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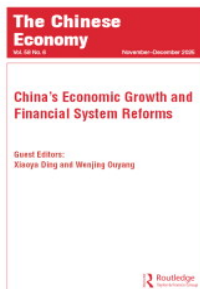


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How Important Are the US-China Trade War to FDI Flows into ASEAN Countries?

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ABSTRACT

This study examines how the U.S.–China trade war reshaped investment dynamics in ASEAN through trade and FDI diversion channels. Using a two-stage least squares (2SLS) estimation for eight ASEAN economies from 2012 to 2023, the analysis identified the causal impact of USA tariffs on Chinese goods on both USA imports from ASEAN and Chinese FDI inflows. The first-stage results confirm significant trade diversion effects, as higher US tariff on Chinese products diverted USA imports toward Cambodia, Vietnam, and Thailand. The second-stage findings reveal that these redirected trade flows stimulated Chinese FDI inflows to Indonesia, Thailand, and the Philippines, supporting the tariff-jumping FDI hypothesis. The results highlight ASEAN's strategic position as a beneficiary of global supply chain resolutions. The study contributes to the literature by integrating trade diversion and tariff jumping FDI theories in a unified empirical framework, offering insights for regional policymakers to sustain redirected investment inflows.

KEYWORDS

trade openness; USA tariff; Chinese FDI; trade war; USA imports

Introduction

With the rise of globalization, some events integrate national economies into the global economy. There are some questions about how developing countries, mainly in ASEAN countries, can develop and attract investors to those countries, which has become a debate in research and policy in governments, including FDI, Trade openness, imports and GDP Annual growth (Banday et al., 2021). Over the past three or four decades, FDI (Foreign Direct Investment) has become a prominent aspect of globalization and liberalization of trade (Gammeltoft, 2008); also, FDI is one of the drivers for economic development in developed and developing countries (Udemba & Keleş, 2022). According to the United Nations Corporation for Trade and Development (UNCTAD), between 1980 and 2017, the growth of FDI over GDP grew from 5.45% to 41.33% (UNCTAD., 2021). The impact of Foreign Direct Investment on the domestic growth of the countries cannot be certain. It could not be predicted how far the countries would advance to a high level (Hornstein, 2024). The growth of countries that need FDI can be varied according to regulatory and government policies that invest in their countries, and the FDI needs approval from other countries which invest in that country (Hornstein & Naknoi, 2023). FDI could invest flows to other countries, primarily globally. However, the trade war between the United States of America and China, which began in 2018 and continues until now, and the appreciation of the dollar and depreciation of the renminbi have affected the economy, including Southeast Asian Countries (Jeanne & Son, 2024). Moreover, this made the trade openness barrier to Southeast countries high. The FDI (Foreign Direct Investment) inflows can be reduced, and many

multinational companies were affected by the regulatory restrictions on their operating cost (Zhao & Zemin, 2022). Also, the effect of the trade increased, causing the tariff level to increase significantly, imposing significant costs on industries, especially in Southeast Asian countries (Liu et al., 2018).

Many factors affect FDI in some countries, including trade openness, imports, annual GDP growth, etc. (Battat & Aykut, 2005). Durmaz (2017) states that trade openness can affect FDI in some countries. Trade openness has long been a driver of economic growth and development in some countries, and trade liberalization can increase exports and imports for some countries to sell and buy their products to other countries that need them (Durongkaveroj, 2024). Also, it can reduce poverty in some countries by employing the population.

Some economists believe that countries with higher GDP per capita can increase obligations to their populations in terms of social guarantees, healthcare support and other factors, and this factor must attract foreign direct investment to ensure their national interest for technological development and high performance of the national and multinational companies (Kwilinski, 2025). Countries with higher GDPs that approve FDI have varied their regulatory regimes over time regarding the scale and scope of government approvals. The frequency of disclosure of this data and foreign investors' propensity to implement announced projects varies across time and host countries and is higher in host countries with reduced economic uncertainty and stable political environments (Hornstein & Naknoi, 2023). However, in Southeast Asian countries, the FDI is not optimally used because the confidence of investors in their policymakers is low, especially due to corruption and other factors, such as gangsters, etc., and the poor institutions make the FDI seem like a tax, which leads investors to doubt investing in these countries. After all, the cost of doing business is high (Buchanan et al., 2012; Mengistu & Adhikary, 2011).

Southeast Asian countries depend on China's export market; ASEAN's dependency on China's manufacturing sector is well-documented. According to the World Bank (2024), East Asia and the Pacific accounted for 45.48% of China's total imports in 2023, with ASEAN countries—especially Vietnam, Indonesia, Thailand, and Singapore—comprising approximately 49.1%. The BRI (Belt and Road Initiative), which China plans, has a positive impact on Southeast Asian countries (ASEAN) and has a plan to dock and achieve a shared prosperity for the two parties. The BRI project, which China devised, also has the 21st-century Maritime Silk Road, which exports goods from China to all countries, including ASEAN, by sea (Bi, 2021).

Although numerous studies have explored the determinants of foreign direct investment—including trade openness, economic growth, and institutional quality—most have primarily focused on internal factors within host countries. However, relatively few have examined how external trade policy shocks, such as China's tariff exposed by USA increases during the US–China trade war, affect FDI inflows into third-party economies like ASEAN. Despite growing interest in trade and investment flows, few studies have investigated how USA Imports from ASEAN influence Chinese FDI in ASEAN.

To address this gap, we use exports as an instrumental variable to obtain unbiased estimates of how trade openness and economic growth affect FDI in ASEAN. Based on the description above, the purpose of this research is (1) to examine the relationship of GDP Annual growth to FDI in ASEAN countries, 2) to examine the relationship of USA imports from ASEAN to FDI in ASEAN countries, 3) to examine the relationship between Trade Openness and FDI in ASEAN countries, and 4) to examine the relationship between Trade wars and FDI in ASEAN countries.

To clarify the purpose of this research, the grand theory of this research is an eclectic paradigm theory that states the consideration of foreign investors to invest the money, which includes location, trade openness, and GDP, offering the market situation as tariffs for imports of goods and services imposed by the country's policymakers. Therefore, this research aims to strengthen theoretical contribution and knowledge of FDI, USA tariff to China, trade openness, GDP annual growth and USA Imports to ASEAN as buffers, as well as the practical contribution for

policymakers of ASEAN countries to develop and devise the economic growth and investments in those countries.

This research fills that gap by utilizing a 2SLS panel regression with exports as an instrumental variable, offering a novel empirical strategy. The findings contribute to the theoretical refinement of the Eclectic Paradigm, Endogenous Growth Theory and Tariff Jumping Theory by demonstrating how institutional quality conditions the impact of openness and tariffs on FDI. This study contributes to the existing literature by examining the impact of USA'S tariff policy on Chinese FDI inflows into ASEAN countries—an angle that has received limited empirical scrutiny. The study also applies a two-stage least squares (2SLS) regression using export levels as an instrumental variable to address crucial endogeneity between USA Tariff exposed to China and FDI. Furthermore, the research reevaluates the applicability of the Eclectic Paradigm and other international trade theories in the ASEAN context, emphasizing the moderating role of institutional quality.

This research is among the first to explicitly quantify the spillover effects of USA Tariff exposed to China adjustment triggered by the USA–China trade war on Chinese FDI inflows into ASEAN countries. The research addresses an empirical gap in ASEAN investment studies by integrating external trade policy shocks into the Eclectic Paradigm framework and other international trade theories and employing a 2SLS approach with exports as an instrumental variable. Also, it advances methodological rigor in assessing cross-border policy spillovers.

Literature review

Grand theory

Eclectic Paradigm theory according to Dunning (1977, 1997, 2000) explain the level of structure of foreign firm adding level activities, it comes with three conditions which are: (1) unique and specific advantages than other firms (Ownership Advantages—“O”); (2) The extend of companies to sell them to other companies (Internalization Advantages—“I”); (3) The extend of companies to sell, create and innovate the “O” in foreign location (Location—“L”), from this component it made the OLI framework model which can explain the FDI and other factors. Eclectic paradigm, according to Dunning (1997), can attract FDI because USA tariff can be reduced for the countries which want to invest because of relocation with market seeking components, GDP annual growth can attract FDI in ASEAN because of market seeking. Last Trade openness can be considered the countries that market seeks from (Dunning, 1998). Eclectic paradigm in ASEAN countries, where the favorable sector is in the Location sector, because ASEAN relates to global trade hubs, such as the Malacca Strait, which connects Singapore, Malaysia and Indonesia and the South China Sea and many of the busiest ports are connected to Singapore.

