

# FDI and Health Expenditure Dynamics in ASEAN

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## Research

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# Abstract

**Background:** Given ASEAN's steadily increasing levels of foreign direct investment over time, it is imperative to understand how FDI can assist to improve healthcare capacity level which will help the country stay on course to achieve target 3 of the Sustainable Development Goals (SDG) of achieving equal health by 2030. Health is important for any country's economic development and has been a major goal under United Nations assigned Sustainable Development Goals. Health expenditure is a necessity good at the state level. Studies suggest although globalization is an important engine of growth, role of globalization in health has been rarely studied. Some of the traditional benefits include technology transfer and human skills. Its impact on health been under-investigated. In this paper we aim to understand the dynamics between FDI and health expenditure in ASEAN. Three models, ordinary least square, Quantile and two stage least square regression using Instrumental variables were employed to test the relationship between FDI and healthcare expenditure. Instrumental variables include market size, population health and labor productivity.

**Results:** The correlation index showed that except labor productivity, all variables were strongly correlated. The OLS and quantile regression confirmed that the market size, population health and labor productivity are significant for health expenditure for ASEAN. In the 2SLS instrumental approach, the study finds that there is a strong causal relation between FDI and health expenditure.

**Conclusion:** Our results confirms that FDI is an important factor of human capital and influences the health expenditure capacity of a country in a short and long run. We advocate that the potential of FDI in building nation's healthcare expenditure capacity is very critical and should be included in policy making. This is among very rare studies which has tested the role of FDI on health expenditure.

## Background

Strengthening health financing is one of the important objectives of Sustainable Development Goal implemented by the United Nations in 2015. This goal aims to ensure healthy lives and promote well-being for all population (1). The levels and trends of health expenditure data identify key understanding of an economy for health facilities & infrastructure, better health technology, and better trained human resources. Strong health expenditure capability for an economy is critical for achieving quality health services without suffering financial hardship.

In the current pandemic period, the health and healthcare financing capability of the economy has become more important. Healthcare financing capability has been measured as health expenditure in this study. It is well established that health is an important criterion for economy's productivity and overall economic development (2, 3). Foreign direct investment (FDI) is often seen as important driver for economic growth. FDI directly affects national income and is a critical source of economic development particularly for the developing countries (4). This has ultimately resulted in a shift in health outcomes of

the population and has also upgraded the healthcare ecosystem. In this study we investigate whether how FDI inflows affects health expenditure in ASEAN economies.

The most substantial impacts of globalization on population health are a hugely debated topic. Researchers have found mixed results when studying the impact of globalization on health. Health is a multidimensional concept and has always viewed as an integral part of development.

FDI has undoubtedly brought development in most of the developing and emerging countries. while its relationship to health has remained largely unexplored (5, 6). FDI has been a catalyst for greater integration within the world economy through capital transfers, technology transfers, and upskilling the labour. It has been established that Investment is a major enabler of economic growth and development. However, investment alone may not be enough to achieve sustainable growth and development. In today's time, COVID 19 explains the global condition where it has placed an unprecedented social and economic burden. It has caused unimaginable disruption to the world economy, healthcare, and globalization.

In the pre-COVID times, globalization has considerably increased the movement of people and goods around the world, which constituted a key channel of viral infection COVID-19. The outbreak of COVID 19 has created negative health fears and have adversely affected population health and labour productivity. The drastic impact of pandemic on economy and population health has resulted in uprooting economic globalization and have deterred foreign investments (7).

The Association of Southeast Asian Nations (ASEAN) is a diverse group with different characteristics such as economic growth, languages, cultures, and individual markets. There are several free trade agreements as an economic block between ASEAN and is pursuing further integration in the broader economic sector and socio-cultural matters. This research work contributes to the literature in several ways: First, to the best of our knowledge, this is the first study that has tested this association in the context of the ASEAN countries. FDI flows to ASEAN as an economic bloc, has increased substantially from US\$21.8 billion in 2000 to US\$160.6 billion in 2019. FDI has become key underpinning factors in the region's economic development. As the region seeks to deepen its ties with the world through FDI, it is crucial to understand the complexities and contradictions associated with other major aspects of economy such as health and sustainability.

The aim of conducting this study is to examine the underlying association among FDI and health expenditure in the data set of ASEAN countries. The remainder of the article is organised as follows. The following section summarizes the studies focused on FDI and health expenditure. The third section explains the data, and methodology employed in the study. The fourth section provides data analysis results. The last section provides the concluding remarks suggesting policy implications and future research.

