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## The Impact of Minimum Wage Policy on Wages and Employment in Developing Countries: The Case of Indonesia

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## **Abstract**

Since the late 1980s, minimum wages have become an important plank of the Indonesian government's labour policy. Minimum wages have increased faster than average wages and GDP. As a result, minimum wages have become binding for the majority of workers. This study finds that minimum wages have a positive but statistically insignificant impact on average wages. On the other hand, minimum wages have a negative and statistically significant impact on employment. In particular, the disemployment impact is greatest for women, youth, and less educated workers. However, the employment prospects of white-collar workers are enhanced by increases in minimum wages.

JEL Classification: J23, J31, J38

Key words: Minimum wage, wages, employment, developing countries, Indonesia

## **I. Introduction**

Although minimum wages were first introduced in Indonesia in the early 1970s, their importance did not gain much attention until the late 1980s when the government began to make minimum wages an important plank of its labour market policies. In the first half of 1990s, the government tripled minimum wages in nominal terms and more than doubled in real terms in a period of just five years. During the second half of the 1990s, nominal minimum wages continued to increase, but in real terms began to taper off after 1996 and fell significantly in 1998 due to the high inflation that swept the country during the economic crisis.<sup>1</sup>

However, the importance of minimum wages as a key element of economic and social policy has reappeared in 2000 and 2001. In these two consecutive years, the levels of minimum wages were increased very significantly. As a result, the levels of real minimum wages in 2001 are estimated to be already higher than their peak pre-crisis levels in 1997. Critically, this was all done in the backdrop of an economy which was still struggle to recover after a major economic crisis. After a massive economic contraction of 13.7 percent in 1998 and near zero economic growth in 1999, the economy grew by around 5 percent in 2000 and various estimates put the economic growth in 2001 to a lower level, ranges between 3 to 3.5 percent.

Both theoretically and empirically, there is no consensus on the direction and magnitude of the likely impact of minimum wages on employment. At the theoretical

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<sup>1</sup> Indonesia was hit by an economic crisis starting in the mid of 1997. The impact of the crisis still evolves in 2001, four years after the crisis started. See Feridhanusetyawan (1999) and Manning (2000) for discussions on the impact of the crisis on the labour market.

level, a competitive labour market model predicts that a minimum wage established above the equilibrium market wage will cause a reduction in employment and create unemployment. On the other hand, a monopsonistic labour market model predicts that a minimum wage set above the monopsony wage level (but below the competitive wage level) will increase employment.

Whether a country's labour market is closer to the competitive or monopsonistic model is an empirical matter. However, observers generally have maintained that the Indonesian labour market — particularly real wages — is flexible.<sup>2</sup> There is no evidence to characterise the Indonesian labour market as monopsonistic, with the minor possible exception of some large, isolated employers in the outer islands.<sup>3</sup>

In the context of developed countries, the recent controversy on the impact of minimum wages on employment has focused around the findings of Card and Krueger (1994). Based on data collected through a telephone survey of fast-food restaurants, they compare employment changes in two states in the United States. They find that restaurants in New Jersey, where the minimum wage was increased, expanded their workforce relative to restaurants in Pennsylvania, where there was no change in the minimum wage.

This finding has been challenged by many, notably by Neumark and Wascher (1995). They re-evaluate the evidence from Card and Krueger finding using different data, obtained from actual payroll records. They find that the minimum wage increase in

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<sup>2</sup> See Feridhanusetyawan (1999) and Manning (2000).

<sup>3</sup> For the most recent comprehensive review of the Indonesian labour market, see Manning (1998).

New Jersey actually led to a decrease in employment in this state relative to the Pennsylvania control group.

A similar controversy has occurred in the context of developing countries. Castillo-Freeman and Freeman (1992) analyse the imposition of U.S. minimum wage norms in Puerto Rico. They estimate that elasticity of employment to minimum wage in this country is around  $-0.5$ . Hence, they assert that the imposition of U.S. minimum wage has led to massive job loss on the island. Krueger (1995), however, disputes this finding on methodological grounds and argues that the evidence of a negative employment impact of the imposition of U.S. minimum wage in Puerto Rico is statistically fragile.

Meanwhile, Bell (1997) contrasts the cases of Mexico, where minimum wages are very low relative to average wages, and Columbia, where minimum wages are much closer to the mean. She finds that the disemployment impact of minimum wages is zero in Mexico but substantial in Columbia. Similarly, based on a study of eight Latin American countries, Maloney and Nuñez (2001) find minimum wages have significant implication for employment and affect wage distribution, not only in the neighbourhood of the minimum wages but also in the higher reaches of the distribution and in the informal sector.

In the context of Indonesia, the first serious attempt to assess the impact of minimum wage policy on the labour market was conducted by Rama (1996).<sup>4</sup> He finds that minimum wages have a modest impact on labour market outcomes. Based on the results of his analysis, he concludes that the doubling of the minimum wage in the first half of 1990s has led to an increase in average wages in the range of 5 to 15 percent, and

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<sup>4</sup> Subsequently published as Rama (2001).

a decrease in urban wage employment in the range of 0 to 5 percent. However, he suggests that the disemployment impact appeared to be considerable in small manufacturing firms.

This finding has been challenged by Islam and Nazara (2000). They argue that the Indonesian regional minimum wage policy has not impaired employment prospect. They also argue that there is no evidence that minimum wage-induced increases in domestic labour costs have eroded business profitability in large and medium-scale manufacturing. Based on the results of their analysis, they propose that if Indonesia achieves annual economic growth of four percent, real minimum wages can be increased by 24 percent annually without incurring net job losses.

This current study offers a reassessment of the impact of minimum wage policy on labour market outcomes in Indonesia, in particular in the urban formal sector. In this study, the wage and employment impacts of minimum wages are investigated through an econometric approach using the data from the National Labour Force Surveys (Sakernas). Different from previous studies on labour market impact of minimum wages in Indonesia which have only focused on the impact for the whole aggregate of workers, this study also assesses the impact for different types of workers.

The remainder of the paper is organised as follows. Section two highlights the Indonesian regional minimum wage policy. Section three describes the sources of the data used in this study. Section four discusses the trends in the Indonesian minimum wages. Section five analyses the changes in wage distribution due to the imposition of minimum wages. Section six investigates the impact of the minimum wage policy on



average wage and employment level. Section seven provides the conclusions and implications of the results of this study.

## **II. The Indonesian Minimum Wage Policy**

During the 1970s and 1980s, the Indonesian government practically did not intervene in wage determination, nor did it enforce regulations on the laying-off of workers. In addition, the government tightly controlled the labour movement by allowing only one government-sanctioned labour union. As a result, as noted by Manning (1994), there was little effective direct government or union involvement in the setting of wages.

The late 1980s, however, witnessed many changes in the Indonesian labour market, two of which are especially important. Firstly, several independent labour unions were established despite the government's efforts to disband them and declare them illegal. Secondly, the government began to enforce the implementation of the regional minimum wage regulations, which were updated annually.

These changes came about in response to both internal and external pressures. The internal pressures came from many of those concerned about the condition of the workers in an increasingly industrialised Indonesian economy. This included the growing concern of many senior policy makers that labour was not sharing in the high growth that had taken place in the economy (Agrawal, 1996; Edwards, 1996; Manning, 1994).

The external pressures, meanwhile, were an indirect result of the increasing level of Indonesian exports to North America and the European Union (EU), where concerns were being exposed in many quarters about labour market conditions in developing countries. The focus was on workers in export sectors, where, it was claimed, there were

poor working conditions, low wages, and the denial of fundamental rights to form labour union. This belief led to calls for a 'social clause' in the countries trade agreement between developed and developing countries, stipulating that favoured access to the markets of developed countries would not be granted to those third world countries where labour standards remained unsatisfactory (Addison and Demery, 1988).

Indonesia was one of the countries targeted by this concern. In the early 1990s, several complaints were filed under the Generalised Scheme of Preferences (GSP), threatening to deprive Indonesia of low tariffs on its exports to the United States market. On top of this, the withdrawal of investment guarantees to US companies that would ensue was a threat of potentially greater significance (Rama, 1996).

