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Fiscal Decentralization and Urbanization in Indonesia

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Abstract

Indonesia went through a process of fiscal decentralization in 2001 involving the devolution of several policymaking and service delivery functions to the subnational tiers of government (provinces and districts). This process is likely to have affected regional patterns of urbanization, because the new prerogatives granted to the local governments have altered the distribution of urban amenities and labour market outcomes among and within the local jurisdictions. This paper uses a dataset of local governments for 1996 and 2004-05 to estimate the effect of the decentralization of minimum-wage setting in 2001 on urban population growth. Our findings suggest that, controlling for demand- and supply-side determinants of urban population growth, if the minimum wage had risen by an additional 81.5 thousand rupiah (25 per cent of its initial mean value), the urban population would have risen by an additional 0.4 per cent from its initial level.

Keywords: Indonesia, minimum wage, federalism, urbanization

JEL classification: H72, J61, R23

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Acronyms

DAK earmarked or conditional transfers (*dana alokasi khusus*)

DAU general allocation grant (*dana alokasi umum*)

SDA sharing of oil and gas revenue

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1 Introduction

Indonesia went through an ambitious process of fiscal and administrative decentralization in 2001, according to which several political, policymaking and service delivery functions were transferred to the lower tiers of government. Of particular interest was the devolution of minimum-wage setting to the local governments and provinces. This process is likely to have affected regional patterns of urbanization, because the new prerogatives granted to the local governments, coupled with growing political autonomy, have altered the distribution of infrastructure (urban amenities) and labour market outcomes among and within the local governments. At about 50 per cent, Indonesia's urbanization rate is in line with the average of low-income countries, but there is considerable regional variation within the country in urbanization rates and trends.

Against this background, this paper describes trends in urbanization across the Indonesian local jurisdictions and discusses how a particular feature of decentralization —minimum-wage setting—is likely to have affected urban population growth and the distribution of the local population between cities and rural areas. Theoretical motivation is derived from two strands of literature. One is based on the conventional models of urbanization, following the tradition of Brueckner (1990), according to which urban population growth is driven primarily by differences in income and market potential between urban and rural areas. The other is inspired by De Long and Shleifer (1993), Ades and Glaeser (1995), Davis and Henderson (2003) and Henderson and Wang (2007) and considers the effects of institutions, including federalism and democratization, on urbanization and urban concentration. Previous research on the effects of fiscal decentralization on urbanization and regional development includes Firman (2003).

Empirical evidence is provided for a dataset of Indonesian local governments constructed primarily on the basis of the labour market (*Sakernas*), household (*Susenas*) and industrial (*Survei Industri*) surveys. Using the local governments as the units of observation, we estimate the effect of decentralization of minimum-wage setting in 2001 on urban and rural population growth in a reduced-form setting that controls for the supply and demand drivers of urbanization. We focus on changes in the relevant variables between 1996 and 2004-05,[1] a time span that covers the pre- and post-decentralization periods. We differ from previous empirical literature in two main ways: we focus on a cross-section of local governments within a single country, rather than on a cross-section of countries, and use household and labour market survey, rather than population census, data.

Our main finding is that, controlling for demand and supply factors, an increase in the minimum wage is associated with an increment in the urban population at the district level. In particular, controlling for other determinants of urban population growth, if the minimum wage had risen by 81.5 thousand rupiah (25 per cent of its initial mean value), the urban population would have risen by an additional 0.4 per cent from its initial level.

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1 While *Sakernas* is carried out every year, the consumption/expenditure module of *Susenas* is available every four years. Thus, *Sakernas* data refer to 2004 and *Susenas* data to 2005.

The paper is organized as follows. Section 2 overviews the main features of urbanization in Indonesia. Section 3 describes the estimation procedure and the dataset. Section 4 presents the estimation results, and Section 5 concludes.

2 Minimum wage, decentralization and urbanization

2.1 Urbanization in Indonesia

Indonesia's urban population nearly has doubled since 1990 to about 109 million in 2005, the latest year for which mid-census data are available. The country's urbanization rate is in the neighbourhood of 50 per cent, which is in line with the average of low-income countries, and is estimated to rise to nearly 69 per cent in 2030 (United Nations 2007).

As in other developing countries, rural/urban migration has been the main engine of city growth in Indonesia. The urban population grew by over 4.5 per cent per year on average during 1985-05, while the rural population shrank by 0.3 per cent per year on average over the same period. Net migration is estimated to have accounted for almost 60 per cent of urban growth in Indonesia in the 1980s (United Nations 2001). Nevertheless, Indonesia's rural population, although declining, is among the largest in the world, at about 117 million in 2005. This suggests ample room for further rural emigration to continue to sustain rapid urbanization.

Of course, population census-based urbanization trends, although illustrative, need to be assessed with some caution. For example, they are affected by changes in the classification of localities between urban and rural, which is often based on administrative criteria that not always reflect differences in economic structure between urban and rural areas (Hugo 2003; Firman, Kombaitan and Pradono 2007).[2] We go some way in addressing this problem by using household and labour market survey data. To illustrate these methodological differences, basic urbanization indicators are reported in Table 1 for 1996 and 2004, the reference years used in the empirical analysis below.

