

Determination Of State Economic Activities - Developing Countries In East Asia & Pacific Using Classical Approaches

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Research

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DETERMINATION OF STATE ECONOMIC ACTIVITIES - DEVELOPING COUNTRIES IN EAST ASIA & PACIFIC USING CLASSICAL APPROACHES

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Abstract

Countries in East Asia and the Pacific region are potential countries with fairly strong economic growth rates amid slowing global economic growth. One contributing factor to economic growth in East Asia and the Pacific can be seen using a classical approach where economic growth is seen from capital, natural resources, incoming foreign investment and the use of technology. This research wants to see how big these factors are in influencing the economic activities of developing countries in East Asia and the Pacific. The methodology used in this study is to use a Vector Error Correction Model by focusing on the impulse response function and variance decomposition to see the response of several variables due to changes in other variables and to see how much the proportion of one variable affects other variables in the short term or long term. In the short term, incoming foreign investment and technology affect productive land while in the long run productive land is influenced by incoming foreign investment and human resources. In the short term, GDP is not affected by any variable, whereas in the long term GDP is affected by human resources, incoming foreign investment, and technology. In the long run, human resources are affected by incoming foreign investment. Foreign investment that enters in the short term is influenced by productive land and human resources, whereas in the long run, only human resources can directly influence foreign investment. Technology in the short term is influenced by productive land and incoming foreign investment while in the long run technology is influenced by incoming foreign investment and human resources. The economic growth reflected in GDP and productive land contained in East Asia and the Pacific was largely influenced by technology in the final period. Incoming foreign investment and technology are largely influenced by productive land. Whereas the human resources found in East Asia and the Pacific are mostly influenced by GDP.

INTRODUCTION

East Asia & Pacific economic growth in the transition period at the end of 2019 towards the beginning of 2020 is growing slowly and this is predicted to continue until 2045 with tolerance values ranging between 5.7%. The strength of economic growth in East Asia and the Pacific is supported by domestic consumption while contributing to slowing economic growth in East Asia & the Pacific is caused by exports in several countries in East Asia & Pacific which have decreased, the trade war between the United States and China and the impact of uncertainty due to Brexit (Organization for Economic Cooperation and Development, 2019).

In recent decades research with the theme of economic growth in developing countries such as East Asia & the Pacific has always been linked to international trade activities, investment activities, and globalization related to export and import activities carried out by the countries concerned. Globalization has a positive influence on economic growth in developing countries (Ying, Chang, & Lee, 2014). International trade will also have a positive impact on economic growth in developing and developed countries (Kotlewski, 2013). Foreign investment in several developing countries in East Asia & the Pacific is considered a pioneer for economic growth (Rasiah, Asirvatham, & Adamu, 2017)

The theory of economic growth that is often used as a material for discussion by economists is the Classical economic growth theory and Keynesian growth theory. Both theories have different patterns of view when looking at economic growth in a country. Adherents of classical economic growth theory assume that an economy can run on its own which is carried out by market mechanisms whereas, in Keynes's view, the government needs to interfere in economic activities, if the economy is considered to enter a dangerous phase so that the government can control the economy by implementing various policies. In an increasingly modern era of globalization which is supported by the development of science, technology and the reduction of barriers between countries in carrying out economic activities, most business people, both producers, and consumers in several developed countries want their economic activities to run according to market mechanisms in the sense of wanting full freedom in carrying out individual economic activities and reducing the role of government in the economy. Understanding such economic activities is slowly also beginning to be followed by people in developing countries who also want activities and economic growth that are freely left to market mechanisms because developing countries have also entered the era of globalization.

In economic theory using the classical approach explained that the economic growth of a country is determined by various factors of production available such as capital, land, technology and human resources contained in the country (Najeb, 2014). The economic strength of East Asian & Pacific countries is largely sourced from demographic and geographical bonuses which are reflected in the abundant wealth of natural resources and the large population in East Asia & Pacific. Factors of production such as land, capital, labor, and technology become one of the keys to the success of East Asian & Pacific countries in catching up with developed European countries. (Aerni, 2011). In the case of classical economics, it states that the role of the three factors of capital, land and labor production begins to diminish and is replaced by a greater proportion of technology in determining the pattern of economic activity of a country which is commonly called the "Marx bias" (Foley & Marquetti, 1997).

Several recent studies explain economic growth in various countries using macroeconomic or microeconomic variables where the majority uses the Keynesian approach, but rarely research that discusses economic growth in a country with a focus on the classical approach which only discusses the production factors owned by the state such as land, capital, labor, and technology. The purpose of this study is to address the phenomenon of anomalous events that occur in East Asian & Pacific countries where East Asian & Pacific countries have abundant production factors but do not have a major impact on the maximum income of people in several East Asian & Pacific countries. This phenomenon is an interesting event to be studied in this study. This study also seeks to find out partially the factors of production which are considered to influence the activities of a country in East Asia & the Pacific

LITERATURE REVIEW

Classical Economic Theory

This economic theory emphasizes an economy that is centered on market mechanisms with little government intervention. In the view of classical economists, many factors influence economic growth such as population, the total stock of capital goods, land area and natural wealth, and the level of technology. Classical economics has limitations related to economic conditions in the agrarian sector which are strongly influenced by productive land conditions and combining productive land, technological advancements, international trade and the pace of investment will remain interconnected with one another to influence economic growth in a

country in the era of globalization (Harris, 2007). In classical economic theory economic growth is more influenced by how a country can increase the scale of productivity by utilizing available production factors (Kates, 2018).

Economic Growth

Broadly speaking, the concept of economic growth theory will be divided into two, namely theoretical concepts which are based on the Solow growth model and based on endogenous growth (Gould & Ruffin, 1993). The Solow model emphasizes capital accumulation, changes in population and technological development. This model seeks to achieve long-term balance by making the population and technology grow the same. Whereas endogenous theory is based on the idea that long-term economic growth is determined by economic incentives. So that the economy in the future will be greatly influenced by how much technological development and educated staff are in a country.

Productive Land

The evolution of agricultural productivity in the modern and global era will always interact with economic growth and population growth at the global level. Schumpeter's two-sector growth model explains, where the manufacturing sector produces traditional consumer goods and the agricultural sector produces food to maintain the population contained in each region. The agricultural sector demands land as input, which is treated as a rare form of capital in this modern economy. Low soil quality will hurt agricultural productivity and have an impact on rising costs in producing food. For developing countries cases such as hunger and deteriorating environmental conditions are due to improper land use and there is no technological element that can support in maintaining the availability of productive land. If this is allowed to continue, then it will worsen the economic condition of a country. Therefore, technology certainty is needed to maintain the preservation and adequacy of productive land in each country (Lanz, Dietz, & Swanson, 2018).

