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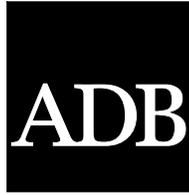
## **Do Minimum Wages Reduce Employment and Training?**

Guntur Sugiyarto and Benjamin A. Endriga

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# DO MINIMUM WAGES REDUCE EMPLOYMENT AND TRAINING?

GUNTUR SUGIYARTO AND BENJAMIN A. ENDRIGA

**MAY 2008**

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## **FOREWORD**

The ERD Working Paper Series is a forum for ongoing and recently completed research and policy studies undertaken in the Asian Development Bank or on its behalf. The Series is a quick-disseminating, informal publication meant to stimulate discussion and elicit feedback. Papers published under this Series could subsequently be revised for publication as articles in professional journals or chapters in books.



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## **ABSTRACT**

This paper examines minimum wage effects on employment and training provision for various workers in different kinds of firms using unique firm-level data. The results show negative effects on unskilled workers but not on skilled ones, with the adverse effects more severe in small firms. Minimum wages also reduce in-house training for unskilled workers while the effects on skilled workers are mixed.

The findings suggest that having been forced to pay higher wages because of binding and increasing minimum wages, firms reduce hiring and training of unskilled workers, leaving them unemployed and untrained. This should be of utmost concern as firms seem to adopt a short-term policy at a long-term cost for unskilled workers, further exacerbating unemployment and poverty. Moreover, the crucial role of firm characteristics in determining the adverse effects of minimum wages has raised reservations regarding previous studies that have used data from household or labor force surveys, which do not take this issue into account.



## I. INTRODUCTION

*The minimum wage has put a sense of equality back into workers' relationship with their employer. Wages are supposed to be a fair reflection of an employee's efforts, but for too long wages were a point of exploitation—what could an employer get away with. In very simplistic terms this put a pressure to keep low-paid wages low. With the minimum wage, this downward pressure is at least partly removed.*

BBC News (2005)

The relevance and efficacy of minimum wage regulations are a persistent issue among policymakers. The key question is whether the implementation and therefore the increase in minimum wages will adversely affect the employment prospects or chances of low-skilled workers, i.e., the group of workers that minimum wage regulations aim to help. These workers earn around the minimum wage so that any changes in the rate may affect their income and even their employment.

Another important issue is “detraining”, whereby minimum wages affect training provided by firms. If firms are forced to pay higher wages due to the high and binding minimum wage, rational and profit-maximizing firms can react by reducing their other worker-related expenses, including allocations for in-house training. Firms can also “disemploy”, or choose to recruit less or even lay off unskilled workers and hire more skilled workers to reduce overall labor costs and alleviate the pressure to provide training.

The minimum wage effects on employment and training thus have repercussions on overall wage and income distribution and, hence, poverty. The most relevant question here is, therefore, who actually benefits from the setting of minimum wages.

The main purpose of this study is to examine the effects of minimum wages on employment levels and training for different types of workers with Indonesia as a case study. The study uses unique firm-level data and considers different types of firms, business sectors, as well as modeling specifications. Further examination of export orientation, foreign ownership, and firm size to substantiate the effects of minimum wages is also carried out to show how firm characteristics have, to some extent, influenced the adverse effects of minimum wages.

In Indonesia, the latest trend in labor market policies has become increasingly pro-labor, and the minimum wage has become one of the main issues in the policy debate, making Indonesia an interesting and important case study. Increasing labor protection with minimum wages and severance pay, against a backdrop of persistent rising unemployment despite economic recovery after the Asian financial crisis, is a major issue. The increase in the minimum wage in Indonesia has been largely higher than the growth of inflation and labor productivity, and the severance pay system has become one of the most expensive in Asia (Manning 2003 and Sugiyarto et al. 2006).

The study uses multiple regression analyses taking into account the differences in the firm's types and sizes, as well as industry sectors. Regression analyses for skilled labor are also conducted to gain insights on the possibility of employers substituting skilled workers for unskilled ones when minimum wages rise. More regression analysis for subsamples of different types of firms such as exporters and nonexporters, domestic and foreign, and different-sized firms are also performed to further examine the role of firm characteristics in determining minimum wage effects.

Sections II to IV review the empirical literature on the issue, including previous studies on the minimum wage in Indonesia. Section V provides discussions of the data and empirical models used in this study. Section VI presents the estimation results for both employment and training regressions. Section VII concludes the study by summarizing the main findings and some discussions on the policy implications and key challenges for the future.

## **II. RATIONALE OF THE MINIMUM WAGE POLICY**

Minimum wage or wage-floor regulations are enforced mainly on the grounds of social justice, i.e., to raise incomes of poor or near-poor families whose members are receiving wages around the minimum level. The regulations are part of social protection policies to shield the lowest-paid workers against possible adverse effects from labor market imperfections and abuses of profit-maximizing capitalists. This protection is in line with International Labour Organisation (ILO) Convention No. 26, which protects vulnerable workers from having their wages forced down or maintained at exceptionally low levels by employers who are in a stronger position to determine wages.

Proponents of the minimum wage policy argue that it maintains living standards and protects the poor. The policy, they say, could thus be an effective tool for poverty alleviation, especially in developing countries where social protection policies for workers and the poor are not well developed. They also make a case that the minimum wage does not have a significant disemployment effect, nor does it have a negative effect on fringe benefits to low-wage workers (Simon and Kaestner 2003 and Saget 2006). Studies show that minimum wage increases have negligible effects on employment or even lead to an increase in the employment of low-wage workers (Katz 1991, Katz and Krueger 1992, Card and Krueger 1993). Moreover, they also argue that the disemployment effects of the minimum wage only presume a zero-growth economy, where there is no compensating demand stimulus that can nullify the negative employment effects of a rise in the minimum wage above the market clearing level (Islam and Nazara 2000).

Critics, on the other hand, emphasize the efficiency losses of the minimum wage that can result in disemployment and other adverse effects. Minimum wage regulations distort the labor market, creating negative effects on the economy. They also cite evidence that the adverse employment effects of minimum wages are actually significant (Neumark and Wascher 1991, 1994a, 1994b, 1995, and 1999). Furthermore, they argue that the only plausible reason for the minimum wage is to redistribute incomes from capitalists to low-skilled workers; unfortunately, the minimum wage is a crude instrument for doing this. A minimum wage provides some low-skilled workers higher wages, however, its disemployment effects also make other workers receive zero salaries.<sup>1</sup> In addition, if

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<sup>1</sup> From the asymmetric information literature point of view, it can be argued that capitalists should be better informed than low-skilled workers so that any additional demand from the latter arising from minimum wage regulations can stimulate capitalists to protect their interests. Moreover, firms can also respond to minimum wage increases by making working conditions more difficult. In this framework, jobs with difficult working conditions are better paid and workers will have different preferences for working conditions. In the absence of minimum wage regulations, the firm would

the minimum wages are set lower for young workers, this can encourage firms to hire low-skilled teenagers or young-adult workers to replace low- or high-skilled adult workers. This will decrease school enrollment and disrupt general income distribution without changing the employment level. Income distribution worsens because the replaced adult workers are more likely to be the breadwinners of low-income families, while the newly recruited teenage workers are mainly members of better-off families.

Minimum wage laws can also encourage people to think that low wages are merely the fault of profit-seeking employers or capitalists, while low wages can actually result from workers' low skills and education. In this context, minimum wage regulations can reduce workers' incentive to acquire more skills and education since they feel protected and receive higher wages anyway.

Theoretically, minimum wages can constrain employment, especially in the context of a competitive labor market. A minimum wage set above the equilibrium price, for instance, will lead to job rationing and open unemployment. Under a monopsonistic setting, however, this condition can be reversed. With "employer power", firms can pay workers less than their marginal product, which is equal to the market-clearing level of wages in a competitive labor market. To some degree, the monopsonistic labor market can increase both wages and employment at the same time.

In practice, minimum wage regulations are a common mode of government intervention in the labor market. This is partly due to the public's enormous support for the policy and the government's efforts to avoid being labeled "anti-labor", which can be politically costly. The minimum wage, for instance, has become a "symbol of decency and fairness" (Tony Blair as quoted by BBC News 2005) and multilateral institutions such as the ILO have also supported the minimum wage policy as a tool to address income inequality and to improve workers' living standards.

The first national minimum wage law was enacted by New Zealand in 1896, followed by Australia in 1899 and the United Kingdom in 1902 (Wikipedia 2008). A number of developing countries in Asia have also introduced minimum wage regulations as part of their industrial policies. Among the earliest, for instance, is Sri Lanka's 1927 Minimum Wage Ordinance. The subsequently impressive development of minimum wage systems in many countries reflects their particular historical and institutional development. Minimum wages in the People's Republic of China, Indonesia, Japan, Philippines, and Thailand, for instance, have been decentralized, while Republic of Korea and Viet Nam each have a single rate. In Cambodia, the minimum wage is only for workers in the garment and textile sector, which is in complete contrast with India where the rates vary by state, sector, and occupation (Lee 2007, Saget 2006, and Felipe and Hasan 2006).

### **III. MINIMUM WAGE POLICY IN INDONESIA**

Indonesia was arguably the worst hit by the 1997 Asian crisis. From 1991 to 1996, the country's real GDP growth grew by 7.8% on average owing to rapid increases in investments and exports, which grew by 10.4% and 9.4% annually. The crisis overturned that course and the economy was unable to fully recover.

