The Association between Health Expenditure and the Components of Fiscal Policy: VECM Approach in the Context of Latin America and the Caribbean

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ABSTRACT

Growing healthcare expenses are being experienced by numerous nations, particularly nations in Latin America, as a result of capacity inefficiencies, economic growth, demographic shift to the aging population, and an imbalance between the cost of manpower and output. Therefore, it is a significant burden for a nation to collect enough money for the health sector in view of escalating expenditures. Hereby, this paper analyzes the association that exists between health expenditure and the components of fiscal policy particularly in Latin America and the Caribbean during the last 21 years. To proceed with the study, we subdivided the fiscal policy components into two major models. The first model encompasses large-scale components whereas the second model consists of small-scale components. Correspondingly, we performed a VECM and granger causality approach to capture the long run as well the causal relationship between the factors. The findings revealed that in the short run trade, tax revenue, and interest rate have an influence on health expenditure. While in the long run, all the fiscal policies except domestic credit offered to the private sector presented an influence on the funds allocated to the health sector. Finally, considering the Covid, 19 pandemic, and other international wars, countries may be hesitant to allocate funds to a particular area. In light of this, the study helps ease these worries by outlining the scope of fiscal measures adopted by countries in relation to the health sector.

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Sağlık Harcamaları ile Maliye Politikasının Bileşenleri Arasındaki İlişki: Latin Amerika ve Karayipler Bağlamında VECM Yaklaşımı

ÖZ

Kapasite verimsizlikleri, ekonomik büyüme, yaşlanan nüfusa doğru demografik kayma ve insan gücü ile üretim maliyeti arasındaki dengesizliğin bir sonucu olarak çok sayıda ülke, özellikle Latin Amerika'daki ülkeler artan sağlık harcamaları yaşıyor. Bu nedenle, artan harcamalar karşısında bir ülkenin sağlık sektörü için yeterli parayı toplaması önemli bir yüktür. Bu makale, özellikle Latin Amerika ve Karayipler'de son 21 yılda sağlık harcamaları ile maliye politikası bileşenleri arasında var olan ilişkiyi analiz etmektedir. Çalışmaya devam etmek için maliye politikası bileşenlerini iki ana modele ayırdık. Birinci model büyük ölçekli bileşenleri kapsarken, ikinci model küçük ölçekli bileşenleri içermektedir. Buna bağlı olarak, uzun vadeli ve faktörler arasındaki nedensel ilişkiyi yakalamak için bir VECM ve granger nedensellik yaklaşımı uyguladık. Bulgular, kısa dönemde ticaret, vergi geliri ve faiz oranının sağlık harcamaları üzerinde etkili olduğunu ortaya koydu. Uzun dönemde ise özel sektöre sunulan yurtiçi krediler dışındaki tüm maliye politikaları sağlık sektörüne ayrılan fonlar üzerinde etkili olmuştur. Son olarak Covid, 19 pandemisi ve diğer uluslararası savaşlar göz önüne alındığında ülkeler belirli bir alana fon tahsis etmekte tereddüt edebilirler. Bunun ışığında çalışma, ülkelerin sağlık sektörü ile ilgili olarak aldıkları mali önlemlerin kapsamını ortaya koyarak bu endişeleri gidermeye yardımcı olmaktadır.

1. Introduction

Health systems differ from mainstream industries in a number of ways, including the frequency of uncertainty and ambiguity, the issue of information asymmetry, the lack of rivalry, and the presence of inefficiencies (Izquierdo et al., 2018). Healthcare expenditure as a percentage of GDP is typically 6.83 percent since the industry is one of the most profitable industries in the world economy (Rojas-García et al., 2018). State interference in the healthcare industry is a universal reality. Since the government spends a large portion of its budget on health care. In addition to spending funds on health, states also utilize a variety of interference strategies to influence the nation's healthcare system, such as legislation and public policies (Baltagi & Moscone, 2010).

Hall et al. (2012) state that the government has affected the healthcare service by modifying the number of public funds allocated to healthcare, adjusting its social assistance system, or controlling the commercial health industry. Because governments may change national healthcare systems by adjusting the quantity of public financing, their participation in reform programs is also crucial. Authorities in emerging nations make an active effort to enhance the welfare programs of their inhabitants by modifying the structure and focus of public spending. Because the poor use a large portion of public resources and services, hence health expenditure has a great ability to redistribute and allocate money toward them. Consequently, it could be said that the overall public involvement in health in contemporary society is quite crucial (Rajkumar, 2008).

The majority of nations support health care through a variety of means, although the extent of public funding varies considerably between nations and throughout time. Nevertheless, in particularly advanced economies, the state plays a huge involvement in the healthcare system (McKibbin & Fernando, 2021). Studies demonstrate that healthcare expenditure has a significant influence on important indices including child mortality and accessibility to clean water and sanitary in low countries, in addition to elements of healthcare services used by the poor (Ridzuan & Abd Rahman, 2021). Although public investment focused on enhancing health status is anticipated to result in a higher standard of living in addition to having a favorable effect on a nation's economic growth, states with low income have a low level of public expenditure on healthcare (Faria-e-Castro, 2010).

The effective use of reduced capital resources is essential in all public entities, and the healthcare system is no different given the growing economic challenges in emerging nations (Botta et al., 2020). Therefore, the precise assessment of allocating resources to the health sector is becoming more and more crucial in health management. But in many developing nations, the lack of consistent and organized methods for assessing national health expenditures has proven to be a serious roadblock (Elgin et al., 2020). Without a continuous and organized endeavor, it can be challenging to track total the expenditure in the health sector because healthcare is typically funded by a variety of sources. This mission is especially challenging in Latin America and the Caribbean, as many countries have significant healthcare spending through multiple authorities, the private sector, and social security agencies (Cuadro Sáez et al., 2020).