Human Resources

The higher the quality of education, the greater the impact on economic growth (Reza, Mada, Widodo, & Mada, 2013). The impact of this education itself usually cannot last for a short time and also has an element of uncertainty depending on the output of learning outcomes (Odit, Dookhan, & Fauzel, 2010). The economic growth of a nation will not be separated from the ownership of educated and skilled workers in a region. In this modern era, the combination of students' intellectuality and technology development becomes an accelerator for a country's economic growth. In general, some countries already require levels of education in their countries as outlined in the policies made by the government. The level of education applied in each country is usually carried out sequentially and stratified, so that the higher the level, the simpler the more educated human resource indicators.

Foreign Direct Investment

FDI has an important role in the economic life of a country both domestically and globally, especially in developing countries. This is reasonable because FDI has many benefits such as the transfer of new technology, improving managerial skills, expanding productivity, international production networks, creating relationships with foreign markets and reduce unemployment (Tabassum & Ahmed, 2014). In the Solow economic theory model, the neoclassical flow explains that the presence of FDI that continues to enter a country means that capital reserves in the area will increase so that it can finance economic activities in a country (Farshid, Ali, & Gholamhosein, 2009).

Technology

The production factor which can bring a country to compete in the modern era is the technological advancement that is owned by a country. Global competition in this modern era has experienced a slight shift where if the international business world has been influenced by technological excellence, competition is no longer measured only on a macro scale (national and even between countries) but also competitive competition occurs on a micro-scale (competition on a domestic scale) (Pasierbiak, 2013). Technology also greatly helps the economy through research and development sectors which continue to be exploited, especially in maximizing the production process of producing goods in various industrial sectors (Zalewski, 2009). Technology also helps make it easier in terms of distribution and marketing to meet the needs of consumers who are increasingly easy to use internet access available in modern times.

RESEARCH METHODOLOGY

The research variables used in this study are the availability of land in East Asia & the Pacific which is described by productive land productivity, capital which is explained through Foreign Direct Investment (FDI), human resources reflected by the level of education explained by the percentage of people who have completed basic education, and technology explained by the use of the internet in each country. This research is included in the applied research category where this research tries to implement theory by confronting data or it can be called empirical theoretical research by optimally utilizing the existence of secondary data and this research is a replication of previous researchers with a modification, especially on variables observed.

Estimation Method

The stages estimation method used in this study is as follows:

Stationary Test

Time series economic data are generally stochastic or have trends that are not stationary, meaning that the data have unit-roots. To be able to estimate a data usage model, the first step that must be taken is to test the stationarity of data or known unit root tests (Damodar N. Gujarati, 2004). At least the first step taken in the data stationarity test is to test the degree level, if it is still not stationary, it will be continued at the first-order level until the second-order difference.

In determining the level of stationarity the data can pay attention to the following models;

$$Y_t = \delta Y_{t-1} + U_t \dots\dots\dots (1)$$

If the above equation is reduced by Y_{t-1} , the right and left sides will be obtained

$$Y_t - Y_{t-1} = \delta Y_{t-1} - Y_{t-1} + U_t \dots\dots\dots (2)$$

$$\Delta Y_t = (\delta - 1)Y_{t-1} + U_t \dots\dots\dots (3)$$

Or it can be stated as follows;

$$\Delta Y_t = \beta Y_{t-1} + U_t \dots\dots\dots (4)$$

Based on equation 4, the following hypotheses can be made;

$$H_0: \beta = 1 \text{ (Non-stationary time series data)}$$

$$H_0: \beta < 1 \text{ (Stationary time coherent data)}$$

Optimum Lag Selection

Determination of the number of lags (orders) that will be used in the Vector Autoregressive (VAR) or Vector Error Correction Model (VECM) models, the determination of the number of lags can be determined based on the Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC) criteria. The lag that will be selected in this study is the model with the smallest AIC value, with the following formula;

$$\ln(\text{AIC}) = \ln \frac{\sum \hat{u}_t^2}{n} + \frac{2k}{n} \dots\dots\dots (5)$$

$$\ln(\text{SIC}) = \ln\left(\frac{\sum \hat{u}_i^2}{n}\right) + \frac{k}{n} \ln(n) \dots \dots \dots (6)$$

Where, \hat{u}_i^2 = the sum of squared residuals; k = number of free observations; n = number of observations

Cointegration Test

If the phenomenon of stationarity is at the level of physical difference or I (1) or second II (2), it is necessary to test to see the possibility of cointegration. A cointegration test is performed to see the long-term balance between the observed variables. Sometimes an individual data is not stationary, but when connected linearly the data becomes stationary, but when connected linearly the data becomes stationary. This is then called that the data are cointegrated. If a set of variables is completely cointegrated, it must be detected implied restriction or unrestricted Vector Autoregressive (VAR) or Vector Error Correction Model (VECM).

The Engle-Granger cointegration test was then developed by Johansen and then called the Johansen cointegration test. Johansen's cointegration test uses trace statistic analysis and / or test statistics for maximum eigenvalues and critical values at a confidence level = 5% with the following steps:

Hypothesis:

H_0 = there is no r cointegration equation

H_1 = there is r cointegration equation

Test Statistics

Static Test Test

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) \dots \dots \dots (7)$$

Test statistics for maximum eigenvalue:

$$LR_{max}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) = LR_{tr}(r|k) - LR_{tr}(r + 1|k) \dots \dots \dots (8)$$

For r = 0, 1, ..., k - 1, with

$$\lambda_i = \text{Eigen value largest } - i \text{ for matriks } \pi = (\lambda_1 \leq \lambda_2 \leq \dots \lambda_n) \dots \dots \dots (9)$$

T = Number of observations observed

K = The number of dependent variables

Vector Error Correction Model (VECM)

In this research, the Vector Error Correction Model (VECM) is used in analyzing data. VECM is an analysis that is used if there are variables that will not be stationary in using Vector Autoregressive (VAR) (Usman, Fatin, Barusman, Elfaki, & Widiarti, 2017). In the analysis of modern econometrics to build a relational model among economic variables in a non-structural way, the Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) models can be used (Zou, 2018). However, if all variables are found in stationary conditions at a level, the analysis used is VAR. By using VECM analysis, can determine the relationship and shock between the variables in the short term and long term.