Many factors have contributed to the slow recovery. Economic expansion after the crisis was driven mostly by consumption, creating no significant additional employment. The weak investment

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not require workers who prefer lighter working conditions to work harder, because it would have to compensate them for that. With the introduction of a minimum wage, the firm will require them to work harder to compensate for the higher wages. See Fraja (1999) for an example of the use of the framework.

climate discouraged current and potential investors, while the lengthy and costly process of doing business, widespread corruption, and uncertainties and irregularities in the taxation and labor market policies further hindered investments (ADB 2005). Therefore, despite the government's efforts to increase investments, the investment rates after the crisis remained low after a massive contraction of 33% in 1998. The investment level prior to the crisis, for example, was about 30% of GDP, while the present level of investment is only around 16% (ADB 2007).

The Indonesian labor market has had to endure the negative repercussions of the crisis. Open unemployment and underemployment have been increasing during this period. The government's heavy reliance on economic growth to promote employment and labor market policies that seem to constrain, rather than facilitate job creation, have made it very difficult to improve labor market conditions. Constraining labor market regulations include the minimum wage, which has become more problematic especially after its decentralization in 2001.

Minimum wage fixing in Indonesia was first introduced in 1956, and the National Wage Council, which is in charge of setting minimum wages, has been operating since 1969 (Saget 2006b). Each province has its own regional or provincial wage council that determines the minimum wage level. In the 1970s, minimum wage regulations were implemented with little government intervention, especially in determining the minimum wage. In the 1980s, however, minimum wage regulation became an important plank of the government's labor policy. Since then, regional minimum wages were set and updated annually based on the cost of the commodity bundle deemed necessary for a particular worker.

Many, however, considered that minimum wage levels in the 1970s and 1980s were set too low, below the market clearing level (see, e.g., Rama 2001). The minimum wages in these periods were merely symbolic, to avoid possible "labor exploitation."<sup>2</sup> This situation is in contrast with the condition that began in the first half of the 1990s when minimum wages were tripled in nominal terms and more than doubled in real terms. In the second half of this decade, the nominal rates continued to increase but not necessarily in real terms since inflation also increased. During 2000 to 2002, the minimum wages increased for three consecutive years and, by the end of 2002, the rates in real terms breached their pre-crisis levels in 1997 (Suryahadi et al. 2003).

Some have raised concerns that the increasing minimum wage has further worsened the unemployment problem, which has been increasing since 2000 with weak investments from a deteriorating investment climate after the economic crisis. Moreover, decentralization in Indonesia since 2001 has further complicated the issue, creating adverse effects on the investment climate. Decentralization is supposed to promote key principles of regional autonomy, government accountability and transparency, economic efficiency and effectiveness, and equitable access to services. However, the hasty and big-bang approach of decentralization in Indonesia has contributed to the worsening of some main aspects of the investment climate such as creating more uncertainties and corruption (ADB 2005).

Decentralization has transferred authority from national to regional and local governments, including the power to determine issues on minimum wages and other labor and human resource policies. As a result, labor market outcomes vary across regions and to some extent become dependent on the style and leadership capabilities of the regional and local leaders.<sup>3</sup> Unfortunately, limited resources and capacity constrain regional and local governments in carrying out all their decentralized

<sup>2</sup> Information from key government officials in Indonesia.

<sup>3</sup> Discussions with some key government officials in Indonesia.

responsibilities. The Ministry of Manpower and Transmigration is one (though not unique) department experiencing such constraints. The regional offices of this ministry were detached from the central office and attached to different local institutions under different names and functions without clear mandates and job descriptions. Consequently, there has been some confusion about their roles in the local institutions. The adverse effects of this ambiguity are evident in, for example, the halt in gathering labor market statistics from some regions, making planning and other related activities more problematic.

## IV. LITERATURE REVIEW

### A. Minimum Wage Effects across Countries

Most studies find that minimum wages have disemployment effects, particularly among unskilled-teenage and young-adult workers. Abowd et al. (1997 and 1999) used logit models to study the minimum wage effects in France and the United States (US), and noted that the minimum wage has large negative effects on employment. The effects are mild in general but very strong on workers employed at the minimum wage level. For instance, a 1% increase in the minimum wage reduces the chance of job retention by 2.5% in France and 2.2% in the US for young males. Neumark and Nizalova (2004) estimated the long-run effects of minimum wages in the US and found that as workers reach their 20s, they work less the longer they are exposed to a higher minimum wage. Their study also found that minimum wage effects are more significant for African-American workers.

A series of papers by Neumark and Wascher employed different approaches and datasets, and generally found negative employment effects with the minimum wage. Using panel data at the state level in the US, they found that the estimates of teenage and young employment population ratios fell following the minimum wage increase (Neumark and Wascher 1991). Moreover, using a conditional logit model of employment and enrollment outcomes for teenagers and data for 1977–1989, they showed a negative effect of minimum wages on school enrollment, a positive effect on teenagers neither employed nor in school, and employer substitution of higher-skilled for lower-skilled teenage workers (Neumark and Wascher 1994a). Furthermore, employing a disequilibrium approach with an endogenous switching regression to measure disemployment effects, their two-regime competitive and three-regime monopsony models yielded significant negative effects of minimum wages on employment, and the results were consistent when matched with the Current Population Survey in the US (Neumark and Wascher 1994b).

Using a multinomial logit model, Neumark and Wascher (1995) showed that higher minimum wages have small but significant negative effects on employment. Minimum wages have also raised the probability that higher-skilled teens leave school to displace lower-skilled workers from their jobs. In their later study, they estimated pooled time-series cross-section regressions of 16 countries of the Organisation for Economic Co-operation and Development using data for 1975–1997 and found similar results (Neumark and Wascher 1999). They also found that the disemployment effects tend to be smaller when there are subminimum wage provisions for youth, and more severe when wages are set by collective bargaining agreements including government policies that restrict employer efforts to vary working hours in response to wage increases.

Other studies for some Latin American countries also found strong adverse employment effects of minimum wages. Freeman and Freeman (1991), for instance, found that the minimum

wage implementation in Puerto Rico substantially lowered employment, altered labor allocation across industries, and had massive effects on earnings distribution. Similar results were obtained by Maloney and Mendez (2003).

A comparison across countries shows that the disemployment effects of minimum wages in Latin America are stronger than in industrial countries. This is because the labor markets in Latin America are more rigid, making the trade-off between effects on poverty and reduced flexibility more severe. Krueger (1994) also found that the adverse employment effects are strong in time series' studies, while the weakest evidence comes from cross-industry analyses.

Using the same data set in the study by Neumark and Wascher (1992), Card et al. (1993) however found no disemployment effects of teenage workers. They argued that the disemployment effects found in the earlier study may be attributed to an error in the definition of school enrollment rate. Moreover, applying one year-lagged estimates in the modeling specification also showed no adverse employment effects. Other studies also express some skepticism about the disemployment effects of minimum wages. Boschen and Grossman (1981) found that the minimum wage policy did not affect aggregate employment or average wages. Studies by Katz (1991) and Katz and Krueger (1992) using a longitudinal survey of firms in the fast-food industry in Texas (1991 and 1992) and New Jersey (1993) also found no disemployment effects arising from the minimum wage. In fact, employment improved relatively among those firms likely to be affected by minimum wage increases.<sup>4</sup>

In estimating the effects of the US federal minimum wage increase in 1990, Card (1992) noted that the increase in the minimum wage raised teenage wages, but there was no evidence of a reduction in teenage employment. Moreover, Simon and Kaestner (2003) found that there was no effect of minimum wage increases on fringe benefits to low-wage workers, and that the results were valid whether using federal- or state-level variations in the minimum wage data.

On the direct link between minimum wages and poverty, Neumark and Wascher (1997) found that minimum wage increases tend to redistribute income among low-income families rather than from the high- to low-income households. Two studies by Neumark et al. (1998 and 2000) also found negative distributional effects of minimum wages. While minimum wages raise the income of some poor families, they also increase the proportion of poor and near-poor families. Their study in 2000 found that while wages of low-wage workers increase, their hours worked and employment decline so that the net effect is a decline in their income. These findings suggest that the minimum wage is not a good policy tool for poverty reduction. Also, in considering the alternatives to the minimum wage, the income tax credit was found to be more beneficial for poor families than the minimum wage (Neumark and Wascher 2000).

Saget (2001) obtained insignificant disemployment effects from minimum wages. Performing regressions on a sample of selected developing countries in North and Sub-Saharan Africa, Latin America, and Asia (Indonesia not included), Saget found that the minimum wage has an insignificant effect on employment level, and a negative and significant effect on poverty level. This suggests that minimum wages can be an effective tool for poverty reduction in developing countries.

Bird and Manning (2005) noted, however, that only 17% of the minimum wage increase in Indonesia in 2003 went to poor families, 34% to near-poor, and half of the benefits accrued to nonpoor families. Assuming no job losses, their study found that the minimum wage policy is not effective in benefiting the poor.

<sup>4</sup> It should be noted, however, that the fastfood industry was booming in the two states at the time of the studies, undermining the minimum wage effects.

## B. Minimum Wage Effects in Indonesia

Sugiyarto et al. (2006) noted that the Indonesian government policies toward the labor market have shifted from being repressive toward labor unions and being pro-employer, to favoring labor unions and being pro-worker. This was partly due to the international pressure to improve labor standards in developing countries, which led to labor-friendly policies in the 1990s. This was strengthened during decentralization since 2001. Such pro-labor policies include free creation of labor unions, introduction of new minimum wages and social security; and promotion of labor rights on working hours, discrimination, child labor, retrenchments and severance pay, contract, and occupational health and safety. In 2000, for instance, Indonesia became the first country in Asia to adopt all ILO conventions on labor, including on minimum wages, industrial dispute resolution system, working hour limitation, overtime pay, severance pay, and leaves pertaining to maternity, illness, and holidays.