Table 1
Urbanization indicators, 1996 and 20040-05, %

	Sakernas		Population census[a]	
	Urban	Rural	Urban	Rural
1996	42.9	57.1	35.6	64.4
2004	49.9	51.0	48.1	51.9

Note: [a] refers to 1995 and 2005 (mid-census years), instead of 1996 and 2004.

Source: Susenas, Sakernas, and United Nations (2007).

[2] This is important, because the distinction between urban and rural areas has become increasingly blurred, reflecting to a large extent an increasingly complex mix of activities in urban and peri-urban areas and along transport corridors connecting large urban centres. In the case of Indonesia, for example, this phenomenon is often referred to as *kotadesasi* (McGee 1991, 1992; Firman 1992; Firman, Kombaitan and Pradono 2007).

There is a limited empirical literature on the determinants of urbanization in Indonesia. Firman Kombaitan and Pradono (2007) discuss the main determinants of urbanization since the 1980s and attribute the concentration of population and economic activity in the Jakarta Metropolitan Area (Jabotabek) to the country's integration into the world economy. Firman (1992) uses census data to describe the patterns of urban population growth in 82 Javanese predominantly rural districts (*kapubaten*) during 1980-90, excluding Jakarta and the districts that are predominantly urban (*kota*). Consistent with our approach, the unit of observation is the local governments (*kabupaten*/*kota*). The author reports a trend towards comparatively higher urban population growth in the large cities and in their surrounding areas. When discussing the main determinants of urban concentration in the metropolitan areas of Jakarta and Bandung, Firman (2003 and 2009) relates urbanization and fiscal decentralization through the empowerment of local governments, which is expected to better tailor the provision of urban amenities and infrastructure to local needs.

2.2 An overview of Indonesia's decentralization process

Following the demise of the Suharto regime in 1998, Indonesia launched an ambitious fiscal decentralization programme that was implemented from 2001. Decentralization allowed for increasing demands for policymaking autonomy at the subnational level to be met in a country that is characterized by considerable economic and geographic diversity. 'Big-bang' decentralization was implemented smoothly, despite serious administrative and capacity constraints at the local level and without serious disruption in service delivery. Fiscal and administrative decentralization was taken a step further in 2004, when direct elections (*Pilkada Langsung*) were introduced for province governors and heads of local governments.

Decentralization has put the local, rather than the middle-tier, jurisdictions at the forefront of service delivery. Several expenditure assignments, especially in the social area, were decentralized to the local governments, which now account for almost two-thirds of consolidated government spending, nearly double the pre-decentralization share. Notwithstanding their increased expenditure assignments, the local governments have limited taxing autonomy: income and property tax revenue is collected by the centre and transferred to the local governments on a derivation basis. The bulk of local government revenue comes from a general allocation grant (DAU, *dana alokasi umum*), followed by the sharing of oil and gas revenue (SDA) and earmarked or conditional transfers (DAK, *dana alokasi khusus*), which are used to finance predominantly capital outlays. Own sources account for less than 10 per cent of local government revenue. DAU is financed through a fixed share of central government net revenue (currently 26 per cent), of which 90 per cent is allocated to the local governments and the remainder is allocated to the provinces.

In addition to increasing vertical imbalances, decentralization has exacerbated horizontal inequality among the local governments. This is essentially because the sharing of revenue from the exploitation of natural resources is limited to the oil- and gas-rich provinces. Also, there is limited scope for using DAU as an equalization tool, because funds are distributed among the local governments on a derivation basis, rather than in relation to estimated fiscal capacity and expenditure needs. Another consideration is that, although DAU allocations are intended to be formula-based, they are still guided in part by historical budgeting on the basis of pre-decentralization

appropriations for the formerly deconcentrated personnel and assets that have subsequently been decentralized to the regional governments (Hofman et al. 2006).

At the same time, the central government retains control over the regional governments in areas related to tax policy (by setting tax bases and ranges for rates), budget making (local budgets need to be submitted to and approved by the central government), financial management (there are constraints on local government borrowing and debt management) and investment programmes, including in devolved sectors, such as education, health care and infrastructure development.

Following decentralization, there was a proliferation of subnational jurisdictions. The number of local governments (both *kapubaten* and *kota*) rose from 314 in 1998 to 440 at end-2005, and five provinces were created over this period, raising their number to 33. Legal constraints on the creation of new jurisdictions are lax and incentives for fragmentation are strong, given the reliance of local governments on financing from the centre, as well as bureaucratic and political rentseeking in some cases (Fitrani, Hofman and Kaiser 2005).

Of particular importance for our empirical analysis is the devolution of minimum-wage setting to the subnational governments in 2001.[3] The minimum wage is currently calculated by the local governments on the basis of an estimated cost-of-living indicator and then proposed to the provincial governments by a tri-partite wage council, including representatives from labour, government and the private sector. Typically, the provinces set the minimum wage at the level proposed by the local governments.[4] By contrast, prior to decentralization, the minimum wage used to be set nationally by the central government on the basis of a different cost-of-living indicator. Following decentralization, the minimum wage rose considerably in real terms, especially during 2000-03, reaching about 65 per cent of the median wage in 2004, a ratio that is far higher than the 45 per cent average of the OECD area (OECD 2008; Comola and de Mello 2009, 2010).

