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ABSORPTION OF FORMAL AND INFORMAL SECTOR WORKERS THROUGH THE MINIMUM WAGE: STUDIES IN INDONESIA⁵

This study aims to determine the effect of the minimum wage on employment in the formal and informal sectors in Indonesia. This study has a panel data set with a total of 170 observations consisting of 34 provinces in Indonesia during the 2017-2021 period. The use of the Ordinary Least Square (OLS) method, fixed effect, and random effect are used to compare the results of the three methods used. The results explain that the minimum wage has a negative and significant effect on the absorption of formal sector workers, while the minimum wage has a positive and significant effect on the absorption of informal sector workers.

Keywords: minimum wage; formal sector; informal sector

JEL: J23; O17; O46

1. Introduction

The Minimum Wage Policy has become an important policy on employment issues in many developed and developing countries. This minimum wage policy aims to meet the minimum living needs of workers and their families. Thus, the minimum wage policy aims to (a) guarantee workers' income so that it is not lower than a certain level, (b) increase worker productivity, and (c) develop and improve companies with more efficient production methods (Sumarsono, 2003).

The minimum wage policy in Indonesia has a long history. This policy was first introduced in 1956 and then formally started to be implemented in the early (Comola & De Mello, 2011). Even so, at the beginning of its implementation, the minimum wage policy was only

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symbolic, because at that time the minimum wage regulations were non-binding. The new minimum wage policy became binding in the early 1990s, mainly as a result of pressure from countries outside Indonesia to stop the "sweatshop" practice that suppressed low wages, long working hours, and an inhospitable workplace (Pratomo, 2014).

The Minimum Wage Policy in Indonesia is regulated based on Law Number. 13 concerning Manpower which is described in Government Regulation No. 13 of 2003 concerning Manpower and then elaborated again in Government Regulation No. 78 of 2015 concerning Wages. Based on this Law, the minimum wage is the lowest monthly wage consisting of wages without allowances or basic wages including fixed allowances. The minimum wage only applies to workers or labourers with less than one year of service at the company concerned. In its development, Job Creation Law No. 11 of 2020 and Derivative Regulations on the Job Creation Law No. 11 of 2020 emerged, in which President Joko Widodo issued Government Regulation Number 36 of 2021 concerning wages, which are derived from regulations from the Law. No. 11 of 2020 concerning job creation states that the minimum wage consists of the provincial minimum wage, district/city minimum wage, and minimum wage set based on economic and employment conditions. The minimum wage policy is directed at achieving Decent Living Needs in addition to providing guarantees for workers/labourers receiving wages to make ends meet.

The program for achieving the minimum wage for Decent Living Needs shows real improvement. It is intended that the fulfilment of life's needs will be achieved in stages. Article 27 paragraph 2 of the 1945 Constitution also states that everyone has the right to work and a decent living. This means that every Indonesian citizen has the right to prosper his life by having a decent job. Employment and a good standard of living should be used as criteria for setting the minimum wage. The minimum wage policy is a wage system that has been widely implemented in several countries, which basically can be seen from two sides. First, the minimum wage is a means of protection for workers to maintain that the value of the wages received does not decrease in meeting their daily needs. Second, as a means of protection for companies to maintain worker productivity

Despite this, in reality, many wages received by workers in most provinces in Indonesia are lower when compared to the necessities of a decent life. The increase in prices has increased the need for Decent Living and will further increase the minimum wage. Viewed from the company's perspective, wages are costs, which are usually used as a reference for setting prices. The Provincial Minimum Wage (UMP) is usually used as a reference for setting wages for workers in the formal sector, therefore an increase in UMP that is higher than worker productivity will be detrimental to companies because it can increase production costs. High production costs mean that output prices are competitive, and in the end, the company will reduce its output. The continuous increase in wages has been one of the main causes of unemployment since the financial crisis occurred in 1997–1998 (SMERU, 2001; Suryahadi et al, 2003) in Comola & De Mello (Comola & De Mello, 2011).

The first minimum wage in Indonesia was already introduced in 1956, followed by a national wage council established in 1969 and minimum wage legislation implemented in the early 1970s (Saget 2008). However, until the late 1980s, minimum wages had more of a symbolic character since they were neither binding nor enforced (Pratomo 2012).⁴ Under

increasing pressure from domestic and international groups against low wages and labour standards in the growing economy, the Indonesian government implemented new minimum wage legislation in 1989 that states that minimum wages have to be based on minimum physical needs, local costs of living, and labour market conditions (Rama 2001). In 2001, in line with a national devolution policy, the responsibility for minimum wage setting was given to provincial governments. That is, district wage commissions calculate annual subsistence living needs based on annual survey data and prepare a recommendation for a district minimum wage (Widarti 2006). Based on these district-level recommendations, the governor and the provincial wage council elaborate a recommendation for a provincial minimum wage before the governor announces the final rate. The minimum wage legally applies to all workers/labourers (every person who works for a wage or other forms of remuneration) (International Labour Organisation ILO 2004), leaving the self-employed and unpaid family members uncovered. Given that they account for around half of the workers in our dataset, these groups have to be taken into account when analyzing the labour market effects of the minimum wage policy.

Based on the Regulations stipulated by the government, the minimum wage is the lowest monthly wage earned by workers. Then, Government Regulation Number 36 of 2021 was issued concerning wages which is a derivative of Law No. 11 of 2020 concerning Job Creation which contains the Provincial Minimum Wage (UMP), District/City Minimum Wage (UMK), and the determination of the minimum wage based on economic and employment conditions.

