INFRASTRUCTURE, EMPLOYMENT AND INCOME CONVERGENCE

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***Abstract**: This study analyses the income convergence in the Gunungkidul Region, Indonesia and the role of infrastructure and employment in supporting this convergence. The data published by the Central Bureau of Statistics is used in this study. Then, this study uses the regression analysis of dynamic panel data to see whether the poor district will tend to grow faster than rich ones so that all economies will eventually converge in terms of per capita income. The results show that there is an income convergence in Gunungkidul Region. The infrastructure and employment are a useful tool for supporting income convergence.*

***Keywords**: infrastructure; employment; income; convergence; growth*

***JEL Classification**: O18; R11*

1. Introduction

Convergence discussions are increasingly attractive because of the existence of many developing countries that are getting worse, while some countries are experiencing high economic growth (Islam, 2003). Besides the poverty problem, generally developing countries face the problem of inequality. Economic development that emphasizes macroeconomic growth tends to ignore the large gap between regions (Busega and Postoiu, 2015). This income inequality arises as a result of differences in ownership of resources. Resources may be considered as one of the factors supporting the process of economic growth. The availability of resources in a given region makes it easier for

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acquiring and using them. Conversely, a region, where resources are not available, has to depend on other regions in order to acquire it.

Inequality of inter-regional resources will decrease in the case of mobility factor of production between regions. The mobility of factor of production causes areas that were initially a lagging to overgrow. Poor regions tend to grow faster than rich ones so that the poor regions tend to catch up to the rich one in terms of per capita income (Barro and Sala-i Martin, 2004). In this process, differences in economic growth between regions, as a result of differences in production technology, will be lost due to the movement of capital and free labor between regions. Free movement of factors of production will equalize the value of marginal products between regions. The mobility of factor of production leads to reduce a difference in per capita income between regions. If this process occurred continuously, all regions would see convergence in terms of per capita income.

Most of the studies on income convergence have tested the Neo-Classical growth theory separately between countries, regions and industries and derive various conclusions. Some studies have found a convergence at the aggregate level (state) rather than at the disaggregate level (region and industry), while other studies have found opposite results. The study by Gyawali et al. (2008) shows the convergence of income in rural and suburban areas. Poor rural and suburban areas can grow faster than urban areas so that income disparities will be lost and income convergence will be achieved. This result shows that income convergence exists at the country, regional and industry level. However, the speed of convergence differs at different levels of aggregation. The speed of convergence at the regional level is faster than at the state and industry level (Naveed and Ahmad, 2016).

In contrast, some studies suggest the divergence of income, especially for urban and metropolitan areas. Non-metropolitan areas with larger urban centres and small towns showed the strongest tendencies to diverge. Differences in human capital appear to have influenced the relative performance of metropolitan and non-metropolitan regions suggesting a role for agglomeration economies in the observed trend toward divergence (Hammond, 2006). Furthermore, Pedroni and Yao (2006) show that China has been experiencing regional income divergence since the Reform Period. There is a long run tendency since the Chinese government has been in provincial level incomes to continue to diverge. This divergence cannot be attributed to differences in preferential open-door policies, but it is pervasive both nationally and within these various regional and political sub-groupings.

The initial differences in the degree of inequality factor endowments had profound and enduring effects on the economy. The great equality or homogeneity among regions

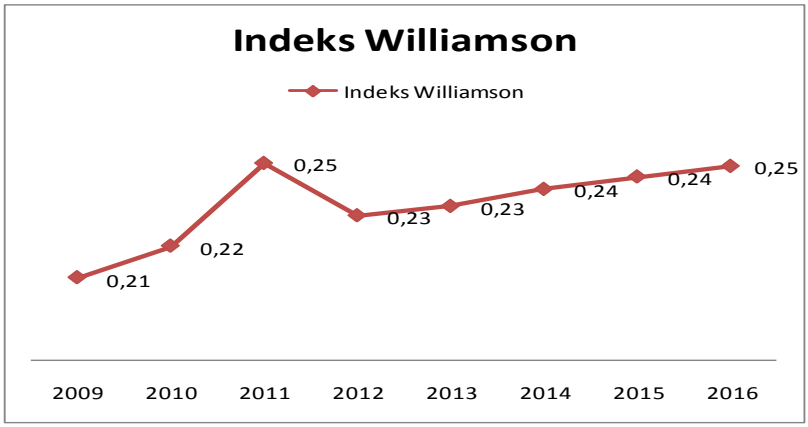
encourage more investment in public goods and infrastructure that offered broad access to economic opportunities. Conversely, where there is inequality, investments in public goods and infrastructure are more limited that tended to provide highly unbalanced access to economic opportunities. The roots of this disparities in the extent of inequality lay in differences in the initial factor endowments (Engerman and Sokoloff, 2002).