As part of the responses to this, the government of Indonesia revamped the mechanism to set minimum wages in 1989 and then on several subsequent occasions during the 1990s. The government's objective has been to set minimum wages with reference to a range of factors including the so called minimum subsistence needs (*kebutuhan hidup minimum* or KHM), the cost of living, the capacity and sustainability of companies, existing market wage rates, labour market conditions, and economic and income per capita growth.<sup>5</sup>

Prior to 1996, minimum wages were calculated with reference to what was termed minimum physical needs (*kebutuhan fisik minimum* or KFM) rather than KHM.<sup>6</sup> Both KFM and KHM are bundles of consumption items which are deemed essential for the livelihood of a single worker. The KHM bundle is consisted of 43 items, range from

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<sup>5</sup> See the Minister of Manpower Regulation No. 01/1999 on Minimum Wages.

<sup>6</sup> The change from KFM to KHM is stipulated in the Minister of Manpower Decree No. 81/1995.

food, clothing, housing, transport, health, to recreation.<sup>7</sup> Essentially KHM is a broader consumption bundle, and hence represents a higher standard of living, than KFM. For example, the food bundle of KFM was set achieve a caloric intake of 2,600 calories per day, while the food bundle of KHM was set achieve a caloric intake of 3,000 calories per day.<sup>8</sup>

Until 2000, most provinces had just one level of minimum wage, which was applied throughout the entire province. Exceptions were to be found in Riau, South Sumatra, West Java, East Java, and Bali, where several minimum wages existed for different regions within these provinces. In addition, some provinces had different minimum wages for different sectors of the economy. In such cases, the sectoral minimum wages could not be set at a lower level than the general minimum wage that applied in that region.

Until the year 2000, the regional minimum wages were established by a decree issued by the Minister of Manpower. In determining minimum wage levels, the minister received recommendations from provincial governors. In formulating the recommendations, the governors in turn received recommendations from provincial tripartite councils, made up of representatives from employees, employers, and the government. In practice, employee and employer representatives were usually government appointees.

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<sup>7</sup> The details of KHM can be seen in Depnaker (1998).

<sup>8</sup> Since the aim is to provide a sufficient level of labour income to achieve a certain standard of living, the minimum wages in Indonesia are set in monthly, rather than hourly, terms.

Beginning in 2001, as part of the regional autonomy policy adopted and implemented throughout the country, the power to set minimum wage levels has been transferred to governors, mayors, and regents (*bupati*), as the respective heads of provinces, cities, and districts (*kabupaten*).<sup>9</sup> As of 2000, Indonesia has 341 cities and districts. In setting the levels of minimum wages, mayors and regents also receive recommendations from tri-partite councils in their regions.

### **III. Data**

The data analysed in this study are drawn mainly from the National Labour Force Surveys (Sakernas), collected annually by Statistics Indonesia (BPS). Sakernas is a nationally representative repeated cross-section survey that each year is conducted annually in the month of August covering all provinces in Indonesia. In particular, the analysis in this study uses the Sakernas data from the 1988 to 2000 surveys, except for the 1995 data which are from the labour force module of the Inter-census Population Survey (Supas). The numbers of households and individuals in the sample for each year are presented in Table A1 in the Appendix.

Sakernas and the labour force module of Supas collect information on individual main employment activities, earnings, and hours of work on the primary job, as well as data on individual characteristics such as gender, age, and level of education. To make nominal wages and minimum wages comparable across years, they are deflated by the annual provincial Consumer Price Index (CPI). In addition, the study also uses the regional gross domestic product (RGDP) data from each province, published by BPS.

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<sup>9</sup> See the Minister of Manpower and Resettlement Decree No. 226/2000.

The minimum wage data, meanwhile, were obtained from the Department of Manpower and Transmigration.

#### **IV. Trends in Minimum Wages**

As a result of the changes in labour market policy in the late 1980s, minimum wages have become an important plank of government's labour policy. This is evident from the speed at which the level of minimum wages had been increased by the government. Figure 1 shows the trend in the real minimum wage from 1989 to 2000 compared to the trends in the average real wage and real Gross Domestic Product (GDP) during the same period.<sup>10</sup>

The figure shows that in real terms minimum wages in Indonesia have increased much faster than both the average wage and GDP. The level of the real minimum wage in 1994 is around 2.4 times its 1989 level, mainly the result of large increases in minimum wage in 1990 and 1994. Curiously, Figure 1 also indicates that those two large increases in minimum wage coincided with declines in average wage. When the real minimum wage was increased by almost 50 percent in 1990, the real average wage declined by more than 12 percent in the same year. Similarly, when the real minimum wage was increased by 30 percent in 1994, the real average wage declined by around 2 percent. During the other periods before the crisis, when the increases in real minimum wages were more modest, generally real average wage also increased, more or less in line with increases in real GDP.

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<sup>10</sup> The "national level" minimum wage represented in Figure 1 is calculated as the average of regional minimum wages weighted by the number of urban formal sector workers in each region.

The figure also shows that the real minimum wage in 2000 was increased substantially, much higher than the increases in real average wage and real GDP. The increase in weighted average of real regional minimum wages was more than 17 percent, while the increase in real average wage was around 13 percent and the real GDP grew by less than 5 percent. Although it cannot be shown in the figure yet, the real minimum wages were further increased by even much higher proportion in the following year. This would certainly have brought the 2001 level of minimum wage to a new peak, higher than the pre-crisis peak in 1997.

As a result of the faster increases in minimum wages relative to average wages, Figure 2 shows that the ratio of minimum to average wage increased markedly from around 20 percent in 1989 to around 50 percent in 1994. This ratio has stayed at around that point since then with only a slight decline during the crisis. The figure also shows the proportion of workers whose monthly earnings were less than the minimum wages. In general, this proportion tended to increase up until 1994 and then steadily decreased since then. It increased from around 7 percent in 1989 to around 21 percent in 1994 and 1995, and then continuously declined to reach less than 11 percent by 2000. This implies that there has been a tendency for a higher compliance with the minimum wage regulations over time since the mid 1990s.

## **V. Minimum Wages and the Wage Distribution**

Some studies have shown that the impact of minimum wages are not limited to workers with wages around the minimum but also to the whole wage distribution (e.g. Maloney and Nuñez, 2001; Neumark *et al.*, 2000). Figure 3, which is a kernel density of

the wage distribution in the Indonesian urban formal sector, shows the evolution of how minimum wages have affected the wage distribution in Indonesia over time. In this series of diagrams, the wage of each worker is measured as a ratio of the worker's nominal wage to the nominal minimum wage applying in the region where the worker lives. Therefore, the vertical line at point 1 in each of the graph represents the minimum wage level.

Figure 3 reveals that in 1988, a year before the minimum wage regulations were revamped, minimum wages had very little impact on the wage distribution in Indonesia. There was no apparent spike in the wage distribution around the minimum wages. But this has changed over time. By 1992, the impact of minimum wages on the wage distribution had become more apparent. Spikes at and around the minimum wage occurred in the distribution. In 1996, the mode of the wage distribution was only slightly higher than the minimum wage. By 1999, and also in 2000, the minimum wage has become the mode of the distribution, indicating that minimum wages have become binding for the majority of workers.

The graphs in Figure 3 show the wage distribution for all workers. As mentioned earlier, minimum wage regulations may have a different impact on different groups of workers. Figure 4 shows the impact of minimum wages on the wage distributions across various groups of workers in 2000. Again the vertical line at point 1 in each of the graph represents the minimum wage level. As indicated before, only wage workers in the urban formal sector are included.

Graph (a) reveals that the wage distributions of both male and female workers are affected by minimum wages, but it appears that the wage distribution of female workers

is more affected than that of male workers. The proportion of female workers at the minimum wages is higher than the proportion for male workers. In addition, while the mode of the wage distribution for female workers is at the minimum wages, the mode for male workers is still slightly higher than the minimum.

In terms of age, Graph (b) indicates that the wage distributions of both adult and youth workers are affected by minimum wages. In this study, youth workers are defined as those between 15 and 24 years old. The graph reveals that the wages of most youth workers are at or around the minimum, only a few of youth workers earn more than double the minimum. The graph, however, still indicates that the impact of minimum wages on adult workers is also significant as the mode of the wage distribution is only slightly higher than the minimum.

