

# Do returns to schooling and on-the-job training for informal workers differ from formal workers in Indonesia?

Data Avicenna<sup>1</sup>    Gamilang Sahadewo<sup>2</sup>

<sup>1</sup>Research School of Economics, Australian National University (ANU), Australia

<sup>2</sup>Department of Economics, Universitas Gadjah Mada (UGM), Indonesia

AASLE 2024 Conference  
December 13, 2024

# Outline

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# Introduction

## Motivation: The Informal Labor Market

- The informal sector and informal employment remain a sizable and growing feature of the economies of developing countries (Cuevas, Mina, Barcenas, & Rosario, 2009).
- Informal workers are well exposed to economic insecurity or vulnerability as well as poverty (OECD & ILO, 2019).
- 61.2% of the employed population in the world make a living through the informal economy (ILO, 2018). Emerging and developing countries account for 93% of global informal employment (ILO, 2018).

# Human Capital Theory

- Individuals contribute a distinctive set of abilities and obtained skills (human capital), to the labor market (Mincer, 1958).
- Workers with higher skills and education typically earn higher wages (Blundell, Dearden, Meghir, & Sianesi, 1999).
- Education and training are the main sources of human capital investments that contribute to a large increase in earnings (Becker, 1993).

# Objective

This study...

aims to estimate the differences in the returns to schooling and on-the-job training between informal and formal workers.

- Study context: Developing country - Indonesia
- In some settings, individuals may regard formal employment as a more inferior option and instead engage in self-employment activities to pursue higher returns (Park and Qu, 2013).
  - Potential substantial returns to human capital investments for informal workers (Vivatsurakit and Vechbanyongratana, 2020).
- Labor market segmentation: When there is a difference in returns, potential opportunities for workers to move to the opposing group with higher returns (Park and Qu, 2013).

# Informal Labor Market in Indonesia

- Informal workers in Indonesia are an integral part of the labor force, contributing to 61 to 70% of the labor force (Rothenberg et al., 2016).
- The informal sector makes a substantial contribution to Indonesia's economy in terms of employment by offering economic opportunities to workers who have been displaced from or are unable to be absorbed by the formal sector (Cuevas et al., 2009).



# Contribution

- Expands literature on wage returns to human capital investments in informal labor markets.
- The literature mostly compares the returns to schooling between informal and formal workers (Vivatsurakit and Vechbanyongratana, 2020; Park and Qu, 2013; Kuepie, Nordman, and Roubaud, 2009; Zamo-Akono and Nanfosso, 2013) as opposed to on-the-job training.
- This study contributes to the literature by also exploring the difference in the returns to on-the-job training between informal and formal workers.

# Data and Method

# Data: Indonesian Family Life Survey

- Data source: Indonesian Family Life Survey (IFLS) waves 4 & 5 (2007-2008 and 2014-2015)
- Covers 13 Indonesian provinces, representing 83% of the population.
- Sample: Individuals aged 15 and above, reporting schooling, as well as wages and training in their current primary job.
- Panel data of 4,722 individuals (9,444 observations)

## Data: Informal Worker Definition

- Workers with informal jobs.
  - Jobs that are not subject to national labor legislation, income taxation, social protection, or privilege to specific employment benefits.
  - Preferably workers with no pension schemes.
- Follows OECD and ILO (2019) and the International Conference of Labour Statisticians (ICLS) in 2003.
- Opens up the possibility of classifying workers with informal jobs in the formal sector as informal workers (Chen, 2012).

# Empirical strategy: Extended Mincer Equation

- **Extended Mincer equation:**

$$\log(w)_{it} = \alpha + \beta_1 S_{it} + \beta_2 T_{it} + \beta_3 Inf_{it} \\ + \beta_4 S \cdot Inf_{it} + \beta_5 T \cdot Inf_{it} + \delta X_{it} + \tau \hat{Y}_{it} + \eta_i + u_{it}$$

- Wage ( $w$ ), schooling ( $S$ ), on-the-job training ( $T$ ), informal status ( $Inf$ ), a vector of control variables ( $X$ ), selectivity correction term ( $\hat{Y}_{it}$ ), unobserved time-invariant factors ( $\eta_i$ ), unobserved time-variant factors ( $u_{it}$ ).
- **Main variables of interest:** Interaction between  $S$  and  $Inf$  ( $\beta_4$ ), and  $T$  and  $Inf$  ( $\beta_5$ )
- $\hat{Y}_{it}$ : predicts the probability of selection into informal employment from observed individual characteristics using a logit regression.