Employment is a fundamental aspect of human life because it includes social and economic dimensions. Economic development is based on opening up opportunities in the labour market to balance the growth of the labour force, which is faster than the growth in employment opportunities. The imbalance between labour force growth and job creation will impact increasing unemployment. This increase in unemployment will impact wasting resources, becoming a significant source of poverty, increasing social unrest, and hindering economic development. Unemployment conditions in Indonesia continue to increase, in 2012 it was at 5.7%, and this figure is increasing and it has skyrocketed in 2020 by 7.07%; 2020 countries in the world were shocked by the Covid-19 pandemic; the pandemic was not spared attacking Indonesia so it has an impact on increasing the percentage of unemployed.

Research on the effectiveness of the minimum wage as a redistributive policy tool is still quite controversial among policymakers and economists, where there are various effects ((Cengiz et al., 2019); (Clemens & Wither, 2019); (Harasztosi & Lindner, 2019); (Neumark & Munguía Corella, 2021); (Zhao & Sun, 2021); (Agarwal et al., 2022)). The study above explains most topics that focus on the impact or influence of labour absorption on the labour market. According to Pratomo (Pratomo, 2016), the effect of the minimum wage on labour has been the main focus of many studies on the labour market. The effect of the minimum wage on the labour market is quite complex, especially in developing countries, where the labour market is segmented between the formal and informal sectors. The average Indonesian minimum wage from 2017-2021 is explained in Figure 1.

Figure 1. Average Minimum Wage in Indonesian



Source: Badan Pusat Statistik (BPS), 2023.

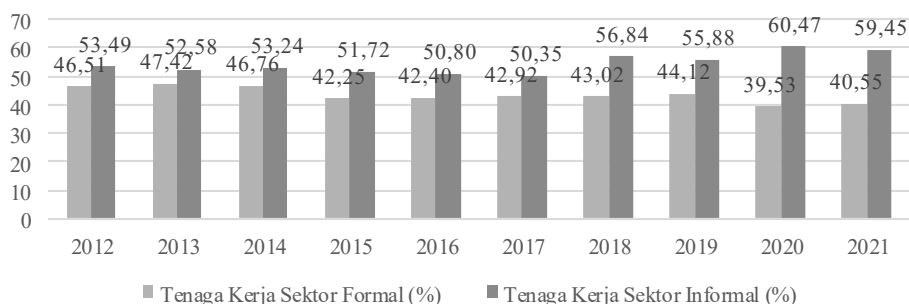
Figure 1 shows that the average minimum wage in Indonesia increased during 2017-2021. The exception is in 2021 when 2021 the Minister of Manpower issued Circular Letter Number M/11/HK.04/2020 addressed to the Governors of all of Indonesia concerning the Setting of the Minimum Wage for 2021 at which time Indonesia was experiencing the coronavirus disease 2019 (COVID-19) pandemic. The Minister of Manpower explained that there was a need for national economic recovery, in the context of providing protection and continuity of work for workers/labourers and maintaining business continuity, so it was necessary to make adjustments to the setting of the minimum wage in the economic recovery situation during the Covid-19 pandemic.

The effect of the minimum wage on the development of the formal and informal sectors is quite controversial. Comola and De Mello (Comola & De Mello, 2011), for example, show that an increase in the minimum wage affects the number of workers in the informal sector, which has an impact on increasing employment in the informal sector. Hohberg & Lay (Hohberg & Lay, 2015) in Indonesia stated that the minimum wage significantly positively affects the formal sector, while it does not affect the informal sector. Andres Ham (Ham, 2018) in Honduras shows that higher minimum wages reduce formal sector employment and increase informal sector employment. Holtemöller & Pohle (Holtemöller & Pohle, 2020), emphasized that the minimum wage has a significant adverse effect on the informal sector and a significant positive effect on the formal sector. Then Maarek and Moiteaux (Maarek & Moiteaux, 2021) stated that the decline in the absorption of formal sector workers in the labour market and the level of labour participation depends on the minimum wage level that applies in the European labour market. The conditions of the formal and informal sectors in Indonesia are described in Figure 2.

Research on the impact of the minimum wage on employment in the labour market in Indonesia is essential for several reasons. First, research on the impact of the minimum wage on employment in the formal and informal sectors is interesting to re-examine because there is a decentralization of setting the minimum wage from the central government to the provincial government. This is unlike the prediction of the dual labour market model introduced by Welch (1974), which states that the minimum wage will reduce the absorption of formal sector labour and increase the absorption of labour in the

informal sector. Welch (1974) introduced a dual labour market model to capture spillover effects on the informal sector.

Figure 2. Percentage of the Proportion of Formal and Informal Sector labour in Indonesia



Source: Badan Pusat Statistik (BPS), 2023.

According to Welch (1974) the minimum wage will reduce the number of workers in the formal sector and increase the number of workers in the informal sector because there is a shift in labour from the formal sector. Indonesia is a developing country where the minimum wage policy cannot be fully implemented (incomplete coverage) because there is an informal sector labour market not covered by the minimum wage policy. This makes the impact of the minimum wage on employment different from that of developed countries because the impact is not only in the sector covered by the minimum wage (formal) but there is also a spillover effect in the sector that is not covered (informal). Second, regarding the issue of the effect of the minimum wage on employment in the labour market in Indonesia, the minimum wage phenomenon cannot be separated from the phenomenon of absorption of labour in the labour market, where the effect of the minimum wage on employment in the formal sector labour market and everyday needs to be considered, as well as the condition of the influence of the minimum wage on unemployment.