Education is also an important determinant of earnings. In Graph (c), workers are grouped into two categories, the “educated” and the “less educated”, where the less educated workers are defined as those with lower secondary education or below. As expected the graph reveals that the wage distribution of less educated workers is more affected by minimum wages than that of educated workers. However, the graph indicates that the impact of minimum wages in altering the shape of the wage distribution of educated workers is also still significant.

When workers are separated into white-collar and blue-collar workers as shown in Graph (d), it becomes clear that minimum wages have very different consequences for their wage distributions. The graph suggests that the wage distribution of white-collar workers is not much affected by the presence of minimum wages as their earnings are mostly way above the minimum. On the other hand, the majority of blue-collar workers



are clearly affected by the minimum wages, indicated by the fact that the minimum is the mode of the wage distribution for these workers.

Finally, Graph (e) shows the wage distribution for full-time and part-time workers. A worker is classified as a part-time worker if he or she works less than 30 hours per week. The graph shows that minimum wages are only binding for full-time workers and the minimum is the mode of their wage distribution. For part-time workers, however, minimum wages are of no consequence, since most earned less than the minimum. This indicates that minimum wages are not binding for this group of workers.

## **VI. Wage and Employment Impacts of Minimum Wages**

The purpose behind minimum wage regulations is to attempt to lift the wages of those workers who currently earn below the minimum wage. All other things being equal, this will also increase the average of all workers' wages. Unfortunately, in reality things are not that simple. The imposition of minimum wages by a government affects both supply and demand in the labour market. Hence, the impact of minimum wages is not only limited to wages, for there is also an impact on employment. Of equal importance, minimum wages can also be expected to have a different impact on different groups of workers.

### ***The Model***

To formally formulate a simple model of how minimum wages may affect wages and employment, let us define supply and demand for workers as follows:

$$l^s = \alpha^s + \beta^s w + \gamma^s m(w) + \theta^s X \quad (1)$$

$$l^D = \alpha^D + \beta^D w + \gamma^D m(w) + \theta^D Y \quad (2)$$

where  $S$  and  $D$  indexes supply and demand respectively, so that  $l^S$  represents labour supply,  $l^D$  represents labour demand,  $w$  represents wages,  $m$  represents the minimum wage,  $X$  is a vector of labour supply shifters,  $Y$  is a vector of labour demand shifters, while  $\alpha$ 's,  $\beta$ 's,  $\gamma$ 's, and  $\theta$ 's are vectors of parameters. The minimum wage is defined as a function of wages due to the fact that the prevailing wage rates are one of the factors that is considered in the regulation on setting minimum wages.

In equilibrium, labour supply is equal to labour demand. The reduced form solutions for wages and employment respectively are:

$$w = \Lambda^w + \Omega^w m(w) + \Pi^w Y + \Sigma^w X \quad (3)$$

$$l = \Lambda^l + \Omega^l m(w) + \Pi^l Y + \Sigma^l X \quad (4)$$

where  $\Lambda^w = \frac{\alpha^D - \alpha^S}{\beta^S - \beta^D}$ ,  $\Omega^w = \frac{\gamma^D - \gamma^S}{\beta^S - \beta^D}$ ,  $\Pi^w = \frac{\theta^D}{\beta^S - \beta^D}$ ,  $\Sigma^w = \frac{-\theta^S}{\beta^S - \beta^D}$ ,

$$\Lambda^l = \frac{-\alpha^S \beta^D - \alpha^D \beta^S}{\beta^S - \beta^D}, \quad \Omega^l = \frac{\beta^S \gamma^D - \beta^D \gamma^S}{\beta^S - \beta^D}, \quad \Pi^l = \frac{\beta^S \theta^D}{\beta^S - \beta^D}, \quad \Sigma^l = \frac{-\beta^D \theta^S}{\beta^S - \beta^D}.$$

Equations (3) and (4) show that both wages and employment are affected by the minimum wage, labour demand shifters, and labour supply shifters. Since the parameters of interests are  $\Omega^w$  and  $\Omega^l$  — that is how the minimum wage affects wages and employment — equations (3) and (4) can be directly estimated to obtain the estimates of these parameters.

In estimating equation (3), however, the minimum wage variable is an endogenous variable as it is a function of wages, the dependent variable. Hence, to obtain a consistent estimate, it is necessary to estimate this wage equation using the instrumental variable

method. Meanwhile, in equation (4) the minimum wage variable can be treated as an exogenous variable. Hence, an estimation of this employment equation using the ordinary least squares (OLS) method will produce a consistent and efficient method.

### ***Provincial Panel Data Construction***

Following Rama (1996), data on individual wages and employment from the Sakernas are aggregated at the province level. These data on provincial average wages and employment level, which are calculated for the whole aggregate of all workers as well certain segments of workers in the urban formal sector, are then combined across years to form a set of panel data with the province as the unit of observation.

This panel data set is then merged with other provincial-level data on the minimum wages, yearly consumer price index (CPI), regional gross domestic product (RGDP), and demographic variables. The complete panel data set can be constructed for all 26 provinces in Indonesia, covering a yearly time period from 1988 to 1999, so in total there are 312 points of observation. The exceptions are for white-collar and blue-collar workers data, which are only available starting from 1994.

### ***The Results of Estimations***

The wage regression of equation (3) is estimated using the Two-Stage Least Squares (2SLS) method on the provincial panel data for all workers as well various segments of workers.<sup>11</sup> In these estimations, the minimum wage variable is instrumented by its one period lag and other exogenous variables in the model. The labour supply

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<sup>11</sup> Table A2 in the Appendix provides summary statistics of the Indonesian labour market.

shifter is the population group of 15 years and over, while the labour demand shifter is real regional gross domestic product. Province dummies are included to measure the fixed effects of provincial specific characteristics, which do not vary across time. Meanwhile, year dummies are included to measure specific time effects, which affect all provinces in any given year.

In addition, a variable of degree of compliance to minimum wages is included in the estimations. As shown by Figures 2 and 3, compliance to minimum wages in Indonesia has increased over time. This has important consequences on how minimum wages affect labour market outcomes. Therefore, it is necessary to control for the impact of varying degree of compliance to measure the true impact of minimum wages.<sup>12</sup> Consistent with Figure 2, in these estimations the degree of compliance is approximated by the proportion of workers who earn above the minimum wage.

The results of the estimations are presented in Table 1. The table indicates that the elasticities of average wages with respect to the minimum wage in general are positive but statistically insignificant. This is true for all workers as well as all segments of the workforce, except for female and adult workers where the coefficients are negative. Meanwhile, the coefficient for blue-collar workers is statistically significant.

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<sup>12</sup> Rama (1996) asserts that minimum wages would have a limited impact on labour market outcomes if firms were not forced to comply. He argues that in the context of Indonesia in early 1990s, there were two main sources of non-compliance. Firstly, firms that were unable to afford the minimum wage can request a waiver from the government. Secondly, and more importantly, there was a weakness in the enforcement capabilities of the government. In spite of this, both Rama (1996) and Islam and Nazara (2000) did not control for compliance in their regression estimations.

These results imply that the impact of minimum wages on pushing up average wages across the workforce is in general statistically no different from zero. This does not mean that minimum wages have no impact on the wages of individual workers. Rather, it suggests that the impact is mixed. The wages of some workers are pushed up by minimum wages, while the wages of others are depressed by minimum wages, resulting in no significant impact on average wages. The exception is for blue-collar workers, where minimum wages have a statistically significant positive impact on their average wages. The estimated elasticity of 0.89 implies that a 10 percent increase in real minimum wages will increase the real average wages of blue-collar workers by around 9 percent.

The coefficients of the degree of compliance variable are also positive although statistically not significant, except again for blue-collar workers. This means that higher compliance with the minimum wage regulations tends to add to the positive impact of minimum wages on average wages. In particular, blue-collar workers benefit significantly from higher compliance with minimum wages.

