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IMPACT OF TOLL ROAD DEVELOPMENT ON MODERN RETAIL GROWTH IN INDONESIA

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Abstract: This study would like to see the impact of toll road development on retail industry growth especially modern retail by taking the construction of the Trans Java toll road in Indonesia. Using a difference-in-differences (DID) approach, this study analyzes the effect of the Trans Java Toll Road in 7.656 villages crossed by the toll road from 2006 to 2018. The result shows that, on average, after the Trans Java toll road program, the trend of increasing the number of minimarkets in villages crossed by the Trans Java toll road is 0.53 units larger compared to The villages that don't cross by the Trans Java toll road. But the results show that there is no significant effect of the Trans Java toll road on the number of traditional stores, namely the grocery store as traditional retail. It can be seen that toll road development programs tend to open up access to the growth of the modern retail industry in Indonesia.

Keywords: Toll Road; Retail Industry; Minimarket; Traditional Stores; Difference-in-differences.

INTRODUCTION

The development of toll road infrastructure has a positive impact on regional economic growth, which can simultaneously reduce production costs and logistics costs. Toll road access connections in an area can increase location advantages, attract inflows from production factors and facilitate trade implementation to lead to economic growth. In addition, toll roads also affect the improvement of domestic trade efficiency because they can reduce travel time and logistics travel costs. The construction of toll roads has a positive influence on increasing household income in the manufacturing sector and retail sectors around the region. This makes it easier for manufacturers to reach a wider market at a lower cost (Zhang et al., 2020) (Yoo & Hoon, 2016) (Shatz, Howard J; Kitchens, Karin E; Rosenbloom, 2011).

Existing studies say that the pattern occurs in fulfilling the provision of modern retail supplies such as supermarkets, one of which is due to good infrastructure access. (Reardon & Hopkins, 2006) Infrastructure development results in massive increases in connectivity in various regions, especially for the areas through which it passes which will eventually open new centers of economic growth and integrated special economic zones (Feder, 2018). However, infrastructure development can cause negative externalities for residents around the development area which include air pollution and noise pollution (Glaeser, 2018). Thus, the extent of the effect of toll road construction in encouraging the growth of the retail industry, both modern retail and traditional retail, is still unknown.

This study wants to see how the impact of toll road construction on the growth of the retail industry in the area it passes. To be able to support the research question, this study wants to see the effect of toll road construction on the growth of the retail industry. In this study, the author tries to analyze the influence of toll roads on the retail industry, where the transformation of the retail industry can be represented of them by the increase in the number of supermarkets. In addition, this study also wants to see the influence of toll roads on traditional retail. The existence of the Trans Java toll road is expected to affect the number of grocery stalls/stores due to the increase in access and economic activity generated by toll road construction (Berger & van Helvoirt, 2018).

Toll roads have a far-reaching impact on economic growth. The construction of toll roads significantly increases local economic growth. (Chandra & Thompson, 2000a) (Zhang et al., 2020) Private involvement is also needed due to limited government funding for infrastructure development (Macário, 2010). The provision of new infrastructure in the field of transportation is expected to create new opportunities for local companies and workers. This will produce spillover effects by affecting trading locations, household income, government tax revenues as well as general economic performance in the region. (Yoshino & Abidhadjaev, 2017) Spillover effects have a positive and significant influence on capital or public capital, especially those aimed at

transportation infrastructure on regional productivity (Condeço-melhor et al., 2014).

Investment in infrastructure stimulates economic activity, increases company productivity, improves economic performance, and leads to sustainable economic development and equal distribution of income. The retail sector (Zolfaghari et al., 2020) is one of the main economic activities in every urban area, where the retail sector creates jobs, a source of state income through taxes, and reflects the viability and ability of its people. By looking at the impact of toll road development on the retail industry as a policy evaluation, we can see how the process of economic equality between regions and also the increase in people's income which is ultimately expected to reduce poverty levels as a result of a policy, namely in this case investment in infrastructure (Erkip & Ozuduru, 2015).

The supermarket revolution is a process of expansion from traditional forms of retail to modern forms of retail. From a macro perspective, the acceleration of change is influenced by the rapid increase in people's income and also urbanization. At first, modern retail was aimed at consumers with high incomes and later expanded to middle and lower-class consumers. The first wave in the transformation of modern retail initially occurred in developed countries such as European and American countries. The next wave occurred in developing countries in Asia and was followed by countries in Africa (Maruyama et al., 2016) (Paper et al., 2016) (Schipmann et al., 2020). The area traversed by the toll road experienced an increase in income in the manufacturing industry, retail trade industry, and service industry. Based on this, the author wants to see how the impact of the construction of the Trans Java toll road on economic growth, especially the growth of the retail trade industry, in this case, can be represented by an increase in the number of minimarkets and an increase in the number of stalls/grocery stores in the area traversed by the toll road (Chandra & Thompson, 2000b).

