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The Aviation Industry Development And The Economic Growth in Indonesia

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Abstract

Competition in the air transportation service business is currently experiencing very rapid development. This study looks at the effect of economic growth, population density, and provincial land transportation in Indonesia on the number of passengers and the number of cargo. This study uses statistical data on air transportation released by the Central Statistics Agency (BPS). The regression method used is the Fixed Effect. This study indicates that GDP per capita and government policies regarding upper and lower limit fares showed a significant positive effect on the number of passengers when not using the time trend. Furthermore, trucks are indicated to significantly affect cargo when they do not use the time trend. The policy to impose tariff limits can upset the market balance. When applying the upper limit rate is below the equilibrium price, it can cause excess demand.

Perkembangan Industri Penerbangan dan Pertumbuhan Ekonomi di Indonesia

Abstrak

Persaingan bisnis layanan jasa transportasi udara pada saat ini mengalami perkembangan yang sangat pesat. Penelitian ini melihat pengaruh pertumbuhan ekonomi, kepadatan penduduk, dan jumlah transportasi darat dan provinsi di Indonesia terhadap jumlah penumpang dan jumlah cargo. Studi ini menggunakan data statistik transportasi udara yang dirilis Badan Pusat Statistik (BPS). Metode Regresi *yang digunakan menggunakan Fixed Effect. Hasil penelitian ini menunjukkan bahwa Produk Domestik Bruto (PDB) per kapita dan kebijakan pemerintah mengenai tarif batas atas maupun bawah berhubungan positif dan signifikan terhadap jumlah penumpang. Selanjutnya variabel transportasi darat yang diwakili truk memiliki hubungan yang positif dan signifikan terhadap cargo. Studi ini juga menemukan kebijakan penerapan batas tarif dapat menganggu keseimbangan pasar. Ketika penerapan tarif batas atas dibawah harga keseimbangan dapat menimbulkan excess demand.*

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The aviation industry is a service industry. It has undergone significant development. The evidence shows the increased numbers of airline passengers since the aviation industry regulation (Warpani, 2002). Heretofore, many studies investigated the correlation between the aviation industry and the economy. However, studies about the correlation of the economy toward the aviation industry development are still limited. Previous studies on China, one of the countries with fast-developing aviation industry, found the increased air volume due to the economic development, population, and land transportation availability (Hu, Xiao, Deng, Xiao, & Wang, 2015).

This research aims to determine the influence of economic development, population, and land-transportation availability of provinces in Indonesia toward the aviation industry development, seen from the numbers of passengers and cargo. The researchers analyzed the government policy influence about the upper and lower limit rates toward the numbers of passengers and cargo. This research was conducted in Indonesia because Indonesia is the largest and unique archipelago country. It makes the aviation industry grows quickly to connect all islands in Indonesia or to other countries.

Before implementing the aviation industry, the Government Regulation Number 40 Year 19995 about aviation transportation, the aviation industry of Indonesia only consisted of some airlines, such as Garuda Indonesia, Merpati, Mandala, and Sempati Air. After the regulation, the government opened the private national airline to exist and serve the scheduled flights with jet airplanes. Thus, there is a high increase in the national aviation industry. The indications of the aviation industry development are the presence of private-domestic airlines, such as Lion Air, Batavia Air, Sriwijaya Air, Wings Air, and some other airlines. Besides that, the aviation industry development is also observable from the increased numbers of domestic passengers. The numbers increased higher annually, with an average of 22% per year (Kompas, April 13, 2010).

The aviation industry in Indonesia has reached a significant growth from 2009 until 2018. It is observable from the numbers of passengers and cargo (see the Table 1 and Table 2 below).

Table 1. The Numbers of Passengers from 2009-2018

Years	Arrivals	Departures	Total
2009	42,565,099	41,691,082	84,256,181
2010	50,518,023	48,872,363	99,390,386
2011	59,035,279	59,275,637	118,310,916
2012	69,494,439	70,685,216	140,179,655
2013	77,568,403	73,624,917	151,193,320
2014	73,889,533	71,625,696	145,515,229
2015	75,593,248	72,615,655	148,208,903
2016	85,954,474	83,349,974	169,304,448
2017	95,401,545	90,902,024	186,303,569

Source: the aviation transport statistics (bps.go.id)

Table 2. The Numbers of Cargo from 2009-2018

Years	Unloading	Loading	Total
2009	311,427,797	288,650,616	288,650,616
2010	361,242,998	375,752,771	375,752,771
2011	450,208,458	463,506,863	463,506,863
2012	462,724,515	520,556,075	520,556,075
2013	469,149,195	525,412,127	525,412,127
2014	392,612,540	542,752,670	542,752,670
2015	496,459,703	598,015,870	598,015,870
2016	445,502,601	532,183,821	532,183,821
2017	557,653,312	603,151,794	603,151,794

