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## Food Security, Government Effectiveness, and Macroeconomic Variables: Evidence in ASEAN

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### Abstract

*The study aims to examine the role of government effectiveness and several macroeconomic variables consisting of gross domestic product (GDP), total population, and foreign direct investment, on food security in ASEAN member countries. Specifically, this study uses the Panel Estimated Generalized Least Square method (Cross-section weights). The panel data used consists of 11 ASEAN member countries with a span of 2010 to 2021. Data on food security, government effectiveness, and macroeconomic variables are obtained from the World Bank. The indicators are respectively. This study found a positive relationship between food security; government effectiveness; and macroeconomic variables. These results indicate that, the influence of government effectiveness and macroeconomic variables in ensuring food security in ASEAN is relevant in improving food security. The study recommends that policies and programs that ensure quality civil services, policy formulation, implementation and credibility of government commitment to such policies are fundamental to long-term food sustainability in ASEAN Member States.*

**Keywords:** ASEAN, Food Security, Government Effectiveness, Macroeconomics

### 1. INTRODUCTION

Every year, food demand continues to increase along with the increase in population. Population increase is not the only obstacle in achieving food security. Increasing land conversion to residential or industrial use due to increased investment is a serious challenge in the effort to maintain food security.

Food security undergoes various changes in every context, time and place. More than 200 definitions of food security have been found in research by FAO in 2003 and by Maxwell in 1996. In addition, at least 450 indicators of food security have been identified by Hoddinott in 1996. Since the World Food Conference

in 1974 until the 1990s, there have been changes in the definition of food security. Initially, food was seen as a basic need (food first perspective), but later it evolved into a livelihood perspective. In addition, objective indicators have shifted to subjective perceptions of food security, which are seen at the global, national, household and individual levels (Maxwell & Frankenberg, 1992).

According to Arifin (2005), food security is currently a priority that must be faced in order to achieve national prosperity in this millennium. The topic of food security has always been important because food is a basic need that must be fulfilled by every individual, and is a key factor in determining the quality of human resources in a country. Every government always makes food security one of the main goals and becomes an issue in national development, as mentioned by (Saliem & Ariani, 2016). The government has a very important role in maintaining the stability of the country's food security because it requires policy intervention.

The government is implementing policies to create food security as their main task in building a strong and resilient food security system. The success of government policies in achieving food security depends on the paradigm or approach they use in integrating food security policies with other national development policies, such as poverty alleviation policies and macroeconomic policies (Díaz-Bonilla, 2015).

In policy making, the development of macro studies can serve as a basis. One finding shows that food aid has a negative impact on food production, but no negative impact was found in micro studies. According to Minot et al. (2019), the decline in wheat production in Ethiopia occurred due to an increase in food aid. Economic decision-makers revealed that food security is a significant challenge for developing countries, while the impact of foreign direct investment (FDI) in the agricultural sector has a positive effect (Slimane et al., 2016). There are still many studies that find different results regarding the positive and negative impacts of FDI on food security.

Based on the previous explanation, the objective of this study is to evaluate the impact of government effectiveness and macroeconomic variables on food security in the ASEAN region. This study consists of five sections. In Section 2, a literature review will be conducted. Section 3 is an explanation of the data and methodology used in this study. Furthermore, Section 4 will discuss the results and discussion that have been obtained. Finally, Section 5 will provide the conclusion of this research.

## 2. LITERATURE REVIEW

Improved food security can be achieved by understanding Engel's law which explains the importance of absorption capacity in times of food crisis. Food insecurity is caused by various factors, including productive and unproductive assets. Human capital; social needs; ensuring access to income-generating activities for food consumption. If individuals do not have these rights, they will be faced with various types of risks, including: B. Market risks. The risks of climate change, market network collapse and institutional failure can only be addressed through public policy (Dreze & Sen, 1989). Badiane (1988) believes that food security can be guaranteed by the excess costs generated by the economy.