## Empirical strategy: Ability bias

- Unobserved time-invariant factors ( $\eta_i$ ): ability, motivation.
  - Estimates are biased if ability is correlated with schooling and on-the-job training.
- **Uses entity fixed effects on the panel data to eliminate  $\eta_i$ .**

# Empirical strategy: Control variables

## Vector of control variables ( $X$ ):

- **Individual characteristics:**

Experience and experience squared, tenure and tenure squared, approximate hours of work per week, a set of dummies indicating the type of attended secondary education—general (SMA), vocational (SMK), and Islamic (MA) schools—, a dummy for marital status, a set of dummies for employment categories.

- **Household characteristics:**

Household size, number of dependents in a household, a dummy for urban place of residence.

- **Other:**

District fixed-effects, year fixed-effects, and district-by-year fixed-effects.

# Results

# OLS and Fixed Effects Estimates

	Dependent variable: log(wage)	
	(1) OLS	(2) Fixed Effects
Years of schooling	0.072*** (0.012)	0.110*** (0.028)
1 if informal	-0.119 (0.082)	-0.013 (0.134)
1 if informal * years of schooling	-0.032*** (0.007)	-0.015 (0.011)
1 if received on-the-job training	0.154*** (0.028)	0.089*** (0.033)
1 if informal * 1 if received on-the-job training	-0.001 (0.038)	-0.003 (0.043)
Predicted probability of selection into informal employment	-0.385** (0.162)	0.120 (0.254)
Constant	11.242*** (0.302)	6.761*** (0.734)
Observations	9,444	9,444
R-squared/Overall R-squared	0.549	0.109
Within R-squared	—	0.574
Between R-squared	—	0.064
Control covariates	Yes	Yes
District, year, district-by-year fixed effects	Yes	Yes

Robust standard errors clustered at the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.  
Control covariates are not shown in the table for brevity. Source: IFLS wave 4 and 5, Authors' Estimation.

- **Main finding:** After applying fixed effects, the returns to schooling and on-the-job training are not different between informal and formal workers.

# OLS and Fixed Effects Estimates

Possible explanations:

- **Returns to schooling:** Although informal workers have lower education on average, they can reap substantial returns to an additional year of schooling.
  - Additional investments in human capital do not necessarily translate to higher earnings for labor markets that are dominated by agriculture and low skilled work (Vivatsurakit and Vechbanyongratana, 2020).
  - Wage could be compensated through channels other than education.

# OLS and Fixed Effects Estimates

Possible explanations:

- **Returns to on-the-job training:** Formal workers as characterized by higher education participate in training to maintain their human capital instead of amplifying it.
  - Investments in training for those with higher education can take on forms other than higher wages (Fouarge, Schils, & de Grip, 2013).
  - Thus, informal workers are able to reap just about the same returns to on-the-job training as formal workers.

# Possible Mechanism

	Dependent variables	
	(1) Experience	(2) Hours of work
Years of schooling	-1.041*** (0.015)	-0.000*** (0.000)
1 if informal	-0.237*** (0.068)	0.000*** (0.000)
1 if informal * years of schooling	0.021*** (0.007)	-0.000*** (0.000)
1 if received on-the-job training	0.007 (0.045)	-0.000 (0.000)
1 if informal * 1 if received on-the-job training	-0.037 (0.048)	0.000 (0.000)
Predicted probability of selection into informal employment	-0.503** (0.201)	0.000 (0.000)
Constant	28.074*** (0.362)	-0.000 (0.000)
Observations	9,444	9,444
R-squared/Overall R-squared	0.302	1.000
Within R-squared	0.989	1.000
Between R-squared	0.248	1.000
Control covariates	Yes	Yes
District, year, district-by-year fixed effects	Yes	Yes

Robust standard errors clustered at the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Control covariates are not shown in the table for brevity. Source: IFLS wave 4 and 5, Authors' Estimation.

- For an additional year of schooling, informal workers obtain slightly higher working experience than formal workers, and the effect is statistically significant.
- Hours of work for an additional year of schooling and training do not differ between informal and formal workers.

## Possible Mechanism

- The wages of informal workers are compensated by the gain in working experience for each additional year of schooling.
- Experience is more valued in informal work.
- Thus, informal workers are able to reap just about the same returns to schooling as formal workers.

## Additional Analysis: Sector-Based Categorization

	Dependent variable: log(wage)	
	(1) OLS	(2) Fixed Effects
Years of schooling	0.045*** (0.009)	0.100*** (0.027)
1 if informal	-0.099 (0.084)	-0.145 (0.102)
1 if informal * years of schooling	-0.019*** (0.007)	-0.021** (0.009)
1 if received on-the-job training	0.211*** (0.021)	0.088*** (0.024)
1 if informal * 1 if received on-the-job training	0 (0)	0 (0)
Predicted probability of selection into informal employment	-0.687*** (0.152)	0.005 (0.252)
Constant	11.276*** (0.257)	7.105*** (0.719)
Observations	9,444	9,444
R-squared/Overall R-squared	0.527	0.109
Within R-squared	—	0.574
Between R-squared	—	0.064
Control covariates	Yes	Yes
District, year, district-by-year fixed effects	Yes	Yes

Robust standard errors clustered at the individual level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Control covariates are not shown in the table for brevity. Source: IFLS wave 4 and 5, Authors' Estimation.