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As per Makin (2019) even though LAC has seen a considerable increase in health sector expenditure, it is still significantly lower in comparison to OECD countries and highly reliant on private expenditure. In most nations, increasing government spending on healthcare is necessary to achieve elevated quality and affordable healthcare. Nevertheless, it's equally crucial to spend less on healthcare and also more. No matter how different economic and demographic projections are from one country to the next, improving effectiveness and minimizing waste in healthcare systems ought to be a top priority for all nations (Gunarsa et al., 2020). The conclusion is that healthcare frameworks should provide individuals with the best price available, which encompasses both the finest treatment to suit individuals' requirements and desires and the lowest amount of money needed to provide that treatment (Yan et al., 2020). This occurs in LAC at a time when the working population is expanding, raising consumer expectations for the quantity and quality of healthcare and straining government health funds (Ho & Im, 2015).

According to Goel et al. (2017) allocating adequate funds to the healthcare sector implies that, in the face of rising demands for improved care, tightening budgetary restrictions, and ongoing rising costs brought on by the older population and advancements in technology, the healthcare sector is capable of securing enough funds and using them as efficiently as possible to enhance the health of the public. Managing the expenditure in the healthcare industry allows the system's existing resources to be used more effectively in the near term and boosts public support for raising extra funds for health. Long-term, it guarantees durability and resistance against a shortage of public financing, new problems, and systemic shocks (Flaxman et al., 2020).

Countries set up the institutional process for the LAC healthcare sector. The presence of controls on health expenditure is among the aspects the poll examines. 14 nations have established limitations on public health expenditure for various players in the healthcare sector (levels of government, insurance funds, etc.). The national parliament must accept the spending limitations, which are determined by the federal financial authority (often the Ministry of Finance). Approximately, thirteen of those nations possess a system in place to alert policymakers when spending may go beyond the limit (Benmelech & Tzur-Ilan, 2020).

There are various approaches to react when budgets go above their initial caps. The majority of nations, with the exception of Brazil, Costa Rica, and Panama, make additional budgetary

provisions (Alberola et al., 2021). In addition, provincial and district suppliers and divisions of government may grow their deficits. One method of cost conservation that is frequently employed is to reduce the number of medicines purchased. In addition to responding to budgetary excess, it is crucial that nations create measures to tighten up institutional responsibility and substantially restrict expenditures (Gaspar et al., 2020). Some LAC nations have seen increased indebtedness from various participants in the sector, such as hospitals and organizations providing products and services to hospitals or primary care clinics, while health expenditures face growing challenges (e.g., pharmaceutical companies, laboratory or radiological services) (Kimura et al., 2020).

This study is different from previous papers in various perspectives. First, only a fewer paper has conducted an analysis of the fiscal policy in proportion to the healthcare sector. Most studies focused on fiscal policy and economic growth. Second, the study is giving importance to Latin America and the Caribbean which is an understudied and neglected region in comparison to European Union and Asia. Third, this is the first paper that categorized fiscal policy into two categories to better capture the impact of these factors in proportion to health expenditure.

Within this context purpose of this paper is to analyze the association that exists between health expenditure and the components of fiscal policy in Latin America and the Caribbean for the period 2000 to 2021. Within this scope, the paper employed a VECM and granger causality test to assess the relationship among these factors. To carry on with the study, we subdivided the fiscal policy into two major groups namely small-scale and larger-scale components. The small-scale components compromise tax revenue, inflation, interest rate, and domestic credit provided to the private sector. Whereas, the large-scale component consists of the government's final expenditure, gross capital formation, trade, and, national income. The reason behind this classification is to capture the interlinkage of various fiscal policies with heal sector expenditure without being biased or overlooking important results. Finally, the study offers evidence of the variables influencing the budget assigned to the health sector. Considering the Covid, 19 pandemic, and other international wars, countries may be hesitant to allocate funds to a particular area. In light of this, the study allays these worries by outlining the scope of fiscal measures adopted by countries in relation to the health sector. Additionally, by focusing on a specific industry, the study adds to the body of literature. The paper's findings also offer a thorough discussion of the effective funding allocation practices of emerging and less developed countries.

The paper is structured in the following manner. It begins by giving a succinct summary of the healthcare sector in Latin America and the Caribbean as well as a few crucial indicators of fiscal policy. Then, it discusses the results of earlier research on the factors affecting the healthcare industry and the component of fiscal policy. The paper then continues with the findings section in which we interpret the discovered results. The final section summarizes the key findings and concludes with a number of policy implications. After that, the findings part of the study proceeds with the interpretation of the findings. In the last part, the discussion concerning the findings is reported which also involves the conclusion and policy implications.

2. Literature Review

Before the 1930s, the economic structure was mainly of a laissez-faire structure, whereby the authorities regulated and to a certain degree did not interfere with the market structure, particularly in industrialized countries such as The USA and Great Britain and several other western major economies (Combes et al., 2017). Nevertheless, claims that with the onset of a substantial economic crisis during the 1930s and subsequent post-World War II issues related to economic downturns, including the decline in global petroleum costs in the 1980s, hence in order to lessen the effects of the great recession on the economy, public welfare, and social order, the state thought that they had to interfere using their monetary and fiscal policies, which are composed of their expenditures, tax reductions, and adequate monetary system (Koh, 2017).