Efforts to raise labor standards also resulted in passing the Manpower Protection Act of 2003 in which the minimum wages are regulated. Among others, the Act guarantees minimum wage annual revisions through provincial government decrees based on district governments' recommendations and wage criteria for a "decent" standard of living (Manning 1993). Until 2000, regional minimum wages were established by decree issued by the Ministry of Manpower and Transmigration. The process started from the recommendations of provincial tripartite councils (with representatives from employees, employers, and government) then to provincial governors before reaching the minister. With decentralization and more regional autonomy since 2001, the power to set minimum wages has been shifted to governors, mayors, and regents, based on recommendations from tripartite councils. This change has resulted in significant increases in the minimum wage, without regard to changes in the worker's productivity and general price, and more labor disputes.<sup>5</sup>

While well-intentioned, such policies also led to counterproductive results. The change in the power balance between employer and employee has resulted in arbitrary increases in the minimum wage regardless of productivity growth and rising labor costs. Minimum wage increases that have thus been higher than both inflation and workers' productivity coupled with the severance pay system have become one of the most expensive in the Asia and Pacific region. As a result, economic growth in 2000–2003 was characterized by declining investments and coincided with rising unemployment and labor costs. Jobs in the manufacturing sector fell by 9.8% while labor costs were 35% higher than prior to the Asian crisis (Sugiyarto et al. 2006).

Rama (2001) estimated employment effects of minimum wages by defining the wage variable in different ways, i.e., as a ratio to average wage, or to labor costs or value added per worker. His main finding was that there was no negative effect on aggregate employment and that doubling the minimum wage in Indonesia reduces urban wage employment by 0–5%. Disaggregating the regressions by firm size yields different results: significant disemployment effects for small firms but positive effects on large firms.

Alatas and Cameron (2003) found disemployment effects of minimum wages in the clothing, textile, footwear, and leather industries. Their study adopted Card and Krueger's method of using

<sup>5</sup> On the concern about the high and increasing minimum wages in Indonesia despite the lack of labor productivity improvement, labor unions have refused to be responsible, referring instead to the fact that machinery and other capital equipment currently in use are old and obsolete since there have been no new investments after the crisis. Accordingly, Indonesian workers with the same skill level and in the same situation will never be able to compete with their counterparts from other competing countries for their competitors enjoy better and newer equipment that will increase their productivity (Sugiyarto et al. 2006 and based on discussions with some labor union leaders).

difference-in-difference and applied micro-level data in the fastfood industry in New Jersey, US. This method can avoid model specification problems inherent in regression-based results, which can be highly model-specific and could generate skepticism about the actual minimum wage effects on employment.

Suryahadi et al. (2003) also had similar findings on the minimum wage impact in the urban formal sector in Indonesia. Using data mostly taken from the National Labor Force Surveys (Sakernas), the authors found that minimum wages have adverse effects on the employment of unskilled workers but no effects on white-collar workers. The negative impacts on female, young, less-educated, full-time and part-time workers were also significant. The regression results showed that a 10% increase in real minimum wages reduces total employment by more than 1%, i.e., an elasticity of  $-0.11$ . The employment elasticities of minimum wages for female workers were  $-0.31$ , less-educated workers  $-0.20$ , full-time workers  $-0.09$ , and part-time workers  $-0.36$ . For white collar workers, the elasticity was positive at  $1.00$  and statistically significant, indicating that these workers benefit from minimum wage increases. Their results suggest that the negative employment effects of minimum wages are borne almost entirely by groups most vulnerable to changes in labor market conditions, forcing them into the informal sector to take on lower paying jobs with poorer working conditions. This finding seems in line with the unemployment condition in Indonesia, which is most prevalent among women, youth, and uneducated, and which takes place alongside the increasing trend of workers returning to agriculture and the informal sector (Sugiyarto et al. 2006).

Manning (2003) found that the high levels of minimum wages in Indonesia have put pressure on average wages, increasing wage costs and reducing employment significantly. He further argued that such minimum wage levels are damaging Indonesia's comparative advantage in labor-intensive industries. Manning (2003) further pointed out that the minimum wage policy has played a crucial role in keeping formal sector wages above market-clearing levels at the expense of jobs in the formal sector. Real industrial wages in large and medium establishments rose fastest after the Asian crisis, reaching about 50% higher than pre-crisis levels by late 2004.

### C. Level and Binding Aspects of the Minimum Wage

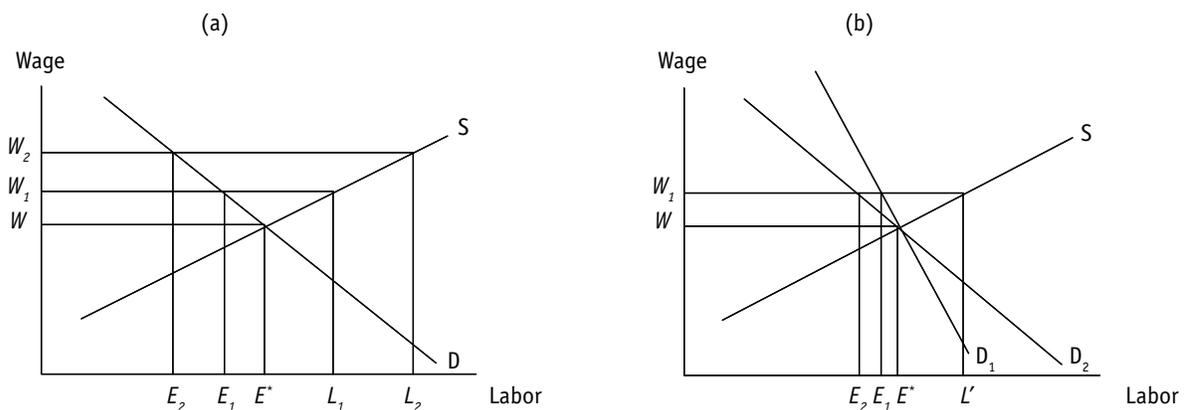
Two crucial issues underlying the results of examining minimum wage effects are whether the minimum wage is really above the market clearing level and if minimum wage regulations are binding for all firms. Unfortunately, many studies on minimum wage effects have taken these issues for granted, basically assuming that the minimum wage rate is always above the market clearing level and that all firms comply with regulations by paying their workers above the minimum wage. These assumptions are consistent with the standard analysis on minimum wage effects on employment level.

In the standard model, the minimum wage is assumed to be above the market clearing level and there is no compliance issue. As in a fully competitive world, the market clearing level equals the marginal productivity of workers, Figure 1 panels (a) and (b) represent the minimum wage effects on employment from which the following conclusions can be drawn:

- (i) *Minimum wages will cause unemployment.* Setting the minimum wage above the market clearing level at  $W_1$  in Figure 1 panel (a), for instance, will reduce labor demand from  $E^*$  to  $E_1$ , creating unemployment of  $(L_1 - E_1)$ .

- (ii) *The higher the minimum wage, the more unemployment there will be.* From the Figure 1 panel (a), if the minimum wage is further increased to  $W_2$ , unemployment is also increased to  $(L_2 - E_2)$ . Notice that  $(L_2 - E_2)$  is larger than  $(L_1 - E_1)$ .
- (iii) *Increasing the minimum wage will encourage workers to move into the protected sector, in which the minimum wage is imposed.* This is implicit in the upward slope of the labor supply curve.
- (iv) *For any given minimum wage rate, the more elastic the demand for labor, the larger the minimum wage's unemployment effect will be.* In Figure 1 panel (b), demand curve  $D_2$  is more elastic than  $D_1$ . For a given minimum wage  $W'$  and labor supply curve  $S$ , the unemployment effect of minimum wage is greater for demand curve  $D_2$  than  $D_1$ , which is shown by  $(L' - E_2)$  is greater than  $(L' - E_1)$ .

**FIGURE 1**  
**STANDARD ANALYSIS OF THE EMPLOYMENT EFFECTS OF MINIMUM WAGE**



Source: Authors' summary.

Unfortunately, the assumptions that minimum wages are always above the market clearing level and that firms always comply with regulations implicitly assumed in the standard model are not always true. Therefore, the standard analysis depicted in the Figure 1 is not always valid.

As discussed, many considered the minimum wages in Indonesia in the 1970s and 1980s as below the market clearing level and as serving only as a benchmark to avoid "labor exploitation." In this condition, whether the minimum wage regulation is binding or not is really not important as most firms paid their workers above the minimum wage anyway.

On the other hand, if the minimum wage is above the market clearing level, i.e., higher than the marginal productivity of labor in the competitive market, then the binding issue or the enforcement of minimum wage regulations becomes very important. Two possible scenarios arise: first, the minimum wage is not binding or not enforced, and, second, the minimum wage is binding or is enforced. In the first case, the minimum wage effects on employment are still insignificant, while in the second case, the minimum wage effects on employment and other factors become very important. This is because the implementation and increase in minimum wages above the worker's marginal productivity will likely create adverse responses from firms in the form of reduced employment and other expenses by the firms for workers.

A report from SMERU (2001) provides a good example by showing the minimum wage impact on wage distribution in Indonesia during 1988–2000. In 1988, the minimum wage had very little effect on wage distribution, but from the beginning of 1992, the minimum wage effects on wage distribution became more apparent so that by 2000 most wages were already clustered around the minimum wage. This shows that minimum wage compliance has steadily increased over time and has become binding for most workers in the urban formal sector. Rama (2001) also showed that about 15% of manufacturing workers in Indonesia are paid less than the minimum wage, and that this proportion rises to 26.9% for women and 20.6% for workers under 25 years of age. The binding minimum wage regulations are also evident from the survey results in this study, which will be discussed further in the next section.

