium Unemployment Theory, Chapter 1*

- The model pins down equilibrium wages, vacancies, and unemployment, as a function of productivity, matching efficiency and the separation rate.

- The core assumption is that workers and firms are not immediately able to find one another, but need to engage in a costly and time-consuming search process.

The Matching function

- There are L workers. u (v) is unemployment (vacancy) rate
- Time is continuous.
- $\theta = \dfrac{v}{u}$ is market tightness (vacancies per unemployed)

- $mL = m(uL, vL)$ is the **matching function**: gives number of job matches per unit of time given uL and vL.
  - Increases in both arguments, concave, CRS.
  - E.g., Cobb Douglas
- $q(\theta) = \frac{m(uL,vL)}{vL}$ is the rate at which a vacancy meets a worker ($q(\theta)' \leq 0$).

- The probability that an unemployed worker meets a vacancy is $\theta q(\theta)$

- Matches are destroyed exogenously at rate λ.

1 The Beveridge Relationship

Flows:

$$\begin{aligned} \text{Inflow to unemployment:} \quad & \lambda(1-u) \\ \text{Outflow from unemployment:} \quad & \theta q(\theta) u \end{aligned}$$

Steady state:

$$\lambda(1-u) = \theta q(\theta) u$$

Solve for unemployment:

$$\boxed{u = \frac{\lambda}{\lambda + \theta q(\theta)}} \tag{1}$$

The Beveridge curve: traces the relation between vacancies v and unemployment u.

2 Job Creation

- The (present discounted) value of a vacancy V is given by $rV = -pc + q(\theta)(J - V)$.
- Free entry: vacancies are created until $V = 0$:

$$pc = q(\theta)J$$

- The (present discounted) value of a job filled J is given by $rJ = p - w - \lambda J$

Capital markets are perfect. p is productivity, w the wage, r the interest/discount rate, pc the cost of maintaining a vacancy.

The Job Creation Curve

Recall $pc = q(\theta)J$.
Substitute $J = \frac{p-w}{r+\lambda}$ (implied by $rJ = p - w - \lambda J$).
Rearrange and get:

$$\boxed{p - w = \frac{(r+\lambda)pc}{q(\theta)}} \tag{2}$$

Intuition: wage markdown is a function of expected hiring costs.

The job-creation curve: shows that when w falls, firms enter (to keep $V = 0$) and θ increases (and thus hiring costs increase).

3 The Wage Equation

Workers' value functions:

$$rU = z + \theta q(\theta)(W - U), \qquad rW = w + \lambda(U - W)$$

where z is the flow value of unemployment.

Surpluses:

$$S_W = W - U = \frac{w - z}{r + \lambda + \theta q(\theta)}, \quad S_F = J = \frac{p - w}{r + \lambda}.$$

3 The Wage Equation

Nash bargaining (with bargaining weight β) implies:

$$(1-\beta)S_W = \beta S_F$$

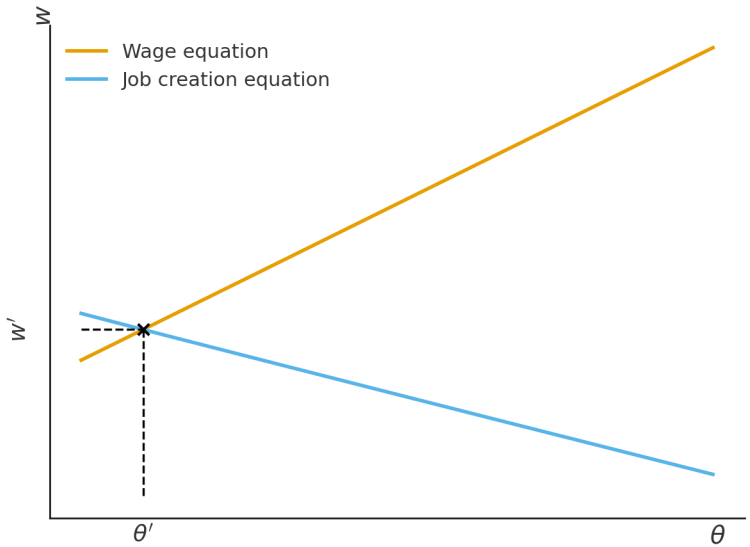
This in turn implies:

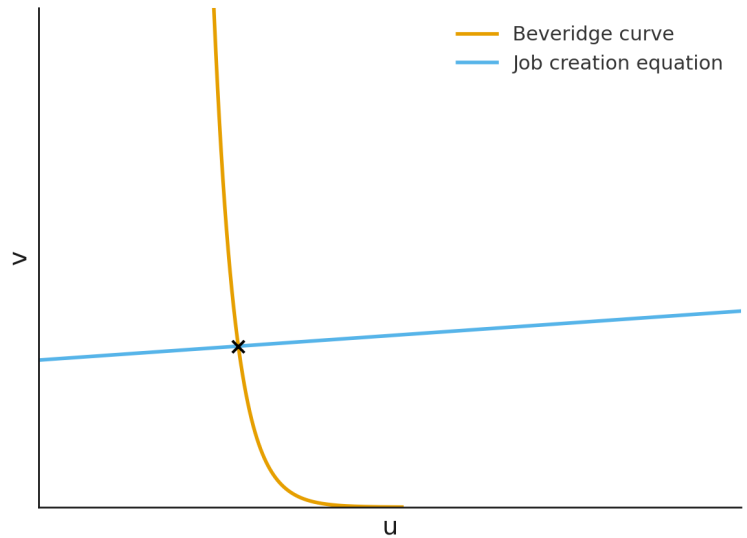
$$\boxed{w = (1-\beta)z + \beta p\big(1 + c\theta\big)} \tag{3}$$

Now w and θ are +vely related. Intuition: employed workers capture a share of the average hiring cost they save firms.

