Effect of Minimum Wage on Household and Education

1. Research Question

I am planning to investigate the potential effect of minimum wage policy on education, particularly through the perspective of household. The specific question that set the bound of my research is *How will households adjust human capital investment via education as a result of minimum wage policy?* Finding an answer to this research question will offer some explanation on household level dynamics that may have been a driving force of the policy outcomes observed in the previous researches as well as giving a more integrated insight on the welfare effect of minimum wage. A possible extension of this research is to investigate how the change in education as a result of minimum wage affect income-earning potential of young workers over the long run, but at this time my research is limited to test the effect on education.

2. Motivation: Issue of Interest

The controversy surrounding minimum wage policy is a subject of many debates in both the academics and political arena. The policy is celebrated by its proponents as a means of alleviating income disparity and denounced by its opponent for the risk of displacing workers and choking firms’ competitiveness with increased labour cost. While there is little dissent regarding the positive effect of the policy on formal sector wage rate (given successful enforcement), the effect of the policy on employment is by far a more controversial topic. Often, the employment effect of the policy is shown to be varying across different labour markets, especially in the face of limitation of enforcing the policy on informal labour sector. Early researches into the field such Stigler (1946) noted the adverse effect on minimum wage as a result of distortions in labour market. While the analysis is consistent with traditional model of competitive labour market, more recent empirical researches using econometric analysis did not find significant negative effect of raising minimum wage on employment (Card & Krueger 1993; Machin & Manning 1997). The inconclusive outcomes on employment suggest an unobserved dynamics at work at the level of labour market that may have driven the employment effect. Subsequent researches identified some of these variables as hiring firms’ monopsony power (Dicken et al 1999) and firm-sponsored training (Acemoglu and Pischke 1999)

In addition to labour market and firm-side analysis, behavioral change at the household level can also be the driver of employment effect, such as increasing market size of the local firms through increased household spending (Magruder 2013). In this context, rather than looking at the direct labour
market implication, I intend to take a more household-oriented approach and investigate the manner in which households change their educational investment in response to the policy. I find that this is a lacking area in the current literature as there are comparatively fewer researches that address the relationship between minimum wage and educational attainment as well as a lack of universal consensus among previous researches. Cahuc and Michel (1996) suggested that the more competitive labor market environment in lower wage sector can incentivize individuals to increase investment their human capital investment to mitigate the risk of being unemployed. However, numbers of empirical researches on the United States had also noted that higher minimum wage to induce incentive for teenager to transition from schooling to work and hence lead to reduction of school enrollment (Neumark & Wascher 1997; Chaplin et al 2003). Additionally, I have not found any previous researches linking education and minimum wage that was conducted at a household-level, especially in the setting of developing economy. By investigating the relationship at the level of household, I hope to uncover some of the household-level dynamics resulting from minimum wage that may not be visible from the previous state or provincial level regressions.

3. Underlying Economic Theory

Instead of labour market model typically used to study minimum wage in the context is increase in labour cost, I will take a more household-oriented approach. I have not found a formal economic model that is a suitable representation of the topic, probably due to its very limited nature. Hence, I will proceed through the analysis using an ad hoc model of intergeneration household based on basic economic rationality. Consider a basic two generations model with adult and child. In each period, the adult can only work and earn either high-skilled wage ($W_{HS}$) or minimum wage ($W_{MW}$) and decide whether to put the child in school (in which case, no income is earned) or to work at minimum wage. In each subsequent period, the child becomes an adult, have a child of his own, and either find employment in high-skilled sector with probability ($p$) or minimum wage sector with ($1 - p$). Educated children find employment in high skilled sector with ($\tilde{p}$) such that ($\tilde{p} > p$). Each individual gain utility from both their lifetime income and the expected income of their immediate offspring. In this framework, the benefit of education is additional probability of gaining the difference between wage of high-skilled labour and minimum wage and the cost of education is the foregone minimum wage from not sending the child to work.
From the household perspective, successful enforcement of minimum wage policy has two implications on educational investment (assuming that wages above the minimum are not affected). First, an increase in minimum wage reduces the potential gain from education as well as increasing the cost of foregone minimum wage. Consequently, some of the affected households might find it optimal to substitute the child’s education for work. By itself, this analysis indicates a deleterious consequence of increasing minimum wage in the form of lower human capital in the labour market on the aggregate level and as an increasing difficulty for the new cohorts of less educated workers to move on to higher pay skilled employment on the household level. However, without the access to credit market for household to borrow against their potential human capital, it is possible that a number of households are constrained from making their optimal investment in education. In which case, a positive shock to their wage earners’ income through minimum wage can lead to an increase in educational investment as the household shift their allocation closer toward their optimal investment plan. From this theoretical framework, the number of households that decide to invest in education are affected by two opposing dynamics. The ultimate direction of the minimum wage effect on education is thus dependent whether the positive income effect or the negative substitution effect induces a stronger change. Untangling this ambiguity regarding the effect on education will be one of the goal of study.

4. **Data Sources**

For this research, I will focus on the post-90 Indonesia, where minimum wage rate was subjected to continual above inflation increase (Rama 2001). In addition to the policy background, Indonesia has two main significances as the setting of this research. First, the level of income inequality tends to be higher in developing countries, implying a more stringent budget constraint on the household and hence more visible income effect. Second, the presence of large informal labour sector, which is not covered by the minimum wage, can be utilized as a control group for the income effect. Previous research on Indonesia’s minimum wage policy indicated that the policy has statistically insignificant effect on the income of workers in informal sector (Hohberg & Lay 2015).