## **FDI links to Health expenditure.**

Globalization and health/healthcare systems are integral part of an economy and interrelate with the economy in several ways. They have multiple causal mechanisms that define the relationship. Healthcare has been largely ignored by policymakers competing for FDI (5). To best of our knowledge, we did not find any study which purposefully look at the relationship between the FDI inflows and the health expenditure in the respective country. There are few studies which has focused on health expenditure and FDI (8). However, these studies have mostly looked as health expenditure as FDI attractor. These studies confirm that health expenditure determines FDI inflows. The rationale of this study is to study the role of FDI in health expenditure which prepares an economy to manage the health risk notably posed due to global movement.

In this section we review the study which links FDI and any form of health measurement. The impact of FDI on population health of 17 highly developed host countries (9). They found that FDI is associated with life expectancy in the host country. Unsing a sample of 114 countries, the causal relation between health focusing on communicable diseases and FDI flows was explored (10). They concluded that an increase in the incidence of years of lives lost due to communicable diseases decreased per capita FDI and decreased the ratio of FDI to GDP. Researchers investigated relationship between life expectancy and FDI inflows in 46 developing economies over fifteen years period. The study suggests that extending life expectancy can determine growth in FDI (11).

Economic growth in the context of globalization and international business has been a contentious and been widely researched. However, comprehension of the FDI- Health interrelations remain quite limited. We argue that there is a need to understand the relationship with FDI and health expenditure. Economic development may be an outcome of several factors and government initiative. However, FDI brings its fair risk and benefit to the economy. Studies argue that globalization do bring public health benefits and challenges. However, the policy makers seldom place FDI as an indicator of health, most attention for health still focuses on notions of individual responsibility and lifestyle change.

Several studies have demonstrated that population health is a significant predictor of economic development, however countries may benefit to different degrees from health depending on the healthcare system (12, 13, 2). Studies found that an increase in health improvements led to stronger economic development in developing countries compared to developed countries (13).

Even though there are enough circumstantial evidence, empirical findings connecting FDI to health expenditure are noticeably lacking. The gap in the literature has consequences. As ASEAN strive to attract FDI, questions about globalization and its effectiveness on health are raised. ASEAN expects FDI will bring economic growth, technology transfers, and eventually human development. However, there is no understanding of FDI role in health expenditure that can help the economy improve its ability to cope with major health crisis such as Covid-19 and help it rebound.

## Methods

### 3.1 Data

Table 1 provides the data sources and descriptive statistics of the variables used in the study. To investigate FDI relationship to health expenditure in ASEAN, annual panel data from 10 nations, over the period 2001-2019 (19 years) were used.

**Table 1: Descriptive statistics of variables for ASEAN (2001-2019)**

Variables	Variables Definition	N	Minimum	Maximum	Mean	Std. Deviation
HEPC	Health expenditure per capita, from World Bank 2020	190	4.48	2823.64	316.3841	537.76778
FDIPC	Foreign Direct Investment per capita, from UNCTAD, 2020	190	-356.47	15864.08	1091.9652	2971.60424
GDPPC	Gross Domestic Product per capita, from UNCTAD 2020	190	208.95	64820.78	9944.4830	15747.93132
LEXP	Life Expectancy, from WHO 2020	190	59.37	83.60	72.6894	6.03463
LPR	Labour Productivity Ratio 2020	190	.67	1.70	1.0690	.26940

### 3.2 Econometric Approach

The methodology used refers to the basic panel data models in this study. We used three econometric techniques to explore the relationship between FDI and health expenditure in the presence of other variables. As baseline estimations ordinary least squares (OLS) regression models were used to test the association between FDI and health expenditure. Studies suggest that OLS is a useful benchmark still can be biased by country time invariant differences between countries and endogeneity risk. As a second benchmark, we used quantile regression. Employing quantile regression adjusts for unobserved time-invariant heterogeneity between countries potentially correlated with both FDI and health expenditure, however it may not solve the endogeneity issue which would be a consequence of the bi-directional association between FDI and health expenditure (14, 15). If a regression analysis fails to take heterogeneity and endogeneity into account, the results will be spurious if the association between variables are bidirectional (16). The relationship between FDI and health measurement could be bi-directional (17, 9). Following these studies, we included instrument variables for the 2SLS model. Instrumental variable regression (IVR) methods are widely used to estimate the parameters of a regression model to eliminate the risks associated with the validity of inferences including autoregressive errors, spatial effects, reciprocal causation, the presence of omitted variables, measurement error in the predictors etc. This model aims at consistently estimating the parameters of a regression model in the presence of correlated errors between the predictors and the outcome's errors. The IVR model can be