2.3 How may decentralization affect urbanization?

There are several channels through which the devolution of service delivery and minimum-wage setting to sub-national governments, coupled with greater political autonomy, may affect the supply-demand mix for urbanization.

First, decentralization has granted the local jurisdictions increasing autonomy to allocate their budgetary resources among competing needs. This is despite the fact that several expenditure functions are still costed on the basis of historical budget allocations and financed through transfers from the centre. Moreover, there is considerable anecdotal evidence that capacity constraints in the areas of budget making and expenditure management have had a bearing on the ability of local governments to implement

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3 For more information on minimum-wage setting, see SMERU (2001) and Widartu (2006). See also Comola and de Mello (2010) for empirical evidence on the effect of the minimum wage on employment and earnings using a multinomial selection model.

4 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.

Table 2
Infrastructure indicators: Urban and rural areas, 1996 and 2005
Access rates, in % of households

	1996		2005	
	rural	urban	rural	urban
Sources of drinking water				
Piped water	43.9	7.6	6.4	1.0
Pump	16.5	6.7	37.0	9.8
Well	34.1	50.8	44.6	40.8
Spring	2.4	20.8	7.7	27.8
Other	3.2	14.1	4.4	20.6
Toilet facilities				
Private	65.7	39.8	72.7	50.8
Shared	16.0	11.0	15.0	11.1
Other	18.3	49.2	12.3	38.1

Source: Susenas.

infrastructure development projects. Notwithstanding these caveats, urban-rural infrastructure differentials have shrank somewhat over time, although there is no clear pattern across indicators (Table 2).

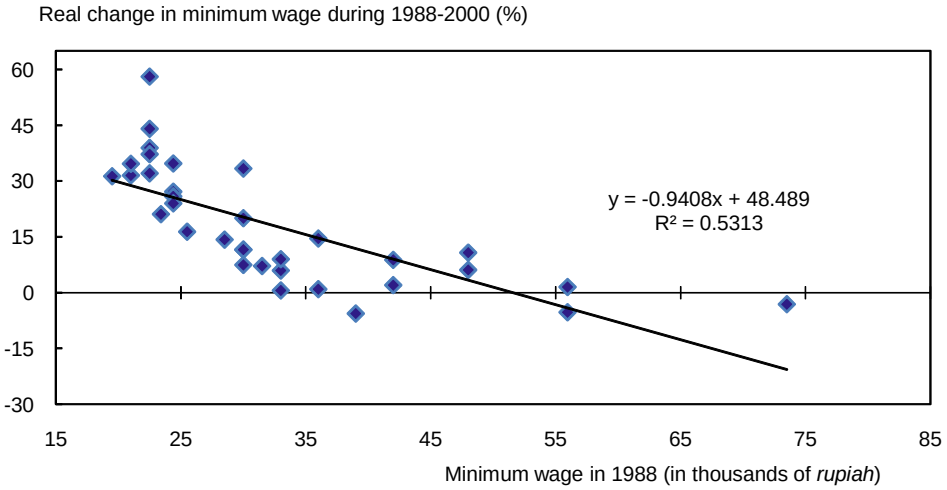
Second, by devolving minimum-wage setting to the districts and provinces, decentralization may have resulted in greater wage dispersion across the regions. This is important for our empirical analysis. Until 2000, there appears to have been a process of gradual reduction in disparities in the value of the minimum wage across jurisdictions, with higher real increases in the local governments and provinces where the minimum wage had the lowest values (Comola and de Mello 2009). However, decentralization seems to have put a halt to this process of minimum-wage convergence (Figure 1). As wage is a key determinant of rural-urban migration (both within and across districts), the decentralization of minimum-wage setting is likely to have played a role in the process of urbanization and to have affected some local governments more than others.

An important consideration is that minimum-wage provisions apply only to full-time regular workers and are not enforced among informal sector workers. This is interesting for empirical hypothesis testing, because it can be used as an identification device: changes in the minimum wage can be used to identify an effect of decentralization that is circumscribed to urban areas. Of course, there are informal sector workers in urban areas, but it can be assumed that rural employment is essentially informal. Labour-market survey (*Sakernas*) data indeed suggest that over 91 per cent of employment in rural areas was informal in 2004, against about 56 per cent in the urban areas (Comola and de Mello 2009).[5]