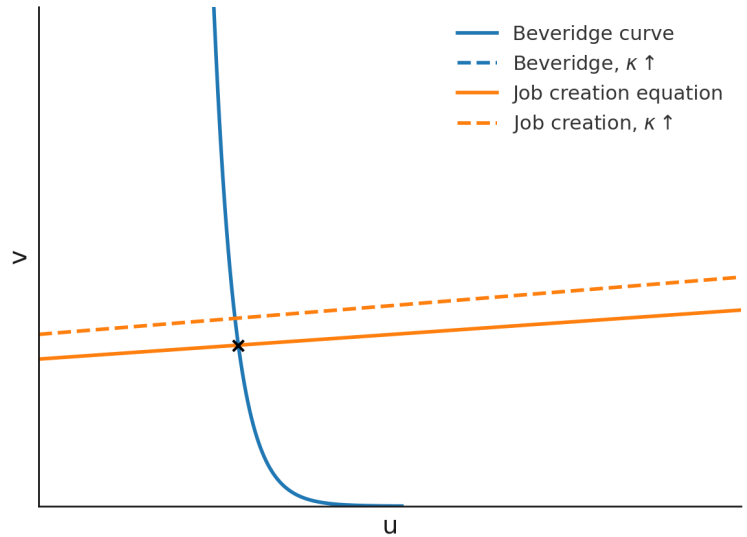
(see Pissarides (2000) for derivations and discussion)

The graphical solution of the model



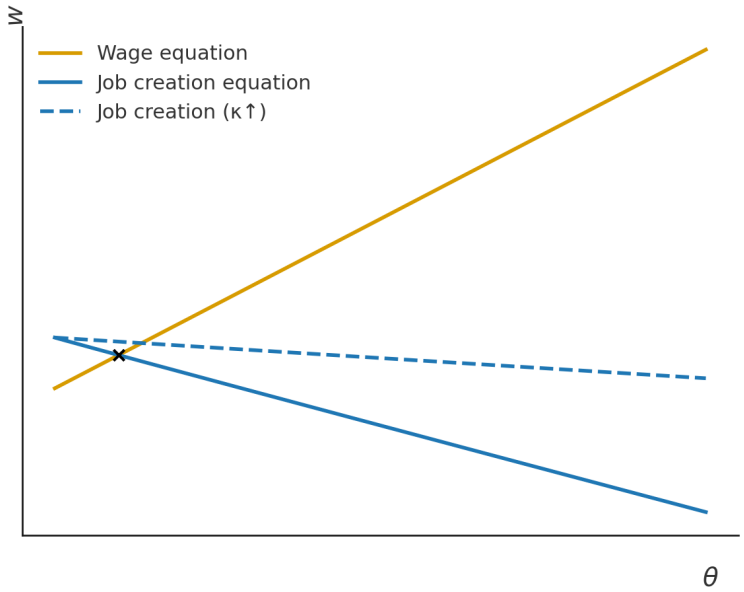


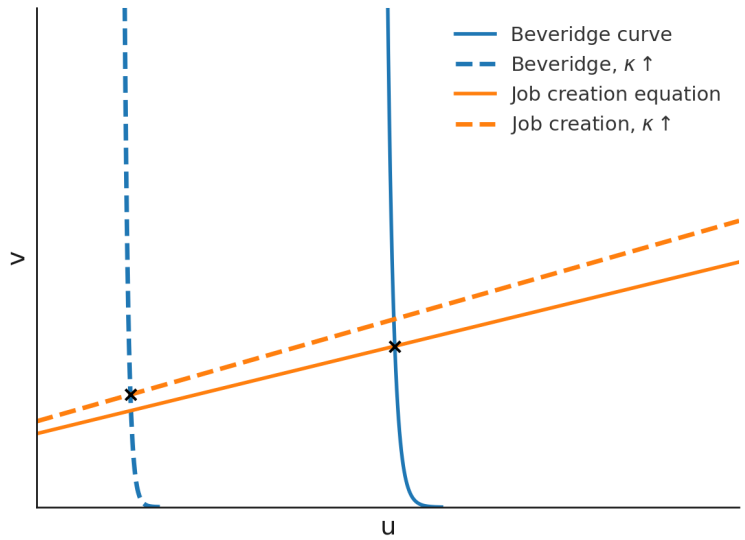
An increase in productivity



w and θ increase, and u decreases.

An increase in matching efficiency





w and θ increase, and u decreases.