The contribution of this research is twofold: first, this research can be used by the government as a reference in implementing a minimum wage policy that increases every year so that it can be beneficial in the employment sector; it can improve welfare and not have a negative impact on some workers covered by the policy. the minimum wage is in the formal sector. Second, this study simultaneously estimates the impact of the minimum wage on employment in the formal, informal, and unemployment sectors. In contrast, previous empirical studies for Indonesia and other developing countries have partially estimated the effect of the minimum wage on employment. Previous research ignored the interdependence between the minimum wage on employment in the formal sector and informal sector labour market, as well as unemployment. As Pratomo (Pratomo, 2014) sees changes in the minimum wage for working hours of workers in Indonesia; Pratomo (Pratomo, 2016) examines young workers in the informal sector; Neumark & Munguía Corella (Neumark & Munguía Corella, 2021) looks at the workforce with low education

and income; Maarek and Moiteaux (Maarek & Moiteaux, 2021) stated that the effect of a decline in the formal workforce in the labour market and the level of participation depends on the prevailing minimum wage in the local labour market as seen from education and labour skills. Therefore, this research explains the estimated interdependence of the minimum wage on employment in Indonesia's formal, informal, and unemployed sectors

2. Literature Review and Hypothesis

Minimum wages are minimum monthly receipts as Remuneration provided by employers to employees for work or services that have been or will be performed and valued in the form of money determined based on agreements or laws and regulations and paid based on work agreements between employers and workers including benefits, both benefits for workers and benefits for their families. Government Regulation no. 8/1981 stipulates that minimum wages can be set regionally. The minimum wage consists of a basic wage and fixed benefits, but in government regulations, it is clear that only the basic wage does not include benefits, this has implications for controversies between employers and workers regularly and regardless of the level of attendance of workers or the output produced, such as family allowances and benefits based on seniority (Pratomo & Saputra, 2011).

The labour market, like other markets in the economy, is governed by the forces of demand and supply, the imbalance between demand and supply of labour will determine the wage rate. However, there are differences in the labour market, namely the decline in labour demand (derived demand) is very dependent on the demand for the output it produces (Borjas, 2010; N. Gregory Mankiw, 2017). In Indonesia, there are four types of labour market, namely: (1) Perfect Competition Market; (2) Monopsony Market; (3); Monopoly Market; and (4) Bilateral Monopoly. The table below will describe the types of markets in Indonesia, as follows:

Table 1. Types of Labour Market

No	Market Type	Labor Market Conditions	Company Condition	Wage Rate
1	Perfect Competition Job Market	Lots of them (no union)	Many	Same with the equilibrium wage
2	Monopoly labour Market	Joining in one force (union)	Many	The wage is above the equilibrium
3	Monopsony labour Market	Joining in one force (union)	Only 1 (one) company	Can be above or below the equilibrium wage
4	Bilateral Monopoly labour Market	Multiple (no union)	Many	Above the equilibrium wage

Source: Mankiw, 2012.

Labor is one of the factors of production used in the production process to produce goods and services. The relationship between the production of goods and services and the demand for labour is one of the factors that determine the balance of the minimum wage. Ricardo (2009) in Sulistiawati (2012) states that the exchange value of an item is determined by the costs incurred to produce an item, which includes the cost of raw materials and labour wages, which are only sufficient to survive (subsistence) for these

workers. This wage is a natural wage. The amount of natural wages is determined by local customs or culture. The natural wage rate rises, in accordance with people's standard of living. As with other prices, the price of labour (wages) is determined by demand and supply, so under conditions of theoretical equilibrium, workers will receive wages that are proportional to the value of their work in producing products and services (N. Gregory Mankiw, 2017). This is explained in the following figure:

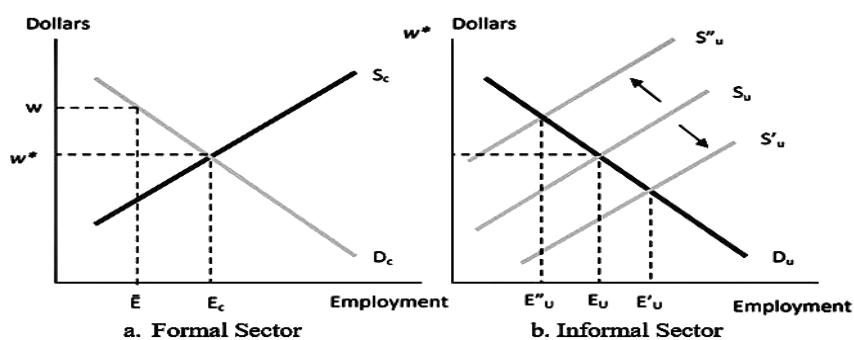
Welch (1974) in Nuhradi and Widyawati (2019) introduced a dual labour market model to capture spillover impacts in the informal sector, minimum wages will cause a decrease in the workforce in the formal sector and an increase in the workforce in the informal sector due to the mobility of workers from the formal sector. The Welch model developed by Mincer and Gramlich (1976) in Nuhradi and Widyawati (2019), considers not only looking at the movement of labour from the formal sector to the informal sector but also the movement of labour into or out of the labour market. Assuming that formal sector job vacancies always exist periodically, the impact of the minimum wage will not only cause a shift in labour from the formal sector to the informal sector but also enter the formal sector from the informal sector or the non-labour force. The existence of inflows and outflows from the informal sector makes the impact of the minimum wage on employment in the informal sector ambiguous, while the effect of the minimum wage in the formal sector is the same as what Welch (1974) said, namely the results are negative.