The VECM model treats all variables symmetrically without blaming independent and dependent variables or in other words this model treats all variables as endogenous variables. In line with the previous description and about this research, it can be explained that the details of the determinants of economic activity variables of developing countries in East Asia & the Pacific use the classical approach. So to write the equation of factors of production that influence the determinants of economic activity according to the classical approach, partially it can be written as follows:

$$\text{GDP} = C_1 + a_{1i} \sum_{i=1}^k LP_{t-k} + a_{1i} \sum_{i=1}^k \text{SDM}_{t-k} + a_{1i} \sum_{i=1}^k \text{FDI}_{t-k} + a_{1i} \sum_{i=1}^k \text{TK}_{t-k} + \varepsilon_1 \dots \dots \dots (10)$$

In the equation model (1) GDP growth will be used as a dependent variable while land area (LP), human resources (HR), incoming foreign investment (FDI) and Technology (TK) become independent variables which will, in turn, affect GDP growth

$$LP = C_2 + a_{2i} \sum_{i=1}^k GDP_{t-k} + a_{2i} \sum_{i=1}^k SDM_{t-k} + a_{2i} \sum_{i=1}^k FDI_{t-k} + a_{2i} \sum_{i=1}^k TK_{t-k} + \varepsilon_2$$

..... (11)

In equation model (2), productive land area (LP) will be influenced by GDP growth in East Asian and Pacific countries, human resources (HR), incoming foreign investment (FDI) and technology reflected by individual use (TK)

$$SDM = C_3 + a_{4i} \sum_{i=1}^k LP_{t-k} + a_{3i} \sum_{i=1}^k GDP_{t-k} + a_{3i} \sum_{i=1}^k FDI_{t-k} + a_{3i} \sum_{i=1}^k TK_{t-k} + \varepsilon_3$$

..... (12)

Model equation (3), shows that the human resources reflected in the completion of basic education (HR) are influenced by productive land (LP), GDP growth, incoming foreign investment (FDI) and technology (TK) found in East Asia and the Pacific

$$FDI = C_4 + a_{4i} \sum_{i=1}^k LP_{t-k} + a_{4i} \sum_{i=1}^k SDM_{t-k} + a_{4i} \sum_{i=1}^k GDP_{t-k} + a_{4i} \sum_{i=1}^k TK_{t-k} + \varepsilon_4$$

..... (13)

Equation model (4), will look at the movement and response of foreign investment entering East Asian and Pacific countries in the event of shocks to productive land (LP) variables, quality of human resources (HR), GDP growth and technology (TK) in East Asia and the Pacific

$$TK = C_4 + a_{4i} \sum_{i=1}^k LP_{t-k} + a_{4i} \sum_{i=1}^k SDM_{t-k} + a_{4i} \sum_{i=1}^k FDI_{t-k} + a_{4i} \sum_{i=1}^k GDP_{t-k} + \varepsilon_4$$

..... (14)

Model equation (5) looks at the technology used in East Asian and Pacific countries influenced by productive land (LP), human resources (HR), incoming foreign investment (FDI) and economic growth reflected in (GDP)

Instrument Vector Error Correction Model (VECM)

In conducting its analysis, VAR has a specific instrument that has a specific function in explaining the interaction between variables in the model. The instruments include Impulse Response Function (IRF) and Variance Decompositions (VD), or commonly called variance Decomposition (VD). IRF is used to look at the moving average vector which aims to see how long the shock of one variable affects the other variables. Impulse Response analysis is done to see the response of a variable when there is a shock to other variables. Individually the coefficients in the VECM model are difficult to interpret, so econometrics experts use Impulse Response analysis. This Impulse Response Analysis tracks the response of endogenous variables in the VECM system due to shock or changes in the interference variable (e). Impulse Response is the result of VAR estimation that can be illustrated by graphs or tables, by looking at graphs or impulse response tables we can see how much the variable response to shocks is equal to one standard deviation (S.D) of the variables in the model.

Whereas VD in VECM functions to analyze how much the shock of a variable affects other variables. Variance Decomposition Analysis is conducted to find out which variables have a relatively important role in changing the variables themselves and other variables. While this analysis of variance decomposition illustrates the relative importance of each variable in the contribution of the percentage of variance to each variable due to changes in certain variables in the VECM system. Variance Decomposition in the form of a graph or table can provide an overview of the variance of a variable due to the shock of other variables and to himself. By looking at exogenous variables (explaining) it will be known whether the shock of each variable is very important in shaping the variants of these variables and other variables.

In other words, Variance Decomposition analysis is useful to find out which variable shock most influences the change in a variable.

RESULTS AND DISCUSSION

Stationarity Test

Testing the level of stationarity of the data in this study was carried out using the Augmented Dickey-Fuller (ADF) test. Furthermore, the statistical ADF results are compared with the critical value developed by MacKinnon. If the ADF t statistic count is smaller than the MacKinnon critical value, then the data is said to be not stationary. Conversely, if the calculated ADF value is greater than the MacKinnon critical value, then it is said to be stationary. Unit root testing starts at level form. If at the level of the data level used is not stationary, then proceed with testing in the form of first difference to the second difference.

Test results Stationary tests of economic growth, productive land, quality of human resources, investment and use of technology found in East Asian and Pacific countries can be briefly described as follows:

Table 1: Unit Root Test Results Of Sequence Level Values

Variable	Augmented Dickey-Fuller test statistic				Prob
	t - Statistik	1% level	5% level	10% level	
GDP*	-4.413442	-4.356068	-3.595026	-3.233456	0.0088
LP**	-2.213765	-4.356068	-3.595026	-3.233456	0.4629
SDM*	-5.610403	-4.374307	-3.603202	-3.238054	0.0006
FDI**	-2.547992	-4.356068	-3.595026	-3.233456	0.3046
TK**	-2.956578	-4.416345	-3.622033	-3.248592	0.1647

* = Stationary; ** = Non Stationary

When the ADF t-static is smaller than MacKinnon critical values, the variable in non-stationary conditions, but vice versa if when the ADF t-static is greater than the MacKinnon critical values, the variable in stationary conditions (Riza Silvia Faustina, Arief Agoestanto, 2017), (Anisa, 2010), (Tulak & Utami, 2017), (Eko Setyawan, Renan Subantoro, 2016). From table 1, it is explained that GDP and quality of human resources are at the stationary stage while productive land, incoming foreign investment and the technology used are not stationary. Thus stationary testing will be carried out with a first-order difference

Table 2: Unit Root Test Results Of Sequence First-Order Differences

Variable	Augmented Dickey-Fuller test statistic				Prob
	t - Statistik	1% level	5% level	10% level	
GDP*	-6.274455	-4.394309	-3.612199	-3.243079	0.0002
LP*	-4.874159	-4.374307	-3.603202	-3.238054	0.0033
SDM*	-4.449410	-4.394309	-3.612199	-3.243079	0.0089
FDI*	-5.244844	-4.374307	-3.603202	-3.238054	0.0014
TK**	-0.143449	-4.416345	-3.622033	-3.248592	0.9904

* = Stationary; ** = Non Stationary

From table 2. It can be seen that GDP, productive land, the quality of human resources, foreign investment coming in are stationary while technological mastery is in non-stationary conditions, then the final test is carried out with a second-order difference to determine the level of stationer of the variable used in research. In the second-order difference test, it can be seen that all variables used in the study are in stationary conditions.

