

## HOW DOES DECENTRALIZED MINIMUM WAGE SETTING AFFECT EMPLOYMENT AND INFORMALITY? THE CASE OF INDONESIA

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The Indonesian labor market is characterized by widespread and growing informality (defined as non-salaried work). To what extent can the growth in informality be attributed to a sharp increase in the real value of the minimum wage since 2001, when minimum-wage setting was decentralized to the provincial governments? To answer this and related questions we use survey data on the labor market, on household income and expenditure, and on the industrial sector to construct a district-level dataset spanning the period 1996 to 2004. The effects of changes in the minimum wage on unemployment, formal-sector employment, and the incidence of informality in urban areas are estimated by fixed effects with a seemingly unrelated regression estimator. We find that an increase in the ratio of the minimum to the mean wage is associated with a net increase in employment: a rise in informal-sector employment more than compensates for job losses in the formal sector.

**JEL Codes:** J23, J31, J64

**Keywords:** Indonesia, minimum wage, informality, employment, unemployment

### 1. INTRODUCTION

Indonesia is a very interesting case for empirically testing the impact of minimum-wage legislation on employment and informality. The country went through a process of fiscal decentralization in 2001 that, among other things, devolved minimum-wage setting responsibilities to the provinces and local governments. Devolution was followed by a sharp increase in the real value of the minimum wage to about 65 percent of the median wage in 2004, far exceeding labor productivity gains. Previous empirical literature suggests that this minimum-wage hike is among the main culprits for persistent unemployment since the 1997–98 financial crisis (SMERU, 2001; Suryahadi *et al.*, 2003).

It is not easy to gauge empirically the effects of changes in the minimum wage on labor-market outcomes. Job losses tend to be stronger the higher the minimum wage in relation to average earnings and the sharper its increase over time. But other labor market characteristics, such as the prevalence of informality, defined in this paper in terms of non-salaried work, which accounted for close to 70 percent

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of urban employment in 2004, are likely to also play a part. To shed light on this issue, we constructed a dataset using survey data on the labor market (*Sakernas*), household earnings and expenditure (*Susenas*), and the industrial sector (SI, *Survei Industri*) for 1996–2004, thereby spanning the pre- and post-decentralization periods. In particular, we investigate whether or not—and, if so, the extent to which—an increase in the minimum-to-mean wage ratio drives urban workers out of the formal sector and into informality. This displacement effect would be consistent with the predictions of standard dual economy models of labor market segmentation (Welch, 1974; Gramlich, 1976; Mincer, 1976; Brown *et al.*, 1982).

This study contributes to the existing literature in two main ways: first, we build a panel using the local governments, rather than the provinces, as the units of observation, while all previous literature focuses on provincial data (Islam and Nazara, 2000; Rama, 2001; Suryahadi *et al.*, 2003). Second, to our knowledge, this is the first paper to estimate jointly the effects of the minimum wage on formal-sector employment, informality, and unemployment using seemingly unrelated regression (SUR) techniques. Previous empirical work for Indonesia and other developing countries has estimated the effect of the minimum wage on labor market outcomes separately. In doing so, it ignores the interdependencies that exist among these outcomes in response to changes in the minimum wage. Our estimating strategy therefore accounts for the presence of such interdependencies.

Our main finding is that an increase in the relative value of the minimum wage is associated with higher informality and lower formal sector employment, which is in line with previous empirical evidence for Indonesia. Also, an increase in the minimum-to-mean wage is associated with a decrease in “queuing unemployment,” a phenomenon that takes place when individuals faced with a job loss prefer to remain unemployed while “queuing” for a formal-sector job, instead of working informally. A more interesting finding is perhaps that a minimum-wage hike is associated with a net increase in total (formal and informal) employment: the increase in informal-sector employment more than offsets the corresponding loss of jobs in the formal sector. This finding is consistent with the “lighthouse effect,” described by Neri *et al.* (2001) in the case of Brazil, which we also find for Indonesia, whereby informal-sector earnings rise in tandem with the minimum wage, thus attracting inactive workers into the labor market.

The paper is organized as follows. Section 2 reviews the literature on the impact of the minimum wage on employment in both developed and developing countries. Section 3 describes the data used in the empirical analysis, discusses labor-market trends, and summarizes the main institutional features of minimum wage setting in Indonesia. Section 4 elaborates on the estimating strategy and reports the empirical findings for the entire working-age population, and separately for males and females. Section 5 concludes.

## 2. LITERATURE REVIEW

Minimum-wage legislation is meant to protect vulnerable workers by ensuring that low pay is consistent with the satisfaction of basic living standards. Nevertheless, it can be argued that, to the extent that the minimum wage destroys jobs, it harms, rather than protects, workers whose attachment to the labor force

is weak. If the minimum wage is set above its market clearing level, job losses are likely, because it induces a shift in labor demand away from unskilled to skilled labor, and, where possible, from the formal to the informal sector.

### 2.1. *Developed Countries*

Neoclassical theory suggests that, in a perfectly competitive labor market with homogeneous labor and full compliance with minimum wage legislation, setting the minimum wage above its market clearing level would be equivalent to a negative labor demand shock, which would lead to job losses (Stigler, 1946). The magnitude of the corresponding disemployment effect depends on the wage elasticity of labor demand and the elasticity of substitution between skilled and unskilled labor. However, in a non-competitive environment, the minimum wage may have a positive, rather than negative, effect on employment. This is especially the case where firms have discretion in wage setting (“monopsonistic employer”) or if employers set wages above their equilibrium level to induce workers to be more productive (Rebitzer and Taylor, 1995).

Empirical studies have not reached a consensus on the predictions of the neoclassical model. The empirical literature has focused on developed countries, in particular the United States and Europe (see Dolado *et al.*, 1996, and Brown, 1999, for surveys). The first generation of studies (surveyed by Brown *et al.*, 1982) used time-series techniques and found the expected negative relationship between the minimum wage and employment, in particular for teenagers, whose attachment to the labor force is particularly tenuous. However, the time-series approach was criticized subsequently on the grounds that it does not allow for appropriately disentangling the effects of the minimum wage on employment from those of unobserved changes in macroeconomic conditions.

To overcome these difficulties, a second generation of empirical studies relied predominantly on survey-based data. This literature finds much weaker evidence of a disemployment effect associated with the minimum wage. A few longitudinal studies show that vulnerable individuals, such as youths, are more likely to be unemployed after a rise in the statutory minimum wage (Currie and Fallick, 1996; Neumark and Wascher, 2001; Bazen and Marimoutou, 2002). But in many cross-sectional studies the estimated employment elasticity of the minimum wage is statistically insignificant or even positive (Card, 1992; Neumark and Wascher, 1992; Card and Krueger, 1995; Bazen and Skourias, 1997; Bell, 1997; Burkhauser *et al.*, 2000; Neumark and Wascher, 2004). A positive employment elasticity would be consistent with the prediction of non-competitive models.