Institutional theory which are normative and regulatory of governments can made an attractive and increased the infrastructure of location which investors want to invest the FDI in that countries and the governments can promote or restrict FDI in countries to grow the economic development and help make the job opportunities for the young generations to work in investors companies (Mudambi & Navarra, 2003; North, 1990). In Chaudhry's (2011) research, Trade openness can attract FDI because of a country's good institutional quality. However, trade openness does not distract FDI in poor institutional-quality countries. Tariffs can also be reduced, especially in China, to attract FDI because the quality and diplomatic strength of the countries in ASEAN, and GDP, can attract FDI, as a higher GDP can make the investment favorable in ASEAN. Some countries in ASEAN have good institutional quality, and some have poor institutional quality. This trade openness is positive in some countries and negative in others, which affects FDI, and some countries endure bribery while others do not.

Neoclassical growth theory made the GDP growth sustainable when it accumulated growth and capital, especially FDI, in some countries, so the empowerment of capital, technology and labor made the business environment in those countries sustainable and grow to the maximum points (Solow). Countries with good environments, regulations and policies increased the GDP and attracted the FDI, making trade openness and tariffs favorable for FDI in ASEAN countries.

Endogenous growth theory in Mayer (1996) made GDP annual growth attract many foreign investors to invest in countries for FDI to generate profit and diminishing returns for the new knowledge in GDP annual growth. GDP annual growth reflects a country's overall economic performance and market potential. With trade openness, ASEAN can attract FDI from foreign countries and become an innovation hub for countries in ASEAN (Frankel & Romer, 1999). Moreover, USA tariffs can be considered by the countries in the short run as benefits but generate long-run costs in countries, including ASEAN regions, according to Brock and Turnovsky (1993).

Tariff Jumping theory related to antidumping protection for some trade issues because there are no standard forms of trade protection in some countries. This pivotal in some countries because it increased the competition between national and foreign firms, in this case Chinese FDI to ASEAN. It can eliminate, reduce or reversing of foreign firms from positive trade policy which to protected domestic firms. This not be fair or normal value for difference between USA price imports to protect maximally domestic industry without tariff jumping theory according to Blonigen (2002).

GDP annual growth and foreign direct investments

According to Blanchard (2017), GDP Annual growth is the percentage growth of GDP from year to year. GDP Annual growth influences FDI according to Durmaz (2017). GDP annual growth has a significantly positive effect on FDI, as stated by Aziz and Mishra (2016). GDP Annual growth increases the FDI in countries with developed economies (Saini & Singhania, 2018). In the endogenous growth theory by Berthélemy and Démurger (2000), research stated that GDP annual growth positively affected the inflows of FDI in China from 1985 to 1996 in 24 provinces. In Shah et al. (2024) research, GDP annual growth positively affects FDI inflows in India during the 1970–2023 period.

Trade openness and foreign direct investments

Trade Openness is a percentage of Gross Domestic Product (GDP), which is the total income earned through producing goods and services in an economic territory during an accounting period, according to the World Bank (2015). According to (Aziz & Mishra, 2016; Durmaz, 2017; Saini & Singhania, 2018), trade openness positively impacts FDI in these countries. In Aziz and Mishra (2016), trade openness positively attracts FDI in Arab countries from 1984 to 2012. Saini and Singhania (2018) findings stated that trade openness can attract FDI in 11 developed and nine developing countries from 2004 to 2013. Using yearly data, Durmaz (2017) stated that trade openness positively attracted FDI inflows in Turkey from 1977 to 2011. The (Alhamran et al., 2025) study found that trade openness significantly boosts FDI in GCC countries. According to Le and Kim (2020) and Ta et al. , trade openness positively impacts FDI inflows in Vietnam. Nguyen (2021) also stated (Nguyen, 2021) that FDI has improved with trade openness in Vietnam. However, according to Busse and Hefeker (2007) research in 83 developing countries from 1984 to 2003, some studies found that trade openness has a negative relationship to FDI (Busse & Hefeker, 2007).

Trade war and foreign direct investment

According to Liu et al. (2025) Trade war have negative long run and statistically significant on FDI in other countries.

Research methods

Population and samples

This study utilized annual data from 2012 to 2023 because lacks of available data from 2008 until 2011, and interpolated from 96 to 384 observations, which increased by 288 observations after interpolation, using the Denton method to ensure the consistency of quarterly data and widely accepted in macroeconomic variables although it concerns the measurement errors, the result is consistent to our findings (Franses, 2022). Denton (1971) showed that Denton methods change the annual data that obtained from the only available data in annual to quarterly or monthly data (Denton, 1971), which We fill the gap to estimate an accurate model and form the unbalanced panel data format according to Baltagi and Wooldridge (2018). The observations are from 8 Southeast Asian countries: Indonesia, Singapore, Thailand, Malaysia, Vietnam, Cambodia, Philippines, and Brunei. The dependent variable of this study is China Foreign Direct Investment, and the independent variables are Trade Openness, USA Imports from ASEAN and GDP Annual Growth, where USA Tariff to China is the instrumental variable for USA imports from ASEAN. The analysis used RStudio software with *dplyr* and *tidyr* packages for data manipulation, *zoo* package for formatting quarterly data, *tempdisagg* for interpolation and *AER* package for 2SLS regression (Kleiber & Zeileis, 2008; Sax & Steiner, 2013; Wickham et al., 2023, 2024; Zeileis & Grothendieck, 2005)

All the datasets obtained from the World Bank, UN Comtrade and Petersen Institute for international economics website from 2012 to 2023 . Table 1 summarizes the data measurement.

Methodology

To load the missing quarterly observations for FDI inflows, utilized Proportional Denton Methods, this method made the short-term growth of related variables especially GDP annual growth or trade openness while retaining same with annual totals. The interpolation methods follow 5 main processes:

1. Identify data gaps which to fill annual data to quarterly data.
2. Select indicator series which are used such as GDP growth and trade openness.
3. Apply Denton algorithms using Tempdisagg package in Rstudio.

Table 1. Variables description and data sources.

Indicator	Measurement	Scale	Source
China Foreign Direct Investment to ASEAN	CFDI = Chinese FDI for each country in ASEAN	Ratio	CEIC (2023)
Trade Openness	TO = (Total Export + Import) / GDP	Ratio	World Bank (2023)
GDP Annual Growth	GDP = (GDPT- GDPT-1) / GDPT	Ratio	World Bank (2023)
USA Imports from ASEAN	USIM = Total US Imports from each country in ASEAN	Ratio	UN COMTRADE (2023)
Trade War	0 = prior 2018 1 = 2018-2023	Ratio	Petersen Institute for International Economics (2023)
USA Tariff to China	Average of USA Tariff exposed to China (%)	Ratio	Petersen Institute for International Economics (2023)

Source: Author's Investigation.

4. Validate the results to ensure annual consistency for smooth transition between quarters.
5. Integrate the interpolation data into panel format for 2SLS estimation.

$$\min Y_t \sum_{t=2}^T \left\{ \left(\frac{y_{y,q}}{x_{y,q}} - \frac{y_{y,q-1}}{x_{y,q-1}} \right)^2 \right\} \text{ with constraint } \sum_{q=1}^4 Y_{y,q} = A_y$$

Min denotes minimize, $Y_{y,q}$ denotes quarterly FDI inflows, A_y denotes annual total and $X_{y,q}$ denotes control variables of quarterly. $t=2$ denotes begins in second period for calculation.

This methods ensures that generated quarterly FDI followed the short term dynamics of economic activity while retain the annual aggregates (Denton, 1971; Sax & Steiner, 2013).