Setting a minimum wage policy will reduce the demand for labour in the formal sector. This excess supply of labour in the formal sector will be absorbed by the informal sector, whose wage rate is not protected by the minimum wage policy. This excess supply of labour will result in the informal sector lowering wage rates. If the share of employment in the informal sector is lower, the impact on income distribution will worsen. As we can see in Figure 5, before the existence of the minimum wage policy, wages in the formal and informal sectors were assumed to be the same, namely at the level w^* (at the intersection of the supply curve S_c and the demand curve D_c in the formal sector, and on the supply curve S_u and D_u 's demand curve in the informal sector). With the increase in the minimum wage, the wage rate in the formal labour market, which was initially at w^* , eventually increased to $w. \bar{E}$). In the dual sector model, workers who lose their jobs in the formal sector will move to the labour market in the informal sector. The excess supply of workers in the formal sector which causes an increase in the supply of workers in the informal sector (E_u to $E'u$) causes a shift in the supply curve for workers in the informal sector from S_u to $S'u$, so that the wage rate in the informal sector decreases. When informal sector workers move to the formal sector, this causes a shift in the supply curve for workers in the informal sector to $S''u$, the number of workers falls to $E''u$, and the wage rate in the informal market increases.

The relative value of the minimum wage has shifted workers from the "queuing" unemployed to the openly unemployed population or the informal sector (Comola & De Mello, 2011). Honduras provides evidence supporting the dual-sector minimum wage model, which suggests that a change in the composition of the labour force i.e. a 10% increase in the minimum wage, reduces employment by 8% and increases by 5% in the informal sector. In particular, employment in the formal sector has decreased while the informal sector has increased (Ham, 2018). In addition, the research looks at the impact of minimum wage policies on the labour market in Chile, indicating that employment in the

private sector has increased relatively compared to the public sector (Navarro & Tejada, 2022).

Figure 3. Minimum Wage in the labour market



Source: Borjas, 2008.

A study on the impact of the minimum wage on employment by considering the spatial dependence of the labour market using IFLS (Indonesian Family Life Survey) data and the Annual Survey of Industrial Companies (SI), as well as statistical analysis of spatial differences Magruder (2013) found that a lower minimum wage has a negative effect on employment in the informal sector and has a positive effect on employment in the formal sector and is different from Yamagishi's (2021) spatial equilibrium model, where an increase in the minimum wage has a positive effect on the labour market as seen from the increased demand for housing rent.

The impact of the labour market depends on the elasticity of labour supply (as workers are more likely to leave the labour force than find work in the informal sector) and on the demand for and the size of the informal sector. The LIC shows a negative regulatory effect on the formal sector and a positive compensatory effect on the informal sector, the effect on aggregate employment and the unemployment rate is less clear/ambiguous (Nataraj et al., 2014). The results of Comola and De Mello's research (Comola & De Mello, 2011) show that an increase in the relative value of minimum wages in Indonesia is associated with a weakening of the informal sector, which is in line with previous empirical evidence. The most interesting result is that the increase in the minimum wage affects increasing the number of workers in the informal sector, which has an impact on increasing employment in the informal sector. The evidence from the Neumark and Munguía Corella study (Neumark & Munguía Corella, 2021) on the impact of minimum wages on employment in developing countries is contradictory. One explanation is that there is no clear evidence of the impact of unemployment in developing countries. In contrast, however, this study finds evidence that heterogeneity is systematic, with often more negative predictive effects in relatively more feature-rich studies where other factors are present. Institutional and competitive models more strongly predict negative effects. A study estimating the effect of the minimum wage on the German labour market using panel data regression at the level of industrialized countries found that there is a strong positive-negative effect of the minimum wage on the informal sector and a strong positive effect on workers in the formal sector

(Holtemöller & Pohle, 2020). Regarding the number of jobs, the results show a negative effect overall.

The labour market is becoming increasingly polarized as the formal sector workforce dwindles. In the flexible US labour market, this has limited impact on the labour market as strong labour market growth in the informal sector and low wages make it impossible for the working workforce to move to the high-wage formal sector. The OLS and IV estimates show that polarization has a negative impact on employment and participation rates in countries with only high minimum wages. Minimum wage increases reduce the likelihood of youth working in the covered (formal) sector, i.e. paid work in the covered sector, and increase the likelihood of youth working in the unreached (informal) sector, including self-employment, unpaid family work, and paid employment in the informal sector (Pratomo, 2016). The hypothesis in this study is as follows:

H1: Minimum wage has a positive impact on the absorption of formal-sector workers

H2: Minimum wages have a negative impact on employment in the informal sector

3. Data and Method

This analysis presents the determinants affecting the employment of the formal sector and the informal sector in the period from 2017 to 2021. This study uses all provinces in Indonesia, totalling 34 provinces in Indonesia, so an approach with panel data is used. Panel data is data that has spatial (individual) and time dimensions (D. Gujarati, 2004). In panel data, the same cross-section data is observed according to time. If each cross-section unit has the same number of time series observations it is called a balanced panel and vice versa if the number of observations is different for each cross-section unit it is called an unbalanced panel. Merging cross-section and time series data in panel data is used to overcome weaknesses and answer questions that cannot be answered by cross-section and time series models. The advantages of using panel data provide many advantages according to Baltagi (2005), including the following:

1. Able to control individual heterogeneity. This method of estimating can explicitly include individual heterogeneity elements.
2. Providing more and various data to reduce collinearity between variables, increase degrees of freedom, and be more efficient.
3. It is better for studying the dynamics of adjustment. Observation of repeated cross-sections, then panel data is better at studying dynamic changes.
4. Better at identifying and measuring effects that simply cannot be addressed in cross-sectional data only or time series data only.
5. Can be used to build and test more complex models than pure cross-section or time series data.

