Determinants of Informal Labor Income: Does Demographic Matters?

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Abstract

In the informal sector, labor is unnecessary to have a higher degree and special skill. Therefore, working in the informal sector is one of the solutions for laborers with the low skill to gain an income and move out from poverty. This research aims to analyze determinant factors of labor income in the informal sector, focused on demographic and social economics variables. The study adopted Mincer Wage Equation and performed the Ordinary Least Square Method. The data were collected from the National Labor Force Survey (Sakernas) of Statistics Indonesia. The result shows that Mincer Equation is still a robust model for modeling wage factors. Labor with more educational backgrounds come up with higher income since the education will refine the workability and capability to improve productivity. On the other hand, laborers in the informal sector who live in the village earn more income than those who work in the city area. This can be concluded that by the right policy, the informal sector can develop higher income as high as the formal sector.

Keywords: Informal sector, Labor income, Poverty, OLS
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INTRODUCTION

Poverty is the main social problem that should be addressed by developed or developing countries. Numbers of poverty undeniably will affect the quality of people followed by other social issues. The data from Indonesian Statistics (2020), the number of the poor in Indonesia has reached 27.55 million people with a poverty level of 10.19 percent. As one of the areas situated in the central part of Java Island, the poverty average in the Magelang area is counted high, which is 10.67 percent from the total population of 1.299.859, higher than the national poverty level. Table 1 informs the poor data in Magelang (city and municipality) from 2015 to 2020.

From Table 1, it can be concluded that the percentage of the poor in Magelang City and Municipality in 2015-2019 was decreased, yet it increased in 2020 due to the Covid-19 pandemic. Many workers lost their jobs, and many businesses must be closed due to a sharp drop in sales. In fact, poverty reduction is highly related to labor income. Azevedo et al. (2013) found that the most important contributor to changes in moderate poverty has been the growth in labor income for the most research object.

Table 1. The Percentage of the Poor in Magelang (City and Municipality)

Year	City	Municipality
2015	9.50	13.07
2016	8.79	12.67
2017	8.75	12.42
2018	7.87	11.23
2019	7.46	10.67
2020	7.58	11.27

Source: BPS (2020)

In comparison to the data of formal and informal labor, Magelang city absorbs more formal workers than the informal labor force. The numbers can notify it of workers from the formal sector, which counted as 34,511 people in 2018 and rose to 36,020 people in 2019 (see Table 2). Meanwhile, the informal factor experienced a decrease from 28,640 people in 2018 to 24,028 people in 2019. For Magelang municipality, the informal sector absorbs more workers than the formal sector. It can be identified that workers in the formal sector decreased, from 236,796 people in 2018 to 235,919 people in 2019. On the other hand, the workers in the informal sector recorded 4427,10 people in 2018, which was decreased in 2019 with 442,710 people (see Table 3).

Table 2. Formal and Informal Workers in Magelang City

		2014	2015	2017	2018	2019
Formal Workers	Working with the Assistance of Permanent Labor	2293	2467	3080	3132	2371
	Labors/Workers/Employees	30841	29661	31885	31379	33649
Informal Workers	Self-Employed	15347	12092	10725	13350	12055
	Working with the Assistance of Non-Permanent Labors	4976	4774	6139	6858	5335
	Freelance for the Farm	91	0	215	108	0
	Freelance for Non-Farm	2115	2594	2695	2171	2001
	Unpaid Labors	3965	5545	3843	6153	4637

Source: BPS (2019)

Table 3. Formal and Informal Workers in Magelang Municipality

		2014	2015	2017	2018	2019
Formal Workers	Working with the Assistance of Permanent Labor	23361	18821	28618	23908	22657
	Labors/Workers/Employees	153947	187463	226895	212888	213262
Informal Workers	Self-Employed	115827	97697	96726	84632	109502
	Working with the Assistance of Non-Permanent Labors	154075	127358	151585	162132	168737
	Freelance for the Farm	28533	29318	39216	35624	31524
	Freelance for Non-Farm	44723	66675	44386	46796	64554
	Unpaid Labors	97867	96381	117225	113526	107721

Source: BPS (2019)

Based on data presented in Table 2 and Table 3, it can be concluded that Magelang Municipality absorbs more workers than Magelang City. Magelang Municipality employs informal sector workers more than formal sector workers, while Magelang City employs more workers from formal sectors than the informal sector. In terms of income, Magelang City and Magelang Municipality tend to earn an increase in income per capita from 2015 to 2019, except in 2020, due to the Covid-19 pandemic (see Table 4).