Niemann and Pichler (2020) support that fiscal policy could be assumed as the means via which the central government or the general public, through its representatives in the national assembly and other appointed parties, influences the economy through funding and tax collection. These actions are primarily intended to affect the threshold and economic expansion of consumer spending, work opportunities, and production.

There are essentially two forms of fiscal policies expansionary and contractionary that are commonly used by the state when it comes to budgeting. Both are concerned with striking an equilibrium between the use of the two primary instruments of fiscal policy, namely the expenditure tool and the taxation tool (Ouedraogo & Sourouema, 2018). The most common sort of fiscal policy employed by the state is expansionary. It operates either by increasing government expenditure, by lowering income via tax reductions, or by doing both simultaneously. The major

goal of this form of policy is to make sure that customers possess the additional cash to spend, which will result in increased consumption and, ultimately, favorable economic progress for the nation (Abdelwahed, 2020). Contrarily, a contractionary fiscal policy involves the state cutting spending, raising tax income, or doing both at once. This fiscal policy is infrequently employed, and its major goal is to lower spending in an attempt to bring down hyperinflation and excessive economic expansion (Bashar et al., 2017).

The COVID-19 situation sparked an economic slump that posed a serious threat to the governmental, institutional, and healthcare systems of many nations. More significantly, the crisis revealed how crucial national budgetary policies are in growing employment rates, improving people's quality of life, and preserving the healthcare sector (Blundell et al., 2021).

Only 10 years had passed since the worldwide financial crisis of 2008 when the COVID-19 epidemic first caused an economic downturn. Changes in the economy presented a challenge to the healthcare framework because they elevated the demand for funded healthcare while also reducing public revenue (Jayawardana et al., 2019). With rising unemployment, falling average earnings, and a contracting economy, public revenue drops. The demand for publicly supported health care increases when individuals are no longer capable of paying for privately financed services, become qualified for means-tested assistance, or demand additional care due to a major decline in their health (Kelly & Stoye, 2020).

Barroy et al. (2021) implied that healthcare systems are equipped beforehand and have the capacity to react quickly, health funding policies can assist health systems in meeting this issue. The characteristics most likely to guarantee resiliency in health financing have been outlined by a number of publications. For instance, Indemnity agreements regarding the population protection, service coverage, and user charge aspects of healthcare insurance should be developed and enforced to guarantee that there are no significant discrepancies in any of the three areas of safety (inhabitants, service, and user fees); which those in need of additional protection, particularly those at risk of neglect marginalization. Secondly, to reduce the percentage of existing healthcare expenditures that comes from out-of-pocket expenses, the health system's funding should primarily come from the public, meaning that it should be mandatory, pre-paid, aggregated, and tied to the capacity to pay. Third, public funding ought to be adequate to fulfill the people's health demands,

macroprudential, and flexible enough to redistribute and use current revenues or absorb incoming resources as conditions change.

Each and every person should have the fundamental right to health since it is a necessary requirement for human existence and growth. A key indication of a nation's or region's degree of social and economic progress is the health of its citizens (Wagstaff et al., 2018). To comprehend the level of expenditure required in the future for a feasible primary healthcare service, forecasts of healthcare costs are crucial. These must include the objectives of the healthcare system, including preserving the availability of a variety of services and ensuring quality in accordance with public standards (Bakkeli, 2016).

The fact that all nations place an equivalent focus on price as well as the expense of healthcare expenditure could be used to explain why there is international attention to it. moreover, the vast majority of health expenditures are publicly financed, such as through taxes or required national health coverage contributions (Lu et al., 2017). Due to the increased demand brought on by a drop in the net cost of treatment, this might lead to an increase in health expenditures. Since essentially all OECD nations have public sector imbalances that have been growing over time, the large share of public funds in health expenditures is an issue (Zulfiqar, 2018). Due to this, the national borrowing and interest charge both rises. Health budgets may be affected by these macroeconomic constraints on public spending plans (Thomson et al., 2022).

In healthcare funding, only a small number of empirical research have examined the link between degrees of health spending and the amount of government funding provided for medical treatment (Bui et al., 2022). In OECD nations and eastern European and central Asian (ECA) nations, disparities in health spending across tax-based and social-insurance-based systems were compared. According to the OECD report, nations with social health insurance systems have greater health expenditures per capita. The ECA study found that relative to nations that just depended on general taxes, nations with social health insurance had greater per capita public health expenditures (Kramaric et al., 2017).

Other investigations of the costs of healthcare in underdeveloped nations have been conducted around 1993. Actual health spending in Eastern Europe and a few other post-Soviet Union nations fell precipitously between 1989 and 1994, according to World Bank studies on

public spending in those regions (Alloza et al., 2021). In comparison, public health spending has increased in nations with National Health Insurance Plans, primarily as a consequence of the government's funding of private services. Nations in Central Europe are having a very tough time supporting the healthcare system since there are little or no restrictions on the sort of service that may be provided (Sorenson et al., 2013). Studies from emerging nations like Chile, which underwent a transformation to a free market, show a substantial decline in actual public spending as well as a surge in out-of-pocket consumer spending (Özer & Karagöl, 2018).

Notwithstanding the growth in research conducted in recent years, little is known about the factors that influence healthcare expenditure in many nations. Considering the experience of developed nations, it is likely that leveraging certain macroeconomic elements may expose those drivers but still, the current information remains scanty and not enough to answer the link of fiscal policy components in proportion to health sector expenditure remain scanty.