Source: the aviation transport statistics (bps.go.id)

Based on Table 1 and 2, the air flight's passenger arrival volume in 2009 is only 42.56 million passengers. Then, the unloading cargo is 311.42 thousand tons. The departing volume of the air flight passengers in 2009 is 41.69 million passengers, while the loading cargo volume is 288.65 thousand tons. The total volume of the passengers in 2009 is 84.25 million passengers, while the cargo volume total in 2009 is 600 thousand tons. In 20118, the aviation passenger volume increased significantly to 196 million passengers with 1.351 thousand tons (transportation statistics of BPS, 2018).

With the trend of aviation industry development in 2009 and 2018, the aviation industry experienced a 133% increase. The trend attracted the government to the aviation industry. The evidence is that the State Revenue Budget structure in 2010 had aviation transportation program funding with Rp. 2.7 Trillion. The fund had the purpose of maintaining and caring for the airport runways, terminals, and buildings of 179 airports. At the national strategic program, the government targeted 15 new airports and procurements of 20 starter planes to serve the air cargo service in 6 locations.

Many studies investigated the importance of airport development toward economic development and the correlation between civil aviation industry development and economic growth. However, there have not been any studies about economic development toward airport development. The interactions of the economy and aviation transportation toward the economy will stimulate new demands of air flight departure and cargo (Higgoda & Madurapperuma, 2019). Yao & Yang, 2008) found that unequally distributed airports in China correlated to regional economic development. The increased volume of aviation passengers in the Western Provinces is higher than the national volume. However, the annual average Gross Domestic Product is low nationally. It means the increase in aviation volume is determined by economic growth and other factors, such as civilization and land transportation availability. In contrast, the volume of inter-regional cargo growth is similar to the economic growth. Higher economic growth directly deals with cargo development.

Goetz (1992) found a positive correlation between aviation transportation and the economic growth of the United States of America. They also found the dependency between aviation transportation and urban economic growth. Goetz (1992) argues that cities with higher aviation passenger indexes had higher population growth and job availability. The results show that economic growth influenced airport development.

Previous studies in Indonesia limited their investigation on the influential factors of passenger numbers. The studies also focused on the smaller scope, the airport level, leaving many gaps for further studies. The opportunity was to look at the development trend of the aviation industry by observing the provincial levels in Indonesia. The current research added the influential factors of the numbers of passengers in national scope due to the applied policy nationally. Thus, this study provides broader and comprehensive descriptions.

Rahmadhani, Hamidi, Widayatsari (2017) investigated the development of airlines in Indonesia. The author observed the air cargo service in Sultan Syarif Kasim II airport. The factor of Gross Regional Domestic Product per capita and the flight ticket influenced the demand of domestic air flight passengers in Sultan Syarif Kasim II airport, Pekanbaru. The GRDP coefficient per capita toward the domestic flight had a positive value. It meant higher GRDP per capita led to higher domestic flights. This current research was limited in the influential factors of air flight cargo demands of Sultan Syarif Kasim II, Pekanbaru.

LITERATURE REVIEW

Aviation is a united system consisting of aerial area uses, airplanes, air transportation, flight navigation, safety and security, environmental life, and other support facilities.

The main subjects of this research were the output estimation of airport developments based on the economic growth that mainly was measured from the GDP per capita. Besides that, some other factors, such as population density, land transportation, and government policy, apply the upper and lower bound tariffs.

The micro economy theory about individual demand explains that when a good price lowers, it has two impacts. The first one is - customers will purchase the products because the price is low. This condition makes the relatively expensive goods, or products will have lower availability. The responses toward price changes of goods are known as substitutive effects. The second impact is that a cheaper product than other products will attract customers' purchasing intention and power. Today, many customers purchase some products at a lower price so that they have savings to purchase additional needs. The changes in demands due to the changes in purchasing level are known as earning effect.

Some studies found the increased numbers of passengers in the level of Indonesia's airport. Amin (2013) found that the numbers of passengers in Ahmad Yani airport were influenced by the GRDP per capita, the flight rates, and the flight tariffs. However, the flight tariffs did not influence the number of passengers. The number of flights positively influenced the

number of passengers. The GDP per capita influenced the number of passengers (Amin, 2013).