- Informal sector workers (self-employed and casual workers) have significantly lower returns to schooling by 2.1 percentage points compared to formal sector workers (private and government workers).
- Drawback: Cannot estimate the difference in returns to on-the-job training.

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# Conclusion

# Conclusion

- The returns to schooling and on-the-job training between informal and formal workers are not different.
  - No indication of labour market segmentation.
- Wage compensation for additional years of schooling is also substantial in informal work.
  - Experience is a potential channel.
- Informal workers are able to reap just about the same returns to on-the-job training.
  - Formal workers pursue on-the-job training to preserve their human capital rather than amplify it.
- Gap in the returns to schooling between informal and formal sector workers.
  - The informal sector is still more inferior than the formal sector in terms of valuing education in wages.

## Limitations and Next Steps

- The findings are unable to infer causation.
  - Entity fixed effects is unable to control for unobservable characteristics that are time-variant (Hill, Davis, Roos, & French, 2020).
- Key variables that change over time with little variation, and having a panel dataset with limited time periods, may lead to less reliable fixed effects estimates.
- Lifetime participation in on-the-job training is not captured in IFLS. Cannot take into account investments in training from past jobs.
- Next steps:
  - Explore other possible channels.
  - Use other definitions of informal employment for robustness check.

## Acknowledgements

I would like to thank:



lembaga pengelola dana pendidikan

The Indonesian Endowment Fund for Education (LPDP) for funding my master's program at The Australian National University.



**STUDENT EXTRACURRICULAR  
ENRICHMENT FUND**

The Australian National University's SEEF for additional financial support for my participation in this conference.

# Thank You

[data.avicenna@anu.edu.au](mailto:data.avicenna@anu.edu.au)

# References

-  Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education* (3rd ed.). University of Chicago Press.
-  Blundell, R., Dearden, L., Meghir, C., & Sianesi, B. (1999). Human Capital Investment: The Returns from Education and Training to the Individual, the Firm and the Economy. *Fiscal Studies*, 20(1), 1–23. <https://doi.org/10.1111/j.1475-5890.1999.tb00001.x>
-  Chen, M. A. (2012). The Informal Economy: Definitions, Theories and Policies. In *WIEGO Working Paper No. 1*.
-  Cuevas, S., Mina, C., Barcenas, M., & Rosario, A. (2009). Informal Employment in Indonesia. *ADB Economics Working Paper Series No. 156*.
-  Fouarge, D., Schils, T., & de Grip, A. (2013). Why do low-educated workers invest less in further training? *Applied Economics*, 45(18), 2587–2601. <https://doi.org/10.1080/00036846.2012.671926>
-  Hill, T. D., Davis, A. P., Roos, J. M., & French, M. T. (2020). Limitations of Fixed-Effects Models for Panel Data. *Sociological Perspectives*, 63(3), 357–369. <https://doi.org/10.1177/0731121419863785>
-  International Labour Organization. (2018). Women and Men in the Informal Economy: A Statistical Picture.
-  Kuepie, M., Nordman, C. J., & Roubaud, F. (2009). Education and earnings in urban West Africa. *Journal of Comparative Economics*, 37(3), 491–515. <https://doi.org/10.1016/j.jce.2008.09.007>
-  Mincer, J. (1958). Investment in Human Capital and Personal Income Distribution. *Journal of Political Economy*, 66(4), 281–302.
-  OECD, & ILO. (2019). Tackling Vulnerability in the Informal Economy. OECD. <https://doi.org/10.1787/939B7BCD-EN>

# References

-  Park, A., & Qu, X. (2013). Informality, Returns to Education, and Labour Market Integration in China. *The Indian Journal of Labour Economics*, 56(4).
-  Rothenberg, A. D., Gaduh, A., Burger, N. E., Chazali, C., Tjandraningsih, I., Radikun, R., & Weilant, S. (2016). Rethinking Indonesia's Informal Sector. *World Development*, 80, 96–113.  
<https://doi.org/10.1016/j.worlddev.2015.11.005>
-  Vivatsurakit, T., & Vechbanyongratana, J. (2020). Returns to education among the informally employed in Thailand. *Asian-Pacific Economic Literature*, 34(1), 26–43. <https://doi.org/10.1111/apel.12284>
-  Warunsiri, S., & McNown, R. (2010). The Returns to Education in Thailand: A Pseudo-Panel Approach. *World Development*, 38(11), 1616–1625. <https://doi.org/10.1016/j.worlddev.2010.03.002>
-  Zamo-Akono, C., & Nanfosso, R. T. (2013). Private Returns to Education in Urban Cameroon. *Business and Economic Research*, 3(2). <https://doi.org/10.5296/ber.v3i2.3679>