### 2.2. *Developing Countries*

The literature on how the minimum wage affects employment in developing countries is rather limited. The conventional theoretical framework is that of a dual economy, where the formal sector behaves as in the neoclassical model (i.e. employment falls in response to a minimum-wage hike), and minimum-wage provisions do not apply in the informal sector (Welch, 1974; Gramlich, 1976; Mincer, 1976; Brown *et al.*, 1982). In this setting, an increase in the minimum wage reduces employment in the formal sector and increases informality, because the

displaced workers from the formal sector are absorbed into the informal sector. The net employment effect depends on the elasticity of labor supply (because workers may drop out of the labor force, instead of seeking an informal-sector job) and demand and the size of the informal sector.

The bulk of empirical studies available to date use Latin American data. As in the case of developed countries, evidence of a discernible negative effect of minimum-wage hikes on employment is mixed. For example, Bell (1997) reports a strong disemployment effect for Colombia in the 1980s, when the real value of the minimum wage rose substantially, but not for Mexico, on the basis of industrial and employment survey data for each country. Maloney and Nuñez (2004) also find a negative employment effect in both the formal and the self-employed sectors in Colombia. Bosch and Manacorda (2010) find no effect for the overall employment rate, although some workers who had previously been employed in the informal sector are shown to find jobs in the formal sector. Their results are nevertheless not robust econometrically and fail to control for evolving macroeconomic conditions. Evidence is also available for Costa Rica. Gindling and Terrell (2007) report a negative employment effect in the formal sector, but El Hamidi and Terrell (2002) find a positive employment effect for formal-sector workers and no effect for the self-employed on the basis of household survey data, although the authors do not control for other determinants of employment or the presence of interactions between formal- and informal-sector employment.

The case of Brazil is instructive of the need to take wage setting in the informal sector into account when estimating the impact of the minimum wage on employment. Using household survey data, Neri *et al.* (2001) show that the minimum wage truncates the earnings distribution in the informal sector, but not in the formal sector, as predicated by standard dual economy models. To some extent, this effect is also observed in Mexico on the basis of household survey data (Fairris *et al.*, 2006). These findings suggest that the interactions between the formal and informal sectors in response to changes in the minimum wage may be more complex in practice than in theory. Based on employment survey data, Lemos (2008) finds no evidence of an adverse employment effect associated with the minimum wage in the formal and informal sectors, while Foguel *et al.* (2001) report a negative effect in the formal sector and a positive effect in the informal sector on the basis of time-series data.

### 2.3. *The Case of Indonesia*

There is a small literature on Indonesia using pooled provincial data to evaluate the response of formal- and informal-sector employment to changes in the minimum wage. Alatas and Cameron (2003) studied the impact of the minimum wage on total employment during 1990–96 using industrial survey data. They used the difference-in-difference approach of Card and Krueger (1995) to exploit variations in the level of the minimum wage between the provinces of Jakarta and West Java. Their estimated disemployment effect is small, if at all significant, and depends on firm type and size. Islam and Nazara (2000) also report very weak evidence in favor of the disemployment hypothesis. By contrast, the results

presented in SMERU (2001) point to a negative elasticity for total urban employment, which is larger for females than males, for youths than older workers, and among lower skilled individuals.

Rama (2001) uses pooled industrial survey data at the provincial level to estimate the impact of the minimum wage on formal-sector employment during 1988–94. His findings suggest that doubling the minimum wage leads to a 0–5 percent decrease in formal-sector employment. An increase in the minimum wage is also shown to lead to a rise (fall) in employment in large (small) firms. In a different context, Bird and Manning (2008) use employment survey data to estimate the overall impact of minimum-wage policies, concluding that an increase in minimum wage is an ineffective anti-poverty instrument as it results in net losses to 79 percent of the poor households.

### 3. AN OVERVIEW OF THE INDONESIAN LABOR MARKET AND MINIMUM WAGE PROVISIONS

#### 3.1. *The Data*

##### 3.1.1. Data Sources

Our work is based on different surveys of individuals, households, and industrial firms available from the Indonesian Statistics Bureau (*Badan Pusat Statistik*, BPS). Our main data source is the National Labor Force Survey (*Sakernas*), which started to be collected in 1976 and focuses on the socioeconomic and labor-market characteristics of individuals and households. *Sakernas* data are representative at the local jurisdiction rural–urban level. Annual waves of *Sakernas* cannot be treated as a panel, but rather as large-scale repeated cross-sections. We focused on five waves (1996, 1998, 2000, 2002, and 2004), including an average of 204,000 individuals per wave (a minimum of 99,000 individuals were surveyed in 1998 and a maximum of 275,000 individuals were surveyed in 2002).

Employment status is reported in *Sakernas* as follows. Each household member belonging to the working-age population<sup>1</sup> is classified as inactive, employed, or unemployed depending on his/her status during the week prior to data collection.<sup>2</sup> Employed individuals are classified as salaried workers (employees), employers, self-employed, or family/unpaid workers. Information on earnings is available only for salaried workers.

The *Sakernas* classification allows for a definition of informality based on employment status. Of course, there is no universally accepted definition; in some countries, informality is measured on the basis of compliance with social security legislation. In others, it is defined according to a worker's labor market status and occupation. Since a definition of informality based on social security coverage is unfeasible for Indonesia, in our baseline definition we treat as informal-sector

<sup>1</sup>The working-age population is defined as those aged at least 10 years until 1997 and at least 15 years from 1998. In our analysis we restricted the sample to individuals aged 15–65 years throughout the sample period.

<sup>2</sup>All individuals who were working during the previous week (or only temporarily out of work despite having a job) were classified as workers. We treated respondents as unemployed if they declared that they were out of work and looking for a job.

workers all individuals who are self-employed, employers, or family/unpaid workers. Thus, in our baseline definition, only salaried workers are considered to work in the formal sector. This definition is consistent with that used in previous empirical literature for Indonesia (surveyed above) and by BPS. Nevertheless, to test the robustness of our findings, we also re-estimated the baseline regressions using an alternative definition of labor informality, which treats all agricultural workers as informal, regardless of whether they are salaried workers or not. Based on *Sakernas* data, 14 and 20 percent of salaried workers in 1996 and 2004, respectively, declared they were working in agriculture. According to this alternative definition, the formal sector includes non-agricultural salaried workers only.

