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Research article

The Impact of Key Sectors on Economic Growth: A Cross-Country Analysis

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ABSTRACT

Economic growth is a multifaceted phenomenon driven by various sectoral contributions. This study investigates the impact of exports, imports, including key economic sectors, such as manufacturing, agriculture, services, and construction, on economic growth in developing and developed countries. It uses time series data from Q2-2011 to Q2-2023 and seven countries, i.e. Indonesia, China, India, France, Germany, the United Kingdom, and the United States. It applies panel data regression with the fixed effect-least square dummy variable method. The findings reveal that exports, manufacturing, agriculture, and services have positive and statistically significant effects on economic growth. In contrast, imports and construction show negative impacts. These findings underscore the importance of fostering export-oriented industries, promoting technological innovation in manufacturing, supporting sustainable agricultural practices, and developing a vibrant service sector. In turn, policymakers should address the potential negative consequences of excessive import dependence and strive to improve the efficiency and productivity of the construction sector. These findings provide implications for policymakers to formulate and implement effective economic growth strategies that prioritize sustainable development and inclusive growth.

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1. INTRODUCTION

Historical issues of the world economy have become important rumors. Over time, the turnaround in the world economy has caused a recession and depression for every developing and developed country. Starting from the beginning of the breakup of a British joint stock company, called the "United Kingdom South Sea Bubble," which was founded in 1711, and the France economic disputes that began with King Louis XV selling his stock company to France, which occurred in 1720 (according to economic history, there was a delay of the industrial revolution for 50 years) and until the industrial depression in the 1870s and 1930s (Bruner & Miller, 2020). At the beginning of the 2nd century, there was a major contraction in economic activity that brought about a temporary expansion policy in the purchase of government goods and services. This has an impact on the holder of the federal reserve system, namely the United States (Prasad et al., 2020), and a severe contraction followed all economies in the world in 2008 (Elstner et al., 2021). The role of every company's management and each country's power stakeholders in the global financial market seems to play a different function of controlling the economy, namely in creating new regulations to improve the economy. We know that, at the end of the previous week, the latest obstacles that have occurred in recent weeks such as the Covid-19 situation, supply chain disruptions, the war between Ukraine-Russia, and the symptoms that will come will be economic changes around the world, especially the Covid-19 pandemic which caused economic shocks in the United States, including a significant surge in inflation (Bryniuk, 2023).

Collective society in a country plays a very important role in increasing economic growth, namely through development institutions, infrastructure, environment, macroeconomics, technological readiness, education, market size (Baariu & Jagongo, 2022), and good social choices in cooperation politics (Adanma & Ogunbiyi, 2024). The literature in reminding the constant price gross domestic product in developed and developing countries is quite varied. In trade of each country, there are differences in technological diffusion in increasing trade in developed and developing countries (Essandoh et al., 2020). The study conducted by Chandru & Suresh (2024) stated that there is a significant difference in trade with GNP in each country, especially in developing countries. The study by Chandru & Suresh (2024) also divides into 3 categories of exports (food) in increasing GNP, including: first, high exports ≥ 66%; medium exports < 66%; and low exports < 33%.