I will use the data from Indonesia Family Life Survey (IFLS) conducted in 1993, 1997, 2000, and 2007, available from the RAND Corporation website. The IFLS is an individual level longitudinal survey with numerical code indexing individuals by their household across each survey wave. Across the 4 survey waves, the data set contains roughly 15,000 households and 66,000 individuals. Among which, roughly 12,000 households and 30,000 individuals are available for all survey years. The IFLS contains
most of the variables required to construct an unbalanced panel of individuals across 4 time periods, including the dependent variable of educational status (whether the individual is currently in school) and controls for their characteristic (e.g., household income, number of working adults and children, parents’ education, education costs). The macro-economic variables are publically available from Indonesian Bureau of Statistics, particularly the independent variable of Indonesia’s provincial minimum wage from 1997-2007 and other macroeconomic controls (e.g., provincial GDP).

The IFLS has two particular advantages for this research. First, the data set allows individuals to be categorized by household unit, which makes it possible to associate the education variable on each individual observation with the household level characteristic as additional controls. Second, the IFLS allows inclusion of individuals in the informal labour sector and their income approximated through reported monthly profit. Formal and informal sector workers are categorized based on self-reported work category in the survey (categories such as “self-employed” and “unpaid family workers” are considered to be representative of informal sector).

5. Empirical Strategy

To capture the effect on the change in education, I propose using the linear probability model with fixed effect, which is a variant of the model that Hohberg and Lay (2015) used to study to effect of minimum wage on employment.

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schl_{i,t}^F = \beta_0^F + \beta_1^F \ln MW_{j,t} + \gamma_1^F X_{i,t} + \gamma_2^F Y_{j,t} + \alpha_i + \delta_t + \varepsilon_{i,t}, \quad educ_{i,t}^F \in \{0,1\} \tag{1}
\]

\[
schl_{i,t}^{IF} = \beta_0^{IF} + \beta_1^{IF} \ln MW_{j,t} + \gamma_1^{IF} X_{i,t} + \gamma_2^{IF} Y_{j,t} + \alpha_i + \delta_t + \varepsilon_{i,t}, \quad educ_{i,t}^{IF} \in \{0,1\} \tag{2}
\]

\(schl_{i,t}\) is a binary variable indicating whether an individual \(i\) under age 25 is in school at time \(t\). Age of 25 is set for the regression based on the IFLS own categorization of the surveyed individuals to answer questions regarding educational status. The superscript \(F\) categorizes whether the individual belongs to a household with at least one income-earner working in formal sector, and \(IF\) for individuals whose household work in informal sector. \(\beta_1^F\) and \(\beta_1^{IF}\) is the coefficient of interest, measuring the effect of minimum wage in province \(j\) at time \(t\) for households in formal and informal sector, respectively. \(X_{i,t}\) is a vector of individual specific control variables and \(Y_{j,t}\) is a vector of macroeconomic control at the provincial level. \(\alpha_i\) captures individual fixed effect, \(\delta_t\) captures time fixed effect, and \(\varepsilon_{i,t}\) is the generic
error term. The usage of linear probability model is limited by the assumption of constant marginal effect which may result in the predicted probability being outside of the [0,1] range. However as the study is mainly concern with the sign of the minimum wage coefficient, I assume that the model should still be suitable. A possible refinement of the model can be made by transforming equation (1) and (2) into a conditional logit model to keep the probability of being in school bounded within [0,1].

The main difficulty of estimating the effect of minimum wage on education is due to the presence of both positive income effect and negative substitution effect. Hence, I propose the following identification strategy. Theoretically, only the formal labor sector should experience the positive income effect. The result of Hohberg and Lay (2015) that minimum wage had an insignificant effect on the income of workers informal labour sector seems to verify this assumption (no spill-over effect of the policy on informal income). The negative substitution effect, however, should equally applied to both sector given the same rise in minimum wage. In which case, $\beta_1^{IF}$ should be able capture the negative substitution effect and the difference term $(\beta_1^F - \beta_1^{IF})$ should capture the aggregate positive income effect. If the prediction of the model is correct then $\beta_1^{IF}$ should be negative and $(\beta_1^F - \beta_1^{IF})$ positive. This interpretation is based on the assumption that the child’s employability in the formal employment at minimum wage is not conditioned on whether the parents are working in informal or formal sector (same negative substitution effect for both sector). The test for this assumption can be approximated by comparing the minimum wage coefficient of formal and informal sector regressions that involves only the individuals belonging to a household whose income is above the minimum wage and hence is not likely to experience the positive income effect. Finally, to ensure that the income effect is driven by household who benefited from minimum wage, I plan to run a separate regression including only formal sector households that reported wage below the minimum in the first survey wave. The positive effect should be stronger given this specification, if the above assumption is true. Lastly, further specifications to the model can be made categorizing $educ_{i,t}$ by primary, secondary, and post-secondary education to check for possible asymmetry of the minimum wage effect by education level.

As a robustness check, I intend to repeat the regression using the minimum wage in years previous to the survey to capture potential lagged effect before the minimum wage affect households’ wealth and hence educational investment as well as any possible friction before an individual can transfer from school to work. Since the minimum wage is set at a provincial level, the study should be able circumvent issue with reverse causality by using an individual level regression. However, there is still a risk of the simultaneity bias such as local economic shock that may cause the province minimum wage to
rise along with access to education (such as large-scale investment projects that lead to concentration of population in a denser community). To control for this potential bias, I will attempt repeat the regression with a suitable IV for provincial minimum wage, which will be tested at a later stage of the study.

Bibliography