## V. MODELLING DEVELOPMENT AND DATA USED

### A. Developing the Model

To estimate the effects of the minimum wage on employment level, it is necessary to develop a model that links the employment level on the left hand side and the minimum wage on the right hand side of the equation, together with other relevant explanatory variables. The following model is used to estimate the effects of minimum wages on employment:

$$N_{ij} = \alpha_i + \beta_i W_{ij} + \phi_i I_{ij} + \gamma_i S_{ij} + \delta_i D_{ij} + \varepsilon_{ij} \quad (1)$$

where  $N$  is the logarithm of employment growth and  $W$  is the logarithm value of average wage to represent the fluctuations in the minimum wage. The variables  $I$  and  $S$  are controlling variables for industry type or business sector, and firm size, respectively. The variable  $D$  is a dummy variable for type of firms, e.g., whether exporting or nonexporting, foreign or domestic, and small or large firms.

The model developed in this study is made possible by the unique data available from the investment climate survey conducted in Indonesia in 2003/2004 (ADB 2005). The modeling approach adopted in this paper has never been applied before since previous studies on the minimum wage issue have used different modeling approaches and data sources.

The two main variables used in equation (1) are, therefore, the logarithm values of employment growth and average wage to represent minimum wage fluctuations. Employment growth between 2001 and 2002 is used as the dependent variable, while average wages are computed by dividing total wage cost with total employment in 2002. Employment growth and average wage are computed for each type of worker, i.e., unskilled workers and skilled workers. The skilled workers are further classified into skilled production workers, professionals, and management. Regression analyses are then performed for unskilled production workers and skilled workers of different types: skilled production workers, professionals, management, and the sum for all skilled workers.

The modeling equation for estimating the minimum wage effects on training can be presented as:

$$T_{ij} = \alpha_i + \theta_i W_{ij} + \eta_i I_{ij} + \lambda_i S_{ij} + \varphi_i D_{ij} + \mu_{ij} \quad (2)$$

where  $T$  is the log of the number of person-weeks of training in 2002 for each firm, and  $W$ ,  $S$ , and  $D$  are defined as in equation (1) above. After various trials, the variable  $I$  was subsequently removed in the training regressions due to insufficient number of observations and to obtain more robust results.

## B. Minimum Wage Variable Used in the Model

In equations (1) and (2), fluctuations in the average wage are used as a proxy for fluctuations in the minimum wage. This implicitly assumes that the minimum wage regulations are binding and that the fluctuations in the average wage are driven mostly by the fluctuations in the minimum wage. This is a strong assumption that must be fulfilled if the modeling results in this paper are to be valid. Fortunately, the best information available so far indicates that this is the case for Indonesia, especially in the manufacturing sector where this study concentrates. As discussed before, Rama (2001) showed that only about 15% of manufacturing workers in Indonesia are paid less than the minimum wage, and SMERU (2001) also noted that the minimum wage in general has been more binding. The higher minimum wage rate further confirms the binding aspect as the values of minimum wages have become closer to the average wages.

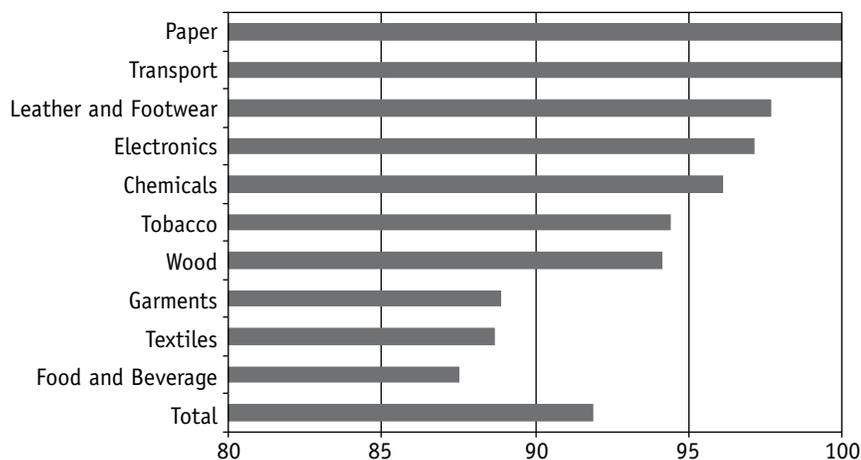
The survey results used in this study, which is concentrated on the manufacturing sector only, further confirm the binding aspect of the minimum wage. As can be seen in Figures 2 and 3, the minimum wage compliance reaches 91.9% for all firms. The compliance rates in the paper and transport industries are even almost 100%. Looking at the different types of firms, about 97% of exporters and 86% of nonexporters comply with the minimum wage regulations. For foreign and domestic firms, compliance rates are even higher at 99% and 91%, respectively. By firm size, compliance with minimum wage regulations is most evident among large firms (98.3%), followed by medium firms (85.4%), then small firms (80%). Therefore, there is a good reason for studying the impact of minimum wages using the data set, and it is justifiable to use the fluctuations in the average wage as a proxy for the fluctuations in the minimum wage.

The pressure of increasing the average wage coming from rising minimum wages can also be traced from the way the minimum wage is implemented in Indonesia. The minimum wage rate was based on the amount of wages required to meet the physical minimum need (*Kebutuhan Fisik Minimum* or KFM) of a particular worker, i.e., single, married, and married with one child. The amount is calculated based on the prices of a bundle of commodities included in the KFM. The proposed rate based on the bundle cost is then negotiated in the three-party negotiation meeting in the wage council of the labor unions, employee associations, and government representatives. In this context, any increase in the general price will be more likely reflected in the increase of “demanded” minimum wage, but not vice versa.<sup>6</sup> Accordingly, the minimum wage rate is set independently, disregarding the firm’s production cost and worker productivity.<sup>7</sup>

<sup>6</sup> This can be seen from the many cases of employer associations walking out of wage negotiations due to unrealistic demands for high increases in the minimum wage.

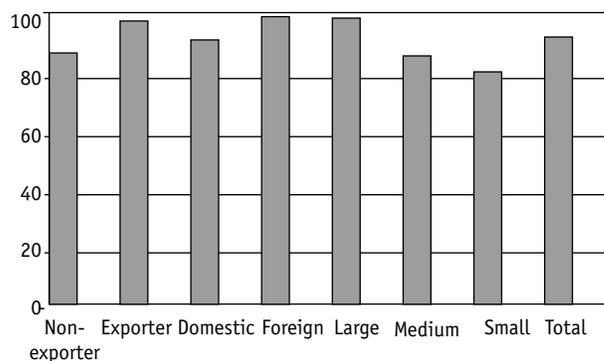
<sup>7</sup> For some experts on the minimum wage in Indonesia, the use of log average wage to represent the fluctuation in the minimum wage can arguably underestimate the minimum wage variable. This is because the trend and fluctuations in the minimum wages are relatively higher than those of the average wage.

**FIGURE 2**  
**MINIMUM WAGE COMPLIANCE RATE ACROSS DIFFERENT TYPES OF INDUSTRIES (PERCENT)**



Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

**FIGURE 3**  
**MINIMUM WAGE COMPLIANCE RATE ACROSS DIFFERENT TYPES OF FIRMS (PERCENT)**



Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

### C. Testing the Validity of the Minimum Wage Variable

To further ensure that the log average wage can be used as a proxy variable for fluctuations in the minimum wage, a test is carried out by conducting a regression of the log average wage of unskilled workers on the district dummy variables:

$$AVW_j = \alpha + \beta DST_j + \varepsilon_j \quad (3)$$

where  $AVW$  is the average wage of unskilled workers across districts and  $DST$  is the district dummy variable. Both variables are constructed from the survey data.

The purpose of this test is to prove that the log average wages of unskilled workers across districts are statistically different, following the distribution of the actual minimum wages across districts that is likewise different. Since the actual minimum wage is set at a district level, the regression of the actual minimum wage on the district dummy must show a significant result. Accordingly, if log average wage is a good proxy for the fluctuations in the actual minimum wage, replacing the actual minimum wage with the average wage should produce similar results. Therefore the estimation in equation (3) above should produce robust results. Table 1 summarizes the regression results, which show that this is the case. This can be seen from the high value of F statistics, low probability value (p-value) of F, and p-values of district dummy variables.