Many studies have also shown that each increase in agricultural activity generates about 1.5 units of economic growth (Haggblade et al., 2007). However, the role of economic growth in improving

food security remains unclear. Although some studies have found a positive relationship between economic growth and food security (Ecker & Qaim, 2011), economic growth does not drive food security. In some parts of the world, the two are related, while in others they are not (Breisinger & Ecker, 2014).

While the literature suggests that the relationship between food security and economic growth is less clear, the main hypothesis of this paper is: - Economic growth is secondary to decisions made by individuals in response to market forces. "Improvements in food security resulted directly from a series of government policies that integrated the food economy into development strategies aimed at achieving rapid economic growth through improved income distribution (Timmer et al., 1983). This suggests that promoting economic growth and food security policies complement each other.

Documented evidence of success in East and Southeast Asia shows that poor countries implementing similar strategies can escape hunger within 20 years, while policies that decouple food security gains from overall economic performance show that this is not impossible. For example, an increase in gross domestic product (GDP) from agricultural labor productivity is on average 2.9 times more effective in raising incomes for the poorest quintile of people in developing countries than an equivalent increase in GDP. This has also been shown to be due to increases in labor productivity in the non-agricultural sector (Bravo-ortega & Lederman, 2005).

## 3. METHODOLOGY

### 3.1 Data and Model Specifications

This study uses data from 2010 to 2021 from 11 ASEAN member countries which include: Indonesia, Malaysia, Thailand, Singapore, Vietnam, Laos, Brunei Darussalam, Philippines, Myanmar, Cambodia, and Timor Leste. The dependent variable used in this study is food security proxied using the food production index. Meanwhile, the independent variables used include: GDP per capita, population, government effectiveness, and foreign direct investment (see Table 1). The data in this study was obtained from the World Bank.

**Table 1. Research Variables**

Variable	Description	Source
<i>FSE</i>	Food Production, The food production index consists of food crops that contain nutrients and non-nutritive items that are not included in this index.	<i>World Bank</i>
<i>GDP</i>	Gross Domestic Product (US\$)	<i>World Bank</i>
<i>POP</i>	Total Population regardless of legal status or citizenship, all residents are counted	<i>World Bank</i>
<i>FDI</i>	Foreign Direct Investment Net Inflow (US\$)	<i>World Bank</i>
<i>GE</i>	Government Effectiveness Index (-2.58 to 2.59)	<i>World Bank</i>

The following model is constructed to analyze the impact of macroeconomic variables and government effectiveness on food production index:

$$FSE = f(GE, GDP, POP, FDI) \quad (1)$$

The general form equation is converted into an econometric model with the addition of logarithm as below:

$$FSE_{it} = \beta_0 + \beta_1 GE_{it} + \beta_2 LGDP_{it} + \beta_3 LPOP_{it} + \beta_4 LFDI_{it} + \mu_{it} \quad (2)$$

where:

- FSE = Food Production Index
- LGDP = Log GDP Per Capita
- LPOP = Log Population
- LFDI = Log Foreign Direct Investment
- GE = Government Effectiveness Index
- $\beta_0$  = Intercept
- $\beta$  = Coefficient
- $\mu$  = Error term
- t = 1,2,3,...,12 (time periods)
- i = 1,2,3,...,11 (countries).

### 3.2 EGLS Panel Data Models

The use of panel data has the advantage of overcoming heterogeneity. Panel data relating to individuals, firms, states, countries, and so on may vary over time. However, it is often not possible to observe the entire panel data set (Gujarati & Porter, 2009). To complement this, EViews can help you by offering the option of a GLS specification that uses cross-section weights. There are several advantages of combining time series with other cross-sections. One of them is that the resulting data becomes more informative.

By combining these two types of data, we can see more variations in the data. In addition, combining time series and cross-section also reduces the collinearity between the variables. This makes the analysis more efficient and provides higher degrees of freedom. Last but not least, this approach also allows us to measure certain effects that occur. This study uses the Panel Estimated Generalized Least Squares (EGLS) cross-section weights method with Fixed Effect (FE) cross-section.

