

INFRASTRUCTURE, ECONOMIC GROWTH AND INEQUALITY IN INDONESIA LAND BORDERS

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Abstract

The purpose of this study is to analyze the impacts of infrastructure on economic growth and inequality in Indonesia land borders. Using static panel data regression and panel two stage least square (2SLS) estimation methods, this study shows that social infrastructure can raise per capita income. The social infrastructures being discussed are number of high schools and number of health facilities. Telecommunication facility can also raise per capita income. In addition, income inequality is found to be positively influenced by income per capita growth and industry sector laborer. It also suggests that infrastructure has indirect relation with income inequality through per capita income.

Keywords: Land borders, infrastructure, economic growth, inequality

JEL classification numbers: C23, C36, O15, O40, O53, I30, R11

Abstrak

Tujuan penelitian ini adalah untuk menganalisis dampak infrastruktur terhadap pertumbuhan ekonomi dan ketimpangan di perbatasan darat Indonesia. Menggunakan metode estimasi regresi data panel statis dan panel two stage least square (2SLS), penelitian ini menunjukkan bahwa infrastruktur sosial dapat meningkatkan pendapatan per kapita. Infrastruktur sosial yang dibahas adalah jumlah sekolah tinggi dan jumlah fasilitas kesehatan. Fasilitas telekomunikasi juga dapat meningkatkan pendapatan per kapita. Selain itu, ketimpangan pendapatan ditemukan secara positif dipengaruhi oleh pertumbuhan pendapatan perkapita dan buruh sektor industri. Paper ini juga menunjukkan bahwa infrastruktur memiliki hubungan tidak langsung dengan ketimpangan pendapatan melalui pendapatan per kapita.

Keywords: Perbatasan darat, infrastruktur, pertumbuhan ekonomi, ketimpangan

JEL classification numbers: C23, C36, O15, O40, O53, I30, R11

INTRODUCTION

Indonesia development vision for 2005-2025 is an independent Indonesia, advanced, fair, and prosperous country with a target of

making Indonesia the world's top-ten economy by 2025. In the document the National Medium Term Development Plan (RPJMN) 2010-2014, the government wishes to strengthen the competitiveness of the econ-

omy and the source of competitiveness is the availability of better infrastructure.

The impact of infrastructure development has a broad spectrum, such as raising productivity, encouraging connectivity, lowering costs, increasing diversification of production, trade development, equitable development, poverty alleviation, and improved quality of life (Bappenas, 2010).

Border regions are part of Indonesia, that has strategic value in supporting the success of national development. The main objective of border management is to maintain the integration of the Unitary Republic of Indonesia (NKRI) as mandated by the constitution, establishing the border region in a balanced, integrated, comprehensive for the welfare of the people, and strengthen the capacity of Indonesia border region in the context of global competition (BNPP, 2011).

Border regions consist of 64 regencies/cities with 16 regencies/cities areland border, five regencies in West Kalimantan Province, three regencies in East and North Kalimantan Province, four regencies and one city in Papua Province, and also three regencies in Nusa Tenggara Timur (NTT) Province with a total land border length is 2374.9 km. From the 16 regencies/cities, onely Jayapura City which is not among underdeveloped region.

Welfare conditions at the border region in general is still very far behind when compared to other regions development or even compared to the socio-economic conditions of the people in the neighboring countries (Bappenas, 2010). Percentage of poor people in the regencies/cities land border remains largely above the national poverty rate, that is 12.49% (Figure 1).

The problems of land border egion are not just about the welfare of the community, but also include a few other issues, especially issues of defense, security, and law enforcement. The disagreement regarding a few border segment make potential territorial conflicts with neighboring countries, threatening the territorial integrity and confusion in the use of natural resources.

Limited number of border crossings and border guard personnel make border surveillance to be weak, because of the long line Indonesian land border. It made land border region vulnerable to illegal logging, smuggling, human trafficking, and the removal of boundary markers. Welfare issues and the lack of infrastructure also gives rise to the desire of some of the public land border region to secede from the Republic of Indonesia. Many problems land border region make land border area management should be more specific than other region.

