Employment Mobility in East Java During the COVID-19 Pandemic

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Abstract

The study examines the mobility of workers between the formal and informal sectors in East Java, Indonesia. The potential mobilities of workers are examined, not only from the formal to informal sector and from informal to formal sector, but also the movement of new entrants (who do not have a job in the past) to the formal-informal sector jobs. Using the 2021 National Labor Force Survey (SAKERNAS), the study contributes to the literature by examining the mobilities in the case of developing countries during an economic downturn during the COVID-19 pandemic. The study is essential in supporting the policies in the region with the existence of a large informal sector in the labor market. Using probit regression, the study found that workers who have previously worked in the formal sector are more likely to enter (re-enter) formal sector employment when the economy starts recovering in 2021. In contrast, workers previously employed in the informal sector have a lower probability of moving to the formal sector. The study continues examining the implications of the different income levels of formal and informal sector workers. The results using Heckman's bias correction selection show that new entrants (workers who have no job previously or freshly graduated) earn more earnings than workers who have previously been employed in the formal-informal sector. One possible reason is the role of digitalization and working-from-home activities that might support, particularly young educated people, to work productively during the pandemic.

Keywords

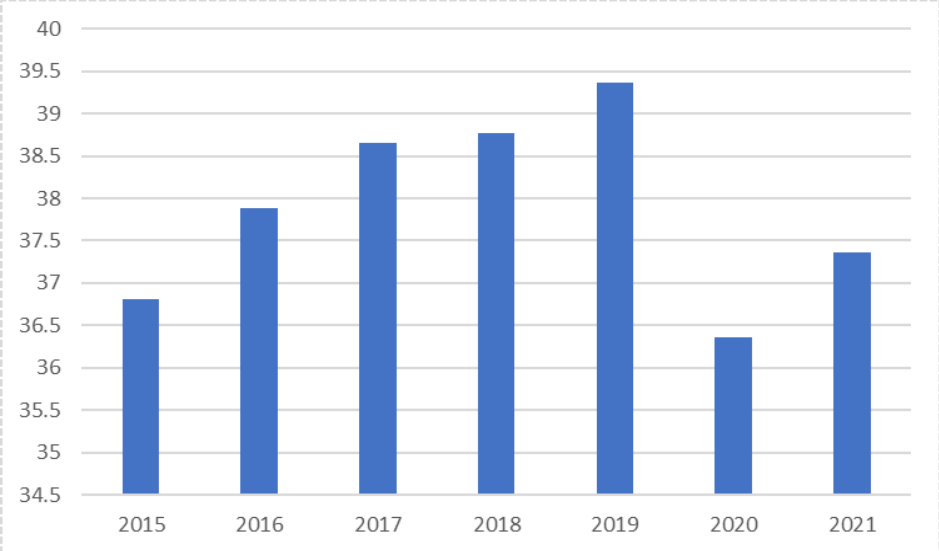
COVID-19; employment; formal sector; income; informal sector

Introduction

The dualistic employment structure of the formal-informal sector is widely confirmed in the cases of developing countries. Several developing countries considered the structural transformation by shifting away from highly informal employment, with lower labor productivity, towards formal sector employment, for example, the International Labour Organization (2021) concerning Vietnam. Cunningham and Bustos Salvagno (2011) also showed that in Latin American countries, young people, remarkably, follow a trend over their life cycle: entering the informal sector for the first time, moving to a formal position for longer spells, and finally becoming self-employed. The structural change of employment from the informal to the formal sector has contributed significantly to economic growth (see Brandt. et al., 2008 for an example of China). With more formal sector employment, this growing productive economy is usually supported by more skill-intensive, human-capital-intensive, and capital-intensive manufacturing and services (Chang, 2007).

East Java, the second largest province in Indonesia, is an excellent place to observe the underlying structural transformation in developing countries. Since the second decade of the 2000s, the economy of East Java has consistently shown a formalization in employment. At the same time, the other provinces in Java, such as West Java or Central Java, tend to fluctuate during the period of study (https://www.bps.go.id/indicator/6/1168/1/persentase-tenaga-kerja-formal-menurut-provinsi.html). Figure 1 shows that formal sector employment grew from 36% in 2015 to almost 40% in 2019, a year before the COVID-19 pandemic. Although the increase was relatively slow, it shows a steady rise from year to year. The formal sector employment in East Java is dominated by workers employed in manufacturing and trade, while the informal sector is more likely concentrated in agriculture and small business. Some home business commonly found in East Java, such as making handicrafts, furniture, leather and shoe crafts, weaving, and many more, is also categorized as informal sectors (Habsari et al., 2022; Hartutik, 2021).

