Insights into the Uneven Impact of Foreign Direct Investment, Sector-Specific Official Development Assistance, and Remittances on Human Development in ASEAN-9: Evidence from Panel Data Models

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Abstract

ASEAN's motto of "One Vision, One Identity, One Community" aims for peace, stability, market integration, and inclusivity. However, development disparities persist among member countries. This research analyzed the impact of foreign capital flows on the Human Development Index (HDI) in ASEAN-9 from 2002 to 2021, using panel data regression models and data from reputable international sources. It also highlights the data characteristics and variations in HDI across member countries. Results show that while Foreign Direct Investment (FDI) and remittances contribute significantly to capital inflows, only FDI affects HDI. Despite its smaller share, Official Development Assistance (ODA) significantly influences HDI. However, the effects of ODA vary across sectors, with grants for social infrastructure and manufacturing, as well as ODA loans for manufacturing and other sectors, positively impacting HDI, while grants for economic infrastructure and other sectors negatively affect HDI. This highlights the complex relationship between foreign capital flows and HDI in ASEAN-9. Targeted ODA allocation and policy considerations are crucial for regional human development, even if the direct impact of remittances on HDI is limited.

Keywords: HDI, FDI, ODA, remittances, and ASEAN.

Introduction

Foreign capital flows, including FDI, ODA, and remittances, have emerged as significant catalysts for economic development, particularly in emerging and developing economies. Each type of capital flow contributes uniquely to human development: FDI is pivotal in facilitating technology transfer, providing technical support, enhancing management skills, augmenting production capacity, and creating employment opportunities within host countries (Blomström & Kokko, 1998; Dunning, 1993). In contrast, ODA supports recipient nations' development through initiatives targeting social and economic infrastructure, promoting productive sectors, and fostering sustainable development (Burnside & Dollar, 2000). Remittances play a distinct role by directly increasing household income, which can be reinvested into education, healthcare, and improved living standards (Jahjah et al., 2003). Consequently, these external capital flows are indispensable in advancing economic growth and human development in recipient countries. However, empirical research has yielded mixed findings, with some research showing positive impacts of foreign capital flows, particularly FDI, on human development in middle-income countries. At the same time, other studies indicate limited or no significant effects, especially in lower-income countries where governance and policy inefficiencies may diminish the benefits. These variations suggest that foreign capital flows may not consistently or substantially encourage human development, as their effects depend significantly on the economic context, governance capacity, specific countries, sectors, and periods examined.

Situated strategically in Asia, the Association of Southeast Asian Nations (ASEAN) has attracted a substantial influx of foreign capital. Nonetheless, notable disparities in human development persist among ASEAN member countries. This prompts crucial questions: How do different types of foreign capital flows—such as FDI, ODA, and remittances—specifically contribute to human development within ASEAN countries?; What role does each country's internal governance capacity play in moderating the impact of these capital flows on the HDI?; and How can targeted foreign capital allocation, alongside political stability, enhance the quality of life in these nations? By focusing on these nuanced relationships, this research explores how different forms of foreign capital influence HDI across the diverse ASEAN region.

Despite extensive research on foreign capital flows, existing research often shows mixed findings and has not fully explored the specific context of ASEAN. This research addresses this gap by evaluating the impact of foreign capital flows (FDI, ODA, and remittances) on the HDI within nine ASEAN countries (ASEAN-9). Brunei and Singapore are excluded from the analysis as they no longer receive significant ODA and remittances, which are key components of this research's focus on foreign capital flows. ASEAN-9 represents a region marked by significant variations in governance quality (government effectiveness and political stability), developmental outcomes (GDP per capita), and the effects of the COVID-19 pandemic.

Literature Review

Examining the influence of foreign capital flows on the HDI has garnered considerable attention among scholars, mainly due to the growing recognition of the significance of human development quality over mere economic growth. Extant literature in this domain has primarily focused on several key aspects.

FDI is widely regarded as a key driver of HDI due to its ability to stimulate economic growth, create employment opportunities, and improve infrastructure. Haddad (2018) utilizes the Ordinary Least Squares (OLS) method to examine the impact of inward and outward FDI on HDI in the United Arab Emirate (UAE), revealing significant positive contributions of inward FDI to human development. Similarly, Johansen cointegration and Toda-Yamamoto causality tests (as cited in Gökmenoğlu et al., 2018) demonstrate the long-term positive impact of FDI on life expectancy and gross national income in Nigeria, emphasizing FDI's role in advancing key determinants of HDI. Ahmad et al. (2019), using panel regression models and two-stage least squares (2SLS) methods, find that FDI positively influenced HDI and contributed to poverty reduction in ASEAN and SAARC economies. However, contrasting findings highlight limitations in FDI's impact, with Ustubici and Irdam (2012) reporting no significant relationship between FDI and HDI, attributing this to weak institutional frameworks in specific regions. Tamer (2013) also concludes that governance challenges in low-income African countries hindered FDI's potential to foster human development. These findings suggest that while FDI significantly enhances human development by driving economic growth, advancing technological capabilities, and creating employment opportunities, its impact depends on governance quality and institutional capacity.

H1: FDI positively impacts the HDI by fostering economic growth, facilitating technology transfer, stimulating export activities, and generating employment opportunities.

ODA has similarly been studied for its potential to improve HDI, particularly through investments in critical sectors such as education, healthcare, and social infrastructure. Ahn and Park (2019) find that ODA significantly enhanced healthcare and welfare in recipient countries using panel least squares estimation with country-fixed effects. Through panel regression models and fuzzy set ideal-type analyses, Lee, Jung, and Sul (2019) demonstrate that targeted ODA investments in public services directly improved HDI across 15 Asian countries. However, challenges in ODA effectiveness have been noted, with Tamer (2013) reporting negative effects of ODA in low-income African regions due to inefficient resource allocation and governance challenges. Ustubici and Irdam (2012) similarly observe no significant relationship between ODA and HDI in low-income countries, citing the misallocation of aid as a critical barrier. These findings underline the dynamic relationship between ODA and HDI, emphasizing the importance of governance frameworks and political stability to ensure effective resource utilization and maximize developmental outcomes.