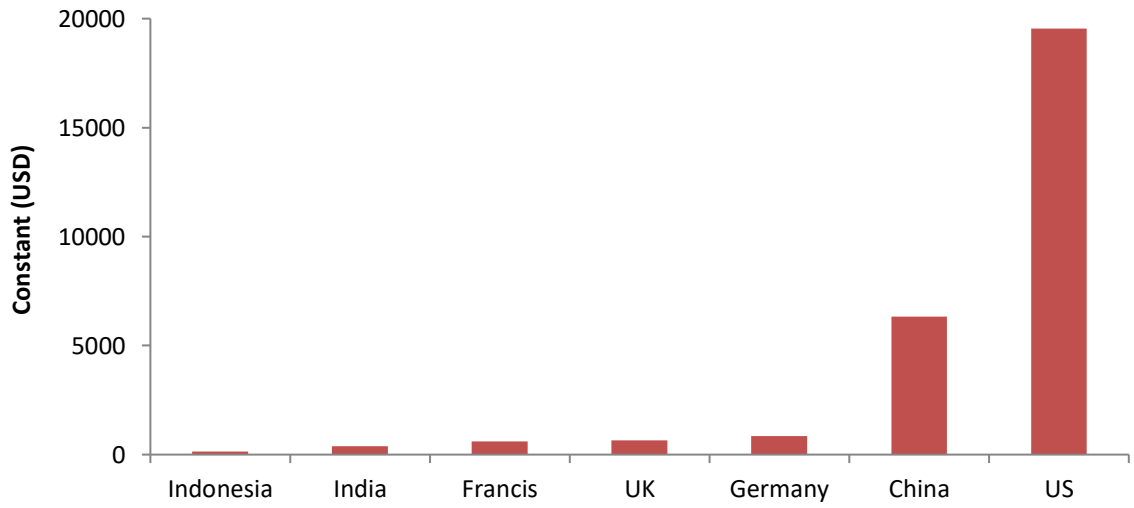

Figure 1. Average real GDP in developed countries and developing countries

GDP growth is important for developing countries such as China, which is gaining benefits from the large amount of foreign investment and large multinational companies spread throughout the world (Ghauri et al., 2021). Additionally, Indonesia is included in the 100 poorest countries in the world, which is measured or gross national income per capita (GNI). The data was released by the World Population Review (WPR), where Indonesia is ranked 73rd with Indonesia's gross national income. The high level of unemployment and poverty is the cause of low opinion in developing countries, especially in Indonesia (Bartolucci et al., 2018). In contrast to developed countries such as the United States in the service sector, for decades the service sector has boosted the country's economy and become an income differentiator for middle- and developing countries (Oreiro et al., 2020). A country that needs to make the modern industrial policy framework which can more good jobs (Prasad et al., 2020), namely by increasing productivity and labor income growth for workers in the service sector (Barnes et al., 2022).

The role of capitalism also contributes greatly to economic growth in the modern era, both in terms of population growth and economic growth itself. The first influence on the economy was by England in the 19th century and then followed by the world in Europe and America related to the industrial revolution (Pilatin & Hacıimamoğlu (2023). For developing countries, high income growth rates have not been a benchmark for whether the country is prosperous or not. We emphasize that high growth rates do not yet determine real evidence of happiness in the country. This basis explains that there are still less reliable aggregate measurements of income growth across countries compared to individual analysis (Clark & Senik, 2011). In general, developing countries are identified in trade solutions to improve their economies, namely relying on the quality of natural resources and the quantity of productivity of the supply of goods for exports and imports, and also the importance of the role of information technology in economic development for developed and developing countries (Degu, 2018; Guan et al., 2021; and Yalgi & Sinha, 2024).

Gross domestic product developed by Simon Kuznet for the United States congressional report in 1934 is the sum of the value added from household consumption, government spending, and also industries operating in the economy (Mishra et al., 2023). Several researchers discuss various problems between economic value added variables, such as a study conducted by Baghirov et al. (2022) revealed that export trade has a positive effect on GDP. Meanwhile, a study conducted by Piechucka et al., (2024) in the UK stated that manufacturing as measured by single capital investment directly has a positive effect on economic growth in the European Union region. Prasad et al. (2020); and Storm & Naastepad (2015) highlighted Germany, finding that the volatility of the economic sector's value added is very important for the future, this improvement has been made since the crisis its GDP fell by 6.6 percentage points for five consecutive quarters from 2008Q1 to 2009Q1. Investigating Schumpeter's conjecture that the increase in the flow of services by the financial sector is important for economic growth and the evolution of manufacturing is closely related to financial activity in thirteen countries listed in the Organisation for Economic Co-operation and Development (OECD). Prasad et al. (2020); Baariu et al. (2022); and Musora & Matarise (2023) reveal that the negative impact of commodity growth on terms of trade volatility offsets the positive impact of commodity booms; and export diversification of countries rich in primary commodities contributes to faster growth.

Many studies discuss cross-country economic growth with various types of models and tests, such as a study conducted by Gupta & Shastri (2020) highlighting the factors that influence GDP with the VAR model. A study conducted by Shafrullah et al. (2024) highlights ASEAN economic growth with several indicators that influence it with a fixed effect model. A study conducted by Sumiyati (2020) highlights the factors that influence exports and manufacturing on GDP using the vector error correction model. Bashir et al. (2018); and Alaloul et al. (2021) investigated the relationship between the construction sector and other sectors through complex relationships that contribute to GDP and sustainable development using the Granger causality, VECM and IRF models. Meanwhile, our study highlights the impact of exports, imports, including key sectors on economic growth in developing and developed countries using panel data regression with the Pooled-OLS approach, least square dummy variable (LSDV), and Within-Group modeling. This will add to and complement previous studies, this study investigates the best model to find out which sectors influence economic growth in cross-country cases, this study complements studies conducted by Bell & Jones (2015); Alaloul et al. (2021); and Baghirov et al. (2022).