Table 3: Unit Root Test Results Of Sequence Second-Order Difference

Variable	Augmented Dickey-Fuller test statistic				Prob
	t - Statistik	1% level	5% level	10% level	
GDP*	-5.211171	-4.440739	-3.632896	-3.254671	0.0020
LP*	-6.087760	-4.416345	-3.622033	-3.248592	0.0003
SDM*	-4.895754	-4.440739	-3.632896	-3.254671	0.0039
FDI*	-6.243451	-4.416345	-3.622033	-3.248592	0.0002
TK*	-6.870425	-4.416345	-3.622033	-3.248592	0.0001

* = Stationary; ** = Non Stationary

Determination of Lag Lag

In this analysis aims to determine the time needed by the dependent variable in response to changes in other variables that are affected (Palupy & Basuki, 2019)

Table 4. Determination of Lag Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-222.9073	NA	57.02060	18.23258	18.47636	18.30020
1	-141.0035	124.4938*	0.630422	13.68028	15.14293*	14.08596
2	-108.1422	36.80462	0.442329*	13.05138*	15.73290	13.79512*

Based on Table 4. it can be seen the results of determining the optimal lag FPE, AIC and HQ criteria recommend a lag of 2. While the LR and SC criteria choose a lag of 1. So that it can be concluded that the optimal selection of lag in this study is lag 2

Cointegration Test

Cointegration test in this study is used to see the relationship between variables used in research, if there is a long-term relationship it will be able to change trends (Xie, Wang, & Liu, 2013), (Mello, Coronel, & Vieira, 2014). If the trace statistic value is greater than the critical value, the observed variables are cointegrated or there is a long-term relationship (Palupy & Basuki, 2019)

Table 5. Test Results for Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.964185	165.6528	88.80380	0.0000
At most 1 *	0.761212	85.74744	63.87610	0.0003
At most 2 *	0.649970	51.37518	42.91525	0.0058
At most 3 *	0.476166	26.18149	25.87211	0.0458
At most 4	0.358737	10.66358	12.51798	0.1001

Table 6. Test Results for Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.964185	79.90532	38.33101	0.0000
At most 1 *	0.761212	34.37226	32.11832	0.0261
At most 2	0.649970	25.19369	25.82321	0.0604
At most 3	0.476166	15.51791	19.38704	0.1671
At most 4	0.358737	10.66358	12.51798	0.1001

The results of the cointegration test use the Johansen approach by comparing trace statistics with critical values or comparing the maximum eigenvalue with critical values. If the trace statistic value is greater than the critical value, then the observed variables cointegrate or there is a long-term relationship. Tables 5 and 6 show that Trace Statistics > Critical Value and Max-Eigen Statistics > Critical Value. With the integration in this equation and the observed variables are stationary in the second difference stage, the next method uses VECM.

VECM Analysis and Estimation

In the analysis of the Vector Error Correction Model (VECM), the first step will be to see whether there is a long-term and short-term influence on the variables used in the study. The results of the VECM estimation can be seen in tables 7 to table 11. In table 7. The VECM results of economic growth (GDP) in East Asian and Pacific countries are found that in the short term productive land, the quality of human resources, the amount of foreign investment coming in and the level of technology does not affect the economic growth of East Asia and the Pacific, but in the long term the quality of human resources, the amount of foreign investment coming in and technology has an impact on the economic growth of East Asian and Pacific countries. With higher investment entering the country, coupled with the development of technology owned by several companies and the use of social scale in East Asian and Pacific countries and increasing the level of education and knowledge of each individual, it will have an impact on the progress of Asian economic growth East and Pacific (Litsareva, 2017).

Table 7. Results of VECM GDP Estimates

Short-term		
Variable	Koefisien	t - statistik
CointEq1	-0.052707	[-0.57625]
D(GDP(-1))	-0.321287	[-1.43192]
D(GDP(-2))	-0.558490	[-2.91871]*
D(LP(-1))	-1.140441	[-0.94699]
D(LP(-2))	1.035892	[0.84291]
D(SDM(-1))	-0.371338	[-1.36969]
D(SDM(-2))	0.338252	[1.06285]
D(FDI(-1))	-0.288698	[-0.34291]
D(FDI(-2))	1.138451	[1.16291]
D(TK(-1))	-0.043556	[-0.13101]
D(TK(-2))	-0.119672	[-0.23811]
C	0.450262	[0.56866]
Long-term		
GDP(-1)	1.000000	
LP(-1)	-1.903459	[-0.51332]
SDM(-1)	-4.262903	[-6.25711]*
FDI(-1)	7.750464	[2.68578]*
TK(-1)	0.182138	[2.21482]*
C	458.2579	

Table 8. VECM Estimated Results of Productive Land

Short-term		
Variable	Koefisien	t - statistik
CointEq1	-0.109278	[-3.88312]*
D(LP(-1))	-0.473082	[-2.43028]*
D(LP(-2))	-0.069063	[-0.34767]
D(GDP(-1))	-0.030377	[-0.83756]
D(GDP(-2))	0.003751	[0.12127]
D(FDI(-1))	-0.446829	[-3.28341]*
D(FDI(-2))	-0.507906	[-3.20969]*
D(SDM(-1))	0.018198	[0.41527]
D(SDM(-2))	0.039465	[0.76717]
D(TK(-1))	-0.176312	[-3.28074]*
D(TK(-2))	0.328239	[4.04043]*
C	-0.389232	[-3.04117]*
Long-term		
LP(-1)	1.000000	
GDP(-1)	-0.525359	[-0.66006]
FDI(-1)	-4.071780	[-3.43791]*
SDM(-1)	2.239557	[5.48023]*
TK(-1)	-0.095688	[-1.42186]
C	-240.7501	

Table 8. can be seen that in the short term productive land (LP) is influenced by incoming foreign investment (FDI) and technology (TK), whereas in the long term productive land is influenced by the quality of human resources (HR) and incoming foreign investment (FDI). Investment plays a role in the short and long term concerning productive land in East Asia & the Pacific. From these results, it can be said that the management and use of productive land in East Asia & the Pacific will be very dependent depending on the number of investors who will invest some capital. This coming investment will also determine productive land use in the East Asia & Pacific region for the next few years and in the long-run foreign investment will negatively affect productive land in various countries (Iddrisu, Immurana, & Halidu, 2015), (Borghesi, Giovannetti, Iannucci, & Russu, 2019), (Lay & Nolte, 2018).

