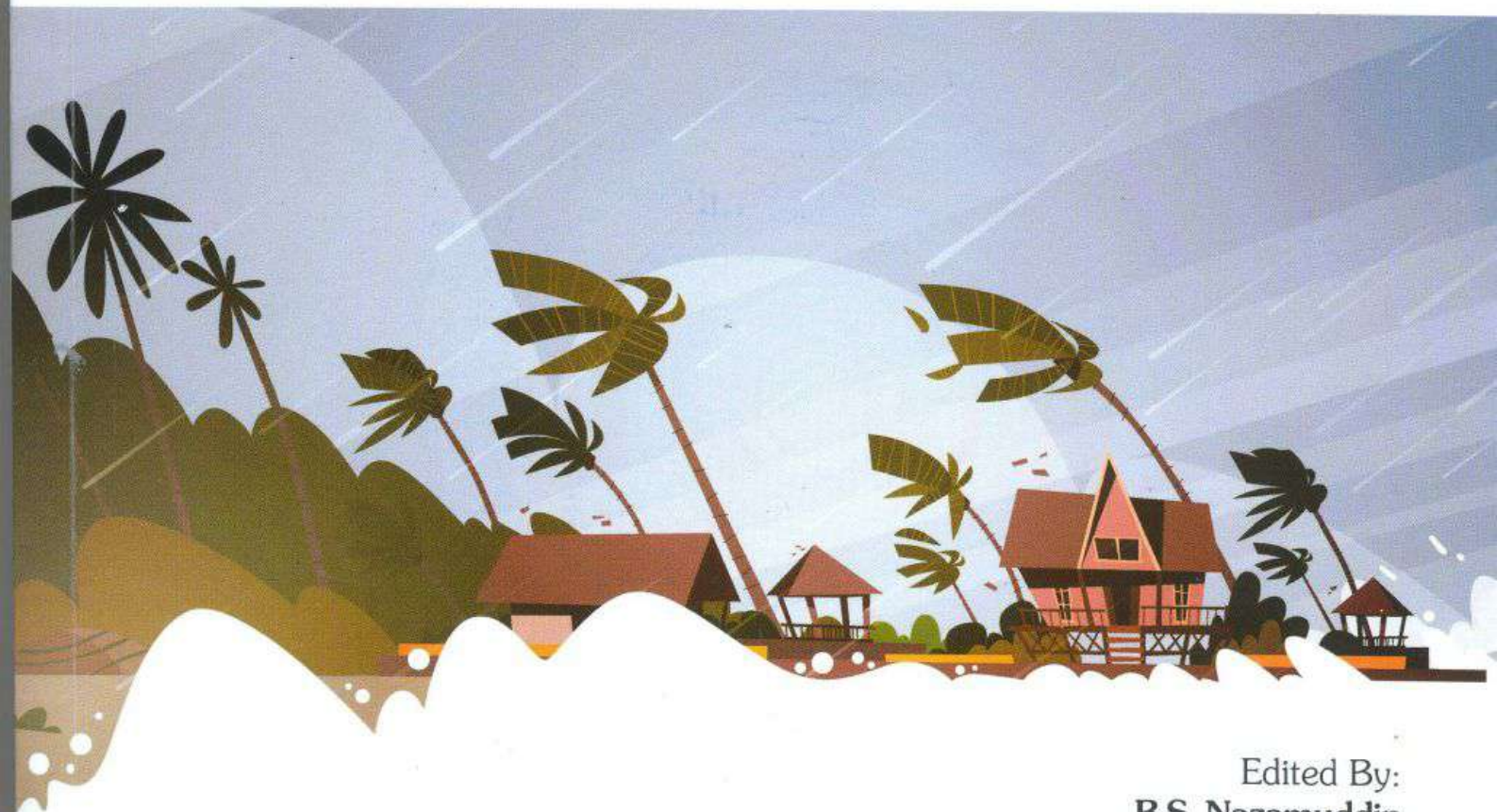




Disasters and Regional Development in Indonesia



Edited By:
B.S. Nazamuddin
Saiful Mahdi
Cut Dewi
M. Saleh Sjafei
Alin Halimatussadiah
Djoni Hartono
Devanto Pratomo
Hefrizal Handra
Budy P. Resosudarmo

DISASTERS AND REGIONAL DEVELOPMENT IN INDONESIA

Edited by:

B.S. Nazamuddin
Saiful Mahdi
Cut Dewi
M. Saleh Sjafei
Alin Halimatussadiyah
Djoni Hartono
Devanto Pratomo
Hefrizal Handra
Budy P. Resosudarmo



DISASTERS AND REGIONAL DEVELOPMENT IN INDONESIA

Penulis:
Indonesia Regional Science Association

Editor:
B. S. Nazamuddin, dkk

Design Sampul:
Arief Anshory Yusuf (gambar dari shutterstock.com)

Tata Letak:
Affandia Bimantara

Proofreader:
Lilies Achmadi

Diterbitkan oleh:

Perkumpulan Ilmu Regional Indonesia (IRSA)
Sekretariat IRSA, Jl. Cimandiri No. 6 Bandung 40115
West Java - Indonesia
Email: *info@irsa.or.id*

ISBN 978-623-94282-0-4

Cetakan pertama, Juli 2020



Hak Cipta dilindungi Undang-Undang.

PART III. HUMAN CAPITAL

- Chapter 7.** Comparative Analysis of Healthcare Service Quality across Regions in Indonesia 139
Muhammad Mulia, Amirusholihin and Edy Purwanto
- Chapter 8.** Impact Evaluation of Indonesia's National Health Insurance: Data Analysis of the Indonesia Family Life Survey 2007 and 2014 159
Felix Wisnu Handoyo
- Chapter 9.** The Influence of Amenities Contribution on Wages and Rents Differentials in Indonesia 189
Gidion P. Adirinekso, N. Haidy A. Pasay, Diah Widyawati and Teguh Dartanto

PART IV. RURAL DEVELOPMENT AND THE ENVIRONMENT

- Chapter 10.** The Impact of Mobile Phone on Farmers' Productivity in Indonesia 213
Rodhiah Umaroh and Evi Noor Afifah
- Chapter 11.** Stakeholders' Perception on Regional Peatland Ecosystem Planning in Central Kalimantan, Indonesia 231
Rizky Januar and Eli Nur Nirmala Sari

LIST OF CONTRIBUTORS

Ahmad TAUFIK

Consultant
The Asia Foundation Indonesia, Jakarta.

Alam Surya PUTRA

Deputy Director
Environmental Governance
The Asia Foundation Indonesia, Jakarta.

Alin HALIMATUSSADIAH

Lecturer
Department of Economics
Faculty of Economics and Business
Universitas Indonesia, Depok.

Amalia Adininggar WIDYASANTI

Senior Advisor to the Minister for Economy and Financing
Ministry of National Development Planning/BAPPENAS, Jakarta.

Amesta RAMADHANI

Researcher
Resilience Development Initiative, Bandung.

AMIRUSHOLIHIN

Researcher
SurveyMETER, Yogyakarta.

B.S. NAZAMUDDIN

Lecturer
Faculty of Economics and Business
Universitas Syiah Kuala, Banda Aceh.

Bertha Fania MAULA

Graduate Student
Faculty of Business and Economics
The University of Melbourne, Melbourne.

Budy P. RESOSUDARMO

Professor
Arndt-Corden Department of Economics
Crawford School of Public Policy
Australian National University, Canberra.

Catur SUGIYANTO

Professor
Faculty of Economics and Business
Universitas Gadjah Mada, Yogyakarta.

Cut DEWI

Executive Director
International Centre for Aceh and Indian Ocean Studies
Universitas Syiah Kuala, Banda Aceh.