Table 4. Income per capita of Magelang (City and Municipality)

Year	Magelang City	Magelang Recency
2015	43.44581	15.14647
2016	45.59024	15.81567
2017	47.91587	16.53648
2018	50.36942	17.25724
2019	53.00537	18.01745
2020	51.95635	17.58765

Source: BPS (2020)

Nevertheless, the output generated by the workers in Magelang City and Municipality cannot diminish the percentage of the poor both. In other words, the workers are still unable to generate output/revenue that can encourage the workers' social mobility. Nationally, the growth of workers in the informal sector occurs more in the city area. It is proven that between February 2018 to February 2019, the workers' portion in the informal sector in the city area has raised from 40.85% to 42.32%. On the contrary, the number of workers in the formal sector is decreased from 59.15% to 57.68%. However, employment in Magelang Municipality is higher than in Magelang City, and the income per capita is three times higher in the city than in the municipality. This phenomenon is found profoundly interesting since if a comparison is made on Regional Minimum Wage (UMR), the UMR of Magelang city is way under the UMR of Magelang Municipality, so as the employment in Magelang city that is positioned way under Magelang Municipality.

The difference of workers' output (labor income) between one worker with another is explained by Mincer (1974), who suggested the main determinant of income, which is education (Lemieux, 2006). Education is not the only issue that causes the difference in income. The gap of income also occurs on gender, between man and woman. Several studies reveal the existence of the difference in income based on gender. From this point, the demography factor turns out to be one of the causes of the difference in income, aside from the social economy factor.

A large number of previous research have attempted to analyze the role of the labor demographic towards labor income. For example, Glover and Short (2020) analyzed how the aging workforce has contributed to the decline in labor's share. Then, Glover (2020) found that recent demographic trends could lower the labor income in the US by less than 50 percent. While d'Albis et al. (2021), who conducted the study on 18 OECD countries from 1985 – 2018, notified that the labor income responds relatively elastic in terms of the demography structure adjustment, in this case, the relationship tends to be relatively negative.

By referring to the Malthus theory, Roa et al. (2011) analyzed the interaction between income growth, demographic patterns, and labor market characteristics by two models, the first is developing an economic growth model containing

unemployment, which comes up with the result that the emergence of irregular sustained oscillations is related to the lack of sensitivity in wage growth to changes in the employment rate. The second model from Roa et al. (2011) introduced the endogenous fertility rate into the basic model to generate a demographic transition. The conclusion could be withdrawn from the research that raising the age of entry into the labor force increases economic growth. Based on the previous explanation, the research about labor welfare can focus on the relevant demographic variables. The objection is to analyze the factors involved in labor income at Magelang City/Municipality, focused on the informal sectors labors.

METHOD

This research employed the data from the National Labor Force Survey (Sakernas) in August 2019. The sample involves 3522 workers in Magelang City and Regency. From that total, a group of labor who work in the informal sector is clustered, as many as 1280 workers. In modeling the labor income dynamics, Mincer Earning theory (1974) relates the income with education level, work experience, square work experience under the following Equation 1 (Mincer, 1974).

$$\ln w(s,x) = \beta_0 + \beta_1 S + \beta_2 exper + \beta_3 exper^2 \qquad \dots\dots (1)$$

The equation of log-linearity on equation (1) is presumed as the standard equation of Mincer model (1974) that model the correlation between income received by the workers, written as log income (ln w) on the constant term, with the education (years of schooling (S) in linear form, as well as experience (exper) or labor's work experiences (year) in the form of linear and quadratic value, in which the existence of log on the wage is considered as the empirical implication towards the model of human capital. Although several studies have offered the model to estimate the income, the Mincer earnings equation is still considered relevant to be applied (Heckman et al., 2003; Lemieux, 2006).