H2: ODA positively impacts the HDI when effectively allocated toward education, healthcare, and social infrastructure.

Remittances are also recognized as a significant contributor to HDI by increasing household income and facilitating investments in education and healthcare. Olcoz-Amaya (2020) uses fixed-effects models to examine the effects of remittances on HDI in Latin American countries, finding that their impact depended on their allocation, with productive investments yielding stronger effects. Ustubici and Irdam (2012) further demonstrate a significant positive relationship between remittances and HDI in middle-income countries, highlighting their role in supporting consumption and human capital development. These findings emphasize the role of remittances in improving human development in countries, where they alleviate poverty, enhance consumption patterns, and foster long-term investments in human capital.

H3: Remittances positively impact the HDI by increasing household incomes, reducing poverty, and improving access to essential services.

Governance quality significantly shapes the relationship between foreign capital flows and HDI. Thi Cam Ha et al. (2023) highlight the importance of institutional frameworks, demonstrating through panel data techniques that institutional quality moderates the impact of FDI on HDI. Topalli et al. (2021) find that governance improvements are essential for maximizing the developmental benefits of foreign capital inflows. Then, Pérez-Segura (2014) emphasizes the role of regulatory quality and the rule of law in enhancing FDI's contributions to HDI. Reiter and Steensma (2010) further establish that low corruption and effective governance amplify FDI's positive impacts on HDI. These findings underscore that governance quality, distinct from the volume of foreign capital inflows, is pivotal in translating these resources into tangible improvements in human development.

H4: Government effectiveness positively impacts the HDI by enabling the implementation of sound policies in public health, education, and poverty reduction.

H5: Political stability positively impacts the HDI by creating a favorable environment for foreign capital inflows and ensuring the continuity of development policies.

GDP per capita (GDPPC) is a fundamental determinant of HDI, reflecting a country's economic capacity to invest in human development. Ahmad et al. (2019) demonstrate that GDPPC significantly improved HDI in ASEAN and SAARC economies, particularly in middle-income countries. Lee (2015) highlights the diminishing returns at higher income levels, recommending the use of logarithmic transformations to capture these dynamics. The research collectively suggests that GDPPC contributes to HDI by improving access to essential services, reducing poverty, and enhancing living standards, although its effects taper in high-income regions.

H6: GDP per capita positively impacts the HDI by improving access to essential services, reducing poverty, and enhancing living standards.

Finally, the COVID-19 pandemic has disrupted human development globally by affecting income, healthcare, and education systems. Alkire et al. (2021) document significant declines in HDI during the pandemic, particularly in countries with weaker healthcare systems, while Anetor et al. (2020) highlight that COVID-19 exacerbate existing inequalities,

further lowering HDI in vulnerable populations. These research findings underscore the pandemic's profound and detrimental effects on key sectors critical to human development, hindering progress in countries.

H7: The COVID-19 pandemic negatively impacts the HDI by disrupting income, healthcare access, and education systems.

In summary, scholarly investigations into the impact of foreign capital flows on HDI highlight the growing recognition of human development quality as a measure surpassing economic growth. Various research have explored the relationships between FDI, ODA, remittances, and HDI, while also addressing factors such as governance quality, political stability, and economic conditions that shape outcomes. These insights contribute to a deeper understanding of the complex dynamics between foreign capital flows and HDI, offering valuable guidance for advancing human development in ASEAN-9 countries and informing policymakers.

Methodology and Data

This research employs a panel data regression model to investigate the effects of foreign capital flows on the HDI in nine ASEAN countries from 2002 to 2021. Brunei and Singapore are excluded from the analysis as they no longer receive ODA and remittances. The data for ASEAN-9 countries are collected comprehensively over the research period, except FDI data for Timor-Leste in 2002 and 2003, and remittance (RET) data for Timor-Leste in 2002, 2003, and 2004. These gaps introduce some limitations to the analysis for Timor-Leste.

Panel data is chosen because it accounts for both cross-country differences and changes over time, providing a more comprehensive view of the relationship between foreign capital flows and HDI. Compared to time-series or cross-sectional data, panel data offers the advantage of capturing both individual heterogeneity and temporal dynamics, which helps reduce the risk of omitted variable bias and improves the accuracy of the findings.

Based on previous research by Olcoz-Amaya (2020), Lee (2015), Anetor (2020), and others, the article aims to assess the influence of various foreign capital flows on HDI, including FDI, ODA, and remittances. Additionally, the research examines the impact of ODA on specific sectors and forms. Moreover, the research endeavor takes into account the level of government efficiency (GE) and political stability (PS), as suggested by Pérez-Segura (2014), to provide a comprehensive analysis of the variables' effects. The research model, which elucidates the relationship between foreign capital flows and HDI in ASEAN countries, is formulated as follows:

$$HDI_{it} = a_0 + a_1FDI_{it} + a_2ODAGS1_{it} + a_3ODAGS2_{it} + a_4ODAGS3it + a_5ODAGSO_{it} + + a_6ODALS1_{it} + a_7ODALS2_{it} + a_8ODALS3_{it} + a_9ODALSO_{it} + a_{10}RET_{it} + a_{11}GE_{it} + a_{12}PS_{it} + a_{13}GDPPC_{it} + a_{14}COV_{it} + \varepsilon_{ij}$$

Note:

HDI_{it}: Human Development Index in country i at time t (dependent variable), sourced from the UNDP database (UNDP, 2023). The independent variables are collected from reliable and recognized sources, as detailed in Table 1.