# Appendix

## Descriptive Statistics for Informal and Formal Workers:

	<b>Formal</b>	<b>Informal</b>	<b>Total</b>
N	2057.00 (21.78%)	7387.00 (78.22%)	9444.00 (100.00%)
Wage	2.84e+06 (2.60e+06)	1.26e+06 (2.25e+06)	1.60e+06 (2.42e+06)
Years of education	13.39 (3.00)	9.48 (4.05)	10.33 (4.17)
Training	0.64 (0.48)	0.17 (0.38)	0.27 (0.45)
Experience	20.02 (9.30)	19.13 (12.24)	19.33 (11.67)
Tenure	167.64 (113.06)	85.75 (92.63)	103.59 (103.13)
Hours of work	40.91 (14.10)	44.40 (20.43)	43.64 (19.29)
Household size	4.25 (1.59)	4.20 (1.87)	4.21 (1.82)
N of dependents	3.48 (2.24)	3.39 (2.41)	3.41 (2.38)
Urban	0.72 (0.45)	0.67 (0.47)	0.68 (0.47)
Married	0.91 (0.28)	0.78 (0.42)	0.81 (0.40)

Note: Standard deviations reported in parentheses.

# Appendix

## Descriptive Statistics for Informal and Formal Workers (Continued):

	Formal	Informal	Total
N	2057.00 (21.78%)	7387.00 (78.22%)	9444.00 (100.00%)
Self-employed	0.01 (0.07)	0.05 (0.23)	0.04 (0.20)
Self-employed with unpaid/temporary worker	0.01 (0.08)	0.05 (0.22)	0.04 (0.20)
Self-employed with permanent worker	0.00 (0.04)	0.01 (0.09)	0.01 (0.08)
Government worker	0.61 (0.49)	0.07 (0.25)	0.18 (0.39)
Private worker	0.38 (0.49)	0.63 (0.48)	0.57 (0.49)
Casual worker in agriculture	0.00 (0.02)	0.05 (0.22)	0.04 (0.20)
Casual worker not in agriculture	0.00 (0.04)	0.15 (0.35)	0.11 (0.32)

Note: Standard deviations reported in parentheses.

# Appendix

## Descriptive Statistics for Informal and Formal Sector Workers:

	<b>Formal</b>	<b>Informal</b>	<b>Total</b>
N	7140.00 (75.60%)	2304.00 (24.40%)	9444.00 (100.00%)
Wage	1.70e+06 (2.02e+06)	1.31e+06 (3.35e+06)	1.60e+06 (2.42e+06)
Years of education	11.13 (3.93)	7.85 (3.93)	10.33 (4.17)
Training	0.36 (0.48)	0.00 (0.00)	0.27 (0.45)
Experience	17.80 (10.60)	24.06 (13.44)	19.33 (11.67)
Tenure	106.22 (100.63)	95.45 (110.14)	103.59 (103.13)
Hours of work	43.87 (17.45)	42.92 (24.09)	43.64 (19.29)
Household size	4.20 (1.80)	4.25 (1.85)	4.21 (1.82)
N of dependents	3.39 (2.38)	3.47 (2.37)	3.41 (2.38)
Urban	0.72 (0.45)	0.57 (0.49)	0.68 (0.47)
Married	0.80 (0.40)	0.81 (0.39)	0.81 (0.39)

Note: Standard deviations reported in parentheses.

# Appendix

## Descriptive Statistics for Informal and Formal Sector Workers (Continued):

	Formal	Informal	Total
N	7140.00 (75.60%)	2304.00 (24.40%)	9444.00 (100.00%)
Self-employed	0.00 (0.00)	0.18 (0.38)	0.04 (0.20)
Self-employed with unpaid/temporary worker	0.00 (0.00)	0.16 (0.37)	0.04 (0.20)
Self-employed with permanent worker	0.00 (0.00)	0.03 (0.16)	0.01 (0.08)
Government worker	0.24 (0.43)	0.00 (0.00)	0.18 (0.39)
Private worker	0.76 (0.43)	0.00 (0.00)	0.57 (0.49)
Casual worker in agriculture	0.00 (0.00)	0.16 (0.37)	0.04 (0.20)
Casual worker not in agriculture	0.00 (0.00)	0.47 (0.50)	0.11 (0.32)

Note: Standard deviations reported in parentheses.