Meanwhile, the employment regression of equation (4) is estimated using the Ordinary Least Squares (OLS) method on the same data set for the whole aggregate of all workers as well as various segments of the workforce. The set of independent variables used in these estimations is the same as in the wage regressions. The results of the estimations are presented in Table 2.

The table shows that the coefficients of the minimum wage variable for all workers and all segments of the workforce are negative, except for white-collar workers. The coefficient for all workers indicates that the elasticity of total employment to the

minimum wage is  $-0.112$  and statistically significant. This implies that every 10 percent increase in real minimum wages will result in more than one percent reduction in total employment. Similarly, the coefficients for female, youth, less educated, full-time, and part-time workers are also all negative and statistically significant. Their employment elasticities with respect to minimum wages are  $-0.307$  for female and youth workers,  $-0.196$  for less educated workers,  $-0.086$  for full-time workers, and  $-0.364$  for part-time workers.

Meanwhile, the only group of workers which benefit from the minimum wage in terms of employment are white-collar workers. Their employment elasticity to the minimum wage is  $1.0$  and statistically significant. This implies that a 10 percent increase in the real minimum wages will increase the employment of white-collar workers by also 10 percent. This perhaps indicates the substitution effect of minimum wages on the employment of different types of workers. As the level of minimum wages is increased, firms reduce the employment of the other types of workers and replace them by employing more white-collar workers. This also provides an indication that firms change technologies in response to increases in minimum wages. Due to capital-skill complementarity, higher proportion of white-collar workers employed usually indicates that more capital-intensive technologies have been adopted.

Like the impact on average wages, the coefficients of the degree of compliance variable indicate that higher compliance tends to strengthen the negative impact of minimum wages on employment. The signs of the coefficients of this variable in general are the same as the signs of the coefficients of the minimum wage variable. In particular, the coefficients for all, female, youth, less educated, and part-time workers are

statistically significant. However, higher compliance has no impact on the employment of white-collar workers.

### ***Sensitivity Analysis***

The results of the analysis have shown that in general minimum wages have a positive but insignificant impact on average wages, and simultaneously a negative and significant impact on employment, except for white-collar workers where the employment impact is found to be positive. Higher compliance is found to strengthen these opposing impacts of minimum wages on average wages and employment. This subsection seeks to verify whether these findings are robust to different model specifications and estimation procedures.

The inclusion of the degree of compliance in the regression is an innovation in this study. Hence, the first sensitivity analysis is to run the wage and employment regressions without this degree of compliance variable. The results for the wage regression are presented in Table A3 in the Appendix, while the results for the employment regression are shown in Table A4. The coefficients of the minimum wage variable in Table A3 still indicate that the impact of minimum wages on average wages is not statistically significant, except for blue-collar workers. Most of the coefficients still have a positive sign, but in addition to the coefficients for female and adult workers, the coefficient for educated workers is now also negative. Furthermore, the magnitudes of the coefficients in Table A3 in general are smaller compared to those in Table 1.

For employment regression, all coefficients in Table A4 have the same signs as those in Table 2. However, the coefficients for youth, full-time, and part-time workers are

now statistically insignificant. Like wage elasticities, the magnitude of the employment elasticities in Table A4 are in general smaller compared to those in Table 2. Hence, these results still indicate that the impact of minimum wages on employment mostly tend to be negative, except for white-collar workers. In fact, the coefficients for white-collar workers in the Tables 2 and A4 are almost exactly the same.

Comparing the results of this first sensitivity analysis with Tables 1 and 2 gives an evidence that the degree of compliance variable has strengthened the estimated impact of minimum wages on average wages and employment. This is an expected result as higher compliance means increased effectiveness of the minimum wage regulations in affecting both the wage and employment decisions of firms and workers. However, it is necessary to test whether a different measure of the degree of compliance will produce a different impact. Hence, a second sensitivity analysis is to re-run the wage and employment regressions in Tables 1 and 2 using a different measure of the degree of compliance.

Drawing from Figures 3 and 4, the skewness of the wage distribution is used as the alternative measure of the degree of compliance. The results are presented in Table A5 in the appendix for wage regressions and in Table A6 for employment regressions. The coefficients of the minimum wage variable in Table A5 in general have the same signs as those in Table 1, except that the coefficient for educated workers is now negative and the coefficient for blue-collar workers becomes insignificant. In addition, the magnitudes of the coefficients in Table A5 are generally smaller than those in Table 1. The magnitudes of the coefficients of the degree of compliance variables in Tables 1 and A5 cannot be directly compared as a different measure is used in each case. However, the



coefficients in the two tables all have the same signs and most of the coefficients in Table A5 are statistically significant.

Similarly, the coefficients of both the minimum wage and the degree of compliance variables in Table A6 generally have the same signs as those in Table 2. Like the coefficients in the wage regressions, the magnitudes of the coefficients of the minimum wage variable in Table A6 are in general smaller compared to those in Table 2. On the other hand, all of the coefficients of the degree of compliance variable in Table A6 are insignificant. These results, and the comparison between the coefficients in Tables A5 and A6 with those in Tables A3 and A4, strengthen the conclusion that the higher the compliance with minimum wages, the greater will be the impact of minimum wages on increasing average wages and lowering employment.

In examining the impact of minimum wages on employment, Rama (1996) uses various measures of minimum wages. In particular, he stresses the ratio of minimum wages to average wages as a measure of minimum wages relative to market wages. This alternative measure of minimum wages is examined in the third sensitivity analysis in this study. As this alternative measure of minimum wages has average wages as one of its components, the regressions are only run for the employment equation. The results are presented in Table A7 in the appendix.

The coefficients of the minimum wage and the degree of compliance variables resulting from the regressions using their alternative measure of minimum wages is in general still negative. In addition to female and part-time workers, the minimum wage coefficients for male and adult workers now are also significant. However, the

coefficients for all workers and for youth, less educated, white-collar, and full-time workers become statistically insignificant.

## **VII. Conclusions**

In 2000 and 2001, the Indonesian Government has vigorously pursued a minimum wage policy. The levels of regional minimum wages have been increased very significantly since the crisis. As a result, the real minimum wages in 2001 are estimated to be already higher than the peak pre-crisis levels in 1997. This was all done against the backdrop of an economy, which is still struggling to recover from a severe economic crisis. Given the low economic growth environment, there are growing concerns that further large increases in minimum wages may reduce long term economic growth and slow employment growth in the modern industrial sector.

This study finds that as minimum wages continued to increase during most of the 1990s, compliance has also steadily increased since the mid 1990s, with the result of altering the entire wage distribution of urban formal workers. In 1988, a year before minimum wage regulations were revamped, minimum wages had very little impact on the wage distribution. But this changed over time. By 1999 and 2000, the minimum wage had become the mode of the distribution, indicating that minimum wages had become binding for the majority of workers.

The results of the analysis in this study show that increases in minimum wages push up wages of blue-collar workers. The results also show a positive link between minimum wages and average wages of most other groups of workers (female, youth, less

educated, and white-collar workers). However, the relationship is not statistically significant.

More importantly, the results of the analysis show that increases in minimum wages have a negative impact on urban formal sector employment, except for white-collar workers. For all workers, the estimated elasticity of total employment to minimum wage is  $-0.112$  and statistically significant. This implies that for every 10 percent increase in real minimum wages, there will be more than a one percent reduction in total employment, controlling for other factors affecting employment, such as economic growth and growth in the working population.

Significantly, the negative impact of minimum wage increases are greatest for those groups that are most vulnerable to changes in labour market conditions such as females, youth, and less educated workers, which make up the bulk of Indonesian labour force. For females and youths workers, the employment elasticities with respect to minimum wages are larger than  $-0.3$ , while for less educated workers is around  $-0.2$ .

On the other hand, white-collar workers are the only category of workers to have benefited from minimum wages in terms of employment. Their employment elasticity to minimum wage is  $1.0$  and statistically significant, which perhaps indicates the substitution impact of minimum wages on the employment of different types of workers. As the level of minimum wages is increased, firms reduce the employment of the other types of workers and replace them with white-collar workers. This may be due to firms substituting more capital and skill-intensive production processes in place of labour-intensive processes in response to increases in minimum wages.