(I used $mL = \kappa v^{0.5} u^{0.5}$)

Take-aways

Governments can lower equilibrium unemployment in two ways:

- By raising productivity
- By improving matching efficiency

Also, note that in this random search model agents do not internalize congestion externalities, so equilibrium not constrained efficient.

Are these conclusions robust to alternative modelling frameworks?

Main alternative is directed search (Wright et al. 2021)

- Firms post wages (e.g. Balgova et al. 2025)
- Agents choose which job to apply to (Abebe et al. 2021b, Belot et al 2022, Kiss et al. 2025)

- More realistic?

- Equilibrium is c. efficient, but can still increase employment by changing the matching function.

Roadmap

Stylised Facts

What determines the equilibrium level of employment?

Experimental Evidence on Frictions

Reading

What could determine the efficiency of matching?

- The cost of search?
- The ease with with firms and workers determine whether a match is a good match?

- There is descriptive evidence consistent both sets of constrains in LMICs.

1. The search for (formal) wage employment is costly and time consuming

Table 3: Job search behaviour and costs

Paper	Country	Proportion search-ing	Search costs among active jobseekers	Search hours
Abebe et al. (2021b)	Ethiopia	75% (past 6 months) 50% (past week)	16% of overall expenditure	-
Alfonsi et al. (2022)	Uganda	93%	40% of earnings[10]	-
Caria et al. (2023)	Jordan	43% of Syrian refugees 57% of Jordanians	38.4% of expenditure for Syrian refugees - 39.2% of expenditure for Jordanians	4.16 hours (past week) for Syrian refugees 5.79 hours (past week) for Jordanians
Carranza et al. (2022)	South Africa	97% (past week)	18.6% of earnings (past week) at endline	17 hours (past week)

From Caria, Orkin et al 2024

2. Widespread reliance on social networks likely to be a response to noisy match-quality information

Social networks are widely used by workers and firms to:

- gather information about vacancies;
- gather information about applicants.

In several labor markets, about half of jobseekers use social networks for either of these two purposes.

See Caria, Orkin et al 2024 for relevant references.

Abebe et al. 2021 present experimental evidence on both constraints

Abebe et al. 2021 experimentally evaluate two programs:

1. a **job application workshop**
2. a **transport treatment**

The hypothesis is that treated subjects will search more *intensely* and *effectively*, leading to improved employment outcomes.

Design

1. A sample of 3,000 young individuals.
   - Good variation in education level, gender, distance from the city centre, etc..

2. Two endline surveys (8 months and 4 years after treatment) and fortnightly phone calls for 1 year.
   - Key to explore mechanisms.

The **Job Application Workshop**

It involves two components:

1. **Orientation for effective job applications**:
   CVs, cover letters, interviews and use of the certificates
2. **Standardised tests**: cognitive, linguistic and mathematical ability and work sample test.

The cost of the intervention was 18.2 USD per person (excluding the cost of developing the tests).

The intervention was implemented by AA Commercial College.