In line with the national development vision, the vision of the management border region is to establish the state border as a region that is safe, orderly, and advanced. To realize this vision, one mission is to increase economic activity, development of infrastructure, human resource development, and sustainable management of natural resources. The other function of the border region are to improve economic activity and as a gateway to trade with neighboring countries. Thus, the approach of development not only from defense side, but as well as innovative approaches to welfare (Bappenas 2010).

The development of proper infrastructure and corresponding character with land border areas can have an impact on the acceleration of economic development, thereby enhancing competitiveness and lead to an increase in social welfare. Based on the above description, the purpose of this study are (1) to analyze the impact of infrastructure development on economic growth in Indonesia land border, and (2) to analyze the impact of infrastructure development on inequality in Indonesia land border.

The development of border areas is affected by the management vision of the border region. The development in that region is done by the approach of the security and the social economy. Development process, which is supported by the availability of infrastructure, will result in an increase in revenue.

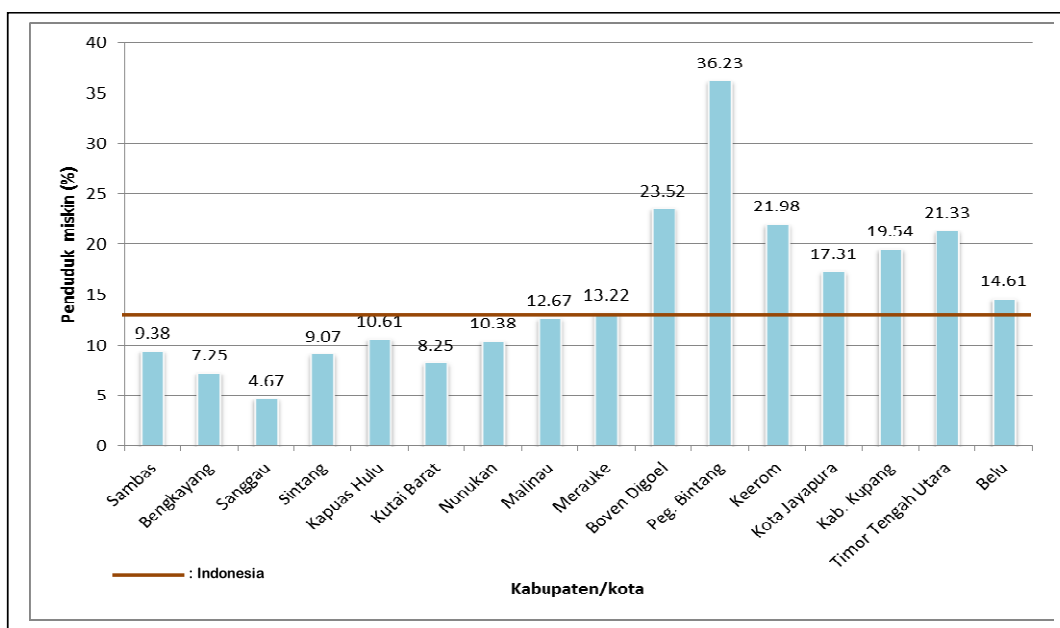


Figure 1: Percentage of Poor People in Land Borders Region, 2011

Review of Relevant Papers

Groote et al. (1999) in their work on infrastructure and economic development in the Netherlands show that the positive effects of infrastructure development is only temporary so the Dutch economic growth is not to be permanently higher. Calderon and Serven (2004) in his research on the impact of infrastructure development on growth and income distribution suggest that the positive impact of infrastructure on growth and income inequality declines with improving the quality and increasing the number of infrastructure.

Amrullah (2006) in his research on the analysis of the influence of infrastructure on regional economic growth in Indonesia shows that there is a positive relationship between infrastructure development, especially economic infrastructure ie roads, electricity, telephone and water, with regional economic growth as represented by earnings per capita of population.

Prasetyo (2010) in his research on the impact of infrastructure development and industrial agglomeration on regional economic growth in Indonesia shows that electricity and road infrastructure significantly influence regional economic growth,

while the clean water infrastructure is not significant.

Crescenzi and Pose (2011) in their work on infrastructure and economic growth in the EU show that the abundance of infrastructure is a relatively poor predictor of economic growth and economic growth in the EU is the result of a combination of 'social filter', both innovation capacity in the region and around it, and the capacity of the region to attract migrant workers.