This study used the 2SLS (Two Stage Least Squares) Method for regression. According to Gujarati and Porter (2009), 2SLS is the methods to examine causal relationship between instrumental variables. Following this an instrumental variable (IV) must satisfy two key situations:

- (1) Relevance.

The instrument must be strongly correlated with the endogenous regressor

- (2) Exogeneity.

The instrument must not be correlated with the error term of the structural equation.

In this study, the U.S. tariff on Chinese exports (UST) is used as an instrumental variable for USIM. The spotlighted intuition is that an increase in U.S. tariffs on Chinese goods encourages trade diversion toward ASEAN economies, thereby arising USA imports from ASEAN. However, UST affects Chinese FDI to ASEAN only indirectly through changes in trade flows thus satisfying the exclusion barriers.

The first stage regresses USA Tariff, GDP growth, trade openness, and trade war on USA Imports from ASEAN while the second stage uses the predicted USA imports from ASEAN to estimate its impact on Chinese FDI to ASEAN.

The model for panel 2SLS is below:

First Stage Regression

$$\text{Log (USIM)}_{it} = \pi_0 + \pi_1 * \text{Log (UST)}_{it} + \pi_2 * \text{GDP}_{it} + \pi_3 * \text{TO}_{it} + \text{TW}_{it} + u_{it} \quad (1)$$

Second Stage Regression

$$\text{Log (CFDI)}_{it} = \alpha + \beta_2 * \text{GDP}_{it} + \beta_3 * \text{Log (USIM)}_{it} + \beta_4 * \text{TO}_{it} + \beta_5 * \text{TW}_{it} + \varepsilon_{it} \quad (2)$$

Where i denotes country and t denotes time, export is the instrument variable, USIM denotes USA Imports from ASEAN, UST is US tariff to Chinese exports, CFDI is Chinese Foreign Direct Investment to ASEAN, TO is Trade Openness, GDP is GDP Annual Growth, and TW is Trade War. β_2 , β_3 , and β_4 denote coefficients of the variables GDP Annual growth, USA Imports from ASEAN, and Trade Openness, and ε refers to error terms.

Diagnosics test

To handle the endogeneity and weak instrument, it could use the Wu-Hausman test to detect them (Gujarati & Porter, 2009; Wooldridge, 2018). For weak instruments used F statistic for examine, if below 10 the instruments weak otherwise strong instruments (Staiger & Stock, 1997) (Table 2).

Results and discussions

The summary or descriptive statistics show the result in Table 3 that the average of Trade Openness in 8 ASEAN Countries. The Trade Openness mean is 34.95, GDP is 3.946, US imports is 6.5 billion, US tariff is 2.3%, trade war is 05 and Chinese FDI is 401534 million.

Table 2. Descriptive statistics.

Variable	N	Mean	SD	Min	Max	Median
Trade Openness	384	34.95	23.16	7.45	120.92	30.87
GDP Annual Growth	384	3.946	3.718	−11.510	11.685	4.879
US Imports from ASEAN	384	6.537e + 09	6173640198	8.887e + 05	3.470e + 10	5.316e + 09
US Tariff to China	384	2.375	2.465	−0.416	5.453	1.229
Trade War	384	0.5	0.5	0	1	0.5
Chinese Foreign Direct Investments to ASEAN	384	401534	567719.8	−17289	3572795	221843

Source: Author's Calculation.

Table 3. Pre and post trade war analysis.

Dependent Variable: Log (CFDI)		
	Pre	Post
Trade Openness	0.028*** (0.008)	0.018 (0.262)
GDP Annual Growth	0.069 (0.779)	−0.06 (0.625)
Log (US Import)	0.046 (0.917)	0.885 (0.430)
Constant	9.538 (0.223)	−7.392 (0.755)
N	188	189
R2	0.366	−0.196
Adjusted R2	0.356	−0.216

Source: Authors' results. *Indicate significance level at 0.10 level, **indicates significance level at 0.05 level, ***indicates significance level at 0.01 level.

Table 3 compares the determinants of Chinese FDI inflows into ASEAN before and after the US–China trade war. During the pre–trade war period (2012–2017), trade openness shows a positive and statistically significant effect on FDI inflows, suggesting that countries with higher trade integration attracted more Chinese investment and firms to open their business in ASEAN. However, in the post–trade war period (2018–2023), trade openness becomes insignificant because the trade–investment link weakened once tariff escalation began.

GDP growth remains statistically insignificant in both subperiods, indicating that short periods macroeconomic assessment was not the vital driver of Chinese FDI during this period. Interestingly, the coefficient on USA imports becomes substantially larger after 2018 even though it remains statistically insignificant. This trend suggests a possible shift toward trade diversion channels, where emerging USA tariffs on China may have indirectly increased ASEAN's attractiveness as an alternative export region beside China.

The model explains about 36% of the variation in FDI inflows before the trade war, but the explanatory power falls sharply afterward, reflecting the increased uncertainty and structural change in investment determinants during the tariff conflict.

The results of the US Tariff divert their imports are in **Table 4**. This show that trade openness, GDP Annual growth, USA Tariff and Trade war effect varies between 8 ASEAN countries. In the first stage regression Across most countries, both trade openness and U.S. tariffs against China emerge as strong and significant predictors of U.S. import volumes from ASEAN. The results demonstrate that the trade war has reshaped global trade patterns, with ASEAN increasingly absorbing diverted trade flows from China.

The coefficient of trade openness is positive and statistically significant for all ASEAN countries, ranging from 0.02 in Malaysia to 0.081 in Cambodia. This indicates that more open economies experience stronger exports connected with the USA market. The effects are particularly large for Cambodia, the Philippines, and Vietnam, which reflects their growing role in global supply chains and export substitution following the escalation of USA tariffs on China. These

Table 4. First stage regression for 8 ASEAN COUNTRIES.

Dependent Variable: Log (US Import from ASEAN)								
Variable	Indonesia	Malaysia	Cambodia	Philippines	Thailand	Vietnam	Singapore	Brunei Darussalam
Trade Openness	0.043* (0.058)	0.02*** (0.009)	0.081*** (0.000)	0.075*** (0.000)	0.024** (0.012)	0.063*** (0.000)	0.006*** (0.008)	0.077** (0.033)
GDP Annual Growth	0.018 (0.229)	−0.00005 (0.996)	−0.009 (0.311)	0.002 (0.513)	0.003 (0.782)	−0.007 (0.710)	−0.006 (0.380)	0.234*** (0.004)
US Tariff to China	0.085*** (0.021)	0.076** (0.037)	0.244*** (0.000)	0.07*** (0.00005)	0.154*** (0.001)	0.177*** (0.001)	0.04 (0.206)	−0.543** (0.019)
Trade War	−0.095 (0.589)	0.067 (0.702)	−0.351* (0.071)	−0.173** (0.04)	−0.187 (0.366)	−0.361 (0.140)	0.338** (0.033)	2.897*** (0.005)
Constant	21.773*** (0.000)	22.105*** (0.000)	18.037*** (0.000)	20.538*** (0.000)	21.922*** (0.000)	20.66*** (0.000)	21.697*** (0.000)	13.895*** (0.000)
Observation	48	48	48	48	48	48	48	48
R2	0.543	0.675	0.922	0.892	0.67	0.883	0.804	0.448
Adjusted R2	0.501	0.645	0.915	0.891	0.64	0.872	0.785	0.397
F Statistic	12.797	22.304	127.418	88.348	21.858	80.865	44.015	8.728

Source: Authors' results. *Indicate significance level at 0.10 level, **indicates significance level at 0.05 level, ***indicates significance level at 0.01 level.

findings are consistent with the literature on trade openness and FDI spillovers (Aziz & Mishra, 2016; Le & Kim, 2020).

The coefficient for U.S. tariffs on Chinese goods is positive and highly significant for nearly all ASEAN economies except Singapore and Brunei. For instance, the tariff effect is strongest in Cambodia, Vietnam, and Thailand. This pattern confirms the existence of trade diversion, where higher USA tariffs on China redirected imports toward ASEAN manufacturing hubs. However, Singapore shows an insignificant coefficient, suggesting its trade with the USA. is primarily in high-value services rather than tariff-affected goods, while Brunei shows a negative response, likely due to its commodity-driven export structure. It supported the tariff jumping theory which proposed by Blonigen (2002) because the reducing of others country investment in ASEAN and made the dumping strategy for Chinese goods and services.