Heckman et al. (2003) suggested that the utilization of experience and square experience variables will lead to model bias by the presence of omitted variables. Hence Heckman et al. (2003) proposed the addition of variables in such an equation. Therefore, in this research, the demography and social economy variables could be included in the Mincer earnings function, also to state the demography variable as the research focus. Altogether, it could avoid the existence of omitted bias variable. By adding the variables of demography and social economy in Equation 1, the basic econometrics model in this research can be formulated in Equation 2.

$$lnincome_i = \beta_1 + \beta_2 S_i + \beta_3 exper_i + \beta_3 exper_i^2 + \sum_s \beta_s x_{si} + \sum_j \beta_j z_{ji} + e_i \ .. (2)$$

In which *lnincome* is explained as the income in natural logarithm, x is defined as demography variable, z is identified as a social economy variable, e is classified as disturbance, i reflects the observation unit (i = 1,2,….,1280), s is considered as numbers of demography variable (s=1,2,3,4,5,6) and j is the numbers of social economy variable (j=7,8,9). Definition of variable operational that is used in this research, as follows:

Lnincome	:	The level of income in natural logarithm
educ (S)	:	The education that is measured by the level of education (the education under or equal to high school/similar level = 1, and Diploma/Undergraduate/S2/S3 = 0)
exper (exper)	:	Labor's work experiences (year)
exper2	:	Square experience
Demography Variable:		
gender (x1)	:	x1, dummy gender L=1 P=0
married (x2)	:	x2, dummy married = 1, No/not yet married = 0
Headfam (x3)	:	x3, head of the family, if 1 = KRT, other than 1=0
Fam (x4)	:	x4, Members of the family
Region (x5)	:	x5, city= 0, village = 1
Social Economy Variable:		
workhours (z1)	:	Total hours per week
inet (z2)	:	dummy inet is, code 1 if a worker uses the internet for work, 0 if in doing the work, the internet is unnecessary
certified (z3)	:	The labor has of having the training, code =1, code = 0 No

RESULTS AND DISCUSSION

Based on the data derived from the National Labor Force Survey (SAKERNAS) in August 2019 that involves 3522 workers in Magelang City and Municipality, 1280 laborers who work in the informal sector are separated. In this research, the variables of demography and social economy are included in the equation of Mincer earnings. All descriptive variables in this research are presented in Table 5.

Table 5. Descriptive Statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
income	1280	720227.7	1105048	0	15.000.000
Educ	1280	0.9523438	0.2131211	0	1
Exper	1280	13.65013	13.273	0	60
Exper2	1280	362.3609	585.8074	0	3600
Gender	1280	0.615625	0.4866373	0	1
Married	1280	0.7875	0.4092366	0	1
Headfam	1280	0.5742188	0.4946542	0	1
Fam	1280	3.704687	1.4918	1	10
Region	1280	0.4578125	0.4984118	0	1
Certified	1280	0.0984375	0.2980217	0	1
Workhours	1280	40.58125	17.19	1	88
Inet	1280	0.2296875	0.4207963	0	1

Table 5 represents the descriptive statistic of the variable that is employed to estimate the Mincer earning model with the addition of demography, social and economic variables. The above table demonstrates that the average income of the informal sector in Magelang City and Municipality is counted as Rp. 720,227 with a minimum income of 0 and a maximum of Rp15 million. The informal workers with Rp. 0 income is categorized as Working with the Assistance of Non-Permanent

Labors/Unpaid Labors and relative-workers. More than 90 percent of informal workers graduated from high school or below. They have an average of 13 years of experience, ranging from 0 to 60 years of experience. More than 60 percent of the informal sector are dominated by man.

Referring to marital status in Table 5, more than 70 percent of informal workers are married, and approximately 50 percent are in charge of the family's head. On average, they live with four members of the family, a minimal one and a maximum of ten members of the family. It takes 40 hours per week on average, ranging from 1 to 88 working hours/week. It can be identified that 90 percent of informal workers have not been accommodated with training, and more than 70 percent of the workers accomplish their tasks using the internet. In brief, it can be resumed that the informal workers are dominated by male workers that also act as head of the family, married, with an education level below or equal to high school. The informal workers are often found in Magelang City than in the village (Magelang Municipality). They are equipped with less training and utilize the internet as work support. Estimation is performed gradually and extracted into 3 models for result consistency test. Below is the complete equation model that will be estimated (see Equation 3-6).