This analysis presents all good data using the Ordinary Least Square (OLS) method, fixed effects, and random effects into a research model that aims to determine whether the minimum wage affects the formal and informal sectors in Indonesia. The presentation of

the three methods above is used as a form of comparison in the research results. The specification of the method in the research is described as follows:

Common Effect / Ordinary Least Square

A common effect is a combination of cross-section data and time series data. This approach assumes that there are similarities in data behaviour between individuals in various periods because they do not pay attention to the time and individual dimensions of research observations. This model is estimated using the Ordinary Least Square (OLS) method. The equation is written as follows:

$$y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

Where y_{it} and x_{it} are the dependent variables and independent variables for each individual i in period t , α is the intercept, while the slope is written as β . Furthermore, ε_{it} is the residual/error value for each individual i in period t .

Fixed Effect

The fixed effect approach is based on different intercepts between individuals, but is time-invariant, while the slope in this model is the same or fixed. This model uses a dummy variable to determine whether there are intercept differences between individuals. The technique commonly used is called the Least Square Dummy Variable (LSDV), which is a fixed effect model using a dummy variable for each unit cross-section to be able to capture differences between individuals. The model equation is as follows:

$$y_{it} = \alpha + \beta_1 X_{it} + \beta_2 D_{1i} + \varepsilon_{it} \quad (2)$$

Random Effect

The random effect model is an estimation model that assumes that there are intercept differences both between individuals and over time. The difference between the two intercepts can be accommodated as an error. Because there are two kinds of error components in the random effects model that can contribute to the formation of errors, the errors will be broken down into individual and time component errors. The parameter estimation of this model uses Generalized Least Square (GLS). Adapt model specifications as follows:

$$y_{it} = \alpha + \beta_1 X_{it} + \beta_2 X_{1i} + \varepsilon_{it}; \quad \varepsilon_{it} = u_{it} + v_{it} + w_{it} \quad (3)$$

where:

- u_{it} = error component between individuals
- v_{it} = intertemporal error component
- w_{it} = combined error component

In this study, the type of data used is secondary data obtained from several data providers that have been published. The data used in this study are described in the following table:

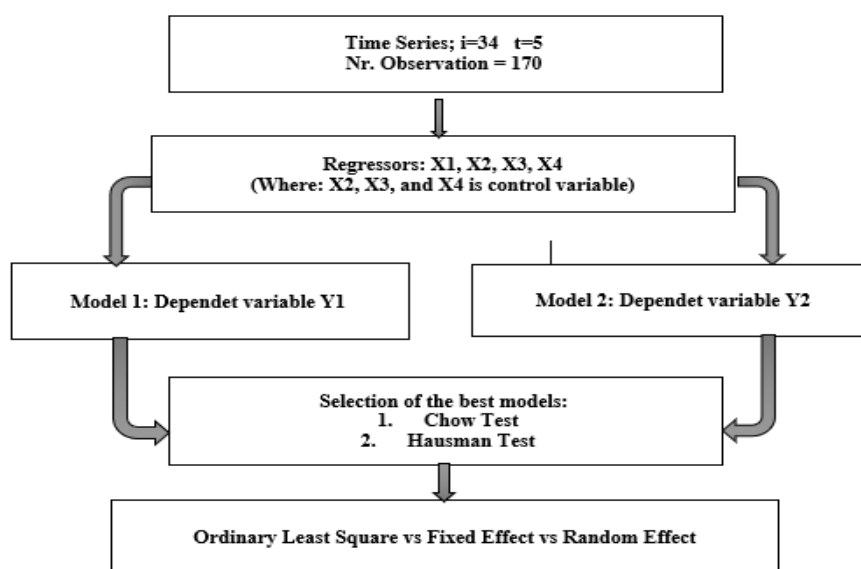
Ariani, Pratomo, D. S., Ekawaty, M., Kaluge, D. (2024). *Absorption of Formal and Informal Sector Workers through the Minimum Wage: Studies in Indonesia.*

Table 2. Description of Research Variables

Variable	Description of Variable	Research Study by
Dependent Variable		
Formal Sector	Percentage of formal sector workers	Hohberg & Lay (2015); Ham (2018); Neumark (Neumark & Munguía Corella, 2021)
Informal Sector	Percentage of informal sector workers	Comola & De Mello (2011); Nataraj et al. (2014); Pratomo (2016)
Independent Variable		
Minimum Wage	The minimum wage of each province in Indonesia	Roosmawarni (2015); Ham (2018); Susilowati & Wahyuni (2019); Neumark (Neumark & Munguía Corella, 2021)
Control Variable		
Productive Age Population	Number of the labour force	Muravyev & Oshchepkov (2013); Brzezinski (2017)
Education	Number of the labour force with higher education	Hohberg & Lay (2015); Amar Jusman (2018)
GRDP	Gross Regional Domestic Product	Hohberg & Lay (2015)

This study uses Stata software to be able to measure the relationship between the variables to be studied. The research design is explained in the following figure:

Figure 6. Design of the analysis



4. Empirical Results

Research on the impact of the minimum wage on employment in developing countries is limited. The conventional theoretical framework is a dual economy or two-sector economy,

in which the formal sector operates as in the neoclassical model (eg increases in the minimum wage in the labour market), and minimum wage provisions do not apply in the informal sector ((Fang & Lin, 2015); (Menon & Rodgers, 2018); Mincer, 1976; Brown et al., 1982). So that an increase in the minimum wage reduces the labour market in the formal sector and increases the informal sector, where workers from the formal sector are concentrated in the informal sector. The results of Comola and De Mello's research (Comola & De Mello, 2011) show that an increase in the relative value of the minimum wage in Indonesia is associated with a weakening of the informal sector.