Since *Sakernas* does not include information on earnings for non-wage employment, we used the National Socio-Economic Survey (*Susenas*) to compute a proxy for informal-sector earnings. *Susenas* is an annual multipurpose repeated cross-section survey that contains information on socioeconomic, labor, demographic, and health status characteristics of around 200,000 households (over 900,000 individuals). The core questionnaire is supplemented every year by a specific-purpose module covering about 60,000 households on a topic that is covered at regular intervals. Information is available in the core module at the individual level and in the specific-purpose module at the household level. We focused on the “household income and expenditure” module, which is surveyed every three years. This module contains information on non-wage income at the household level (i.e. total household income from non-wage agricultural/non-agricultural activities). We used the information available for 1996, 1999, 2002, and 2005 to construct a proxy for district-level non-wage income.

Finally, we used data from the Industrial Survey (SI, *Survei Industri*) to compute a measure of district-level labor productivity. SI is an annual panel survey of all manufacturing establishments with 20 or more employees, or about 22,000 establishments per year during our period of analysis. We used information available for 1996, 1998, 2000, 2002, and 2004.

### 3.1.2. Construction of District-Level Indicators

Our empirical analysis puts emphasis on local governments, rather than provinces, individuals, or households, as the units of observation. Local governments can be regencies (*kabupaten*) or cities (*kota*). The main differences between these jurisdictions are related to demographic and economic structure, rather than administrative hierarchy: regencies tend to be larger in area than cities, and non-agricultural activities are typically more prevalent in cities. However, there are rural and urban areas in both regencies and cities. In what follows, we use the term “district” more generally to refer to both regencies and cities. The districts have their own administrative and legislative bodies, and decentralization since 2001 has put them at the helm of service delivery, especially in healthcare and education.

Changes in Indonesia’s administrative structure over the years poses considerable challenges for the computation and comparability of district-level data. In 2004 Indonesia was divided into 33 provinces, 349 regencies, and 91 cities. Between 1996 and 2004, the province of East Timor became independent and 7 new provinces and 146 new districts were created by splitting the existing ones. In order to

construct our district-level panel, we matched the districts surveyed in *Sakernas* during 1996–2004 using the official district codes published by BPS.<sup>3</sup> Whenever a district was split into two or more new regencies/cities during 1996 and 2004, and only one of these new jurisdictions kept its original name, we considered the new regencies/cities all together as a unique observation and computed the relevant indicators for the years after the split by population-averaging the data across the new districts. Based on this matching procedure, and focusing on the districts with non-zero urban population, we obtained an unbalanced panel of 293 districts for five years, or about 1114–1151 observations across specifications.

### 3.2. Labor-Market Trends

Before turning to the estimations, basic labor-market indicators are reported in Table 1. The labor-force participation, employment, unemployment, and informality rates were computed on the basis of individual-level *Sakernas* data for 1996 and 2004 (the indicators are available for the intermediate years upon request).

The indicators show that labor-force participation has been fairly stable over time at about two-thirds of individuals aged at least 15 years. Participation is higher in rural than urban areas, reflecting the tendency for all household members to work in family plots. In addition, labor supply is higher for males than females and tends to rise with educational attainment.

Labor demand patterns are comparable to those of labor supply. Employment tends to be higher for males than females, for residents of rural areas than for urban dwellers, and among prime-age individuals than among youths and elderly workers. As for unemployment, it is particularly high for youths, workers with secondary education, and women. It increased substantially during 1996–2004, albeit from a small base, for older workers and for the least educated individuals (i.e. those with no schooling). To a certain extent, high unemployment among the workers who would otherwise be best equipped to find a job in the formal sector (i.e. those with tertiary education) suggests that these individuals may not be willing to work in the informal sector. When faced with a job loss, they may prefer to wait for a formal-sector job, instead of working informally, so long as they can support themselves and their families in the meantime, a phenomenon that is often referred to as “queuing unemployment.”<sup>4</sup>

Finally, labor informality is widespread, at about 70 percent of the employed population in 2004. Informality is less widespread among men than women, workers living in urban than rural areas, and among prime-age and younger individuals. Unlike participation and employment in the formal sector, informality declines with educational attainment.

<sup>3</sup>Available from <http://www.bps.go.id/mstkab/index.html>.

<sup>4</sup>The unemployment rates reported in Table 1 are comparable over time, because the same methodology is used for both 1996 and 2004. This is not the case for the statistics reported by BPS, which are affected by a methodological change in 2001. The new definition includes individuals who are preparing to launch a new business and those who are not in the labor force but willing to work. Inclusion of these discouraged job seekers is thought to account for a large share of the increase in unemployment after 2001 (Sugiyarto *et al.*, 2006).

TABLE 1  
LABOR FORCE INDICATORS, 1996 AND 2004

	Labor Force	Employment	Unemployment	Informal Employees (non-salaried workers)
	% of the Population 15+		% of the Labor Force	% of Total Employment
<i>1996</i>				
Total	66.1	62.6	5.3	65.4
By gender				
Males	82.7	78.9	4.6	61.1
Females	49.9	46.7	6.5	72.5
By age				
15–24	50.9	42.6	16.4	57.7
25–54	76.5	74.7	2.4	64.1
55–64	66.1	65.9	0.3	83.3
65+	40.3	40.2	0.2	89.8
By residence				
Rural	71.7	69.4	3.2	77.2
Urban	58.8	53.8	8.6	45.7
By education				
No schooling	67.6	67	0.9	82
Primary	67.5	65.7	2.7	74.2
Lower secondary	51.4	47.9	6.9	62.6
Upper secondary	71.2	61.4	13.8	34.2
Tertiary	86.3	76.3	11.6	12.4
<i>2004</i>				
Total	65	60.7	6.7	69.6
By gender				
Males	83.5	78.6	5.8	67.9
Females	46.7	42.9	8.2	73
By age				
15–24	50	39	22.1	60.1
25–54	74.2	71.8	3.2	68.5
55–64	63.5	63.1	0.6	88.3
65+	39.7	39.6	0.2	95.5
By residence				
Rural	69.8	67.1	3.9	86.4
Urban	60.1	54.2	9.9	48.7
By education				
No schooling	63.5	62.8	1.2	92.2
Primary	66.6	64.9	2.6	84.5
Lower secondary	55.9	51.7	7.5	72.2
Upper secondary	68.9	58.7	14.8	40.9
Tertiary	85.3	77.3	9.4	15

Source: Sakernas and authors' calculations.