Figure 1: Formal Sector Employment in East Java (%), 2015–2021



Note: Statistics Jawa Timur (2022)

Unfortunately, the spread of COVID-19 became a setback to the Indonesian labor market, including East Java. During the pandemic, the employment conditions experienced turmoil, which resulted in most of the workforce losing their jobs and sources of income. These employees were shifting toward various economic activities that could substitute income for the lost wages they should have received from their previous jobs. The informal sector then became an absorber of employment affected by the economic downturn during the pandemic. Figure 1 shows the decrease in formal sector employment, particularly since 2020 during the pandemic in East Java. Due to the pandemic, on the other side, the informal sector grew from 60.6% in 2019 to 63.6% in 2020 and 62.6% in 2021. The proportion of formal sector jobs in East Java returned a similar share 5–6 years before the pandemic hit.

The objective of the study was to observe empirically the labor market mobility between formal and informal sectors in East Java during the COVID-19 pandemic. The potential mobilities of workers were examined, i.e., mobilities of workers from formal to informal sector, from informal to formal sector, and also the movement of new entrants (who did not have a job in the past) to the formal and informal sectors. Research by Feridhanusetyawan and Gaduh (2000) showed that the Indonesian labor market was relatively flexible in supporting labor mobility from the formal sector to the informal sector, as demonstrated by the role of the informal sector as a "safety valve" during the Asian Financial Crisis in the mid-1990s. In other words, if there was some decline in formal sector employment, it was predicted that workers were likely to move back to the informal sector rather than become unemployed, given limited unemployment benefits from the government.

Previous studies discuss employment mobilities, particularly from the informal to the formal sector, in industrializing developing country cases (McCaig & Pavcnik, 2015 in Vietnam and Pratomo & Manning, 2022 in Indonesia). The study, therefore, contributes to the literature by examining employment mobility in developing countries during the COVID-19 pandemic. Only a few studies examined the employment transition in the formal and informal sectors in developing countries during economic shocks (for exceptions, see Silva et al., 2021; Webb et al., 2020). The analysis of the two-sector model was relevant as a background theory for Indonesia and generally developing countries, given a substantial proportion of workers in the informal sector, providing a complete picture of the labor market.

The study is essential for the policymakers in the case of economic shocks in developing countries, suggesting a need for a policy that is designed to improve the standard of living (or welfare) of workers, particularly in the informal sector, given the potential significant employment mobilities from formal to informal sectors. The informal sector employment usually does not benefit enough from job security, health insurance, and other benefits (Pratomo, 2010). The labor absorption capacity for informal sector employment is also limited, suggesting a potential earnings reduction when the informal sector employment is plenty.

This study then examines the implication of these mobilities in both formal and informal sector earnings. Although we might expect employment mobility from the formal to the informal sector during the pandemic, we predict that workers who experience working in formal sectors receive the highest earnings compared to the others (Naidoo et al., 2015). Naidoo et al. also mentioned that the longer individuals experience working in the informal sector, the more likely they will earn less than individuals with similar qualifications who experience working in the formal sector, suggesting a potential scarring effect of the informal sector. Using Heckman's biased correction model, this study contributes to the literature by employing selection-biased corrections for a possible selection bias from a non-random sample. Regarding earnings of the

formal-informal sector, individuals selected in the sample might set themselves (self-selection) into the formal or informal sector where they prefer.

Materials and methods

The study used individual micro-level data from the 2021 National Labor Force Survey (SAKERNAS). The year 2021 was chosen because the economy started to grow positively in employment with more potential transition and mobilities, compared to 2020, characterized by several lockdowns and restricted activities at the beginning of the COVID-19 pandemic (Muzakki, 2020). The SAKERNAS is a labor force survey conducted by Statistics Indonesia (Badan Pusat Statistik [BPS]) at the national level, including some sociodemographic, education, and employment information the study needs. The SAKERNAS 2021 collected important questions for job mobility that were available from SAKERNAS, including (a) whether individuals stopped working in the past year; (b) before individuals stopped working, what was their employment status and industries; and (c) whether individuals ever had a job before (for defining the new entrants). Focusing on the labor force in East Java, the total number of respondents was 75,068 observations. Sampling weights were included in all descriptives and regressions to account for individuals having a different probability of being sampled. Table 1 contains summary statistics for both dependent and independent variables.