The implementation of the Trans Java toll road construction specifically provides an opportunity for this study to analyze the impact of the construction of the Trans Java toll road on the growth of the retail industry, especially for the areas through which it passes. But so far, research that discusses directly the effects of toll road construction on the growth of the retail industry is still very limited. So this research is very important to be able to see the extent of the impact of toll road development, especially the Trans Java toll road run by the Government on the growth of the retail industry for the area it passes.

One of the challenges to evaluate the impact of the construction of the Trans Java toll road on the growth of the retail industry is that transportation infrastructure is not the only influencing factor. The transformation of modern retail is also driven by increased economic growth (Berger & van Helvoirt, 2018). To overcome the problem of endogeneity in the selection of locations traversed by the Trans Java Toll Road, this study uses a difference-in-differences (DID) approach to see how the impact of the Trans Java Toll Road development program in the growth of the retail industry in Indonesia. Through the DID approach, the villages traversed by the

Trans Java Toll Road are analyzed as treatment groups. While other villages that are not traversed by the Trans Java Toll Road are villages in one regency/city other than villages in one sub-district with the treatment group used as a group as a control group.

This research uses Village Potential data (PODES) from 2006 to 2018 issued by the Central Statistics Agency (BPS) as well as map data and location distribution of all Trans Java toll road sections managed by the Ministry of Public Works and Public Housing, especially the Toll Road Management Agency hereinafter referred to as BPJT. Podes data is used to obtain data at the village level because they want to see the Trans Java Toll Road construction program carried out at the village level, where the growth of the retail industry represented by the existence of minimarkets and stalls/grocery stores at the village level has a more even distribution compared to supermarkets which are mostly located in the city center. With the DID approach, the effect of the Trans Java toll road on the growth of the retail industry in villages/ ward was measured by comparing the number of minimarkets and also the number of stalls/grocery stores in the treatment group compared to the control group before and after the policy.

Literature

Toll road infrastructure can affect the economy in several ways, almost all of which are related to increased mobility. Increased mobility can increase the speed at which producers reach markets or inputs, allowing them to lower costs and produce on time (Shatz et al., 2011). Transport infrastructure is considered social capital and basic in economic development. Because transportation infrastructure is the main determinant of transaction costs to be more efficient, economic growth is influenced by the construction and improving the quality of transportation infrastructure (Zhang et al., 2020). In addition to long-term effects, toll road infrastructure can also increase economic activity through direct construction activities resulting from investment in the construction of new toll roads (Shatz et al., 2011).

Improving transportation infrastructure is crucial in the global economy, where the flow of people, goods, and information is a key aspect of a country's competitiveness. Infrastructure investment has implications for people being able to move faster, and more efficiently and use fewer economic resources, which increases the flow of people and goods. Over time, this will result in (Condeço-melhor et al., 2014) spillover effects by affecting trading locations, household income, government tax revenues as well as general economic performance in the region (Yoshino & Abidhadjaev, 2017). Some studies show spillover effects are defined as the positive effects of transport infrastructure that extends beyond the regional boundaries in which it is located (Condeço-melhor et al., 2014).

Improving transportation infrastructure has an impact on the accessibility of an area by reducing transportation costs and increasing the superiority of the local area. Therefore,

accessibility is an important factor for economic development because areas that benefit from high accessibility are usually richer and have benefits in economic activity in the region (Condeço-melhor et al., 2014). Toll roads can simultaneously reduce the cost of goods and factors in transportation, affecting the economy on both sides of production and consumption (Zhang et al., 2020). The area traversed by the toll road experienced an increase in income in the manufacturing industry, retail trade industry, and service industry. The area traversed by the toll road experienced an increase in trade-related activities such as trucking and retail sales (Chandra & Thompson, 2000b) (Michaels, 2008).

The construction of toll roads significantly increases local economic growth. The expansion of the toll road network can reduce transportation costs which will later result in an increase in market potential and contribute to local economic growth. Toll roads influence economic growth by attracting investment and promoting the consumption of goods. (Zhang et al., 2020)Social infrastructure has a major impact on the economic growth of the industrial sector and the service sector. Planning in optimizing the allocation of government capital expenditure is needed to reduce inequality in various regions, especially those with inappropriate inequality indexes (Zolfaghari et al., 2020).

Since the 1990s, the growth of modern retail has become a global phenomenon and spread throughout the developing world. The demand for modern retail in developing countries is further accelerated by structural changes in infrastructure and people's living conditions. These include growing urbanization, private vehicle ownership, better access to public transportation, and women's participation in the workforce. Urbanization and the size of a city is an important keys to economic growth especially the growth of the retail industry. The growth of the retail industry forms a retail transformation where there is transformation from traditional or informal retail to modern retail. Retail transformation generally occurs in developing countries (Paper et al., 2016) (Dholakia et al., 2018a) (Berger & van Helvoirt, 2018).