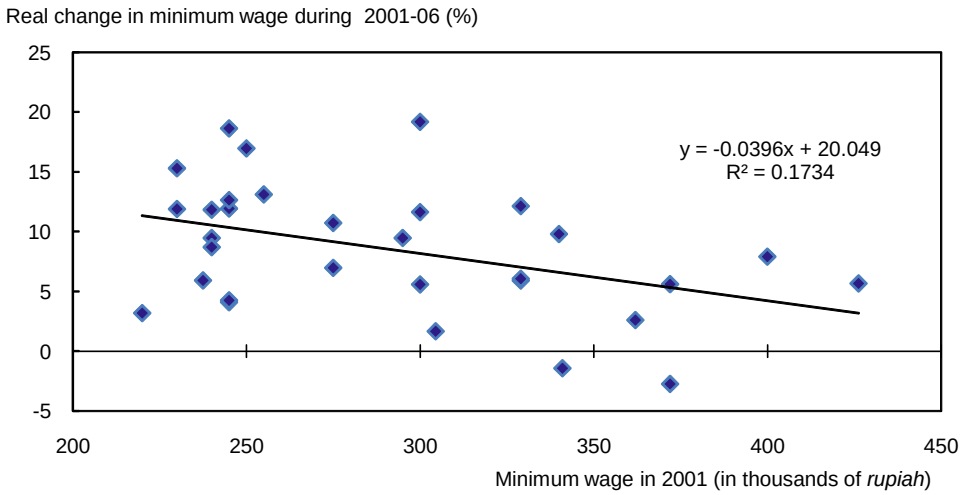
[5] To some extent, earnings in the informal sector are affected by wage-setting in the formal sector, but this hypothesis cannot be tested in Indonesia, because the labour-market survey does not report information on earnings for informal-sector workers. See Comola and de Mello (2010) for more information.

Figure 1
Minimum-wage setting and decentralization, 1988-2006

A. Before decentralisation[1]



B. After decentralisation[1]



Note: 1. The diamonds refer to the minimum wage at the provincial level. Average yearly changes are deflated by the GDP deflator.

Source: Ministry of Manpower and World Bank (WDI).

3 The estimating strategy

3.1 The theoretical hypothesis

There is widespread agreement that the demand for urbanization is driven primarily by differences in income and the stock of amenities (adjusted for cost-of-living differentials) between cities and rural areas.[6] Individuals decide to move to the city in

6 See Brueckner (1990), for example, for a review of the early literature on developing countries; Glaeser, Scheinkman and Shleifer (1995) and Black and Henderson (2003) for a more general

search of better job opportunities, and because they believe the quality of life to be better than in rural areas. Accordingly, the demand for urbanization can be defined as:

$$U_i^d = U_i^d\left(y_i^U, \sum_{j,j\neq i} \frac{y_j^U}{\tau_{ij}}, A_i^U, \sum_{j,j\neq i} \frac{A_j^U}{\tau_{ij}}, P_i^U \right), \tag{1}$$

where y_i^k denotes per capita income in jurisdiction *i* (among the existing *N* jurisdictions) for place of residence *k*, which can be urban (*U*) or rural (*R*); A_i^k is the stock of amenities in jurisdiction *i* for place of residence *k*; τ_{ij} is the average distance between jurisdictions *i* and *j*; and P_i^U is the urban population in jurisdiction *i*, used as a scale variable.

The supply of residents from outside the city also depends on income differentials, the stock of amenities in rural areas in the reference jurisdiction and in neighbouring jurisdictions (adjusted for distance), and the size of the rural population in the reference district. As a result, the supply of migrants to the city can be defined as:

$$U_i^s = U_i^s\left(y_i^R, \sum_{j,j\neq i} \frac{y_j^R}{\tau_{ij}}, A_i^R, \sum_{j,j\neq i} \frac{A_j^R}{\tau_{ij}}, P_i^R \right), \tag{2}$$

where P_i^R is the rural population in jurisdiction *i*.

In equilibrium, where $U_i^d = U_i^s = U_i$, the size of the urban population in the reference jurisdiction can be computed by solving Equations (1) and (2) for P_i^U, such that:

$$P_i^U = P_i^U\left(P_i^R, y_i^U, y_i^R, \sum_{j,j\neq i} \frac{y_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{y_j^R}{\tau_{ij}}, A_i^U, A_i^R, \sum_{j,j\neq i} \frac{A_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{A_j^R}{\tau_{ij}} \right). \tag{3}$$

We argue that decentralization affects indirectly the demand and supply determinants of urbanization through its impact on income through minimum-wage setting. Because of non-enforcement of minimum-wage provisions in the rural sector, as discussed above, we make the identifying assumption that $y_i^U = y_i^U(MW_i)$, where MW_i is the minimum wage in the reference jurisdiction. As a result, Equation (3) can be re-written as:

$$P_i^U = P_i^U\left(MW_i, P_i^R, y_i^R, A_i^U, A_i^R, \sum_{j,j\neq i} \frac{y_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{y_j^R}{\tau_{ij}}, \sum_{j,j\neq i} \frac{A_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{A_j^R}{\tau_{ij}} \right). \tag{4}$$

Equation (4) can be estimated for first-differenced data using the 1996 (before decentralization) and 2004/2005 (after decentralization) waves of the survey data used to construct our dataset (described below), such that:

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theoretical model and evidence on the determinants of city growth; and Duranton and Puga (2004) for a theoretical model.

$$\Delta P_i^U = \Delta P_i^U \left(\Delta MW_i, \Delta P_i^R, \Delta y_i^R, \Delta A_i^U, \Delta A_i^R, \sum_{j,j\neq i} \frac{y_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{y_j^R}{\tau_{ij}}, \sum_{j,j\neq i} \frac{A_j^U}{\tau_{ij}}, \sum_{j,j\neq i} \frac{A_j^R}{\tau_{ij}} \right). \quad (5)$$