This study attempts to contribute to complete the literature related to the impact of exports, imports, especially major sectors such as manufacturing, agriculture, construction, and services on economic growth in the quarters of 2011Q2 to 2023Q2 in developing countries such as Indonesia, China, India; and developed countries such as the United States, the United Kingdom, France, and Germany. We divide several important aspects in it, first, the dominant assumptions in the public sector literature related to important determinants of economic growth. In addition, empirical and theoretical literature highlight the interaction between major sectors on economic growth. Although several studies have examined the bilateral and multivariate relationships between these variables, to the best of the author's knowledge, there has been no serious effort to understand the sectoral influence on growth. An important objective of this study is to identify and address important gaps in the literature on the effects that ignore the six variables that allow each other to influence each other with the best model. Second, previous studies generally use several short-run and long-run model approaches. This study uniquely applies panel data regression with the fixed effect least squares dummy variable (FE-LSDV) method, and the Wald test model to highlight differences across countries, and the Within-Group test model highlights the variation in deviations between each grouped data with the average value of its group (Breitung & Salish, 2021; Abonazel & Shalaby, 2021; and Rodríguez-Modroño & López-Igual, 2021). Thus, this study is expected to provide valuable input for policymakers in designing economic development strategies that are in accordance with the level of development of a country. The rest of this paper is compiled as follows the second part we will provide an overview based on the data framework and methodology. We devote ourselves to filtering the findings and empirical analysis in the third part. Meanwhile, in the last part, we will present a conclusion.

2. RESEARCH METHODS

2.1. Data

This study uses secondary data; the variables selected are indicators of secular volatility and international output fluctuations such as real gross domestic product (USD, contants 2015), exports, imports, manufacturing, agriculture, construction, and services in the economies of the United States, United Kingdom, Germany, and France as developed countries, while India, China, and Indonesia as developing countries in the period 2011Q2-2023Q2. All variables are in United States Dollar (USD) and percentage form (% of GDP) obtained from the World Bank database. The selection of objects is based on several criteria from each developed and developing country, including population, social, cultural, state governance, and trade cooperation in the international region. Additionally, the selection of criteria for developed countries with the largest sectoral contributors, both industry, exports, tourism, and others. Meanwhile, developing countries contribute to the service and industrial sectors by utilizing the strategic location of the country's zone. Availability of data on economic variables obtained during the research publication period.

2.2. Model Specification

This study applies a panel data regression model of seven developed and developing countries from Q2-2011 to Q2-2023 using the least squares dummy variable (LSDV) model. Several steps taken in the testing stage of the least squares dummy variable method are: (1) estimating the parameters of each sample (country analyzed) using the least squares dummy variable; (2) estimating the parameters of the pooled samples using ordinary least squares (OLS); (3) estimating the behavioral relationship between individual variables (explaining individuals between samples based on cross-section data and time series data); and (4) testing for significant positive or negative sign differences between groups. First, we test using panel data analysis (pooled data OLS), which is often used to combine data over time which is called a time series, and between individuals or called cross sections, this is to provide a comprehensive overview of the panel data (Breitung & Salish, 2021). Using matrix notation, the standard regression can be written as follows:

$$GDP_{i,t} = \beta_0 + \beta_1 EX_{i,t} + \beta_2 IM_{i,t} + \beta_3 MF_{i,t} + \beta_4 AGC_{i,t} + \beta_5 CONS_{i,t} + \beta_6 SV_{i,t} + \varepsilon_{i,t} \quad (1)$$

where GDP is the gross domestic product constant price; EX is export value-added; Im is import value added; MF is manufacturing value-added; AGC is agricultural sector value-added; CONS is construction sector value-added; SV is service sector value added; i is the number of samples to be described; t is the number of periods used; β is the k-element vector of regression coefficients; and ε is the standard error.

The main advantage of panel data is that it allows researchers to have great flexibility in modeling individual behavioral differences. Fixed Effect (FE) models are also called individually specific effect models that would enable each cross-sectional unit to have a different intercept term even though the slope is the same (Abonazel & Shalaby, 2021). Fixed effects models explicitly account for the effect of country heterogeneity, with the following matrix notation:

$$GDP_{i,t} = \beta_0 + \beta_1 EX_{i,t} + \beta_2 IM_{i,t} + \beta_3 MF_{i,t} + \beta_4 AGC_{i,t} + \beta_5 CONS_{i,t} + \beta_6 SV_{i,t} + \omega_i + \varepsilon_{i,t} \quad (2)$$

where ω_i is unobserved heterogeneity (country-dependent error term) and ωi is fixed over time but varies cross-sectionally.

The next test estimator is by using the dummy variable technique, in this estimation we have (N) as a sample, and we will use (N-1) dummies to avoid the trap of dummy variables (i.e. collinearity problems). In this section, we will estimate the model, not the model itself in the "least squared" part (Abonazel & Shalaby, 2021). For the intercept to vary among the countries, we run the following differential intercept dummy variable regression model:

$$y_{i,t} = \beta_0 + \beta_1 D1_i + \beta_2 D2_i + \beta_3 D3_i + \beta_4 D4_i + \beta_5 D5_i + \beta_6 D6_i + \beta_7 Ex_{i,t} + \beta_8 Im_{i,t} + \beta_9 Mf_{i,t} + \beta_{10} Agc_{i,t} + \beta_{11} Co_{i,t} + \beta_{12} Sv_{i,t} + \varepsilon_{i,t} \quad (3)$$

where $D1$ = 1 if country 1, 0 otherwise; $D2$ = 1 if country 2, 0 otherwise; $D3$ = 1 if country 3, 0 otherwise; $D4$ = 1 if country 4, 0 otherwise; $D5$ = 1 if country 5, 0 otherwise; $D6$ = 1 if country 6, 0 otherwise; and i is country-7 is the reference category, defined when $D1 = D2 = D3 = D4 = D5 = D6 = 0$; β_0 is the summary of the intercept values is United States; $\beta_0 + \beta_1$ is Indonesia; $\beta_0 + \beta_2$ is China; $\beta_0 + \beta_3$ is Germany; $\beta_0 + \beta_4$ is the United Kingdom; $\beta_0 + \beta_5$ is France; and $\beta_0 + \beta_6$ is India.