3. Methodology

3.1. Data Source and Variables

The paper employs annual time series data varying from 2000 to 2021 with regard to Latin American countries as a focus region. Within this context, the paper assesses the association that resides between health expenditure which is the dependent variable of this study, and the components of the fiscal policy. To carry on with the study we subdivided the analysis into two models. The first model consists of large-scale factors such as final consumption expenditure, gross capital formation, trade, and income per capita. While the second model consists of small-scale factors namely inflation GDP deflator, tax revenue, interest rate, and domestic credit to the private sector. The reason behind this split is to investigate the composition of fiscal policy from a large and small-scale perspective in proportion to health expenditure. Additionally, the data is extracted from the World Bank Database, particularly World Development Indicator.

Table 1

Variables' Description

Notation	Definition	Sources/Information
HE	Current health expenditure (% of GDP)	All the data were extracted from the World Bank indicators.
GE	General government final consumption expenditure (current US$)	
CF	Gross capital formation (current US$)	

T	Trade (% of GDP)	
IC	Adjusted net national income (current US$)	The study focuses exclusively on Latin America Region.
TR	Taxes on goods and services (% of revenue)	
INF	Inflation, GDP deflator (annual %)	
IR	Interest rate spread (lending rate minus deposit rate, %)	The period of the study is 21 years (2020 until 2021).
DC	Domestic credit to the private sector (% of GDP)	

3.2. Empirical Model

The VECM (Vector Error Correction Model) model may be referred to as a constrained VAR because cointegration is present in the model. The fundamental presumption is that all variables must be stationary in the same direction or magnitude relative to the assumption that has to be met, notably in the first difference (Gujarati & Porter, 2010). The long-run and short-run outcomes of the data may be separated using the VECM approach. It is an adaptation of the VAR (Vector Autoregressive) methodology. Hereby, in this study, the VECM approach is composed of two models to assess the long and the short run of health expenditure. Below the two models can be expressed as the follows.

$$\Delta Y_t = \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta Y_{t-1} + \sum_{j=1}^{k-1} \eta_j \Delta X_{t-j} + \sum_{m=1}^{k-1} \xi_m \Delta R_{t-m} + \lambda ECT_{t-1} + \cdots + u_t \qquad (1)$$

$$\Delta HE_t = \sigma + \sum_{i=1}^{k-1} \beta_i \Delta HE_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta GE_{t-j}$$
$$+ \sum_{l=1}^{k-1} \eta_l \Delta CF_{t-l} + \sum_{m=1}^{k-1} \xi_m \Delta T_{t-m} + \sum_{n=1}^{k-1} \vartheta_n \Delta IC_{t-n} + \lambda ECT_{t-1} \qquad (2)$$
$$+ u_t$$

$$\Delta HE_t = \sigma + \sum_{i=1}^{k-1} \beta_i \Delta HE_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta TR_{t-j} \qquad (3)$$
$$+ \sum_{l=1}^{k-1} \eta_l \Delta INF_{t-l} + \sum_{m=1}^{k-1} \xi_m \Delta IR_{t-m} + \sum_{n=1}^{k-1} \vartheta_n \Delta DC_{t-n} + \lambda ECT_{t-1}$$
$$+ u_t$$

The equation above contains the various variables used in the study. First, we observe our dependent variable which is health expenditure (HE) and the independent variables that consist of GE, CF, T, IC, TR, INF, IR and DC. The VECM equation has k-1 which implies that the lag length is reduced by 1. Then we perceive $\beta_i, \phi_j, \eta_l, \xi_m, \vartheta_n, \omega_p$ that stands for the short-run dynamic coefficients of the model's adjustment long-run equilibrium. Next, there is the ECT_{t-1} that signifies the error correction term. And finally, u_t which is the residuals (impulses).

Furthermore, to document the persistent causal relationship between the dependent and explanatory factors is the aim of this study. Accordingly, the Granger causality test, recommended by (Granger, 1969), was applied to see whether there was a potential causal relationship between the variables. More information on the model is provided below:

$$X_t = \sum_{l=1}^{p} \left(a_{11,1}X_{t-1} + a_{12,1}Y_{t-1}\right) + \mu_t \tag{4}$$

$$Y_t = \sum_{l=1}^{p} \left(a_{21,1}X_{t-1} + a_{22,1}Y_{t-1}\right) + \epsilon_t \tag{5}$$

As illustrated in equation 4 and 5 p implies the order of the model, $a_{ij,1}(i,j=1,2)$ denotes the coefficients expressed in the model, while μ_t and ϵ_t denotes the residuals. The coefficients can be estimated using ordinary least squares, and the cause-and-effect connection between X and Y can be determined using F tests.

4. Findings

Table 2 offers insights into the descriptive statistics concerning the variables. The mean value for HE is 6.55%, with maximum and minimum values of 8.14% to 6.49%. The standard deviation denotes a 2.17 variation. Concerning, the rest of the variables we observe that TR and DC are the most volatile. With a standard deviation of 11.70 and 15.70 respectively. This implies that in Latin America and the Caribbean the tax revenue and domestic credit provided to the private sector need to be adjusted with the health expenditure in order to reduce the volatility. Finally, the findings reveal a negatively skewed distribution for all the variables except for trade, inflation, and interest rate.