The supermarket revolution in developing Asia began in the early 2000s and continues to this day. The revolution increased modern retail rapidly, especially in the food sector at the expense of traditional stores or wet markets (Reardon et al., 2012). Supermarkets offer one-stop shopping where middle-to-upper consumers through private vehicles can have a larger storage capacity. In contrast to most traditional store conditions that have limited land space the goods sold are not affordable and not even visible to buyers. This causes more traditional stores to use counter service systems or (Maruyama et al., 2016) services by sellers rather than self-service/self-service or own service by buyers (Dholakia et al., 2018b).

The rapid restructuring of the retail market increases productivity and provides a higher quality supply to consumers and the modernization process is inevitable. But on the other hand, there is opposition to liberalization in the modern retail industry because it causes problems for traditional retailers who are unable to compete. Therefore, policies from the government

are needed that can be a meeting point of problems between modern retail and traditional retail. Government policies should embrace a new conceptualization of the retail sector where formal and informal retailers can coexist (Berger &; Helvoirt, 2018) (Paper et al., 2016).

Modern retail is beginning to adapt by reducing prices to cover low-income segments of society. This is also supported by economic growth and globalization which causes an increase in household income. However, modern retail does not always offer competitive prices compared to informal traders so the lower class with limited income cannot access modern retail. (Schipmann et al., 2020) Hybrid systems of modern retail and traditional retail are needed in food fulfillment in all segments of society. In the absence of modern retail, consumers face implicit tariffs in the form of inefficient transportation, distribution, wholesale, and retail. Consumer transportation capabilities, where ownership of personal transportation is the main reason consumers shop at stores with modern retail formats. Spatial considerations about increasing the size of cities and decreasing distances to cities have a significant positive effect on purchasing power when they have increased access to markets.(Berger & van Helvoirt, 2018) (Bronnenberg et al., 2015) (Maruyama et al., 2016) (Dolislager, 2017).

Toll Road Development Policy in Indonesia

Jagorawi toll road is the first toll road in Indonesia which began operating in 1978 with a length of 59 km. The toll road connects 3 (three) regencies/cities namely Jakarta, Bogor, and Ciawi built by PT. Jasa Marga. Then from 2004 to 2005, the government issued changes to regulations governing toll roads through Law No. 38 of 2004 concerning Roads and Government Regulation No. 15 of 2005 which regulates more specifically toll roads. Both regulations mandate the establishment of BPJT as a toll road regulator in Indonesia which replaces the role of regulators that have been in PT. Jasa Marga. With the establishment of BPJT as the new regulator, toll road development in Indonesia has again entered an acceleration phase. The government began to invite the private sector in terms of toll road infrastructure development through the Build, Operate, and Transfer (BOT) mechanism. To accelerate the process of infrastructure development in Indonesia, the Government issued Presidential Regulation Number 3 of 2016 concerning the Acceleration of the Implementation of National Strategic Projects, which was later amended through Presidential Regulation Number 58 of 2017. The government is accelerating several national strategic projects, which involve the Central Government, Regional Governments, and Business Entities. The construction of the Trans Java Toll Road is included in the national strategic project that is the focus of the Government. In 2018, the Trans Java toll road has been fully operated with the inauguration of 3 (three) toll roads in Central Java and 4 (four) toll roads in East Java.

MATERIALS AND METHODS

This study uses the difference-in-differences (DID) method to see the impact

of before and after the Trans Java toll road policy on the villages traversed on the number of minimarkets and the number of stalls/grocery stores in the area. The DID method requires a treatment group and a control group to be able to see parallel trends before the policy shock of a policy. Using the DID method we can measure the (Zhang et al., 2020)net effect of a policy by comparing changes in average outcomes between treatment groups and changes in average outcomes of control groups, so this method is widely used as a policy evaluation tool. (Card & Krueger, 1994; Gultom, 2019; Lucas & Mbiti, 2012).

Through the DID approach, villages traversed by the Trans Java toll road (Toll Road village) are analyzed as treatment groups. Sedan villages that are not traversed by the Trans Java toll road (Non-Toll Road villages) are villages located in one district/city with treatment villages other than villages in one district with treatment villages used as control groups. In addition, to clarify the comparison between the treatment group and the control group, this study does not include one district that is still in one sub-district with the treatment village as a control village because it is estimated that it is still getting the effect of the Trans Java toll road policy on these villages.

The Year Toll variable, which is a dummy variable, is needed to reflect the first year of operationalization of Trans Java toll road sections and the years after because each toll road section has a different operational year. In this case, the toll road sections used are toll road sections that have the first year of operationalization in 2006-2018. The main thing in the DID method is the interaction between Toll Road and Year Toll which aims to see the effect or impact before and after development by the Trans Java toll road on micro retail modernization in the area. In addition to the availability of toll road infrastructure, the growth in the number of minimarkets and the number of grocery stalls/stores may be influenced by other factors, including low conflict and low crime in the area. Conflict can lead to an influence on retail(Esmark & Noble, 2016a). In addition, regions that have higher rates of violent crime, have fewer food retailers(Singleton & Cooper, 2019). So to be able to capture the influence of these factors, the model in this study uses conflict or mass fights (conflict) and crime (crime) as control variables.