These results imply that minimum wages benefit some workers and disadvantage others. Workers that keep their factory jobs clearly benefit from increases in minimum wages. White-collar workers are clear winners from a vigorous enforcement of minimum wage policy. However, those that lose their jobs as a result of increases in minimum wages are losers from minimum wage policy. The potential losers are those workers most vulnerable to changes in labour market conditions such as female, youth, and less educated workers.

If increases in minimum wages reduces employment growth in the modern sector below the growth in the working population, more unskilled workers may be forced into inferior jobs in the informal sector. Thus, the impact of minimum wages on employment in the modern sector is only part of the story. Their impact is perhaps equally important, if not more, on the welfare of workers in the informal sector, which accounts for the bulk of the workforce in Indonesia. An important area for further research is to assess the spillover effects of the labour displacement impact of minimum wages in the formal sector on employment and real earnings in the informal sector.

## References

- Addison, T. and L. Demery, 1988, Wages and labour conditions in East Asia: A review of case-study evidence, *Development Policy Review* 6, 371-393.
- Agrawal, N., 1996, The benefits of growth for Indonesian workers, Policy Research Working Paper No. 1637 (World Bank, Washington, D.C.).
- Bell, L.A., 1997, The impact of minimum wages in Mexico and Columbia, *Journal of Labor Economics* 15, S102-S135.
- Card, D. and A. Krueger, 1994, Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania, *American Economic Review* 84, 772-793.
- Castillo-Freeman, A. and R. Freeman, 1992, When the minimum wage really bites: The effect of the U.S.-level minimum on Puerto Rico, in: G. Borjas and R. Freeman, eds., *Immigration and the work force* (University of Chicago Press, Chicago).
- Depnaker (1998), Pedoman pengisian data kebutuhan hidup minimum (KHM) (Bagian Proyek Peningkatan Kesejahteraan Tenaga Kerja 1998/1999, Departemen Tenaga Kerja R.I., Jakarta).
- Edwards, A.C., 1996, Labor regulations and industrial relations in Indonesia, Policy Research Working Paper No. 1640 (World Bank, Washington, D.C.).
- Feridhanusetyawan, T., 1999, The impact of the crisis on the labor market in Indonesia, Report prepared for the Asian Development Bank (Centre for Strategic and International Studies, Jakarta).

- Islam, I. and S. Nazara, 2000, Minimum wage and the welfare of Indonesian workers, Occasional Discussion Paper Series No. 3 (International Labour Organization, Jakarta).
- Krueger, A.B., 1995, The effect of the minimum wage when it really bites: A re-examination of the evidence from Puerto Rico, in: S.W. Polachek, ed., Research in labor economics (JAI Press, Greenwich, C.T.).
- Maloney, W.F. and J. Nuñez, 2001, Measuring the impact of minimum wages: Evidence from Latin America, Policy Research Working Paper No. 2597 (The World Bank, Washington, D.C.).
- Manning, C., 1994, What has happened to wages in the New Order?, *Bulletin of Indonesian Economic Studies* 30, 73-114.
- Manning, C., 1998, Indonesian labour in transition (Cambridge University Press, Cambridge).
- Manning, C., 2000, Labour market adjustment to Indonesia's economic crisis: Context, trends and implications, *Bulletin of Indonesian Economic Studies* 36, 105-136.
- Neumark, D. and W. Wascher, 1995, The effect of New Jersey's minimum wage increase on fast-food employment: A re-evaluation using payroll records, NBER Working Paper No. 5224 (National Bureau of Economic Research, Cambridge, M.A.).
- Neumark, D., M. Schweitzer, and W. Wascher, 2000, The effect of minimum wages throughout the wage distribution, NBER Working Paper No. 7519 (National Bureau of Economic Research, Cambridge, M.A.).

Rama, M., 1996, The consequences of doubling the minimum wage: The case of indonesia, Policy Research Working Paper No. 1643 (World Bank, Washington, D.C.).

Rama, M., 2001, The consequences of doubling the minimum wage: The case of Indonesia, Industrial and Labor Relations Review 54, 864-881.

Table 1. Results of 2SLS Estimation of Wage Regression  
(Dependent variable: log of real wage)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	0.122 (0.336)	0.148 (0.533)	-0.011 (-0.019)	-0.047 (-0.153)	0.834 (1.440)	0.030 (0.081)	0.231 (0.603)	0.587 (0.848)	0.890* (2.015)	0.183 (0.501)	0.341 (0.995)
Degree of compliance <sup>a</sup>	1.261 (1.164)	0.997 (1.202)	1.663 (0.988)	0.602 (0.655)	3.318 (1.929)	0.506 (0.467)	2.040 (1.794)	0.092 (0.181)	1.217** (3.754)	1.157 (1.064)	1.879 (1.847)
Log of population group 15 years and over	0.020 (0.189)	0.093 (1.153)	-0.044 (-0.269)	0.048 (0.546)	-0.090 (-0.556)	0.266** (2.772)	-0.291** (-2.659)	0.059 (0.198)	0.114 (0.599)	-0.002 (-0.015)	0.025 (0.251)
Log of real regional gross domestic product	0.031 (0.841)	0.056* (1.986)	-0.051 (-0.875)	0.039 (1.252)	0.004 (0.059)	0.041 (1.089)	0.018 (0.467)	0.003 (0.044)	-0.014 (-0.391)	0.037 (0.980)	-0.002 (-0.059)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.095 (1.831)	7.856* (2.111)	11.907 (0.122)	11.169** (2.643)	0.327 (0.042)	7.508 (1.487)	10.464* (2.044)	5.085 (0.481)	-0.212 (-0.031)	8.739 (1.753)	5.850 (1.254)
R-squared	0.514	0.664	0.303	0.585	0.375	0.829	0.806	0.750	0.924	0.516	0.677
F-test	6.59**	12.42**	2.74**	8.92**	3.62**	30.50**	26.03**	10.54**	42.89**	6.63**	13.09**
Number of observations	286	286	286	286	286	286	286	156	156	286	286

Notes: - <sup>a</sup> Measured as the proportion of workers who earn above the minimum wage  
- Numbers in parentheses are t-values  
- \*\* is significant at 1 percent level  
- \* is significant at 5 percent level



Table 2. Results of OLS Estimation of Employment Regression  
(Dependent variable: log of employment)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	-0.112** (-3.031)	-0.065 (-1.874)	-0.307** (-4.642)	-0.066 (-1.801)	-0.307** (-3.349)	-0.017 (-0.480)	-0.196** (-3.787)	1.000* (2.086)	-0.140 (-0.699)	-0.086* (-2.248)	-0.364* (-2.560)
Degree of compliance <sup>a</sup>	-0.371* (-2.194)	-0.137 (-0.860)	-1.177** (-3.879)	-0.165 (-0.984)	-1.414** (-3.371)	0.059 (0.360)	-0.838** (-3.537)	0.009 (0.010)	-0.609 (-1.687)	-0.217 (-1.236)	-1.958** (-3.003)
Log of population group 15 years old and over	0.997** (35.016)	1.004** (38.260)	0.949** (18.411)	0.975** (35.655)	1.052** (15.304)	0.960** (37.694)	1.038** (26.433)	1.145* (2.114)	0.779** (3.457)	1.007** (34.134)	0.911** (8.299)
Log of real regional gross domestic product	0.014 (1.275)	0.020* (1.935)	0.013 (0.652)	0.018 (1.597)	-0.004 (-0.131)	-0.001 (-0.065)	0.034* (2.190)	-0.127 (-1.177)	0.047 (1.058)	0.010 (0.828)	0.068 (1.577)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.055 (0.088)	-0.471 (-0.831)	2.895** (2.604)	-0.108 (-0.178)	1.762 (1.173)	-0.262 (-0.445)	0.174 (0.205)	-13.879 (-1.384)	2.786 (0.667)	-0.532 (-0.828)	2.037 (0.852)
R-squared	0.998	0.998	0.994	0.998	0.989	0.998	0.996	0.966	0.995	0.998	0.964
F-test	2973.0**	3198.8**	1038.1**	2894.3**	606.8**	2771.7**	1741.1**	102.4**	744.8**	2806.4**	179.5**
Number of observations	312	312	312	312	312	312	312	156	156	312	312