Table 3. Statistic descriptive

Variable	Obs	Mean	Std.dev	Min	Max
Formal sector	170	41.235	10.586	19.53	71.55
Informal Sector	170	58.767	10.595	28.45	80.47
Minimum Wage	170	163.763	37.204	89.41	295.17
GRDP	170	10.481	0.542	9.381	12.072
Productive Age	170	14.582	1.022	12.709	17.024
Education	170	12.320	0.983	10.024	14.629

Source: Stata, processed data (2023).

Table 3 describes the statistical description of each variable. The number of observations is 170 data originating from 34 provinces in Indonesia from 2017 to 2021. The dependent variables used are the formal sector and the informal sector, the results of the statistical analysis explain that the formal sector has a mean of 41,235 and the informal sector is 58,767. The two sectors, both formal and informal sectors have different *min* and *max* values. The results explain that the informal sector dependent variable has a max value of 80.47 while the min number comes from the formal sector with a value of 19.53.

The main variable in this study is the minimum wage variable which is used in USD currency to capture inter-year inflation. The results of the statistical analysis explain that the highest minimum wage value is USD 295.17 which is in the DKI Jakarta province in 2021 and the lowest is in the DI Yogyakarta province in 2017 amounting to USD 89.41. The standard deviation value describes the distribution of data in the sample that is close to the mean or average value. If seen from the distribution of data from the research sample, the formal sector-dependent variable has a standard deviation value that is not far from the average value. This means that the sample data used can represent the entire population used in the study. Meanwhile, the independent variable in the form of the minimum wage has a standard deviation value that is very different from the average value. This condition indicates that there are various samples or a very wide distribution of sample data.

Maarek and Moiteaux (2021) studied the effect of decreasing the proportion of formal labour in the labour market and the level of participation, depending on the level of the minimum wage, on the local European labour market. An increase in the minimum wage in the formal sector using microanalysis found a decrease in labour absorption (Del Carpio et al., 2015) and Hohberg & Lay (Hohberg & Lay, 2015) found different results, where the minimum wage has led to an increase in labour absorption capacity work using macro analysis. Variations in data between districts within the province using panel data reveal the

impact of reduced employment in the formal sector due to an increase in the minimum wage. The results of the analysis carried out in this study are described in Table 4.

Table 4. Result of analysis

	Formal Sector			Informal Sector		
	OLS	FE	RE	OLS	FE	RE
Minimum Wage	-0.049*** (0.019)	-0.030 (0.022)	-0.049*** (0.019)	0.041** (0.019)	0.021 (0.022)	0.041** (0.019)
lnProductiveage	-3.343** (1.552)	-3.190** (1.554)	-3.343** (1.552)	2.824* (1.541)	2.649* (1.540)	2.824* (1.541)
LnEduc	3.517** (1.592)	3.611** (1.598)	3.517** (1.592)	-2.996* (1.581)	-3.088* (1.585)	-2.996* (1.581)
lnGRDP	15.537*** (1.235)	14.856*** (1.287)	15.537*** (1.235)	-15.532*** (1.226)	-14.798*** (1.276)	-15.532*** (1.226)
Constant	-108.129*** (13.738)	-107.520*** (13.683)	-108.129*** (13.738)	210.500*** (13.641)	209.913*** (13.568)	210.500*** (13.641)
Observations	170	170	170	170	170	170
R ²	0.551	0.555		0.558	0.564	
Adj. R-sq	0.540	0.533		0.548	0.543	

Note: The value in brackets is the standard error. (*)(**)(***) describes the (10)(5)(1) percent level of significance
 Source: Stata, Data Processed 2023

Table 4 explains that an increase in wages can lead to a decrease in the formal sector and an increase in the informal sector. This is because when there is a decrease in the workforce it will cause a shift in the informal sector so that it can make an increase in the sector and vice versa. The results of this study are following previous research conducted by Comola & De Mello (Comola & De Mello, 2011).

The results of the study explain that the formal sector has a negative relationship to the minimum wage. An increase in the minimum wage will reduce the absorption of formal sector workers by 0.049. Meanwhile, the informal sector has a positive relationship with the minimum wage, where an increase in the minimum wage will increase the employment of the informal sector. This explains the absorption of labour in the formal sector against the informal sector. The selection of other control variables, both using the workforce, education, and economic growth, shows a significant influence on employment in the formal sector and the informal sector.

Table 5. Selection of the best model

Best Model	Chow Test	Hausman Test
Formal Sector	0.2527	0.4744
Informal Sector	0.2153	0.1114

Source: Stata, Data Processed (2023).

The results of selecting the second-best model used the formal sector dependent variable. The results of the Chow test explained that the P value ($\text{prob} > \chi^2$) > alpha 0.05 which has a value of 0.2527, the best choice is used by OLS. The same is true for the formal sector. The Hausman test is still being carried out to check the accuracy of the analysis results. On

the results of the Hausman test, it is explained that the p-value ($\text{prob} > \chi^2$) $>$ α 0.05 is 0.4744, so the best choice is Ordinary Least Square.

5. Discussion and Conclusion

Economic development and development in other fields always involve human resources as one of the agents of development, therefore the population in a country is the main element in development. A large population does not always guarantee the success of development and can even become a burden for the sustainability of this development. A population that is too large and disproportionate to the availability of jobs will result in part of the population who are of working age not getting a job. The dimensions of the employment problem are not just limited fields or job opportunities and low productivity, but are far more serious with different causes. In the past decade, the main problem has centred on the failure to create new jobs at a rate commensurate with the growth rate of industrial output. In line with the changing macroeconomic environment of the majority of developing countries, the rapidly increasing number of stimulus was mainly due to "limited demand" for labour, which was further reduced by external factors such as deteriorating payment conditions, increasing foreign debt problems and other policies, which in turn has led to a decline in industrial growth, wage rates, and ultimately, providing employment (Todaro, 2000).