### 3.3. Minimum-Wage Provisions and Trends

Minimum-wage provisions are applicable to regular, full-time work. The minimum wage is set on an annual basis at the sub-national level of government on the basis of an estimated cost of living indicator (KHL), which is used as an initial benchmark. This indicator was introduced in the late 1990s and is defined in terms of caloric intake. Since decentralization in 2001, the level of the minimum wage has been calculated by the local governments and then proposed to the provincial government by a tripartite wage council, including representatives from labor,





Figure 1. Minimum Wage Trends, 1987–2006

Notes: (1) Defined as gross value added divided by total employment deflated by the GDP deflator.

(2) Defined as the simple average of the province/district-level minimum wages deflated by the GDP deflator.

Source: Ministry of Manpower, World Bank (WDI database) and authors' calculations.

government, and the private sector. Typically, the lowest minimum wage proposed by the local governments in a given province is chosen by the provincial government. By contrast, prior to decentralization, the minimum wage used to be set nationally by the central government on the basis of an estimated needs indicator (KHM),<sup>5</sup> which corresponds to a lower caloric intake benchmark than that implied by KHL (2600 as opposed to 3000 calories per day in the case of KHL).<sup>6</sup>

Of particular importance for the empirical analysis reported below is the increase in the real value of the minimum wage over time, especially during 2000–03. The minimum wage rose faster in real terms than value added per employee, especially during the 1990s and 2000–03 (Figure 1), and, as a result, it is very high in relative terms, at about 65 percent of the median wage in 2004. To put this relative value in perspective, the ratio of minimum-to-median wage was about 45 percent on average in the OECD area in 2004 (OECD, 2008).

#### 4. THE EFFECT OF THE MINIMUM WAGE ON FORMAL-SECTOR EMPLOYMENT, INFORMALITY, AND UNEMPLOYMENT

##### 4.1. Estimation Strategy

Our empirical strategy is to estimate the impact of the minimum wage on the labor market by regressing the formal-sector employment (i.e. salaried work), informality (i.e. non-salaried work), and unemployment rates on the minimum-to-mean wage ratio (the so-called Kaitz index). Our estimating equation is as follows:

<sup>5</sup>Until end-2000, there were different minimum wages within a few provinces (Riau, South Sumatra, West Java, East Java, and Bali) and for selected sectors of activity.

<sup>6</sup>For more information on minimum-wage setting, see SMERU (2001) and Widarti (2006).

$$(1) \quad Y_{it} = \beta_0 + \beta W_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it}$$

where  $Y = [E \ I \ U]'$ ,  $W$  is the Kaitz index,  $X$  is a vector of controls (defined below), the  $\alpha$ 's are unobserved fixed effects, and  $\varepsilon$  is an error term. The formal-sector employment, informality, and unemployment rates are denoted by  $E$ ,  $I$ , and  $U$ , respectively. Districts and time are indexed by  $i$  and  $t$ , respectively.

We ran equation (1) first for the formal-sector employment, informality, and unemployment rates separately including fixed effects. But our basic hypotheses are that an increase in the minimum wage is associated with a fall in formal-sector employment, and that the workers displaced from the formal sector are absorbed into the informal sector. Therefore, the error terms are bound to be contemporaneously correlated across equations, such that  $E(ee') = \Sigma$  with  $\sigma_{ij} \neq 0$  for  $i \neq j$ , where  $i, j = (E, I, U)$ . To deal with this problem, we also estimated equation (1) using a SUR technique as first proposed by Zellner (1962).<sup>7</sup>

#### 4.2. Definition of the Variables and Identification

Because our units of observation are the districts, all variables were computed using the reference district's adult population (aged 15–65 years) living in urban areas. We restricted the sample to the urban population, because the formality rate is very low in rural areas (Table 1). As noted above, our baseline definition of formal-sector employment includes only salaried workers. The definition of the variables to be included in the regressions is reported in Table 2. Basic descriptive statistics for the entire working-age population are reported in Table 3.

The main variable of interest is the Kaitz index. It is computed for salaried workers only, because minimum-wage legislation does not apply in the informal sector. The set of controls is in line with the literature based on longitudinal data (Maloney, 1995; Neumark and Wascher, 2004) and includes indicators of labor-market conditions (hourly wages and hours worked for formal- and informal-sector workers), labor productivity, demographic effects (shares of population aged 15–25 and 56–65 years), economic structure (the reference district's size, urbanization rate, and share of employment in the industrial sector), and time effects.

The 2001 decentralization reform provides an unique opportunity to evaluate the effects of minimum-wage setting in Indonesia. There has been a considerable post-reform increase in the minimum wage variation among the Indonesian provinces, which lends credence to our identification strategy: in particular, the variance of the minimum wage rose from 0.14 in 2000 to 0.57 in 2002 in the sample of 24 provinces whose boundaries remained unaffected by the administrative reorganizations.

Identification is of particular importance in our analysis. Of course, it is extremely difficult to propose a definitive identification procedure for estimating the labor market effects of minimum-wage setting. Notwithstanding this difficulty,

<sup>7</sup>Bosch and Manacorda (2010) used municipal data for Mexico to assess the impact of a decline in the real value of the minimum wage during 1988 to 1994 on employment. They ran separate regressions for wage-earners and the self-employed, whereas we argue that the impact of the minimum wage should be estimated jointly for formal-sector employment and informality.

TABLE 2  
VARIABLE DEFINITIONS

Variable Name	Definition
Formality rate	Share of formal-sector workers (salaried workers or non-agricultural salaried workers, depending on model specification) in the reference population (all workers, males or females, depending on model specification).
Informality rate	Share of informal-sector workers (based on the different definitions of formality) in the reference population (all workers, males or females, depending on model specification).
Unemployment rate	Share of unemployed individuals in the reference population (all workers, males or females, depending on model specification).
Kaitz index	Ratio of minimum-to-mean wage for formal-sector workers. The mean wage of formal-sector workers is computed over the reference population (all workers, males or females, depending on model specification).
Hourly wage (formal sector)	Mean hourly wage of formal-sector workers computed for the reference population (all workers, males or females, depending on model specification).
Hourly wage (informal sector)	As <i>Sakernas</i> does not provide information on informal-sector earnings, a proxy for the hourly wage of informal-sector workers was computed as follows. In <i>Susenas</i> all household members aged 10 years and above declare their working status (i.e. salaried worker, employer, self-employed, or family/unpaid worker) and the hours worked in a week, while information on wage income and earnings from agricultural and non-agricultural activities is collected at the household level. We selected those households where all members are non-salaried workers and have no wage earnings and computed the mean hourly wage for these households in each district. As <i>Susenas</i> is not available for all the years used in the sample, 1996–99 averages (when both are available) were used for 1998, 1999–2002 averages (when both are available) were used for 2000, and 2005 data were used for 2004.
Labor productivity	Mean value added per worker in the reference district's manufacturing sector computed using Industrial Survey (SI) data.
District size	Adult population living in urban areas in the reference district.
Urbanization rate	Share of the reference district's population living in urban areas.
Hours worked (formal sector)	Mean weekly hours worked by formal-sector workers computed for the reference population (all workers, males or females, depending on model specification).
Hours worked (informal sector)	Mean weekly hours worked by informal-sector workers computed for the reference population (all workers, males or females, depending on model specification).
Employment in industry	Share of overall employment in industry computed for the reference population (all workers, males or females, depending on model specification).
School intensity	Share of the reference district's population born after 1963 multiplied by the number of schools built per children in the reference district under <i>Sekolah Dasar INPRES</i> during 1973–78.
Population aged 15–25 years	Share of population aged 15–25 years in the reference district.
Population aged 56–65 years	Share of population aged 56–65 years in the reference district.