Devanto PRATOMO

Professor
Faculty of Economics and Business
Brawidjaya University, Malang.

Diah WIDYAWATI

Lecturer
Department of Economics
Faculty of Economics and Business
Universitas Indonesia, Depok.

Diana SETIYAWATI

Lecturer
Centre for Public Mental Health (CPMH)
Faculty of Psychology
Universitas Gadjah Mada, Yogyakarta.

Djoni HARTONO

Lecturer
Department of Economics
Faculty of Economics and Business
Universitas Indonesia, Depok.

Edy PURWANTO

Researcher
SurveyMETER, Yogyakarta.

Eli Nur Nirmala SARI

Peatland Restoration Technical Expert
World Resources Institute Indonesia, Jakarta.

Erman A. RAHMAN

Senior Program Director
The Asia Foundation Indonesia, Jakarta.

Evi Noor AFIFAH

Lecturer
Faculty of Economics and Business
Universitas Gadjah Mada, Yogyakarta.

Felix Wisnu HANDOYO

Graduate student
Economics Department
College of Arts and Sciences
State University of New York (SUNY), Buffalo.

Gidion P. ADIRINEKSO

Lecturer
Faculty of Economics and Business,
Universitas Kristen Krida Wacana, Jakarta.

Hefrizal HANDRA

Lecturer
Faculty of Economics and Business
Andalas University, Padang.

Hengki Eko PUTRA

Flood Risk Analyst
P.T. Reasuransi, Bandung.

Herryal ANWAR

Researcher
Resilience Development Initiative, Bandung.

Ichsan HAFIZ

Researcher
Resilience Development Initiative, Bandung.

Iis ISKANDAR

Policy Analyst
Center for Macroeconomic Policy
Fiscal Policy Agency, Ministry of Finance, Jakarta.

Joko Tri HARYANTO

Researcher
Fiscal Policy Agency, Ministry of Finance, Jakarta.

Mochammad Firman HIDAYAT

Senior Staff
Directorate for Macroeconomic Planning and Statistical Analysis
Ministry of National Development Planning/BAPPENAS, Jakarta.

Muhammad MULIA

Researcher
SurveyMETER, Yogyakarta.

Muhammad Saleh SAFEI

Associate Professor
Department of Law and Society
Faculty of Law
Universitas Syiah Kuala, Banda Aceh.

Mustika Septiyas TRISILIA

Graduate student
Faculty of Economics and Business
Universitas Gadjah Mada, Indonesia.

N. Haidy A. PASAY

Professor
Department of Economics
Faculty of Economics and Business
Universitas Indonesia, Depok.

Rizky JANUAR

Researcher
World Resources Institute Indonesia, Jakarta.

Rodhiah UMAROH

Graduate student
Faculty of Economics and Business
Universitas Gadjah Mada, Yogyakarta.

Rudi HANDOKO

Senior Researcher
Center for Macroeconomic Policy
Fiscal Policy Agency, Ministry of Finance, Jakarta

Saiful MAHDI

Researcher
Survey and Policy Analysis Research Group (SPARG)
Department of Statistics
Universitas Syiah Kuala, Banda Aceh.

Saut SAGALA

Lecturer and Researcher
School of Architecture, Planning and Policy Development
Bandung Institute of Technology, Bandung.

Teguh DARTANTO

Lecturer
Department of Economics
Faculty of Economics and Business
Universitas Indonesia, Depok.

Yuna FARHAN

Indonesia Country Manager
The International Budget Partnership, Jakarta.

The Influence of Amenities Contribution on Wages and Rents Differentials in Indonesia

Gidion P. Adirinekso, N. Haidy A. Pasay, Diah Widyawati and Teguh Dartanto

INTRODUCTION

Wage differences have been a long-standing concern in the field of labour economics, as the full comprehensive range of research on this topic, had been conducted in many countries. The concern includes some factors to explain the wage differences. For example, the research using individual data in France (Combes et al. 2008), in Portugal (Pereira & Galego 2014), in America (Roback 1982, 1988; Beeson and Eberts 1987; Kemeny and Storper 2012; Graves 2013).

Roback (1982) explains the local amenities' role in wage differences as well as rent differences across workers. Her framework becomes the primary reference for many empirical studies on hedonic wage and rent differentials (Beeson dan Eberts 1987; Hoehn, Berger and Blomquist 1987; Deller 2009). These empirical studies confirm that amenities determine hedonic wage and rent differentials and also provide evidence of workers choosing to locate within an area with a better quality of life while having lower wages. Indonesia, as an archipelagic country having diverse public facilities or infrastructures, may have another explanation about wages differential.

Few studies have examined the -issue of regional wage differentials (Huang and Chand 2015; Deller 2009; Wu and Gopinath 2008; Combes et al. 2008). Huang and Chand (2015) provide an empirical evidence that there were spatial dependencies of provincial wages in the U.S. Meanwhile. Deller (2009) and Wu and Gopinath (2008) empirically find that amenities contribute to explaining wage variation across counties in the U.S. According to Combes et al. (2008), the spatial wage differences in France are due to the spatial differences in

the composition of the work for skill, the regional interactions between workers and firms, and their amenities. It becomes interesting to explain wage differential in Indonesia, as we know wages set by the regional government and the local government will coordinate with their neighbour to set local wages.

Indonesia is one of the Asian countries that have the fastest urbanisation growth from 1970 to 2010 (Samad 2012). The increasing proportion of the urban area is not only due to migration but because of the changing urban definition. The current urban definition closely linked to the growth of amenities.¹ The urban area is one of our concerns because they have complete and distributed infrastructure or public facilities. Then there is the possibility the urban amenities can explain the differences in wages and rents in Indonesia.

The data shows that the average of real wage has increased from IDR1,412,911 in 2008 to IDR2,272,244 in 2014 while the standard deviation has been tremendous from IDR434,902.7 to IDR880,451.3 during that period. The local land prices have also increased due to regional development. As land price reflected in housing prices, the data shows that the average monthly housing rent per m² has increased from IDR185,588 in 2008 to IDR452,708 in 2014, and the variation of regional monthly housing rent is getting wider from IDR166,904 in 2008 to IDR264,759 in 2014. As both wages and rents are factor prices, the correlations (0.56) between them indicates that labour and land market are related even small. A study in urban areas shows an increasing 10% minimum wage induces housing rents 1%-2% increase in the United States and 2.5%-5% increase in Japan (Yamagishi 2019).

As a mobile factor, workers choose the location to work and live in and may compensate for having a low wage for a better-quality living condition or better public facilities that require higher housing prices. Spatial differences in factor prices reflect spatial differences in the regional composition of workers' skills and the endowments (amenities) that only affect workers' decisions but also firms' decisions on hiring workers. An interaction between workers and firms that can increase the productivity of workers (Combes, Duranton, and Gobillon 2008)

With various site-specific characteristics in infrastructure or public facilities across Regencies/Cities (Kabupaten/Kota) in Indonesia, the study in this chapter provides empirical evidence on the role of amenities to explain regional wage and rent variation. Following (Huang & Chand 2015), the study in this chapter controls the spatial effect on both wage and rent equation to avoid possible biased results.

¹ Definition of urban area in Indonesia has three aspects: (1) population density; (2) households engaging in the agricultural sectors; and, (3) urban facilities and physical distance to reach them. The urban facilities become important, because population de-concentrating phenomenon in major cities in Indonesia (Samad, 2012)

Amenities defined in terms of infrastructures for urbanized regions (Hoehn et al. 1987). These include infrastructure for health (facilities and health workers), education (general and specific education), housing and environment (housing-infrastructure, housing environment), infrastructure (roads and accessibility to capital regency), economic (economic facilities), and socio-culture (entertainment and sports facilities). Urban amenities are decomposed into several indexes to capture each type of amenities. We use 231 Kabupaten/Kota that fall into a category of the urbanised region as more than 30% of the population lives in urban areas.