Table 1 Independent Variables in the Research Model

Variable	Description	Unit	Source
FDI	Foreign direct investment net inflows	(% of GDP)	WDI, 2023a
ODAGS1	ODA grants received by a country, allocated to the social infrastructure sector	% of GDP	OECD, 2024
ODAGS2	ODA grants received by a country, allocated to the economic infrastructure sector	% of GDP	OECD, 2024
ODAGS3	ODA grants received by a country, allocated to the production sector	% of GDP	OECD, 2024
ODAGSO	ODA grants received by a country, allocated to other sectors	% of GDP	OECD, 2024
ODALS1	ODA loans received by a country, allocated to the social infrastructure sector	% of GDP	OECD, 2024
ODALS2	ODA loans received by a country, allocated to the economic infrastructure sector	% of GDP	OECD, 2024
ODALS3	ODA loans received by a country, allocated to the production sector	% of GDP	OECD, 2024
ODALSO	ODA loans received by a country, allocated to other sectors	% of GDP	OECD, 2024
RET	Remittances received by a country	(% of GDP)	WDI, 2023c
GE	Government Effectiveness Index. The GEI, which ranges from 1 to 100, with 100 reflecting the highest level of effectiveness, indicates the government's capacity to enact policies that positively influence various aspects of human development.	Index (1 – 100)	WGI, 2023b
PS	Political Stability and Absence of Violence/Terrorism Index. This index, which ranges from 1 to 100, with 100 representing the highest level of stability, provides a measure of the political climate and its effect on the overall development of a country.	Index (1 – 100)	WGI, 2023
l_GDPPC	Log of GDP per capital. The logarithmic transformation of GDP per capita (logGDPPC) is used to capture diminishing returns in income growth and to normalize income distribution across countries.	USD (log scale)	WDI, 2023b
DCov	Dummy: Covid19 pandemic. Given that the pandemic emerged in early 2020, the variable representing its impact will be assigned a value of 1 for the years 2020 and 2021. In contrast, for the remaining years, the variable will be assigned a value of 0, indicating the absence of the pandemic's influence during those periods.		

Results and Discussions

Overview of HDI and International Capital Flows Trends in ASEAN-9 (2002-2021)

Based on a descriptive statistical analysis of the data in 2002-2021, nine countries in Southeast Asian (ASEAN-9) have notable differences in HDI, international capital flows, per capita income, political stability, and government efficiency. Regarding the HDI within ASEAN-9 countries, notable patterns emerge. Except for Timor-Leste, all other countries in ASEAN-9 experienced an upward trajectory in their HDI, indicating human development across the three dimensions of income, education, and health. Among the ASEAN-9 countries, Malaysia achieved a high HDI level at the earliest, attaining this status in 2002. Thailand holds the second-highest HDI within ASEAN-9 and has maintained a high HDI level since 2007. The Philippines, Indonesia, and Vietnam exhibit similar HDI levels and reach a high HDI threshold in 2015 (Philippines), 2016 (Indonesia), and 2018 (Vietnam), respectively. Timor-Leste stands out in terms of significant HDI variability among the countries. After separating from Indonesia, Timor-Leste experiences rapid and continuous HDI growth within the first ten years. However, it subsequently experiences a sharp decline, settling within the medium HDI threshold. Laos, Cambodia, and Myanmar are the countries with lower HDI levels within the group. Nevertheless, these countries achieve the medium HDI threshold in 2010 (Laos), 2012 (Cambodia), and 2015 (Myanmar).

The emergence of the COVID-19 pandemic led to a continuous decline in HDI across the ASEAN-9 countries in 2020 and 2021 (see Figure 1). Consequently, based on HDI levels, the ASEAN-9 countries can be divided into two groups: one comprising countries that have achieved a high HDI (including Malaysia, Thailand, Philippines, Indonesia, and Vietnam), and the other consisting of countries with a medium HDI (Timor-Leste, Laos, Cambodia, and Myanmar).

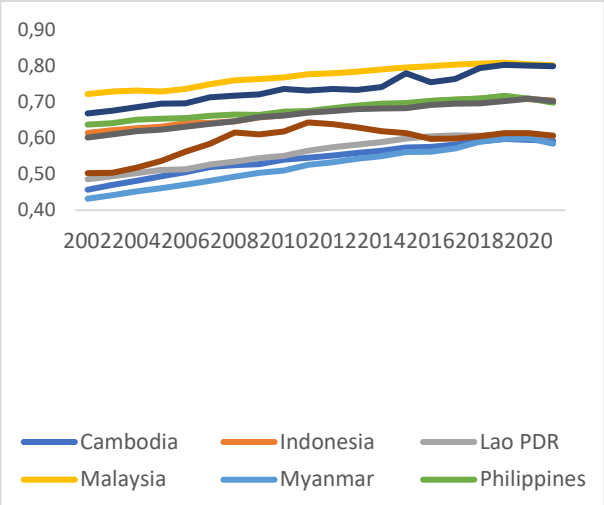


Figure 1 HDI in ASEAN 9 in 2002-2021

Source: UNDP (2023)

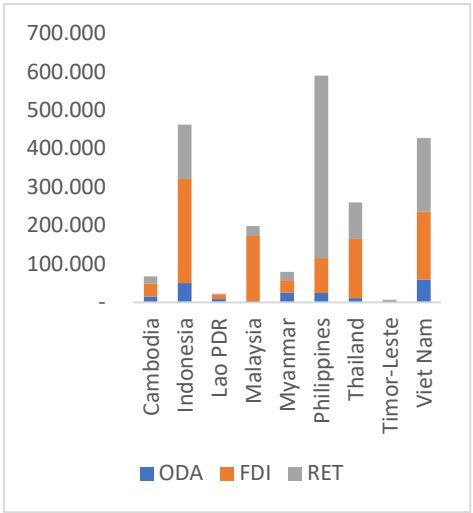
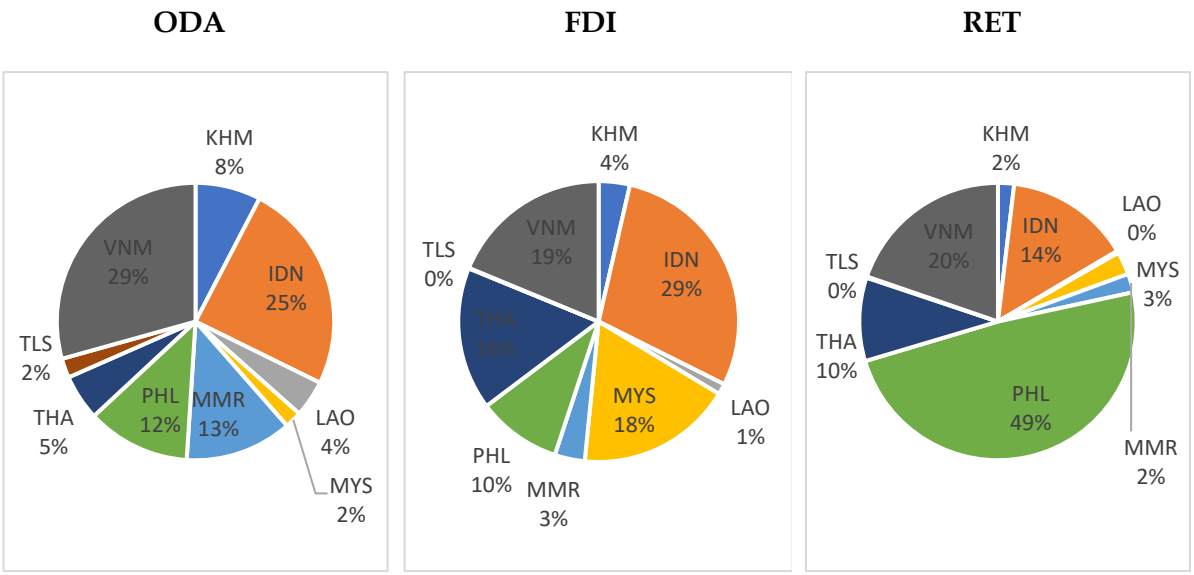