The trade war dummy variable has mixed effects: significantly negative for Cambodia and the Philippines, but positive and large for Singapore and Brunei. These results imply that while some ASEAN exporters benefited from trade diversion, others experienced short-term export disruptions or reconfiguration of supply chains during the initial phase of the trade war.

Overall, the first-stage estimates indicate that USA tariffs on China strongly increased ASEAN exports to the USA, confirming the presence of a regional trade diversion mechanism. The strength of this relationship across multiple ASEAN countries validates the use of USA tariffs as an exogenous instrument for trade openness in the second-stage FDI regressions.

Table 5 presents the second-stage results of the two-stage least squares (2SLS) estimations, where the dependent variable is the logarithm of FDI inflows from China to each ASEAN country. The fitted value of U.S. imports from ASEAN obtained in the first stage serves as the instrumental variable for trade openness, capturing the trade diversion channel resulting from U.S. tariffs on Chinese goods. The second-stage estimates provide strong evidence of heterogeneous FDI responses across ASEAN economies, reflecting their differing structural characteristics and levels of integration within global value chains (GVCs).

The results indicate that the coefficient of predicted trade openness is positive and statistically significant for Cambodia but negative for Indonesia and Brunei. These findings suggest that while increased trade exposure enhanced Cambodia's attractiveness to Chinese investors, it had the opposite effect in Indonesia and Brunei, likely due to market saturation and limited industrial capacities to develop, adopt and produced some quality goods. For the remaining countries, the effect of trade openness is statistically insignificant, implying that other structural factors such as

Table 5. Second stage panel regression for 8 ASEAN countries.

Dependent Variable: Log (ASEAN FDI from China)								
Variable	Indonesia	Malaysia	Cambodia	Philippines	Thailand	Vietnam	Singapore	Brunei Darussalam
Trade Openness	−0.083* (0.053)	0.026 (0.604)	0.069** (0.036)	−0.268 (0.144)	0.01 (0.570)	0.023 (0.532)	−0.009 (0.697)	−0.06*** (0.003)
GDP Annual Growth	−0.014 (0.564)	0.01 (0.774)	−0.015 (0.353)	−0.009 (0.768)	−0.076*** (0.0003)	−0.045 (0.181)	0.015 (0.661)	0.135** (0.028)
Log (US Import from ASEAN)	2.649*** (0.0002)	−1.608 (0.426)	−0.535* (0.084)	4.367* (0.078)	1.251** (0.019)	0.571 (0.246)	−0.067 (0.985)	−0.248 (0.301)
Trade War	−0.061 (0.764)	1.486* (0.099)	0.724*** (0.007)	−0.349 (0.495)	−0.052 (0.857)	0.418 (0.119)	0.848 (0.651)	1.104*** (0.0002)
Constant	−45.377*** (0.002)	47.681 (0.288)	20.741*** (0.0005)	−80.652 (0.113)	−16.377 (0.157)	−1.768 (0.860)	15.879 (0.836)	15.567*** (0.0001)
Observation	48	48	48	48	48	48	48	48
R2	0.746	0.28	0.329	0.161	0.614	0.771	0.333	0.558
Adjusted R2	0.722	0.213	0.267	0.068	0.578	0.749	0.271	0.517

Source: Authors' results. *Indicate significance level at 0.10 level, **indicates significance level at 0.05 level, ***indicates significance level at 0.01 level.

small market size and lack of infrastructure may dominate investment decisions. It's for Indonesia and Brunei supported Busse and Hefeker (2007) research but in Cambodia supported by Aziz and Mishra (2016) research and all countries contrast to other research which related to Aziz and Mishra (2016), Saini and Singhani (2018) because can made the countries not productive to design or sell their national goods.

The U.S. imports from ASEAN highlights the trade diversion mechanism is positive and highly significant in Indonesia, Thailand and the Philippines. This accepted that greater U.S. import substitution from ASEAN following the tariff escalation has translated into higher FDI inflows from China to these economies. The result provides strong support for the tariff-jumping FDI hypothesis (Blonigen, 2002), where foreign firms relocate production to ASEAN to evade U.S. tariffs on Chinese goods.

In contrast, the relationship between U.S. imports and FDI is weak or negative in Cambodia and no have relationship in Vietnam and Singapore, reflecting their already well-established integration into global production networks. These patterns indicate that trade diversion benefits gained more strongly to middle income ASEAN economies planning to expand manufacturing capacity, rather than to high-income or low-cost economies with fixed industrial structures.

The Trade War dummy captures the direct effect of the U.S.–China trade war period (2018–2023) on Chinese investment behavior. It is positive and significant for Malaysia, Cambodia and Brunei, confirming that these countries attracted additional Chinese FDI during the trade war years. These findings are consistent with strategic FDI reallocation, as firms diversified their production bases to mitigate exposure to tariff risks. For the remaining economies, the dummy variable is insignificant, suggesting that the trade war's impact on FDI was largely indirectly channeled through trade diversion rather than through direct investment incentives. It supported the Liu et.al (2025) research that trade war may decrease the FDI in ASEAN during USA China trade war.

The effects of GDP growth are generally weak, except for Thailand and Brunei. The negative GDP growth in Thailand may reflect the opposite nature of FDI inflows, where investment opportunities arise during periods of slower growth due to lower production costs. In contrast, Brunei's positive result aligns with growth driven investment behavior typical of developing energy economies. For 6 countries which are Indonesia, Singapore, Vietnam, Philippines, Malaysia and Cambodia it against endogenous growth theory because FDI from China and against neoclassical growth theory which GDP can affect FDI inflows to ASEAN.

Table 6. Endogeneity and weak instrument.

Countries	Weak Instruments	Wu Hausman	Result
Indonesia	5.762* (0.0208)	20.300*** (0.000)	Weak Instruments
Malaysia	4.662* (0.0364)	13.828*** (0.000)	Weak Instruments
Cambodia	37.370*** (0.000)	3.938. (0.0538)	Strong IV
Philippines	36.833*** (0.000)	2.735 (0.107)	Strong IV
Singapore	1.656 (0.205)	0.686 (0.412)	Not endogenous
Thailand	12.785*** (0.000)	0.804 (0.375)	Not endogenous
Vietnam	12.575*** (0.000)	0.665 (0.419)	Not endogenous
Brunei Darussalam	6.027* (0.0182)	0.243 (0.6246)	Not endogenous

Source: Author's Computation.

Overall, these second-stage results demonstrate that the U.S.–China trade war generated substantial FDI diversion effects toward specific ASEAN economies. Countries that benefited most—such as Indonesia, Thailand, the Philippines, and Cambodia showed stronger connection between trade diversion and FDI inflows, align with the tariff-jumping FDI theory. This evidence highlights ASEAN's rising role as an alternative production hub and beneficiary roles in the post-trade war global value chain reconfiguration.

In Table 6, this study examines weak instruments and endogeneity test with Wu Hausman. The results varied and showed heterogeneity across 8 ASEAN countries. Based on Table 6 the weak instruments result are shown on Indonesia, Malaysia, and Brunei Darussalam because F statistics results below 10 but significantly on 5% level and the strong instruments shown on Cambodia, Philippines, Thailand and Vietnam. It indicates that USA Tariff on Chinese goods have a strong instrument on Cambodia, Philippines, Thailand and Vietnam but in Singapore doesn't have strong relationship with USA Tariff.

Meanwhile The endogeneity test with Wu Hausman showed that Wu Hausman result show endogeneity in Indonesia, Malaysia and Cambodia, but in Singapore, Thailand, Philippines, Vietnam and Brunei Darussalam showed no signs of endogeneity. Overall, these diagnostics validate the use of the 2SLS model for countries where endogeneity is detected and the instrument is sufficiently strong. It also spotted heterogeneity among ASEAN economies, suggesting that the effect of USA tariff measures on trade and investment flows heterogenous across the region.