This chapter finds that urban amenities statistically have an association with regional wages and rents in the spatial model. Accessibility and commercial facilities have positive impacts on local wages. Their association on wages is larger, more significant when the spatial effect imposed on the model. In the land market, this study shows that commercial facilities have a positive association with regional housing rent. However, accessibility and entertainment facilities negatively affect housing rent.

This chapter contributes to the regional study in Indonesia by providing empirical evidence for the role of urban amenities in determining factor prices, especially at the municipality level. This result implies that providing better amenities for urbanised regions increase not only the productivity of workers but also increase housing rent. The government should consider spreading the location of public amenities to avoid a massive gap in wage and rent across regions. The study in this chapter also corrects previous studies by including spatial effect, because, without spatial effect, the coefficient of amenities will be underestimated.

The remaining parts in this chapter will be organized as follows: section two reviews some researches on the role of amenities on wages and rents differentials; section three describes the research methodology; section four discusses the main findings, and the last section is the conclusion.

ROLE OF AMENITIES ON WAGES AND RENTS DIFFERENTIALS

This literature review will explain two development of amenities role on wages in the labour market and rents in the housing market theoretically and empirically. After that, it will explore the contribution of the spatial effect of amenities on wages and rents.

Few theoretical studies explain that amenities determine the hedonic wage and rent (Roback 1982, Beeson and Eberts 1987, Hoehn, Berger and Blomquist 1987, Deller 2009). Roback (1982) introduces the role of amenities

in determining wage and rent differentials across workers. Amenities affect worker's utility as well as the cost of the firms. Roback predicts that better amenities will lower wages if the worker is willing to compensate for a better location to live. The impact of amenities on the rent, however, is still ambiguous. Beeson and Eberts (1987) provide a more precise explanation of the Roback model in explaining factor price differences. They differentiate region from having high (low) amenities if the site-specific characteristics create high (low) rent and low (high) wage, and the region has high (low) productivity if the site-specific characteristics can create high (low) wages and high (low) rent.

Deller (2009) extends Roback (1982) by including unemployment to reflect that amenities also have an impact on unemployment. Great amenities in a rural area may experience higher growth and lower wages, higher rents, and higher unemployment. It implies that workers may choose a place with better amenities to increase their utility, and as a consequence, should pay higher rent and receive a lower wage. It is possible for workers even if they want to unemployed to enjoy amenities in their region temporarily. Unfortunately Deller (2009), unclear to explain theoretically how the connection between wages, rents and unemployment regarding the contribution of amenities.

Most empirical studies confirm that amenities can determine wages and rent differentials. Roback (1982, 1988) provides empirical evidence that confirms her theoretical prediction using individual data in the United States. The higher the quality of amenities, the lower the wage received by workers. The higher the quality of amenities, on the other hand, the higher the rent paid by workers. She used natural amenities, like heating degree days, total snowfall, number of cloudy days, and number of bright days.

Beeson and Eberts (1987) empirically estimate hedonic wage and rent equations for a sample of the metropolitan area in the U.S.A. Site-specific characteristics, geographic and climatic characteristics, may increase or decrease the comfort of living for workers as well as increase or decrease the productivity of the firms. Site-specific characteristics have high (low) productivity reflected by high (low) wages and rents. While site-specific characteristics with high (low) amenities have high (low) rent and low (high) wages.

Hoehn, Berger, and Blomquist (1987) and Blomquist, Berger, and Hoen (1988) use worker's data in the U.S. and show that the impact of amenities to wage and rent differentials still exists. Amenity variables in their studies include the climate and environmental conditions as well as intraurban structures. A climatic condition covers sunshine, precipitation, humidity, wind speed, heating degree days, cooling degree days, and coast. Meanwhile environment includes total suspended particulate, visibility, water pollution discharges, superfund sites, landfill waste, and hazardous waste disposal sites. Intraurban conditions include central city, teacher-pupil ratio, and violent crime rate.

Other studies use aggregate data on estimating regional wages. Wu and Gopinath (2008) use county-level data in the U.S.A. and find that amenities contributed 3.8% in explaining spatial wage variation across counties, and 36.7% in explaining rent spatial variation across counties. They employ natural amenities index and remoteness index to measure specific location characteristics. Natural amenities index is based on six factors: warm winter (average January temperature), winter sun (average number of sunny days in January), temperate summer (low winter-summer temperature gap), summer humidity (low average July humidity), topographic variation (topography scale), and water area (water area proportion of total county area). The remoteness index as representative of location characteristics measures adjacency to metro areas. It takes the lowest value (one) for metro counties with at least one million people and the highest value (eight) for counties that are the most isolated. Combes, Duranton, and Gobillon (2008) empirically prove that in France, spatial wage differences are the result of differences in amenities (seaside, lake, mountains, and architectural heritage). Their estimation results, however, show that amenities has a small role in explaining wage differences. Deller (2009) provides evidence for rural areas. He employs proxies for amenities indices constructed from 59 separate variables are compressed into nine amenity indices. They including measures to describe camping opportunities in the county, clubs such as golf courses and tennis clubs, coastal characteristics, climate, tourism opportunities broadly considered, water characteristics associated with rivers, the terrain of the county, the presence of tour operators and, finally, a measure to capture skiing opportunities. His result provides the ambiguous effect of amenities as signs of amenity variables be inconsistent.

None of the empirical studies above, taking into account the presence of a spatial effect in determining regional wage. Ross (1947), provide an argument that the aspect of spatial interaction is foremost essential in estimating hedonic wage. He stated:

“Buyers and sellers in the labour market meet within a geographic area, but the price that shows the exchanges occurring is often determined by the economic actors of hundreds of kilometers without the necessary knowledge.”

This quote illustrates the importance of wage comparisons in the wage bargaining process, but it also provides a possible explanation for the impact of wages among regions. This view has been supported by some studies that explain regional wage determinants that have included spatial framework (Driffield & Taylor, 2006; Pereira and Galego 2014; Huang and Chand 2015;

Hiller & Lerbs 2015). Driffield and Taylor (2006) estimate that wage spill over in the U.K. They find that wage in neighboring regions has an impact positively on domestic wage. Pereira and Galego (2014) do empirical studies in Portugal. Their findings show that differences in wages surrounding the region explain a positive regional wage differential. Huang and Chand (2015) investigate the impact of spatial interaction on local wages at the provincial level in China. Their study shows that wages in neighborhood regions determine wages in the local region positively. Hiller and Lerbs (2015) find that regional non-market attributes or amenities across German area explain wage and rent differences after controlling spatial wage spill over

On the other hand, a few studies show amenities has a significant impact on housing price controlling with spatial effect (Du & Huang 2018; Wang et al. 2017; Hui & Liang 2016; Wen, Zhang, & Zhang 2014; Brady 2014). Du and Huang (2018) show that there was a spatial and temporal effect of urban wetland on house prices. Ignoring the spatial and temporal aspects will result in biased estimates. Wang et al., (2017) confirm the existence of spatial dependence of housing prices using a spatial lag and spatial error models. Hui & Liang (2016) conducted a study to investigate spatial spill over effects of urban landscape and accessibility of amenities at property prices. Their study shows that spatial effect corrects the impact of amenities on property prices. Wen, Zhang, & Zhang (2014) also show that the effect of amenities on housing prices in Hangzhou is lower after correcting the rent spatial effect. The omitted variable bias exists in the regional hedonic price model when the spatial effect excluded. Brady (2014) shows a spatial diffusion of local home prices in the U.S. House prices at a regional level in a state will be affected by price shocks occurring in the surrounding states.