The labor market mobilities in East Java were estimated using a probit model. The dependent variable was a dummy consisting of two categories: the workers (1) employed in the formal sector and (2) employed in the informal sectors. The main independent variable, represented by a dummy variable, was whether workers a year ago were (a) employed in the formal sector, (b) employed in the informal sector, and (c) new entrants (who did not have a job in the past). New entrants in the model work as a reference/omitted category. Mobility exists between formal and informal sectors and between workers previously employed in the formal (informal) sector and re-entering the formal (informal) sector again.

The hypothesizes of the study was that:

H1: workers employed in the formal sector will move to the informal sector due to the COVID-19 pandemic, while on the other side, workers employed in the informal sector will have difficulties moving to the formal sector.

In general, the equations used in this study can be written as follows:

$$ln\left[\frac{\pi(x)}{1-\pi(x)}\right] = \alpha_0 + \alpha_1 workers\ previously\ employed\ in\ the\ Formal\ Sector_i + \alpha_2\ workers\ previously\ employed\ in\ the\ Informal\ Sectori + \psi X_i + \varepsilon_i$$

Where π(x) was the probability for formal or informal sector employment in 2021, the main independent variable, represented by a dummy variable, was whether workers a year ago were employed in the formal sector, (b) employed in the informal sector. The coefficient vector (ψ) on the variable X acted as a control variable that includes several individual and household characteristics, including age (and age squared), marital status, area of residence, which was divided into urban and rural areas, whether individuals were head of household, level of education, which contains the highest education level completed, and was categorized into three groups, namely, university levels, senior high schools (academics and vocational),

and junior high schools and below (as the reference), whether individuals joined training program supported by the government during the pandemic (i.e., Kartu Prakerja) (Habsari et al., 2022; Kurniawati et al., 2023), using internet/digital technology in their work, job statuses, and some sector of activities. In addition, the district's minimum wage, district's GDP, and districts' poverty rate were added to measure labor demand shifters.

Following the definition of Statistics Indonesia (BPS), self-employed, casual workers, or unpaid family workers were categorized as informal sector employment, while regular employees and employers were categorized as formal sector employment. Although some individuals might have been doing both (working part-time in formal and informal sectors), SAKERNAS only asked questions about their primary job status, making it impossible to capture some workers doing both. Although the study included new entrants (who did not have a job in the past) who entered the formal-informal sector in the year of study, following an approach developed by McCaig and Pavcnik (2015), the study excluded those workers who had not changed their job (not doing employment mobility) during 2020–2021. In other words, the study focused on individuals who had experienced labor mobility during the pandemic.

Table 1 shows that mobility during the pandemic was dominated by the movement of new entrants to enter the labor market for both formal and informal sectors. In contrast, the proportion of individuals who moved from informal to formal, from formal to informal, from formal to (other) formal, and from informal to (other) informal was relatively small. The expansion of new entrants in Indonesia was closely correlated with the strong growth in the number of younger, better-educated educated supported by the rapid increase in government-funded education and healthcare since the second decade of the 2000s (Pratomo & Manning, 2022).

Table 1: Summary Statistics for Main Variables across Formal-Informal Sector

	Formal Sector Employment		**Informal Sector Employment**	
	Mean	**SD**	**Mean**	**SD**
Dependent Variable: Employment	0.229	0.420	0.771	0.420
Dependent Variable: Earning	2,493,078	2,612,812	1,328,505	1,396,853
Main Variable:				
From Formal Sector	0.046	0.208	0.026	0.159
From Informal Sector	0.026	0.159	0.052	0.220
New Entrants	0.928	0.258	0.922	0.267
Education				
Below Junior High	0.216	0.411	0.568	0.495
Junior High	0.152	0.358	0.191	0.392
Senior High-Academic	0.205	0.403	0.126	0.331
Senior High-Vocational	0.190	0.392	0.081	0.272
University	0.237	0.452	0.034	0.182
Other Individual Characteristics				
Age	39.439	12.888	47.452	14.434
Age squared	1,721.571	1,083.577	2,460.105	1,369.882
Head Household	0.462	0.499	0.493	0.500
Member of Household	0.538	0.498	0.507	0.499
Males	0.635	0.481	0.542	0.498