straightforwardly estimated using any structural equation modelling program (18,19). In the first stage, the model predicts the expected value of exposure based on the instrument in a linear equation:

$$E[X|Z] = \alpha_0 + \alpha_1 Z$$

The second stage predicts the outcome as a function of the predicted exposure from the first stage:

$$E[Y|Z] = \beta_0 + \beta_1 E[X|Z]$$

Where Y is the dependent variable, X is the independent variables and Z is the instrument variable. the parameter  $\beta_1$  is equivalent to the instrumental variable estimator. We performed all analysis with SPSS version 26 (IBM SPSS Statistics for Windows, Armonk, NY).

## **Other Variables**

### **Market Size**

Market size is an important determinant of FDI inflows and is generally measured by Gross Domestic Product (GDP) per capita income. It is expected to be a positive and significant determinant of FDI flows (20). Studies also found market size as insignificant determinant of FDI inflows (21, 22)

### **Population Health**

Studies suggest that population health can affect FDI flows (23). Life expectancy as an index of population health was used in the study. Using 74 countries data, found FDI to be strongly and positively influenced by life expectancy (17).

### **Labor Productivity**

Labor productivity is an important economic indicator. It is a good estimator to economic growth and competitiveness, and investments in an economy (24). Labor productivity is generally represented as the total volume of output (Gross Domestic Product) produced per unit of labor during a given time reference period.

## **Results**

This section includes a correlation matrix of variables used in the model, and results from the statistical models identified above. We examined relationships between individual variables can help to highlight dynamics that are not evident in regression models. Table 2 provides a Pearson's correlation coefficient and statistical significance between the variables used in the study. One of the patterns that appears when analysing this matrix is that all the variables are strongly correlated. Among all the variable FDI per capita and Health Expenditure per capita has the highest correlation coefficient (.91) whereas the lowest correlation coefficient (.50) between FDI per capita and Life expectancy. The Labour productivity was found be significant but negatively corelated with the four variables.

Table 2  
Correlation Coefficient for the Variables used in the study

Correlations		HEPC	FDI	GDPPC	LEXP	LPR
HEPC	Pearson Correlation	1	.913**	.669**	.672**	-.296**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	190	190	190	190	190
FDIPC	Pearson Correlation	.913**	1	.591**	.503**	-.325**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	190	190	190	190	190
GDPPC	Pearson Correlation	.669**	.591**	1	.560**	-.144*
	Sig. (2-tailed)	.000	.000		.000	.048
	N	190	190	190	190	190
LEXP	Pearson Correlation	.672**	.503**	.560**	1	-.340**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	190	190	190	190	190
LPR	Pearson Correlation	-.296**	-.325**	-.144*	-.340**	1
	Sig. (2-tailed)	.000	.000	.048	.000	
	N	190	190	190	190	190

\*\*. Correlation is significant at the 0.01 level (2-tailed).

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 exhibits the main statistical analysis of this study. The R value for each model is high. From the OLS regression results (model 1), it was found that all the three variables, FDI per capita, GDP per capita and Life expectancy was significant with p-value of at .001 level. The quantile regression (model 2) also showed similar results. OLS and QR models of the association between FDI inflows and health expenditure in short run (models 1 & 2 in Table 3) support the idea that FDI along with GDP and life expectancy has a sufficient impact on health expenditure in ASEAN.

In the 2SLS regression (model 3) we performed regression including three instrumental variables, market size, labour productivity and life expectancy. The results showed that health expenditure was highly

dependent on FDI in ASEAN economies. In all the three models, the empirical results show that increase in FDI is associated with a rise health expenditure in both short and long run.

Regarding the effect of FDI on health expenditure, we find that, a unit increase in FDI inflows, increases health expenditure by 0.135%, 0.151% and 0.206% in models 1, 2 and 3, all at 1% level of significance level. As outlined in the background, this finding could be explained as FDI increases national income through taxes and employment opportunities which may result in increased spending on health budget on macro level.