We summarize that amenities explained wages and rent differentials among workers and also among regions that are even small. The theoretical and empirical approaches have been used to conduct the studies. The study in this chapter is also introducing a spatial effect at the regional level. Due to free labour and capital movement across regions, the correlation between amenities and regional input prices should take into account the spatial effect in input prices; otherwise, the estimates could be biased. In this chapter, therefore, we control the spatial effect of input prices in estimating the effect of amenities on input prices.

Empirical Model

Regarding the Roback framework (Roback, 1982) and the clear explanation by Beeson and Eberts (Beeson, Patricia E; Eberts, 1987), the labour market closely related to the housing market. This relationship also shown by Deller (Deller, 2009), who used a simultaneous equation system. The empirical model to demonstrate the simultaneous equation system that relates labour and land market equilibrium refers to Kalejian and Prucha (2004), who explicitly consider the inter-district spatial interrelation. The general form of spatial hedonic equations in labour and housing markets are:

$$y_i = \rho \sum_{i=1}^n W_{i,i} y_i + \sum_{r=1}^k X_{i,r} \beta_r + \varepsilon_i \quad (1)$$

Note: this general form of equation used in the labour market and housing market. The explanation is shown in Table 1.

Table 1. The Notation Used in This Paper

Variable	Definition	Variable	Notation
β	K-by-1 vector of regression coefficients	w	n - by - n neighbourhood matrix that accounts for the spatial relationships (dependencies) among the spatial data
X	n - by k matrix of observations on the explanatory variables.	$\sum(\cdot)$	Summation operation on a matrix/vector
k	Number of features	ε	n-by-1 vector of unobservable error.
n	Problem size (number of observation)	y	n - by - 1 vector of observations on the dependent variable. The wages for the labour market equation and the rents for the land market equation
ρ	The Spatial Autoregression (autocorrelation) parameter	t	It is for time by t to k.
i to n	It is the label of district 1 to n.	$\bar{y}_{i,n}$	Endogenous variable
J	It is the label of the neighbourhood of district i.	$-W_{i,j} y_j$	Spatial lag of y

In the spatial analysis, what happens in a region is related to what is happening in the neighbouring regions. As stated by the geographer, Alvin Tobler's "second law of geography" everything is connected to everything else, but things more closely connected are more related (Waters, 2013). In other words, the phrase means that there is a spatial correlation that occurs between regions. Alternatively, it means that what happens at some point in time can be influenced by the present and the future. Therefore, it is necessary to test whether there is a spatial problem or not by using Moran I test (Anselin 1999; Anselin, Gallo & Jayet 2008).

This chapter uses SAR Model.² The model states that the dependent variable y in region j depends on the variable y in the neighboring region. From various models of spatial econometrics, the best fits of this research is the Simultaneously Spatial Autocorrelation Regression (SAR) model.

$$w_i = \rho \sum_{r=1}^n W_{ir} w_r + \sum_{r=1}^k X_{ir} \beta_r + \varepsilon_i \quad (2)$$

$$r_i = \rho \sum_{r=1}^n W_{ir} r_r + \sum_{r=1}^k X_{ir} \beta_r + \varepsilon_i \quad (3)$$

These two equations explain the relationship between the labour market and the housing market because each equation has an independent variable as a dependent variable in another equation, with some other independent variables on each market. The symbol w on equation (2) represents wages in the labour market, and r on equation (3) represents rents in the land market. Equation-1, as a general equation, will apply to the labour and land markets. Equation-2 explains some factors of wages in the labour market in which it includes the wages in their neighbourhood region, health facility, health worker, general education, vocational education, roads, accessibility, unemployment rate, school year, turnover, unconverted land, employed, income, and openness as independent variables. Meanwhile, Equation-3 explains some factors in the land market which included the rents in their neighbourhood region, housing infrastructure, housing environment, road, accessibility, commercial, economic facility, entertainment facility, and sports facility as independent variables in the land market.

Variables and Data Sources

This chapter uses two-factor prices, which are wage and house rent, as dependent variables. House rent proxies for the land price, as reliable data for the land price, is not available. As housing prices and land prices have an

endogenous interrelationship (Wen & Goodman 2013), house rent can represent land prices. The wage for each regency is constructed from the individual wage of those who work as an employee. Using the available weights, we calculate the average monthly nominal wage for each district.

The average monthly nominal wage then converts to real wages by referring to 2010 as the base year. Rent variable is constructed from household spending on renting houses per m² per month. The average nominal rent of houses per square meter for the regency³ level is generated by using existing weights. The average nominal rent converts both wage and rent withdrawn from Susenas 2008, 2011, and 2014 data accordingly. The independent variables can be described as follows:

Spatial Effect

Spatial data is constructed using *weighted matrix*. This matrix represents the neighbourhood of region *i*. A group of regions around the Regency I are formed using a matrix weighting type of spatial data region (LeSage, 1999). Spatially weighted matrices for Region I are constructed using the contiguity approach. This chapter employs Queen Contiguity, as illustrated in Figure 2, in which Region X considers both common vertex and the common border of Region X. In this case, the common vertex of X is, a, b, c, and d, while the common border of Region X is 1,2,3 and 4.

Figure. 2. Queen Contiguity

a	1	b
4	X	2
d	3	c

Queen Contiguity is constructed from maps of regency in Indonesia 2008⁴ using Geoda software. Queen Contiguity will define spatially weighted matrices that will be used in the spatial model.

² Selected from three main models in spatial econometric: Spatial Durbin Model (SDM), Spatial Autoregressive Model (SAR), and Spatial Error Model (SEM).

³ In this study terms of 'regency' will use interchangeably with Kabupaten. Kabupaten is a specific terminology for regency level in Indonesia.

Amenities

Different from the previous studies⁵, which use geographic conditions, climate, and environmental conditions, this study refers to amenities as intraurban structures (Hoehn et al. 1987). We construct several indexes to capture all types of amenities that characterize urban structures, which include health, education, housing and environment, infrastructure, economic, and social culture. The Principal Component Analysis method is used following the standard method used by the OECD.⁶ We use data from PODES to construct amenities indexes. Some urban characteristics used to classify a region as an urbanized region. All data are available at the village level and aggregated into the regency/district level.

Health amenities consist of health facility and health service indexes. (Schumacher & Whitehead 2000; Deller 2009). Index for health facility is constructed using variables: number of hospitals, health clinics, drugstores, puskesmas, and pharmacies. The health service index is developed using variables: the number of doctors, midwives, and paramedics. Regions with higher health indexes are expected to have higher wages and rent, as more health facilities and services available the higher productivity due to better worker's health conditions and easy access to health providers.

Education amenities consist of general and vocational education facilities (Kemeny and Storper 2012, Albouy and Lue 2015; Deller 2009, Hand et al. 2008). General education in this study covers the availability of general education facilities, such as several kindergartens, elementary school, junior high school, senior high school, and academy or university level. Vocational education facilities represent a specific type of education facilities like vocational high school, and several courses such as language courses, computer courses, electronics courses, mechanics courses, welding courses, sewing courses, and beauty courses. More availability of education facilities is expected to have a positive impact on wages and rent, as firms can get better workers in regions with more access to education facilities, and workers are willing to pay more rent for easier access to education services.

² Shp file is downloaded from <http://www.info-geospasial.com/2015/10/data-shp-seluruh-indonesia.html>. Original shp at kabupaten level should modify to adjust the number of kabupaten to number of kabupaten in 2008.

⁵ Empirical testing to prove the role of amenities, especially natural amenities, in explaining the difference in wages and rent has been pretty much done (Rivera, 2016).