Table 2

Descriptive Statistics

	HE	GE	CF	T	IC	TR	INF	IR	DC
Mean	6.555	11.79	11.92	45.06	11.95	34.95	4.091	7.171	36.86
Median	7.088	11.91	12.01	45.48	12.57	37.35	3.568	7.114	38.13
Maximum	8.147	12.01	12.14	53.02	12.72	44.52	7.602	8.349	59.55
Minimum	6.493	11.45	11.58	39.16	12.21	34.40	2.184	5.937	22.43
Std. Dev.	2.179	0.203	0.189	3.045	2.676	11.70	1.646	0.567	14.70
Skewness	-2.574	-0.686	-0.655	0.138	-4.332	-2.502	0.623	0.035	-0.533
Kurtosis	8.216	1.818	2.018	4.022	19.86	8.001	2.121	2.904	2.811
Jarque-Bera	49.24	3.007	2.457	1.029	329.6	45.89	2.134	0.012	1.077
Sum	144.2	259.5	262.3	991.3	263.0	768.9	90.01	157.7	811.0
Observations	22	22	22	22	22	22	22	22	22

Table 3 illustrates the results of the correlation matrix. According, to the results we remark that GE and T are negatively correlated with health expenditure. This implies that health expenditure decreases in value when several large-scale fiscal policy components such as trade and government expenditure decrease and vice versa. On the other hand, the rest of the variables revealed a positive correlation with health expenditure particularly, national income, interest rate, and tax revenue presenting the highest correlation.

Table 3

Correlation Matrix

Variables	HE	GE	CF	T	IC	TR	INF	IR	DC
HE	1.000								
GE	-0.001	1.000							
CF	0.072	0.975	1.000						
T	-0.429	0.501	0.503	1.000					
IC	0.679	-0.082	-0.067	-0.555	1.000				
TR	0.480	-0.044	0.001	-0.317	0.670	1.000			
INF	0.126	-0.451	-0.296	0.112	0.084	0.263	1.000		
IR	0.493	-0.663	-0.655	-0.831	0.445	0.323	0.087	1.000	
DC	0.310	0.665	0.593	0.007	0.608	0.353	-0.465	-0.227	1.000

The component of this study consists of multivariate time series data from the region of Latin America and the Caribbean. Therefore, in order to determine whether the data is stable and the variables are stationary, the unit root test must be considered before proceeding with performing the model. Hereby, the paper employed the Dickey-fuller test and the Phillips-Perron test to ascertain the stationarity of the data. Within this context, both models demonstrated that all the factors are stationary at first difference except IC which is stationary at level. Consequently, we conclude that the variables do not contain unit roots and we can proceed with the regression models. See table 4.

Table 4

Unit Root Test

Variables	Panel A: Dickey-Fuller Tests			Panel B: Phillips–Perron Test		
	At level	First difference	Note	At level	First difference	Note
HE	-1.437	-4.518***	I(1)	-0.825	-4.424***	I(1)
GE	-1.046	-2.261**	I(1)	-1.352	-2.696*	I(1)
CF	-1.154	-2.826***	I(1)	-1.285	-3.541**	I(1)
T	-1.431	-3.604***	I(1)	-1.424	-4.675***	I(1)
IC	-1.660*	-0.884	I(0)	-0.340	-3.192**	I(1)
TR	-3.075***	-4.400***	I(0) I(1)	-3.802***	-7.960***	I(0) I(1)
INF	-1.311	-4.043***	I(1)	-1.748	-5.821***	I(1)
IR	-0.716	-2.426**	I(1)	-1.459	-4.454***	I(1)
DC	-2.079**	-0.555**	I(0) I(1)	-1.686	-2.845*	I(1)

Notes: *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively

Before proceeding with the VAR model, we need to identify first the appropriate lag that will be used in this study. Table 5 presents the lag length selection criteria for both models. Starting with model one we remark that LR, FBE, SC, and HQ are all disclosing that lag order 1 is the appropriate lag for the model. We ignore the AIC output because the model may not meet the stability requirements for the VAR model if there are too many lag orders used, which can result in numerous retaliations and significant temporal oscillations. The same goes for model two which also revealed that lag order 1 is the most convenient.

Table 5

Lag Length Selection

Model 1						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-82.08053	NA	0.004166	8.708053	8.956986	8.756647
1	42.62834	174.5924*	2.14e-07*	-1.262834	0.230765*	-0.971268*
2	69.66910	24.33669	3.14e-07	-1.466910*	1.271353	-0.932373
Model 2						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-249.0998	NA	22269.14	24.19998	24.44868	24.25396
1	-165.4390	119.5154*	90.52657*	18.61324*	20.10541*	18.93708*

* Indicates lag order selected by the criterion LR: sequentially modified LR test statistic (each test at 5% level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion

In table 6, we present the outcome of Johansen's cointegration to determine the possibility of long-run cointegration among the variables. When conducting Johansen's cointegration test If the trace statistics for a given rank in the test are higher than the threshold value, the null hypothesis is dismissed. Hereby, both in models 1 and 2 we observe the presence of a long-run cointegration among the variables.