Figure 2 International capital flows in ASEAN 9 in 2002-2021 (mil.$)

Source: WDI (2023a), WDI (2023c), OECD (2023)

Between 2002 and 2021, the ASEAN-9 countries received approximately USD 2,117 billion in foreign capital inflows, consisting of ODA, net FDI inflow, and remittances. Among these inflows, remittances and FDI accounted for roughly the same proportion, approximately 45% each, while ODA constituted the lowest proportion at only around 9.6%. Notably, the Philippines, Indonesia, and Vietnam emerged as the top three countries with the highest total foreign capital inflows among the ASEAN-9. In contrast, Timor-Leste, Laos, and Cambodia recorded the lowest total inflows. The disparity in attracting foreign capital inflows within the ASEAN-9 is evident in the substantial difference between the Philippines, with a total inflow of approximately USD 590 billion, and Timor-Leste, with an inflow of slightly over USD 6.6 billion (see Figure 2).

The composition of foreign capital flows also varies across the ASEAN-9 countries. Vietnam stands out as the largest recipient of ODA among ASEAN countries during the 2002-2021 period (see Figure 3). However, when considering the proportion of ODA relative to GDP, Timor-Leste accounts for the majority. It is worth noting that the flow of ODA into ASEAN-9 countries has been declining, primarily because some countries have achieved a low-middle income level. Among the ASEAN-9, Myanmar experiences the most significant fluctuations in ODA flows. Indonesia emerges as the country attracting the highest FDI inflows in the region, while Cambodia exhibits a notably higher FDI-to-GDP ratio. The Philippines receives the most enormous amount of remittances among the ASEAN-9 and demonstrates the highest remittances-to-GDP ratio, except for 2010, 2011, and 2012, when Timor-Leste held the highest ratio (see Figure 3).



Note: IDN (Indonesia), VNM (Vietnam), PHL (Philippines), THA (Thailand), MYS (Malaysia), MMR (Myanmar), LAO (Laos), KHM (Cambodia), and TLS (Timor-Leste)

Figure 3 Structure of International Capital Flows in ASEAN 9 during 2002-2021 (percentage of total each flow) Source: WDI (2023a), WDI (2023c), OECD (2023)

Differences among the ASEAN-9 countries are evident across various dimensions, encompassing government effectiveness, political stability, absence of violence/terrorism, and per capita income. Malaysia consistently emerges as the country with the highest level of government effectiveness, while Myanmar lags with the lowest index. Political stability varies within the ASEAN-9, with Malaysia and Vietnam occupying the top two positions regarding the highest indices, while the Philippines records the lowest index (see Figure 4).

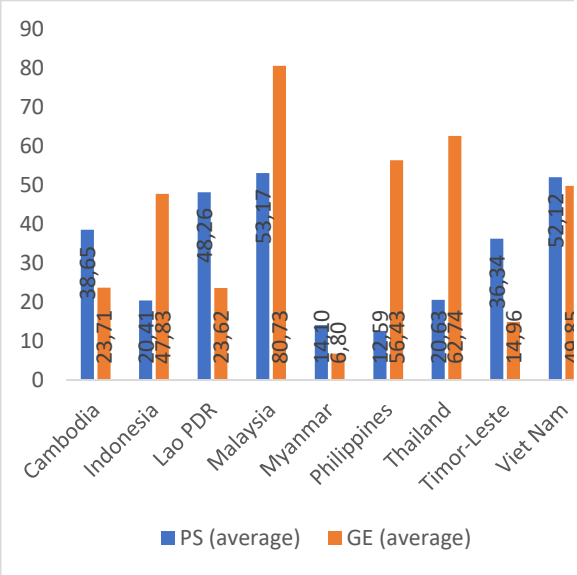


Figure 4 Average of Government Effectiveness (GE) and Political Stability (PS) indexes in ASEAN-9 in 2002-2021 (WGI, 2023)

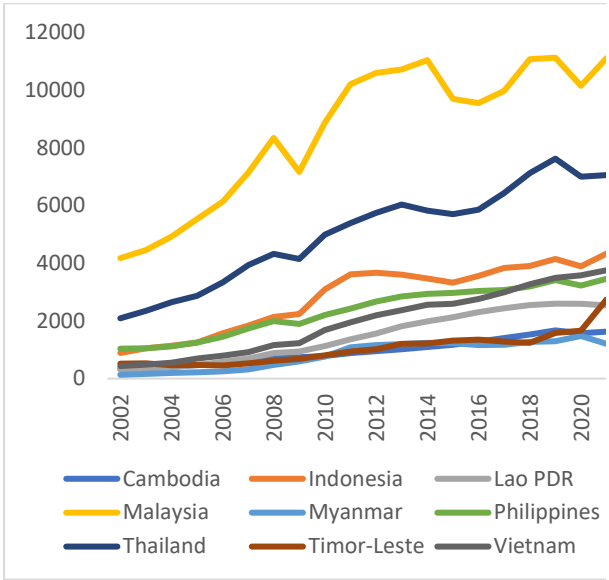


Figure 5 GDP per capita (current US$) in ASEAN-9 in 2002-2021 (WDI, 2023b)