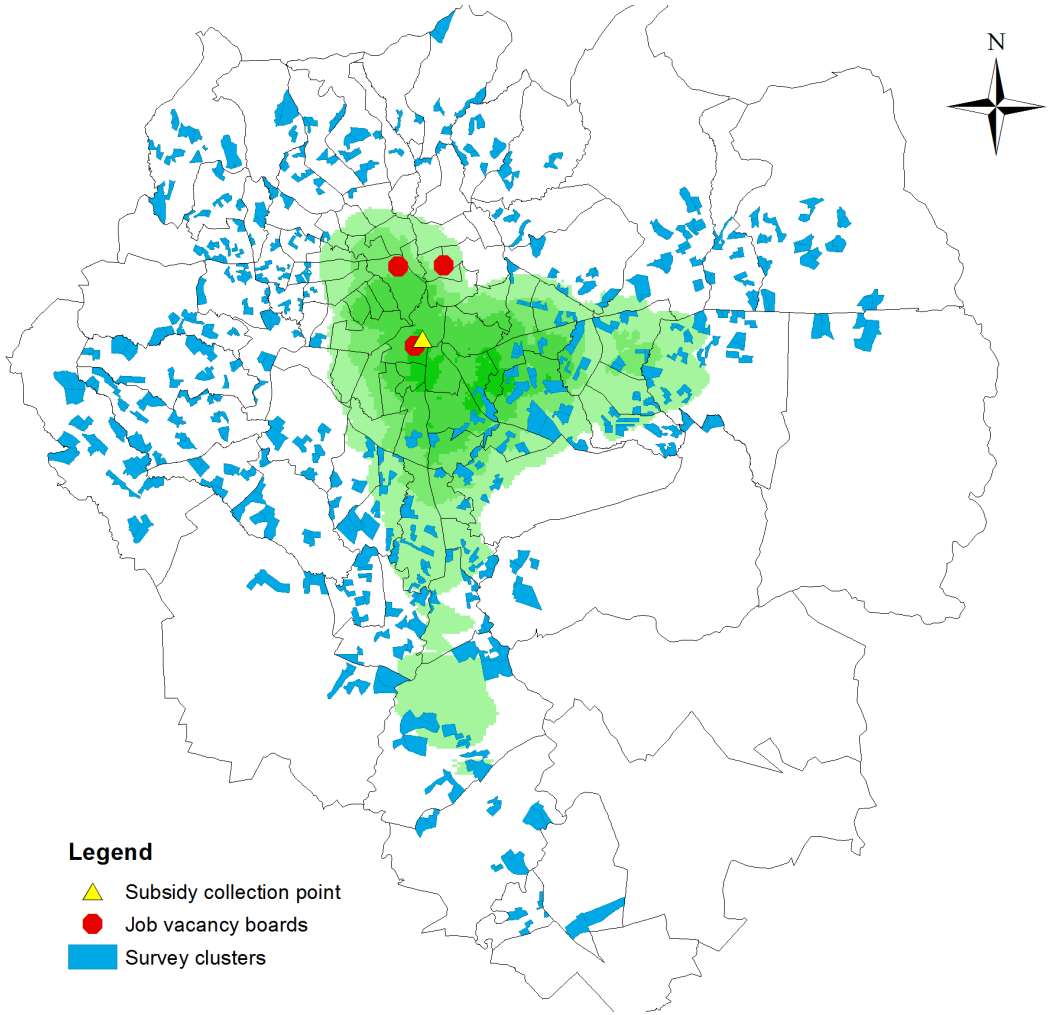
The **Transport Treatment**

- They offer a monetary reimbursement, available at a central location, 3 times per week, for an average of 16 weeks.

- Calibrated to cover the cost of a single return trip to the centre.
  - Median = $ 1 , Max = $ 1.50, Min = $ 0.75.

The cost of the intervention was 19.8 USD per person.

They randomize at the level of geographical clusters



Conceptual framework: finding a 'good' job

Consider a labour market characterised by two frictions:

- Firms are uncertain about worker productivity;
- Workers have to do costly search to be matched to a vacancy.

Workers match with one vacancy every period t and are offered a job with probability S.

Employment rates will thus evolve according to:

$$E_t = 1 - (1 - S)^t$$

Conceptual framework: hiring in the market for 'good' jobs

What determines the probability of being hired S?

$$y_{if} = x_{if} + \varepsilon_{if}$$
$$x_{if} \sim \mathcal{N}(0, 1)$$

x_{if} is match-quality, y_{if} is the signal observed by the firm, and $u(x)$ is the CARA objective function of the firm.

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$$
u(x) = -\exp(-rx)
$$

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Predictions: The Job Application Workshop

The firm will hire if and only if $y_{if} \geq 0.5r \cdot \sigma^2$.

The workshop will **decrease** σ^2 and thus increase hiring. This will:

1. Increase **permanent employment rates**;
2. Increase **expected match quality conditional on employment**, $\mathbb{E}(x_i \mid y_i > 0.5r\sigma^2)$.

Wages will also go up to reflect higher match quality, possibly with a delay.

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Predictions: the Transport Subsidy

The subsidy enables jobseekers to observe more vacancies.

This can be represented as 'speeding up time' by an amount α

$$E_t = 1 - (1 - S)^{\alpha t}$$

1. The subsidy will increase permanent employment rates;
2. but expected match quality will not change.

Predictions: the trajectory of the effects

Both treatments are effective for a limited period of time.

People in the control group continue to find job at the baseline rate and start catching up after the treatments stop.

This implies that:

1. Impacts on permanent employment rates will dissipate;
2. Impacts on match quality will persist: the jobs found by control group jobseeker have lower expected match quality than those of the workshop group.

Predictions: heterogeneity with respect to an observable covariate z

$$\begin{pmatrix} x_{if} \\ z_i \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right).$$

Conditional on x_{if} and z_i, the probability of hiring is:

$$\Phi\left(-0.5r \cdot \sigma + \frac{x_{if}}{\sigma} + \frac{\rho\sigma}{1-\rho^2} \cdot z \right).$$

This probability is decreasing in σ if and only if:

$$-0.5r - \frac{x_{if}}{\sigma^2} + \frac{\rho}{1-\rho^2} \cdot z < 0.$$

A reduction in noise is valued by applicants who have a **worse observable** (that is, lower z_i).

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Four predictions

1. Both intervention raise formal employment rates. This effect is transitory.

2. This result is obtained through different mechanisms: the subsidy leads to more search and the workshop to more effective search.

3. The workshop increases match quality and wages. The transport does not. This effect is permanent.

4. The workshop has strongest impacts for the most disadvantaged workers.

Estimation of impacts on endline job outcomes

Using baseline and endline face-to-face surveys, they estimate:

$$\begin{aligned} y_{ic} = \beta_0 &+ \beta_1 \cdot \texttt{transport}_{ic} + \beta_2 \cdot \texttt{workshop}_{ic} \\ &+ \gamma_1 \cdot \texttt{spillover1}_{ic} + \gamma_2 \cdot \texttt{spillover2}_{ic} \\ &+ \alpha \cdot y_{ic,pre} + \boldsymbol{\delta} \cdot \boldsymbol{x}_{ic0} + \mu_{ic} \end{aligned}$$

$\rightarrow$ They *correct standard errors* at the geographical cluster level.

$\rightarrow$They report false discovery rate q *values* for pre-specified families of outcomes (Benjamini et al., 2006).