Table 6

Johansen Cointegration Test

Model 1				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**Critical Value**	**Prob.**
None *	0.817908	90.26071	69.81889	0.0005
At most 1 *	0.744594	56.19585	47.85613	0.0068
At most 2	0.575553	28.89783	29.79707	0.0632
At most 3	0.299145	11.75846	15.49471	0.1689
At most 4 *	0.207425	4.649364	3.841465	0.0311
Model 2				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**Critical Value**	**Prob.**
None *	0.881710	106.7886	69.81889	0.0000
At most 1 *	0.766453	64.09633	47.85613	0.0008
At most 2 *	0.672486	35.00890	29.79707	0.0115
At most 3	0.404169	12.68440	15.49471	0.1269
At most 4	0.109900	2.328426	3.841465	0.1270

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level and, * Denotes rejection of the hypothesis at the 0.05 level

After confirming the presence of a long-run cointegration among the variables. Now we present the VECM outcome in Table 7. Starting with model 1 which contains the large components of fiscal policy in Latin America and the Caribbean, the results demonstrate that in the short run only T has a positive impact on HE and it is significant at a 10% level. This suggests that an increase of 1% in trade contributes to a 0.6% increase in health expenditure. The rest of the variables reveals an insignificant influence on health expenditure. Contrary, to the first model outcome the second model presents that TR, and IR, have an impact on HE. For instance, an increase of 1% in tax revenue appears to be decreasing health expenditure by 0.08%. While an increase of 1% in interest rate appears to be expanding the health expenditure by 3.5%.

Table 7

Short-Run Estimates

VARIABLES	Model 1					Model 2				
	ΔHE	**ΔGE**	**ΔCF**	**ΔT**	**ΔIC**	**ΔHE**	**ΔTR**	**ΔINF**	**ΔIR**	**ΔDC**
ECT (-1)	-1.043	0.113**	0.0771	-5.29**	0.119	-0.652*	5.19**	-0.401	0.105*	-0.278
	(2.402)	(0.0542)	(0.0925)	(2.551)	(0.336)	(0.343)	(2.023)	(0.254)	(0.0590)	(0.395)
ΔHE (-1)	1.304	-0.113**	-0.0895	4.258	1.41***	0.495	-0.218	0.175	-0.055	8.03***
	(2.479)	(0.0560)	(0.0954)	(2.633)	(0.347)	(0.380)	(2.241)	(0.282)	(0.065)	(0.438)
ΔGE (-1)	142.0	-0.595	0.865	37.19	-4.207	-	-	-	-	-
	(101.2)	(2.285)	(3.898)	(107.5)	(14.17)					
ΔCF (-1)	-1.305	-2.628	-2.741	21.66	7.106	-	-	-	-	-
	(96.39)	(2.176)	(3.711)	(102.4)	(13.49)					
ΔT (-1)	0.684*	0.0021	0.006	0.134	0.0281	-	-	-	-	-
	(0.415)	(0.009)	(0.016)	(0.441)	(0.058)					

ΔIC (-1)	-128.7	3.878	2.870	-44.11	-3.660	-	-	-	-	-
	(195.7)	(4.418)	(7.535)	(207.8)	(27.39)					
ΔTR (-1)	-	-	-	-	-	-0.088*	-0.099	-0.029	-0.0016	-0.037
						(0.048)	(0.284)	(0.035)	(0.008)	(0.055)
ΔINF (-1)	-	-	-	-	-	0.682	1.093	0.00720	-0.0195	0.748
						(0.464)	(2.736)	(0.344)	(0.079)	(0.535)
ΔIR (-1)	-	-	-	-	-	3.259*	12.11	0.548	0.0249	-0.765
						(1.674)	(9.881)	(1.243)	(0.288)	(1.93)
ΔDC (-1)	-	-	-	-	-	0.617	-1.961	0.178	-0.088	0.893**
						(0.379)	(2.238)	(0.282)	(0.0653)	(0.438)
Constant	-1.31*	-0.0006	-0.0188	0.256	-0.0753	-0.577	-0.072	-0.009	-0.014	0.0019
	(0.76)	(0.017)	(0.029)	(0.81)	(0.107)	(0.627)	(3.702)	(0.466)	(0.108)	(0.724)
Observations	20	20	20	20	20	20	20	20	20	20

Standard errors in parentheses and, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 8 presents the results of the long-run cointegration. Within this scope, the findings denote that in model 1 which generally consists of large fiscal policy factors all the variables have a significant influence on HE. For instance, we remark that an increase of 1% in government final expenditure, gross capital formation, and trade rise the health expenditure by 9.9%, 16.3%, and 0.12% respectively. Whereas, a 1% increase in national income demonstrates to be decreasing the health expenditure by 31.3%. Furthermore, model 2 which compromises the small components of fiscal policy factors exhibited that TR, INF, and IR have a significant impact at a 1% level on HE. For example, an increase of 1% in tax revenue, and interest rate demonstrates to reduce the health expenditure by 0.19%, and 2.8%. While an increase of 1% in inflation appears to rise health expenditure by 0.8%. Based on this outcome we conclude that all large components of fiscal policy affect health expenditure. While in the case of small components of fiscal policy we discovered that all the factors except domestic credit to the private sector have an influence on health expenditure.

Table 8

Long-Run Estimates

Model 1				
Dep. HE	Coef.	Std. Err	T-statistics	Prob.
GE	9.980**	5.067859	1.97	0.049
CF	16.35***	1.707917	9.58	0.000
T	0.120***	0.0182506	6.60	0.000
IC	-31.31***	7.066479	-4.43	0.000
Constant	67.08			
Model 2				
Dep. HE	Coef.	Std. Err	T-statistics	Prob.