Despite a significant overall increase in per capita income across the ASEAN-9 from 2002 to 2021, excluding the period impacted by the COVID-19 pandemic, substantial disparities persist in the region. Essentially, there is a lack of convergence regarding GDP per capita between lower-middle-income and upper-middle-income countries within the ASEAN-9. Malaysia has the highest per capita income, approximately nine times greater than the lowest-ranking country, Myanmar, as of 2021 (see Figure 5).

Panel Data Estimation of International Capital Inflows' Impact on HDI

The research utilizes the GRETL software to conduct an empirical analysis of the influence of foreign capital flows on the HDI within the ASEAN-9 countries. To address potential multicollinearity and ensure the stationarity of the data series, the initial step involved transforming the variables into a first-difference form. Subsequently, the researcher examined the correlation relationships among the independent variables. Table 2 indicates that most independent variables have negligible correlations with each other, suggesting that multicollinearity is not a significant concern in this model. For example, key variables such as FDI and HDI have a weak positive correlation of 0.2. Then, ODA grants for social

infrastructure exhibit a low correlation of 0.3 with HDI, confirming their suitability for inclusion in the regression analysis. However, a moderate correlation coefficient of 0.6 is observed between the variables ODAGSO and ODALSO (see Figure 6). This correlation suggests that while the variables are related, they still capture distinct aspects of ODA allocation. As a result, the independent variables included in the model are considered suitable for assessing their respective influences on the dependent variable.

Table 2 Correlation matrix

	d_HDI	d_FDI	d_RET	d_PS	d_GE	d_ODAGS1	d_ODAGS2	d_ODAGS3	d_ODALS1	d_ODALS2	d_ODALS3	d_ODAGSO	d_ODALSO	d_l_GDPPC
d_HDI	1	0.2	0.0	-0.1	-0.1	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2
d_FDI	0.2	1	0.1	-0.1	0.0	-0.1	0.0	0.3	0.1	0.1	-0.1	-0.1	0.0	0.1
d_RET	0.0	0.1	1	0.0	-0.1	-0.1	-0.1	-0.1	0.1	0.0	0.0	0.0	0.1	-0.2
d_PS	-0.1	-0.1	0.0	1	0.3	-0.2	0.0	0.0	-0.1	-0.3	-0.1	-0.2	0.0	0.1
d_GE	-0.1	0.0	-0.1	0.3	1	-0.1	0.1	0.1	0.0	0.0	0.0	-0.2	-0.1	0.0
d_ODAGS1	0.2	-0.1	-0.1	-0.2	-0.1	1	-0.1	-0.1	0.0	0.0	0.0	0.3	0.0	-0.1
d_ODAGS2	0.0	0.0	-0.1	0.0	0.1	-0.1	1	0.3	0.0	0.1	0.0	0.1	0.0	0.0
d_ODAGS3	0.3	0.3	-0.1	0.0	0.1	-0.1	0.3	1	0.0	0.0	0.0	-0.2	0.0	0.0
d_ODALS1	0.0	0.1	0.1	-0.1	0.0	0.0	0.0	0.0	1	0.3	0.2	0.4	0.5	-0.1
d_ODALS2	0.0	0.1	0.0	-0.3	0.0	0.0	0.1	0.0	0.3	1	0.1	0.2	0.2	-0.1
d_ODALS3	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.2	0.1	1	0.0	0.0	0.0
d_ODAGSO	0.0	-0.1	0.0	-0.2	-0.2	0.3	0.1	-0.2	0.4	0.2	0.0	1	0.6	-0.1
d_ODALSO	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.5	0.2	0.0	0.6	1	-0.1
d_l_GDPPC	0.2	0.1	-0.2	0.1	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	1

Note: When transforming the variables into a first-difference form, a "d_" prefix is added to each variable.

Source: Author's calcution from GRETL

In the subsequent stage, this research estimates the impact of the independent variables on the HDI utilizing the Pooled Ordinary Least Squares (OLS) model. The results indicate that the pooled OLS model accounted for 36.03% of the variability in HDI attributed to the independent variables (adjusted R-squared = 0.3603) across the ASEAN-9 countries. The model does not suffer from multicollinearity (VIF values < 4) or first-order autocorrelation (Wooldridge test p-value = 0.772827). Endogeneity is also not an issue, as confirmed by the instrumental variables' two-stage least squares method using lags of the independent variables as instruments. The Hausman test (p-value = 0.186267) indicates no endogeneity, and the Sargan test (p-value = 0.608375) validates the instruments. The Pesaran CD test (p-value = 0.446586) shows no cross-sectional dependence, implying no need for further adjustment. However, the OLS model exhibits heteroskedasticity (Wald test p-value = 5.88111e-52). In addition, to assess whether differences among the countries under study affect the results of the Pooled OLS model, an F-test is conducted. The results of the F-test provide evidence that the presence of country-specific fixed effects necessitates a revision of the pooled OLS model (P-value = 0.0000). Consequently, the estimation is conducted using the Fixed Effects Model (FEM).

The outcomes of the analysis reveal that the FEM captures 42.35% of the variation in HDI, resulting from the independent variables in the ASEAN-9 countries. However, the FEM model exhibits heteroskedasticity, necessitating the utilization of a Heteroskedasticity - corrected model to address this issue.

The estimation results obtain from the Heteroskedasticity-corrected model demonstrate its statistical effectiveness, as evidenced by the significantly low p-value (F-test) approaching zero. The R-squared and adjusted R-squared values are relatively high, measuring 0.601448 and 0.564979, respectively. These results indicate that 56.5% of the variability in HDI is explained by the independent variables, showing that this model offers the most robust fit. The relatively high R-squared values across the models confirm that the independent variables, particularly those related to foreign capital flows and economic growth, significantly contribute to the explanation of HDI variability in ASEAN-9 countries.