Using the analysis of the limited F-test, this analysis was used to look at the relationship between the restricted model (pooled OLS) and the complete model (FE-LSDV) between y and x (Rodríguez-Modroño & López-Igual, 2021). F-statistic test and alternatively, using matrix notation:

$$F = \frac{\frac{SSE_n - SSE_c}{K_c^*}}{\frac{SSE_c}{n-K_c}} \; and, alternatively \; F = \frac{\frac{R_c^2 - R_c^2}{k_c^*}}{\frac{1-R_c^2}{n-k_c}} \quad (4)$$

where the description of the equation (4) is explained by SSE_n is SSE for restricted model (pooled OLS); SSE_c is SSE for complete model ($FE-LSDV$); R_c^2 is R^2 from the complete model; R_r^2 is R^2 from the restricted model; n is the sample size; k_c is the number of coefficients in the complete model ($\beta = 13$); and k_c^* is the number of additional coefficients in the complete model ($\beta = 6$).

Conducting differential wall/differential intercept test of LSDV regression using the same data. For example, the number of countries, periods, data types, sample size (n) = 343. The Wald test is a hypothesis test that is widely used in statistics. After we have done the R test which is done to study all the items individually with SSEn and SSEc, after we will do the Wald test can be made by combining two diagonal matrices horizontally (Ma et al., 2021). Type the following null hypothesis statement on the dialog box (these are the dummy variable coefficients, i.e. the differential intercept values). Using matrix notation, the standard regression Wald test statistic can be written as follows:

$$W_n = ng(\hat{\theta}_n)^T \left[J_g(\hat{\theta}_n) \hat{V}_n J_g(\hat{\theta}_n)^T \right]^{-1} g(\hat{\theta}_n) \quad (5)$$

where n is the sample size; $\tilde{V}_n$ is a consistent approximation of the asymbiotic comorbid matrix θ_n. The goal is to determine if these differences–which denote heterogeneity–are large enough to warrant the use of FE model instead of pooled OLS.

The estimator of the Within Group test measures the relationship between the individual specific deviation of the regressor from its time mean value and the individual specific deviation from its time mean dependent variable (Abonazel & Shalaby, 2021). Using matrix notation, the standard regression can be written as follows:

$$GDP_{i,t} = \beta_{0i} + \beta_1 EX_{1,i,t} + \beta_2 IM_{2,i,t} + \beta_3 MF_{3,i,t} + \beta_4 AGC_{4,i,t} + \beta_5 CONS_{5,i,t} + \beta_6 SV_{6,i,t} + \omega_i + \varepsilon_{i,t} \quad (6)$$

If heterogeneity exists, Cov(ω_i, $x_{i,t}$) ≠ 0. To solve the heterogeneity problem, we express each variable as a deviation from its time–mean. So, from mathematics:

$$y_{i,t} - \bar{y}_i = \beta_1 (x_{1,it} - \bar{x}_{1i}) + \beta_2 (x_{2,it} - \bar{x}_{2i}) + \beta_3 (x_{3,it} - \bar{x}_{3i}) + \beta_4 (x_{4,it} - \bar{x}_{4i}) + \beta_5 (x_{5,it} - \bar{x}_{5i}) + \beta_6 (x_{6,it} - \bar{x}_{6i}) + (\omega_i - \bar{\omega}_i) + (\varepsilon_{it} - \bar{\varepsilon}_{it}) \quad (7)$$

The observations of FE estimation are as follows: Both FE-LSDV and within–group methods give identical slope estimates – the two models are mathematically the same, Unfortunately, the mean correction has a knock-on effect on the use of time-invariant variables because for such variables, $x_1 - x' = 0$. Differencing tends to remove long-run effects in the data, leaving only short-run dynamics.

3. RESULTS AND DISCUSSION

3.1. Results

Descriptive statistics and correlation are statistical methods used to determine the central value and size of the data distribution by providing information about the characteristics of the data presented in Table 1.