**TABLE 1**  
**TESTING THE VALIDITY OF USING LOG AVERAGE WAGE AS A PROXY VARIABLE FOR FLUCTUATIONS**  
**IN THE ACTUAL MINIMUM WAGE**

LOG_AVW	COEFFICIENTS	SE	T-VALUES	P> T	95% CI ESTIMATES	
DST1	15.47	0.552	28.02	0.000	14.39	16.56
DST2	15.54	0.664	23.41	0.000	14.23	16.84
DST3	16.21	0.664	24.43	0.000	14.91	17.52
DST4	15.09	0.813	18.56	0.000	13.49	16.69
DST5	15.67	0.469	33.4	0.000	14.75	16.60
DST6	16.74	1.408	11.89	0.000	13.97	19.51
DST7	15.21	0.469	32.41	0.000	14.29	16.13
DST8	15.46	0.290	53.24	0.000	14.89	16.03
DST9	16.69	0.890	18.74	0.000	14.94	18.44
DST10	15.25	0.235	64.98	0.000	14.79	15.71
DST11	15.87	1.991	7.97	0.000	11.96	19.78
DST12	14.70	0.498	29.52	0.000	13.72	15.67
DST13	15.48	0.996	15.55	0.000	13.53	17.44
DST14	15.38	0.297	51.8	0.000	14.79	15.96
DST15	15.28	0.890	17.16	0.000	13.53	17.03
DST16	15.29	0.813	18.8	0.000	13.69	16.88
DST17	14.17	0.457	31.02	0.000	13.27	15.07
DST18	15.40	0.996	15.47	0.000	13.45	17.36
DST19	15.07	0.383	39.32	0.000	14.31	15.82
DST20	14.50	0.415	34.91	0.000	13.68	15.31
DST21	15.17	0.358	42.41	0.000	14.46	15.87
DST22	15.60	0.364	42.92	0.000	14.89	16.32
DST23	15.95	0.358	44.6	0.000	15.25	16.65
DST24	14.05	0.890	15.78	0.000	12.30	15.80
DST25	14.84	0.630	23.57	0.000	13.60	16.08
DST26	15.02	0.575	26.14	0.000	13.89	16.15
DST27	14.30	0.600	23.83	0.000	13.12	15.48
Source	SS	df	MS	No. of observations		481
Model	111603.4	27	4133.5	F( 27, 454)		1042.63
Residual	1799.9	454	4.0	Prob > F		0
				R-squared		0.9841
				Adj. R-squared		0.9832
Total	113403.3	481	235.76	Root MSE		1.9911

## **D. Data Source**

The study uses data from the Productivity and Investment Climate Survey of Indonesian manufacturing firms (ADB 2005). This survey was completed in 2003/2004, covering 713 firms from 10 manufacturing industries in different parts of the country. The survey was carried out as part of the investment climate study conducted jointly by ADB, the World Bank, Badan Pusat Statistik (BPS), and the Indonesian Coordinating Ministry for Economic Affairs.<sup>8</sup> This is a unique survey at the firm level that has relatively complete information about the firm, including firm characteristics, number of workers for different skills and their wage payments, and training for workers. The survey also collected information on firms such as constraints during establishment; infrastructure and other services; conflict resolution and legal environment; capacity and innovation; labor relations; finance, sales, and productivity; employment dynamics; and human capital stock and acquisition. The survey can be seen as an extension of the standard investment climate assessment conducted worldwide by the World Bank. The variables included in the survey are also much more complete than the regular manufacturing surveys conducted by BPS as part of its statistical system.<sup>9</sup>

The following manufacturing subsectors were included in the Productivity and Investment Climate Survey: food and beverages, tobacco, textiles, garments, leather and footwear, wood, paper, chemicals and chemical products, electrical appliances, and transport equipment. The subsectors were selected because they are the main drivers of manufacturing output as reflected in their contribution to value-added generated during 1996–2000. The survey covered firms in the following 11 provinces, which were also selected based on their importance in the generation of national value-added: Jakarta, Banten, West Java, Central Java, Yogyakarta, East Java, North Sumatera, South Sulawesi, East Kalimantan, Riau, and Bali.

Most studies on the effects of minimum wages are based on macroeconomic data or employment surveys carried out at the household or individual level. Such studies thus make use of macro employment data linked to geographical variables or household/family member characteristics. Previous studies on Indonesia discussed in the literature review are also mostly based on household and labor force surveys. Studies based on firm data are very few, including those by Katz and Krueger (1992) and Card and Krueger (1993).

## **E. Data on Employment and Training**

### **1. Employment Growth**

Employment growth from 2001 to 2002 was about 47.2% for unskilled production workers and 90.4% for skilled production workers. The highest employment growth was observed in the textile industry, which grew by 169.7% and 206.8% for unskilled and skilled production workers, respectively. These growth estimates calculated from the survey results are obviously different from the official numbers, which must be calculated from the more complete samples representative at the national level.<sup>10</sup>

<sup>8</sup> This is part of ADB's Technical Assistance on Improving the Climate for Investment and Productivity in Indonesia (Small Scale TA 3999); see ADB (2005).

<sup>9</sup> Detailed information about the survey, including the questionnaire used, is available from the authors.

<sup>10</sup> Detailed information about the employment growth for different types of workers in 1990–2003 can be obtained in Sugiyarto et al. (2006), while data for other periods and other related information are available from the BPS website at <http://www.bps.go.id>.

Positive employment growth was recorded in the following sectors: tobacco (51%), textiles (170%), wood (31%), garments (19%), food and beverages (7%), and paper (2%). Reductions in employment were noted in transport equipment (11%), electrical appliances (10%), leather and footwear (6%), and chemicals and chemical products (2%).

**TABLE 2 [UNCITED!!!!!!!]  
EMPLOYMENT GROWTH OF PRODUCTION WORKERS ACROSS DIFFERENT INDUSTRIES (PERCENT)**

INDUSTRY	UNSKILLED	SKILLED
Chemicals	-1.9	22.8
Electronics	-9.6	25
Food and beverage	7.2	160.7
Garments	19.3	86.9
Leather and footwear	-6.3	-10.2
Paper	1.8	-7.6
Textiles	169.7	206.8
Tobacco	50.6	7.9
Transport	-11.4	11.1
Wood	31	6.1
Total	47.2	90.4

Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

By firm type, employment growth was observed for exporters (18.7%) and nonexporters (75.1%). The number of workers grew by 55.1% in domestic firms but declined by 5.6% in foreign firms. Based on firm size, employment grew by 91.2% for large firms; remained stagnant for medium-size firms; and declined by 18.7% for small firms.

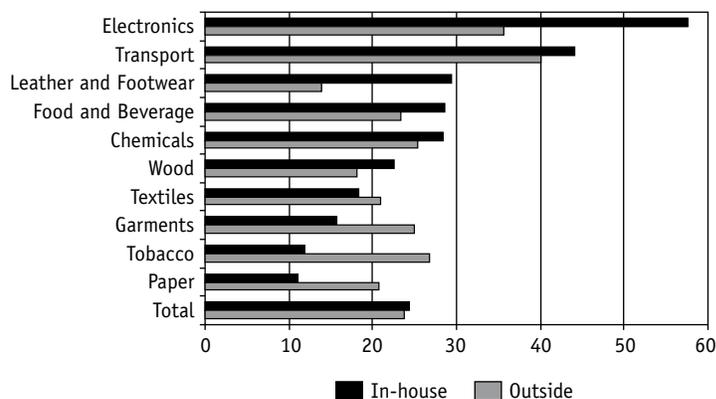
## 2. Training Provision

Figures 4 and 5 show that about a quarter of the firms surveyed in this study provided in-house training for their workers. The highest share of in-house training is provided by firms in electronics (57.6%), transport (44.1%), and leather and footwear (29.3%). Looking at the types of firms, exporters provided proportionately more in-house training than nonexporters, i.e., 34.3% compared with 14.1%. This is also true for foreign firms (43%) as compared to domestic firms (21%). Large firms also tend to provide more training than medium or small firms.

For outside training, the patterns are similar. About 23.8% of firms provided outside training to their workers. Around 32.9% and 14.6%, respectively, of exporters and nonexporters provided training. Meanwhile, 35.6% of foreign firms, and 21.7% of domestic firms, provided training. Large firms also provided relatively more outside training than medium and small firms.

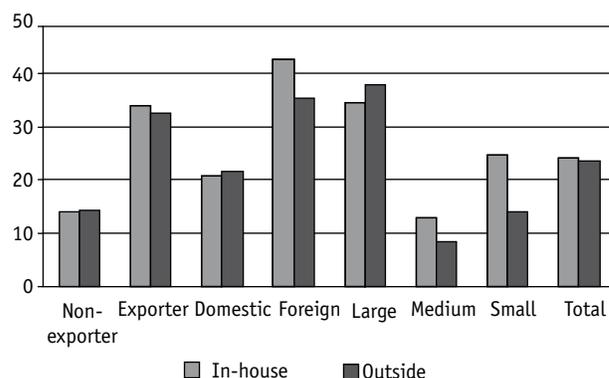
A close examination of the way the question was asked in the survey reveals that part of the external training might be voluntary in nature and not necessarily be provided by or be the application of firm policy. Therefore, the variable of participating in outside trainings is excluded in the modeling estimation, concentrating instead on in-house training to avoid any measurement errors.

**FIGURE 4**  
**PERCENTAGE OF FIRMS CONDUCTING TRAINING FOR THEIR WORKERS**  
**(BY TYPE OF INDUSTRY)**



Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

**FIGURE 5**  
**PERCENTAGE OF FIRMS CONDUCTING TRAINING FOR THEIR WORKERS**  
**(BY TYPE OF FIRM)**



Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

### 3. Training Perception

In addition to collecting information on the number of workers participating in in-house and outside training and on total training costs, the survey also asked questions about the firms' perception on the importance of training for their workers. The firms were asked to rank each important factor related to training on a scale of 0 (not important) to 4 (very important). The eight crucial factors for training are: (i) availability of firm resources; (ii) labor turnover; (iii) knowledge about training techniques and management of training programs; (iv) availability of mature technology to stimulate learning by doing for the new workers; (v) availability of skilled workers that can be readily hired from other firms; (vi) level of skilled attained at education is not enough; (vii) availability of in-house training; and (viii) skepticism about benefits of training.