Aside from infrastructure, other issues that need to be addressed is the employment rate. An increase of the employment will have a multiplier impact on the economy of the region to catch up with other developed regions. Given the higher rate of economic growth, the lagging area can grow faster than the developed ones. The economies of the poor regions are capable of catching up with rich ones (Barro and Sala-i Martin, 2004). If the poor districts grow too high, there is an income convergence (Drezgic, 2011), so the income gap among districts will be lost. This convergence marked by a decline in inequality between regions.

Gunungkidul is one of the regencies in Indonesia with high unbalance growth. Despite, Gunungkidul Regency has high economic growth, but there is an unbalanced growth across districts. The unbalance of growth resulted in economic disparity across districts. According to the size of Gross Regional Domestic Product (GRDP) per capita, there are three districts namely districts with high per capita GRDP, districts with medium per capita GRDP and district with low per capita GRDP. Three districts belonging to the high per capita GRDP category are Wonosari, Nglipar and Playen districts. The districts that are classified as moderate per capita GRDP are Semin, Ponjong, Girisubo, Patuk, Purwosari, Tanjungsari, Rongkop, Panggang, Semanu, and Saptosari. Furthermore, the district group with a low level of the GRDP per capita include Karangmojo, Ngawen, Paliyan, Tepus, and Gedangsari.

The unbalance growth occurred due to the heterogeneity of infrastructure and employment. The most excellent infrastructure is located in Wonosari district as the capital of Gunungkidul Regency. The position of Wonosari district as the centre of government allows the development of the tertiary sector, while other districts are still focused on the primary sector. Therefore, some economic activities are concentrated in Wonosari districts such as trade, bank, transportation and communication. Diversity in economic activities resulted in the higher employment rate. So far, investors tend to choose Wonosari district as a destination of their investment due to the excellent infrastructure. The concentration of economic activities in Wonosari district causes an income disparity across districts. This disparity can be seen from the Williamson Index. The Williamson Index is an index comparing the economies across districts with the average size in the regency. Figure 1 shows that the highest disparity occurred in 2011, and there is an increasing trend of the Williamson Index. This condition reflected an increase in income disparity across districts.

Figure 1. Williamson Index di Gunungkidul Regency



Sources: Bureau Central Statistics

The remainder of this paper is organized as follows. Section 2 reviews the literature of income convergence. We describe our data and methodology in Section 3. Section 4 reviews the empirical results. Meanwhile, in section 5 we discuss the impact of infrastructure and employment on income convergence. Section 6 carries the conclusion.

2. Income Convergence

The regional gap is influenced by several factors such as the progress of economic development (Yemtsov, 2005), and accessibility of infrastructure (Hu, 2002). The economic development shows an increase in the number of outputs accompanied by improvements in income distribution. An increase in the output will occur if the endowment factor is available in sufficient quantities. The problem that arises, in general, is that the endowment factor is not distributed equally among regions. This condition causes the growth rate to vary in each region due to differences in capital accumulation. A region with large endowment factors will be able to grow more rapidly than any other region.

Meanwhile, accessibility of infrastructure is related to the ability of economic actors to utilize existing facilities and infrastructure. There is a tendency that the urban area with an excellent infrastructure, has become an investment destination. Better infrastructure leads to lower production costs so that the output can be produced more cheaply. Therefore, companies want to locate themselves or build their factories in locations with

better infrastructure so that they get lower production costs to produce competitive products. Investments tend to be concentrated only in a few places (Lall et al., 2004), which lie close to the market. The existence of good infrastructure encourages companies to put themselves in some cities. Some cities that get new investment have higher economic growth (Chakravorty, 2003). Consideration of the benefits of agglomeration causes companies often occupy close to each other so that some economic activities are concentrated in urban areas.

The concentration of some economic activities in big cities resulted in the commuter phenomena. A big city is the center of the economy where many state and private office buildings are concentrated there. The density of the population that is not matched by the provision of residential land causes the price of land and houses to be very expensive, and this is according to the law of the market where demand (or the need for housing) increases so the price will be high. In the end, many people (especially those who have a family) will look for settlements/housing in suburban that relatively affordable.