Source: *Sakernas*, *Susenas*, SI, and authors' calculations.

TABLE 3  
DESCRIPTIVE STATISTICS FOR THE WORKING-AGE POPULATION

Variable	N	Mean	St. Dev.	Min.	Max.
<i>Tables 4, 6, 7</i>					
Formality rate	1,356	0.256	0.096	0	0.558
Informality rate	1,356	0.327	0.131	0	1
Kaitz index	1,346	0.479	0.172	0.070	2.267
Hourly wage (formal sector)	1,346	3,132.423	2,016.432	198.611	19,915.230
Hours worked (formal sector)	1,346	44.122	5.346	13.200	66.400
Hours worked (informal sector)	1,351	42.022	7.365	8.143	72.200
<i>Table 5</i>					
Formality rate	1,356	0.241	0.097	0	0.548
Informality rate	1,356	0.342	0.134	0	1
Kaitz index	1,341	0.467	0.157	0.070	2.267
Hourly wage (formal sector)	1,341	3,185.336	2,037.014	198.611	19,915.230
Hours worked (formal sector)	1,341	44.202	5.277	13.200	64.100
Hours worked (informal sector)	1,351	42.073	7.207	8.143	72.200
<i>All tables</i>					
Unemployment rate	1,356	0.050	0.036	0	0.256
Hourly wage (informal sector)	1,243	3,293.962	3,067.389	91.719	39,960.990
Labor productivity	1,285	29,893.670	46,554.300	53.719	634,631.100
District size	1,356	273.042	584.865	14.000	9,582.000
Urbanization rate	1,356	0.429	0.303	0.034	1
Employment in industry	1,356	0.116	0.107	0	0.824
Population aged 15–25 years	1,356	0.264	0.063	0.036	0.486
Population aged 15–25 years	1,356	0.063	0.033	0	0.217
School intensity	1,308	0.0015	0.0008	0.0003	0.0068

Source: *Sakernas*, *Susenas*, *SI*, and authors' calculations.

our strategy consists essentially of using district-level data to run the labor market status equations. The minimum wage (the numerator of the Kaitz index) is set at the provincial level in Indonesia, therefore variations in the minimum wage are likely to be endogenous at the provincial level, but reasonably exogenous at the district level (since districts within the same province are highly heterogeneous for what concerns labor market conditions). For instance, while employment is likely to correlate with the minimum wage at the provincial level, there is no reason to believe that a correlation would exist at the level of each district.<sup>8</sup> Since mean formal-sector wages (the denominator of the Kaitz index) may correlate with unobserved determinants of the labor market outcomes of interest (formality, informality, unemployment), we include mean formal-sector wages among the regressors, along with other district-level controls proxying for labor demand and economic growth.<sup>9</sup>

We also control for human capital and deal with the likely endogeneity of educational attainment by following Duflo (2001) in using information on the

<sup>8</sup>Both employment and the minimum wage may grow faster in rapidly growing provinces, but this is not necessarily the case at the district level, unless all districts in the same province grew at the same pace.

<sup>9</sup>It may also be argued that a fall in the share of formal-sector workers led to an increase in the Kaitz index (through a decrease in the denominator). This would be the case if the decrease in formal-sector employment were associated with a decrease in mean wages in the formal sector, but in our data we do not find evidence that before 2001 district-level formal-sector wages were affected by informality and unemployment.

number of schools built in each district during implementation of a large school construction program (*Sekolah Dasar INPRES*) between 1973–74 and 1978–79. We multiplied the number of schools built in each district by the share of adult population born after 1963 to focus on the cohort that was exposed to the program. Duflo (2001) shows that the cohort of individuals born in districts that benefited from the program was more likely to stay longer at school and to earn more once joining the labor force.

### 4.3. Regression Results

#### 4.3.1. Working-Age Population

The results of the estimation of equation (1) for the formal-sector employment, informality, and unemployment rates separately by fixed effects and jointly by SUR are reported in Table 4 for the entire working-age (15–65 years) population. The standard errors reported in the fixed-effect estimations are robust to serial correlation and heteroskedasticity. Hours worked and demographic factors were used to fulfill the exclusion restrictions in the SUR equations.

The Kaitz index is negatively signed and statistically significant in the formality and unemployment equations, and positively signed and statistically significant in the informality equation, regardless of the estimator used. These findings are in line with the theoretical prediction of a displacement effect for formal-sector workers, who are subsequently absorbed into the informal sector. The negative and significant coefficient on unemployment seems to suggest that the decrease in formal-sector employment due to a rise in the relative value of the minimum wage shifts workers from “queuing” unemployment to the inactive population or the informal sector.

With regard to the remaining covariates, the results are as follows. Formal-sector hourly wages only affect formal-sector employment in the SUR regressions, while informal-sector hourly wages are associated with changes in unemployment in both OLS and SUR estimations. Hours worked have a bearing on employment in the informal sector. Labor productivity and urbanization are not correlated with the distribution of employment between the formal and informal sectors and unemployment. Economic structure matters in that the share of employment in industry is associated with higher employment in the formal sector and lower employment in the informal sector, regardless of the technique used to estimate the regressions. Human capital, proxied by school intensity to avoid a possible endogeneity bias arising from inclusion of educational attainment in the regressions, is strongly negatively (positively) correlated with formal-sector (informal-sector) employment, regardless of the estimation technique used. It affects unemployment positively when the regressions are estimated by SUR, suggesting the presence of “queuing unemployment” for better educated workers. Scale effects, proxied by district size, only matter in the formal/informal-sector employment regressions estimated by fixed effects. Time effects are strongly significant in the formal–informal employment regressions, regardless of the estimator used. The age structure of the population is positively significant in the unemployment equation. This is as expected, because unemployment is very high among youths.