Based on the description above, the basic equation of the DID model is:

$$\begin{aligned}\mathrm{Minimarket}_{it} = \beta_0 + \beta_1\ \mathrm{DTollRoad}_{it} \\ + \beta_2\ \mathrm{DYearToll}_{it} + \\ \beta_3\ \mathrm{DT\ oll\ Road}_{it} \times \mathrm{DYearToll}_{it} + \\ \sum_{k=2}^{n} \beta_k\, \mathrm{control}_{it} + \gamma_i + \delta_t + u_{it} \quad (1)\end{aligned}$$

where $\mathrm{Minimarket}_{it}$ is the number of minimarkets in village I in the period of year t; is $\mathrm{DTollRoad}_{it}$a dummy application of the Trans Java toll road development policy in village I in the period of year t, if the value is 1 then the village is passed by the Trans Java toll road, if the value is 0 it is the opposite; is the $\mathrm{DYearToll}_{it}$dummy year of implementation of the Trans Java toll road policy and the following years in village I in the period of year t, if the value is 1 then the area is passed by the Trans Java toll road that has been operational in that year, if the value is 0 it is the opposite; is $\sum_{k=2}^{n} \beta_k\, \mathrm{control}_{it}$ a control variable consisting of dummy conflict in village I in

the period of year t, if the value is 1 then in the area there has been a conflict or mass fight in the last 1 (one) year, if the value is 0 is the opposite; and dummy crime in village I in the period of year t, if the value is 1 then in the area has occurred in the last 1 (one) year, if the value is 0 is the opposite; γ_i is random effects; is $\delta_t$the year effect, and u_{it} is the error term for each number of minimarkets in village I in the period of year t. The use of year effects is to capture the average outcome in each village each year, to ensure that the main explanatory coefficient (β_3) can measure variations in the impact of Trans Java toll road construction each year.

Analysis using the DID method focuses on looking at the coefficients of interaction between variables $\mathrm{DTollRoad}$ and variable cap $\mathrm{DYearToll}$. From equation (1) we can see that the coefficient of the interaction variabl $\mathrm{DT\ oll\ Road} \times \mathrm{DYearToll}\ \beta_3$ is the treatment effect, which is the difference in the average outcomes after and before the policy in the treatment group minus the difference in the average outcomes after and before the policy in the control group. In this study, to better capture existing variations, analysis methods were used using the unbalanced panel data method and using random effects.

Before identifying the impact of Trans Java toll road construction on the number of minimarkets using the DID method, it is necessary to prove the common pre-treatment trend assumption. The focus of the DID method is to identify trends between treatment and control groups before policy. To control for potential confusion in the presence of other factors that can influence the dependent variable, a trend of time before the policy is included to be able to separate the effects of the policy. Although the purpose of the (Lucas & Mbiti, 2012) common pre-treatment test is to overcome other factors that can affect the dependent variable, this study still uses control variables as explained above with the basic equation model (1). This assumption requires that there is a similar trend in the number of minimarkets in control and treatment villages before the implementation of the Trans Java toll road development policy.

In checking the common pre-treatment trend or parallel trend assumption, this study follows the method used and uses the basic model of the regression equation as follows: (Gultom, 2019) (Muralidharan & Prakash, 2013).

$$\begin{aligned}\mathrm{Minimarket}_{it} &= \beta_0 + \beta_1 \mathrm{timerescale} \\ &\quad + \beta_2 \mathrm{timerescale} \\ &\quad \times \mathrm{DTollRoad}_{it} + \\ &\gamma_i + \delta_t + u_{it} \qquad (2)\end{aligned}$$

where $\mathrm{Minimarket}_{it}$ is the number of minimarkets in the village I in the period of year t; is a $\mathrm{timerescale}$dummy time rescale variable for each village, where 0 is the first year of implementation of the Trans Java toll road policy (in this study 20 06 is used as the first year of implementation of the Trans Java toll road policy, the common pre-treatment test aims to see the similarity of trends before 2006); -1,-2,-3, etc. are the years before the implementation of the Trans Java toll road policy in each village, and 1,2,3, etc. is the opposite; is a dummy village affected by the Trans Java toll road policy program, where 1 is the village traversed by the Trans Java toll road, while 0 is the opposite.

For assumption tests in classical regression, heteroscedasticity tests, and autocorrelation tests are not performed, because the panel data sets used in this study have a considerable number of observations, but only have a small time variation. The regression panel data in this study was estimated using the clustered standard errors method, which can overcome the problem of heteroscedasticity and autocorrelation. Thus, there is no need for the heteroscedasticity test and autocorrelation test (Wooldridge, 2010).