Furthermore, a concentration of economic activities in urban areas due to their excellent infrastructure causes any region entirely from economic activities. Encourage new investment; the government must build infrastructure the lagging areas. The entry of new investment is expected to increase economic activities, so this area catches up from advanced ones. The availability of infrastructure in lagging areas will increase the amount of capital and result in multiple effects to catch up to the advanced ones. The public investment, especially infrastructure, is the most efficient tool for equalizing regional income disparities. Infrastructure is a prerequisite for technological advancement and economic development. The government-built infrastructure primarily in a region with poor infrastructure to erase inequalities of investment

The infrastructure includes physical and social infrastructure. Physical infrastructure includes electricity, drinking water, transportation and telecommunications. The social infrastructure consists of education, training, and health. Differences in the availability of road can affect differences the ability of regions to carry out their economic activities, then that can be a driver of economic disparity between regions. Development of transportation infrastructure can provide improvements competitive advantage of an area. The road is an essential infrastructure for connecting one region to other regions or one economic center to the other. The availability of road infrastructure will facilitate distribution goods and human mobility. Relations between villages and cities also assisted by the availability of road infrastructure. The efficient transportation system makes the process of goods mobility and humans fast and cheap. Therefore, an efficient transportation system will solve the problem of high-cost distribution.

Good public transportation system will attract investors and create field employment and, finally increase public consumption. The regional income increases and government spending on regional development can increase too. An increase of investment in capital enables more output to be produced. Infrastructure development in lagging areas will have a higher impact than that in developed regions. The lagging area will grow faster than advanced ones so that convergence of income will occur.

The other infrastructure which determines economic growth is a health facility. Development of human resources can take the form of development in public health. Healthy communities are expected to work more productive, to produce output or income well. Investment in the health sector can be in the form of repairs and or addition of health facilities. Hospitals and health centre are health infrastructure that can be accessed by the community. The construction and repairing of this infrastructure are one effort that can be made to ensure the availability of health services for the community. The areas with better health infrastructure are it is expected that it will be better able to provide adequate health services to the community.

Furthermore, besides road infrastructure and health facilities, one factor that should be considered to increase per capita income is the employment rate. Employment rate indicates the percentage of job seekers who get the job they are looking for. The higher employment rate, the higher the output produced by the economy. If the increase in output exceeds the increase in population, then per capita income will increase. Regarding the employment level, usually, the employment in the rural area is lower than that in cities area. Even though, lagging areas usually include rural areas where most of the population work in the agricultural sector with limited capacity. This limited causes some residents to try to get jobs by commuting to urban areas.

On the contrary, an urban area is the center of the economy with many economic activities. Demand for labor in city areas is not only fulfilled by city dwellers, but also by residents from other regions. Rural residents are usually not too selective in choosing jobs. They are willing to migrate or commute to get a job. This movement causes income convergence to take place rapidly. The estimated rate of convergence (the rate at which the economy converges to its steady-state growth path) is also on average increased somewhat by introducing net inward migration in the growth regression. The inclusion of a net migration variable increases this convergence (Ozgen et al., 2009). The difference in infrastructure and employment rate across regions have an impact on differences in income across regions. A weak region can pursue per capita income from a rich region (Barro and Sala-i Martin, 2004) so that there is a convergence of income marked by declining income gap between regions.

There are 2 (two) concepts of convergence, namely σ convergence and β convergence. The concept of σ convergence refers to the dispersion that can be measured by, for example, the standard deviation of the revenue logs of per capita products between regions. If the value shows a decrease, then there has been a convergence of income and vice versa. Meanwhile, the concept of β convergence states that a poor economy can catch with the rich ones in term of per capita income (Barro and Sala-i Martin, 2004). The concept of β convergence is divided into 2 (two) namely absolute convergence and conditional convergence. Absolute convergence refers to the measurement of convergence based on initial income levels alone. Absolute convergence measurements are made without including the control variables that are characteristic of each region. Each region is considered to have the same steady-state conditions so that the calculation of convergence does not include other variables such as investment and employment. Conversely, the calculation of conditional convergence is carried out by including the influence of control variables which are expected to affect the steady-state conditions of each region. To see the effect of infrastructure and control variables on the steady-state conditions of each region, conditional convergence is performed.

3. Data and Methodology

This research takes the area of Gunungkidul Regency which covers 18 with Wonosari district which becomes the capital of local government. The district- based data use is expected to be able to illustrate the presence or absence of income convergence more closely. Taking a narrower area of research can eliminate bias due to aggregation factors. With the microdata, it can be analyzed the condition of each district in more detail. Therefore, it can be designed more appropriate policy according to existing economic condition.