⁶ The amenities index is compiled using the OECD approach. The Principal Component Analysis (PCA) method is recommended in constructing composite indicators (OECD, 2008).

Housing index developed using variables: a source of electrical energy from the State Electricity Company, other Private Companies, and public lights in the neighbourhood of the residents. The availability of these services will induce higher rent due to better access to electricity and public goods. The housing environment index measures the environmental conditions of a regency. Variables used to construct the environment index are slum areas, riverbank areas, wetlands, and high voltage line areas. The higher the environment index, the less likely a household will live there due to adverse environmental conditions, which reflected with low rent.

Economic amenities are represented by a commercial facility index (Green 2001; Kemeny and Storper 2012; Sadayuki 2008; Cai and Liu 2015). Variables that are included in commercial facility index are the availability of modern markets, traditional markets, supermarkets, grocery stores, restaurants, and shops. Better economic amenities lead to higher wages and rent due to more convenient access to the market for both households and firms. They may lower prices for commodities due to reduced logistic costs for distributing consumer goods.

Infrastructure amenities consist of road quality index and accessibility index (Gyourko 1991; Wu and Gopinath 2008; and Rahadi et al. 2015). Index for road quality includes the availability of asphalt roads, stone paths, dirt roads, and other roads. The availability of roads will support the activities of workers and firms, as it is possible to move from one location to another within a district or across districts. Accessibility index is composed of the average travel time to the centre of economic activity in the district and the availability of roads that passed throughout the year without being hindered by weather or seasons. Districts with a better quality of the roads and easier access to mobile are more likely to have higher wages and rent due to more productive firms and the area's accessibility so that households are willing to pay higher rent.

The social culture index consists of an entertainment facility index and sports facility index (Kemeny and Storper 2012; and Shimizu et al. 2014). While the entertainment index formed using variables, the availability of cinemas, theatres, exhibition building, karaoke places. Sports index includes sport-related variables, which are the availability of soccer field, basketball, and volleyball courts. The presence of entertainment and sports facilities represents the dynamic life of urban areas – regions with a more productive life expected to have higher rents.

This chapter incorporates control variables to represent demand and supply-side effects in the labour and housing market. Besides amenities, these factors have also influenced the dependent variable in labour market or housing market, and they are divided into supply-side and demand side factors. Below are the variables:

Supply-Side Factors

In the labour market, unemployment rate, turnover, schooling years are defined as control variables from the supply side, as they influence labour supply. The unemployment rate is a percentage of the unemployed worker to labour forces. An increasing unemployment rate indicates more supply of labour and will lower market wages. The turnover variable is a percentage of workers who worked a year before and continue working for the current year. It indicates labour market stability in the Regency. Schooling years measures the quality of workers in a region. The longer the average education of workers indicates better quality of workers and leads to a higher wage. The data was collected from Sakernas data and constructed at the district level as a unit of analysis.

In the land market, house ownership, house quality, and unconverted land are the control variables from the supply side. House ownership variable is a percentage of households that have the house to all households. The house ownership variable is the percentage of the house that belongs to households. Qualities of a house in a region are proxied by floor, roof, and wall qualities. Meanwhile, floor quality is the percentage of houses with the broadest floor, which is not ceramic or granite. Roof quality is the percentage of houses in which the most extensive roof of the house is not built using concrete cement. Wall quality is the percentage of houses in which the most extensive wall of the house is not made of concrete cement. The higher the percentage, the lower the quality of the house, and it results in lower house rent. The unconverted land is the availability of land in a district that has not converted into business or residential areas. Regions with more availability of unconverted land are more likely to have lower rent.

Demand-Side Factors

Hired workers are the percentage of the labour force that is hired by firms. It proxies for the capacity of firms to absorb the labour force. Openness represents the demand for labour by industries that have a relation to the international market. Openness variable creates from real export value minus real import value. As a categoric variable, openness will be positive if the export is bigger than import, and 0 otherwise.

In the land market, higher income per capita will induce demand for housing. The income per capita created from total Product Domestic Regional Bruto (PDRB) at each regency level is divide by their total population. Regions with high density are more likely to have higher rent due to more

intense economic activities. In this case, density is measured by the number of population for every 1 km² at the regency level, whereas data on income per capita and density is collected from Statistics Indonesia or Badan Pusat Statistik (BPS).

Table 2. Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Amenities: Supply Side					
Health_Facility (0 - 20)	693	4.02	3.11	0.38	16.21
Health_Worker (0 - 20)	693	3.16	1.06	1.39	9.44
General_Education% (0 - 100)	693	0,14	0.09	0.00	0.66
Vocational_Education (0 - 20)	693	1.83	1.65	0.00	9.38
Housing_Infrastructure% (0 - 20)	693	2.92	0.65	0.78	4.57
Housing Environment% (0 - 20)	693	1.46	0.89	0.09	8.95
Amenities: Demand Side					
Road% (0 - 200)	693	1.78	0.75	0.19	5.06
Accessibility% (0 - 20)	693	2.94	0.80	0.36	5.48
Eco_Facilities% (0 - 20)	693	0.79	0.32	0.14	2.12
Entertainment Facility% (0 - 20)	693	0.55	0.36	0.00	2.28
Sport Facility% (0 - 20)	693	0.36	0.27	0.00	1.51
Control Variables					
Supply Side					
Urate (%)	693	5.88	3.39	.33	18.18
school_year (year)	693	7.40	1.76	0,17	12.02
Turnover (%)	693	67.48	14.97	15	99
Unconverted Land (%)	693	0.96	0.25	0.04	0.17
Ownership (%)	693	4.94	6.80	.009	18.51
Floor quality (%)	693	4.34	5.98	.008	19.21
Roof qualitym (%)	693	7.89	10.86	.013	24.50
Wall quality (%)	693	5.82	8.22	.007	23.29
Demand Side					
Ln wage (natural logarithm)	693	14.41	.32	13.30	15.19
Ln rent (natural logarithm)	693	12.66	.71	9.33	14.46
Employed (%)	693	44	5	25	55
Income (m. rupiah)	693	11.61	16.68	.37	178.62
Openess (dummy var)	693	.39	.48	0	1
Pop.Density (number of people)	693	1955	4231	2.32	42244

Source: Author, 2018.

RESULTS

Table 2 presents the results of two models *without spatial* and *spatial models*. A selection process to choose the best model refers to the significant value of L.M. Lag (Anselin), 6.0756, and L.M. Lag (Robust), 2.29e+07. Both of them are significant under 5%.⁷ It means that the spatial model is the best model to represent the behaviour of regional wage and rent.

The Role of Amenities

Education facilities have a positive impact on regional wage as more available education facilities can make more comfortable for a household to have access to education and it can give impact on the quality of labour (Barl-El 2006). Accessibilities and economic facilities explain wage equilibrium positively in the labour market. Lower travel costs can induce more economic activities for firms and households, and this will induce higher factor prices. Commercial facilities give opportunities for households and firms to interact more due to more availability of markets, shops, and stores. Firms can be more productive, and workers will locate in the regions with more open markets. Workers in regions with higher commercial facilities will get a higher wage, but at the same time, they have to pay higher rent.

In the land market, accessibilities, commercial facilities, and entertainment facilities are significantly determined by regional rent. Accessibility as a type of amenity in infrastructure has a minimal negative contribution to rent in the spatial model. It means that accessibilities increase worker utility but decrease the unit cost of firms. This interaction results in a small negative impact on rent. Workers get easier in moving from one location to another. Workers can work in a different place from where they live.