Equation 1, the basic model of wage equation:
$$lnincome_i = \beta_0 + \beta_1 educ_i + \beta_2 exper_i + \beta_3 exper_i^2 + e_i \quad \dots (3)$$
Equation 2, Mincer earning equation with the addition of demography variable:
$$lnincome_i = \beta_0 + \beta_1 educ_i + \beta_2 exper_i + \beta_3 exper_i^2 + \beta_4 gender_i +$$
$$\beta_5 married_i + \beta_6 headfam_i + \beta_7 fam + \beta_8 region + e_i \quad \dots (4)$$
Equation 3: Mincer earning equation with the addition of social economy variable:
$$lnincome_i = \beta_0 + \beta_1 educ_i + \beta_2 exper_i + \beta_3 exper_i^2 + \beta_4 workhours +$$
$$\beta_5 inet + \beta_6 certified + e_i \quad \dots (5)$$
Equation 4: Mincer earning equation with the addition of demography and social economy variables:
$$lnincome_i = \beta_0 + \beta_1 educ_i + \beta_2 exper_i + \beta_3 exper_i^2 + \beta_4 gender_i +$$
$$\beta_5 married_i + \beta_6 headfam_i + \beta_7 fam + \beta_8 region + \beta_9 workhours +$$
$$\beta_{10} inet + \beta_{11} certified + e_i \quad \dots (6)$$

The result of regression estimation for the equation model is presented in Table 6. From several statistical tests, the estimation result shows the proper result, as indicated by the inclination of Adjusted R-square value on each variable addition on the regression model. The basic model of the Mincer earning equation in Table 6 (equation 1) indicates the result that is already aligned with the theory, in which the variable of Education, Experience is valued positive and significant, while square experience is valued negative and significant. The working experience has a positive and significant influence with Alpha of 0.01, and the coefficient of square experience has a negative and significant influence with Alpha of 0.05, as seen in the basic equation (equation 1). Each time the experience of the informal sector workers is added 1 year, the income will incline for 2.25 percent, and at a certain point, the wage will decline since longer experience leads to income decreasing, extensive experience indicates that a worker is old. It leads to lower productivity in earning the income (it is shown with the negative value of square experience). From this result, the discussion will be continued to the development model.

Table 6. The Result of Estimation with OLS

Dependent variable: $lnincome_i$	(Model 1)	(Model 2)	(Model 3)	(Model 4)
Educ	-0.598	-0.525	-0.394	-0.372
	(-3.91)***	(-3.59)***	(-2.83)**	(-2.74)**
Exper	0.0252	0.0293	0.0259	0.0269
	(3.48)***	(4.06)***	(4.03)***	(4.11)***
exper2	-0.000559	-0.000625	-0.000455	-0.000478
	(-3.22)**	(-3.69)***	(-2.96)**	(-3.12)**
Gender		0.525		0.319
		(6.78)***		(4.42)***
Married		-0.0315		0.0000513
		(-0.44)		(0.00)
headfam		-0.0222		0.0541
		(-0.27)		(0.74)
fam		0.0271		0.0388
		(1.19)		(1.88)
region		0.233		0.163
		(3.75)***		(2.87)**
certified			0.0735	0.0945
			(0.75)	(0.98)
workhours			0.0205	0.0187
			(11.33)***	(10.51)***
inet			0.575	0.488
			(7.88)***	(6.72)***
_cons	14.23	13.63	13.05	12.67
	(92.89)***	(73.11)***	(81.59)***	(68.40)***
AIC	1714.2	1645.4	1545.4	1508.1
R-squared	0.0376	0.142	0.254	0.304
Adj R-squared	0.0334	0.1318	0.2474	0.2923
F (3, 682)	8.88	14.00	38.54	26.73
Breusch-Pagan (Prob > chi2)	0.4196	0.0026	0.0004	0.0001

Note(s): *, **, *** indicate the level of significance at 10%, 5% and 1%, respectively, + become significant, previously insignificant.