Table: Employment outcomes

Outcome	2015			2018		
	Control mean (1)	Transport (2)	Workshop (3)	Control mean (4)	Transport (5)	Workshop (6)
Work	0.562	0.041 (0.029) [0.397]	0.021 (0.031) [0.666]	0.693	-0.063* (0.034) [0.305]	0.027 (0.031) [1.000]
Hours worked	26.18	0.268 (1.586) [0.946]	-0.254 (1.562) [1.000]	28.26	-2.636* (1.486) [0.305]	0.144 (1.404) [1.000]
Monthly earnings	1,145.0	4.8 (75.5) [0.946]	71.4 (83.9) [0.656]	1,533.7	27.1 (100.3) [0.715]	308.8** (123.4) [0.087]
Permanent job	0.171	0.029 (0.018) [0.392]	0.065*** (0.020) [0.008]	0.307	-0.038 (0.025) [0.305]	-0.011 (0.028) [1.000]
Formal job	0.224	0.054*** (0.019) [0.033]	0.051** (0.020) [0.029]	0.319	-0.006 (0.030) [0.715]	-0.006 (0.030) [1.000]
Job satisfaction	0.237	-0.001 (0.027) [0.946]	0.025 (0.027) [0.656]	0.574	-0.025 (0.036) [0.586]	0.069* (0.036) [0.159]

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Hours worked	26.18	0.268 (1.586) [0.946]	-0.254 (1.562) [1.000]	28.26	-2.636* (1.486) [0.305]	0.144 (1.404) [1.000]
Monthly earnings	1,145.0	4.8 (75.5) [0.946]	71.4 (83.9) [0.656]	1,533.7	27.1 (100.3) [0.715]	308.8** (123.4) [0.087]
Permanent job	0.171	0.029 (0.018) [0.392]	0.065*** (0.020) [0.008]	0.307	-0.038 (0.025) [0.305]	-0.011 (0.028) [1.000]
Formal job	0.224	0.054*** (0.019) [0.033]	0.051** (0.020) [0.029]	0.319	-0.006 (0.030) [0.715]	-0.006 (0.030) [1.000]
Job satisfaction	0.237	-0.001 (0.027) [0.946]	0.025 (0.027) [0.656]	0.574	-0.025 (0.036) [0.586]	0.069* (0.036) [0.159]

Table: Employment outcomes

	2015			2018		
Outcome	Control mean (1)	Transport (2)	Workshop (3)	Control mean (4)	Transport (5)	Workshop (6)
Work	0.562	0.041 (0.029) [0.397]	0.021 (0.031) [0.666]	0.693	-0.063* (0.034) [0.305]	0.027 (0.031) [1.000]
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What about predictions 2-4?

1. Both intervention raise permanent employment rates. This effect is transitory.

2. This result is obtained through different mechanisms: the subsidy leads to more search and the workshop to more effective search.

3. The workshop increases match quality and wages. The transport does not. This effect is permanent.

4. The workshop has strongest impacts for the most disadvantaged workers.

Prediction 2: we find impacts on search intensity and efficacy

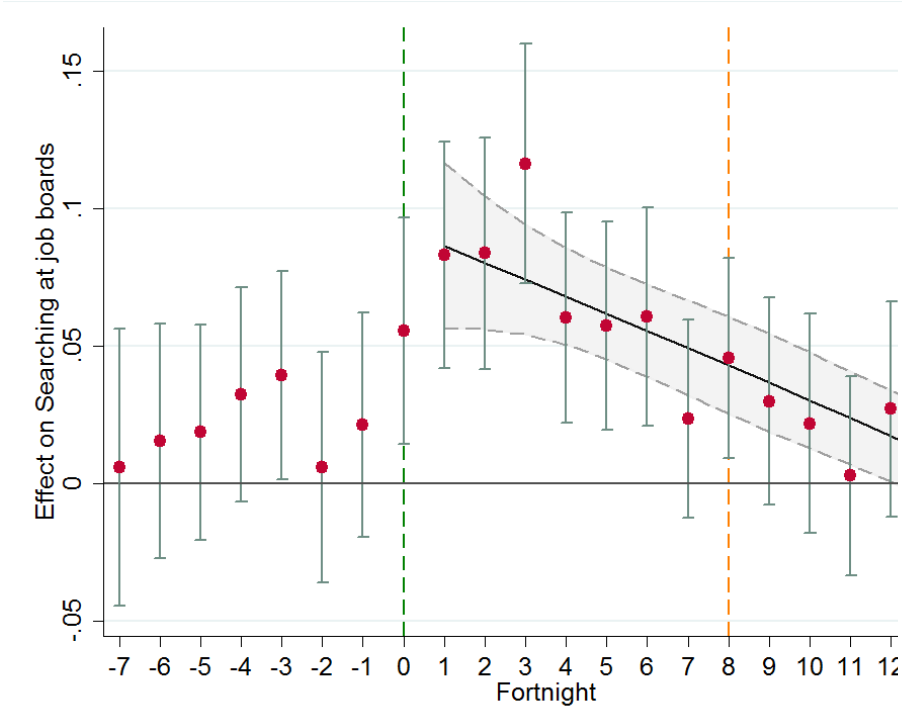
They find that treated individuals:

1. search more intensely (only for the transport)

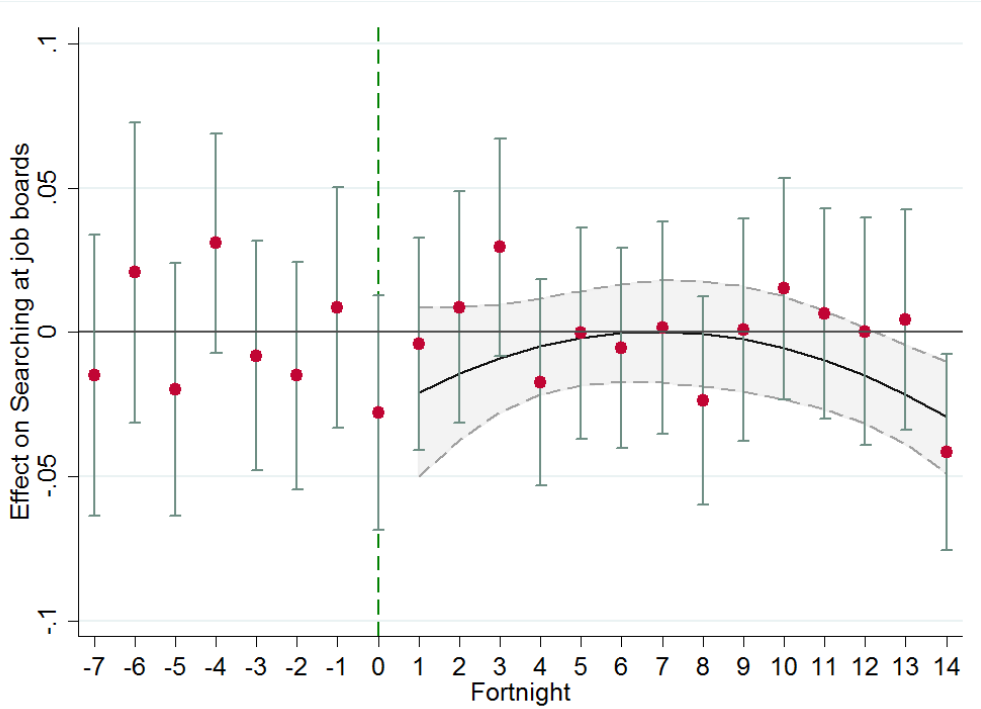
2. search more effectively

Also, evidence that effects of workshop are driven by higher return to skills.