Notes: - <sup>a</sup> Measured as the proportion of workers who earn above the minimum wage  
- Numbers in parentheses are t-values  
- \*\* is significant at 1 percent level  
- \* is significant at 5 percent level

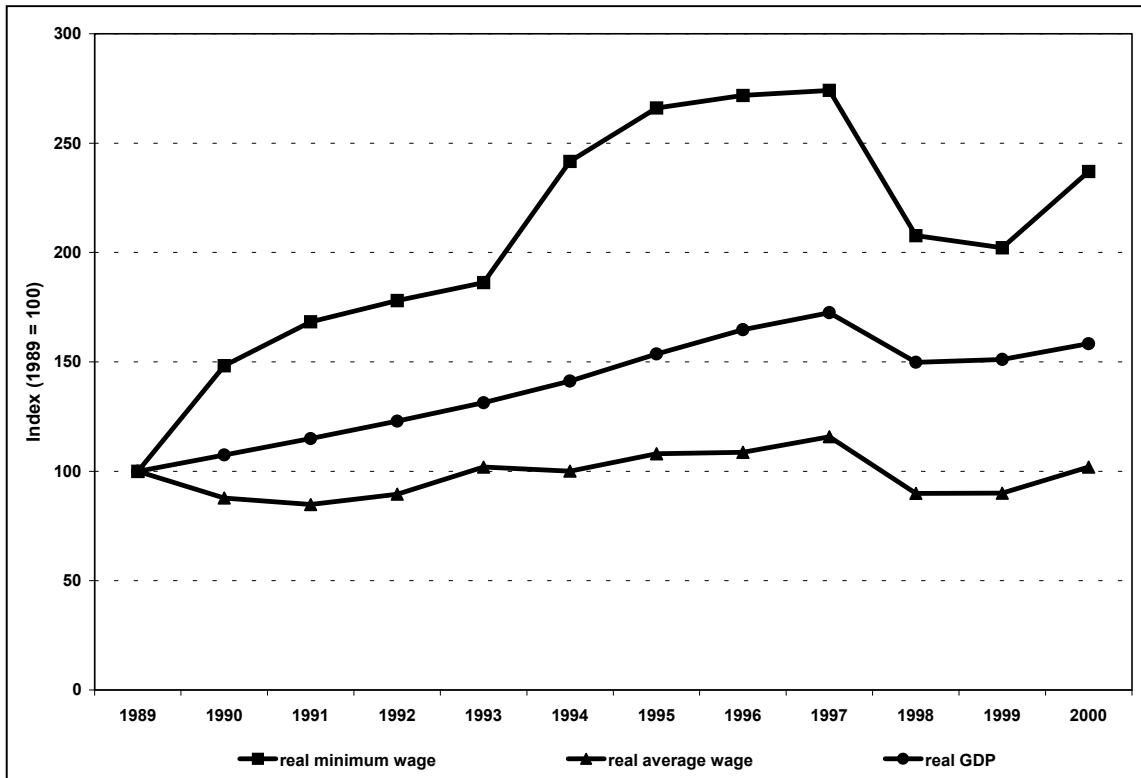


Figure 1. Trends in the Real Minimum Wage, Real Average Wage, and Real Gross Domestic Product in Indonesia, 1989-2000

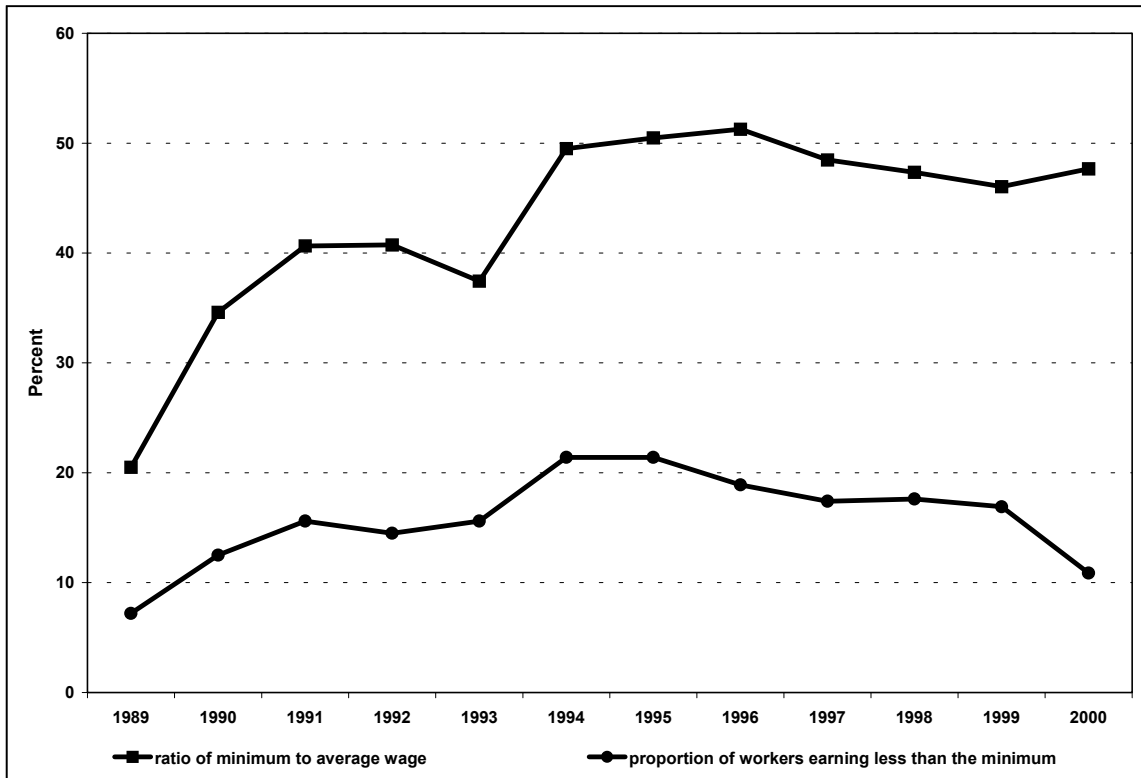


Figure 2. Ratio of Minimum Wage to Average Wage and Proportion of Workers Earning Less Than Minimum Wages, 1989-2000

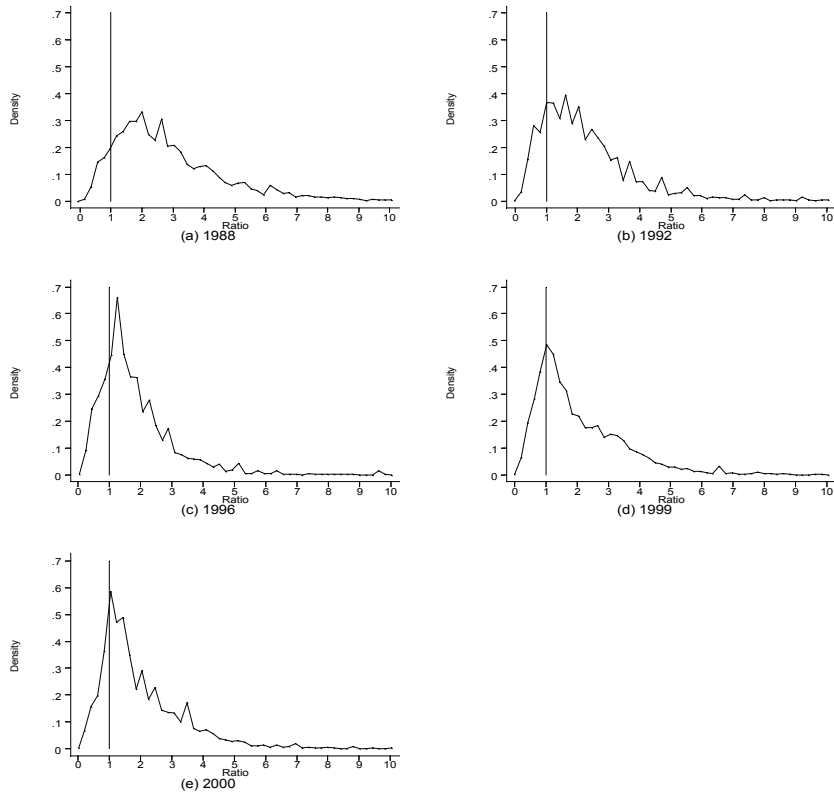


Figure 3. The Impact of Minimum Wages on Wage Distribution, 1988-2000

Note: The vertical line in each graph represents minimum wage.