Table 9. Explains that human resources both in the short to long term are not affected by GDP growth, productive land and the level of technology found in East Asia & the Pacific. Incoming foreign investment has a long-term effect on human resources found in East Asia & the Pacific. Human resources used in this study are related to education in East Asia & the Pacific. The quality of the level of education found in East Asia and the Pacific, in the long run, will be affected by the presence or absence of incoming investment. In this case, the incoming investment is expected to improve educational facilities and infrastructure, by increasing educational facilities and infrastructure, the ultimate hope is that the quality of human resources will increase along with the better educational facilities and infrastructure owned by a country (Yildirim & Tosuner, 2014).

Table 10. Explain that foreign investment that enters, in the long run, will be greatly influenced by the human resources available in a country. This is reasonable given that the process of entry and effective use of foreign investment will be greatly influenced by the quality of its human resources. One way to assess a country's human resources can be seen by the education pursued by its people. The higher education that is taken by the people in a country, the people certainly know and understand how to invite foreign investors to want to invest and be able to make optimal use of foreign investment that enters their country so that it has an impact on economic growth that has a macro impact (Akin & Vlad, 2011), (Agusty & Damayanti, 2015).

Table 9. VECM Human Resource Estimation Results

Short-term		
Variable	Koefisien	t - statistik
CointEq1	-0.350623	[-1.02544]
D(SDM(-1))	0.722560	[3.03916]*
D(SDM(-2))	-0.224537	[-0.80454]
D(GDP(-1))	0.147562	[0.74994]
D(GDP(-2))	0.083881	[0.49988]
D(LP(-1))	0.526471	[0.49851]
D(LP(-2))	-0.098743	[-0.09162]
D(FDI(-1))	-0.939065	[-1.27192]
D(FDI(-2))	0.394661	[0.45971]
D(TK(-1))	0.104787	[0.35940]
D(TK(-2))	0.112118	[0.25439]
C	-0.497598	[-0.71663]
Long-term		
SDM(-1)	1.000000	
GDP(-1)	-0.234582	[-0.69485]
LP(-1)	0.446517	[0.47329]
FDI(-1)	-1.818119	[-2.70451]*
TK(-1)	-0.042726	[-1.44992]
C	-107.4990	

Table 10. Estimated Results of VECM Foreign Direct Investment

Short-term		
Variable	Koefisien	t - statistik
CointEq1	-0.303573	[-1.30888]
D(FDI(-1))	-0.056955	[-0.20677]
D(FDI(-2))	-0.127124	[-0.39690]
D(GDP(-1))	-0.053326	[-0.72641]
D(GDP(-2))	-0.042696	[-0.68200]
D(LP(-1))	-0.371492	[-0.94285]
D(LP(-2))	-0.863240	[-2.14693]*
D(SDM(-1))	-0.164810	[-1.85804]*
D(SDM(-2))	-0.040556	[-0.38950]
D(TK(-1))	0.088009	[0.80907]
D(TK(-2))	-0.207447	[-1.26158]
C	0.253411	[0.97820]
Long-term		
FDI(-1)	1.000000	
GDP(-1)	0.129025	[0.61217]
LP(-1)	-0.245593	[-0.60940]
SDM(-1)	-0.550019	[-5.55101]*
TK(-1)	0.023500	[1.61178]
C	59.12651	

Table 11. shows that in the short term there is a relationship between technology and human resources and productive land. Whereas in the long run technology is associated with incoming foreign investment and the quality of human resources in East Asia and the Pacific. Entering the modern and global era, the role of technology cannot be underestimated for the economic growth of a nation. With the increase in the technology used by a country, it will be

significant in the productive land use that is used primarily in the agricultural sector so that it can produce maximum yields. Technology also plays a big role in the advancement of human resources in a country because, with the entry of technology, human knowledge contained in a country will also increase.

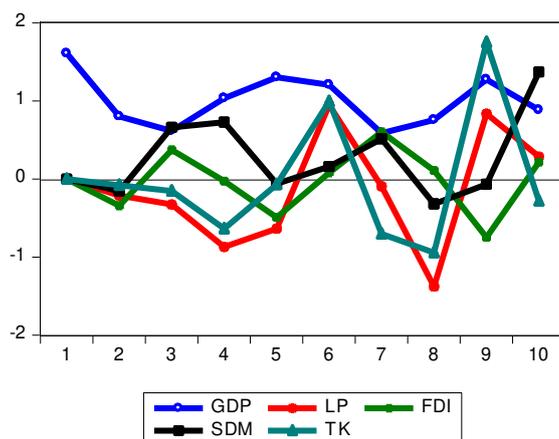
Table 11. VECM Technology Estimation Results

Short-term		
Variable	Koefisien	t - statistik
CointEq1	-0.023043	[-1.15808]
D(TK(-1))	0.728068	[1.83346]*
D(TK(-2))	-0.404393	[-0.67367]
D(GDP(-1))	0.076667	[0.28608]
D(GDP(-2))	-0.083317	[-0.36456]
D(LP(-1))	3.297528	[2.29255]*
D(LP(-2))	-0.415047	[-0.28276]
D(FDI(-1))	0.619802	[0.61637]
D(FDI(-2))	2.380921	[2.03626]*
D(SDM(-1))	-0.084002	[-0.25942]
D(SDM(-2))	-0.150861	[-0.39689]
C	1.710413	[1.80860]*
Long-term		
TK(-1)	1.000000	
GDP(-1)	5.490338	[0.95875]
LP(-1)	-10.45063	[-0.47866]
FDI(-1)	42.55267	[3.06106]*
SDM(-1)	-23.40478	[-5.65187]*
C	2515.991	

Impulse Response Functions

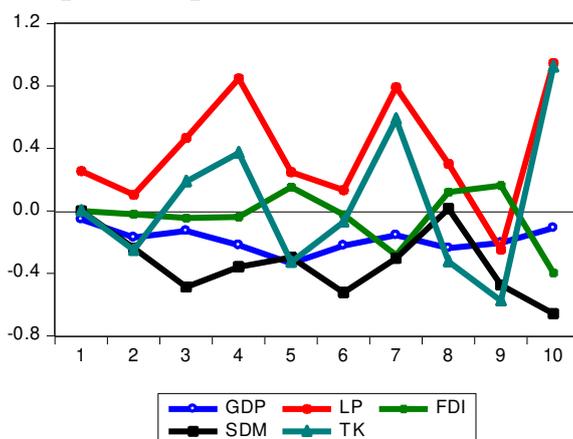
The impulse response analysis obtained in this study will be divided into five analyzes. First, analyzing the effect of productive land shocks (LP), human resources reflected in the level of education pursued (HR), incoming foreign investment (FDI) and technology seen from the use of the internet (TK) on economic growth (GDP) and him alone. The variable response to GDP due to shocks to itself shows a positive response. This positive response has occurred in the first period until the last period had experienced a weakened response in period five to period six and again increased after period six. Productive land and labor at the beginning of the period until the fifth period showed a negative response to GDP. Whereas in the fifth to the sixth period it was responded positively, until in the sixth to the eighth period it was responded negatively, whereas at the end of the productive land and labor period the positive response was again returned by GDP. The shock caused by investment variables that entered the country early in the period until the next period responded negatively and continued to experience fluctuating responses until the final period of FDI responded positively by GDP.