TABLE 4  
INFORMALITY, FORMALITY, AND UNEMPLOYMENT, ENTIRE WORKING-AGE POPULATION

	Fixed Effects, Robust S.E.			Fixed Effects, SUR		
	Formality	Informality	Unempl.	Formality	Informality	Unempl.
Kaiz index	-0.0532* [0.062]	0.0823*** [0.001]	-0.0237*** [0.001]	-0.0515*** [0.002]	0.0869*** [0.000]	-0.0230*** [0.001]
Hourly wage (formals)	5.22E-06 [0.160]	-4.97E-06 [0.189]	-4.08E-07 [0.731]	5.18E-06** [0.019]	-4.35E-06 [0.104]	-4.75E-07 [0.599]
Hourly wage (informals)	3.42E-07 [0.736]	5.38E-07 [0.594]	-1.03E-06*** [0.000]	3.52E-07 [0.691]	5.56E-07 [0.617]	-1.03E-06*** [0.006]
Labor productivity	8.87E-08 [0.390]	-6.08E-08 [0.638]	2.59E-08 [0.563]	8.12E-08 [0.315]	-8.68E-08 [0.394]	2.25E-08 [0.510]
District size	7.77E-06*** [0.003]	-9.30E-06*** [0.001]	9.42E-07 [0.376]	7.52E-06 [0.137]	-9.59E-06 [0.130]	1.01E-06 [0.636]
Urbanization rate	-0.0176 [0.626]	0.00654 [0.889]	0.01 [0.391]	-0.0144 [0.511]	0.00841 [0.760]	0.0114 [0.219]
Hours worked (formals)	-0.00033 [0.636]	0.00033 [0.889]	0.00033 [0.391]	-0.00019 [0.595]	0.00033 [0.760]	0.00033 [0.219]
Hours worked (informals)		-0.00208*** [0.000]			-0.000990*** [0.002]	
Employment in industry	0.201*** [0.000]	-0.194*** [0.000]	-0.0109 [0.444]	0.201*** [0.000]	-0.193*** [0.000]	-0.0113 [0.361]
School intensity	44.53*** [0.002]	-59.81*** [0.001]	6.707 [0.320]	50.45*** [0.000]	-63.25*** [0.000]	10.58* [0.055]
Popul. aged 15-25 years			0.113*** [0.000]			0.0715*** [0.000]
Popul. aged 56-65 years			0.161*** [0.000]			0.165*** [0.000]
1998	-0.0305*** [0.000]	0.0332*** [0.000]	-0.00376 [0.226]	-0.0312*** [0.000]	0.0344*** [0.000]	-0.00369 [0.170]
2000	-0.0448*** [0.000]	0.0569*** [0.000]	0.00367 [0.371]	-0.0479*** [0.000]	0.0552 [0.000]	0.00312 [0.333]
2002	-0.0932*** [0.000]	0.0993*** [0.000]	0.00795* [0.097]	-0.0950*** [0.000]	0.0989*** [0.000]	0.00438 [0.299]
2004	-0.0965*** [0.000]	0.0975*** [0.000]	0.00672 [0.228]	-0.0988*** [0.000]	0.0951*** [0.000]	0.00466 [0.322]
Constant	0.246*** [0.000]	0.448*** [0.000]	0.0091 [0.488]	0.167*** [0.002]	0.560*** [0.000]	0.0378* [0.074]
No. of obs.	1151	1148	1151	1148	1148	1148
No. of districts	265	264	265	264	264	264
R-squared	0.167	0.142	0.062	0.519	0.558	0.397

Notes: Standard errors in brackets; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

### 4.3.2. Robustness Checks

The baseline results rely on the identification hypothesis that the minimum wage is reasonably exogenous to district-level formal-sector employment and labor-market conditions. This identification hypothesis is important because, by construction, all the variation in the Kaitz index arises from the within-province variation in district-level mean formal-sector wages. The hypothesis is valid because, as noted above, the minimum wage is set through a political process at the provincial, rather than district, level on the basis of caloric intake indicators. But this may not be true for some of the districts, because the provincial governments typically set the minimum wage at the level of the lowest minimum wage put forward within each province. It may therefore be the case that the Kaitz index is endogenous for low-income districts. To make sure that this is not driving our results, we re-estimated the regressions by excluding from the sample those districts whose average wages are below their respective provinces' median wage. Our main findings (not reported but available upon request) are nevertheless robust to this re-estimation, which lends credence to our identification hypothesis.

The baseline findings are also robust to a change in the definition of informality. To test this hypothesis, we re-estimated the baseline regressions while treating only non-agricultural salaried workers as formal. The results, reported in Table 5, are comparable to the baseline findings in the sign and magnitude of the estimated coefficients. We also run the baseline regression for the three types of informal-sector workers (i.e. self-employed, employers, and family workers) separately. The results of these regressions (not reported but available upon request) show that the increase in informality arising from a hike in the Kaitz index is due entirely to higher self-employment, the group of workers that accounts for the bulk of the informal sector.

### 4.3.3. Males and Females

Another consideration is that the effect of the minimum wage on labor-market outcomes may differ between males and females. To shed further light on possible gender differentials, the baseline regressions were re-estimated by SUR for males and females. The results reported in Table 6 for formal- and informal-sector employment are comparable to those reported above for the entire working-age population: an increase in the relative value of the minimum wage is associated with higher informality and lower employment in the formal sector. With regard to unemployment, the minimum wage appears to have a negative effect for females but not for males. Hourly wages in the formal sector affect formal-sector employment positively (negatively) for males (females) and informal-sector employment negatively for males (no effect for females). The finding suggests that rising wages in the formal sector attract male workers who might otherwise work informally to the formal sector, leaving unemployment unchanged. For females, by contrast, rising formal-sector wages depress employment in the formal sector. Nevertheless, informal-sector wages affect unemployment negatively, suggesting that women may be attracted to the informal sector when wages rise in that sector, rather than registering as unemployed.