Nevertheless, the estimation with standard OLS, as performed in Table 6, still violates the classic assumption of homoscedasticity, as shown by the Brousch-Pagan test, for equations 2, 3, and 4. Therefore, a robustness check is used to solve the problem of heteroscedasticity and spurious regression. In addition, the option "robust" in STATA was used to produce robust standard errors in all models. The result in Table 7 confirms that the model is considered robust by considering the consistency of estimation result on the coefficient, either by using the OLS standard (Table 6) or with the addition of Robust Standard Error (RSE) on the OLS (Table 7), and only one variable that must be followed up with the improvement, after employing the RSE. Table 7 represents the regression result for estimation model Robust Standard Error to model the development of Mincer earnings equation.

Table 7. The Result Estimation with Robust Standard Error

Dependent variable: $lnincome_i$	(Model 1)	(Model 2)	(Model 3)
Educ	-0.525	-0.394	-0.372
	(-2.79)**	(-2.18)*	(-2.11)*
exper	0.0293	0.0259	0.0269
	(3.68)***	(3.76)***	(3.65)***
exper2	-0.000625	-0.000455	-0.000478
	(-3.35)***	(-2.68)**	(-2.70)**
gender	0.525		0.319
	(6.48)***		(4.32)***
married	-0.0315		0.0000513
	(-0.44)		(0.00)
headfam	-0.0222		0.0541
	(-0.28)		(0.76)
fam	0.0271		0.0388
	(1.28)		(1.96)*+
region	0.233		0.163
	(3.76)***		(2.91)**
certified		0.0735	0.0945
		(0.69)	(0.90)
workhours		0.0205	0.0187
		(10.20)***	(9.52)***
inet		0.575	0.488
		(8.20)***	(6.97)***
_cons	13.63	13.05	12.67
	(60.68)***	(63.54)***	(56.83)***
aic	1645.4	1545.4	1508.1
R-squared	0.142	0.254	0.304

Note(s): *, **, *** indicate the level of significance at 10%, 5%, and 1%, respectively, + become significant, previously insignificant.

From Table 7, several independent variables represent the significant influence: education level, work experience, square experience, gender, region, working hours, and internet utilization that have the consistent value at the equation combination 1, 2, and 3. In the informal sector, the education level significantly influences Alpha 0.10. The income of informal sector workers who graduated from the Diploma/Undergraduate program will achieve 0.372 percent higher than the workers who have education below or equal to high school/similar.

Besides, gender has a significant influence with Alpha 0.05. A male earns 0.319 percent income higher than a female who works in the informal sector. The region indicates the significant value at the Alpha 0.05. It is notified that the informal sector workers who work in the village have 0.163 percent higher incomes than the informal sector workers who work in the city. Working hours also have a positive and significant influence on the Alpha of 0.01. 1-hour additional working hour per week will lead to the rise of 1.87 percent income. The internet utilization gives significant influence with Alpha of 0.01, which indicates the informal workers who use the internet in their work have 0.488 percent higher income than the workers who do not.

Naturally, the numbers of people in Magelang City are smaller than the population in Municipality, by considering its width. The economic mover is considerably higher in Magelang Municipality instead of the city. Nevertheless, the income per capita for Magelang Municipality is way below the Magelang City. This implies that the total aggregate output in Magelang Municipality is noticeably low. When the low aggregate output value is divided by the large numbers of people, it will lead to a small value of income per capita.

As previously explained, the main factor of determination for income is education level. In the Mincer earning theory, the education variable coefficient suggests the amount of educational benefit that demonstrates one's investment to gain future income (Björklund & Kjellström, 2002). Tables 5 and 7 inform that the dummy variable for education level demonstrates the income of an informal sector worker with the education below or equal to high school/similar is more dominant and lower than a worker with diploma/undergraduate education, which serves the same sector. Labor with higher educational levels has higher opportunities to earn a higher income than those who hold lower educational levels (Ayu et al., 2021). Labor with more educational backgrounds come up with higher income since the education will refine the workability and capability to improve productivity. The estimation is confirmed as robust; although the study involves several time frames and different variable combinations, the education variable still consistently influences the incomes that the workers earn (McGuinness et al., 2021), as also found in this research that education is significant at all 4 equation model.