Table 3 summarizes the average score of firms' perception with regard to training for their workers. Two main conclusions can be derived from the summary results as follows:

- (i) *Firms seem fully aware of the importance of providing training for their workers and that the workers' skill levels gained from schooling are not adequate for their jobs.* Therefore, firms will be more likely to invest in training provided there are resources available.
- (ii) *Labor turnover and availability of trained workers from other firms are not important determining factors for firms to invest in training.* This shows that the firms confidently invest in training and that there is no evident concern of trained workers moving to different firms.

Furthermore, comparing firms' perceptions on training across different sectors and their actual provision of training highlights the positive association between training perception and training provision. Firms in the electronic sector, for instance, seem to be more aware of the importance of training, and they also conduct relatively more trainings than firms in other sectors.

**TABLE 3**  
**PERCEPTION OF FIRMS ON TRAINING**

<b>FACTORS CONSIDERED</b>	<b>AVERAGE SCORE*</b>
Availability of resources	2.09
Labor turnover	1.14
Availability of mature technology to stimulate learning- by-doing for new workers	1.96
Knowledge of training techniques and management of training programs	1.76
Availability of skilled workers that can be readily hired from other firms	0.94
Skills that workers learn in school are not adequate	1.45
Availability of in-house training	1.64
Skepticism about benefits of training	1.14

\*The score value ranges from 0 for not important to 4 for very important.  
Source: Productivity and Investment Climate Survey in Indonesia 2003/2004 (ADB 2005).

## VI. ESTIMATION RESULTS

### A. Minimum Wage and Employment

#### 1. Unskilled Workers

Table 4 summarizes the results of employment regressions for unskilled production workers. As mentioned in the methodology section, the employment variable used in the modeling estimation is the growth of unskilled workers in logarithmic form, while the minimum wage variable is the log of average wage. Due to some missing observations, the number of samples used in the regression is reduced to 453 firms.

**TABLE 4**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGES ON THE EMPLOYMENT OF UNSKILLED WORKERS**

VARIABLES	MODEL 1	MODEL 2	MODEL 3	MODEL 4
MINWAGE	-0.022 (-1.74)*	-0.023 (-1.80)*	-0.021 (-1.65)*	-0.022 (-1.72)*
IND1	-0.328 (-2.13)**	-0.303 (-1.97)**	-0.306 (-1.98)**	-0.318 (-2.06)**
IND2	-0.304 (-1.6)	-0.316 (-1.68)*	-0.259 (-1.35)	-0.263 (-1.36)
IND3	-0.224 (-1.50)	-0.19 (-1.27)	-0.216 (-1.44)	-0.219 (-1.46)
IND4	-0.254 (-1.73)*	-0.238 (-1.62)	-0.227 (-1.53)	-0.244 (-1.65)*
IND5	-0.404 (-2.46)**	-0.392 (-2.40)**	-0.379 (-2.30)**	-0.388 (-2.35)**
IND6	-0.237 (-1.35)	-0.199 (-1.14)	-0.239 (-1.36)	-0.237 (-1.35)
IND7	-0.193 (-1.31)	-0.168 (-1.15)	-0.17 (-1.15)	-0.186 (-1.26)
IND8				
IND9	-0.431 (-2.31)**	-0.399 (-2.15)**	-0.41 (-2.20)**	-0.412 (-2.20)**
IND10	-0.299 (-1.88)*	-0.274 (-1.72)*	-0.269 (-1.68)*	-0.295 (-1.85)*
SME		-0.106 (-2.41)**		
EXPORTING			-0.067 (-1.47)	
FOREIGN				-0.066 (-0.98)
Constant	0.605 (2.48)**	0.643 (2.65)**	0.599 (2.46)**	0.600 (2.46)**
No. of observations	453	453	453	453
F-statistic	1.58	1.98*	1.64	1.52
Adjusted R <sup>2</sup>	0.013	0.023	0.015	0.013

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

The regression results show a negative relationship between employment and minimum wages and the results are valid even after controlling for industry types and firm characteristics such as size, exporting activity, and foreign ownership. The basic regression results of Model 1 show that employment level of unskilled workers drops by 2% when the minimum wage is doubled. The same negative employment elasticities are also found in the other three models, i.e., when controlling for small firms as in Model 2, for exporting firms in Model 3, and for foreign firms as in Model 4.

All disemployment effects of minimum wages are statistically significant at the 10% significance level and are quite stable for different types of modelling specifications. The disemployment effects are evident in bivariate regressions between employment and wages only, as well as after the introduction of dummy variables for industry types and firm characteristics.

Moreover, comparing results across the four different models shows that the disemployment effect in Model 2 is more severe than in other models. This indicates the important role of firm characteristics in determining the magnitude of disemployment effects. In particular, the disemployment effects of minimum wages are more severe for small firms, and there is no evidence that the adverse effects on exporting and foreign firms are worse than in nonexporting and domestic firms. The severe disemployment effects of minimum wages in small firms are consistent with the earlier finding by Rama (2001).

In addition, there are also significant sectoral effects observed in the results. The negative effects are relatively varied across sectors in terms of significance level but not on the sign of coefficient dummies, which show a consistent pattern across sectors and models. Given that minimum wage compliance rates across sectors is already very high (ranging from 88% to 100%), the significant adverse effects of minimum wages across sectors indicate that there seems to be a positive relationship between compliance and magnitude of the adverse effect. Thus, because firms are complying with the minimum wage regulations, they react more negatively to an increase in the minimum wage, e.g., by hiring fewer unskilled workers and recruiting more skilled ones.

## 2. Skilled Workers

Regressions on the three different types of skilled workers, namely skilled production workers, professionals, management, and the sum of all three categories of skilled workers, are also carried out in this study. For each type of skilled worker, employment effects of minimum wages on different types of sectors and firms are estimated. Table 5 summarizes the main results, concentrating only on the minimum wage variable, while the detailed results for each regression are presented in Appendix 1.

The regression results for skilled production and management workers show the negative effects of minimum wages on employment level but the effects are largely insignificant. The effects on professional workers, however, are positive although the coefficient is also insignificant. The overall results are quite stable for different modeling specifications and after the introduction of controlling variables.

Comparing the results across four modeling specifications, there are some similarities observed in the results of each type of skilled worker in Model 1, and after controlling for small firms in Model 2, for exporters in Model 3, and for foreign firms in Model 4. In other words, the consistent result patterns are observed for different types of skilled workers: skilled production, management, and total skilled workers. The close similarity of the regression results on skilled workers of different types and across different models shows that the insignificant impacts of minimum wages on skilled workers are common for all skilled workers in all types of firms.<sup>11</sup> This is in contrast to the regression results for unskilled workers. This finding further emphasizes the crucial role of minimum wages for unskilled workers but not for skilled ones. This finding is ironic given that the minimum wage

<sup>11</sup> The dummy coefficients in each model and type of skilled workers are, however, different showing varying effects of minimum wage on small, exporting, and foreign firms. See summary tables in Appendix 1 for details.

was introduced in the first place to protect the unskilled workers, who presumably receive wages around the minimum wage level.

**TABLE 5**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGES ON THE EMPLOYMENT OF SKILLED WORKERS**

SKILLED WORKERS	MODEL 1	MODEL 2	MODEL 3	MODEL 4
<b>Skilled Production Worker</b>				
Min. Wage	-0.025 (-0.93)	-0.026 (-0.95)	-0.022 (-0.81)	-0.021 (-0.78)
Adjusted R <sup>2</sup>	0.0013	0.0006	0.0037	0.0169
No. of Obs.	596	596	596	596
<b>Professionals</b>				
Min. Wage	0.004 (0.39)	0.002 (0.18)	0.002 (0.21)	0.004 (0.36)
Adjusted R <sup>2</sup>	0.0112	0.0011	0.0069	0.0126
No. of Obs.	393	393	393	393
<b>Management</b>				
Min. Wage	-0.009 (-0.85)	-0.011 (-1.06)	-0.011 (-1.06)	-0.009 (-0.84)
Adjusted R <sup>2</sup>	0.0036	0.0066	0.007	0.002
No. of Obs.	606	606	606	606
<b>Total Skilled</b>				
Min. Wage	-0.019 (-0.62)	-0.019 (-0.63)	-0.012 (-0.4)	-0.013 (-0.42)
Adjusted R <sup>2</sup>	0.01	0.009	0.02	0.027
No. of Obs.	676	676	676	676

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level. Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

## B. Minimum Wages and Training

### 1. Unskilled Workers

Next, regression analysis is applied on minimum wage implementation and training provision for both unskilled and skilled workers of different categories. The training variable used in the modeling estimation is the number of person-weeks of training for unskilled workers. Table 6 summarizes the regression results for the unskilled workers, while Table 7 is for skilled workers of different types. The summary results are presented here, while the detailed regression results on training are in Appendix 2. To be consistent with the wage variable and to measure the elasticity value, the training variables are also transformed into logarithmic form.

The summary results in Table 6 clearly show that different types of firms overwhelmingly reduce in-house training for unskilled production workers as the minimum wage increases. This is shown by the results in the base regression (Model 1), which has a coefficient of  $-0.39$ , meaning

that doubling the minimum wage will lower the in-house training provided by about 39%. Similar results and magnitudes are observed in Model 2 with elasticity of 34% after controlling for small firms; Model 3 with elasticity of 36% after considering for exporters; and Model 4 with elasticity of 35% when controlling for foreign firms. All the negative effects of the minimum wage on providing training for unskilled workers are statistically significant even at the 1% confidence level, except in Model (2) where the significant level is at 5%. The results show that the negative impacts of minimum wages on training provision are observed across different types of firms.