Unexpectedly, entertainment facilities harm regional rent. A region with a more significant number of entertainment venues, theatres, historic buildings, or theatrical venues tends to decrease the value of selling or renting houses. Workers may not look for a house with such characteristics, but they prefer regions with less intense dynamic life.

Commercial facilities have contributed positively to rent a house. It indicates that the existence of modern markets, supermarkets, grocery stores, and traditional markets provide opportunities for transactions between economic agents. It encourages workers to benefit from living in this area. Similarly, the company will get an excellent opportunity to open its business in the area. As the demand for shelters increases, the rent will also increase accordingly.

The Relationship between Wage and Rent

Labour and land markets have a healthy relationship. They are reflected in the significant coefficient of rent and wages in two different markets. The result is different from what hypothesized by Roback (1982). According to Roback, when natural amenities are available, then the relationships between wages and rentals should be negative. In equilibrium, regions offer wage and rent that exactly offset their natural advantage (natural amenities). We use amenities for an urban structure that provides comfort, convenience, or enjoyment or something that promotes smoothness of pleasantness in social relationships for sustainable communities. The development of urban amenities depends on regional development. Workers will look for regions with a better quality of amenities to live and work, and firms will provide wages higher to compensate for high rent along as those amenities can increase firms' productivity. Dependency between the labour and the land markets in this study is supported by the study conducted by Deller (2009) and Graves (2013).

The spatial effects correct the biased estimate of the rent variable in the wage equation. Without controlling the spatial effect, the coefficient of rent is smaller than with controlling spatial effect. It indicates the possibility of underestimation when one does not control for spatial effect when running a regression using regional data. However, it does not apply for wage variables in rent equations.

Other Determinants of Wage and Rent

An increasingly high unemployment rate will drive regional wages down. The consistency of the influence of the unemployment rate against the wages in the labour market support studies by Blanchflower and Oswald (2012, 1995, 2005). Schooling years have a significant positive impact on regional wage. The longer a worker enjoying education, the more productive workers and the higher the wages received.

The percentage of hired labourers and income per capita can explain the regional labour market significantly. Unfortunately, openness as a proxy for exposure to the international market has a significant negative effect on wages. Higher exposure on the international market causes a decrease in the level of wages, which indicates that as exporter regions, they compete with paying a lower wage (comparative advantage).

With regard to another role of control variables in the land market, as indicated in Table 4.1, the model included house ownership and housing quality to explain the behaviour of rent from the supply side. If the percentage of house ownership in a region increase, it will be followed by an increase

in the rent value for the worker. This result is confirmed by Arifin and Dale (2005). Quality of housing, as reflected by the quality of floor, roof, and wall, gave a reasonable explanation about the value of rents. If the quality of the wall decreases because it was built not from cement, the rent will decrease accordingly. It happened in some cities in Indonesia (Rahadi et al., 2015), the residential value in Onitsha, Nigeria (Uju & Iyanda, 2012), and the slum area in Indonesia (Brueckner, 2013).

From demand-side factors in the land market, we have an income per capita and population density. The income per capita significantly contribute to rent in the local land market but insignificant in the spatial model. Meanwhile, population density insignificantly causes rent, but the direction of the coefficient is in the right way. The insignificant impact from income per capita to rent in the local land market may be caused by the impact of spatial effect in the land market that is more strongly than the local income per capita. There is a possibility that per capita income in the area is not big enough to push people buying/renting a home or apartment above a rental price.

Table 2. Regression Result in Urbanised Regions

<i>Independent Variables</i>	<i>Without the Spatial Effect</i>		<i>With Spatial Effect</i>	
	Ln Wage	Ln Rent	Ln Wage	Ln Rent
<i>Spatial Effect</i>				
<i>wly_wage</i>			.0021** (2.58)	
<i>wly_rent</i>				-0.0019* (-1.93)
<i>Amenities</i>				
<i>Health Facility</i>	-0.0001*** (-4.20)		-0.0001 (-1.08)	
<i>Health Worker</i>	0.0000 (0.44)		-0.0000 (-0.43)	
<i>General Education</i>	0.0001*** (2.79)		0.0003*** (5.21)	
<i>Vocational_Education</i>	-0.0000 (-1.41)		-0.0000 (-0.23)	
<i>Housing_Infrastructure</i>		-0.0001 (-1.22)		-0.0000 (-0.44)
<i>Housing_Environment</i>		0.0000 (0.09)		-0.0000 (-0.68)
<i>Roads</i>	-0.0000	-0.0001	0.0000	0.0000

Independent Variables	Without the Spatial Effect		With Spatial Effect	
	(-0.14)	(-0.56)	(1.13)	(0.11)
Accessibility	0.0001*	-0.0003*	0.0001***	-0.0002***
	(2.29)	(-2.34)	(4.52)	(-3.53)
Economic/commercial Facility	0.0000	0.0001**	0.00001**	0.0001**
	(0.08)	(2.14)	(2.23)	(2.01)
Entertainment Facility		-0.0003***		-0.0003***
		(-5.09)		(-4.30)
Sport Facility		0.0001		-0.0000
		(0.22)		(-0.36)
Control Variables		(0.22)		(-0.36)
Supply Side In Labour or Housing Markets				
Ln rent	0.142***		0.521***	
	(3.40)		(6.85)	
Ln wage		0.966***		0.949***
		(4.36)		(12.64)
Unemployment rate	-0.0025		-0.0185**	
	(-0.71)		(-2.83)	
Schooling years	0.0551***		0.0876***	
	(5.73)		(3.99)	
Turnover workers	0.0018***		0.0044***	
	(2.80)		(3.20)	
Unconverted Land	0.0000	0.0003***	0.0000***	0.0001**
	(0.80)	(4.44)	(2.96)	(2.17)
Ownership		0.102***		0.088***
		(3.89)		(3.52)
Floor Quality		-0.0413		-0.049*
		(-1.44)		(-1.71)
Roof Quality		0.111		-0.0015
		(1.49)		(-0.05)
Wall Quality		-0.0561***		-0.0414***
		(-4.87)		(-3.52)
Demand Side In Labour or Housing Markets				
Hired labour	-0.0932		0.2880***	
	(-1.19)		(3.22)	
Income per capita	0.0264*	0.1350***	0.0574***	0.0393
	(1.79)	(4.76)	(5.18)	(1.64)
Openness	0.0016		-0.0812*	
	(0.09)		(-1.90)	
Density		0.0000*		0.0000*

Independent Variables	Without the Spatial Effect		With Spatial Effect	
			(1.92)	
Constant	12.13***	-2.5110	17.11***	-1.538
	(26.18)	(-0.82)	(8.47)	(-1.15)
N	693	693	693	693

Note: * sig at 10%; ** sig at 5%; *** sig at 1%; Standard errors in parentheses.

Source: Author Calculation

CONCLUSION

This chapter has shown the impact of amenities on regional wages and rents in Indonesia. Amenities in the forms of general education, accessibility, commercial facilities, and business area explain wage differences. The availability of infrastructure or public facilities in education has increased the productivity of labour because of their education level. It is also supported by good accessibility, commercial facilities, and business area.

It is essential for the district to provide adequate quantity and good quality of general education to improve the skills and knowledge of labour. If the quantity of labour in one district increases their quality, they will have the opportunity to increase their productivity. The availability of good proper access to the district with high commercial facilities and business area, will capture the quality workforce. The quality workforce is expected to increase productivity, which in turn will impact the district economy positively.

On the other hand, amenities in the forms of accessibility, commercial facilities, business area, and entertainment facilities explain rent differences. The districts with amenities that encourage productivity will have an impact on increasing rental housing. Labour will pay high rent in a location with good access, commercial facilities and business area, and entertainment facilities. In such conditions, the companies will still benefit because the productivity of labour will cover their labour costs.