	Formal Sector Employment		Informal Sector Employment	
	Mean	**SD**	**Mean**	**SD**
Females	0.365	0.481	0.458	0.498
Training	0.011	0.102	0.007	0.077
Without Training	0.989	0.101	0.993	0.077
Married	0.705	0.456	0.776	0.417
Single/Widowed	0.295	0.455	0.224	0.417
Living in Urban Areas	0.656	0.475	0.421	0.494
Living in Rural Areas	0.344	0.475	0.579	0.493
Using Internet	0.586	0.493	0.220	0.414
Without Internet	0.414	0.493	0.780	0.414
Demand Variations				
District Minimum Wage	2,714,536.000	890,609.700	2,408,238.000	731,912.700
District GDP	90,451.360	129,372.900	59,969.260	85,462.450
District Poverty Rate	0.104	0.041	0.123	0.046
Job Statuses				
Manager	0.028	0.166	0.015	0.121
Professional	0.140	0.346	0.006	0.076
Blue-collar workers	0.832	0.373	0.979	0.142
Sector of Activities				
Manufacturing	0.007	0.084	0.006	0.074
Trade	0.190	0.393	0.232	0.422
Services	0.293	0.455	0.043	0.203
Mining	0.246	0.431	0.088	0.284
Construction	0.063	0.243	0.059	0.237
Finance	0.049	0.216	0.005	0.074
Transportation	0.051	0.219	0.099	0.297
Utilities	0.009	0.034	0.003	0.054
Agriculture	0.092	0.088	0.465	0.498

Moreover, the study examined the relationship between the transition between sectors and the earnings workers receive in formal and informal sectors. Relating to earnings, in practice, individuals might select themselves into their preferred work-status category (formal and informal sector) depending on the level of earnings on offer. In general, formal sector work offers higher earnings than informal sector employment. This implies that unobserved factors that affect the choice among types of work were also likely to be correlated with the unobserved factors in the earnings equation, suggesting a potential sample-selection bias in the ordinary least squares (OLS) estimator. To control for this potential sample selection bias, Heckman's selection bias corrections based on the probit equation (finding from the first estimate) were used when estimating the earnings equation.

The dependent variable for this earnings equation was the log of hourly earnings. However, the National Labor Force Survey reported the earnings monthly, and the hourly earnings were used to make it comparable across individuals, particularly in the informal sectors where the hours worked vary greatly. The hourly earnings data was obtained in the survey by dividing the monthly wage data into the total hours worked per month. Previous studies also used hourly rather than monthly earnings (Barham et al., 2020; Barrero et al., 2022). The marital status (whether an individual is married or not) was used to identify the selection terms (in the first stage of the estimation). They were likely to affect work status (formal or informal

sectors) but were unlikely to directly affect the outcome variable (hourly earnings). The same as in the probit estimate, the main independent variables included workers: (1) workers who were a year ago employed in the formal sector, (2) workers who were a year ago employed in informal sectors, (3) and not working/new entrants (as the reference/omitted variable). The control variables were broadly the same as in the probit estimate. The hypothesis of the earnings equation was that:

H1: workers already employed in the formal sector will have higher earnings in both formal and informal sectors due to their experiences compared to those employed in the informal sectors and new entrants.

Results

Table 2 presents the probit estimates of the mobility across sectors in East Java. The dependent variable was a dummy variable consisting of two categories: workers (1) in the formal sector and (0) in the informal sectors in 2021. From the main independent variables, individuals who previously worked in the formal sector showed a positive and statistically significant relationship with the formal sector jobs. The result indicated that individuals who previously worked in the formal sector were less likely to enter the informal sector, suggesting there was not much mobility from formal to informal sectors in 2021. The result also indicated that experience does matter in supporting previously formal sector workers who lost jobs to re-enter formal sector employment.