This study uses data from the Central Bureau Statistic. This data includes per capita income, health infrastructure, road infrastructure, and employment in each district during the period 2009-2016. Selection of the starting point of research in 2009 is because in this year the economic structure began to change marked by an increase in the share of services sector so that the share of this sector has exceeded the share of the agricultural sector. Meanwhile the selection of the endpoint in 2016 because the data in this year is the latest data.

Furthermore, the operational variables are defined as follows. The per capita income is the value of the gross regional domestic product of the district at constant 2010 prices divided by the total population. Meanwhile, the health infrastructure is the total number of health personnel that consist of government and private employees working in a health center, hospitals or health clinics in each district. Road infrastructure covers the

length of the road with the right conditions in each district. An employment rate is some people available to work are being used.

The study included per capita income in each district in Gunungkidul regency and the variables that influenced it during the period 2009-2016. Thus, the research data is dynamic panel data. Panel data has several advantages over cross-sectional data or time series data. The use of the dynamic model can describe the real condition that the interaction between economic variables is rarely instantaneous. Dynamic models are needed because the variation of endogenous variables in the current period is not only determined by variations in exogenous variables in the same period. The dependent variable reacts to the independent variable with the time interval (lag). The dynamic model can make static theories to be dynamic by taking into account the elements of time explicitly. Therefore, the research model is formed in a dynamic regression model by inserting lag on both rights and left sides of the equation.

Furthermore, to get a simple model, it is reduced the most extended lag to the shortest lag to get the desired model. Estimate of per capita income model is written in the following equation.

$$\Delta \ln Y_{it} = \alpha_i + \omega \ln Y_{i,t-1} + \sum_{j=0}^{k} \beta_{ij} \ln X_{1it-j} + \sum_{j=1}^{k} \gamma_{ij} \ln X_{2it-j} + \sum_{j=1}^{k} \delta_{ij} \ln X_{3it-j} + e_{it}$$

Respectively, Y is per capita income, X_1 is the number of health personnel, X_2 is the length of road in excellent condition, X_3 is the employment rate.

The analysis of the above equation provides an overview of the process of income convergence and the influence of independent variables in supporting this convergence. The income convergence has occurred when the coefficient on $lnY_{i,t-1}$ is negative $(\omega < 0)$. The convergence velocity λ in which the convergence per capita income level to a uniform per capita income level can be calculated according to $\lambda = -[\left(\frac{1}{T}\right)\ln(\omega + 1)]$. Then, T shows the length of time interval considered. An easy way to express the speed of convergence is the time it takes an income level to move its initial level and the steady-state income level (Mahmood, 2012) halfway. The time it takes to close half of the initial gap called the convergence half-life is calculated by a formula stated by Jan and A.R. Chaudhary (2011) as follow $H = (Ln2)/\lambda$

4. Empirical Result

The result of cointegration testing based on Kao method shows that the value of -2.104 with the p-value less than 0.05. This result means that there is a linear combination of variables in the stationary model. The residual generated from the model is stationary

$I(0)$. Variables in the model have long-run equilibrium relationships under economic theory. The estimation model has consistency in the long run, or at least there is a cause-and-effect relationship in one direction among the variables in the model.

Furthermore, to obtain a simple model, a lag selection is made using Akaike criteria (Liew, 2004). A smaller value of the Akaike (*AIC*) criterion indicates a better model. Based on the VAR estimation results, the minimum *AIC* value for the model occurs when the lag length is one year. VARs with a single lag length will be spared from error specifications and a problem of reduction in degrees of freedom. Therefore, VAR of length 1 is VAR parsimony.

In panel data regression, there are 2 (two) basic models; fixed effects and random effects model. The Hausman test results show that the individual effect is correlated with the independent variable, so it does not meet one of the Gauss-Markov assumptions. Therefore, the fixed effect model remains superior to the random effects model. Based on estimates with fixed effects model and a reduction of a non-significant parameter, a simple result is obtained. The value of determination coefficient of 0.498 indicates that the variation in the independent variables can explain the variation of per capita income as much as 49.8 per cent. Meanwhile, the remaining of 50.2 per cent is explained by the residual. Furthermore, a high F value indicates that the independent variables simultaneously affect the dependent variable.