In addition, to strengthen the results of the study, in this study DID regression was also carried out to see the impact analysis of the Trans Java toll road construction program on the number of Grocery Stalls/shops. The DID equation used to measure the impact of the effect of the Trans Java toll road on the number of Grocery Stalls/shops is as follows:

$$\begin{gathered}\text{sub} - \\ \text{Kelontong Warung\_Toko\_Kelontong}_{it} = \\ \beta_0 + \beta_1 \, \text{DTollRoad}_{it} + \beta_2 \, \text{DYearToll}_{it} + \\ \beta_3 \, \text{DTollRoad}_{it} \times \text{DYearToll}_{it} + \\ \sum_{k=2}^{n} \beta_k \, \text{control}_{it} + \gamma_i + \delta_t + u_{it} \quad (3)\end{gathered}$$

where $\text{Warung\_Toko\_Kelontong}_{it}$ is the number of stalls/grocery stores in village I in the period of year t; is DTollRoad_{it}a dummy application of the Trans Java toll road development policy in village I in the period of year t, if the value is 1 then the village is passed by the Trans Java toll road , if the value is 0 it is the opposite; is the D Year Toll_{it}dummy year of implementation of the Trans Java toll road policy and the following years in village I in the period of year t, if the value is 1 then the area through which the Trans Java toll road has been operational in that year, if the value is 0 it is the opposite; for the same variable $\sum_{k=2}^{n} \beta_k \, \text{control}_{it}$ as used in equation (1); γ_i is random effects; is the year $\delta_t$effect, and u_{it} is the error term for each number of stalls/grocery stores in village I in the period of year t. A common pre-treatment test is also performed before analyzing the equation (4).

Data and Sample Characteristics

In this study, an analysis method using panel data was used. The panel data used is secondary data obtained from PODES data in 2006, 2008, 2011, 2014, and 2018 issued by BPS. In addition to data from BPS, this study also uses data from the Ministry of PUPR namely maps and locations of all Trans Java toll road sections that are operational from 2006 to 2018. The data we get from the Ministry of PUPR, especially BPJT is data in the form of a Geographic Information System (GIS) which is then processed so that it can see all village data traversed by the Trans Java toll road.

This study only focuses on villages traversed by the Trans Java toll road which was operational from 2006 to 2018. Data on maps and locations of all Trans Java toll road sections derived from GIS are combined using village id and village data derived from PODES data. The total number of villages used as treatment villages is 628 villages. Villages located in one regency/city other than one sub-district with villages traversed by the Trans Java toll road are used as control villages except for villages that are in one sub-district with treatment villages. So that the total number of villages sampled in this study are 7,656 villages.

In Table 4.1 we can see the characteristics of the sample villages at the beginning and end of the study year. The area traversed by the Trans Java toll road or Toll Road village has a higher average increase in the number of minimarkets if we compare it with Non-Toll Road villages. Then the percentage of villages that experienced conflicts or mass fights that occurred in the last 1 (one) year (conflict) in the first year of the policy, conflicts in Toll Road villages were higher than those of Non-Toll Road villages. This becomes relevant to the assertion that conflict can cause influence retail (Esmark & Noble, 2016b).

Table 1. Characteristics of Sample Villages

	Desa Toll Road		Desa Non Toll Road	
	2006 (n=578)	2018 (n=628)	2006 (n=6.593)	2018 (n=6.462)
Average Number of Minimarkets	0.28 Unit	1.46 Unit	0.26 Unit	1.17 Unit
Average Number of Stalls/Grocery Stores	38.56 Unit	43.64 Unit	35.25 Unit	43.63 Unit
Percentage of villages with Conflict in the last 1 (one) year	3,96%	4,61%	2,81%	4,03%
Percentage of villages with Crime in the last 1 (one) year	59,68%	67,19%	52,51%	65,11%

Source: BPS processed, 2020

In table 1. we look at the number of minimarkets in Toll Road villages and the number of minimarkets in Non Toll Road villages from 2006 to 2018. There is a difference in the number of villages in the treatment group and the control group, of course, we cannot compare directly about the comparison of the number of minimarkets.

Table 2. Number of Minimarkets in Toll Road Village and Non Toll Road Village Source: BPS processed, 2020

Tahun	2006	2008	2011	2014	2018
Desa Toll Road	166 (n=578)	285 (n=624)	707 (n=627)	880 (n=627)	923 (n=628)
Desa Non Toll Road	1.724 (n=6.593)	2.353 (n=6.593)	5.710 (n=6.438)	6.173 (n=6.468)	7.613 (n=6.462)

Sumber: BPS diolah, 2020

RESULTS AND DISCUSSION

Toll Road Effect on the Number of Minimarkets

The first step to be able to see how much effect the construction of the Trans Java toll road has on the growth of the retail industry in the villages it passes, will be a pre-treatment test using minimarkets as the dependent variable. The test was conducted to be able to see the similarity of trends at the time before the implementation of the policy. The purpose of the common pre-treatment test is to address other factors that may affect the dependent variable. If there is a common trend between the treatment group and the control group before the implementation of the policy, then the use of toll road development policy variables is considered sufficient and no control variables are needed in the equation model. However, this study still uses control variables in the equation model to be able to see the consistency of the regression results of the equation.