The positive coefficient (of workers previously employed in the formal sector) also implied that the new entrants (the omitted category) had a higher probability of entering the informal sector and a lower probability of entering the informal sector. In other words, the new entrants, mainly composed of young people (more likely without enough experience), have a lower probability of moving to formal sector employment than individuals with experience working in the formal sector. Youth seem to experience more barriers to entering formal sector employment, mainly because most lack the necessary experiences required by formal sector jobs. The other possible reason was that young people leave school to spend a short time in the informal sector before moving to a formal position for longer spells (Cunningham & Bustos Salvagno, 2011). The others probably also tended to "wait and see" on the economic condition, mainly due to the limited probability of being employed in the formal sector (some studies called it luxury unemployment) (Manning & Pratomo, 2018).

Moreover, the results showed that workers who had experienced working in the informal found it difficult and less likely to enter formal sector employment in 2021. The negative coefficient of workers who previously worked in the informal sector also showed that new entrants (the omitted category) had a higher probability of entering the formal sector and a lower probability of joining the informal sector than workers previously employed in the informal sector. The evidence supports the evidence of an "informality trap" for most of the informal sector workers in Indonesia, as mentioned by Pratomo and Manning (2022). The difficulties of previous informal sector employment to enter formal sector jobs also indicated the potential scarring effect on job market formalities after the pandemic.

Table 2: Probit Estimates for Formal-Informal Sector Employment (1: Formal Sector Employment and 0: Informal Sector Employment)

	Coef.	S.E.	Z	Prob
From Formal Sector	0.0828	0.031	2.64	0.008
From Informal Sector	-0.2502	0.034	-7.44	0.000
Junior High	-0.0807	0.019	-4.2	0.000
Senior High-Academic	0.086	0.020	4.28	0.000
Senior High-Vocational	0.2561	0.022	11.52	0.000
University (Tertiary)	0.4235	0.027	15.43	0.000
Age	0.0254	0.003	8.9	0.000
Age squared	-0.0004	0.000	-12.95	0.000
Head HH	0.1851	0.018	10.03	0.000
Males	0.4050	0.016	24.67	0.000
Training	-0.2906	0.070	-4.17	0.000
Married	-0.0758	0.017	-4.45	0.000
Urban	0.0366	0.015	2.48	0.013
District Minimum Wage	0.1570	0.034	4.64	0.000
District GDP	0.0221	0.009	2.44	0.015
District Poverty Rate	-0.8013	0.175	-4.59	0.000
Internet	0.4085	0.016	25.52	0.000
Manager	0.1463	0.048	3.06	0.002
Professional	0.7030	0.044	15.8	0.000
Manufacturing	1.1818	0.076	15.48	0.000
Trade	0.9092	0.019	46.96	0.000
Services	1.9191	0.026	74.7	0.000
Mining	1.7732	0.020	86.64	0.000
Construction	1.0132	0.028	36.78	0.000
Finance	2.0063	0.050	40.1	0.000
Constant	0.7462	0.027	27.49	0.000
Number of obs.	75,068			
LR chi2(27)	33,442.36			
Prob>chi2	0.000			
Pseudo R squared	0.4093			

The control variables show significant results. Higher education was associated with a higher probability of entering formal sector employment. In contrast, informal sector jobs generally do not require completion of a certain level of education (Oesch & Baumann, 2015). The result also showed some ranking based on workers' level of education, with the highest probability of entering formal sector jobs found among workers with university (tertiary) level education, and the lowest probability was found among workers with junior high school education. Moreover, individuals living in urban areas showed a positive and significant relationship with formal sector employment, supported by modern formal sector employment in industry or services primarily found in urban areas (Pratiwi et al., 2020). Females had a lower probability of entering the formal sector, supporting Gunaprasida and Wibowo's (2019) evidence that females tend to work in the informal sector, which offers more job flexibility.

The age and age-squared variable coefficient shows a significant and opposite relationship, suggesting a nonlinear relationship between age and job prospects at transition. For older workers, the chances of them transitioning to the formal sector were lower, while younger

workers supported the expansion of formal employment (Deelen et al., 2018; Jolkkonen et al., 2012). The turning point was found at 32 years old (calculated as the age coefficient divided by (2 x age-squared coefficient)). Individuals who joined training supported by the government were more likely to enter the informal rather than the formal sector. This result was in line with previous studies that also found an increased likelihood of individuals engaging in the informal sector, particularly self-employment and entrepreneurship, after joining employment training provided by the government (Chakravarty et al., 2019; de Mel et al., 2014; Premand et al., 2016). Moreover, the result also showed that workers using digital technology or the internet were more likely to be employed in the formal sector, supporting the study of Faizah et al. (2021).