3.2 Estimating equation

Equation (5) is a reduced-form equation relating changes in the size of the urban population to changes in the minimum wage. However, its estimation poses a few initial methodological challenges. *First*, population growth is known to be persistent (Rappaport 2004), which affects the error structure of the estimating equation. We deal with this problem by including the initial value of the urban and rural populations among the regressors. *Second*, ΔP_i^R and Δy_i^R, as well as changes in the amenity indicators, are most likely endogenous, which would bias the parameter estimates. Estimation by IV is difficult, because it would raise the issue of the appropriateness of instruments and because overidentification tests perform poorly in the presence of persistent errors. Instead, we deal with this problem by replacing the differenced RHS variables by their initial values. *Finally*, we include the initial value of urban income among the regressors to control for the initial relative value in the minimum wage, and a vector of time-invariant or initial-level controls (including education, population age structure, availability of natural resources and location within an extended metropolitan area) to account for district-specific characteristics. Equation (5) can therefore be estimated as:

$$\begin{aligned} \Delta P_i^U &= a_0 + a_1 \Delta MW_i + a_2 P_{i0}^U + a_3 P_{i0}^R + a_4 y_{i0}^U + a_5 y_{i0}^R + a_6 A_{i0}^U + a_7 A_{i0}^R + \ldots, \\ &\ldots + a_8 \frac{\sum_{j,j\neq i} y_j^U}{\tau_{ij}} + a_9 \frac{\sum_{j,j\neq i} y_j^R}{\tau_{ij}} + a_{10} \frac{\sum_{j,j\neq i} A_{j0}^U}{\tau_{ij}} + a_{11} \frac{\sum_{j,j\neq i} A_{j0}^R}{\tau_{ij}} + a_{12} x_{i0} + v_i, \end{aligned} \quad (6)$$

where *v* is an error term and subscript 0 indicates initial values.

3.2 Data

Our empirical analysis focuses on local governments as the units of observation. We expand the dataset constructed by Comola and de Mello (2009) to include local government-level indicators of urban and rural income as well as amenities, using household survey (*Susenas*) data. The dataset matches the district-level data available from the labour market survey (*Sakernas*) for 1996 and 2004 taking into account the administrative changes that took place over the period, including the creation of new jurisdictions. The dataset includes 378 jurisdictions. Our baseline sample includes 215 local governments for which information is available for all variables of interest and where both rural and urban residents are surveyed.

To measure the stock of urban and rural amenities, we construct a synthetic index using the different indicators of access to infrastructure available from *Susenas*. Of course, each indicator could enter the estimating equations as a proxy for the stock of amenities. But these indicators are correlated, which makes it difficult to obtain reliable estimates of the individual coefficients. In addition, there is no a priori criterion for selecting the most appropriate proxies for amenities among the indicators available. Moreover, individual indicators may not exhibit sufficient variation between rural and urban areas

to fully capture rural-urban differentials in the availability of amenities. We therefore apply principal component analysis to reduce the number of infrastructure indicators available from *Susenas* into a more manageable, smaller number of 'dimensions', while preserving the data variability contained in the original indicators. Our synthetic indices are defined as the first principal component of the underlying variables. The use of synthetic indicators to capture a wide range of amenity measures has been used increasingly in the urbanization literature (Gunderson and Ng 2006).

The synthetic indicators of infrastructure were constructed as follows: *first*, four raw indicators (the shares of households with electric light, private drinking facilities, piped or pumped water, and private toilet facilities at home) were computed for rural and urban areas separately. Then, for each district we took the first principal components of the rural and urban indicators. These first principal components explain 0.47 and 0.53 of the rural and urban variances, respectively. They are highly correlated with each individual indicator: for instance, the correlation between the indicator for rural infrastructures and the four proxies is 0.85, 0.4, 0.29 and 0.21 respectively.

A detailed description of the variables included in the dataset is presented in the Appendix. The dataset's descriptive statistics are reported in Table 3.