TABLE 5  
INFORMALITY, FORMALITY, AND UNEMPLOYMENT, ALTERNATIVE DEFINITION OF INFORMALITY

	Fixed Effects, Robust S.E.			Fixed Effects, SUR		
	Formality	Informality	Unempl.	Formality	Informality	Unempl.
Katiz index	-0.0720*** [0.002]	0.105*** [0.000]	-0.0259*** [0.002]	-0.0702*** [0.000]	0.107*** [0.000]	-0.0254*** [0.001]
Hourly wage (formals)	3.98E-06 [0.237]	-3.24E-06 [0.376]	-1.13E-06 [0.305]	3.84E-06* [0.073]	-2.72E-06 [0.311]	-1.20E-06 [0.185]
Hourly wage (informals)	6.41E-07 [0.479]	2.00E-07 [0.825]	-9.79E-07*** [0.001]	6.47E-07 [0.451]	2.50E-07 [0.821]	-9.74E-07*** [0.009]
Labor productivity	1.46E-07 [0.134]	-1.34E-07 [0.262]	4.07E-08 [0.374]	1.38E-07* [0.079]	-1.61E-07 [0.114]	3.72E-08 [0.275]
District size	5.95E-06** [0.022]	-7.62E-06*** [0.009]	1.18E-06 [0.259]	5.68E-06 [0.246]	-7.86E-06 [0.212]	1.25E-06 [0.553]
Urbanization rate	-0.0363 [0.292]	0.0254 [0.598]	0.00966 [0.412]	-0.0331 [0.120]	0.0272 [0.321]	0.0111 [0.231]
Hours worked (formals)	-0.000111 [0.877]			-3.00E-06 [0.993]		
Hours worked (informals)		-0.00217*** [0.000]			-0.000992*** [0.002]	
Employment in industry	0.219*** [0.000]	-0.216*** [0.000]	-0.00973 [0.498]	0.219*** [0.000]	-0.215*** [0.000]	-0.01 [0.413]
School intensity	33.23** [0.025]	-49.17*** [0.005]	8.42 [0.182]	39.21*** [0.001]	-52.42*** [0.001]	12.38** [0.026]
Popul. aged 15-25 years			0.110*** [0.000]			0.0698*** [0.000]
Popul. aged 56-65 years			0.158*** [0.000]			0.162*** [0.000]
1998	-0.0339*** [0.000]	0.0369*** [0.000]	-0.00367 [0.244]	-0.0346*** [0.000]	0.0380*** [0.000]	-0.00364 [0.179]
2000	-0.0465*** [0.000]	0.0580*** [0.000]	0.0048 [0.244]	-0.0496*** [0.000]	0.0562*** [0.000]	0.00425 [0.187]
2002	-0.0825*** [0.000]	0.0880*** [0.000]	0.00869* [0.061]	-0.0841*** [0.000]	0.0876*** [0.000]	0.00515 [0.224]
2004	-0.0832*** [0.000]	0.0835*** [0.000]	0.00778 [0.145]	-0.0851*** [0.000]	0.0810*** [0.000]	0.00573 [0.225]
Constant	0.249*** [0.000]	0.439*** [0.000]	0.00927 [0.480]	0.186*** [0.000]	0.531*** [0.000]	0.0375* [0.075]
No. of obs.	1146	1146	1146	1143	1143	1143
No. of districts	265	264	265	264	264	264
R-squared	0.152	0.129	0.063	0.544	0.58	0.4



TABLE 6  
INFORMALITY, FORMALITY, AND UNEMPLOYMENT, BY GENDER

	Males			Females		
	Formality	Informality	Unempl.	Formality	Informality	Unempl.
Katiz index	-0.0569*** [0.000]	0.0744*** [0.000]	-0.00614 [0.207]	-0.0282*** [0.000]	0.0273*** [0.001]	-0.00566** [0.040]
Hourly wage (formals)	5.61e-06** [0.020]	-7.81e-06*** [0.004]	2.29E-07 [0.822]	-2.99e-06* [0.078]	7.89E-07 [0.715]	4.04E-07 [0.568]
Hourly wage (informals)	1.06E-06 [0.381]	3.79E-07 [0.785]	-8.01E-07 [0.123]	-3.09E-07 [0.115]	5.21E-07 [0.655]	-1.27e-06*** [0.001]
Labor productivity	8.31E-08 [0.454]	-2.22e-07* [0.082]	5.62E-08 [0.240]	5.49E-08 [0.479]	2.18E-08 [0.840]	5.09E-09 [0.884]
District size	1.01E-05 [0.141]	-1.21E-05 [0.124]	8.47E-07 [0.775]	4.53E-06 [0.344]	-5.49E-06 [0.406]	3.96E-07 [0.854]
Urbanization rate	-0.00576 [0.847]	0.0124 [0.718]	-0.00726 [0.574]	-0.0111 [0.594]	-0.0209 [0.470]	0.0258*** [0.007]
Hours worked (formals)	-0.000395 [0.324]			-0.000327 [0.302]		
Hours worked (informals)		-5.48E-05 [0.855]			-0.000776** [0.023]	
Employment in industry	0.305*** [0.000]	-0.249*** [0.000]	0.00157 [0.923]	0.0243 [0.282]	-0.0177 [0.571]	-0.0157 [0.124]
School intensity	94.55*** [0.000]	-76.53*** [0.000]	6.085 [0.426]	-8.234 [0.495]	-56.54*** [0.001]	14.80** [0.012]
Popul. aged 15-25 years			0.00377 [0.883]			0.0552** [0.011]
Popul. aged 56-65 years			0.145*** [0.001]			0.112*** [0.002]
1998	-0.0515*** [0.000]	0.0505*** [0.000]	0.000876 [0.810]	-0.0046 [0.435]	0.0103 [0.207]	-0.00436 [0.105]
2000	-0.0801*** [0.000]	0.0826*** [0.000]	0.00653 [0.144]	0.00359 [0.616]	0.0190* [0.052]	-0.00278 [0.394]
2002	-0.142*** [0.000]	0.166*** [0.000]	0.000901 [0.874]	-0.0280*** [0.001]	0.0267** [0.019]	-0.00139 [0.740]
2004	-0.147*** [0.000]	0.166*** [0.000]	0.00177 [0.779]	-0.0196* [0.050]	0.0193 [0.147]	-0.00057 [0.899]
Constant	0.173** [0.013]	0.656*** [0.000]	0.0239 [0.411]	0.201*** [0.000]	0.438*** [0.000]	0.0601*** [0.005]
No. of obs.	1142	1142	1142			1114
No. of districts	264	264	264			263
R-squared	0.512	0.547	0.338	0.49	0.593	0.42

Notes: All models are estimated as SUR fixed effects panel. Standard errors in brackets; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

With regard to human capital, we experimented with replacing school intensity, which cannot be computed for males and females separately, by the shares of population having attained primary and lower-secondary education. The results (not reported but available upon request) are comparable to those reported in Table 6, although the effect of formal-sector hourly wages on informal-sector employment loses significance in the regression for male workers.