Table 1. Estimation Result (Fixed Effects)

No.	Variable (in a log)	Coefficient	Standard Errors
1	Per capita income the previous year	-0.066*	0.009
2	Health workers	0.002*	0.001
3	Road infrastructure	0.006*	0.009
4	Employment	0.056*	0.013
5	Constant	0.025*	0.069

Outcome: Change in log (Per capita income)

R^2 = 0,498 F = 6,911 * Significant at (α=5%)

5. Discussion

The results show that the regression coefficient of per capita income (previous year) is negative. It means that there is a process of convergence of per income capita between districts in Gunungkidul Regency. The per capita income growth in the poor districts is capable of pursuing per capita income in rich one, and then per capita income gap among districts will be lost.

The coefficient of per capita income of the previous year of -0.066 indicates that if all other things being equal, an increase per capita income (previous year) by 1 per cent causes a decrease of per capita income (current) by 0.066 per cent. An increase in per capita income in lagging districts is higher than that in the advanced districts. Therefore, the lagging districts will be able to catch up from relatively advanced ones. An increase in per capita income leads to income convergence. The rate of income convergence in Gunungkidul regency is 0.068[1]. This level shows that the speed of each district to achieve steady state is 6.8 per cent per year. Furthermore, the time to close half of the initial gap or half-life of income convergence is 10.2 years[2]. The income convergence in Gunungkidul regency is faster than that in Indonesia. Maryaningsih et al. (2014) found that speed of income convergence is 1.75 per cent per year and half-life time is 41.14 year. Convergence speeds that differ from previous studies can be caused by differences in the selection of variables used in the study method of analysis and scope of research. Also, this means that income convergence in Gunungkidul regency occur quickly maybe because there is an interaction of economic agents among districts in this regency.

Meanwhile, health infrastructure has a positive effect on per capita income. The coefficient of this infrastructure of 0.002 indicates that if the number of health personnel increased by 1 per cent will increase per capita income of 0.002 per cent (all other things being equal). The development of health infrastructure will improve public health. Healthy communities are expected to work more productive, to produce output or income as well. If an increase in output more than an increase of population, it will increase per capita income. The result of this study is in line with the result of Acemoglu and Johnson (2006) which suggests that improvements in health leads to an increase in per capita income are directly to produce more per unit of labor input. Individuals who are healthier have higher returns to labor input.

Furthermore, road length has a positive regression coefficient to per capita income. The regression coefficient of road length is 0.006, so an increase in the length of a road by 1

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[1] Calculated based formula $\lambda = -[\left(\frac{1}{T}\right)\ln(\omega + 1)] = -[\left(\frac{1}{1}\right)\ln(-0{,}066 + 1)]$=0.068

[2] Calculated based formula $H = (Ln2)/\lambda$ = 0.069 /0.068=10.19

per cent causes an increase in per capita income of 0.097 per cent (all other things being equal). This result is in line with Del Bo et al. (2010) confirmed that there is a positive relationship between road infrastructure and economic development. This results also support the result of Yang (2017) which states that highways promote productivity growth by facilitating firm entry, exit and reallocation. Improved road facilities, especially in lagging areas, can accelerate economic activity in these regions. This increase is characterised by an increase in some goods and services that can be produced by a region. An efficient transportation system will solve the problem of high-cost distribution. The mobility of goods and people can take place quickly and cheaply. It means that road infrastructure development increases worker productivity so that per capita income increases.

Meanwhile, the employment rate has a positive effect on per capita income. The coefficient of employment rate variable of 0.025 indicates that if the employment rate increases by 1 per cent, it will increase per capita income of 0.025 per cent (all other things being equal). An increase of employment shows an increase of productive workers who participate in the production process so that GRDP increases. The increase in GRDP will encourage an increase in per capita income. An increase in employment in the poor district will be able to encourage an increase in output so that this region will be able to catch up from the rich one. An increase in employment rates supports the income convergence.

6. Conclusion

There is a process of income convergence between districts in Gunungkidul Regency. An increase in per capita income in the poor districts can catch up from relatively rich ones. Therefore, the gap in per capita income between districts will disappear. Infrastructure development and an increase of employment rate will increase the GRDP, and then, this increase will encourage an increase in per capita income. Furthermore, an increase in per capita income encourage income convergence. Meanwhile, in line with regional autonomy, planning, maintenance and implementation of the construction of the road network of regencies, cities and villages are the authority of the local government. Thus, the local government currently has a greater role in manage the infrastructure of their respective regions. Areas with excellent infrastructure have more opportunities to develop their economy. Improvement of infrastructure in lagging areas will have a higher impact than that in developed regions. The lagging area will grow faster than advanced ones, in turn, this process encourages income convergence.