Table 3
Descriptive statistics

Variable	N	mean	max	min	s.d.
Growth_urban	262	34.00	8175.00	-2031.00	878.69
Growth_rural	262	-67.76	1180.00	-1288.00	300.52
delta_MW (in *rupiah*)	262	319072.40	515550.00	182500.00	81544.81
n_urbans96	262	396.18	4395.00	0.00	640.14
n_rurals96	262	522.84	1968.00	0.00	421.87
total_population96	262	919.02	6363.00	51.00	808.70
low_education96	262	62.19	91.15	15.99	16.21
young_population96	262	39.21	53.85	25.25	4.85
urban_income (in *rupiah*)	237	10021.84	20541.43	4774.34	3044.38
rural_income (in *rupiah*)	238	6620.56	13954.34	1113.02	1814.93
urban_infrastructure (in units)	260	0.80	1.34	0.23	0.26
rural_infrastructure (in units)	251	0.78	1.54	0.07	0.28
provincial_urban_income (in *rupiah*)	237	1026979.00	1749539.00	679226.30	197181.50
provincial_rural_income (in *rupiah*)	238	636939.20	878915.70	487187.80	94595.13
provincial_urban_infrastructure (in units)	260	0.85	1.26	0.39	0.15
provincial_rural_infrastructure (in units)	251	0.74	1.14	0.20	0.19
external_urban_income (in *rupiah*)	262	31410.52	42563.18	14055.12	8488.71
external_rural_income (in *rupiah*)	262	17978.01	24566.06	8126.11	4640.33
external_urban_infrastructure (in units)	262	0.02	0.03	0.01	0.01
external_rural_infrastructure (in units)	262	0.02	0.03	0.01	0.01
metropolitan1	262	0.03	1.00	0.00	0.18
metropolitan2	262	0.01	1.00	0.00	0.11
metropolitan3	262	0.02	1.00	0.00	0.14
oil_provinces	262	0.10	1.00	0.00	0.30
squared_urban_income	237	1.10E+12	4.22E+12	2.28E+11	6.94E+11
squared_rural_income	238	4.71E+11	1.95E+12	1.24E+10	2.75E+11
delta_rural_income (in *rupiah*)	224	640878.20	6906986.00	-485949.10	664148.10
ratio_value_added	125	0.87	10.18	0.01	1.19

Source: *Sakernas, Susenas, Statistik Industri* and authors' calculations.

4 The estimation results

4.1 The baseline model

The baseline results (estimated by OLS) are reported in Table 4. Model 1 refers to the estimation of Equation (6), and the dependent variable is the change in urban population (*growth_urban*). For the sake of comparison, the same regression is estimated in Model 2 for changes in rural population (*growth_rural*) as the dependent variable.

Table 4
Baseline specification
(Dep. var.: Change in resident population during 1996-2004)

	Model 1	Model 2
delta_MW	0.0020***	-0.0003
	(0.000)	(0.340)
n_urbans96	-0.3823***	0.0336
	(0.000)	(0.185)
n_rurals96	0.2888***	-0.2614***
	(0.000)	(0.000)
low_education96	3.2453	-1.7222
	(0.180)	(0.399)
young_population96	-3.2693	-0.8779
	(0.602)	(0.868)
urban_income	0.0353***	-0.0011
	(0.000)	(0.878)
rural_income	0.0213	-0.0016
	(0.208)	(0.911)
urban_infrastructure	-137.9878	-216.7084**
	(0.167)	(0.011)
rural_infrastructure	278.5470**	-335.5352***
	(0.029)	(0.002)
provincial_urban_income	-0.0005**	0.0002
	(0.032)	(0.387)
provincial_rural_income	0.0000	-0.0009**
	(0.910)	(0.017)
provincial_urban_infrastructure	242.5958	-175.2763
	(0.153)	(0.221)
provincial_rural_infrastructure	123.5163	125.9039
	(0.534)	(0.453)
external_urban_income	-0.0103	-0.0704***
	(0.659)	(0.000)
external_rural_income	0.0105	0.1436***
	(0.747)	(0.000)
external_urban_infrastructure	-24,661.8881	36,001.3984
	(0.454)	(0.197)
external_rural_infrastructure	34,542.4804	-57,656.1616***
	(0.130)	(0.003)
metropolitan1	193.1061**	60.1922
	(0.048)	(0.464)
metropolitan2	626.4902***	-401.9118***
	(0.000)	(0.004)
metropolitan3	156.3069	-22.9440
	(0.144)	(0.799)
oil_provinces	-168.9431*	-233.2851***
	(0.062)	(0.002)
Constant	-1,196.7533***	1,156.0674***
	(0.004)	(0.001)
Observations	215	215
R-squared	0.784	0.753

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

With respect to the covariates, both models include initial rural and urban populations, educational attainment and age structure, and the initial mean urban and rural incomes in the reference jurisdiction and in the other local governments located in the same province (excluding the reference jurisdiction). We also include mean urban and rural incomes and infrastructure in all other Indonesian provinces weighted by distance in order to proxy for economic conditions in alternative migration destinations. Finally, three dummies are included to identify local jurisdictions belonging to the country's main metropolitan areas (Jakarta, Yogyakarta and Surabaya), because, as discussed above, the distinction between urban and rural locations is particularly difficult in these large metropolitan centres. A dummy variable is also included to identify the local governments located in the oil-rich provinces (Aceh, Riau, East Kalimantan, Papua). This is to test for the presence of effects on regional development associated with the devolution of revenue from the exploitation of natural resources to these regions after decentralization.

The selection of covariates is consistent with the literature. For example, to estimate the determinants of city growth in the United States during 1960 and 1990, Glaeser, Scheinkman and Shleifer (1995) include various urban characteristics in 1960 among the regressors, such as initial population and income, output composition, unemployment and the educational attainment of the labour force. They find that urban population growth is positively related to initial schooling, negatively related to initial unemployment and the initial share of employment in manufacturing. De Mello (2002) estimates the determinant of city growth in Brazil during 1985-94 and shows that local government spending on social services, including health care, and on housing/urbanization, is a powerful determinant of city growth. Da Mata et al. (2007) estimate the determinants of city growth in Brazil during 1970 and 2000 and also include initial human capital, a proxy for market potential, initial population, change in rural population and income among the regressors. They find that urban population growth decreases with rural income opportunities and intercity transport costs and increases with market potential for goods and labour force quality.