Sari (2011) in her research on the analysis of the effect of infrastructure development program on poverty reduction in lagging districts shows that the real infrastructure stimulus aid positively affect the economy in the long term so as to reduce the percentage of poor people in underdeveloped districts.

Wahyuni (2011) in her study of the convergence and the factors that influence inequality district/city in Java shows that the factors that affect income inequality is the share of manufacturing, workforce education, health infrastructure, electricity, and clean water.

Moreover, Radiansyah (2012) in his research on the analysis of contribution of

infrastructure to regional economic growth in Indonesia shows that there is a positive relationship between infrastructure development and implementation of regional autonomy on economic growth, represented by per capita income of the population.

Egert et al. (2009), Sahoo et al. (2010), Jan et al. (2012) in their research suggest that there is a positive relationship between the availability of infrastructure and economic growth with a per capita income approach.

Seneviratne and Sun (2013) in their work on infrastructure and income distribution in the ASEAN-5 show that better infrastructure, in terms of quality and quantity, will reduce income inequality, while the relationship between investment and income distribution is weak. Calderon and Chong (2004) found that economy growth and inequality had relationship.

Land Border Economic and Inequality Performance, 2007-2011

In general, Indonesia land border real GDP per capita mean increased gradually during the 2007-2011 periods. At 2007 real GDP per capita mean was 6.301 million rupiah and at 2011 became 7.66 million rupiah. Figure 2 shows that as Indonesia land border real GDP per capita mean during 2007-2011.

The development process is carried out not only pursuing economic growth, but there are ideals to further expand economic development so that the positive effects of economic development can be felt not only in all parts of Indonesia, but also by the entire community in the archipelago. The ideals of equality leads to better development outcomes across regions and between individuals. To realize these goals required a more equitable distribution of income for each individual or household. Distribution of income reflects the share of income received by individuals or households within an area.

Inequality does not only occur between regions, but also between individuals or households. Inequality among individuals or households is called income inequality. One indicator to measure income inequality is the Gini ratio. Gini ratio is calculated using the data an individual or household income, but because the data is difficult to obtain valid income through surveys, the Gini ratio calculation is done with the data approach or household consumption expenditure. Calculation of gini ratio with this expenditure approach will produce numbers underestimate, because the approach to expenditure per capita income is only sensitive to describe the low-income population groups.