**TABLE 6**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGES ON IN-HOUSE TRAINING**  
**FOR UNSKILLED PRODUCTION WORKERS**

VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.392 (-3.11)***	-0.344 (-2.89)**	-0.364 (-3.11)***	-0.352 (-2.79)**
SME		-1.457 (-2.65)**		
EXPORTING			1.418 (2.79)**	
FOREIGN				1.288 (1.59)
Constant	9.16 (3.71)***	1.457 (2.65)**	8.757 (3.83)***	8.59 (3.51)***
No. of observations	49	49	49	49
F-statistic	2.55**	3.39***	3.52***	2.64**
Adjusted R <sup>2</sup>	0.2056	0.3095	0.3211	0.2351

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level. Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

Moreover, the adverse effects of minimum wages on training provision provided by small firms are more severe than in large firms. The same applies for the nonexporting and domestic firms, meaning that the adverse effects on nonexporting and domestic firms are worse than on exporting and foreign firms, respectively. This finding highlights the stronger need for training of unskilled workers in the large, exporting, and foreign firms even as the minimum wage increases. For small firms, minimum wage hikes increase disemployment effects; and the effects on small firms seem to be the worst affected.

## 2. Skilled Workers

Regressions on training provision for skilled workers of different categories were conducted for each type of skilled worker, namely, skilled production workers, professionals, management, and total skilled workers. Table 7 summarizes the regression results, concentrating only on the minimum wage variable, while the detailed results for each regression of skilled workers are presented in Appendix 2. As in the case of unskilled workers, the training variable used in the equations is the number of person-weeks of training. To be consistent with the wage variable and to measure elasticity, the training variable is transformed into a logarithmic form.

Table 7 shows the negative effects of in-house training provision among different types of skilled workers. The strongest negative effects are for management (statistically significant at 1%), followed by professionals (statistically significant at 5%), and skilled production workers (statistically significant at 10%). For these three categories of skilled workers, the results show that doubling the minimum wage will reduce person-weeks training of management by 28%, professionals by 23%, and skilled production workers by 22%. These results are consistent across different models.

Looking at the dummy variables effects (Appendix 2), the negative effects of minimum wages on training provision for skilled workers are consistently more severe for small firms than for large firms. The dummy results for exporting or foreign firms are largely insignificant. This again highlights the adverse effects of minimum wages on small firms.

**TABLE 7**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGES ON IN-HOUSE TRAINING**  
**FOR SKILLED WORKERS**

SKILLED WORKERS	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
<b>Skilled Production Worker</b>				
Min. Wage	-0.23 (-1.69)*	-0.213 (-1.62)	-0.226 (-1.66)*	-0.227 (-1.65)*
Adjusted R <sup>2</sup>	0.0372	0.0266	0.0405	0.0539
No. of Obs.	71	71	71	71
<b>Professionals</b>				
Min. Wage	-0.234 (-2.00)**	-0.237 (-2.04)**	-0.232 (-1.95)**	-0.234 (-1.97)**
Adjusted R <sup>2</sup>	0.0125	0.028	0.0148	0.0156
No. of Obs.	46	46	46	46
<b>Management</b>				
Min. Wage	-0.274 (-3.55)***	-0.276 (-3.55)***	-0.279 (-3.63)***	-0.275 (-3.52)***
Adjusted R <sup>2</sup>	0.2418	0.2269	0.2502	0.2219
No. of Obs.	46	46	46	46
<b>Total Skilled</b>				
Min. Wage	-0.151 (-1.29)	-0.151 (-1.36)	-0.147 (-1.27)	-0.148 (-1.25)
Adjusted R <sup>2</sup>	-0.053	0.065	-0.028	-0.063
No. of Obs.	81	81	81	81

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level. Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

## VII. CONCLUSIONS AND POLICY IMPLICATIONS

This study confirms the negative effects of minimum wages on the employment or hiring of unskilled workers. The result is valid even after subjected to applications of various modeling specifications. In general, the study found that doubling the minimum wage will reduce hiring of unskilled workers by 2%. This is ironic given that the minimum wage was introduced in the first place to mainly protect unskilled workers, who are supposedly receiving wages around the minimum wage level.

The study also finds that the disemployment effects of minimum wages on unskilled workers are much more severe among small firms, while the results for exporting and foreign firms are no different from nonexporting and domestic firms respectively. This finding highlights the important role of firm size in determining the adverse effects of minimum wages on unskilled workers.

With the exception of professional workers where positive impacts are seen, skilled workers also exhibit disemployment effects from minimum wages. The negative impacts are, however, largely insignificant, reflecting the strong demand for skilled workers despite increases in the minimum wage.

The result for training provision unskilled and skilled workers also points to the minimum wage's adverse effects. Unskilled workers suffer a consistent reduction in the provision of in-house training for them following a minimum wage increase, and the negative effects are statistically very significant. In general, doubling the minimum wage will reduce in-house training provision for unskilled workers by about 34–39%. The negative effect is much stronger in small firms and less severe in exporting and foreign firms. This may reflect the stronger need for training even for unskilled workers in the exporting and foreign firms. Recall that exporting and foreign firms conduct relatively more training than nonexporting and domestic firms, respectively.

Comparing the magnitudes of the minimum wage's disemployment and detraining effects on unskilled workers, the results show that the reduction in training provision is much stronger than the reduction in hiring. In addition, there seems to be a strong correlation between disemployment and detraining effects as can be seen from their relatively stronger adverse impacts in small firms compared to that in exporting and foreign firms. This again highlights the important role of firm size in determining the adverse effects of minimum wages on unskilled workers.

For skilled workers, the strongest negative effects on training provision are observed for management workers, followed by professional and skilled production workers. For skilled workers, doubling the minimum wage will decrease person-weeks of training by 23–27%. The negative effects on training provision for skilled workers in small firms remain higher than in large firms. This further amplifies the minimum wage's disemployment effects in small firms, indicating that small firms are the most severely affected by minimum wage increases. Comparing the minimum wage effects on employment and training shows that in addition to the firm's size, the need for training seems to be influenced by job status or job sophistication.

The overall results suggest that having been forced to pay higher wages due to the binding and increasing minimum wage, firms choose to reduce hiring unskilled workers and concentrate instead on recruiting the already skilled ones. In addition, firms also reduce training provision especially for unskilled workers, leaving them unemployed and untrained. This response could raise a serious concern as the firms seem to adopt a short-term policy at the cost of more long-term

repercussions, especially for the unskilled workers. At the macroeconomic level, this short-sighted response can further exacerbate the unemployment problem and therefore on poverty. Unfortunately, this tendency seems to be the case as unemployment worsens and the poverty condition fails to improve (see Sugiyarto et al. 2006).

Moreover, the crucial role of firm's characteristics in determining the minimum wage's disemployment and detraining effects raises some reservations about the results of previous studies using household or labor force surveys, since by the surveys' designs, it is very difficult to take disemployment and detraining effects into account.

This study also found a strong disemployment effect for unskilled workers even it uses a cross-industry data set at the firm level. This is in contrast to Krueger's (1994) finding that the adverse employment effects are usually weak in cross-industry analyses but strong in time series studies.

The strong disemployment effects in this study may partly be due to the way the minimum wage has been set up in Indonesia, which is characterized by strong bargaining power from labor unions and by disregarding worker productivity and general price changes. Other contributing factors include the adverse effects of other government policies that create rigidities in the labor market such as the severance pay system, which is beyond the scope of this research.

The key policy implications of this study call for improving the labor market condition in Indonesia, including how the minimum wage is set. Creating a flexible labor market to ensure that the minimum wage determination works properly is a necessary condition that must be followed up by improvements in the detailed mechanism on how the minimum wage should be set. The rate may not necessarily be a single level for all types of workers, but it could consider different types of workers in different regions, sectors, age groups, and so on. The rates should also be updated regularly following changes in the relevant prices, as well as by taking other wages and overall wage distribution into account. Benchmarking with the median wage and other acceptable way of wage indexation, for instance, can be used as a starting point. The ILO Minimum Wage Fixing Convention No. 131/1970 identified four criteria, namely, the needs of workers and their families, the capacity of firms to pay, the level of incomes and other wages in the economy, and the requirement of the economic development of the country (Saget 2006), which should be put in balance without necessarily sacrificing the interest of profit-maximizing capitalists. Therefore, striking the right balance is really the key. In the end, the minimum wage should reflect more a fair and competitive wage rather than a fixed and distorted wage. The rate must guarantee a decent standard of living since the workers should be happy with their work and not be confronted with a choice between the humiliation of poverty pay and the indignity of unemployment.