Before analyzing the impact of the construction of the Trans Java toll road on the number of minimarkets, we need to conduct a common pre-treatment test to be able to see the similarity in the trend of the number of minimarkets between the treatment group and the control group before the policy.

Table 3. Common Pre-treatment Test Results Number of Minimarkets

Dependent Variable : Number of Minimarkets	Pre-treatment coefficient
Independent Variable:	
timerescale	0.0227***
	(0.00521)
timerescale × DTollRoad	0.00230
	(0.00645)
Observations	23,177
Number of Villages	7,647

Note: confidence level 99% (***), 95% (**), 90% (*).
Clustered standard errors based on villages in parentheses.

Source: data processed, 2020

Based on the results in Table 3. it can be seen that the interaction between timerescale × DTollRoad , indicated by the coefficients β_2 shows insignificant results. From these results, the null hypothesis cannot be rejected in this common pre-treatment test. Theresults of the common pre-treatment test showed a similar trend between the number of minimarkets in the treatment group and the control group before the implementation of the Trans Java toll road development policy operating in the treatment group. These results show that there is no need for

control variables in the equation model. Showing trends during the pre-treatment period or the period before the policy (time rescale < 0) shows no difference in trends or commons regarding the average market amount between the treatment group and the control group.

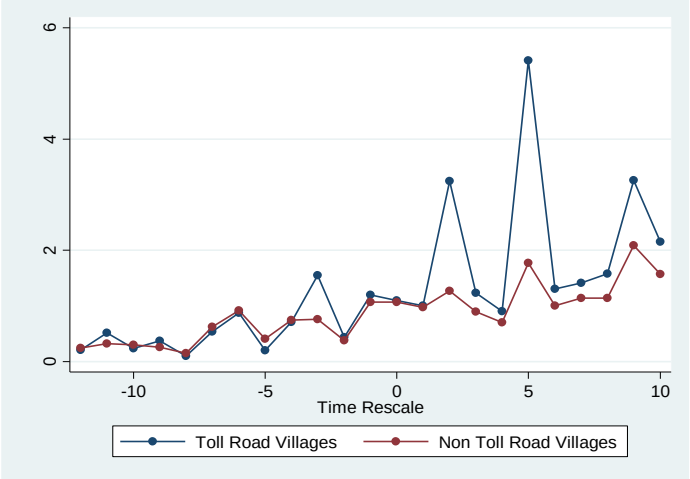

Figure 1. Average Trend in the Number of Minimarkets Source: data processed, 2020

From table 3. using the treatment model group (1) we can see that the value of the coefficient of the interaction variable () is positive, which is 0.53 in column (1) and $\mathrm{DTollRoad} \times \mathrm{DYearToll}$ β_3 0.53 in column (2) and significant at the level of 5% in both. The interaction coefficients in column (1) and column (2) show that on average, after the construction of the Trans Java toll road, the trend of increasing the number of minimarkets in villages traversed by the Trans Java toll road is higher by 0.53 units when compared to villages that are not traversed by the Trans Java toll road and is significant at 5% level. This result remains consistent even if some control variables are added to column (2

Table 4. Effects of Trans Java Toll Road on the Number of Minimarkets Group Treatment Model (1)

	Basic Model	Models with Control Variables
Dependent Variable : Number of Minimarkets	(1)	(2)
Independent Variable:		
$\mathrm{DTollRoad} \times \mathrm{DYearToll}$	0.530**	0.531**
	(0.226)	(0.228)
Conflict		0.560***
		(0.108)
Crime		0.316***
		(0.0360)

Observations	35,419	35,419
R-squared	0.016	0.013
Number of Villages	7,656	7,656

Note: confidence level 99% (***), 95% (**), 90% (*).
Clustered standard errors based on villages in parentheses.
Variables and variables are included in the regression but are not reported.$\mathrm{DTollRoad_{it}}$ $\mathrm{DYearToll_{it}}$

Source: data processed, 2020

This finding shows that the Trans Java toll road program has an impact on increasing the average number of minimarkets in villages traversed by the Trans Java toll road when compared to villages not traversed by the Trans Java toll road, where the increasing number of minimarkets can illustrate the growth of the retail industry in the region. So we can conclude that after the construction of the Trans Java toll road, the number of minimarkets in the area traversed on average has increased when compared to areas that are not traversed by toll roads. The hope of the growth policy of the modern retail sector in the area traversed by the Trans Java toll road, will later create jobs, increase sources of state revenue through taxes, and ultimately will increase the feasibility and eliminate economic inequality between regions (Erkip &; Ozuduru, 2015; Zolfaghari et al., 2020).