The regional GDP showed positive results and was significant at a 5% level, supporting formal sector employment growth. Moreover, the higher minimum wage was associated with formal sector employment. At the same time, the poverty rate coefficient showed a statistically negative relationship, meaning that a higher poverty rate tended to shift and affect the informal sector more than the formal sector (Pratomo & Jayanthakumaran, 2018). The sector of activities shows positive results suggesting a higher probability of entering formal sector employment than agriculture (the reference sector of activity), which was mainly categorized as an informal sector. In addition, managers and professionals (with higher job statuses) were also more likely to be employed in formal sector employment.

In the final section, Table 3 presents the results of the earning equation of workers, specifically in the formal-informal sector, using Heckman's selection-biased corrections model. As mentioned above, the log of hourly earnings in the formal-informal sector was worked as the dependent variable. Using Heckman's two-step estimation procedure, the selection term(s) (lambda) obtained from the first estimation stage was included in the earnings equation to correct for potential selection bias. As indicated in the first column, lambda was positive and significantly different from zero, suggesting evidence of a selection effect in earning equations for both formal and informal sectors. The positive term indicated an upward bias if we use OLS without a correction process (Dimova & Gang, 2007).

Table 3 shows that individuals who previously worked in the formal sector (and also the informal sector) had negative coefficients. It means that they, interestingly, generally received lower earnings than the new entrants (the omitted categories). The coefficient of individuals who previously worked in the formal sector was smaller than that of individuals who previously worked in the informal sector, suggesting that individuals who previously worked in the formal sector received higher earnings than individuals who previously worked in the informal sector (as mentioned by the coefficient of -0.092 which was smaller than -0.179). Workers who were once in the formal sector and switched to the informal sector also had higher incomes than workers previously in the informal sector (as mentioned by the coefficient of -0.107, smaller than -0.125). The gap was higher in formal sector employment (in the first column).

Table 3: Earning Equation for Work Status in the Formal and Informal Sectors

	Formal Sector Employment Earnings				Informal Sector Employment Earnings			
	Heckman		OLS		Heckman		OLS	
	Coef.	Prob	Coef.	Prob	Coef.	Prob	Coef.	Prob
Moving from Formal Sector	-0.092	0.027	-0.109	0.000	-0.107	0.034	-0.089	0.007
Moving from Informal Sector	-0.179	0.036	-0.122	0.000	-0.125	0.024	-0.119	0.000
Junior High	0.138	0.019	0.153	0.000	0.024	0.018	0.048	0.002
Senior High-Academic	0.418	0.020	0.392	0.000	0.079	0.028	0.129	0.000
Senior High-Vocational	0.473	0.024	0.415	0.000	0.047	0.032	0.101	0.000
University	0.953	0.028	0.878	0.000	0.213	0.053	0.310	0.000
Age	0.052	0.003	0.047	0.000	0.047	0.005	0.036	0.000
Age sq.	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Head HH	0.167	0.017	0.134	0.000	0.093	0.019	0.065	0.000
Males	0.299	0.022	0.224	0.000	0.321	0.020	0.289	0.000
Training	-0.358	0.055	-0.307	0.000	-0.136	0.066	-0.170	0.008
Urban	0.062	0.013	0.053	0.000	0.008	0.018	0.022	0.065
District Minimum Wage	0.530	0.029	0.500	0.000	0.357	0.035	0.397	0.000
District GDP	0.001	0.007	-0.003	0.679	0.048	0.009	0.049	0.000
District Poverty Rate	-0.219	0.157	-0.050	0.736	1.259	0.146	1.145	0.000
Internet	0.360	0.023	0.274	0.000	0.210	0.015	0.210	0.000
Manager	0.353	0.035	0.326	0.000	0.077	0.041	0.087	0.033
Professional	-0.314	0.028	-0.395	0.000	-0.061	0.073	0.012	0.855
Manufacturing	0.413	0.099	0.077	0.242	0.086	0.067	0.046	0.473
Trade	-0.004	0.062	-0.274	0.000	0.046	0.048	-0.059	0.000
Services	0.156	0.105	-0.317	0.000	-0.211	0.027	-0.226	0.000
Mining	0.413	0.100	-0.040	0.071	-0.158	0.023	-0.182	0.000
Construction	0.243	0.070	-0.055	0.052	0.360	0.034	0.297	0.000
Finance	0.263	0.108	-0.214	0.000	0.061	0.069	0.074	0.283
Transportation	-0.042	0.057	-0.263	0.000	0.244	0.062	0.110	0.000
Utilities	0.297	0.110	-0.123	0.040	-0.504	0.086	-0.532	0.000
Constant	0.399	0.466	1.712	0.000	2.720	0.404	2.566	0.000
Lambda	0.351	0.000			0.158	0.021		
No Obs.	17,527		17,527		24,185		24,185	
R squared			0.287				0.121	