The findings from both stages of the 2SLS estimation provide consistent evidence of trade and FDI diversion effects during the USA–China trade war. The first-stage results confirm that rising USA tariffs on Chinese goods significantly increased imports from ASEAN countries, particularly Cambodia, Vietnam, and Thailand, indicating trade substitution. The second-stage results confirmed that this redirected trade also attracted higher FDI inflows from China into Indonesia, Thailand, the Philippines, and Cambodia.

These trends support the tariff-jumping FDI theory (Blonigen, 2002), which explained that firms relocate production to avoid trade barriers. In this context, Chinese investors strategically shifted part of their production to ASEAN countries to maintain access to the USA. market. The results also align with the OLI paradigm, suggesting that ASEAN's location and cost advantages enhanced its attractiveness as an alternative manufacturing location to produce high quality goods.

The heterogeneity across ASEAN countries underscores the role of domestic conditions—such as market size, institutional quality, and infrastructure—in moderating FDI diversion. Countries with robust governance (Malaysia, Thailand) or cost competitiveness (Cambodia, Indonesia)

benefited the most, while advanced economies (Singapore, Vietnam) experienced limited marginal effects.

From a policy perspective, ASEAN governments should strengthen regional integration, promote investment facilitation, and maintain macroeconomic stability to sustain the FDI gains induced by trade diversion. China's sustainable engagement through Belt and Road investments could made advantages on these linkages, reformed short-term trade shocks into long-term production reallocation.

Conclusions

This study purpose to analyze how trade war between USA and China influences investment ecosystem in ASEAN region with trade diversion mechanism and FDI diversion. Utilized the 2SLS for 8 countries in ASEAN region during 2012–2023 periods. This study result showed the strong relationship between increased USA Tariff to China divert their imports from ASEAN and FDI inflows to ASEAN from China in that region.

The first stage result confirms the increased USA tariff to China significantly divert USA imports from ASEAN, especially Cambodia, Vietnam and Thailand. The result of second stage regression confirms that increased USA imports from ASEAN affected some countries on Chinese FDI to ASEAN specifically in Indonesia, Thailand, Philippines and Cambodia. It is supported by tariff jumping theory which foreign firms relocate their business to avoid the tariff barriers and still connected with USA market.

The heterogeneity effect on 8 ASEAN countries spotted that trade war consequences was big to middle income countries but have high manufacturing capacities and large population specifically Indonesia, Thailand and Philippines, beside that the small countries like Cambodia and Brunei also get advantages from relocation of foreign firms to investing their business and develop it. But in the countries which have good governance like Singapore and Vietnam spotted the limited capacity cause their investment basis already to mature before trade war begins.

The results show that the USA-China trade war has facilitate the reallocation of FDI from China to ASEAN countries through trade diversion channels. To sustain this trend, ASEAN governments must enforce comprehensive industrial and investment policies that enhance production efficiency and investor confidence. Empirical evidence from previous studies (Buchanan et al., 2012; Busse & Hefeker, 2007; Hornstein & Naknoi, 2023) suggests that institutional quality, governance reforms, and policy predictability are critical determinants of long-term FDI inflows.

In practical terms, ASEAN policymakers and governments should focus on modernizing logistics and digital infrastructure, facilitating investment regulations, and harmonizing trade policies under regional initiatives such as the RCEP and the Belt and Road Initiative (Bi, 2021; Liu et al., 2025). By strengthening regional integration and maintaining political stability, ASEAN can transform short-term trade diversion effects into a sustainable investment advantage. These policy efforts will emphasize that diverted FDI pivotal not only to short-term capital inflows but also to long-term industrial upgrading and economic resilience across ASEAN economies.

This research has some limitations which are: 1) Only consist 8 countries in ASEAN region from 2012 to 2023 which some countries like Laos and Myanmar did not have complete data; 2) The data used interpolation to make it unbalanced panel form which caused biased interpretation while use Denton method for interpolation; 3) Use of export as instrumental variable have drawback for interpret some variables which include in FDI and Tariff; 4) This model not considered the organization variable such as regulation quality, political stability or ease of doing business in ASEAN countries. This research has some suggestions which are: 1) broadening from ASEAN to other regional examples, such as MENA (Middle East and North Africa) etc.; 2) employ the more advanced panel models such as Generalized Method of Moments (GMM) for analysis; 3) the

variables can add the institutional variables such as corruption perception index, corporate governance quality, etc.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Navigating Tariffs, Growth and Investment: Panel 2SLS Analysis for FDI in ASEAN during the USA-China Trade War

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Abstract

⁷This study aims to determine the effect of GDP annual growth, Trade Openness and China Tariff level on Foreign Direct Investment in ASEAN countries. The study used period from 2008 until 2023 period with interpolation methods and analyses used panel 2SLS regression method. This research best models were fixed effects with Robust Standard Errors. The findings of this research are GDP annual growth does not have influence on FDI in ASEAN countries, but China Tariff Level and Trade Openness affect the Foreign Direct Investment in ASEAN countries from 2008 until 2023 periods. These findings contradict the traditional international investment theories that emphasize the importance of trade liberalization and tariff shocks as FDI drivers. this research offers a novel perspective by identifying ASEAN as a strategic beneficiary of investment diversion amid trade conflicts. Additionally, the unexpected negative effect of trade openness on FDI contributes to the growing discourse on institutional constraints in developing regions and incorporating China tariff shocks as a determinant of FDI inflows in ASEAN.

Keywords: GDP Annual growth, Trade Openness, China Tariff Level, ⁴⁶Foreign Direct Investment.

1. Introduction

With the rise of globalization there are an event which integrate national economics to global economy There are some questions how developing countries which mostly in ASEAN countries can develop and attract the investors to that countries which are become debate in research and policy in governments include FDI, Trade openness, Tariff level and GDP Annual growth (Banday, Murugan and Maryam, 2021). ⁷Over the past three or four decades, FDI (Foreign Direct Investment) has become ²⁸prominent aspect of globalization and liberalization of trade (Gammeltoft, 2008), also FDI is one of the drivers for economic ⁶development in developed and developing countries (Udemba & Keleş, 2022). According to the United Nations Corporation for Trade and Development (UNCTAD) between the year ¹⁹1980 until 2017 the growth of FDI over GDP grew from 5.45% to 41.33% (UNCTAD, 2021). The impact of Foreign Direct Investment on the domestic growth of the countries could not be certain. It couldn't be predicted how far the countries advanced to high level (Hornstein, 2024). The growth of countries that needed FDI can be varied according to regulatory and governments policy that invest in their countries, also the FDI needed the approval from the other countries which invest in that country (Hornstein & Naknoi, ³⁶2022). FDI could make the investment flows to other countries especially global. However, the trade war between United States of America and China which begin in 2018 until now and the appreciation of dollar also depreciation of renminbi of China made an effect on global economy include southeast Asian Countries (Jeanne & Son, 2024). And this made the trade openness barrier to southeast countries could be high and the FDI (Foreign Direct Investment) inflows can be reduced and many multinational companies affected by the regulatory and freedom of their operating cost (Zhao & Zemin, 2022). Also, the effect of trade war made the China tariff level increased significantly that imposed by United States of America and make the export and imports got the high cost for developing countries especially in southeast Asian countries (Liu et al., 2018).

⁴¹ There are many factors that affected FDI in some countries which are Trade Openness, Tariff level and GDP Annual growth etc. (Battat & Aykut, 2005). Trade openness according (Durma⁴² 2017) can affected the FDI in some countries. Trade openness since a long time became drivers of economic growth and development in some countries and the trade liberalization can increase the export and import for some countries to sell and buy their products to other countries that need it according to (Durongkaveroj, 2024) and also can reduce poverty in some countries by open the employment for populations in some countries.