In the PODES data used, several villages do not have minimarkets, so the dependent variable is 0 (zero). To be able to anticipate data administration problems, considering that several villages do not have minimarkets, to be able to test the consistency of the estimation results from equation (1), this study is the first robustness check. The estimation made does not make village I in period T a sample in the calculation when the value of the number of minimarkets in Village I in period T value 0 (zero). Each regression result in this study uses the clustered standard errors method. The main model in this study uses villages traversed by the Trans Java toll road as a treatment group and does not include villages in the same sub-district with villages traversed by the toll road as a treatment group because it is estimated that these villages still get the effects of the Trans Java toll road policy.

Then the authors performed a robustness check using 2 different additional treatment group models. First, the author uses model (2) where the equation used is the same as the basic equation of model (1) but with a different treatment group. The treatment group in the model (2) only included villages located near the Trans Java toll gate to be able to capture variations in the sample area and see the consistency of the results. The treatment group in the model (3) included all villages in one sub-district with villages traversed by toll roads to be able to capture variations in the sample area and see the consistency of the results.

Table 5. Comparison of Robustness Check Effect of Trans Java Toll Road on Number of Minimarkets in 3 (three) Treatment Group Models

	Model (1) Village Treatment Group Passed by Toll Road (n=628 villages)		**Model (2) Village Treatment Group located at the Toll Gate (n=87 villages)**		**Model (3) Treatment Group of All Villages located in one sub-district with villages traversed by toll roads (n = 2440 villages)**	
	Basic Model	Models with Control Variables	Basic Model	Models with Control Variables	Basic Model	Models with Control Variables
Dependent Variable : Number of Minimarkets	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variable:						
$\mathrm{DTollRoad} \times \mathrm{DYearToll}$	0.530**	0.531**	1.747*	1.754*	0.370***	0.370***
	(0.226)	(0.228)	(0.962)	(0.968)	(0.0928)	(0.0935)
$\mathrm{Conflict}$		0.560***		0.595***		0.476***
		(0.108)		(0.117)		(0.0902)
Crime		0.316***		0.330***		0.302***
		(0.0360)		(0.0347)		(0.0339)
Observations	35,419	35,419	32,760	32,760	43,831	43,831
R-squared	0.016	0.013	0.017	0.014	0.017	0.015
Number of Villages	7,656	7,656	7,115	7,115	9,468	9,468

Note: confidence level 99% (***), 95% (**), 90% (*).

Clustered standard errors based on villages in parentheses.

Columns 1, 3, and 5 are the base model; and columns 2, 4 and 6 are the base model with controls

Variables and variables are included in the regression but are not reported.$\mathrm{DTollRoad}_{\mathrm{it}}$ $\mathrm{DYearToll}_{\mathrm{it}}$

Source: data processed, 2020

Table 5. We can compare the results of the estimated basic equation of model (2) by using only villages located at the Trans Java toll gate as a treatment group. The estimation results from the robustness check model (2) which only uses villages located at the Trans Java toll gate as a treatment group shows consistent results. From Table 5. In model (2) we can see that the value of the coefficient of the interaction variable () $\mathrm{DTollRoad} \times$ $\mathrm{DYearToll}$ is positive, which is 1.74 in column (1) with a significant level of 10%, and of 1.75 in column (2) with a significant value at the level of 10%. β_3

We can see that the results of the robustness check model (2) remain consistent with the main results of the study in Table 3, so this can strengthen the main results of the study, namely the Trans Java toll road construction program has an impact on increasing the average number

of minimarkets in villages traversed by the Trans Java toll road when compared to villages that are not traversed by the Trans Java toll road. From these results, we can see that the effect of the Trans Java toll road with a treatment group that only uses villages located at toll gates has a higher effect if we compare it with treatment groups that use villages with locations along the Trans Java toll road. This shows that the closer the village is to the toll gate, the more it has a strong effect on the number of modern retailers in the village.

Then from table 4. We can also compare the results of the estimation of the basic equation of model (3) using all villages traversed by the Trans Java toll road including villages in one sub-district as a treatment group. The estimation results from the robustness check model (3) which uses all villages traversed by the Trans Java toll road including villages in one sub-district show consistent results. From Table 4. in model (3) we can see that the value of the coefficient of the interaction variabl $\mathrm{DTollRoad} \times \mathrm{DYearToll}$ β_3 () is positive, which is 0.37 in column (1) with a significant at level 1 %, and 0.37 in column (2) with a significant at level 1%.

We can see that the results of the robustness check model (3) remain consistent with the main results of the study in Table 3. So that this can strengthen the main results of the study, namely the Trans Java toll road construction program has an impact on increasing the average number of minimarkets in villages traversed by the Trans Java toll road when compared to villages that are not traversed by the Trans Java toll road. The results of Table 4. model (3) show that the use of treatment groups using all villages located in one sub-district with villages traversed by the Trans Java toll road has a smaller coefficient value than model (1). The results show that the effect of the construction of the Trans Java toll road using villages with a wider scope with toll roads as the treatment group, shows a smaller effect when compared to the treatment group in Table 3. Thus, we can conclude that the farther the location of the village from the Trans Java toll road, the smaller the effect of the Trans Java toll road.