## APPENDIX 1 EMPLOYMENT REGRESSIONS

**APPENDIX TABLE 1.1**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE EMPLOYMENT**  
**OF SKILLED PRODUCTION WORKERS**

VARIABLES	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.025 (-0.93)	-0.026 (-0.95)	-0.022 (-0.81)	-0.021 (-0.78)
IND1	-0.234 (-0.85)	-0.202 (-0.73)	-0.173 (-0.62)	-0.156 (-0.57)
IND2	-0.425 (-1.42)	-0.433 (-1.45)	-0.305 (-1.00)	-0.163 (-0.53)
IND3	0.007 (0.03)	0.048 (0.18)	0.021 (0.08)	0.029 (0.11)
IND4	-0.283 (-1.07)	-0.261 (-0.99)	-0.219 (-0.83)	-0.226 (-0.87)
IND5	-0.243 (-0.83)	-0.236 (-0.80)	-0.177 (-0.60)	-0.101 (-0.34)
IND6	-0.176 (-0.56)	-0.129 (-0.41)	-0.165 (-0.53)	-0.163 (-0.52)
IND7	-0.208 (-0.79)	-0.198 (-0.75)	-0.137 (-0.52)	-0.165 (-0.63)
IND8				
IND9	-0.167 (-0.56)	-0.143 (-0.48)	-0.098 (-0.33)	-0.044 (-0.15)
IND10	-0.115 (-0.40)	-0.100 (-0.34)	-0.033 (-0.11)	-0.094 (-0.33)
SME		-0.127 (-1.56)		
EXPORTING			-0.167 (-1.99)**	
FOREIGN				-0.402 (-3.44)***
Constant	0.440 (0.88)	0.481 (0.96)	0.419 (0.84)	0.373 (0.75)
No. of observations	596	596	596	596
F-statistic	0.92	1.06	1.2	1.93**
Adjusted R <sup>2</sup>	0.0013	0.001	0.0037	0.0169

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

APPENDIX TABLE 1.2  
REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE EMPLOYMENT OF PROFESSIONAL WORKERS

VARIABLES	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	0.004 (0.39)	0.002 (0.18)	0.002 (0.21)	0.004 (0.36)
IND1	0.105 (0.63)	0.134 (0.8)	0.081 (0.48)	0.098 (0.58)
IND2	-0.024 (-0.13)	-0.035 (-0.20)	-0.076 (-0.43)	-0.048 (-0.27)
IND3	0.004 (0.03)	0.021 (0.12)	-0.007 (-0.04)	0.002 (0.01)
IND4	-0.018 (-0.11)	-0.026 (-0.16)	-0.052 (-0.31)	-0.025 (-0.15)
IND5	-0.018 (-0.10)	-0.017 (-0.1)	-0.047 (-0.27)	-0.028 (-0.16)
IND6	-0.001 (0.00)	0.011 (0.06)	-0.008 (-0.04)	-0.001 (0.00)
IND7	0.044 (0.27)	0.038 (0.24)	0.008 (0.05)	0.04 (0.24)
IND8				
IND9	-0.045 (-0.25)	-0.053 (-0.29)	-0.084 (-0.46)	-0.059 (-0.32)
IND10	-0.044 (-0.25)	-0.037 (-0.22)	-0.079 (-0.45)	-0.048 (-0.27)
SME		-0.109 (-2.59)**		
EXPORTER			0.069 (1.62)	
FOREIGN				0.037 (0.68)
Constant	-0.022 (-0.09)	0.051 (0.22)	-0.003 (-0.01)	-0.015 (-0.07)
No. of observations	393	393	393	393
F-statistic	0.57	1.13	0.75	0.56
Adjusted R2	0.0112	0.004	0.0069	0.0126

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

**APPENDIX TABLE 1.3**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE EMPLOYMENT OF MANAGEMENT WORKERS**

VARIABLES	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.009 (-0.85)	-0.012 (-1.07)	-0.011 (-1.06)	-0.009 (-0.84)
IND1	-0.075 (-0.45)	-0.05 (-0.30)	-0.102 (-0.61)	-0.075 (-0.45)
IND2	-0.087 (-0.49)	-0.088 (-0.50)	-0.142 (-0.78)	-0.086 (-0.47)
IND3	-0.227 (-1.38)	-0.198 (-1.20)	-0.234 (-1.43)	-0.227 (-1.38)
IND4	-0.221 (-1.36)	-0.207 (-1.27)	-0.251 (-1.54)	-0.221 (-1.36)
IND5	-0.103 (-0.60)	-0.094 (-0.54)	-0.133 (-0.76)	-0.103 (-0.59)
IND6	-0.219 (-1.16)	-0.192 (-1.01)	-0.228 (-1.21)	-0.219 (-1.16)
IND7	-0.138 (-0.85)	-0.125 (-0.77)	-0.17 (-1.04)	-0.138 (-0.85)
IND8				
IND9	-0.31 (-1.73)*	-0.287 (-1.60)	-0.341 (-1.89)*	-0.309 (-1.71)*
IND10	-0.187 (-1.08)	-0.166 (-0.95)	-0.221 (-1.26)	-0.187 (-1.08)
SME		-0.08 (-1.92)*		
EXPORTER			0.075 (1.74)*	
FOREIGN				-0.001 (-0.01)
Constant	0.392 (1.62)	0.45 (1.84)*	0.418 (1.72)*	0.392 (1.61)
No. of observations	606	606	606	606
F-statistic	1.22	1.45	1.39	1.11
Adjusted R <sup>2</sup>	0.0036	0.008	0.007	0.002

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

APPENDIX TABLE 1.4  
REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE EMPLOYMENT OF ALL SKILLED WORKERS

VARIABLES	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAG	-0.019 (-0.62)	-0.019 (-0.63)	-0.012 (-0.40)	-0.013 (-0.42)
IND1	-0.25 (-0.74)	-0.239 (-0.70)	-0.161 (-0.48)	-0.15 (-0.45)
IND2	-0.623 (-1.69)*	-0.629 (-1.70)*	-0.429 (-1.15)	-0.315 (-0.84)
IND3	-0.083 (-0.25)	-0.068 (-0.21)	-0.069 (-0.21)	-0.059 (-0.18)
IND4	-0.543 (-1.67)*	-0.537 (-1.65)*	-0.444 (-1.36)	-0.474 (-1.47)
IND5	-0.485 (-1.36)	-0.484 (-1.36)	-0.388 (-1.09)	-0.322 (-0.90)
IND6	-0.189 (-0.49)	-0.176 (-0.45)	-0.175 (-0.45)	-0.175 (-0.45)
IND7	-0.421 (-1.29)	-0.417 (-1.28)	-0.32 (-0.98)	-0.369 (-1.14)
IND8				
IND9	-0.188 (-0.51)	-0.182 (-0.49)	-0.083 (-0.22)	-0.037 (-0.10)
IND10	-0.126 (-0.36)	-0.121 (-0.34)	-0.002 (0.00)	-0.094 (-0.27)
SME		-0.047 (-0.50)		
EXPORTER			-0.268 (-2.75)**	
FOREIGN				-0.487 (-3.56)***
Constant	0.376 (0.64)	0.396 (0.68)	0.321 (0.55)	0.276 (0.48)
No. of observations	676	676	676	676
F-statistic	1.70*	1.57	2.25**	2.73**
Adjusted R <sup>2</sup>	0.01	0.009	0.02	0.027

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

## APPENDIX 2 TRAINING REGRESSIONS

**APPENDIX TABLE 2.1**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGES ON THE NUMBER OF PERSON-WEEKS**  
**OF IN-HOUSE TRAINING FOR SKILLED PRODUCTION WORKERS**

VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.23 (-1.69)*	-0.213 (-1.62)	-0.226 (-1.66)*	-0.227 (-1.65)*
SME		-1.247 (-2.24)**		
EXPORTING			0.451 (0.90)	
FOREIGN				0.11 (0.19)
Constant	5.514 (2.07)**	3.99 (1.49)	5.004 (1.84)*	5.471 (2.03)**
No. of observations	71	71	71	71
F-statistic	0.72	1.19	0.73	0.64
Adjusted R <sup>2</sup>	0.0372	0.0266	0.0405	0.0539

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

**APPENDIX TABLE 2.2**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE NUMBER OF PERSON-WEEKS**  
**OF IN-HOUSE TRAINING FOR PROFESSIONAL WORKERS**

VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.234 (-2.00)**	-0.237 (-2.04)**	-0.232 (-1.95)**	-0.234 (-1.97)**
SME		-0.836 (-1.25)		
EXPORTING			-0.118 (-0.18)	
FOREIGN				0.045 (0.07)
Constant	5.348 (2.98)**	4.544 (2.40)**	5.443 (2.87)**	5.322 (2.87)**
No. of observations	46	46	46	46
F-statistic	1.06	1.13	0.93	0.93
Adjusted R <sup>2</sup>	0.0125	0.028	0.0148	0.0156

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

**APPENDIX TABLE 2.3**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE NUMBER OF PERSON-WEEKS**  
**OF IN-HOUSE TRAINING FOR MANAGEMENT WORKERS**

VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.274 (-3.55)***	-0.276 (-3.55)***	-0.279 (-3.63)***	-0.275 (-3.52)***
SME		-0.284 (-0.55)		
EXPORTING			0.566 (1.18)	
FOREIGN				-0.141 (-0.28)
Constant	5.458 (3.71)***	5.21 (3.36)***	4.972 (3.27)***	5.479 (3.67)***
No. of observations	46	46	46	46
F-statistic	2.59**	2.32**	2.50**	2.28**
Adjusted R <sup>2</sup>	0.2418	0.2269	0.2502	0.2219

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

**APPENDIX TABLE 2.4**  
**REGRESSIONS ON THE IMPACT OF MINIMUM WAGE ON THE NUMBER OF PERSON-WEEKS**  
**OF IN-HOUSE TRAINING FOR ALL SKILLED WORKERS**

VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
MINWAGE	-0.151 (-1.29)	-0.151 (-1.36)	-0.147 (-1.27)	-0.148 (-1.25)
SME		-1.459 (-3.15)***		
EXPORTING			0.729 (1.65)*	
FOREIGN				0.305 (0.56)
Constant	4.651 (1.95)*	4.646 (2.07)**	3.851 (1.60)	4.599 (1.92)*
No. of observations	81	81	81	81
F-statistic	0.56	1.56	0.79	0.53
Adjusted R <sup>2</sup>	-0.053	0.065	-0.028	-0.063

Note: Figures in parenthesis are t-ratios, where \*\*\* means significant at 1%; \*\* at 5%; and \* at 10% significance level.  
Source: Calculated from the Investment Climate Survey 2003/2004 (ADB 2005).

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