This result confirms several studies that use intraurban infrastructure or human-made amenities in explaining wage and rent differences. These studies are conducted by Beeson and Eberts (1987), Hoehn, Berger, and Blomquist (1987), Deller (2009), Kemeny and Storper (2012), Graves (2013), Garretsen & Marlet (2017). Furthermore, using the contemporary approach with spatial effect at the regency level, this study gives a valuable contribution from previous limited studies in developing countries.

The future research related to amenities can be done by (1) expanding the

response of households and firms in their interaction by adding amenities in neighborhood regions (*spatially weighted amenities*), and (2) extending workers and firms consideration to factor prices from another market by adding equilibrium factor prices in a different market (*spatially weighted prices*).

REFERENCES

- Albouy, D., & Lue, B. (2015). Driving to opportunity: Local rents, wages, commuting, and sub-metropolitan quality of life. *Journal of Urban Economics*, 89, 74–92. <https://doi.org/https://doi.org/10.1016/j.jue.2015.03.003>
- Anselin, L. (1999). Spatial econometrics. *A Companion to Theoretical Econometrics*, 310–330. <https://doi.org/10.1016/j.regsciurbeco.2006.11.009>
- Anselin, L., Gallo, J. Le, & Jayet, H. (2008). Spatial Panel Econometrics. *Advanced Studies in Theoretical and Applied Econometrics*, 46, 625–660. https://doi.org/0.1007/978-3-540-75892-1_19
- Arifin, L. S., & Dale, R. (2005). Housing needs of migrant women industrial workers in Surabaya: Insight from a life story approach. *Habitat International*, 29(2), 215–226. <https://doi.org/10.1016/j.habitatint.2003.09.003>
- Bar-El, R. (2006). Inter-regional labor market equilibrium: Another pattern of spatial mismatch. *Annals of Regional Science*, 40(2), 393–405. <https://doi.org/10.1007/s00168-006-0059-5>
- Beeson, Patricia E; Eberts, R. W. (1987). Identifying Amenity and Productivity Cities Differentials. *Economic Review, Quarter 3*, 16–25.
- Beeson, P. E., & Eberts, R. W. (1987). Identifying Amenity and Productivity Cities Using Wage and Rent Differentials. *Economic Review*, 3, 16–25.
- Blanchflower, D. G., & Oswald, A. J. (1995). An Introduction to the Wage Curve. *Journal of Economic Perspectives*, 9(3), 153–167.
- Blanchflower, D. G., & Oswald, A. J. (2005). The Wage Curve Reloaded. *NBER Working Paper Series*.
- Blanchflower, D. G., Oswald, A. J., Blanchflower, D. G., & Oswald, J. (2012). Estimating a Wage Curve for Britain 1973 - 90. *The Economic Journal*, 104(426), 1025–1043.
- Blomquist, B. G. C., Berger, M. C., & Hoehn, J. P. (1988). New Estimates of Quality of Life in Urban Areas. *The American Economic Review*, 78(1), 89–107.
- Brady, R. R. (2014). The spatial diffusion of regional housing prices across U.S. states. *Regional Science and Urban Economics*, 46(1), 150–166. <https://doi.org/10.1016/j.regsciurbeco.2014.04.003>
- Brueckner, J. K. (2013). Slums in developing countries: New evidence for

- Indonesia. *Journal of Housing Economics*, 22(4), 278–290. <https://doi.org/10.1016/j.jhe.2013.08.001>
- Cai, L., & Liu, A. Y. C. (2015). Wage determination and distribution in urban China and Vietnam: A comparative analysis. *Journal of Comparative Economics*, 43(1), 186–203. <https://doi.org/10.1016/j.jce.2014.02.004>
- Combes, P., Duranton, G., & Gobillon, L. (2008). Spatial wage disparities: Sorting matters! *Journal of Urban Economics*, 63, 723–742. <https://doi.org/10.1016/j.jue.2007.04.004>
- Deller, S. (2009). Wages, Rent, Unemployment, and Amenities. *The Journal of Regional Analysis & Policy*, 39(2), 141–154.
- Driffield, N., & Taylor, K. (2006). Wage Spillovers, Inter-regional Effects and the Impact of Inward Investment. *Spatial Economic Analysis*, 1(2), 187–205. <https://doi.org/10.1080/17421770601009825>
- Du, X., & Huang, Z. (2018). Spatial and temporal effects of urban wetlands on housing prices: Evidence from Hangzhou, China. *Land Use Policy*, 73(April 2017), 290–298. <https://doi.org/10.1016/j.landusepol.2018.02.011>
- Garretsen, H., & Marlet, G. (2017). Amenities and the attraction of Dutch cities. *Regional Studies*, 51(5), 724–736. <https://doi.org/10.1080/00343404.2015.1135239>
- Graves, P. E. (2013). Spatial Equilibrium in Labor Markets. In M. M. Fischer & P. Nijkamp (Eds.), *Handbook of Regional Science* (pp. 18–33). London: Springer Science. <https://doi.org/10.1007/978-3-642-23430-9>
- Green, G. P. (2001). Amenities and Community Economic Development: Strategies for Sustainability. *The Journal of Regional Analysis & Policy*, 31(2), 61–75.
- Gyourko, J., & Tracy, J. (1991). The Structure of Local Public Finance and the Quality of Life. *The Journal of Political Economy*, 99(4), 774–806. Retrieved from <https://www.newyorkfed.org/medialibrary/media/research/economists/tracy/jpe1991.pdf>
- Hand, M. S., Thacher, J. A., McCollum, D. W., & Berrens, R. P. (2008). Intra-regional amenities, wages, and home prices: The role of forests in the southwest. *Land Economics*, 84(4), 635–651. <https://doi.org/10.3368/le.84.4.635>
- Hiller, N., & Lerbs, O. (2015). The capitalization of non-market attributes into regional housing rents and wages: evidence on German functional labor market area. *Review Regional Resources*, 35(1), 49–72. <https://doi.org/10.1007/s10037-014-0089-x>
- Hoehn, J. P., Berger, M. C., & Blomquist, G. C. (1987). JRS 1987 Hedonic Model HoehnBergerBlom.pdf. *Journal of Regional Science*, 27(4), 605–620.
- Huang, Q., & Chand, S. (2015). Spatial spillovers of regional wages: Evidence