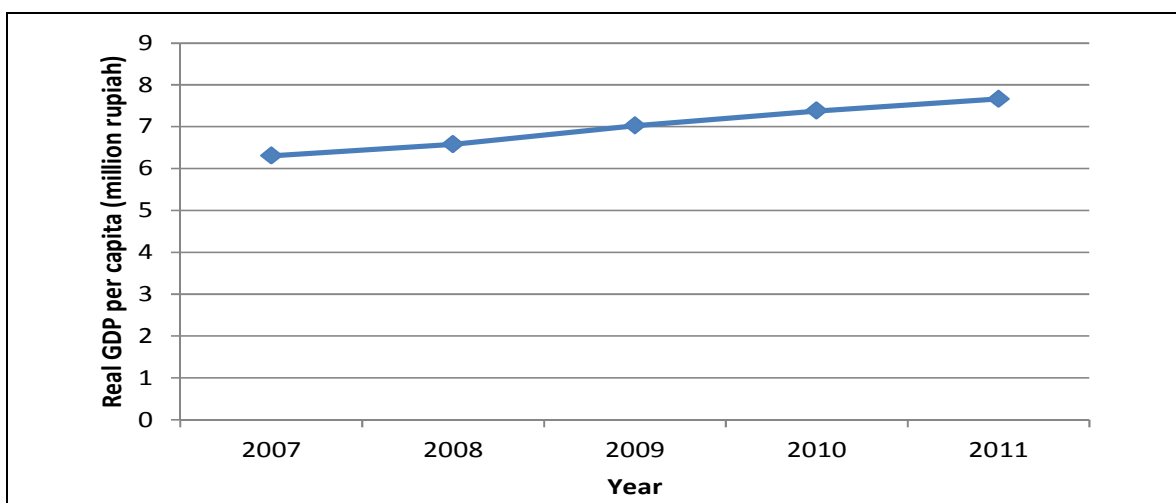


Figure 2: Real GDP per Capita mean in Indonesia Land Borders, 2007-2011

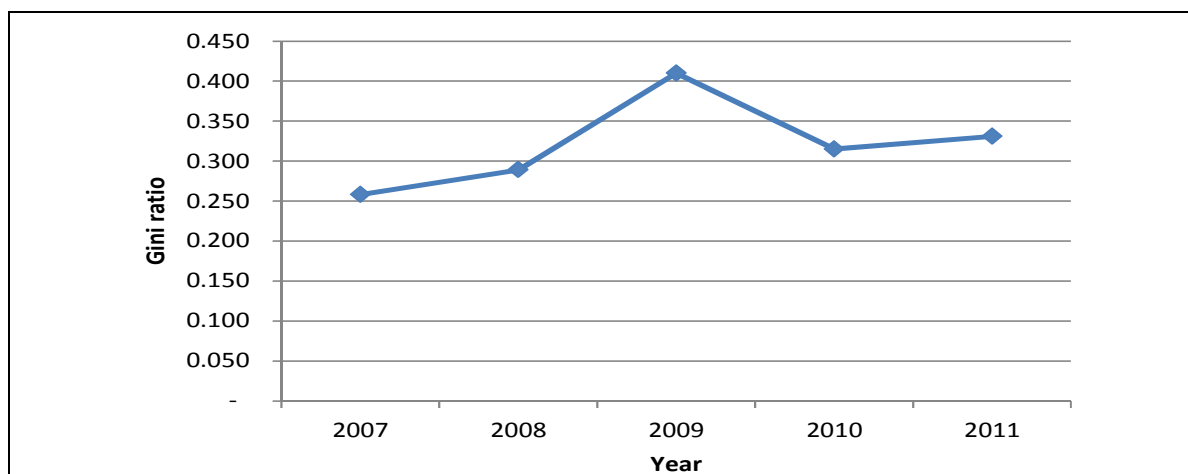


Figure 3: Gini Ratio mean in Indonesia

Gini ratio is measure of income inequality that fulfill four criteria, anonimitas principle, independent scale, independent population, and transfer. In early development, income inequality tended to increased, but in the next stage income inequality will be decreased. Development progress in Indonesia land border became faster after autonomy, that is after 1999, so there are still in early development progress. Because of that, income inequality mean in Indonesia land borders during 2007-2011 tended to increased. At 2007 income inequality mean was 0.258, and at 2011 became 0.331 (Figure 3).

METHODS

The data used in this study are secondary data from the Central Statistics Bureau (BPS), namely BPS Kalbar, 2012; BPS Kaltim, 2012; BPS NTT, 2012; and BPS Papua, 2012, and data from other agencies, to the years 2007 to 2011. The variables under investigation are income per capita, Gini ratio, length of roads, electricity users, water users, means of transportation, the number of educational facilities, the number of health facilities, household sanitation, telecommunications, and labor.

This study uses descriptive analysis, regression analysis static panel data, and 2SLS panel, with the help of Microsoft Ex-

cel 2010 software, ArcView 3.3, and Eviews 6.0 software packages.

The model to determine the impact of infrastructure development on growth is adapted from Calderon and Serven (2004) as follows:

$$\begin{aligned} \ln KAP_{it} = & \alpha_0 + \alpha_1 \ln JLN_{it} + \alpha_2 \ln SMU_{it} \\ & + \alpha_3 \ln KES_{it} + \alpha_4 AIR_{it} \\ & + \alpha_5 LIS_{it} + \alpha_6 SAN_{it} \\ & + \alpha_7 KOM_{it} + \alpha_8 BDR_{it} \\ & + \alpha_9 LFI_{it} + \alpha_{10} DBatas_{it} \\ & + \varepsilon_{it} \end{aligned}$$

Model inequality refers to research Seneviratne and Sun (2013) which has been modified as:

$$Gini_{it} = \alpha_0 + \alpha_1 \ln KAP_{it} + \alpha_2 LFI_{it} + \varepsilon_{it}$$

The inequality model will be estimated with 2SLS and use Instrument Variable (IV). KAP variable will be instrumented by infrastructure and labor force that is in first model. Using IV because of endogeneity in the right hand regressor. By endogeneity we mean the correlation of the right hand side regressor and the disturbances.