Figure 1. Impulse Response to Functions of Economic Growth



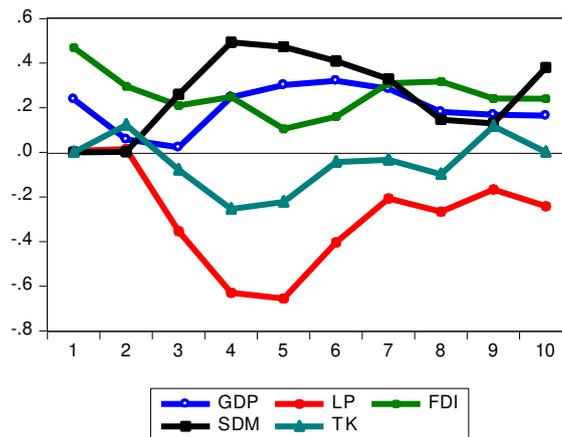
Second, this study will analyze productive land if it gets a shock from GDP, productive land (LP), human resources (HR), and technology (TK). At the time of HR and GDP from the beginning of the period until the end of the period responded negatively by productive land (LP). While the shocks caused by technology responded positively by productive land (LP) at the end of the period even though at the beginning of the period it responded negatively and in the middle of the period fluctuated. Productive land experiences a positive response due to shocks generated by itself and experiences a negative response only in period nine.

Figure 2. Impulse Response of Productive Land Functions



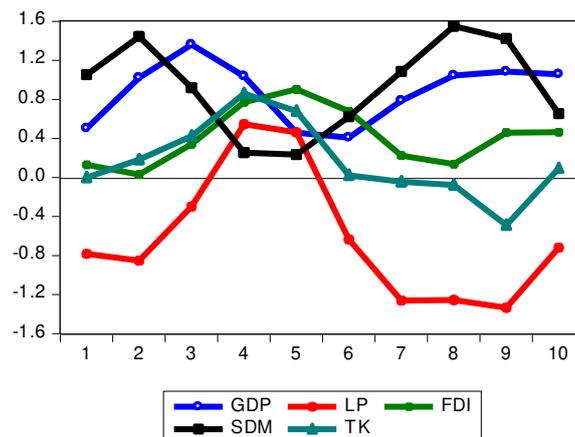
The third analysis explains that the response occurs to incoming foreign investment in the event of a shock to GDP, human resources, technology, and productive land. The results show that when shocks occur in the HR, GDP and the variables themselves, they respond positively from the beginning of the period until the end of the period. Shocks that are produced by productive land get a negative response from incoming foreign investment. While technology at the beginning and end of the period gets a positive response, but in the middle of the period tends to respond negatively by incoming foreign investment when shocks occur in the technology variable (TK).

Figure 3. Impulse Responses of Incoming Foreign Investment Functions



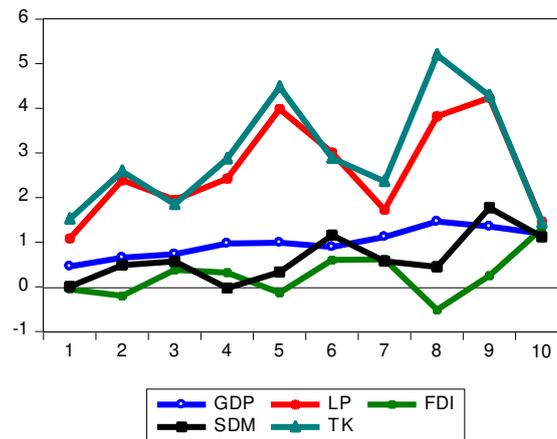
The fourth function impulse analysis is the response caused by the variable human resources (HR) if there is a shock to the variable GDP, productive land (LP), technology (TK) and incoming foreign investment (FDI). When there is a shock to the variable human resources (HR), GDP and incoming foreign investment (FDI) from the beginning of the period until the end of the period respond positively by the variable human resources (HR). When shocks to productive land (LP) are responded negatively by human resources (HR) only in the fourth and fifth periods positively responded by human resources (HR).

Figure 4. Impulse Response to Human Resource Functions



The fifth analysis is looking at the responses generated by technology (TK) when shocks occur to GDP, productive land (LP), incoming foreign investment (FDI), human resources (HR) and the variable itself. Of the four variables that occur shocks namely productive land (LP), technology (the variable itself), GDP and human resources (HR) responded positively by technology. In the shocks that occur in the variable incoming foreign investment (FDI) the majority responded positively in each period except in the eighth period responded negatively by technology (TK).

Figure 5. Impulse Response to Technology Investment Functions



From some impulse response analysis conducted on the five variables used in this study, namely GDP, productive land, human resources, technology, and foreign investment, it appears that the majority of technology contained in East Asian and Pacific countries when shocks occur in various variables studied, the majority get a positive response from the beginning to the end of the period.

Variance Decomposition

In the analysis of variance decomposition, the same as in the analysis of the impulse response function there will be five analyzes, where the purpose of this analysis is to find out what variables affect one variable with another. The first analysis is to look at what variables affect GDP from the initial period to the final period as shown in table 12. In the initial period, 100% of GDP was influenced by the GDP figure itself. Until the beginning of the period until the end of the period, technology (TK) has a growing influence on GDP in the amount of 22.26, followed by productive land (LP) of 18.35, human resources 12.19 and foreign investment in (FDI) in East Asia and the Pacific at 5.56.