Table 1. The Result of Descriptive Statistics and Correlation

Descriptive	GDP	EX	IM	MF	AGC	CONS	SV
Mean	1,082	8,493	-2,676	-6,960	1,716	1.,516	1,273
Median	-1,809	-1,561	-0,989	0.002	-0,086	-0,188	-0,430
Maximum	9,317	101,882	72,316	3,230	759,681	711,914	5,219
Minimum	-4,851	-51,095	-46,422	-1,684	-373,975	-368,002	-2,819
Std. Dev.	1,474	19,025	17,378	46.556	11,589	11,928	1,029
Jarque-Bera	2.051	1.442	3.030	3.674	3.194	1.445	4.729
Probability	0.346	0.532	0.214	0.153	0.104	0.512	0.102
GDP	1.000	-	-	-	-	-	-
EX	0.483	1.000	-	-	-	-	-
IM	0.483	0.875	1.000	-	-	-	-
MF	0.939	0.397	0.329	1.000	-	-	-
AGC	0.865	0.243	0.166	0.967	1.000	-	-
CONS	0.972	0.399	0.416	0.925	0.854	1.000	-
SV	0.943	0.494	0.576	0.793	0.678	0.938	1.000

Table 1 reports the results of descriptive statistics and correlations between variables, namely the existence of fairness obtained from the characteristics of each variable used, including export (EX) variables, imports (IM), manufacturing (MF), agriculture (AGC), construction (CONS), services (SV), and gross domestic product (GDP). The result shows that several characteristics are known in each variable, including. First, the study meets the requirements for normality in the data with the assumption that the amount of data used is more than 30 observations with country specifications of up to 7 countries, including 4 developed countries such as the United States, Germany, France, United States and 3 developing countries such as Indonesia, India, China. As for Table 1, the highest value on the sectoral average is in agriculture. Meanwhile, at the maximum and minimum levels of the sectoral level are the domestic growth variable of products at constant prices.

Table 1 also reports the correlation to see the strength of the relationship between variables which aims to avoid multicollinearity problems in model estimation. The results of the correlation relationship between variables show the results of the correlation of constant price gross domestic product with other explanatory variables. The highest correlation between construction variables and constant price gross domestic product is 0.972. Meanwhile, the lowest moderate relationship occurs between import and agriculture variables of 0.166. Therefore, it can be concluded that overall the estimation model variables are free from multicollinearity problems (Mahesh et al., 2023; Yaqoob et al., 2023 and Coca et al., 2023).

Table 2. The Result of the Panel Unit Root test

Variables	Panel Individual ADF-Statistics		Information
	Level	First Difference	
Δ(GDP)	-0.668	-17.597***	*I*(1)
Δ(EX)	2.310	-10.443***	*I*(1)
Δ(IM)	1.461	-8.335***	*I*(1)
Δ(MF)	-2.237**	-	*I*(0)
Δ(AGC)	-11.619***	-	*I*(0)
Δ(CONS)	-3.123***	-	*I*(0)
Δ(SV)	0.605	-15.002***	*I*(1)

Notes: *** and ** indicate significant levels at 1% and 5%

The next stage, this study conducted a traditional panel unit root test and a Pesaran-based cross-sectional test using the ADF-test model which produced inconsistent and biased values (Pesaran et al., 2008)The unit root test presented in Table 2 shows various results at the level and first difference. For example, the manufacturing, agriculture, and construction variables are stationary at the level method. Meanwhile, the constant price gross domestic product, exports, imports, and services variables are stationary at the first difference.

Table 3. The Result of the Cross-Sectional Dependence test

Variables	B-P LM test		P-S LM-test		B-CS LM test		P CD-test	
	Stats	Prob	Stats	Prob	Stats	Prob	Stats	Prob
GDP	677.449	0.000	101.292	0.000	101.219	0.000	25.190	0.110
EX	567.863	0.000	84.383	0.000	84.310	0.000	21.455	0.000
IM	530.046	0.000	78.547	0.000	78.474	0.000	19.394	0.101
MF	467.793	0.000	68.942	0.000	68.849	0.000	19.774	0.000
AGC	86.538	0.000	10.113	0.000	10.039	0.000	-1.041	0.297
CONS	290.189	0.000	41.537	0.000	41.464	0.000	11.776	0.000
SV	608.121	0.000	90.595	0.000	90.522	0.000	23.963	0.000

Notes: B-P is the Breusch-Pagan test; P-S is the Pesaran Scale test; B-CS is the Bias-corrected Scale test, P-CD is the Pesaran cross-sectional dependence test.

To determine whether or not the residuals in the model were independent, this study first performed a correlation and unit root test for each variable, followed by a cross-sectional dependences (CD) test (Coca et al., 2023). The test results presented in Table 3 show that the cross-sectional results were null hypothesis rejected at a significance level of 0.01 from the number of variables in this study (Pesaran et al., 2008). Additionally, three variables are not significant based on the cross-sectional dependences test, namely the gross domestic product constant price, import, and agriculture, each with statistics of 25,190, 19,394, and -1,041. These results strengthen the conclusion Musora & Matarise (2023) which states that there is evidence of dependency in cross-sectoral relationships and growth.