The minimum wage policy is a wage system that has been widely implemented in several countries, which basically can be seen from two sides. First, the minimum wage is a means of protection for workers to maintain that the value of the wages received does not decrease in meeting their daily needs. Second, as a means of protection for companies to maintain worker productivity (Simanjuntak, 1992 in Gianie, 2009). Wages depend on subsistence needs, namely seeing the minimum needs required by workers in order to survive. The minimum needs referred to by Ricardo are needs that depend on the environment and culture. If the standard of living increases, the wages demanded of workers also increase (Nugroho et al., 2022). Wages are defined as the price for the use of labour, this is the result of an agreement on labour demand and labour supply. The minimum wage can be adjusted based on the factors that affect the payment of payments, namely the value of economic growth, inflation and other variables.

This study aims to determine the effect of the minimum wage on employment opportunities in the formal and informal sectors. The results of the study explain that the minimum wage significantly affects employment in the formal and informal sectors. The minimum wage has a significant positive effect on the informal sector, while the formal sector has a significant negative effect. So we can see that an increase in the minimum wage can cause a decrease in the formal sector and an increase in the informal sector with the assumption that a decrease in employment in the formal sector will be absorbed in the informal sector so that there is a difference between employment opportunities due to an increase or decrease in the minimum wage. The absorption of labour is expected to improve people's welfare. absorption of labour will directly increase household income which can be used in improving the quality of life. Improving the quality of life carried out by the community

can help reduce poverty in Indonesia, which is a common goal in supporting the Sustainable Development Goals (SDGs).

The results of other studies explain that the workforce which is included in productive society groups has a negative relationship with the formal sector, and conversely has a positive relationship with the informal sector. Meanwhile, education is an investment that will improve the quality of human resources, including labour in an area. Education can also be used as a workforce capital to get better and decent jobs. Educated or highly educated workers, including industrial workers, will certainly have better cognitive abilities and skills compared to uneducated or low-educated workers, so they tend to be more easily absorbed into leading sectors, including them. industrial sector. The results of other studies explain that included education has a positive relationship with the formal sector, and vice versa has a negative relationship with the informal sector. this illustrates that an increase in education will be able to increase the opportunity for the community to be able to participate in absorbing the formal workforce, while the informal sector has smaller opportunities to absorb the workforce. This increase in education is in line with the desire of the community to participate more in the formal sector. This is supported by research conducted by (Yunie, 2020; Hilmi, 2022).

In addition to improving education, an increase in the economic growth of a region must be continuously improved so that it can balance with the conditions of society. Economic growth is a macro indicator of development success so that all countries try to achieve high economic growth in order to create social welfare, especially for developing countries. The results of the research conducted explain that growth has a positive effect on the absorption of formal sector workers, and vice versa has a negative effect on the absorption of the informal sector. This illustrates that an increase in the economy of a region will help people's welfare, especially in the formal sector. This is in accordance with research conducted by (Panca Erni, 2017; Claudiu, 2013)

Based on the results of the research as a whole, it is explained that there are various factors that affect employment, both in the formal sector and the informal sector. Overall, the results of the research show that there is a significant difference between the magnitude of changes in the absorption of the two sectors. The formal sector and the informal sector have results that tend to be the opposite, this is because there is a shift in labour absorption depending on the influencing factors. The main results that are the focus are the negative effect between the formal sector and the minimum wage, as well as the positive effect between the informal sector and the minimum wage.

References

- Agarwal, N., Azad, A., Shore, N. D., Carles, J., Fay, A. P., Dunshee, C., Karsh, L. I., Paccagnella, M. L., Santo, N. Di, Elmeliegy, M., Lin, X., Czibere, A., Fizazi, K. (2022). Talazoparib plus enzalutamide in metastatic castration-resistant prostate cancer: TALAPRO-2 phase III study design. - *Future Oncology*, Vol. 18, N 4. <https://doi.org/10.2217/fon-2021-0811>.
- Brzezinski, A. (2017). Synergies in Labour Market Institutions: the Nonlinear Effect of Minimum Wages on Youth Employment. - *Atlantic Economic Journal*, 45(2), pp. 251-263. <https://doi.org/10.1007/s11293-017-9537-7>.
- Cengiz, D., Dube, A., Lindner, A., Zipperer, B. (2019). The Effect of Minimum Wages on Low-Wage Jobs. - *The Quarterly Journal of Economics*, 134(3), pp. 1405-1454. <https://doi.org/10.1093/qje/qjz014>.