Effects on **search at job boards**

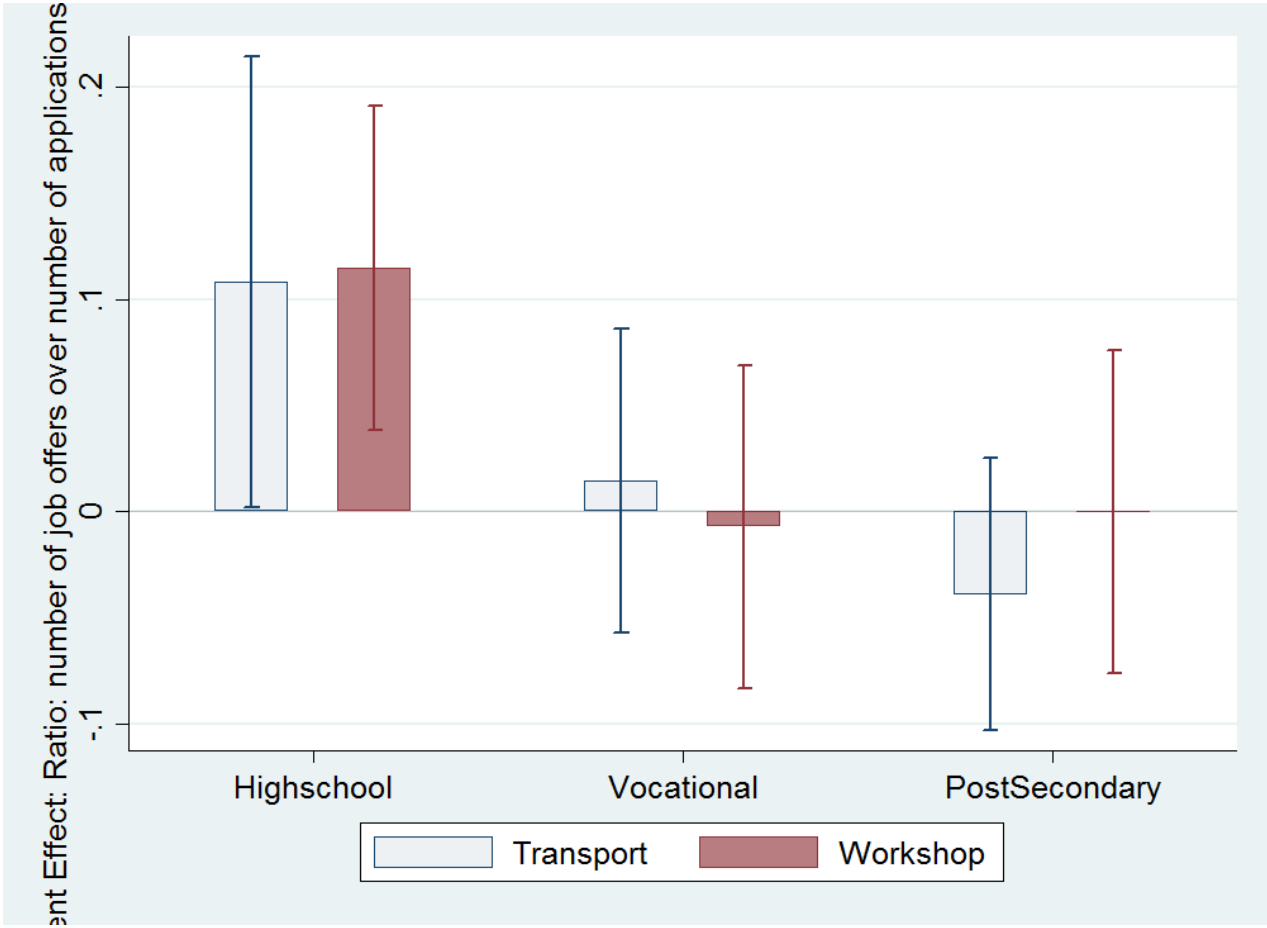


(a) Transport

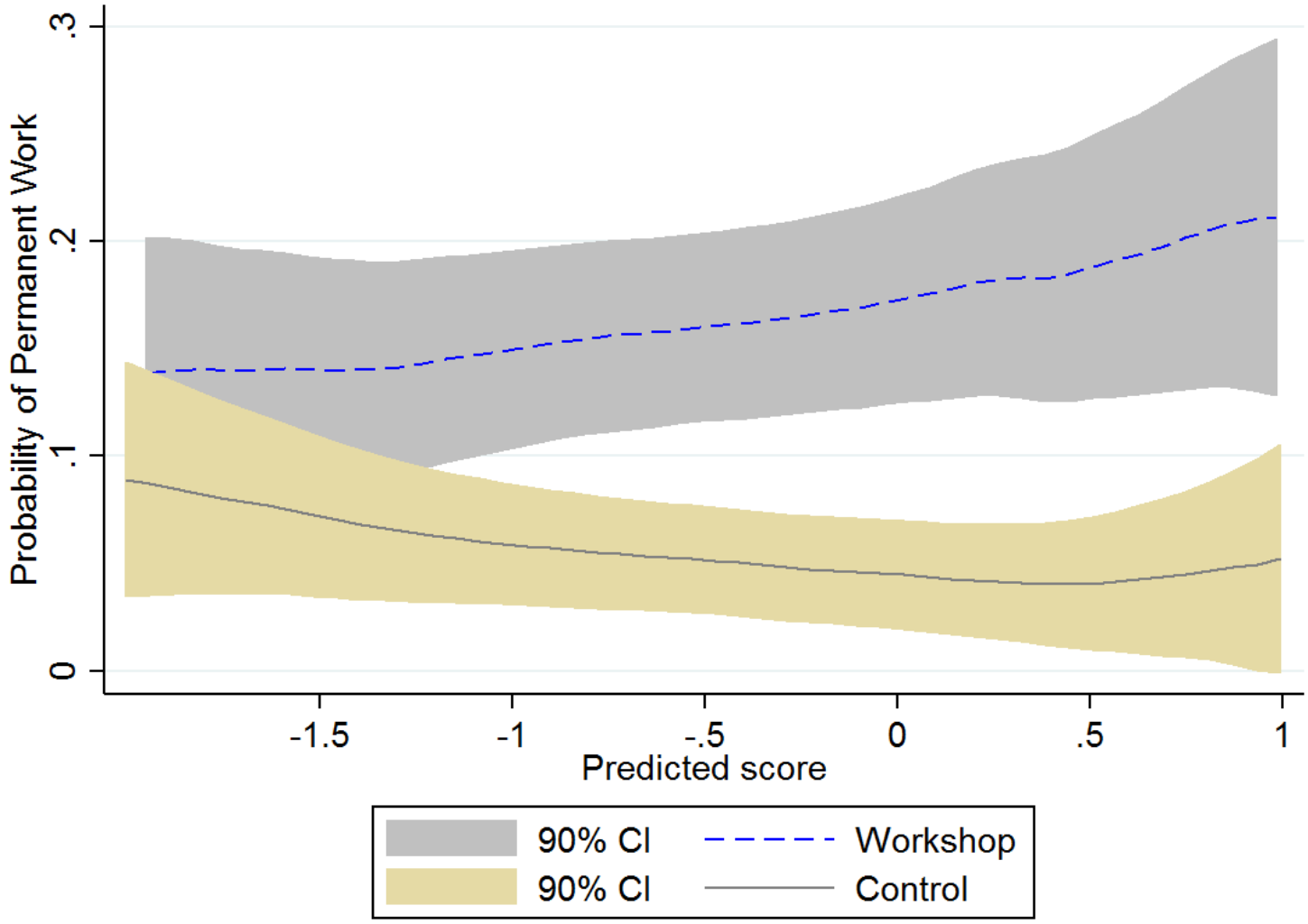


(b) Workshop

Endline effects on **search efficacy**: offers/applications



The workshop increases the returns to observable skills



Prediction 3: They find direct evidence of improved match quality

Outcome	Control mean	N	ITT Estimates Transport Coeff	ITT Estimates Workshop Coeff
Longest tenure (months)	11.845	1,739	0.294	1.197*
			(0.561)	(0.619)
Current job tenure (months)	21.326	1,383	0.199	-0.539
			(1.165)	(0.977)
Promoted in current job	0.190	1,383	0.022	0.006
			(0.025)	(0.023)
Uses skills in current job	0.323	2,016	0.032	0.082**
			(0.040)	(0.040)
Earnings conditional on working	2,209.3	1,383	195.0	370.4**
			(143.1)	(157.6)

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Prediction 4: The workshop benefits the most disadvantaged

	Covariate = 0			Covariate = 1		
Baseline covariate	Control mean	Trans.	Works.	Control mean	Trans.	Works.
Tertiary Ed.n	826.4	15.1 (124.4) [1.000]	470.9** (188.1) [0.034]	1,835.1	54.2 (159.9) [1.000]	37.3 (149.8) [0.993]
Male	1,181.9	-40.0 (110.0) [1.000]	132.1 (116.4) [0.087]	1,892.4	104.7 (179.3) [1.000]	475.5* (245.1) [0.363]
Active searcher	1,442.2	3.1 (132.7) [1.000]	351.9* (188.9) [0.050]	1,625.8	62.5 (160.0) [1.000]	235.5 (183.1) [0.663]
Ever perm. job	1,465.8	40.2 (104.7) [1.000]	356.5*** (136.7) [0.034]	1,975.7	-42.3 (367.8) [1.000]	-288.7 (350.3) [0.696]
Close to centre	1,468.8	41.8 (151.0) [1.000]	406.2** (196.9) [0.042]	1,606.3	52.2 (143.0) [1.000]	141.9 (150.3) [0.696]
Pred. earnings (above the median)	930.8	123.1 (115.5)	467.1*** (170.3)	2250.4	-226.4 (227.8)	-99.0 (224.1)

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$\rightarrow$ Overall, the results are consistent with a simple framework focused on two frictions:

1. uncertainty about skills;

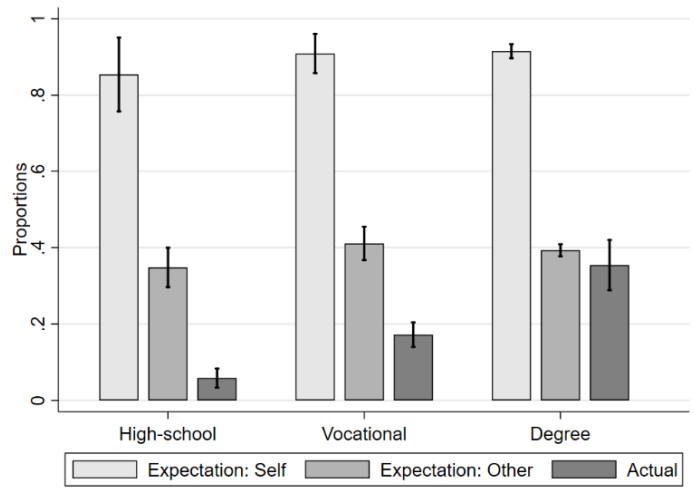
2. costly job search.

What are the implications of these findings for equilibrium employment?

What other frictions may reduce the efficiency of the matching function?

Abebe et al 2024 show evidence of worker overconfidence

Figure 7: **Jobseekers' expectations of finding a job with a permanent contract in the next 12 months**



Note: 'Expectation: Self' refers to jobseekers' stated probabilities that they will be employed with a permanent contract in the next 12 months, as measured in our 2019 follow-up survey. 'Expectation: Other' refers to jobseekers' stated probabilities that others like them will be employed with a permanent contract in the next 12 months, as measured in our 2019 follow-up survey. 'Actual' refers to the actual proportion of jobseekers who found a job with a permanent contract, using our original survey data.

... but also of employer misperceptions

Appendix Figure B.2: **Distribution of employer beliefs by education**

PANEL A: BELIEFS ABOUT THE AVERAGE RAVEN'S TEST SCORE (LEFT: HIGH SCHOOL; RIGHT: TERTIARY)

Other papers with similar findings on the worker side:

- Banjeree and Sequiera
- Bassi et al
- Kiss et al.
- Alfonsi and Spaziani
- Chakravoty et al.

Roadmap

Stylised Facts

What determines the equilibrium level of employment?

Experimental Evidence on Frictions

Reading

(*) Pissarides, Christopher A. Equilibrium unemployment theory. MIT press, 2000.
Only Chapter 1

(*) Abebe et al. 2021 Anonymity or distance? Job search and labour market exclusion in a growing African city. The Review of Economic Studies 88, no. 3 (2021): 1279-1310.

Bandiera et al. (2022). Economic Development and the Organisation Of Labour: Evidence from the Jobs of the World Project. Journal of the European Economic Association 20, no. 6 (2022): 2226-2270.