Table The results of the Chow test show that the cross-section F-statistics is 327.684 with a p-value < 0.05. So, in this test, the fixed effect model was chosen, not the common effect model. Meanwhile, the results of the Hausman test from Table 4 show that cross-section F-statistics is 1966.104 with a p-value <0.05, this implies that the fixed effect model was chosen. The last results using the Lagrange multiplier (LM) test in Table 4 show that the Breusch-Pagan cross-section F-statistics is 604.119 with a p-value <0.05, this implies that the random effect model was chosen, not the common effect model.

Table 4 also reports the estimation results from the Ordinary Least Square model. We assume the seven countries have the same character because the panel data includes different countries with different characteristics. There is a possibility of heterogeneity in each country, which refers to unobserved country-specific characteristics. For example, heterogeneity includes each country's geographical location, culture, and management philosophy. Although the characteristics vary across developed and developing countries, these characteristics are time-invariant, meaning that the characteristics in each country are fixed, over time.

Table 4 reports the estimation results of the three models that predict that there will still be trade competition in each country, even though the value added of each sector from year to year is still relatively the same. The fit of the three models shows that the Pooled-OLS, FE-LSDV, and within-group models have high R-squared values of 0.9973, 0.9996, and 0.9918, respectively, implying that the three models have goodness of fit of 99.73%, 99.96%, and 99.18% of the variation in the independent variables can explain the variation in the dependent variable. The results of this study found that R^2 for the restricted model in Pooled-OLS is 0.9996, for the restricted model FE-LSDV is 0.9973, the number of additional coefficients in the full model (k_c^*) is 6, the number of coefficients in the full model (k_c) is 13, and the sample size (n) is 343, so the F-test result obtained is 0.12402 which means the null hypothesis is rejected because the F-test value of 0.1240 is smaller than the critical value of the F-test is 2.1260, finally the inclusion of differential intercepts significantly

improves the model, therefore we accept fixed effect model and reject the Pooled-OLS model. Meanwhile, in the Wald test, the Chi-Square value was 2029.850 with a p-value <0.05 at a degree of freedom of 6. This implies that this study model has considered heterogeneity in determining the impact of exports, imports, manufacturing, agriculture, construction, and service sectors on economic growth across countries.

Table 4. The Result of Pooled OLS Estimation, FE-LSDV, and Within-Group

Dependent variable = GDP			
Variables	**Pooled OLS**	**Fixed Effect-LSDV**	**Within-Group**
Constant	3.732***	9.098***	-5.127***
	(0.517)	(0.415)	(0.724)
EX	0.060***	0.053***	4.733***
	(0.013)	(0.010)	(0.920)
IM	-0.061***	-0.043***	-4.095***
	(0.016)	(0.011)	(1.052)
MF	0.378	1.135***	1.255***
	(0.244)	(0.131)	(0.120)
AGC	0.045***	0.028***	2.377***
	(0.008)	(0.004)	(0.364)
CONS	-0.038***	-0.026***	-2.902***
	(0.003)	(0.003)	(0.388)
SV	0.930***	1.030***	1.031***
	(0.085)	(0.032)	(0.320)
D_Indonesia	-	-5.144***	-
		(0.195)	
D_China	-	-5.668***	-
		(0.201)	
D_India	-	-5.029***	-
		(0.201)	
D_Germany	-	-4.829***	-
		(0.217)	
D_United Kingdom	-	4.943***	-
		(0.193)	
D_France	-	-4.951***	-
		(0.195)	
D_US	-	5,264***	-
		(0.187)	
Goodness of fit			
R^2	0,9973	0,9996	0,9918
SSE	349,160	133,056	134,038
Selected methods	**Cross-section F**	**p-value**	
Chow test	327.684	0.000	
Hausman test	196.104	0.000	
Breusch-Pagan test	604.119	0.000	
Wald test	2029.850	0.000	

Notes: *** and ** indicate significant levels at 1% and 5%

We found that in the pooled-OLS model, only the manufacturing sector has an insignificant effect on economic growth. Meanwhile, in the FE-LSDV and within-group models, consistent results were found, such as exports, manufacturing, agriculture, and services sectors having positive signs and significant influence on economic growth in a panel. Meanwhile, imports and construction have negative signs and significant influence on economic growth. This finding aligns with the study conducted by Anwer et al. (2015); Q. Wang & Zhang (2021); and Musora & Matarise (2023) which states that there are positive signs and significant influences of export trade and agriculture on economic growth in cross-country cases.