## 4. RESULTS AND DISCUSSION

### 4.1 Statistik Deskriptif dan Correlations Matrix

Publications on the theme of GE in Southeast Asia have been documented between the years 2010 and 2024 based on the dataset obtained from Scopus. Table 1 presents a summary of information about the dataset used in this study. Specifically, this study has considered 204 articles and reviews published in 108 journals. Overall, these documents were authored by 675 authors, with only 28 authors identified as single authors. This statistic indicates that collaborative performance in GE research is trending. The study also notes that the percentage of reviews is 2.5% of the total documents, suggesting a lack of review articles conducted in this field. Additionally, research on GE in Southeast Asia has emerged for over a decade.

**Table 2. Descriptive Statistics of All Variables**

Variable	Mean	Max	Min	Std. Dev
FSE	98.6	133	61.2	10.5
GE	0.08	2.32	-1.62	1.01

LGDP	10.9	12.1	8.95	0.83
LFDI	9.50	11.1	6.74	0.89
LPOP	7.26	8.44	5.60	0.83

Figure 2 illustrates the annual growth of GE-themed publications and the average citations per year. According to the Scopus database, GE publications in Southeast Asia commenced in 2010, with the number of publications starting to increase in 2015 and reaching its highest point in 2023 with 62 publications, while the average citations ranged from 0.12 to 9.31.

**Table 3. Spearman Rank-Order Correlations Matrix**

	FSE	GE	LGDP	LFDI	LPOP
FSE	1.0000				
GE	0.2497*	1.0000			
LGDP	0.2909*	0.4733*	1.0000		
LFDI	0.2789*	0.5256*	0.8574*	1.0000	
LPOP	0.1272	-0.0690	0.7355*	0.5463*	1.0000

\*. Correlation is significant at the 0.01 level.

### 4.1 The Panel EGLS (Cross-section weights) Results

Panel data models can have heteroscedasticity and correlation between errors that exist both within the same time and over time. In our case, we recommend using White's cross-section estimator as it is robust to heteroskedasticity and cross-section dependence. In an effort to achieve this goal, we utilize the Panel EGLS (Cross-section weights) approach.

**Table 4. Panel Estimated Generalised Least Square (Cross-section weights)**

Variable	Coefficient	Std. Err	t-Statistic
C	-1261.763*	263.9230	-4.780800
GE	10.71504*	3.483307	3.076110
LGDP	15.412***	8.286002	1.860067
LFDI	3.017503	2.579096	1.169985
LPOP	160.0157*	41.63024	3.843738
Adj R-squared	0.592913	F-statistic	14.62847***

\*. Significant at the 1% level, \*\*. Significant at the 5% level, \*\*\*. Significant at the 10% level

Based on partial estimation, it is found that government effectiveness has a significant influence on food security, this result is in line with the results found by Olofin et al. (2015). From this result, it is illustrated that the government is the main element in maintaining the stability of food security in a country. Government policy in decision-making is an important instrument that has a significant effect especially on food security. Macroeconomic variables play an important role in shaping resilience through two main factors, namely GDP and population level. GDP is an important instrument that determines the direction of a country's economy in a country. The results are in line with the research conducted by Hanif et al. (2019).

In seeing the welfare of its people, a good economy is an important benchmark. Community welfare cannot be separated from the fulfillment of basic needs, including food. Therefore, food security is a significant issue and an important factor in a country. If the handling of human resources is not optimal, an increase in population can become a problem that needs serious attention. However, on the other hand, population increase can contribute to maintaining food security, as long as it is balanced with the quality of human resources. The relationship between food security and the quality of human resources is closely intertwined. When food security is well-maintained, it will have a positive impact on the quality of human resources, as basic needs are met and promote prosperity.

## 5. CONCLUSION

In this study, government effectiveness is defined as the quality of public services and the degree of interdependence between political pressure, policy formulation, policy implementation, and government commitment to the policy. It relates to food security in ASEAN. Therefore, this study indicates that the government can assist farmers in improving food security through effective regulations, such as fertilizer subsidies and farm equipment subsidies.

Meanwhile, increasing GDP and population have a significant impact in supporting food security through macroeconomic variables. It is recommended by this study that governments in ASEAN countries increase their efforts in fulfilling their governance responsibilities towards their people to maintain food needs through stable food security.

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