RESULTS

Infrastructure and Economic Growth

Growth model is analyzed using panel data. Hausman test results obtained from the

probability value of 0.1734, so that we can not reject H_0 and we can conclude that the best growth estimates model is the random effects model.

Testing the sustainability of the model using the F test yielding a value of F statistic and probability of 8.453327 and 0.000000, respectively (Table 1), which means it is significant even at 1% significance level. The significance reflects that the model is feasible for being able to explain the diversity of the dependent variable. Parameter estimation in the Random Effect Model (REM) is conducted using the Generalized Least Square (GLS).

Infrastructure variables that have a significant relationship with per capita income growth are the number of high school, the number of health facilities, mobile phone ownership, and borders. These results are in accordance with the results of Calderon and Serven (2004) and Radiansyah (2012). Variables that have the most impact is the border dummy variable, meaning that a regency/city bordering with the more developed countries will had higher growth of per capita income.

Variable number of educational facilities, which was approached with an

equal number of high school has an elasticity of 0.1111, which means that every 1% increase in the ratio of the number of educational infrastructure, the high school or its equivalent, will encourage the growth of income per capita amounted to 0.1111% ceteris paribus. Education variables are included in the social infrastructure, in addition to health variables. Some border countries have implemented 12-year compulsory education program. The program is supported by the provision of adequate educational infrastructure, including the development of high school or its equivalent schools. Significant relationship indicates that in order to achieve higher growth, it is proper land border region began implementing 12-year compulsory education program, due to the provision of basic higher education, will be ready to enter the working world. Construction of school infrastructure is not only directed to the public high school, but also aimed at increasing the number of vocational schools, so that graduated from vocational schools already have skills that can be immediately used in the workplace, as well as for the self-employed.

Table 1: The Results of the Growth Model Estimation

Variabel	Koefisien	Std. Error	t-Statistic	p-value
C	3.094975	0.650395	4.758607	0.0000
Ln(JLN)	0.045741	0.046496	0.983775	0.3287
Ln(SMU)	0.111083**	0.057725	1.924364	0.0584
Ln(KES)	0.078514*	0.037626	2.086701	0.0406
AIR	0.002021	0.001559	1.296493	0.1191
LIS	0.000457	0.001460	0.312862	0.7553
SEP	-0.001061	0.001638	-0.647559	0.5194
KOM	0.002818*	0.001127	2.500740	0.0148
BDR	0.001515	0.001201	1.261828	0.2113
LF	0.001511	0.002009	0.751955	0.4546
DBATAS	0.422909**	0.216829	1.950424	0.0552
F-statistic	8.453327			
Prob (F-statistic)	0.000000			

Notes: The value is significant at 5% (*), 10% (**)

Source: Data estimation

Health variable, which is approximated by the number of health centers, health centers and mobile clinics, has an elasticity of 0.0785. It means that any increase in the ratio of the amount of 1% of health facilities will encourage the growth of income per capita amounted to 0.0785% *ceteris paribus*. Provision of hospital districts in the capital just to make low-income people who can not access hospital facilities, because of high transport costs. These limitations make the existing health centers in each district, and sub-health center in the village spearhead the public health services. While to reach villages that are not sub-health centers, local governments around this border region by creating mobile health clinics, either by means of land and river. Development centers from time to time, the better, starting with a doctor on standby, to the inpatient clinic and 24-hour clinic. The existence of health centers to improve the quality of public health frontier, thus encouraging them in their work productivity is higher and will increase revenue.

Telecommunications infrastructure that is approached with cell phone ownership affect the growth of per capita income. Telecommunications infrastructure elasticity of 0.0028, which means that any increase in mobile phone ownership by 1% will encourage the growth of income per capita amounted to 0.0028% *ceteris paribus*. Mobile phone ownership reflects that the regency/city borders are there wireless telecommunications network, while the increase in mobile phone ownership, in addition

to reflecting the increased signal coverage also reflects the increase in incomes.