#### 4.3.4. Net Effect on Employment

The fact that an increase in the minimum-to-mean wage ratio increases informality and depresses formal-sector employment does not predict the overall employment effect of minimum-wage hikes. To be sure, we re-estimated equation (1) as a two-equation model for total (formal- and informal-sector) employment and unemployment as the dependent variables. The results are reported in Table 7.

The parameter estimates for the entire working-age population show that an increase in the Kaitz index is associated with an increase in total employment and a decrease in unemployment. An increase in informality associated with minimum-wage hikes therefore more than compensates for concomitant job losses in the formal sector and the exit of some unemployed individuals from the labor force. In the case of male workers, the net effect on employment is positive, and minimum-wage hikes do not affect unemployment. This finding is consistent with the results reported in Table 6, where the (positive) effect of changes in the Kaitz index on informality is greater in magnitude than the (negative) effect on formal-sector employment. In the case of females, however, the net employment effect is null, because an increase in informality offsets a concomitant decrease in formal-sector employment.

The finding that an increase in the relative value of the minimum wage has a positive net effect on employment, at least as far as male workers are concerned, is consistent with the so called “lighthouse effect,” according to which inactive workers are attracted to the labor market, because rising wages in the formal-sector are associated with higher pay in the informal sector. This seems to be the case in Indonesia: the coefficient of the Kaitz index in a regression of informal-sector earnings on the Kaitz index is consistently positive and significant (results obtained by fixed effects available upon request).

## 5. CONCLUSIONS

There is considerable controversy over the impact of minimum-wage legislation on employment in both developed and developing countries. Empirical evidence available to date for a variety of countries points toward a relatively mild, if at all significant, disemployment effect. The case of Indonesia is interesting, because the decentralization of minimum-wage setting to the provinces in 2001 offers the opportunity to revisit this topic. Also, the Indonesian minimum wage is very high, even in comparison with OECD countries, at about 65 percent of the median wage in 2004, which suggests that its disemployment effect might be potentially strong.

TABLE 7  
TOTAL EMPLOYMENT AND UNEMPLOYMENT

	Total		Males		Females	
	Employment	Unemployment	Employment	Unemployment	Employment	Unemployment
Katitz index	0.0368** [0.018]	-0.0226*** [0.001]	0.0171* [0.051]	-0.00597 [0.221]	-0.00121 [0.889]	-0.00564** [0.040]
Hourly wage (formals)	1.08E-06 [0.605]	-4.97E-07 [0.582]	-2.34E-06 [0.213]	2.28E-07 [0.823]	-2.72E-06 [0.251]	3.95E-07 [0.577]
Hourly wage (informals)	9.11E-07 [0.266]	-1.03E-06*** [0.006]	1.44E-06 [0.118]	-8.01E-07 [0.123]	2.38E-07 [0.838]	-1.27E-06*** [0.001]
Labor productivity	-1.02E-08 [0.891]	2.22E-08 [0.516]	-1.40E-07* [0.099]	5.59E-08 [0.242]	5.37E-08 [0.617]	5.02E-09 [0.886]
District size	-2.14E-06 [0.646]	1.02E-06 [0.632]	-2.03E-06 [0.699]	8.58E-07 [0.772]	-1.07E-06 [0.871]	4.02E-07 [0.852]
Urbanization rate	-0.00555 [0.784]	0.0113 [0.222]	0.0064 [0.779]	-0.00746 [0.564]	-0.0305 [0.290]	0.0257*** [0.007]
Hours worked (formals)	-0.00011 [0.816]	-0.00051 [0.259]	-0.00051 [0.259]	-0.00051 [0.259]	-0.00051 [0.280]	-0.00051 [0.280]
Hours worked (informals)	-0.000796** [0.014]	-1.35E-05 [0.965]	-1.35E-05 [0.965]	-1.35E-05 [0.965]	-9.32E-05 [0.799]	-9.32E-05 [0.799]
Employment in industry	0.00725 [0.788]	-0.0114 [0.354]	0.0561* [0.051]	0.00148 [0.928]	0.0075 [0.810]	-0.0156 [0.125]
School intensity	-13.64 [0.228]	10.47* [0.058]	18.13 [0.156]	5.811 [0.448]	-64.93*** [0.000]	14.75** [0.013]
Popul. aged 15-25 years		0.0643*** [0.001]		-0.00078 [0.976]		0.0532*** [0.014]
Popul. aged 56-65 years		0.151*** [0.000]		0.132*** [0.002]		0.108*** [0.003]
1998	0.00347 [0.552]	-0.00353 [0.189]	-0.00099 [0.877]	0.001 [0.783]	0.00676 [0.406]	-0.00431 [0.109]
2000	0.0068 [0.334]	0.00319 [0.322]	0.00272 [0.730]	0.0066 [0.139]	0.0230** [0.020]	-0.00275 [0.398]
2002	0.00342 [0.698]	0.00384 [0.362]	0.0244** [0.010]	0.000544 [0.924]	0.000216 [0.985]	-0.00153 [0.714]
2004	-0.00473 [0.655]	0.00457 [0.332]	0.0195* [0.084]	0.00174 [0.783]	0.000829 [0.952]	-0.00058 [0.898]
Constant	0.712*** [0.000]	0.0401* [0.058]	0.833*** [0.000]	0.0258 [0.375]	0.623*** [0.000]	0.0609*** [0.004]
No. of obs.	1148	1148	1142	1142	1114	1114
No. of districts	276	276	264	264	263	263
R-squared	0.592	0.396	0.462	0.337	0.652	0.42

Notes: All models are estimated as SUR fixed effects panel. Standard errors in brackets; \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.1.

The panel methodology used in this paper improves upon the empirical literature by recognizing the complexities of labor-market dynamics in a dual economy, such as Indonesia, where the impact of the minimum wage on employment is affected by the pervasiveness of informality. According to the definition used in this paper, over 70 percent of employment is considered informal. We address this issue by correcting for contemporaneous correlations among the residuals of the labor-market outcome equations. Another contribution of the paper is its focus on local, rather than provincial, governments as the units of observation. This is useful not only for exploiting a much richer source of variations in the data, but also to address the endogeneity of the minimum wage at the provincial level.

The main findings reported in the paper—that minimum-wage hikes destroy formal-sector jobs, but that these job losses are more than compensated for by the expansion of the informal sector—suggests that minimum-wage legislation is hurting, instead of protecting, vulnerable workers. Its use as social protection and income redistribution instruments can therefore be called into question. A policy recommendation that arises from the empirical analysis is that further increases in the minimum wage could be capped so as not to exceed labor productivity gains. This, or, if it were possible, a gradual reduction over time would help to alleviate the adverse employment impact of such a high minimum wage (in relation to the median) and to facilitate formalization in the labor market.

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