- Clemens, J., Wither, M. (2019). The minimum wage and the Great Recession: Evidence of effects on the employment and income trajectories of low-skilled workers. - *Journal of Public Economics*, 170, pp. 53-67. <https://doi.org/10.1016/j.jpubeco.2019.01.004>.
- Comola, M., De Mello, L. (2011). How Does Decentralized Minimum Wage Setting Affect Employment And Informality? The Case Of Indonesia. - *Review of Income and Wealth*, 57(SUPPL. 1). <https://doi.org/10.1111/j.1475-4991.2011.00451.x>.
- Del Carpio, X., Nguyen, H., Pabon, L., Wang, L. C. (2015). Do minimum wages affect employment? Evidence from the manufacturing sector in Indonesia. - *IZA Journal of labour and Development*, 4(1). <https://doi.org/10.1186/s40175-015-0040-8>.
- Fang, T., Lin, C. (2015). Minimum wages and employment in China. - *IZA Journal of labour Policy*, 4(1), 22. <https://doi.org/10.1186/s40173-015-0050-9>
- Ham, A. (2018). The Consequences of Legal Minimum Wages in Honduras. - *World Development*, 102, pp. 135-157. <https://doi.org/10.1016/j.worlddev.2017.09.015>.
- Harasztosi, P., Lindner, A. (2019). Who Pays for the Minimum Wage?. - *American Economic Review*, 109(8), pp. 2693-2727. <https://doi.org/10.1257/aer.20171445>.
- Hohberg, M., Lay, J. (2015). The impact of minimum wages on informal and formal labour market outcomes: evidence from Indonesia. - *IZA Journal of labour and Development*, 4(1). <https://doi.org/10.1186/s40175-015-0036-4>.
- Holtmøller, O., Pohle, F. (2020). Employment effects of introducing a minimum wage: The case of Germany. - *Economic Modelling*, 89(November 2018), pp. 108-121. <https://doi.org/10.1016/j.econmod.2019.10.006>.
- Maarek, P., Moiteaux, E. (2021). Polarization, employment, and the minimum wage: Evidence from European local labour markets. - *Labour Economics*, 73(December 2019), 102076. <https://doi.org/10.1016/j.labeco.2021.102076>.
- Magruder, J. R. (2013). Can minimum wages cause a big push? Evidence from Indonesia. - *Journal of Development Economics*, 100(1), pp. 48-62. <https://doi.org/10.1016/j.jdeveco.2012.07.003>.
- Menon, N., Rodgers, Y. van der M. (2018). Child labour and the minimum wage: Evidence from India. - *Journal of Comparative Economics*, 46(2), pp. 480-494. <https://doi.org/10.1016/j.jce.2017.09.001>.
- Mincer, J. (1976). Unemployment Effects of Minimum Wages. <https://doi.org/10.1086/260534>, 84(4, Part 2), S87-S104. <https://doi.org/10.1086/260534>.
- Muravyev, A., Oshchepkov, A. Y. (2013). Minimum Wages and labour Market Outcomes: Evidence from the Emerging Economy of Russia. - *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2255896>.
- Muravyev, A., Oshchepkov, A. Y. (2021). Minimum Wages, Unemployment and Informality: Evidence from Panel Data on Russian Regions. - *SSRN Electronic Journal*, 7878. <https://doi.org/10.2139/ssrn.2377614>.
- Nataraj, S., Perez-Arce, F., Kumar, K. B., Srinivasan, S. V. (2014). The Impact Of labour Market Regulation On Employment In Low-Income Countries: A Meta-Analysis. - *Journal of Economic Surveys*, 28(3), pp. 551-572. <https://doi.org/10.1111/joes.12040>.
- Navarro, L., Tejada, M. M. (2022). Does public sector employment buffer the minimum wage effects?. - *Review of Economic Dynamics*, 43, pp. 168-196. <https://doi.org/10.1016/j.red.2021.02.004>.
- Neumark, D., Munguia Corella, L. F. (2021). Do minimum wages reduce employment in developing countries? A survey and exploration of conflicting evidence. - *World Development*, 137, 105165. <https://doi.org/10.1016/j.worlddev.2020.105165>.
- Nuhradi, M., Widyawati, D. (2019). Dampak Upah Minimum Terhadap Penyerapan Tenaga Kerja Sektor Formal Dan Informal: Analisis Spasial. - *Jurnal Ekonomi-Qu*, 9(1), pp. 97-117. <https://doi.org/10.35448/jequ.v9i1.5442>
- Pratomo, D. S. (2014). Does minimum wage affect hours worked of paid employment in Indonesia?. - *International Journal of Social Economics*, 41(5), pp. 362-379. <https://doi.org/10.1108/IJSE-01-2013-0009>.
- Pratomo, D. S. (2016). How does the minimum wage affect employment statuses of youths?: evidence of Indonesia. - *Journal of Economic Studies*, 43(2), pp. 259-274. <https://doi.org/10.1108/JES-07-2014-0131>.
- Pratomo, D. S., Mahardika, P., Saputra, A. (1945). 108-Article Text-242-1-10-20120516. 269-284.
- Roosmawarni, A. dan S. (2015). Analisis Pertumbuhan Ekonomi Dan Transformasi Struktural Di Provinsi Jawa Timur Tahun 2000-2010. - *Jurnal Ekonomi Dan Bisnis*, 1, pp. 13-25.
- Sumarsono, S. (2003). *Ekonomi manajemen sumberdaya manusia dan ketenagakerjaan: Vol. Pertama (Pertama)*. Graha Ilmu.
- Susilowati, L., Wahyuni, D. (2019). Pengaruh Upah Minimum Terhadap Penyerapan Tenaga Kerja Bidang Industri Di Indonesia. - *Equilibrium: Jurnal Ekonomi-Manajemen-Akuntansi*, 15(2), 222. <https://doi.org/10.30742/equilibrium.v15i2.699>.
- Welch, F. (1974). Minimum Wage Legislation In The United States. - *Economic Inquiry*, 12(3), pp. 285-318. <https://doi.org/10.1111/j.1465-7295.1974.tb00401.x>.
- Yamagishi, A. (2021). Minimum wages and housing rents: Theory and evidence. - *Regional Science and Urban Economics*, 87(February), 103649. <https://doi.org/10.1016/j.regsciurbeco.2021.103649>.
- Zhao, N., Sun, M. (2021). Effects of minimum wage on workers' on-the-job effort and labour market outcomes. - *Economic Modelling*, 95(March 2020), pp. 453-461. <https://doi.org/10.1016/j.econmod.2020.03.012>.