Although model (2) and model (3) in Table 3. show consistent results, this study still use the estimation results from Table 3. as the main model because estimation using the model is considered to have the number of observations and variations in control and treatment areas that are more precise which only use villages traversed by the Trans Java toll road as a treatment group. From the estimation results of the three equation models in table 4. all of them show positive and significant effects. This finding certainly supports the statement of Chandra & Thompson who said that the area traversed by toll roads experienced an increase in income in the manufacturing industry, retail trade industry, and service industry, whereas in this study the villages traversed by toll roads experienced an increase in the retail trade industry through an increase in the number of minimarkets (Chandra &; Thompson, 2000).

Toll Road Effect on Number of Grocery Stalls/Stores

Then testing equation (3) was carried out to see the impact of the Trans Java toll

road on the number of stalls/grocery stores, with the test steps being the same as equation (1). The common pre-treatment test is obtained by regressing equation (2) but using the dependent variable of the number of grocery stores. The results of the common pre-treatment test are presented in Table 6.

Table 6. Common Pre-treatment Test Results Number of Grocery Stalls/Stores

Dependent Variable : Number of Grocery Stalls/Stores	Pre-treatment coefficient
Independent Variable:	
timerescale	-0.646***
	(0.222)
timerescale × DTollRoad	-0.189
	(0.270)
Observations	23,177
Number of Villages	7,647

Note: confidence level 99% (***), 95% (**), 90% (*).
Clustered standard errors based on villages in parentheses.
Source: data processed, 2020

Based on the results in Table 6. it can be seen timerescale × DToll Road that the interaction between, represented by the coefficient β_2, is not statistically distinguishable from zero (insignificant), so we cannot reject the null hypothesis of this common pre-treatment test. Thus, the results of the common pre-treatment test show a similar trend between the number of stalls/grocery stores in the treatment group and the control group before the implementation of the Trans Java toll road development policy. With the similarity in trends before the implementation of the Trans Java toll road development policy.

Empirical tests are carried out by estimating by regression of panel data using equation (4). From table 5.5 we can see that the coefficient values of the interaction variables are negative, which are -3.613 and -3.566 in the base model in column (1) and the model with the control variable in column (2). However, the results of both models show no signs of the Trans Java toll road to the number of grocery stalls/stores. β_3DTollRoad × DYearToll

Table 7. Effects of Trans Java Toll Road on the Number of Grocery Stalls/Stores

	Basic Model	Models with Control Variables
Dependent Variable: Number of Grocery Stalls/Stores	(1)	(2)
Independent Variable:		
DTollRoad × DYearToll	-3.613	-3.566

	(2.543)	(2.557)
Conflict		6.535**
		(2.756)
Crime		9.342***
		(0.742)
Observations	35,419	35,419
R-squared	0.009	0.007
Number of Villages	7,656	7,656

Note: confidence level 99% (***), 95% (**), 90% (*).

Clustered standard errors based on villages in parentheses.

Variables and variables are included in the regression but are not reported.$\mathrm{DTollRoad}_{it}$ $\mathrm{DYearToll}_{it}$

Source: data processed, 2020.

Although there is no significant influence from the impact of the construction of the Trans Java toll road on the number of stalls/grocery stores in the village traversed by the Trans Java toll road, the increase in the number of minimarkets is considered to have been able to represent the growth of the retail industry as a result of the construction of the Trans Java toll road. This is in line with the statement that the transformation of modern retail can be represented of them by the increase in the number of supermarkets (Berger & van Helvoirt, 2018). However, the government still needs to pay attention to support for the traditional retail sector because the segmentation of traditional retail is a middle to lower-class community and requires attention to fulfilling their consumer goods. Support for traditional retail can be provided in the form of programs or assistance that can stimulate traditional retail to remain competitive with modern retail.

CONCLUSIONS

This research shows that the implementation of the Trans Java toll road development policy carried out in areas traversed by the Trans Java toll road can encourage modern retail growth. This study shows that on average after the Trans Java toll road program operates, the trend of increasing the number of minimarkets in villages traversed by the Trans Java toll road is higher by 0.53 units when compared to villages that are not traversed by the Trans Java toll road and this result is significant at the level of 5%. The increase in the number of minimarkets in the treatment group is the influence of the existence of the Trans Java toll road. The presence of the Trans Java toll road can provide opportunities for the development of the modern retail industry.

In addition, this study also found that there was no significant influence of the impact of the construction of the Trans Java toll road on the number of stalls/grocery stores in villages traversed by the Trans Java toll road even though the coefficient of the interaction variable showed a negative value. The toll road development program policy can be one solution to encourage economic improvement through the growth of the retail industry in the areas it

passes. Referring to this, the government needs to continue the integrated toll road development program to have an impact on the growth of the retail industry. Toll road construction must still pay attention to a balance that not only supports modern retail, but the government still needs to pay attention to traditional retail by providing stimulants that can encourage traditional retail growth to be able to encourage competitiveness from traditional retail to modern retail.

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