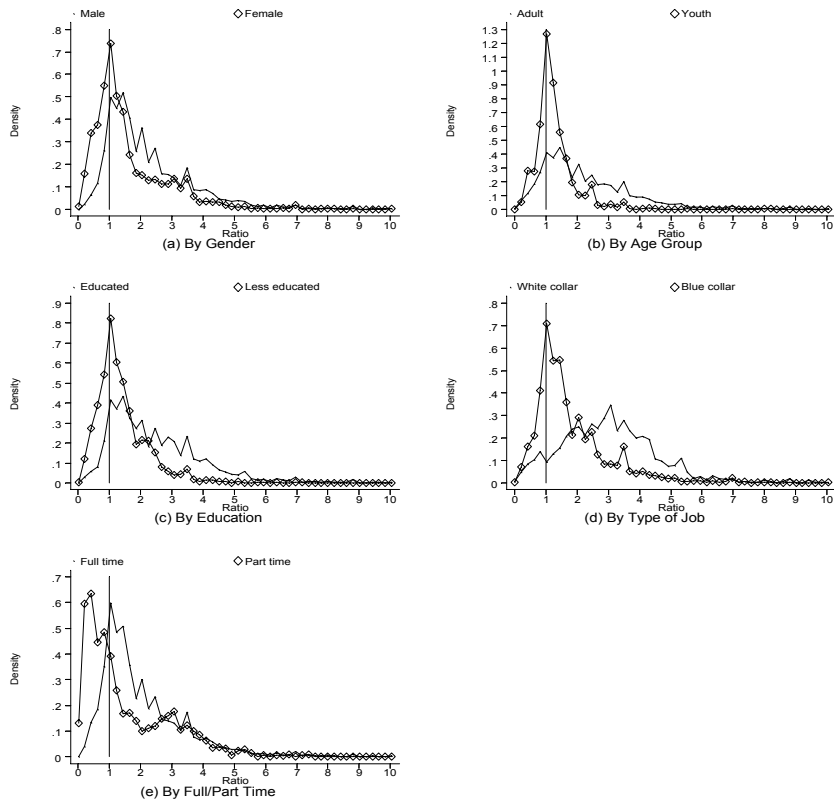


Figure 4. The Impact of Minimum Wages on Wage Distribution across Various Categories of Workers, 2000

Note: The vertical line in each graph represents minimum wage.

## Appendix

Table A1. Number of Households and Individuals (15 year old and over) in the Sakernas Sample, 1988-2000

Year	Household	Individuals
1988	64,032	190,582
1989	42,858	183,302
1990	80,704	240,090
1991	78,391	234,178
1992	77,088	233,489
1993	79,458	231,689
1994	71,561	205,006
1995 <sup>a</sup>	211,248	605,056
1996	72,925	208,371
1997	64,752	185,720
1998	48,478	139,266
1999	47,580	135,295
2000	31,432	86,488

Note: <sup>a</sup>The 1995 data is from Supas

Table A2. Summary Statistics of the Indonesian Labour Market, 1988-1999

Labour Market Characteristics	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Size of labour force (in millions)	71.9	72.8	75.4	76.2	76.2	79.2	83.7	84.2	88.2	89.6	92.7	94.8
Labour force participation rate (%) <sup>a</sup>	66.9	66.1	66.4	66.0	67.8	67.8	66.8	65.4	66.9	66.3	66.9	67.2
Unemployment rate (%) <sup>b</sup>	2.8	2.8	2.5	2.6	2.8	2.8	4.4	7.0	4.9	4.7	5.5	6.4
Urban labour force (%)	23.6	23.9	25.5	27.7	28.7	29.5	31.3	34.3	33.9	35.6	36.0	38.1
Formal work force (%)	26.9	27.6	28.1	30.0	30.7	32.1	36.1	37.5	37.9	39.1	35.4	36.9
Female labour force (%)	40.1	39.9	38.8	38.3	39.0	38.6	38.9	36.5	38.5	38.3	38.8	38.4
Youth labour force (%) <sup>c</sup>	23.1	22.5	23.1	23.1	22.8	22.2	23.0	23.9	22.3	21.5	21.3	21.3
Less educated labour force <sup>d</sup>	87.9	87.0	86.5	85.4	84.4	83.7	82.0	85.9	78.8	77.9	77.4	76.3
Blue-collar work force (%)	-	-	-	-	-	-	89.0	82.5	81.2	85.2	81.8	80.0
Part-time work force (%) <sup>e</sup>	28.9	28.2	28.0	27.6	29.6	29.1	28.4	32.4	33.3	26.5	28.6	27.3

Source: Sakernas, except for 1995 where the data has been obtained from Supas.

- Notes: - <sup>a</sup> The labour force participation rate is the proportion of the labour force from the total population 15 year old and over.  
- <sup>b</sup> Unemployment rates from 1994 onward are not comparable with the preceding period due to change in job search length.  
- <sup>c</sup> Youth labour force is defined as part of labour force whose ages are 15-24 year old.  
- <sup>d</sup> Less educated labour force is those who have at most junior secondary education level.  
- <sup>e</sup> Those who work less than 30 hours per week are considered to be working part-time.

Table A3. Results of 2SLS Estimation of Wage Regression without Degree of Compliance Variable  
(Dependent variable: log of real wage)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	0.040 (0.131)	0.082 (0.354)	-0.118 (-0.247)	-0.087 (-0.336)	0.618 (1.256)	-0.003 (-0.011)	0.096 (0.296)	0.592 (0.843)	0.952* (1.960)	0.108 (0.352)	0.218 (0.750)
Log of population group 15 years and over	0.043 (0.400)	0.113 (1.414)	-0.018 (-0.110)	0.060 (0.683)	-0.053 (-0.322)	0.274** (2.844)	-0.260* (-2.362)	0.053 (0.182)	0.029 (0.146)	0.019 (0.178)	0.059 (0.578)
Log of real regional gross domestic product	0.040 (1.054)	0.063* (2.185)	-0.039 (-0.662)	0.044 (1.367)	0.027 (0.434)	0.044 (1.175)	0.032 (0.796)	0.002 (0.039)	-0.019 (-0.465)	0.045 (1.173)	0.011 (0.305)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.793** (2.860)	9.202** (3.293)	14.197* (2.392)	11.971** (3.743)	5.109 (0.873)	8.211* (2.186)	13.314** (3.450)	5.201 (0.509)	1.322 (0.187)	10.298** (2.727)	8.382* (2.336)
R-squared	0.501	0.656	0.285	0.580	0.343	0.828	0.795	0.750	0.910	0.505	0.660
F-test	6.51**	12.43**	2.62**	9.00**	3.48**	31.27**	25.20**	10.95**	37.71**	6.63**	12.68**
Number of observations	286	286	286	286	286	286	286	156	156	286	286