³² Some economists believed that countries with higher GDP per capita can increase obligations to their populations in terms of social guarantees, healthcare support and other factors and this factor must attract foreign direct investment to ensure their national interest for technological development and high performance of the national and multinational companies (Kwilinski, 2025). The countries that have higher GDP approve FDI have varied their regulatory regimes over time regarding the scale and scope of government approvals, and the frequency of disclosure of this data, the propensity of foreign investors to implement announced projects varies across time and host country and is higher in host countries with reduced economic uncertainty and stable political environments (Hornstein and Naknoi, 2023). But in Southeast Asian countries the FDI not optimally used it because the confidence from investor to their policymakers has low trust especially because corruption and other factors like gangster etc., the poor institutions made the FDI seems like a tax and the effect is investor are doubt to invest in that countries because the cost doing business is high (Buchanan et al., 2012; Mengistu & Adhikary, 2011).

Southeast Asian countries have dependency to China market for export, ASEAN's dependency on China's manufacturing sector is well-documented. According to the World Bank (2024), East Asia and the Pacific accounted for 45.48% of China's total imports in 2023, with ASEAN countries—especially Vietnam, Indonesia, Thailand, and Singapore—comprising approximately 49.1%. The BRI (Belt and Road Initiative) that planned by China have a positive impact for Southeast Asian countries (ASEAN) and have a plan to docking and achieve a common prosperity for two parties. BRI project that devised by China also have 21st century maritime silk road which are export the goods from China to all countries include ASEAN by the sea (Bi, 2021).

²⁷ Although numerous studies have explored the determinants of foreign direct investment—including trade openness, economic growth, and institutional quality—most have primarily focused on internal factors within host countries. However, relatively few have examined how external trade policy shocks, such as China's tariff increases during the US–China trade war, affect FDI inflows into third-party economies like ASEAN. Despite growing interest in trade and investment flows, few studies have investigated how China's tariff policies influence FDI in ASEAN.

To address this gap, we also make an export as instrumental variable to obtain unbiased estimates of how trade openness and economic growth affect FDI in ASEAN. ¹⁰ Based on description above, this research purpose is (1) To examine the relationship of GDP Annual growth to FDI in ASEAN countries, 2) To examine the relationship of China tariff level to FDI in ASEAN countries and 3) To examine the relationship between Trade Openness to FDI in ASEAN countries.

To clarify the purpose of this research the grand theory of this research is eclectic paradigm theory that stated the consideration of foreign investors to invest the money which are location, trade openness strengthen the location advantage and GDP offers the market situation also tariff for imports of goods and services that imposed by country's policymakers. Therefore this

research purpose to strengthen the theoretical contribution and knowledge of FDI, tariff, trade openness, GDP annual growth and exports as buffers also the practical contribution for policymakers of ASEAN countries to develop and devise the economics growth and investments in that countries.

This research fills that gap by utilizing a 2SLS panel regression with exports as an instrumental variable, offering a novel empirical strategy. The findings contribute to theoretical refinement of the Eclectic Paradigm and Endogenous Growth Theory by demonstrating how institutional quality conditions the impact of openness and tariffs on FDI. This study contributes to the existing literature by examining the impact of China's tariff policy on FDI inflows into ASEAN countries—an angle that has received limited empirical scrutiny. The study also applies a panel two-stage least squares (2SLS) regression using export levels as an instrumental variable to address crucial endogeneity between tariff level and FDI. Furthermore, the research re-evaluates the applicability of Eclectic Paradigm and other international trade theory in the ASEAN context, emphasizing the moderating role of institutional quality.

This research is among the first explicit quantify the spillover effects of China's tariff adjustments—triggered by the US–China trade war—on FDI inflows into ASEAN countries. By integrating external trade policy shocks into the Eclectic Paradigm framework and other international trade theory also employing a 2SLS approach with exports as an instrumental variable, the research not only addresses an empirical gap in ASEAN investment studies but also advances methodological rigor in assessing cross-border policy spillovers.

2. Literature Review

2.1. Grand Theory

Eclectic Paradigm theory according to (Dunning, 1977, 1997, 2000) explain the level of structure of foreign firm adding level activities, it comes with 3 conditions which are: (1) unique and specific advantages than other firms (Ownership Advantages – “O”); (2) The extend of companies to sell them to other companies (Internalization Advantages – “I”); (3) The extend of companies to sell, create and innovate the “O” in foreign location (Location – “L”), from this component it made the OLI framework model which can explain the FDI and other factors. Eclectic paradigm according Dunning (1997) can attract FDI because the China tariff can be reduced to the countries which want to invest because of relocation with market seeking components, GDP annual growth can attract FDI in ASEAN because the market seeking and last Trade openness can consider the countries with market seeking from (Dunning, 1998). Eclectic paradigm in ASEAN countries which lucrative sector is in Location sector, it because ASEAN connected with global trade hub which are Malacca Strait that connected Singapore, Malaysia and Indonesia and South China Sea and many busiest port are connected to Singapore.

Institutional theory which are normative and regulatory of governments can made an attractive and increased the infrastructure of location which investors want to invest the FDI in that countries and the governments can promote or restrict FDI in countries to grow the economic development and help make the job opportunities for the young generations to work in investors companies (North, 1990; Mudambi and Navarra, 2003). In (Chaudhry, 2011) research Trade openness can attract FDI because the countries good institutional quality but in poor institutional quality made trade openness didn't distract FDI, Tariff also can be reduced especially China for attract the FDI because the quality and diplomacy strength of the countries in ASEAN and GDP can attract FDI because higher GDP can made the investment lucrative in ASEAN. Some countries in ASEAN have good institutional quality and some of them have poor institutional quality. Because this trade openness positive

in some countries and negative in some countries which effects are FDI endure some bribery and others.

Neoclassical growth theory made the GDP growth sustain when accumulated the growth and capital especially FDI in some countries, so the empowerment of capital, technology and labor made the business environment in that countries sustain and grow into the maximum points (Solow, 1999). Countries which have good environments, regulations and policy made the GDP higher and attract the FDI, also can made trade openness and tariff lucrative for FDI in ASEAN countries.

Endogenous growth theory in (Mayer, 1996) made GDP annual growth attract many foreign investors to invest in countries for FDI so in can generate profit and diminishing returns for the new knowledge in GDP annual growth. GDP annual growth reflects the overall economic performance and market potential of a country. With the trade openness can attract FDI from foreign countries to ASEAN and made the innovation hub for countries in ASEAN (Frankel and Romer, 1999). And China tariff can be considered by the countries in short run benefits but generate long run cost in the countries include ASEAN regions according to (Brock and Turnovsky, 1993).

2.2. GDP Annual Growth and Foreign Direct Investments

GDP Annual growth according (Blanchard, 2017) is percentage growth of GDP from year to year. GDP Annual growth has an influence on FDI according (Durmaz, 2017). GDP Annual growth has a positive significant result on FDI stated by (Aziz & Mishra, 2016). GDP Annual growth increases the FDI in countries with developed economies (Saini & Singhania, 2018). In endogenous growth theory from (Berthélemy and Démurger, 2000) research stated that GDP annual growth has positive effect on inflows of FDI in China during 1985-1996 in 24 provinces. In (Shah *et al.*, 2024) research GDP annual growth has positive effect on FDI inflows in India during 1970-2023 periods.

2.3. China Tariff Level and Foreign Direct Investments

China Tariff level is the taxes that applied on imported goods by Chinese governments according to (World Bank, 2015). Tariff level has an impact for micro and macroeconomics in UK, China, USA, and Europe which are FDI etc., (Ortiz Valverde and Latorre, 2020). Also, in Indonesia the reduce of tariff can increase the business and reduce the income equality according to (Vadila and Resosudarmo, 2020) findings. According to (Aisbett and Silberberger, 2021) regions or countries which tariff liberalization is higher made the foreign companies want to invest to countries firms so performs to the top of list ranking of global standard.