Novaldhy (2017) found the increased passenger demand in Mutiara Sis Al Jufri Airport, Palu. It had a linear correlation between GRDP per capita toward the passengers' demands. GRDP per capita positively influenced the passengers' demands. Besides that, the population density did not significantly influence and did not have a linear correlation toward the passengers' demands in Mutiara Sis Al Jufri airport. These research scopes were the analyzed variables, such as GRDP per capita and the population density.

The applied approach to calculate the community earning in a country is to calculate the GRDP. GDP refers to the values of goods and services produced by all communities in a country (Lohne & Skrbo, 2020). The per capita income is the annual gross production total of a country divided by the population density. If it gains increased per capita income, the numbers of passengers would also increase because of higher purchasing power. Albayrak, Ozcan, Can & Dobruszkes (2020) found that per capita income influenced positively and significantly the numbers of passengers in Turki and in Thailand (Erjongmanee & Kongsamutr, 2018). It also happened in Indonesia which shown in Figure 1.

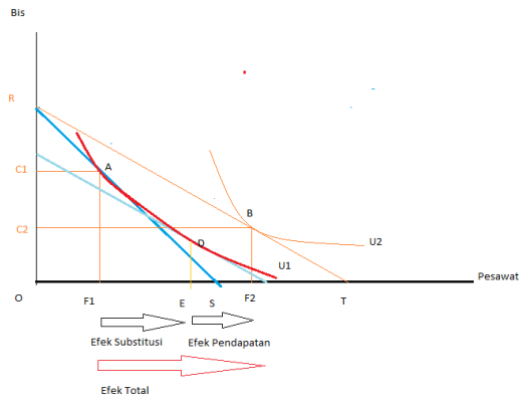

Figure 1. The Curve of Individual Demand

The affordability of flight tickets could lead to the increased demands of air flights. The Figure 2 shows lower ticket price has the substitutive effects and income effects. The starting point is A, while the cost line is RS. If the flight ticket price decreases, the demands of flight travel increase until point B, with F1F2. The substitutive effect occurs in EF1, in which many customers prefer flight travel because of their comfortability, speed, and safety. The income effect occurs in EF2, in which higher purchasing power is caused by higher per capita income. The total effect is seen in F1F2.

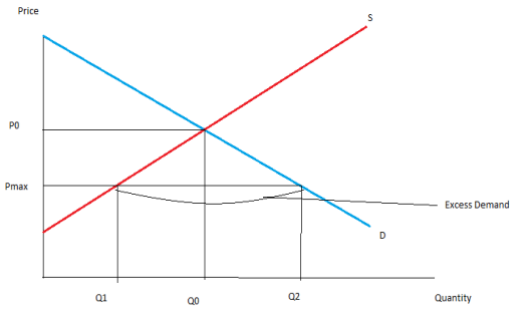

Figure 2. Determining The Ceiling Price

Determining the ceiling price is the highest price bound that the doers of aviation industries must obey. This policy aims to protect the customers from enjoying the price. The graphic shows the Ceiling Price (Pmax) under the balance point (P0), leading to excess demand. It is a situation in which the aviation industry provides the ticket (Qs) with a lower number, but the demand (Qd) is high. Thus, there is a market imbalance. In 2016,

the government issued the Regulation of Transportation Minister Number 14 the Year 2016 about the Mechanism of Calculation and Determination Formulation of Upper and Lower Bound Tariffs. In this research, the government policy used the dummy variable.

METHOD

Data Source

The applied data were from the air transportation statistics, land transportation statistics, and the Central Bureau of Statistics website. The units of analysis were Provinces. All 34 provinces in Indonesia promote air transportation statistics. The research period was from 2009-2018. The data of air transportation statistics consisted of the numbers of the passengers and cargo. The data of land transportation statistics consisted of the numbers of buses and trucks. The Central Bureau of Statistics' website data are dynamics tables of GDP per capita for each province and population density.

The Applied Variables

The dependent variables were the numbers of passengers and cargo. The numbers of passengers provided descriptions about the costumers of certain corporations, specifically demanded consideration and belief that passengers obtained the benefits of a product (Woodruff, 1997). The numbers of the passengers consisted of all corporate service customers. It dealt with using a product based on the perception of the received and the given matters (Zeithaml 66, 1988). The Central Bureau of Statistics released the variables of passengers and cargo in air transport statistics.

The independent variables were the Gross Domestic Product per capita of 34 Provinces in Indonesia based on the research objectives. The data were obtained from the Central Bureau of Statistics website. GDP reflects the level and scale of regional economic development. The higher per-capita GDP of a region determines the air travel demands. The independent variables were population density, bus, truck, and government policy about the tariffs with dummy variable (before the policy, 2009-2015=0, after the policy, 2016-2018=1).