TR	-0.199***	0.0285553	-7.00	0.000
INF	0.801***	0.2553706	3.14	0.002
IR	-2.856***	0.7488576	-3.81	0.000
DC	0.028	0.0391431	0.72	0.473
Constant	17.01			

Standard errors in parentheses and, *** p<0.01, ** p<0.05, * p<0.1

Following an examination of the cointegration between the dependent variable (HE) and the explanatory variables (GE, CF, T, IC, TR, INF, IR, and DC), now the granger causality test will be used to ascertain the relationship between the variables. Starting with model 1, we notice that trade and health expenditures (HE and T) have a bidirectional relationship that is also significant at the 1% level. This suggests that there is a long-term causal relationship running from both sides. Next, no clear causal relationship was found between health expenditure, final government expenditure, and gross capital formation. In contrast, we find a unidirectional causality between IC and HE. In this relation, the amount of national income has an influence on health expenditure. Nevertheless, the lagged variable of HE does not cause IC. Furthermore, in model 2 the causality test demonstrated a bidirectional relationship that exists among all the variables. For instance, we remark on a causality running from both sides in the case of HE with tax revenue, inflation, interest rate, and domestic credit provide to the private sector. See Table 9.

Table 9

Granger Causality Test

Hypothesis	F-statistic	Prob.	Decision	Direction
Model 1				
HE granger cause GE	2.710	0.258	Dismiss	
GE granger cause HE	3.067	0.216	Dismiss	No Causality
HE granger cause CF	0.407	0.816	Dismiss	
CF granger cause HE	0.107	0.216	Dismiss	No Causality
HE granger cause T	9.601***	0.008	Maintain	
T granger cause HE	14.43***	0.001	Maintain	Bidirectional
HE granger cause IC	1.393	0.498	Dismiss	
IC granger cause HE	12.64***	0.000	Maintain	Unidirectional
Model 2				
HE granger cause TR	5.691*	0.058	Maintain	
TR granger cause HE	40.67***	0.000	Maintain	Bidirectional
HE granger cause INF	6.263**	0.044	Maintain	
INF granger cause HE	9.008**	0.011	Maintain	Bidirectional

HE granger cause IR	18.38***	0.000	Maintain	
IR granger cause HE	6.431**	0.040	Maintain	Bidirectional
HE granger cause DC	10.70***	0.005	Maintain	
DC granger cause HE	13.01***	0.000	Maintain	Bidirectional

***, **, and * imply a significance level of 1%, 5%, and 10% respectively

The impulse responses estimate in Table 10 shows that the amount of health expenditure in Latin America and the Caribbean would likely decrease as a result of trade, national income, and tax revenue. This implies that trade Sur balances and deficits, the national income generated, and the tax earned in the region will reduce the health expenditure in the next 5 years. These outcomes are partially consistent with the long-run VECM results. Hence, these areas require additional focus and funding to help boost the health sector expenditure during the coming ten years. Contrarily, government final expenditure, gross capital formation, inflation, interest rate, and domestic credit offered to the private sector would probably increase the health expenditure of the region in the next 5 years.

Table 10

Impulse Response Function

Model 1				
Years	HE	GE	CF	T	IC
1	1.852567	0.000000	0.000000	0.000000	0.000000
2	5.764475	3.765330	3.257882	-3.379901	-24.30963
3	-303.0822	-43.51980	-45.42974	27.60546	184.2205
4	1743.394	-213.6716	-120.4505	285.4086	2120.964
5	31630.46	8531.372	8023.612	-6713.223	-46682.40
Model 2				
Years	HE	TR	INF	IR	DC
1	1.801693	0.000000	0.000000	0.000000	0.000000
2	1.718211	-0.110677	-0.168864	0.468278	0.799823
3	9.652141	-0.046459	0.096574	0.511469	0.703972
4	8.135920	-0.435531	-0.887037	2.694482	4.296956
5	44.02185	-0.227846	0.670594	2.699774	3.056346

In relevance, with the variance decomposition estimate, the results imply that the national income which is anticipated to increase from 89 percent in 2022 to 64.80 percent in 2025, would have a greater variance shock of 64.80 percent on the health expenditure. Contrarily, model 2's finding suggests that the domestic credit given to the private sector, which is projected to rise from 9 percent in 2022 to 1.34 percent in 2025, will have a bigger variance shock of 1.34 percent on health spending. With variance shocks of 2.16 percent, 1.9 percent, 1.33 percent, 0.01 percent, 0.05

%, and 0.6 percent, respectively, the other components are not anticipated to have a substantial influence on health expenditure in the next five years. See table 11.

Table 11

Variance Decomposition

Model 1					
Years	HE	GE	CF	T	IC
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	5.522636	2.135728	1.598861	1.720870	89.02190
3	70.05311	1.454607	1.581399	0.589638	26.32124
4	40.09004	0.608955	0.212308	1.052805	58.03590
5	29.78292	2.161329	1.910957	1.339841	64.80495
Model 2					
Years	HE	TR	INF	IR	DC
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	87.32388	0.172572	0.401726	3.089333	9.012485
3	98.34859	0.014261	0.037455	0.475980	1.123712
4	85.37109	0.105245	0.425256	3.991822	10.10658
5	97.88268	0.011913	0.059301	0.699397	1.346704

After concluding all the tests, we finally run the diagnostic test to assess the validity of the model used in the study. To begin with the residual of autocorrelation, the test demonstrates no prominent autocorrelation among the variables at lag order. The diagnostic test is next performed to determine the validity of the study's model once all other tests have been completed. Starting with the residual of autocorrelation the test shows no significant autocorrelation among the variables at lag order. The white test for heteroskedasticity then revealed a prob value of 0.45 for model 1 and 0.60 for model 2, leading us to reject the heteroskedasticity hypothesis and affirm that the model is homoscedastic. The stability requirement puts 4-unit moduli on both models as a final requirement. The model appears to be stable based on this.