Table 12. Variance Decomposition of GDP

Period	S.E.	GDP	LP	FDI	SDM	TK
1	1.608840	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.849378	94.35126	1.318207	3.442811	0.697296	0.190424
3	2.121846	80.05575	3.388798	5.703999	10.17972	0.671734
4	2.694939	64.30968	12.54169	3.545910	13.59220	6.010522
5	3.101020	66.21636	13.68446	5.199701	10.30788	4.591601
6	3.602962	60.23502	17.05874	3.898859	7.825662	10.98172
7	3.802247	56.45219	15.37696	6.009125	8.855926	13.30580
8	4.235266	48.68723	23.01009	4.907320	7.716422	15.67894
9	4.887995	43.34835	20.20582	6.039051	5.812286	24.59449
10	5.172543	41.62019	18.35178	5.566331	12.19694	22.26475

The second analysis is to see what variables have the biggest to lowest influence on productive land (LP) in East Asia & the Pacific. In the initial period, GDP was able to influence productive land (LP) of 4.31, but until the last period the largest variable that had a large influence on productive land (LP) besides the productive land variable itself was technology (TK) of 28.38, resources human resources (SDM) 21.98, GDP of 5.63 and the entry of foreign investment into the country (FDI) of 4.39

Table 13. Variance Decomposition of Productive Land

Period	S.E.	GDP	LP	FDI	SDM	TK
1	0.260055	4.317667	95.68233	0.000000	0.000000	0.000000
2	0.477415	13.86409	33.12952	0.190860	24.99711	27.81842
3	0.859048	6.528499	39.81031	0.334027	39.95011	13.37706
4	1.332096	5.417571	57.11504	0.226990	23.86336	13.37705
5	1.472470	9.614882	49.59443	1.260399	23.59795	15.93234
6	1.585618	10.27248	43.47411	1.111415	31.20375	13.93824
7	1.919108	7.668010	46.69481	2.948131	23.81379	18.87526
8	1.987802	8.587273	45.82870	3.121456	22.20151	20.26106
9	2.153376	8.218090	40.37365	3.232273	23.77299	24.40300
10	2.642974	5.626773	39.61330	4.391211	21.98642	28.38230

The third analysis is to look at the variables of GDP, productive land (LP), human resources (HR) and technology (TK) in influencing foreign investment (FDI). There are two variables, namely GDP and productive land (LP) in the initial period which affect the incoming foreign investment (FDI) of 20.49 and 0.02, respectively. Until the end of the period in table 14. It is seen that the most influential foreign investment (FDI) is influenced by productive land 35.34%, human resources (HR) 26.69, GDP 13.08 and technology (TK) 4, 34%

Table 14. Variance Decomposition of Foreign Direct Investment

Period	S.E.	GDP	LP	FDI	SDM	TK
1	0.526373	20.49466	0.018733	79.48660	0.000000	0.000000
2	0.619067	15.68677	0.072506	80.30538	0.001522	3.933822
3	0.791215	9.683199	19.99594	56.21732	10.72175	3.381789
4	1.205568	8.379563	35.91193	28.45597	21.34990	5.902630
5	1.502960	9.439241	42.12644	18.79828	23.65274	5.983301
6	1.649384	11.63754	40.97283	16.54496	25.80808	5.036588
7	1.746587	13.05147	37.94441	17.90972	26.56560	4.528796
8	1.812827	13.11614	37.37829	19.69361	25.31107	4.500894
9	1.852365	13.39343	36.60837	20.55875	24.72918	4.710271
10	1.928334	13.08307	35.34170	20.53186	26.69686	4.346508

Table 15. Variance Decomposition of Human Resources

Period	S.E.	GDP	LP	FDI	SDM	TK
1	1.410863	12.69425	30.82926	0.837037	55.63945	0.000000
2	2.425380	22.06405	22.80132	0.297405	54.27516	0.562066
3	2.993429	35.14931	15.96378	1.503609	45.02784	2.355466
4	3.425588	35.99758	14.73836	6.221585	34.93487	8.107604
5	3.672571	32.87062	14.40043	11.46152	30.79713	10.47030
6	3.860812	30.85608	15.73064	13.46419	30.47182	9.477271
7	4.282897	28.43586	21.46374	11.21082	31.17686	7.712714
8	4.841263	26.91238	23.53336	8.853001	34.63879	6.062475
9	5.373377	25.92916	25.27335	7.915035	35.12956	5.752897
10	5.581783	27.60848	25.08516	8.022744	33.92413	5.359480

The fourth analysis of variance decomposition is to see how much GDP, productive land (LP), incoming foreign investment (FDI) and technology (TK) affect human resources (HR). In the initial period of productive land (LP), the influence was quite large with a value of 30.82, then GDP 12.69 and incoming foreign investment (FDI) 0.83. In the final period that most affected human resources (HR) besides the variable itself was GDP 27.61, productive land 25.08, incoming foreign investment (FDI) 8.02 and technology (TK) 5.35.

Table 16. Variance Decomposition of Technology

Period	S.E.	GDP	LP	FDI	SDM	TK
1	1.921573	5.679804	31.81179	0.084491	8.31E-05	62.42384
2	4.098728	3.781510	40.95707	0.270560	1.383803	53.60706
3	5.001120	4.662096	42.72338	0.759104	2.226028	49.62939
4	6.338442	5.235729	41.19693	0.717986	1.388212	51.46115
5	8.785223	3.988302	42.01218	0.398220	0.863588	52.73771
6	9.848812	3.996741	42.73102	0.690590	2.066048	50.51560
7	10.36874	4.767512	41.32212	0.972135	2.168577	50.76966
8	12.31755	4.785967	38.91301	0.863553	1.667928	53.76954
9	13.89314	4.711204	39.87905	0.711684	2.932101	51.76596
10	14.19750	5.212273	39.24921	1.526615	3.426772	50.58513

The fifth analysis of the variable decomposition is to see what variables influence technological variables (TK). At the beginning of the productive land period (LP) had a considerable influence on technology (TK) of 31.81, then human resources (HR) 8.31, GDP 5.67% and foreign investment (FDI) of 0.08. Whereas in the final period there was no change in the variables affecting technology (TK) where productive land (LP) from beginning to end still had the greatest influence with a value of 39.24, then GDP 5.21, human resources (HR) 3.43 and foreign investment (FDI) with a value of 1.53

CONCLUSION

Economic activities in East Asia and the Pacific using a classic approach using the GDP variable as an indicator of economic growth, available productive land use, the quality of human resources reflected in the level of education, the amount of foreign investment coming in the East Asia and Pacific region and technology which is reflected from the use of technology.

In the short term, incoming foreign investment and technology affect productive land while in the long run productive land is influenced by incoming foreign investment and human resources. In the short term, GDP is not affected by any variable, whereas in the long term GDP is affected by human resources, foreign investment, and technology. In the long run, human resources are affected by incoming foreign investment. Foreign investment that enters in the short term is influenced by productive land and human resources, whereas in the long run, only human resources can directly influence foreign investment. Technology in the short term is influenced by productive land and incoming foreign investment while in the long run technology is influenced by incoming foreign investment and human resources. The economic growth reflected in GDP and productive land contained in East Asia and the Pacific was largely influenced by technology in the final period. Incoming foreign investment and technology are largely influenced by productive land. Whereas the human resources found in East Asia and the Pacific are mostly influenced by GDP.