Moreover, Table 3 presents the probability values (p-values) of each independent variable, revealing that five variables exhibit a significant influence on the dependent variable HDI at a 1% significance level. This high significance level implies a strong and reliable relationship between these variables and HDI, indicating that these factors are crucial for human development in ASEAN countries. One variable demonstrated significant influence at a 5% significance level, suggesting a still strong but slightly less certain effect. Two variables exhibited significance at a 10% level, which indicates a moderate impact that, while less robust, remains relevant for policy consideration, particularly in sectors like disaster preparedness and environmental protection.

To ensure the robustness of the results, multiple model specifications, including a heteroskedasticity-corrected model, fixed-effects model, and pooled OLS model, are employed. Across all models, ODA grants for social infrastructure and production consistently positively impact HDI, underscoring the importance of targeted aid. FDI demonstrates a significant positive effect in the heteroskedasticity-corrected model at the 1% level, though it was not statistically significant in the fixed-effects model, indicating potential country-specific influences**.** ODA loans for the production sector also had a positive effect, albeit at a 10% significance level, with less consistent results in other models. Economic growth, measured by GDP per capita, consistently correlates positively with HDI across all models, reinforcing the importance of economic development. Conversely, ODA grants for other sectors negatively impact HDI, highlighting the limitations of less-targeted aid. The COVID-19 pandemic variable significantly negatively affects HDI, reflecting income, education, and healthcare disruptions. These consistent findings across models confirm the robustness of the research and highlight the importance of targeted ODA and economic growth in driving human development.

Table 3 Regression Analysis Results from Heteroskedasticity-corrected, Fixed Effect and Pooled OLS Models

Model's results	Heteroskedasticity-corrected				Fixed-Effects	Pooled OLS
Variable	**Coefficient**	**Std. Error**	**t-Ratio**	**P-value**	**Coefficient**	**Coefficient**
const	0.00492538	0.000652733	7.546	3.75e-12 ***	0.00530178***	0.00526432***
d_FDI	0.00104673	0.000301668	3.470	0.0007 ***	0.000324066	0.000346378
d_ODAGS1	0.00167858	0.000380399	4.413	1.92e-05 ***	0.00151992***	0.00165289***
d_ODAGS2	-0.00261806	0.00160029	-1.636	0.1039	-0.00431011***	-0.00349347***
d_ODAGS3	0.0119920	0.00284026	4.222	4.14e-05 ***	0.0139592***	0.0147495***
d_ODAGSO	-0.00243825	0.000963935	-2.529	0.0124 **	-0.00282052***	-0.00247715***
d_ODALS1	0.00122197	0.00184441	0.6625	0.5086	0.0011451	0.00168319
d_ODALS2	-0.00244384	0.00196016	-1.247	0.2144	-0.00254059	-0.00281372
d_ODALS3	0.00779972	0.00470553	1.658	0.0995 *	0.00204717	0.00259945
d_ODALSO	0.00382176	0.00197023	1.940	0.0542 *	0.00485613***	0.00439993***
d_RET	0.000114572	0.000278652	0.4112	0.6815	2.40914e-05	0.000124479
d_PS	-1.54496E-05	5.26786E-05	-0.2933	0.7697	-4.53163e-05	-5.51403e-05
d_GE	-2.97885E-05	0.000100965	-0.2950	0.7684	-5.37931e-05	-6.71890e-05
d_l_GDPPC	0.0160390	0.00508521	3.154	0.0019 ***	0.0147201***	0.0159609***
DCov	-0.00884452	0.00152611	-5.795	3.76e-08 ***	-0.00993621***	-0.00985791***

Note:
When transforming the variables into a first-difference form, a "d_" prefix is added to each variable
* : Significant at the 10% level
**: Significant at the 5% level
***: Significant at the 1% level.

Source: Author's Calcution from GRETL

Discussion of Key Findings

The Impact of FDI on HDI

FDI is pivotal in promoting human development, particularly through its impact on job creation, industrial capacity expansion, and technological innovation. In ASEAN-9, FDI has been instrumental in driving these outcomes, which align with Baghirzade (2012) and Gökmenoğlu et al. (2018). The research find that FDI positively impacts education, healthcare, and income levels. For example, Vietnam has leveraged FDI effectively, transitioning into a global manufacturing and export hub. Sectors such as electronics, textiles, and automobiles, driven by global corporations like Samsung and LG, have experienced significant growth, creating jobs and raising income levels. This economic expansion has enhanced education and healthcare access, directly improving HDI outcomes. Notably, FDI inflows into Vietnam's manufacturing sector surpassed $23.5 billion in 2023, further solidifying the country's position in global supply chains (Interesse, 2024).

Similarly, Indonesia has benefited from FDI in its manufacturing and infrastructure sectors, which has resulted in improved living standards, job creation, and enhanced social infrastructure (Oxford Business Group, n.d). These cases demonstrate how well-targeted FDI inflows can catalyze economic growth, leading to broader social improvements that enhance HDI.

The Impact of ODA on HDI

ODA has been instrumental in enhancing HDI in ASEAN-9, particularly through targeted investments in healthcare, education, and infrastructure. ODAGS1 has a substantial positive impact on HDI by improving healthcare and education systems across ASEAN-9. In Laos, Japan International Cooperation Agency (JICA)-funded projects have expanded access to essential services, such as maternal and child healthcare, which directly boosted health outcomes and HDI (JICA, 2023). Similarly, in Cambodia, ODA grants have strengthened the healthcare system by upgrading hospital infrastructure and improving educational services (Open Development Cambodia, 2022). These findings align with Lee et al. (2019), who conclude that targeted ODA for social infrastructure contributes significantly to HDI improvements. Furthemore, ODAGS3 also plays a key role in Vietnam's transformation from a low-income country into a manufacturing hub, fostering economic growth and raising employment and income levels—key elements of HDI improvement (Lee et al, 2019).