Table 12

The Diagnostic Test

Model 1		
Tests	Prob	Note
Residual auto-correlation LM test	Lag 1 (0.72) lag 2 (0.31)	No prominent autocorrelation at lag order.
White test for heteroskedasticity	0.4514	No heteroskedasticity
Eigenvalue stability condition	The VECM specification imposes 4-unit moduli	

Model 2		
Tests	**Prob**	**Note**
Residual auto-correlation	Lag 1 (0.13) lag 2 (0.96)	No prominent autocorrelation at lag order.
White test for heteroskedasticity	0.6061	No heteroskedasticity
Eigenvalue stability condition	The VECM specification imposes 4-unit moduli	

5. Conclusion

A country's welfare crucially relies on its residents' possessing accessibility to a fair, reasonable, and responsible healthcare system. Through worker performance and the financial cost of disease, health has a substantial impact on national economic progress. Accordingly, a nation's Ministry of Finance spends a sizeable amount of its funding on healthcare expenses each fiscal year. Nonetheless, it has been noted in several studies that this budgetary allocation is misleading to emerging and developed nations. Another study concluded that money directly influences how much an individual spends on health care, and as a result, wealthy individuals are discovered to be highly concerned with their health than the disadvantaged group. This context of events is famous in Latin America and the Caribbean because of the inequality levels.

A key obstacle to establishing universal health coverage in Latin America and the Caribbean is health finance. Given the relatively limited financial resources allocated to the growth of the healthcare system in Latin America and the Caribbean, there are more disastrous Out-of-Pocket (OOP) health expenditures and worse medical services. According to the research on health finance, the slow expansion of public health spending over time is caused by disadvantageous macro-fiscal policies, which have a negative impact on the country's economic ability to mobilize resources and obstruct the expansion of the entire health sector.

According to evidence from wealthier nations, positive macro-fiscal policies such as prolonged economic development, high revenue mobilization, reduced fiscal shortfall, and debt burden result in a greater priority for health expenditures but decrease funds allocated throughout the economic crisis. Prior research has claimed that severe macro-fiscal circumstances throughout the global recession in late 2008 particularly in Latin American countries negatively impacted the percentage of health spending in the overall expenditure. Richer nations were most affected by the crisis, which resulted in a drastic fall in budgetary funding for health care and higher out-of-pocket expenses due to weaker income creation in the years following the global recession.

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Contrary, there were no funding reductions for public health in the nations of the Soviet Bloc. On the contrary, the crisis response had developed innovative fiscal regulatory tools for the accumulation of funding from outside sources and efficient usage of healthcare expenditure. Similar to how certain emerging nations had increased fiscal deficits and debt payment costs following the global recession, social welfare spending did not decrease during this time.

Based on these, the study was conducted to figure out the interlinkage that exists between the funds allocated to the healthcare sector and the components of fiscal policy, particularly in Latin America and the Caribbean region. To proceed with the study, we selected health expenditure as the dependent variable while we subdivided the fiscal policy components into two models. The first model encompasses the large scale of fiscal components such as government final consumption, trade, national income, and gross capital formation. The second model compromises the small scale of fiscal elements namely, tax revenue, interest rate, inflation, and domestic credit to the private sector. Additionally, the paper performed a VECM and granger causality test to capture the long-run relationship as well as the causality that exists among the factors. Within this framework, the result demonstrated in the short run that trade, tax revenue, and interest have a positive influence on health expenditure. For instance, trade and interest rates were revealed to be increased health expenditure whereas tax revenue was revealed to decrease health expenditure. This suggests that during the short period in Latin America and the Caribbean tax revenue, interest rate and inflation appear to have a substantial effect on the funds allocated to the health sector. On the other hand, the long run results displayed for both models that all the fiscal policies except domestic credit provided to the private sector have an impact of the health expenditure. The paper uncovered that during the long period national income, tax revenue, and interest rate negatively affect health expenditure while government final consumption, gross capital formation, trade, and inflation are presented to positively support the fund allocated to the health sector. In addition to these results, the granger causality test revealed a bidirectional relationship between health expenditure, tax revenue, inflation, interest rate, domestic credit offered to the private sector, and trade. However, government final consumption as well as gross capital formation recorded no causality in proportion to health expenditure.

Finally, the study provides evidence regarding the factors that affect the fund allocated to the health sector. Within the context of the Covid, 19 pandemic and as well global conflicts nations

may be skeptical about their fund allocation to a specific sector. Accordingly, the paper eases these concerns by identifying the magnitude of fiscal policies implemented by nations in regard to the health sector. Additionally, the study contributes to broad literature by investigating a particular sector. Further, the outcomes of the paper provide extended questions concerning the way emerging and less developed nations allocate efficiently their funds.

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Appendix

Table 13

Countries in Latin America and the Caribbean

Brazil	Haiti	Jamaica	Antigua and Barbuda
Mexico	Cuba	Trinidad and Tobago	Dominica
Colombia	Dominican Republic	Guyana	Saint Kitts & Nevis
Argentina	Honduras	Suriname	Saint Kitts & Nevis
Peru	Paraguay	Belize	
Venezuela	Nicaragua	Bahamas	
Chile	El Salvador	Barbados	
Guatemala	Costa Rica	Saint Lucia	
Ecuador	Panama	Grenada	
Bolivia	Uruguay	St. Vincent & Grenadines	