The experience shows the positive and significant influence on an increase in wages, while the square experience indicates the significant negative coefficient. These results confirm the Mincer theory. The potency of square work experience identifies the marginal return that keeps on decreasing. The marginal escalation of decreasing income will follow the marginal escalation of work experience potency. As previously mentioned, the most popular version of the Mincer equation encloses the square function in years of potential experience to capture the fact that investments in the form of job training are decreasing over time in the human resources model with the standard life cycle. Mincer (1974) showed that the square profile implied by the model, in which the investment at a certain point will experience the diminishing return, decreasing linearly from time to time, is described by the reverse U-shape curve. Aside from explaining the experience flow, experience specification in the square value is presumed easier in estimation than to calculate in the non-linear equation, which is considered more complex and implied by the assumption of constant investment decreasing and more consistent with economic theory.

Two basic variables from the Mincer earning equation are proven robust (Education and Experience) to estimate the income determinant factor (Taufiqurahman, 2013). However, in a more complex study, the utilization of a square form of experience should be re-considered (Oswald-Egg & Renold, 2021). The gender variable suggests the significant result indicating the existence of a gap between male and female workers in the informal sector. The income of male workers is considered high than female workers. This research result is supported by a study conducted by Hennigusnia (2014), which stated that male workers have a higher income than female workers. The income difference implies gender bias in the informal work market. At a certain type of job, the stigma of male and female

works still exists. The gender bias not only occurred in the type of jobs but also in the job position. The rampant bias against gender must encourage the government to apply a strict policy by emphasizing the regulation of wages hence the income gap could be restrained.

For the family demography variable, marital status, head of the family status, and numbers of family members give an insignificant impact on income for informal sector workers. Based on region, the informal sector workers who live in the village earn more income than those who work in the city area. From this result, it is proven that by improve improving working conditions in the informal sector can create better employment that offers greater economic inclusion. Labor looking for fixed-pay jobs believes that cities have a better standard of living and quality of life, even though it is hard to find a suitable job because limitations can lead to unemployment and underemployment. Whereas informal sector can lead to more growth than the formal sector (Setyanti, 2020).

On the other hand, the dummy variable for training showcases an insignificant result on the increase of income in the informal sector. Both workers have been assigned with training or have not, they earn an averagely similar income. Working hours per week indicates a positive and significant influence on income. The additional working hours could enhance the income in the informal sector. The workers will prefer to spend or add their time to work to increase the income, instead of enjoying their leisure time. Other findings in this research reveal the technology optimization by accessing the internet, which can support the job in the informal sector, which could encourage the increase of the income. The potency of technology utilization in supporting more efficient and effective work is inevitably necessary to ease the job and reach the market.

CONCLUSION

The characteristic of informal workers is still considered one of the determinant variables for the number of workers' incomes. Several factors are discovered, such as informal workers are dominated by male workers as the head of the family, married, with lower or equal to high school/similar, in terms of education. The informal workers are mostly found in the city area (City) compared to the village (Municipality). They receive less training yet use the internet for work. The male workers, who hold diploma/undergraduate degrees and work in the village, earn more income than male workers with a lower educational background who live in the city. Experience has a reverse "U" correlation towards income. The technology role has a real impact on the income increase for workers in the informal sector. Those findings highlight the existing gap on several characteristics clusters that still exist. The demography factor is considered a key factor for implementing policies related to poverty alleviation.

The policymakers and related institutions are expected to provide the training and appropriate coaching for the workers' competency development in the informal sector. The technology supports can be expanded and aligned with the productivity improvement. The extended experience gives a negative impact on income for informal sector workers. It requires coaching and assistance to prepare the workers ready for retirement age. For future research, it is suggested to analyze the income determinant by inserting the spatial element and determinant from other regions. From the perspective of the method, the utilization of the Mincer equation

as a basic model needs to be improved, as well as the application of instrumental variable (IV) or heteroscedasticity covariant as the replacement IV.

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