Table 3  
Models of FDI and HEPC in ASEAN

Model number	1		2		3	
Estimation method	OLS		Quantile regression		IV2SLS	
Model Variables	Coef.	p-Value	Coef.	p-Value	Coef.	p-Value
FDIPC	.135	.000***	.151	.000***	.206	.000***
GDPPC	.003	.005***	.006	.000***	-	-
LPR	98.544	.052**	101.913	.000***	-	-
LEXP	23.704	.000***	19.233	.000***	-	-
Constant/ Intercept	-1688.759	.000***	-1404.830	.000***	90.985	.000***
Observations	190		190		190	
R-square	.902		.640		.719	
F-value	-	-	-	-	480.557	.000***
*** Signification at the .001 level						
** Signification at the .01 level						

## Conclusion

The FDI and its role in sustainable development goals have the potential to become impact-oriented approach instead of just profit-oriented investment (25). In the current times, patterns of globalization are shifting, and these shifts are occurring faster in ASEAN than elsewhere. ASEAN is a diverse region and could shape the way globalization unfolds in technology productivity and human capital, in the years to come. Despite increasing recognition of the link between health and FDI in emerging markets, the relationship has to date received scant attention. We argue that this lack of attention is not justifiable. There is considerable and convincing evidence that FDI has led to economic development in developing countries. Other than FDI, health has been a major contributor to economic development as better

population health increases labour supply and productivity. Despite sufficient evidence, economic researchers and policymakers have explored and analysed the relationship to a lesser extent.

Several studies have exhibited that FDI promote population health in the least and emerging markets (6, 26, 27), we extend the knowledge by providing the evidence that FDI also impacts healthcare expenditure which is crucial during any health crisis management. The study investigated the effect of FDI on public health expenses within ASEAN economies. The results clearly reveal that over the time FDI has positive impact on the health expenditure and have prepared ASEAN better to deal with pandemics such as COVID 19. Results from the three dynamic models confirms a significant positive effect of FDI on the health expenditure of the countries under study.

The long-term results show that FDI plays a positive and significant role in accelerating the pace of health expenditure in ASEAN economies. This can be attributed to the fact that higher health expenditure means an improvement in the health status of the labour force, which in turn will boost productivity and increase the pace of growth (27). The ASEAN governments need to continuously strengthen access, affordability and accountability of health services being provided to the population.

This paper highlights that FDI directly impacts health expenditure in ASEAN economies. The data that we included in this study is critical as it provides pre-COVID view. According to United Nations Conference on Trade and Development 2021 data, global FDI collapsed in 2020, falling 42% from \$1.5 trillion in 2019 to an estimated \$859 billion. In its latest study reports that there will be a reduction in FDI flows of 40% globally (7). The economic fallout of the pandemic in most emerging and developing economies is likely to be far worse than most developed countries. For developing countries, the prospects for 2021 are a major concern. The current pandemic has caused unprecedented health crises and shattered the social and economic activities (28). In the current times, many of the economies in ASEAN are struggling with a relatively underdeveloped public healthcare system. According to World Health Organization, the region has a severe shortage of medical personnel: the average number of physicians in ASEAN is 0.6 per 1,000, lower than that in developed economies such as the UK (2.8), Germany (3.7), and the U.S. (2.4). In this study we argue that FDI should be considered as a tool that increases the investing capacity in health as one (of few) way by which to achieve their economic objectives. This article focuses on FDI, and health expenditure financing and it is part of a wider literature linking the role of health on economic behavior. The policy implications of this study are relevant in the current context of the COVID-19 outbreak. Improvement in healthcare financing, an outcome of some underlying developmental process, will help investors to look for destinations that provide support in time of such pandemics and, hence decreasing the overall cost.

To sum up, FDI causes an increase in income growth, and income growth causes an increase in healthcare expenditure. Therefore, it can be stated that FDI can be a determinant to maintain sustainable healthcare expenditure for ASEAN. Hence, FDI policies can play a significant role to determine policies for ASEAN economies.

Future research should include to investigate FDI role in healthcare and health expenditure and how FDI can help meeting the sustainable development goal of equal health. Another aspect that needs to be fully studied is that COVID-19 shock may reinforce trends that were not present in terms of FDI role in pandemic preparedness. It should be noted that health has not yet been included into many globalization efforts. While there is still an important role for foreign investment to strengthen development prospects on the continent, the current COVID-19 crisis has also created the need for more robust healthcare system. We highlight the increased urgency of economic diversification in ASEAN countries and the necessity to future proof their economies against health shocks. When a pandemic such as COVID-19 virus spreads globally, economic paralysis and unemployment is bound to happen, but FDI can play a crucial role in building a robust healthcare system. This would help the economy to bounce back quickly after such health shocks.

## Declarations

Ethical Approval and Consent to participate: Not applicable.

Consent for publication: Yes

Availability of supporting data: The data and analysis can be provided upon request.

Competing interests: The author declares that there is no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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