REFERENCES

Acemoglu, D. and Johnson, S., (2006), Disease and development: The effect of life expectancy on economic growth. NBER Working Paper Series, No. 12269.

Banerjee, Biswajit and Jarmuzek, Mariusz, (2009), Anatomy of Regional Disparities in the Slovak Republic, IMF Working Papers No. 9/145.

Barro, Robert J. and Xavier Sala-i Martin, (2004), *Economic Growth* 2nd Edition. MIT Press, London.

Cole Matthew A. and Eric Neumayer, (2007), The Impact of Poor Health on Total Factor Productivity, *Journal of Development Studies,* 42 (6), pp. 918-938

Del Bo, Chiara, Massimo Florio, and Giancarlo Manzi, (2010), Regional Infrastructure and Convergence: Growth Implications in a Spatial Framework, *Transition Studies Review*, 17(3), pp. 475-493.

Gyawali, Buddhi, Rory Fraser, James Bukenya, and John Schelhas, (2008), Income Convergence in a Rural, Majority African-American Region, *The Review of Regional Studies*, 38 (1), pp. 45–65

Gilbert Cette, Simon Corde and Rémy Lecat, (2012), Firm-level Productivity Dispersion and Convergence Working Papers of the Banque de France.

Hammond, George W. (2006), "A Time Series Analysis of U.S. Metropolitan and Non-metropolitan Income Divergence," *Annals of Regional Science*, 40, pp. 81–94.

Iacovone, Leonard, Luis F. Sánchez-Bayardo and Siddharth Sharma, (2015), Regional Productivity Convergence in Peru, Policy Research Working Paper 7499

Ito, Tadashi, (2010), NAFTA and Productivity Convergence between Mexico and the US, Cuademos de Economía, 47(Mayo), pp. 15-55.

Jan, Sajjad Ahmad dan A.R. Chaudhary, (2011), Testing the Conditional Convergence Hypothesis for Pakistan. *Pak. J. Commer. Soc. Sci*, 5 (1), pp. 117-128.

Lall, S., Z. Shalizi, and U. Deichmann, (2004), Agglomeration economies and productivity in Indian Industry, *Journal of Development Economics,* 73(2), pp. 643-673

Liew, V.K. S., (2004), Which Lag Length Selection Criteria Should We Employ?, Economics Bulletin, 3 (33), pp. 1−9.

Mahmood, Tahir, (2012), Labour Productivity Convergence in 52 Industries: A Panel Data Analysis of Some European Countries, International Journal of Economics and Financial Issues, 2 (3), pp. 320-339.

Männasoo, Kadri, Heili Hein and Raul Ruubel, (2016), Regional Productivity Convergence in Advanced and Emerging European Economies, European Policy Analysis, 12.

Maryaningsih, Novi, Oki Hermansyah and Myrnawati Savitri, (2014), Pengaruh Infrastruktur terhadap Pertumbuhan Ekonomi Indonesia, Bulletin Ekonomi Moneter dan Perbankan, (the Influence of Infrastructure on Indonesian Economic Growth, Bulletin of Monetary and Banking Economics), 17(1) pp. 61-67.

Mitra, Pritha and Cyril Pouvelle, (2012), Productivity Growth and Structural Reform in Bulgaria: Restarting the Convergence Engine, IMF Working Paper European Department.

Mitra, Pritha and Cyril Pouvelle, (2012), Productivity Growth and Structural Reform in Bulgaria: Restarting the Convergence Engine, IMF Working Paper European Department.

Naveed, Amjad dan Nisar Ahmad, (2016), Labour Productivity Convergence And Structural Changes: Simultaneous Analysis At Country, Regional And Industry Levels, Economic Structures, 5 (19): 1-17

Niebuhr, Annekatrin and Friso Schlitte, (2004). Convergence, trade and factor mobility in the European Union-Implications for enlargement and regional policy, *Intereconomics: Review of European Economic Policy*, 39 (3), pp. 167-176.

Wilkinson, R. and Pickett, K., (2011), The Spirit Level, Bloomsbury Press Kim.

Yang, Yang, (2017). "Transport Infrastructure, City Productivity Growth and Sectoral Reallocation: Evidence from China," RIEI Working Papers 2017-08, Xi'an Jiaotong-Liverpool University