ODALS3 and ODALSO, which target areas such as environmental protection, disaster preparedness, and food security, have also positively impacted HDI. For instance, in Vietnam, ODA loans have driven the development of the country's manufacturing sector, creating jobs, driving economic growth, and improving living standards (Nguyen, 2023). In Timor-Leste, JICA's infrastructure projects, such as the construction of National Road No.1 and irrigation systems, have improved rural livelihoods and food security, directly contributing to HDI (JICA, 2024). Similarly, in the Philippines, JICA's Post-Disaster Standby Loan has been crucial in facilitating disaster recovery efforts, reducing the adverse effects of natural disasters on public health and livelihoods, thereby indirectly supporting HDI growth (Jocson, 2023). When managed effectively, these examples show that even untargeted ODA can contribute positively to human development. This stand contrasts with research by Ustubici et al. (2012), which shows mixed effects of untargeted ODA.

However, untargeted ODA grants (ODAGSO) have shown limited effectiveness in improving HDI. Broad and unfocused allocations, such as those aimed at environmental protection and disaster preparedness, often fail to address critical human development needs like healthcare and education. Ustubici et al. (2012) similarly observe that untargeted ODA tends to be less effective, especially in low-income countries where immediate social services are lacking. In ASEAN-9, the allocation of ODA grants to broad categories has been substantial in countries like Myanmar and Cambodia. In Cambodia, for instance, around 20% of total ODA has been allocated to sectors such as environmental protection and disaster preparedness, while in Myanmar, this figure is approximately 40% (OECD, 2023). Despite

these significant investments, these countries face challenges in improving HDI. Myanmar, for example, still struggles with a low HDI ranking—0.585 in 2021, placing it 149th out of 191 countries (UNDP, 2023). This suggests that ODA needs to be more strategically focused on sectors like education and healthcare to generate better human development outcomes.

Interestingly, ODAGSO's limited effectiveness contrasts with the positive outcomes of ODALSO, where loans with stricter oversight ensure better accountability and targeted development outcomes. In countries like Timor-Leste, ODA loans have been successfully directed toward infrastructure projects such as road development and irrigation systems, which have directly enhanced food security and rural livelihoods, positively impacting long-term human development (JICA, 2024). Similarly, in the Philippines, JICA's Post-Disaster Standby Loan has provided critical financial support for disaster recovery, directly improving public health and livelihoods, which indirectly boosts HDI (Jocson, 2023). These examples show that loans, with better oversight, can be more effective than grants in ensuring positive development outcomes.

While ODA grants for economic infrastructure (ODAGS2) do not demonstrate statistically significant effects at the highest confidence levels in the heteroskedasticity-corrected model, they show a significance level of 1% in the other two models, implying a relatively negative relationship with HDI. Economic infrastructure projects—such as those focusing on transport, energy, or large-scale infrastructure—typically take longer to translate into tangible human development outcomes. A significant portion of ODA has been allocated to large infrastructure projects in Cambodia and Laos. However, social outcomes, such as improvements in healthcare and education, have lagged. Despite the influx of ODA, Cambodia's health sector remains fragmented, with resources scattered across numerous small, uncoordinated projects, leading to inefficiencies in healthcare delivery (Lee & Park, 2024).

Similarly, in Laos, while ODA has supported infrastructure projects, progress in social services like healthcare and education remains limited. The World Bank (2024**)** notes that although access to education has improved in Laos, significant gaps persist due to economic challenges and inadequate funding for comprehensive social services. These cases highlight the need for a more balanced approach to ODA allocation, ensuring that investments in social services complement infrastructure development to achieve holistic development. Tamer (2013) suggests that investments in economic infrastructure often delay immediate improvements in human development, particularly in regions where basic social services are underdeveloped. The negative correlation in ODAGS2 highlights the importance of complementing long-term infrastructure projects with targeted aid for health and education, which can generate more immediate social benefits.

Finally, ODA loans for infrastructure (ODALS1 and ODALS2), which typically involve long-term projects, may not have had enough time to show measurable effects on human development outcomes within the period studied. The nature of these loans—focused on infrastructure—could also delay benefits in key sectors like healthcare or education.

The Impact of Remittances and Governance Quality on HDI

Remittances (RET), political stability (PS), and government effectiveness (GE) do not exhibit statistically significant effects on HDI in ASEAN-9 countries during the research period. Several factors could explain this outcome. For remittances, their primary use in supporting household consumption rather than fostering long-term investments in education or healthcare may limit their impact on HDI within the ASEAN context. This contrasts with regions like Latin America, where remittances are often directed toward developmental purposes. Political stability and government effectiveness are structural factors whose benefits tend to accrue gradually over extended periods, becoming evident through governance reforms and sustained policy implementation. While these variables do not show immediate statistical significance, they remain integral to human development. Their potential influence on HDI, especially through indirect pathways such as enhanced institutional frameworks and economic resilience, underscores the need for further research to understand their roles in the ASEAN context.

The Impact of GDP per Capital on HDI

GDP per capita (logGDPPC) demonstrates a consistently strong positive relationship with HDI across all ASEAN-9 countries, corroborating findings from Pérez-Segura (2014) and Lee, Y. (2015). In countries such as Malaysia and Thailand, higher per capita incomes have facilitated significant improvements in human development outcomes by enabling greater investments in education, healthcare, and enhanced living standards. This emphasizes the pivotal role of sustained economic growth in fostering human development across the region, highlighting GDP per capita as a key driver of progress in ASEAN-9.