Notes: Numbers in parentheses are t-values

\*\* is significant at 1 percent level

\* is significant at 5 percent level



Table A4. Results of OLS Estimation of Employment Regression without Degree of Compliance Variable  
(Dependent variable: log of employment)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	-0.063* (-2.131)	-0.047 (-1.698)	-0.155** (-2.833)	-0.044 (-1.512)	-0.123 (-1.635)	-0.025 (-0.864)	-0.087* (-2.042)	0.999* (2.135)	-0.073 (-0.369)	-0.058 (-1.880)	-0.109 (-0.943)
Log of population group15 years and over	0.988** (34.792)	1.001** (38.587)	0.926** (17.636)	0.971** (35.879)	1.028** (14.756)	0.961** (38.118)	1.020** (25.659)	1.144* (2.143)	0.834** (3.711)	1.003** (34.240)	0.867** (7.856)
Log of real regional gross domestic product	0.012 (1.066)	0.019 (1.863)	0.006 (0.279)	0.017 (1.510)	-0.012 (-0.439)	-0.000 (-0.029)	0.029 (1.836)	-0.127 (-1.185)	0.052 (1.144)	0.008 (0.714)	0.056 (1.282)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.697 (-1.341)	-0.749 (-1.607)	0.452 (0.481)	-0.441 (-0.884)	-1.234 (-1.000)	-0.139 (-0.291)	-1.562* (-2.204)	-13.848 (-1.452)	0.694 (0.173)	-0.971 (-1.812)	-1.934 (-0.957)
R-squared	0.998	0.998	0.993	0.998	0.989	0.998	0.996	0.966	0.995	0.998	0.962
F-test	3006.9**	3284.0**	1012.1**	2968.8**	599.3**	2851.8**	1713.0**	106.4**	755.9**	2872.7**	178.6**
Number of observations	312	312	312	312	312	312	312	156	156	312	312

Notes: Numbers in parentheses are t-values

\*\* is significant at 1 percent level

\* is significant at 5 percent level

Table A5. Results of 2SLS Estimation of Wage Regression with Alternative Measure of Degree of Compliance Variable  
(Dependent variable: log of real wage)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	0.012 (0.042)	0.063 (0.290)	-0.156 (-0.342)	-0.112 (-0.478)	0.601 (1.231)	-0.027 (-0.094)	0.071 (0.230)	0.527 (0.758)	0.869 (1.834)	0.079 (0.279)	0.214 (0.735)
Degree of compliance <sup>a</sup>	0.012** (6.584)	0.008** (5.722)	0.015** (5.213)	0.011** (7.155)	0.007* (2.324)	0.010** (5.271)	0.011** (5.488)	0.001 (0.589)	0.002 (1.102)	0.012** (6.728)	0.002 (0.839)
Log of population group 15 years and over	0.030 (0.300)	0.107 (1.428)	-0.040 (-0.253)	0.042 (0.521)	-0.052 (-0.320)	0.257** (2.812)	-0.268* (-2.576)	0.063 (0.215)	0.042 (0.210)	0.006 (0.058)	0.057 (0.560)
Log of real regional gross domestic product	0.037 (1.050)	0.061* (2.243)	-0.043 (-0.767)	0.041 (1.402)	0.024 (0.402)	0.042 (1.162)	0.029 (0.766)	0.001 (0.016)	-0.020 (-0.513)	0.041 (1.182)	0.011 (0.293)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	11.268** (3.228)	9.477** (3.600)	14.864** (2.626)	12.474** (4.268)	5.290 (0.911)	8.664* (2.423)	13.682** (3.747)	5.838 (0.576)	2.134 (0.309)	10.782** (3.098)	8.444* (2.345)
R-squared	0.577	0.698	0.356	0.653	0.358	0.846	0.818	0.750	0.913	0.584	0.661
F-test	8.60**	14.60**	3.52**	11.89**	3.63**	34.59**	28.38**	10.58**	37.54**	8.86**	12.37**
Number of observations	286	286	286	286	286	286	286	156	156	286	286

Notes: - <sup>a</sup> Measured as the skewness of the wage distribution  
- Numbers in parentheses are t-values  
- \*\* is significant at 1 percent level  
- \* is significant at 5 percent level

Table A6. Results of OLS Estimation of Employment Regression with Alternative Measure of Degree of Compliance Variable  
(Dependent variable: log of employment)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Log of real minimum wage	-0.062* (-2.068)	-0.045 (-1.631)	-0.155** (-2.822)	-0.042 (-1.445)	-0.122 (-1.624)	-0.026 (-0.884)	-0.083 (-1.952)	1.000* (2.127)	-0.073 (-0.367)	-0.055 (-1.800)	-0.116 (-0.999)
Degree of compliance <sup>a</sup>	-0.001 (-0.960)	-0.001 (-1.050)	-0.000 (-0.003)	-0.001 (-1.078)	-0.000 (-0.082)	0.000 (0.378)	-0.001 (-1.483)	-0.001 (-0.202)	-0.001 (-0.669)	-0.001 (-1.312)	0.002 (0.950)
Log of population group 15 years and over	0.988** (34.768)	1.000** (38.556)	0.926** (17.604)	0.971** (35.881)	1.028** (14.720)	0.961** (38.053)	1.019** (25.677)	1.132* (2.100)	0.818** (3.608)	1.002** (34.262)	0.869** (7.868)
Log of real regional gross domestic product	0.012 (1.070)	0.020 (1.869)	0.006 (0.278)	0.017 (1.515)	-0.012 (-0.438)	-0.000 (-0.030)	0.029 (1.848)	-0.127 (-1.181)	0.051 (1.139)	0.008 (0.721)	0.056 (1.277)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.711 (-1.366)	-0.760 (-1.631)	0.452 (0.480)	-0.459 (-0.919)	-1.236 (-1.000)	-0.131 (-0.273)	-1.588* (-2.246)	-13.692 (-1.425)	0.911 (0.226)	-0.990 (-1.849)	-1.883 (-0.931)
R-squared	0.998	0.998	0.993	0.998	0.989	0.998	0.996	0.966	0.995	0.998	0.963
F-test	2930.9**	3203.1**	983.2**	2896.4**	582.1**	2771.8**	1677.5**	102.4**	730.3**	2808.4**	174.1**
Number of observations	312	312	312	312	312	312	312	156	156	312	312

Notes: - <sup>a</sup> Measured as the skewness of the wage distribution  
- Numbers in parentheses are t-values  
- \*\* is significant at 1 percent level  
- \* is significant at 5 percent level

Table A7. Results of OLS Estimation of Employment Regression Using Alternative Measure of Minimum Wage  
(Dependent variable: log of employment)

Independent Variable	All workers	Male	Female	Adult	Youth	Educated	Less educated	White-collar	Blue-collar	Full-time	Part-time
Ratio of minimum wage to average wage	-0.068 (-0.946)	-0.233** (-3.111)	-0.202* (-2.120)	-0.191* (-2.363)	-0.024 (-0.246)	-0.034 (-0.397)	0.113 (1.438)	0.231 (0.411)	-0.491 (-2.010)	-0.064 (-0.814)	-0.534** (-4.028)
Degree of compliance <sup>a</sup>	-0.151 (-916)	-0.209 (-1.394)	-0.748* (-2.362)	-0.191 (-1.196)	-0.636 (-1.509)	0.077 (0.506)	-0.081 (-0.324)	-0.334 (-1.382)	-0.887* (-2.302)	-0.058 (-0.343)	-1.940** (-3.412)
Log of population group 15 years and over	0.990** (34.288)	0.997** (38.553)	0.936** (17.614)	0.968** (35.517)	1.040** (14.772)	0.959** (37.356)	1.022** (25.529)	1.001 (1.833)	0.771** (3.493)	1.002** (33.719)	0.904** (8.385)
Log of real regional gross domestic product	0.014 (1.275)	0.020 (1.929)	0.018 (0.844)	0.018 (1.619)	-0.004 (-0.133)	-0.001 (-0.063)	0.035* (2.182)	-0.151 (-1.382)	0.056 (1.265)	0.010 (0.826)	0.076 (1.784)
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.294** (-3.134)	-0.978** (-2.733)	-0.745 (-1.023)	-0.671 (-1.743)	-2.229* (2.385)	-0.442 (-1.219)	-2.589** (-4.661)	0.178 (0.024)	1.608 (0.529)	-1.553** (-3.641)	-1.788 (-1.197)
R-squared	0.998	0.998	0.993	0.998	0.989	0.998	0.996	0.965	0.995	0.998	0.965
F-test	2884.8**	3270.9**	977.2**	2919.1**	582.6**	2770.9**	1665.9**	98.9**	766.7**	2761.6**	186.0**
Number of observations	312	312	312	312	312	312	312	156	156	312	312

Notes: - <sup>a</sup> Measured as the proportion of workers who earn above the minimum wage  
- Numbers in parentheses are t-values  
- \*\* is significant at 1 percent level  
- \* is significant at 5 percent level