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Figures

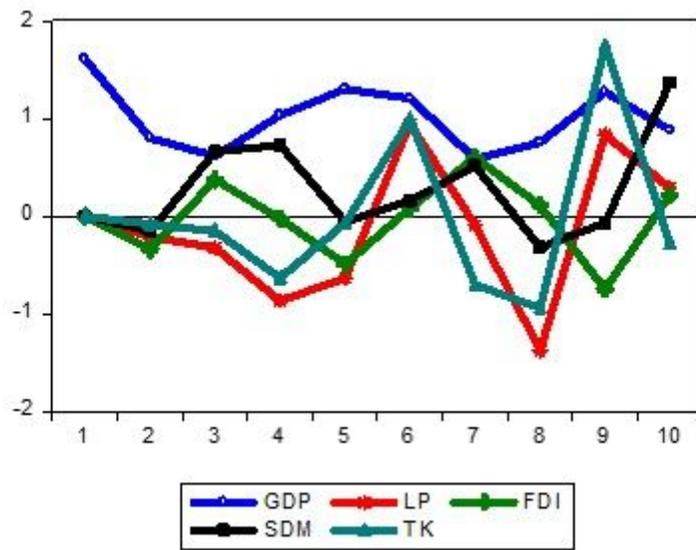


Figure 1

Impulse Response to Functions of Economic Growth

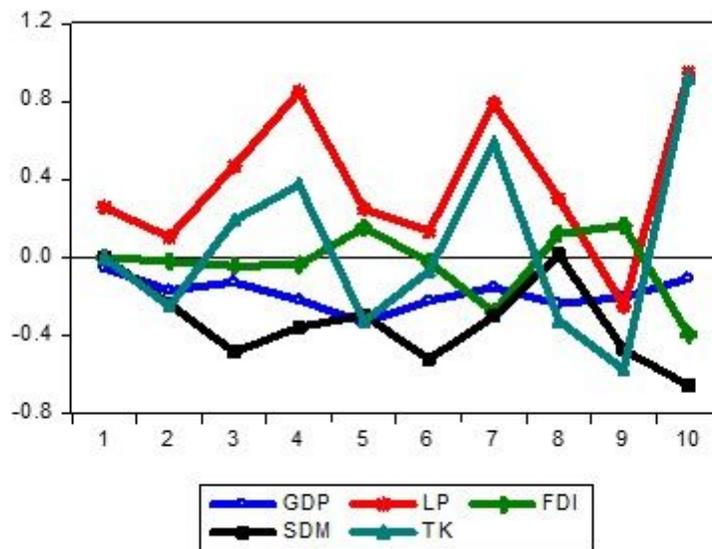


Figure 2

Impulse Response of Productive Land Functions

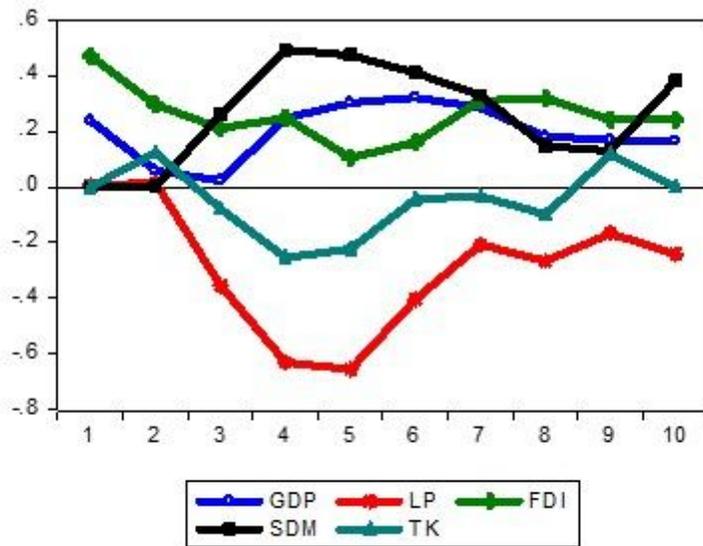


Figure 3

Impulse Responses of Incoming Foreign Investment Functions

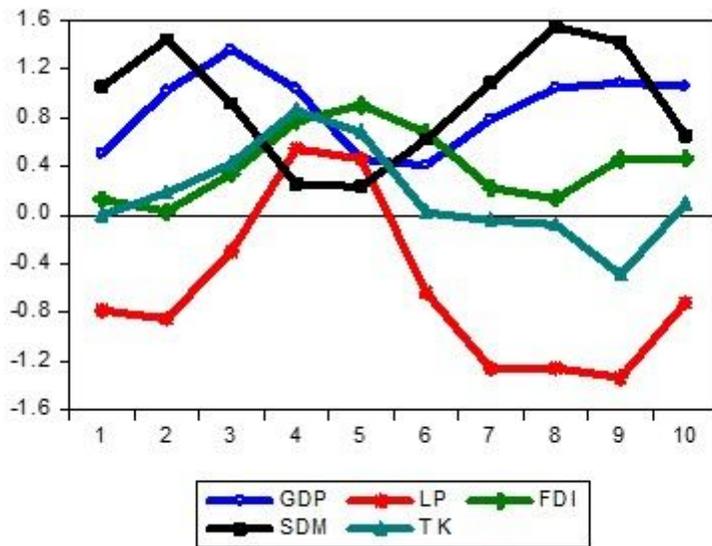


Figure 4

Impulse Response to Human Resource Functions

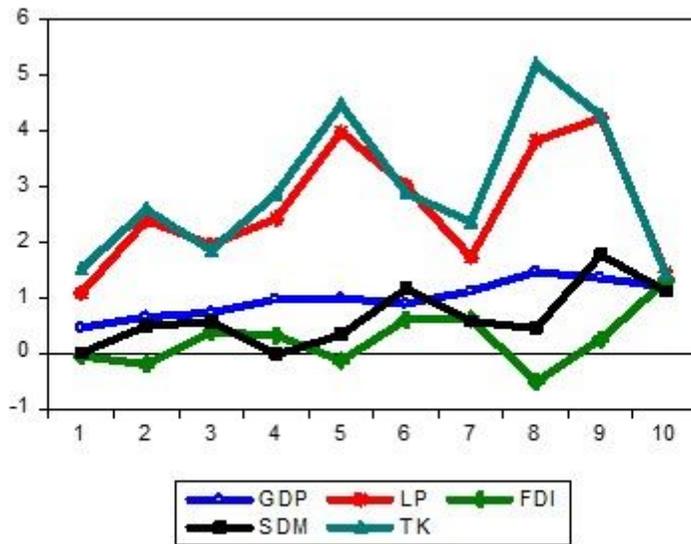


Figure 5

Impulse Response to Technology Investment Functions

Supplementary Files

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- [untitled.WF1](#)
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