The Impact of Covid-19 Pandemic to HDI

The COVID-19 pandemic stands is a significant external shock that severely undermined human development across ASEAN-9. The pandemic disrupted healthcare systems, education, and economic activities, leading to widespread declines in HDI indicators such as life expectancy, income, and access to education. Cambodia and Myanmar were particularly hard hit, with overwhelmed healthcare systems and reduced access to essential services (WHO, 2023). In Cambodia, prolonged school closures affected over 3 million students, resulting in significant learning losses and threatening to reverse years of educational progress (UNICEF, 2022). At the same time, essential health services declined, exacerbating existing human development challenges (UNDP, 2020). In Indonesia, over 68 million students were affected by school closures, resulting in learning losses estimated to range from 0.9 to 1.2 years (Empatika, 2021). This disruption not only hindered academic progress but also impacted the psychosocial well-being of children. The healthcare system similarly struggled, as resources were diverted to manage the pandemic, straining essential services and further affecting HDI outcomes. This aligns with broader findings in the literature, such as Lee (2015), which emphasizes the vulnerability of human development to

external shocks and the importance of resilient healthcare and education systems. The negative impact of COVID-19 on HDI underscores the need for ASEAN-9 countries to invest in robust social safety nets and resilient health and education systems capable of withstanding future crises. Without such systems in place, countries remain vulnerable to future shocks, threatening to erode hard-won development gains.

Conclusions

The research sheds light on the complex relationship between foreign capital flows and the HDI in the ASEAN-9 countries. It reveals significant variations across these nations regarding HDI, foreign capital inflows, political stability, government effectiveness, and per capita income. The use of panel regression analysis deepens understanding of these dynamics, particularly concerning the impact of remittances on HDI, which, despite constituting a substantial portion of foreign capital inflows, do not exhibit an evident influence on human development.

The research also highlights the heterogeneous effects of ODA across different sectors, underscoring the importance of formulating targeted strategies to attract and effectively utilize ODA in specific fields. This emphasizes the need for policymakers to consider sector-specific approaches to promote human development within the ASEAN countries. It is crucial to tailor these strategies to the unique circumstances of each country, taking into account the considerable variation in the ODA-to-GDP ratio.

Furthermore, a focused approach becomes imperative given the declining trend in ODA sources, particularly for countries that have reached a medium-income level, such as Indonesia, the Philippines, and Vietnam. Policymakers should prioritize ODA aid towards social and production infrastructure projects and ODA loans in other sectors like environmental protection and food security while reducing allocations for economic infrastructure projects. This targeted allocation of resources can actively support the development of populations in countries with a medium HDI, including Timor-Leste, Laos, Cambodia, and Myanmar.

Based on the findings of this research, policymakers in ASEAN countries should adopt several key recommendations to maximize the positive impacts of foreign capital inflows and address the challenges identified in different sectors.

First, prioritizing FDI in sectors such as manufacturing and infrastructure is crucial. The research findings show that FDI has significantly promoted human development, particularly in Vietnam and Indonesia, where FDI has driven economic growth, job creation, and technological advancements. These investments have directly improved education and healthcare, critical components of HDI. Governments must focus on creating stable and transparent investment environments to fully leverage FDI's benefits. For countries with lower HDI, such as Myanmar and Cambodia, FDI should be directed toward upgrading healthcare and educational services. In contrast, countries with higher HDI, like Malaysia and

Thailand, should concentrate on maintaining and enhancing existing infrastructure to sustain their progress.

Second, the strategic allocation of ODA is critical for enhancing human development. This research demonstrates that ODA grants for social infrastructure (ODAGS1), particularly in Laos and Cambodia, have significantly improved healthcare and education, positively affecting HDI. However, ODA to less targeted sectors, such as environmental protection or disaster preparedness (ODAGSO), negatively affects HDI. Therefore, policymakers should ensure that ODA is channeled into sectors. Therefore, policymakers should ensure that ODA is channeled into sectors with direct impacts on human development, like education, healthcare, and social services, especially in lower-HDI countries, where addressing basic human needs is essential for achieving development goals.

Third, while ODA loans for other sectors (ODALSO) have positively impacted HDI, stricter oversight and accountability are required to ensure their effective use. Examples from Timor-Leste and the Philippines show that ODA loans for infrastructure projects, disaster recovery, and rural development have improved food security and contributed to long-term development. In maximizing these benefits, close monitoring and effective management of loans are necessary to ensure they foster sustainable human development.

Fourth, sustained economic growth, as indicated by GDP per capita, is a key driver of human development across ASEAN. Higher-income countries like Malaysia and Thailand have experienced better HDI outcomes due to consistent economic growth. Policymakers should promote sustainable growth by supporting small and medium enterprises (SMEs), improving labor productivity, and enhancing access to international markets. However, this growth must be coupled with reinvestment in social services, ensuring that rising incomes improve healthcare, education, and living standards.

Lastly, the significant negative impact of the COVID-19 pandemic on HDI highlights the urgent need for ASEAN countries to build resilient social safety nets and strengthen healthcare and education systems. The pandemic severely disrupts these sectors, particularly in Cambodia and Myanmar, where school closures and overwhelmed healthcare systems led to setbacks in human development. ASEAN countries must invest in robust social infrastructures capable of withstanding external shocks to prevent future crises from eroding development gains. This includes building comprehensive healthcare systems, improving access to quality education, and ensuring disaster preparedness to protect vulnerable populations.

ASEAN countries can significantly enhance human development outcomes by focusing on targeted FDI, optimizing ODA allocations, fostering sustainable economic growth, and building resilient social systems. Tailoring these strategies to the unique circumstances of each country ensures that foreign capital and aid flows contribute effectively to long-term, inclusive, and sustainable development across the region.

Thus, policymakers in the ASEAN countries should integrate the insights gained from this study to inform their decision-making. By understanding the nuances of foreign capital

flows, sector-specific impacts, and individual country contexts, policymakers can allocate resources more effectively and prioritize areas that lead to substantial and sustainable improvements in human development.

While this research provides valuable insights, several limitations must be acknowledged. The primary limitation is the time frame, which extends only until 2021 and may not capture more recent developments in foreign capital flows and ODA, particularly in the post-COVID-19 context. Extending the analysis in future research would offer a more comprehensive understanding of the long-term effects on HDI. Additionally, further research could benefit from sectoral disaggregation and the exploration of regional variations within ASEAN to assess the nuanced impacts of foreign capital flows. Although robustness checks are conducted, potential issues related to endogeneity and omitted variable bias remain areas for further investigation. Expanding the time frame and incorporating more granular data would deepen the understanding of these dynamics and provide a more detailed assessment of policy implications.

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