The Empirical Model

The micro economy theory about the individual demand explains that lower prices of goods and services increase the individual demand due to substitutive effects and earning effects (Pindyck, Rubinfeld & Rabasco, 2013). Thus, there is a positive correlation between economic development and the air travel demand for passengers and cargo. The economic development level is represented by GDP per capita. The passenger equation is:

$$\ln Y_{It} = \alpha + \beta_1 lnpdb_{It} + \beta_2 lnpd_{It} + \beta_3 lnbis_{It} + \beta_4 gov_{It} + Year\ FE + Province\ FE + \text{error}$$

Y_{It} refers to the number of passengers as the dependent variable. GDP refers to the per-capita GDP of each province. Pd refers to population density. Bis refers to the number of the bus in a province. Gov refers to the government's policy about upper and lower bound of tariffs with variable dummy (before the policy, 2009-2015=0, and after the policy, 2016-2018=1).

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
ln_percapita GDP	0,892***	0,476	2.411*	4,837	0.674***	0.382**
	(0.137)	(0.381)	(1.104)	(7.790)	(0.0512)	(0.143)
ln_density	0,165	0.0858	-3,529	-3,310	0.0815	0.0309
	(0.155)	(0.140)	(7.361)	(9.452)	(0.105)	(0.0780)
ln_bis	-0,443	-0,513	-1,112	-1,269	-0,133	-0,160
	(0.295)	(0.351)	(0.751)	(1.156)	(0.121)	(0.140)
policy	0.217***	0,678	0,192	-2,682	0.202***	0.539***
	(0.0717)	(0.405)	(0.385)	(8.502)	(0.0331)	(0.187)
Constant	9.279***	14.49***	28.77	5,246	8.530***	11.87***
	(2.288)	(3.389)	(52.55)	(116.2)	(0.912)	(2.128)
Observations	313	313	60	60	253	253
R-squared	0,522	0,546	0,524	0,559	0,785	0,827
Numbers of provinces	33	33	6	6	27	27
FE province	YES	YES	YES	YES	YES	YES
FE Year		YES		YES		YES
Sample	Full	Full	Java	Java	Non-Java	Non-Java

Table 3. The Regression Analysis Results of Tl

Sources: the authors' processed data (2018)

Error refers to the factor of error. Year FE to determine the occurred annual shock. Province FE describes the characteristics of provinces that remain still
for a long time. This research used Robust Standard Error to decrease the bias the cargo equation:

$$\boldsymbol{ln\, Y_{It} = \alpha + \beta_1 lnpdb_{It} + \beta_2 lnpd_{It} + \beta_4 gov_{It} + Year\ FE + Province\ FE + error}$$

Y_{It} refers to the number of passengers as the dependent variable. GDP refers to the per-capita GDP of each province. Pd refers to population density. Bis refers to the number of the bus in a province. Gov refers to the government's policy about upper and lower bound of tariffs with variable dummy (before the policy, 2009-2015=0, and after the policy, 2016-2018=1). Error refers to the factor of error. *Year FE* to determine the occurred annual shock. Province FE describes the characteristics of provinces that remain still for a long time. This research used *Robust Standard Error* to decrease the bias.

RESULT AND DISCUSSION

The observation data were from 33 provinces in Indonesia for ten years (2009-2018). In the first column, all provinces in Indonesia, without a time trend, obtained the results that the per-capita GDP was significant toward passengers increased

8.92%. In column 2, for all provinces, the per-capita GDP variable with time trend, population density, bus, and policy did not significantly affect the number of passengers. The complete results is shown in Table 3.

standard errors in parentheses*** p<0.01,** p<0.05,* p<0.1

In column 3 In Java Island, the regression results, without time trend, obtained the results that per-capita GDP significantly influences the numbers of passengers. The density did not influence significantly toward the passengers. The dependent variable, the passengers, could be explained by the signifying variables. The goodness-of-fit is 52.40%. The GDP represents the economy. It had a significant and positive toward the passenger volume. With each 10% GDP increase, the flight passenger volume would increase by 24.11%. As the substitution, the land transportation, represented by bus, did not significantly influence the flight passenger volume. The government policy, in the form of the Ministerial Regulation Number 14. The year 2016 is about the calculation and determination formulation mechanism for upper and lower bound tariffs of the scheduled-domestic economic class flight. The government policy implementation was insignificant toward the flight passengers. In Java, the regression results were higher than the time trend. It obtained the GDP, population, bus, and policy were not significant toward the passenger. The dependent variable, the passengers, could be explained by the signifying variables. In column 3, the goodness-of-fit is 55.9%. In column 5, the Non-Java, the regression results without the time trend, obtained the results of per-capita GPD was significant toward the passenger. With each 10% increase in GDP, the flight passenger volume also increased by 6.74%. The policy did not have any significance toward the passenger. The population and bus did not significantly influence passengers. The dependent variable, the passengers, could

be explained by the signifying variables. In column 2, the goodness-of-fit is 78.5 %. From column 6, the Non-Java, the regression analysis results without time trend, obtained the per-capita GDP and policy significant toward the passengers. The population and bus did not influence significantly toward the passengers. The dependent variable, the passengers, could be explained by the signifying variables. In column 4, the goodness-of-fit is 82.7 %.