The FE-LSDV model shows that there is significant heterogeneity in GDP levels across countries. The country dummy variables successfully capture these differences and allow us to compare each

country's GDP levels relative to the United States as the base country. The FE-LSDV model presented shows that the dummy variables for each country have statistically significant coefficients (p-value <0.05), indicating that there is a significant difference in GDP levels between these countries compared to the United States as the base country. Countries with lower GDP levels than the US are Indonesia, China, India, Germany, and France. The negative coefficients on the dummy variables for these countries indicate that the average GDP levels of these countries are lower than the United States, this implies that after controlling for other variables in the model. Meanwhile, countries with higher GDP levels than the US such as the UK have positive coefficients on the dummy variables, indicating that the average GDP levels are relatively comparable to the US GDP levels. Various factors, such as differences in productivity levels, human capital, infrastructure, government policies, and geographic conditions can cause the significant differences in GDP levels between countries. The results of this analysis can be the basis for further analysis of the factors that cause differences in GDP levels between countries. This finding is in line with a study conducted by Wang (2019) opinion on the existence of negative and positive influences on each cross-sectoral volatility of developing and developed countries. Therefore, each country needs to increase cooperation in open trade and from foreign investment in improving the cross-sectoral economy.

Several previous studies conducted by Baghirov et al. (2022); and Musora & Matarise (2023) stated that the most appropriate model used in calculating the economic growth rate between countries is the Fixed Effect Model. This explains that economic growth greatly affects the sectoral added value of a state policy. It is important to see that, for developing countries with a high population, it will greatly affect sectoral opportunities in the service sector to improve the economy. On this assumption, India and Indonesia are very influential in the service sector. Meanwhile, in developed countries such as the United States, the United Kingdom, France, and Germany, an increase is needed in the field of construction and manufacturing, this is also balanced by an increase in goods that must be needed in the field of services and imports of necessary commodity goods. Meanwhile, China has a stable high income, with a high population. However, it is necessary to encourage the country by increasing added value in the construction and manufacturing sectors in order to compete with developed countries.

3.2. Discussions

This study reveals a nuanced picture of how different sectors contribute to economic growth. Notably, the exports, manufacturing, agriculture, and services sectors demonstrate a positive and statistically significant impact on economic growth. This suggests that these sectors play a crucial role in driving economic expansion. The positive influence of exports on economic growth aligns with economic theory. Expanding exports generates foreign exchange, increases demand for domestic goods, and fosters technological advancements through exposure to global markets. This finding supports a study conducted by Ogunjobi et al. (2023); Ahmad et al. (2020); Ahmad et al. (2017); and Nguyen (2020).

A thriving manufacturing sector is often associated with higher productivity, technological innovation, and job creation. The positive impact of manufacturing on economic growth is consistent with this expectation. This finding supports a study conducted by Szirmai & Verspagen (2015); Haraguch et al. (2017); and Cantore et al. (2017). While often overlooked in developed economies, agriculture remains a significant sector in many developing countries. Its positive influence on growth likely stems from its contribution to food security, rural development, and employment. This finding supports a study conducted by Bashir et al. (2018); Sertoglu et al. (2017); and Awunyo-Vitor & Sackey (2018). The growing importance of the services sector in modern economies is reflected in its positive impact on growth. The services sector encompasses a wide range of activities, from finance and technology to tourism and healthcare, all of which contribute to economic output and employment. This finding supports a study conducted by Das & Raut (2014); Grubel & Walker (2019); and Magoti & Mtui (2020).

The negative impact of imports on economic growth might seem counterintuitive. However, it's important to consider that high levels of imports can indicate a reliance on foreign goods, potentially crowding out domestic production and hindering the development of domestic

industries. This finding supports a study conducted by Usman & Bashir (2022); and Dao, M. Q. (2014). Meanwhile, this finding contradicts the results of a study conducted by Mishra (2012); Bakari (2017); and Okyere & Jilu (2020). Additionally, the negative impact of construction on economic growth is an interesting finding. It's possible that the construction sector in this particular context may be characterized by low productivity, high capital intensity, or cyclical fluctuations that negatively impact overall economic stability. This finding supports a study conducted by Chia (2012); Chiang et al. (2015); and Qabaja & Tenekeci (2023). This finding contradicts the results of a study conducted by Chiang et al. (2015); Yakimchuk et al. (2017); and Qabaja & Tenekeci (2024).

Our findings explain that the sector that plays the most role in increasing economic growth in Indonesia is manufacturing. This finding supports research conducted by Athukorala & Patunru (2023) explaining that several things make the manufacturing sector very profitable in increasing economic growth in Indonesia, including the large number of manufacturing sectors in Indonesia such as the manufacturing industry from the food and beverage industry, automotive, pharmaceuticals, cement, and textiles on an international scale, which can compete with developed countries. Sumiyati (2020); and Fazaalloh (2024) Explain that increasing profits in the continuous manufacturing sector, including industrial, export, electronics, pharmaceutical, and other sectors, can help increase the number of jobs and productivity in Indonesia and indirectly increase the workforce. The biggest advantage gained from China is in the service sector. This implies that the high service sector and driven by the high level of manufacturing in China makes this country with the capital city of Beijing known as the largest gold producer in the world. This finding were confirmed by research Yin & Choi (2023); and Awan (2023) explains that the role of construction of services has a significant impact on increasing economic growth in China. Based on this, several important things that must be considered from the benefits obtained in the service sector in China include, optimization of financial and information services, rapidly increasing technology makes transformation in industrial services more effective and efficient, and the high competitiveness of the advantages of the service sector has a beneficial effect on other sectors such as exports, transportation, trade, industry, and is driven by higher education.