Estimation of Model 1, where the dependent variable is *growth_urban*, shows that minimum wage has a positive, statistically significant impact on urban population growth, as hypothesized. Our findings suggest that, controlling for other determinants of urban population growth, if the minimum wage had risen by one standard deviation (81.5 thousand *rupiah*, or 25 per cent of its initial mean value), the urban population would have risen by 0.4 per cent from its initial value.

We also find evidence of mean reversal in urban population growth: initial urban population is negatively signed and strongly significant. Urban population also grows faster in local jurisdictions with larger rural populations. Moreover, initial rural income does not seem to affect urban population growth, while initial urban income is significant and positively signed. Initial urban income at the provincial level, excluding the reference district (weighted by population in each district within the province), does appear to deter urban population growth in the reference district. This suggests that districts with rich neighbours tend to urbanize at a slower pace, most probably because its residents may be attracted to cities in neighbouring districts. The same applies across provinces (adjusted for distance), but the parameter estimate is not statistically significant.

As for the pull effects associated with urban amenities, the regression results suggest that infrastructure development in rural areas is associated with urban population growth in the same district. This might indicate that a minimum level of infrastructure development is needed in rural areas to support migration to the cities. Differentials in the stock of amenities within the province where the reference district is located, as well as across provinces, do not seem to affect urban population growth in the reference jurisdiction.

Finally, two of the three metropolitan-area dummies are positively signed and statistically significant, suggesting that urban population growth in the jurisdictions located within the Jakarta and Yogyakarta metropolitan areas (*metropolitan1* and *metropolitan2*, respectively) indeed grow faster than those outside these urban centres. As for the dummy variable identifying the local governments located in the oil/gas-rich provinces (*oil_provinces*), the results suggest the urban population growth has actually slowed in these jurisdictions.

Estimation of Equation (6) using rural population growth as the dependent variable (Model 2), confirms the finding that minimum-wage setting does not seem to affect the rural population growth, as hypothesized. This finding lends credence to our identification hypothesis that minimum-wage setting does not affect the earnings distribution of informal sector workers. In addition, the parameter estimates suggest that the higher the initial rural population the lower the change in rural population growth. A higher stock of urban and rural infrastructure, as well as rural infrastructure in provinces other than that where the reference jurisdiction is located, seem to decrease rural growth. As for income effects, rural and urban income in the reference jurisdiction do not seem to affect rural population growth. The effects of income in neighbouring jurisdictions within the same province and across provinces do not show a clear pattern. Belonging to the Yogyakarta metropolitan area or the oil/gas-rich provinces is associated with lower rural population growth.

4.2 Robustness checks

Table 5 reports the results of robustness checks on the baseline specification (Model 1 of Table 4), where the dependent variable is the growth of urban population. In order to test for the possibility of nonlinear effects in the relationship between urbanization and income/decentralization (Davis and Henderson 2003), the square of rural and urban income was included among the regressors (Model 1). These variables turned out not to be statistically significant at classical levels. The finding is robust to including one squared variable at a time.

We also experimented with including rural population growth and the change in rural income during the period 1996-2004 among the regressors (Model 2). It seems that neither of these variables captures omitted mechanisms influencing changes in urban population. Inclusion of these variables does not change the baseline results in a qualitative manner.

Finally, we added an additional regressor to capture the effect of shifting patterns in economic activity between urban and rural areas: the ratio of per capita value added in labour-intensive versus non-labour intensive manufacturing firms (Model 3). Labour-intensive sectors appear to be losing dynamism as a result of competition from neighbouring countries, such as Vietnam, in the production and exports of labour-

intensive goods, such as garments, textiles and footwear. Because labour-intensive industries are located predominantly in urban areas, this loss of dynamism is tantamount to an asymmetric shock to the urban economy. The variable *ratio_value_added* is computed for the manufacturing firms located in each district using industrial survey (*Survei Industri*) data. In any case, the variable does not seem to affect urban population growth in a statistically significant manner, although it is negatively signed, as expected.

Table 5
Robustness checks
(Dep. var.: Change in urban population during 2004-1996)

	Model 1	Model 2	Model 3
delta_MW	0.0020***	0.0022***	0.0035***
	(0.000)	(0.000)	(0.000)
squared_urban_income	0.0000		
	(0.607)		
squared_rural_income	-0.0000		
	(0.705)		
growth_rural		0.0860	
		(0.321)	
delta_rural_income		-0.0000	
		(0.368)	
ratio_value_added			-15.2234
			(0.581)
Constant	-1,147.6868**	-1,280.8699***	-1,940.2825**
	(0.017)	(0.004)	(0.013)
Observations	215	202	106
R-squared	0.785	0.787	0.840

p values in parentheses. All other regressors are included. *** p<0.01, ** p<0.05.