2.4. Trade Openness and Foreign Direct Investments

Trade Openness is a percentage of Gross Domestic Product (GDP) which is the total income earned through the production of goods and services in an economic territory during an accounting period according to (World Bank, 2015). Trade Openness according to (Aziz and Mishra, 2016; Durmaz, 2017; Saini and Singhania, 2018) have a positive significance to FDI in the countries. In Aziz and Mishra (2016) the Trade openness positively attract FDI in

Arab countries during 1984-2012 periods. Saini and Singhania (2018) findings stated that trade openness can attract FDI in 11 developed countries and 9 developing countries in 2004-2013 periods. In Durmaz (2017) stated that Trade openness positively attracted FDI inflows in Turkey in 1977-2011 using yearly data. In the (Alhamran *et al.*, 2025) study found that trade openness has significant effects on boosting FDI in GCC countries. Trade openness according to findings of (Le and Kim, 2020; Ta *et al.*, 2020) have positive impact on FDI inflows in Vietnam. It also stated by (Nguyen, 2021) which FDI has improved by Trade openness in Vietnam. But some studies found that trade openness have negative relationship to FDI according to (Busse and Hefeker, 2007) research in 83 developing countries during 1984 to 2003 periods.

3. Research Methods

3.1. Population and Samples

This study utilized annual data from 2008 to 2023 period and interpolated from 131 observations to 548 observations which increased 417 observations after interpolated with quadratic match average sum method. We use interpolation method because the observation doesn't have complete data for every year and filled the gap to estimate the accurate model and form the unbalanced panel data format according (Baltagi, 2005; Wooldridge, 2018). The observations from 9 Southeast Asian countries which are: Indonesia, Singapore, Thailand, Malaysia, Vietnam, Cambodia, Philippines, Laos and Brunei. The dependent variable of this study is Foreign Direct Investment, and the independent variables is Trade Openness, China Tariff Level and GDP Annual Growth which Export are the instrumental variables for China Tariff Level. The analysis used Rstudio software with *plm* package for panel regression, *dplyr* package for data manipulation, *lmtest* for heteroskedasticity test and *AER* package for 2SLS regression (Zeileis and Hothorn, 2002; Kleiber and Zeileis, 2008; Croissant and Milla, 2018; Wickham *et al.*, 2023)

All the dataset obtained from world bank website which ranged from 2008-2022. A summary of data explained in Table 1.

Table 1. Variables Description and Data Sources

Indicator	Measurement	Scale	Source
Foreign Direct Investment	FDI = FDI Inflows / GDP	Ratio	World Bank (2023)
Trade Openness	TO = (Total Export + Import) / GDP	Ratio	World Bank (2023)
GDP Annual Growth	GDP = (GDPT - GDPT-1) / GDPT	Ratio	World Bank (2023)
China Tariff Level	CTL = Average of Chinese import tariff (%)	Ratio	World Bank (2023)
Export	Export = Total Export to all Countries	Ratio	World Bank (2023)

Source: Author's Investigation

3.2. Methodology

This study used panel 2SLS (Two Stage Least Squares) Method for regression, this test according to (Gujarati & Porter, 2009) applied estimation with 3 test which are Pooled OLS

(Common Effect), Fixed Effect and Random Effect. After 3 model examined, we use Hausman Test to test the appropriate effect for Fixed or Random Effect (Hausman, 1978).

Exports are used as an instrumental variable for China's tariff level to address potential endogeneity. The rationale is that while exports are correlated with China's trade policy (relevance condition), they are unlikely to affect FDI directly outside of the tariff channel (exogeneity condition), making them a valid instrument in the 2SLS framework. Exports are log-transformed to correct for skewness and heteroskedasticity in the data. The log of exports is used as an instrumental variable for China's tariff level, under the assumption that it is strongly correlated with tariff policy (relevance condition) but does not directly affect FDI inflows (exogeneity condition).

The first stage regresses China's tariff level on exports, GDP growth, and trade openness, while the second stage uses the predicted tariff level to estimate its impact on FDI.

The model for the panel 2SLS is below:

First Stage Regression

$$CTL_{it} = \pi_0 + \pi_1 * \log(Export_{it}) + \pi_2 * GDP_{it} + \pi_3 * TO_{it} + u_{it} \quad (1)$$

Second Stage Regression

$$FDI_{it} = \alpha + \beta_2 * GDP_{it} + \beta_3 * CTL_{it} + \beta_4 * TO_{it} + \varepsilon_{it} \quad (2)$$

Where i denote country and t at time, Export is the instrument variable, CTL denote China Tariff Level, FDI is Foreign Direct Investment, TO is Trade Openness and GDP is GDP Annual Growth. β_2 , β_3 , β_4 denote coefficients of the variables GDP Annual growth, China Tariff Level and Trade openness, and ε refers to error terms.

3.3. Diagnostics Test

To ensure the model not violated BLUE (Best Linear Unbiased Estimator) assumption, we test the heteroskedasticity and autocorrelation in panel 2SLS regression, use the Breusch Pagan test for heteroskedasticity and panel Breusch Godfrey Test for autocorrelation. The heteroskedasticity is the condition which are unbiased in point estimate and autocorrelation is the condition which are the correlation have connected with other. To handle heteroskedasticity and autocorrelation it could use Robust Clustered Standard errors for regress the best models that appropriate from Chow and Hausman test respectively according (Gujarati and Porter, 2009; Wooldridge, 2018). To handle the endogeneity and weak instrument it could use Wu Hausman test for detect them (Gujarati and Porter, 2009; Wooldridge, 2018)

4. Result and Discussions

Table 2. Matrix Correlation

	Foreign Direct Investments	GDP Annual Growth	China Tariff Level	Trade Openness	Exports
Foreign Direct Investments	1	0.20	0.086	0.47	0.697
GDP Annual Growth	0.20	1	0.32	-0.025	-0.015
China Tariff Level	0.086	0.257	1	-0.173	-0.018
Trade Openness	0.47	-0.025	-0.173	1	0.794
Exports	0.697	-0.015	-0.018	0.794	1

Source: Author's Calculation

²⁵ Based on the correlation matrix in table 2, it can be observed that FDI is positively correlated with exports (0.697) and trade openness (0.47), indicating that increased engagement in international trade is generally associated with higher inflows of foreign investment. However, the relatively weak correlation between FDI and GDP (0.2) or China's tariff level (0.086) suggests that these variables may require more sophisticated modeling, such as 2SLS, to capture potential indirect or lagged effects. The strong correlation between exports and trade openness (0.794) raises concerns regarding multicollinearity in the main regression model, which must be addressed through proper model specification.

²³ **Table 3.** Descriptive Statistics

Variable	N	Mean	SD	Min	Max	Median
China Tariff Level	548	1.0058	0.32	0.49	1.54	0.97
Trade Openness	548	34.3	23.29	7.91	112.62	30.17
GDP Annual Growth	548	1.068	0.92	-2.87	4.121	1.25
Exports	548	5.150E+10	54941524542	3.401E+08	2751E+11	4.384E+10
Foreign Direct Investments	548	1.46	1.56	-0.7548	8.27	0.89

Source: Author's Calculation

The summary or descriptive statistics show the result in table 3 that the average of Trade Openness in 7 ASEAN countries is 34.3 the minimum is 7.91 and max is 112.62 which are very lucrative in Singapore, China Tariff Level average is 1 which low trade barriers for Chinese imported goods and service across ASEAN, the minimum China Tariff is 0.49 and maximum is 1.54, GDP Annual growth is low in 1.068% which because in 2020 until 2021

suffered by global COVID 19 Pandemic , exports is 54.9 billion and it's vary between ASEAN countries ,and Foreign Direct Investment inflows is 1.46%, the minimum is -0.75% and the maximum is 8.27%.

Table 4. Choice of Best Panel Models

Test	Probability	Choice
Chow Test	0	Fixed Effect
Hausman Test	0	Fixed Effect

29
Source: Author's Calculation

In table 4 based on this research, the choice of the best panel models examined by 2 test which are Chow and Hausman test, both of the test results' probability result is below 0.05, the best choice of the panel models is fixed effect models for this research.