In Java, the variable was not significant because of the short research period. The data only covered the provincial level, so that they were lack of variants. The growth of flight passengers was due to the same trend among the times for each region. When the researchers took the time trend into account, the results were not significant.

Next the results of cargo numbers from cargo equation regression results are shown in Table 4.

The observation data were from 31 provinces in Indonesia for ten years (2009-2018). From column 1, all provinces without time trend, the data show the variable of the truck is not significant toward cargo. With each 10% increase of trucks, the cargo volume would increase by 10.9%. Column 2 shows all provinces with time trend reveals the significance of policy toward cargo, with a significant level of 10%. In column 3 in Java Island, the regression results, without time trend, obtained the results that per-capita GDP significantly influences the cargo. The dependent variable, the cargo, could be explained by the signifying variables. In column 1, the goodness-of-fit is 49.70 %.

From column 4, in Java, the regression results with the time trend obtained the GDP, population, truck, and policy did not significantly influence cargo.

Table 4. The Regression Analysis Results of

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
ln_percapitagdp	0,206	-0,334	2,008	4,505	-0,160	-0,515
	(0.373)	(0.664)	(1.595)	(8.434)	(0.317)	(0.513)
ln_density	-0.0342	-0.0506	1,063	3,402	-0.0706	-0.0564
	(0.245)	(0.240)	(5.685)	(7.442)	(0.193)	(0.189)
ln_truck	1.090*	0,994	-0.0916	-2,449	1.313**	1.310**
	(0.558)	(0.645)	(2.064)	(7.781)	(0.545)	(0.553)
policy	0.0821	0.867*	0,153	-1,671	0.0180	0.538*
	(0.0907)	(0.449)	(0.349)	(9.686)	(0.0716)	(0.268)
Constant	1,619	7.978**	-11.29	-23.46	3,271	6.609**
	(2.780)	(3.521)	(44.60)	(150.0)	(2.599)	(2.476)
Observations	310	310	60	60	250	250
R-squared	0,367	0,384	0,497	0,522	0,464	0,487
Numbers of provinces	31	31	6	6	25	25
FE province	YES	YES	YES	YES	YES	YES
FE Year		YES		YES		YES
Sample	Full	Full	Java	Java	Non-Java	Non-Java

Sources: the authors' processed data (2018)

The dependent variable, the passengers, could be explained by the signifying variables. In column 3, the goodness-of-fit is 52.2%.

In column 5, the Non-Java, the regression results without time trend obtain ed the insignificant results toward cargo. Each 10% truck increase, the cargo volume increases 13.13%. The dependent variable, the passengers, could be explained by the signifying variables. In column 2, the goodness-of-fit is 46.4 %.

In column 6, in Non-Java, the regression analysis results with time trend obtained the results that truck and policy significantly influenced cargo. Each 10% truck increase, the cargo volume increases 13.10 %. signifying variables. In column 4, the goodness-of-fit is 48.7 %.

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

CONCLUSION

The research proved that the per-capita GDP had positive and significant indications toward the numbers of passengers in Java and Non-Java when they were without the time trend. In Non-Java, the policy significantly influenced the number of passengers. In Java and non-Java, the population density of a region and bus insignificantly indicated the influence of passenger numbers. Then, in Non-Java, the truck significantly and positively indicated the influence of cargo without time trend.

In Java, the per-capita GDP, population, policy, and bus did not significantly influence the numbers of passengers when using time trends. In Non-Java, the GDP and policy significantly influenced the numbers of passengers with the time trend. Then, in Non-Java, the truck significantly influenced the cargo while using the time trend. The variable was not significant because of the short period of the research, and the data size only covered provinces. Thus, the data were lack of variety. The significant influence of per-capita GDP for all provinces simultaneously increased. Thus, the influence of per-capita GDP could not be estimated to influence the passengers. The equation of passengers, per-capita GDP, and policy influenced the numbers of passengers. On the other hand, the cargo equation and truck influenced the numbers of cargo.

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