India has the largest sectoral added value in the manufacturing and agricultural sectors, these sectors contribute greatly to economic growth in India, as the country with the largest population in the world, this makes it difficult for the country to achieve increased development and growth, namely the high population makes India vulnerable to the impacts of social inequality, high poverty rates, income inequality, and other socio-economic problems (Inoue, 2019). Some arguments such as Yaqoob et al. (2023); and Mahesh et al. (2023) explains that there are several advantages possessed by the country of India, including, the high population rate creates high productivity, the vast industrial land becomes a place for domestic investment and foreign investment, and the high population makes the country have many urbanites outside the region or country to send money (remittances), and initiatives towards increasing agriculture make other countries interested in importing goods from the country.

Germany has the same role as Indonesia, as a developed country, Germany has quite high economic growth, which is contributed by the manufacturing and service sectors. This finding summarizes the results of a study conducted by Braun (2020); and Xu et al. (2021) explains that the increasing economic growth in Germany is influenced by the high added value in the manufacturing sector. There are several important aspects of the manufacturing sector in Germany that are very profitable added value for growth and development, including the industrial revolution that is continuous and driven by technological advances in a transformative way, this is a deep cause of the industry functioning significantly. In addition, manufacturing in the industrial revolution also has consequences at the social and economic levels (Israel & Schnabl, 2024). Technological developments and the industrial revolution also play an important role in improving labor services and will consistently increase productivity in the country (Ronzon et al., 2020).

The UK's economic growth is contributed by the added value in the largest sector in the import and service sector, this confirms the study conducted by Irwin (2024); and Attiah (2019) explaining that increasing the added value of the manufacturing and service sectors has a very strong influence on increasing economic growth in the UK. The literature explains that the UK has developed various

systems and reforms that have made the country experience rapid progress in the export-import of manufactured goods and agricultural products. Liu et al. (2020) revealed that until this year the UK has continued to increase productivity, trade cooperation between countries, and business to drive economic growth.

France is popular after the progress of its revolutionary government which is famous for modern democracy, this country has also created many developments in the world of fashion and technology (Oliinyk, 2023). Rapid economic growth makes this country stable in developing its economy. In addition, the number of multinational companies from the service and manufacturing sectors makes competition between trade in Europe increasingly tight. The many advances that have occurred in France such as a stable and increasing economy every year, tourists who always visit, the world of fashion, and the fantastic world of technology make this country increasingly in high growth. Additionally, study by Tourtelier (2023); and Coca et al. (2023) explained that although the added value of the agricultural sector is still quite helpful in increasing economic growth, the country continues to increase technological progress and domestic productivity.

The United States has the highest sectoral added value in the services sector, although other sectors also contribute to economic growth. Several studies have revealed the many advances of the United States such as study by Khanji et al. (2020); and Umar et al. (2021) stated that the United States from a sectoral role has a very strong influence on domestic growth of products at constant prices both in the short and long term, some of these roles include, the level of financial services makes the value of the United States currency a reference for the whole world, increasing exports of petroleum, coal, fossils make income growth continue to soar, adequate levels of production and labor, effective governance, an agrarian and strategic geographical location, and becoming a superpower in military defense. However, Khanji et al. (2020) argue that although the United States has become a stable country in the economy, there are several things that are aspects that have a negative impact that must be considered, such as the need for stabilization in the use of petroleum and fossils to reduce carbon emissions, high use of environmental land makes the country a country that causes high irrigation and pollution. This requires further policies in anticipating an increase in the rate of economic growth.

4. CONCLUSIONS

This finding underscores the critical role of specific sectors in driving economic growth. Notably, exports, manufacturing, agriculture, and services emerge as key contributors, aligning with economic theory. Expanding exports fosters economic dynamism, while a robust manufacturing sector drives productivity and job creation. Agriculture remains pivotal, particularly in developing economies, ensuring food security and supporting rural livelihoods. The services sector's diverse contributions to economic output and employment solidify its significance in modern economies. Conversely, the negative influence of imports highlights the potential risks of over-reliance on foreign goods, which can crowd out domestic production. The unexpected negative impact of the construction sector warrants further investigation into its specific characteristics and potential for improvement. These findings have crucial implications for policymakers. Prioritizing export promotion, fostering innovation in manufacturing, supporting sustainable agricultural practices, and developing a dynamic services sector should be core components of economic growth strategies. Simultaneously, efforts to enhance domestic production capabilities and address potential inefficiencies within the construction sector are essential for sustainable and balanced economic development.

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