5 Conclusions

This paper contributes to a growing strand of empirical literature on the effects of institutions, including federalism, on urbanization. Indonesia went through a major fiscal decentralization reform in 2001, which devolved the responsibility of setting the minimum wage to the provinces and local governments. We used this feature of the Indonesian decentralization experience to test whether or not, and, if so, the extent to which, decentralized minimum-wage setting has had a bearing on urban population growth through its effects on urban-rural differentials in income and the stock of amenities. To do so, we constructed a dataset using information available from Indonesia's labour market, industrial and household surveys and treated the local governments as the units of observation. Because minimum-wage provisions are not enforced in rural areas, we make the identifying assumption that the change in minimum-wage setting brought about by decentralization has affected urban-rural income differentials through its impact on urban income. Our main finding is that minimum-wage hikes are associated with faster population growth in urban areas, while having no impact on the growth of rural population.

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Appendix

VARIABLE DEFINITION

Variable code	Source	Description
growth_urban	Sakernas	Urban population in 2004 *minus* urban population in 1996
growth_rural	Sakernas	Rural population in 2004 *minus* rural population in 1996
delta_MW	Sakernas	Minimum wage in 2004 *minus* minimum wage in 1996
n_urbans96	Sakernas	Number of urban respondents in 1996
n_rurals96	Sakernas	Number of rural respondents in 1996
low_education96	Sakernas	Percentage of population with no schooling or at most primary education in 1996
young_population96	Sakernas	Percentage of population aged 10-24 in 1996
urban_income	Susenas	Mean monthly income of urban population in 1996 (1 unit = 100 *rupiah*). As Susenas only reports household income, household income (which includes wage/salary, income from agriculture and non-agriculture activities) was divided by the number of household members
rural_income	Susenas	Mean monthly income of rural population in 1996 (1 unit = 100 *rupiah*). As Susenas only reports household income, household income (which includes wage/salary, income from agriculture and non-agriculture activities) was divided by the number of household members
urban_infrastructure	Susenas	Index of district-level urban infrastructure in 1996, obtained as the principal component of the following 4 indicators: shares of households with electricity (PNL and non-PNL), with private drinking water facility, with pipe or pump as a source of drinking water, and with private toilet facilities
rural_infrastructure	Susenas	Index of district-level rural infrastructure in 1996, which is the principal component of the following 4 indicators: shares of households with electricity (PNL and non-PNL), with private drinking water facilities, with pipe or pump as a source of drinking water, and with private toilet facilities
provincial_urban_income	Susenas	Average *urban_income* for all districts in the same province (excluding the reference district, weighted by total population in 1996)
provincial_rural_income	Susenas	Average *rural_income* for all districts in the same province (excluding the reference district, weighted by total population in 1996)
provincial_urban_infrastructure	Susenas	Average *urban_infrastructure* for all districts in the same province (excluding the reference district, weighted by total population in 1996)
provincial_rural_infrastructure	Susenas	Average *rural_infrastructure* for all districts in the same province (excluding the reference district, weighted by total population in 1996)

continues

VARIABLE DEFINITIONS (con't)

Variable code	Source	Description
external_urban_income	Susenas	Indicator of 1996 urban income in all provinces (excluding the reference province, weighted by total population in 1996), computed in the following way: *first*, for each province mean *urban_income* over all districts is computed (1 unit = 1 *rupiah*), with weight equal to the total district population in 1996. Then, for each province *p* we computed the sum of all other provinces' mean *urban_income* dividing each term of the sum by the geographical distance (in km) between the capital of province *p* and the capital of the province whose income is represented. All districts in the same provinces have the same value of *external_urban_income*
external_rural_income	Susenas	Rural income in 1996 in all other provinces by geographical vicinity, computed with the same procedure as *external_urban_income*
external_urban_infrastructure	Susenas	Urban infrastructure in 1996 in all other provinces by geographical vicinity, computed with the same procedure as *external_urban_income*
external_rural_infrastructure	Susenas	Rural infrastructure in 1996 all other provinces by geographical vicinity, computed with the same procedure as *external_urban_income*
metropolitan1	Sakernas	Dummy equal to 1 for the entire province of DKI Jakarta, and the districts of Bogor, Bekasi, Karawang and Purwakarta in the province of Jawa Barat, and 0 otherwise
metropolitan2	Sakernas	Dummy equal to 1 for the districts of Bantul, Sleman and Yogyakarta in the province of DI Yogyakarta, and 0 otherwise
metropolitan3	Sakernas	Dummy equal to 1 for the districts of Malang, Sidoarjo, Jombang, Gresik and Surabaya in the province of Jawa Timur, and 0 otherwise
oil_provinces	Sakernas	Dummy equal to 1 for the districts in the provinces of Aceh, Riau, East Kalimantan and Papua, and 0 otherwise
squared_urban_income	Susenas	*urban_income*urban_income*
squared_rural_income	Susenas	*rural_income*rural_income*
delta_rural_income	Susenas	Rural income in 2004 *minus* rural income in 1996
ratio_value_added	SI	Ratio of mean value added per worker in textiles, clothing and footwear to mean value added per worker in all other manufacturing sectors in each district