- from Chinese provinces. *China Economic Review*, 32, 97–109. <https://doi.org/https://doi.org/10.1016/j.chieco.2014.12.001>
- Hui, E. C. M., & Liang, C. (2016). Spatial spillover effect of urban landscape views on property price. *Applied Geography*, 72, 26–35. <https://doi.org/10.1016/j.apgeog.2016.05.006>
- Kelejian, H. H., & Prucha, I. R. (2004). Estimation of simultaneous systems of spatially interrelated cross sectional equations. *Journal of Econometrics*, 118(1–2), 27–50. [https://doi.org/10.1016/S0304-4076\(03\)00133-7](https://doi.org/10.1016/S0304-4076(03)00133-7)
- Kemeny, T., & Storper, M. (2012). The sources of urban development: Wages, housing, and amenity gaps across American cities. *Journal of Regional Science*, 52(1), 85–108. <https://doi.org/10.1111/j.1467-9787.2011.00754.x>
- LeSage, J. P. (1999). The Theory and Practice of Spatial Econometrics. *International Journal of Forecasting*, 2(2), 245–246. [https://doi.org/10.1016/0169-2070\(86\)90119-6](https://doi.org/10.1016/0169-2070(86)90119-6)
- OECD. (2008). *Handbook on Constructing Composite Indicators*. OECD.
- Pereira, J., & Galego, A. (2014). Inter-Regional Wage Differentials in Portugal: An Analysis Across the Wage Distribution. *Regional Studies*, 48(9), 1529–1546. <https://doi.org/10.1080/00343404.2012.750424>
- Rahadi, R. A., Wiryono, S. K., Koesrindartoto, D. P., & Syamwil, I. B. (2015). Factors influencing the price of housing in Indonesia. *International Journal of Housing Markets and Analysis*, 8(2), 169–188. <https://doi.org/10.1108/IJHMA-04-2014-0008>
- Rivera, V. H. I. (2016). *Three Essays on Inequality Across Space*. The Ohio State University.
- Roback, J. (1982). Wages, Rents, and the Quality of Life. *Journal of Political Economy*, 90(6), 1257–1278.
- Roback, J. (1988). Wages, Rents, and Amenities : Differences Among Workers and Regions. *Economic Inquiry*, XXVI(January), 23–41.
- Ross, A. M. (1947). The Dynamics of Wage Determination under Collective Bargaining. *The American Economic Review*, 37(5), 793–822.
- Sadayuki, T. (2008). Measuring the spatial effect of multiple sites. *Regional Science and Urban Economics*, 2(i), 155–173. <https://doi.org/10.1016/j.regsciurbeco.2018.03.002>
- Samad, T. (2012). *Indonesia's Urban Development Towards Inclusive and Sustainable Economic Growth*. The World Bank. Indonesia. Retrieved from https://crawford.anu.edu.au/acde/ip/pdf/lpem/2012/2012_09_19_-_KPP_UI_Taimur_Samad.pdf
- Schumacher, E. J., & Whitehead, J. C. (2000). Inputs in Wage-Amenity Models. *Social Science & Medicine*, 50, 507–515.
- Shimizu, C., Yasumoto, S., Asami, Y., & Clark, T. N. (2014). *Do Urban Amenities*

- Drive Housing Rent ?* (Real Estate Markets, Financial Crisis, and Economic Growth: An Integrated Economic Approach No. 9). Kunitaschi, Tokyo.
- Uju, I. V., & Iyanda, S. T. (2012). Comparative Analysis of the Determinants of Residential Land Values. *Chinese Business Review*, 11(2), 187-192.
- Wang, Y., Wang, S., Li, G., Zhang, H., Jin, L., Su, Y., & Wu, K. (2017). Identifying the determinants of housing prices in China using spatial regression and the geographical detector technique. *Applied Geography*, 79, 26-36. <https://doi.org/10.1016/j.apgeog.2016.12.003>
- Waters, N. (2013). Social Network Analysis. In M. Fischer & P. Nijkamp (Eds.), *Handbook of Regional Science* (pp. 726-740). Springer-Verlag. <https://doi.org/10.1007/978-3-642-23430-9>
- Wen, H., & Goodman, A. C. (2013). Relationship between urban land price and housing price: Evidence from 21 provincial capitals in China. *Habitat International*, 40, 9-17. <https://doi.org/10.1016/j.habitatint.2013.01.004>
- Wen, H., Zhang, Y., & Zhang, L. (2014). Do educational facilities affect housing prices? An empirical study in Hangzhou, China. *Habitat International*, 42, 155-163. <https://doi.org/10.1016/j.habitatint.2013.12.004>
- Wu, J., & Gopinath, M. (2008). What Causes Spatial Variations in Economic Development in the United States? *American Journal of Agricultural Economics*, 90(2), 392-408. <https://doi.org/10.1111/j.1467-8276.2007.01126.x>
- Yamagishi, A. (2019). Minimum Wages and Housing Rents: Theory and Evidence from Two Countries. *Munich Personal RePEc Archive*, (Juni), 1-56. Retrieved from https://mpra.ub.uni-muenchen.de/94238/1/MPRA_paper_94238.pdf

Appendix 1. Spatial Lagged Dependent Variable Test

<i>Spatial Model: Wage Equation</i>			
*** Spatial Panel Autocorrelation Tests - Model= (gs2sllsar)			
*** Binary (0/1) Weight Matrix (W): (Non Normalized)			
Ho: Error has No Spatial AutoCorrelation			
Ha: Error has Spatial AutoCorrelation			
GLOBAL Moran MI	= -0.0085	P-Value > Z(-0.169)	0.8655
GLOBAL Geary GC	= 1.1328	P-Value > Z(1.831)	0.0671
GLOBAL Getis-Ords GO	= 0.0141	P-Value > Z(0.169)	0.8655
Moran MI Error Test	= -0.0845	P-Value > Z(-2.006)	0.9327
LM Error (Burrige)	= 0.0394	P-Value > Chi2(1)	0.8427
LM Error (Robust)	= 4.45e+04	P-Value > Chi2(1)	0.0000
Ho: Spatial Lagged Dependent Variable has No Spatial AutoCorrelation			
Ha: Spatial Lagged Dependent Variable has Spatial AutoCorrelation			
LM Lag (Anselin)	= 12.1007	P-Value > Chi2(1)	0.0005
LM Lag (Robust)	= 4.45e+04	P-Value > Chi2(1)	0.0000
Ho: No General Spatial AutoCorrelation			
Ha: General Spatial AutoCorrelation			
LM SAC (LMerr+LMLag_R)	= 4.45e+04	P-Value > Chi2(2)	0.0000
LM SAC (LMLag+LMerr_R)	= 4.45e+04	P-Value > Chi2(2)	0.0000
<i>Spatial Model: Rent Equation</i>			
*** Spatial Panel Autocorrelation Tests - Model= (gs2sllsar)			
*** Binary (0/1) Weight Matrix (W): (Non Normalized)			
Ho: Error has No Spatial AutoCorrelation			
Ha: Error has Spatial AutoCorrelation			
GLOBAL Moran MI	= 0.0530	P-Value > Z(1.315)	0.1886
GLOBAL Geary GC	= 1.0014	P-Value > Z(0.018)	0.9858
GLOBAL Getis-Ords GO	= -0.0885	P-Value > Z(-1.315)	0.1886
Moran MI Error Test	= 0.7820	P-Value > Z(18.935)	0.4342
LM Error (Burrige)	= 1.5447	P-Value > Chi2(1)	0.2139
LM Error (Robust)	=4433.6581	P-Value > Chi2(1)	0.0000

Ho: Spatial Lagged Dependent Variable has No Spatial AutoCorrelation			
Ha: Spatial Lagged Dependent Variable has Spatial AutoCorrelation			
LM Lag (Anselin)	= 7.5536	P-Value > Chi2(1)	0.0060
LM Lag (Robust)	=4439.6670	P-Value > Chi2(1)	0.0000
Ho: No General Spatial AutoCorrelation			
Ha: General Spatial AutoCorrelation			
LMSAC (LMerr+LMLag_R)	=4441.2117	P-Value > Chi2(2)	0.0000
LMSAC (LMLag+LMerr_R)	=4441.2117	P-Value > Chi2(2)	0.0000

Disasters and Regional Development in Indonesia

Due to its location, Indonesia is prone to large seismic activities, some of which have caused a significant number of fatalities and damages to human livelihoods. The country, hence, has to always be prepared and resilient toward these kinds of event. Abilities to soften the human and economic impact of natural shocks and to bounce back the economy as quickly as we can are crucial in sustaining the human and economic development of the country. This book presents disaster-related issues, including disaster management, sustaining regional development, improving human capital in the country, rural development and conserving the environment. Hopefully this book can attract more academics to work on disasters and regional development issues.

Professor Arief A. Yusuf

President, Indonesian Regional Science Association



IRSA Secretariat
Jl. Cimandiri No. 6 Bandung - 40115
West Java - Indonesia

ISBN 978-623-94282-0-4