Infrastructure and Inequality

Analysis of this model using a panel approach EGLS or Two Stage Two Stage Random Effect Panel. In this model, because there is a correlation between the endogenous regressors on the right side and the residuals that will lead to inconsistencies when analyzed using regular OLS, the instrument used in the modeling variables.

From the results of testing the feasibility of the model, the value obtained for the F statistic was 0.026515 and probability was 3.806697 so significant at 5% significance level (Table 2). Thus the model was constructed can to explain the diversity of gini ratio. The estimation results using Two Stage Random Effect Panel in mind that all real variables in the model affect gini ratio. Per capita income variable which instrument with economic infrastructure, social infrastructure, and the workforce variable has the elasticity of 0.0367 so that any increase in per capita income by 1% would result in inequality increased by 0.0367% *ceteris paribus*. Significant value of the variable income per capita is less than 10% (Table 3) shows that the economic infrastructure, social, and labor force will indirectly affect inequality in the land border. These results are consistent with the results of research Wahyuni (2011) and Seneviratne and Sun (2013), and in accordance with the theory Kusnetz.

Table 2: The Results of Inequality Model Estimation

Variabel	Koefisien	Std. Error	t-Statistic	P value
C	0.226988	0.040677	5.580230	0.0000
Ln(KAP)	0.036753**	0.020808	1.766337	0.0813
LFI	0.003633*	0.001638	2.218420	0.0295
F-statistic	3.806697			
Prob (F-statistic)	0.026515			

Notes: The value is significant at 5% (*), 10% (**)

Source: Data estimation

Kusnetz theory of inequality reveal that inequality will increase at the beginning of development in line with the increase in per capita income. General land border region emerging after the regional autonomy in 1999, and again more rapid development since the establishment of the National Agency for Border Management (BNPP). New development rapidly within less than 10 years, making income inequality in the land border will continue to increase. It also encouraged local governments desire of each region to continue to build the infrastructure to open the isolation of the area and increase incomes.

From the model of inequality it is inferred that the percentage of workers in the industrial sector has a positive effect on income inequality. The variable elasticity is 0.0036, which means that every 1% increased in the number of workers in the industrial sector will boost the inequality of 0.0036% *ceteris paribus*. Labor income differences between the industrial sector and the agricultural sector will lead to the occurrence of income inequality in society. In the agricultural sector there is excess labor and characterized by the marginal productivity of labor is equal to zero, while the industrial sector has high productivity. The high productivity will generate higher revenue, so that the people who work the land border areas in the industrial sector will increase income inequality, because most people are still working in the agricultural sector.

CONCLUSION

Infrastructure has a positive impact on the growth of per capita income. In the period 2007-2011 the social infrastructure is more dominant in influencing the growth of per capita income in the land borders of Indonesia. The social infrastructures are education and health. Economic infrastructure that plays a role in the growth of income per capita is telecommunication.

Inequality in the land borders of Indonesia is directly affected by income per capita and the number of workers in the industrial sector. Infrastructure development is not directly influence the increase in inequality, namely through increasing per capita income. At land border region during the period 2007-2011 the development of social infrastructure will increase income inequality.

From the conclusion, we suggest that the decision makers should accelerate economic growth in the Indonesia land border. We also suggest that the re-gency/city land border authority should pay more attention to the quantity and quality of social infrastructure such as education and health. Economic infrastructure such as roads, bridges, and airports are important to open the isolation of a region, but to pursue the growth of income per capita is high, the construction of social infrastructure better able to encourage economic growth.

We also suggest that the re-gency/city governments at land border region to appropriately implementing 12-year compulsory education policy. This policy is important in providing qualified human resources to enter the workforce, especially of vocational graduates. Moreover, government must further develop health centers, sub health centers and mobile clinics in improving the level of public health. That health facility can improve to be inpatient clinic and 24-hour clinic.

The paper also concludes that the range expansion of telecommunications networks, especially the wireless telecommunications, have improved massively, due to the wide range of telecommunications to the border area will be open access to the public information on the border. Other impacts are any events or problems that occurred in the border region, both the security issues and other issues, will be more easily recognized and will improve handling response.

Infrastructure, social, economic, and administrative development should be done thoroughly and continuously to accelerate the distribution of income in the land border of Indonesia. Infrastructure should be developed in an integrated way.

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