The result suggested although new entrants were more likely to be employed in the informal sector and less likely to be employed in the formal sector (as found in the probit estimate) compared to the workers who experienced working in the formal sector, it does not mean that their earnings were lower than individuals who previously worked in the formal sector. The possible reason was the role of digitalization and working-from-home activities that can help employees work productively during the pandemic (Faizah et al., 2021; Simon & Way, 2015). Digitalization is, in particular, supported more by young people who are more friendly with the digital environment. At the same time, work-from-home activities provided more choices, mainly to increase young female participation in the labor market.

Most of the control variables showed significant results. Supporting Kahyalar et al. (2018), higher-education individuals enjoyed higher earnings, suggesting that increasing education was vital in increasing income in formal and informal employment. A typical formal worker

who had completed high school/vocational and tertiary levels was predicted to receive higher earnings, particularly for formal sector employment. Male workers tended to have higher earnings than female workers. This wage gap between male and female workers was associated with the preference of women who seek flexible work (Booth & van Ours, 2013; Meekes & Hassink, 2020) and work close to home (Le Barbanchon et al., 2021).

The results suggested that older workers enjoyed higher incomes than younger workers, potentially due to more experience (Wijayanti et al., 2018). However, there were indications of a nonlinear relationship between age and income, particularly in the formal sector. At a certain age level, older workers tended to have lower incomes than younger workers. The impact of internet utilization was also favorable for both formal and informal sectors, suggesting that workers with the ability to use the digital internet were better off than the other category of workers (Faizah et al., 2021).

Comparing sectors of activities, individuals working in mining and manufacturing enjoyed the highest earnings in formal sector employment. The lowest level of earnings was found in trade and transportation sectors. Meanwhile, employment, utilities, mining, and services in the informal sector receive lower earnings than in agriculture. Workers who live in cities have relatively higher earnings than workers who live in rural areas. Higher earnings in urban areas were generally interpreted as being associated with positive externalities generated by economic agglomeration, thereby helping to increase the productivity of firms located there and leading to higher incomes (Combes et al., 2012).

Furthermore, the results in Table 3 show that the minimum wage positively affects workers' income in formal sector employment. Findings for the positive impact of minimum wages on formal sector earnings align with previous studies (Del Carpio et al., 2015; Sen et al., 2011). The poverty rate does not significantly affect formal and informal employment earnings.

Conclusions

The study examines workers' mobility between the formal and informal sectors in East Java during the COVID-19 pandemic. The study also analyzes the implications of this transition regarding earnings of both formal and informal sectors. Based on the results, workers with experience working in the formal sector have higher opportunities to re-enter the formal sector. Their chance is more significant than workers who previously came from the informal sector and new entrants. Workers who previously worked in the informal sector tend to re-enter the informal sector.

Regarding earnings, workers who come from the formal sector and then enter (re-enter) the formal sector employment have a higher income than those from the informal sector. Likewise, workers previously in the formal sector who switched to the informal sector also have higher incomes than workers previously in the informal sector. The results interestingly also show that new entrants (workers who have no job once) (the omitted category) earn more than formal and informal sectors (as mentioned by negative coefficients of workers who come from the formal sector and the informal sector. One possible reason is the role of digitalization and working-from-home activities that can help new entrants, mainly composed of young people, work productively during the pandemic.

In general, these results imply a need for a breakthrough in supporting particularly the informal sector employment. Besides funding or capital, they need some potential support, including skills improvement, significant strengthening, and digital technology capabilities. The result also shows that workers with more skills and education, including the ability to use the internet or digital technology, are better off than the other workers. The findings also show optimism in East Java as prospects of youth (new entrants) improve amid economic recovery. However, the probability of entering the formal sector employment is still lower compared to the individuals who have experienced working in the formal sector.

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