Table 5. First Stage Regression

	First Stage Common Effect	First Stage Fixed Effect	First Stage Random Effect
Intercept	1.815*** (0.000)	0.725*** (0.001)	2.209*** (0.000)
GDP Annual Growth	0.087*** (0.000)	0.003 (0.524)	0.094*** (0.000)
Trade Openness	0.001* (0.079)	0.000 (0.658)	0.002* (0.058)
Log(Exports)	0.040*** (0.000)	-0.019* (0.086)	- (0.000)
N	548	548	548
R2 Adjusted	0.095	0.976	0.132

2
Source: Authors' results. * Indicate significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

The results of first stage regression in table 5. Indicating that the best models is fixed effect which exports statistically significant at 10% level. This suggests that higher exports activity depend on increase of China Tariff level, supporting the relevance of export performance as a valid instrument in table 8. This estimation adjusted R square is 0.976 which 97,6% variation can be explained by this model.

Table 6. Second Stage Panel Regression

Dependent Variable: Foreign Direct Investments			
	Common Effect	Fixed Effects	Random Effects
Intercept	-5.39* (0.085)	21.534*** (0.003)	2.802** (0.043)
GDP Annual Growth	-0.101 (0.219)	0.136** (0.022)	0.365** (0.014)
China Tariff Level	5.259*** (0.000)	20.719** (0.015)	-1.36 (0.358)
Trade Openness	0.048*** (0.000)	0.054*** (0.000)	-0.011* (0.074)
N	548	548	548
R2 Adjusted	0.571	0.785	0.042

Source: Authors' results. * Indicate significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

In table 6 there are 3 panel regression models, this research chooses fixed effects as the best models for the panel models estimation. This study found that GDP Annual growth has positive effect on Foreign Direct Investments, Trade openness has negative effect on Foreign Direct Investments and China Tariff level has positive effect on Foreign Direct Investments. The estimation model adjusted R square is 0.785 which 78.5% variation explained by this model.

Table 7. Heteroskedasticity and Autocorrelation Tests

	Probability
Breusch Pagan Test	0
Panel Breusch Godfrey Test	11 0

Source: Author's Calculation

In table 7 this study examined the heteroskedasticity test with Breusch Pagan test, it found that the model of fixed effect in heteroskedasticity because the probability below 0.05 which above 0.05 is homoskedasticity.

Table 8. Endogeneity and Weak Instrument

Diagnostic Tests	df1	df2	F statistic	P Value
Weak Instruments	1	544	20.59	0
Wu Hausman	1	543	46.92	0

Source: Author's Calculation

In table 8 this study examined endogeneity test with Wu Hausman Test for China Tariff Level, the result found that F statistics is 46.92 indicating that the tariff variable is endogenous and justifying the use of instrumental variable estimation via 2SLS.

Table 9. Robust Clustered Standard Errors Regression

	Robust Standard Errors Regressions			
	Estimate	Standard Errors	T Statistic	Probability
Intercept	21.35396	7.2544	-2.9431	0.003**
GDP Annual Growth	0.136	0.0857	1.5897	0.1125
China Tariff Level	20.718	6.5987	3.1398	0.0017**
Trade Openness	-0.05	0.019	-2.7936	0.0054**

Source: Authors' results. * Indicate significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

To handle the heteroskedasticity and autocorrelation this study used robust standard errors for fixed it in table 9. GDP Annual growth not significant to FDI in ASEAN countries. It contradicts the neoclassical growth theory that GDP annual growth can attract FDI, it supported by institutional theory. It is because the GDP Annual Growth can't make the investor believe the institutions. It also have lack of economic development quality in that country which depends on extractive sector like natural resources or Micro and Small Medium Enterprises (MSME) which have small effect for economical development. In Institutional theory the investors can doubt the government's ability to manage their countries because of bribery or corruption in those countries. Investors also need the stability of the countries to invest in those countries.

China Tariff level significantly affects the FDI in ASEAN countries. It supported the research of (Ortiz Valverde and Latorre, 2020; Vadila and Resosudarmo, 2020; Aisbett and Silberberger, 2021) and original model before change to robust model. It has impact on FDI in 7 ASEAN countries which related to (Fan, Guo and Hu, 2023) findings. The China Tariff level also not burden the exports and imports of Chinese goods to those countries in regions amid the trade war between China and USA. It also in eclectic paradigm theory the location in OLI which lucrative from China to shift in ASEAN countries, which are Vietnam, Indonesia and Malaysia, also many multinational firms want to relocate their business to ASEAN which are have productive labor in that regions.

Trade Openness have negative relationship with the FDI in ASEAN countries. It supported by the (Aziz and Mishra, 2016; Durmaz, 2017; Saini and Singhania, 2018). It because in (Fiona and Buntu Laulita, 2023) findings which are Trade Openness become lower the FDI became attracted by countries which need it. The cause of this because the annual change of regulations in ASEAN countries, Geopolitics rivalry between China and USA for contest the trade supremacy and politics in 7 ASEAN countries. It contradicts with the endogenous growth theory which trade openness has positive effect on FDI in 7 ASEAN countries. However trade openness in ASEAN countries supported by institutional theory, it caused by frequent annual changes of policy in that countries which come from USA or China goods and services which enter to ASEAN countries also the political regulations in those countries not stable as other regions. High variation of bureaucracy in ASEAN made the trade openness not effective and made the corruption rampant according to institutional theory which stated by Buchanan. In some countries in ASEAN like Cambodia which struggle in their political stability and logistics. Therefore, the trade openness in isolation not sufficient to increase the trade openness, Singapore due to their size does not have problems in their policy but the geography of this country smallest in ASEAN countries limit their firms to expand.

An important methodological note relates to the use of interpolation to construct a balanced panel. Specifically, missing values in variables such as China's tariff level were completed using the quadratic match average method. While this approach ensures consistency and enables the use of panel regression techniques, it may introduce measurement error or smooth over year-to-year volatility in primary indicators. Such bias could change the significance of certain variables, particularly those subject to sudden policy changes or trade shocks. However, the application of robust standard errors and fixed effects models helps mitigate this risk, although caution is still advised when interpreting variables affected by interpolation.

10 5. Conclusions

This study investigates the impact of GDP Annual growth, trade openness and China's tariff level on foreign direct investments in ASEAN countries during 2008-2023 using 2SLS panel regression with fixed effects and robust standard errors.

First, GDP annual growth didn't significantly influence the FDI inflows to ASEAN, it contradicts to all theory that stated sustained GDP annual growth can attract FDI to countries, but in ASEAN cases suggests that GDP annual growth does not attract FDI in some countries in ASEAN. It is caused by economic and institutions structural problems in ASEAN, but also by slow growth of global economics amid the trade war between USA and China during 2018 period.

Second, China's tariff level (CTL) significantly influence FDI inflows to ASEAN. This result implies that the expected "trade diversion effect" stemming from US-China trade tensions may not automatically translate into increased FDI for ASEAN countries. It suggests that geopolitical shocks alone are insufficient; domestic fundamentals and structural competitiveness likely play a more decisive role in attracting foreign investment. This also calls into question the assumption that tariff increases in a major partner like China directly benefit neighbouring economies.

Third, contrary to conventional wisdom, trade openness is found to have a negative and statistically significant effect on FDI inflows in the ASEAN countries. This unexpected result may reflect the structural vulnerabilities of overly liberal trade regimes, especially in countries with underdeveloped institutional frameworks or high reliance on commodity exports. It suggests that trade openness, if not accompanied by lucrative industrial like manufacturing and Research and Development sector and investment policies, may fail to generate sustainable FDI inflows and might even deter long-term investment due to market volatility and weak domestic linkages.

This research has some limitations which are: 1). Only consist countries in ASEAN region from 2008-2023 which some countries like Laos and Myanmar didn't have complete data; 2) The data used interpolation to make it unbalanced panel form which caused biased interpretation while use quadratic match average method for interpolation; 3) Use of export as instrumental variable have drawback for interpret some variables which include in FDI and Tariff; 4) This model not considered the organization variable such as regulation quality, political stability or ease of doing business in ASEAN countries. This research has some suggestions which are: 1) broadening from ASEAN to other regional example MENA (Middle East and North Africa) etc.; 2) employ the more advanced panel models such as Generalized Method of Moments (GMM) for analysis; 3) the variables can add the

institutional variables such as corruption perception index, corporate governance quality and etc.

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Navigating Tariffs, Growth and Investment: Panel 2SLS Analysis for FDI in ASEAN during the USA-China Trade War

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