



## Exploring the Channel of Transmission between External Debt and Economic Growth: Evidence from Lower Middle Income Countries

Muhammad Hammad Ul Haque<sup>1</sup>, Khurram Iftikhar<sup>2</sup>, Syed Zia Abbas Rizvi<sup>3</sup>

<sup>1</sup> M.Phil. Scholar, Applied Economics Research Center (AERC), University of Karachi, Pakistan.  
Email: [hammadhaque1279@gmail.com](mailto:hammadhaque1279@gmail.com)

<sup>2</sup> Research Economist, Applied Economics Research Center (AERC), University of Karachi, Pakistan.

<sup>3</sup> Research Economist, Applied Economics Research Center (AERC), University of Karachi, Pakistan.

### ARTICLE INFO

#### Article History:

Received: May 10, 2023  
Revised: June 18, 2023  
Accepted: June 19, 2023  
Available Online: June 20, 2023

#### Keywords:

TFP  
GDP  
External Debt  
Lower-Middle Income Countries

#### Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### ABSTRACT

The study intends to ascertain the pathway through which foreign debt affects GDP growth in lower-middle-income countries (LMICs). High external debt stock has been major source concern for many LMICs in the late 90's and post financial crises period. Cross-section panel data from 30 countries were studied for the period 1999–2019 using a two-step system (GMM) estimation technique. The sample LMICs were further broken into Asian and African nations and the period was divided into 2010–2019 to assess the impact of post-financial crisis events. The research revealed a strong relationship between external debt and GDP growth via total factor productivity when the entire sample of LMICs was considered. However, the estimations also indicated that TFP is not a channel of transmission in Asian nations in both eras, namely 1999–2010 and the post-financial crisis period of 2010–2019, because foreign debt reduces total factor productivity. Furthermore, considering the entire sample and the post-financial-crisis period in African countries, external debt has a negative but minor connection with TFP. GDP growth shows a large and positive association with TFP in both periods in African countries.

© 2023 The Authors, Published by iRASD. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License

Corresponding Author's Email: [hammadhaque112@gmail.com](mailto:hammadhaque112@gmail.com)

## 1. Introduction

The lower middle-income nations are heavily indebted, according to World Bank data. From US\$ 2,089 to US\$ 8,242 billion, these countries' combined external debt has grown by over 300% while the GDP growth in LMIC has decreased from 4.23% to 3.68 % (World Bank, 2020). The world's lower middle-income countries (LMICs) are a heterogeneous group and are classified as lower-middle-income nations, with a gross national income (GNI) per capita ranging between \$1,036 and \$4,255, according to the World Bank's definition from July 2022 to the present. Resources in these countries cannot be utilized for other productive purposes because of principal and interest obligations. Second, growing foreign debt that was taken out at floating rates contributes to rising debt service. Third, private investors may be scared off by the huge debt stock because they believe it would result in capital flight as well as an imminent foreign tax on their future returns on investment.

These economies also faced two huge crises, the Asian financial crisis in 1997-98 and the global financial crisis of 2008-09. The research is divided into two eras, 1999-2010 and 2010-2019, to investigate the impact of the global 2008-09 financial crises on Asian and African countries in terms of external debt on GDP growth. Majority of these nations borrowed to make up for insufficient domestic savings and to fulfill the requirement for foreign currency for the import of intermediate and capital goods. There are several research studies available on this issue, yet after the 2008-09 global financial crisis, little research work is done to probe the influence on the world's lower middle-income nations and how it affects their economic progress. Researchers and policymakers are becoming increasingly interested in how the negative impacts

of external debt are propagated throughout the economy, (Fiagbe, 2015; ul Mustafa, Nishat, & Abro, 2022).

Total external debt, according to the World Bank, may be defined as "*debt owed to non-residents repayable in terms of external currency, goods or services*". External debt is the composition of long-term debt (public and publicly guaranteed debt plus private nonguaranteed debt), short-term commercial debt, and IMF loans. In many LMIC's, external debt / external aid is almost inevitable and is considered a significant source of income. The question is whether external debt is a barrier to development and whether the high stock of external debt accretion in lower middle-income countries (World Bank, 2017) creates reservations about economic policies and potential impediments to investment, as well as the path through which foreign debt can affect development.

Several empirical conclusions have been drawn regarding the direct influence of external debt on economic growth. Contemporary research, however, indicates that, in addition to direct impact, there is a channel (such as TFP) through which external debt is transmitted to the economy and affects national economic growth (Abro, Ul Mustafa, Ali, & Nayyar, 2021; Checherita-Westphal & Rother, 2012; Munir & Mehmood, 2018; Silva, 2020; ul Mustafa, Abro, & Awan, 2021). The purpose of this study is to investigate (TFP) as a channel of transmission between external debt and economic growth in 'lower-middle-income' countries of the world from 1999 to 2019, covering the post-financial-crisis period, and to determine whether the debt has a beneficial or detrimental effect on these countries through this channel. The remaining sections of the paper are organized as follows. "Empirical model" displays the data as well as the model specification, which includes variable definitions. "Estimation results and deliberation" displays model estimation, results, and discussion, while "Conclusion" concludes along with the policy recommendations.

### **1.1. An Overview of the Theory behind the External Debt and Growth**

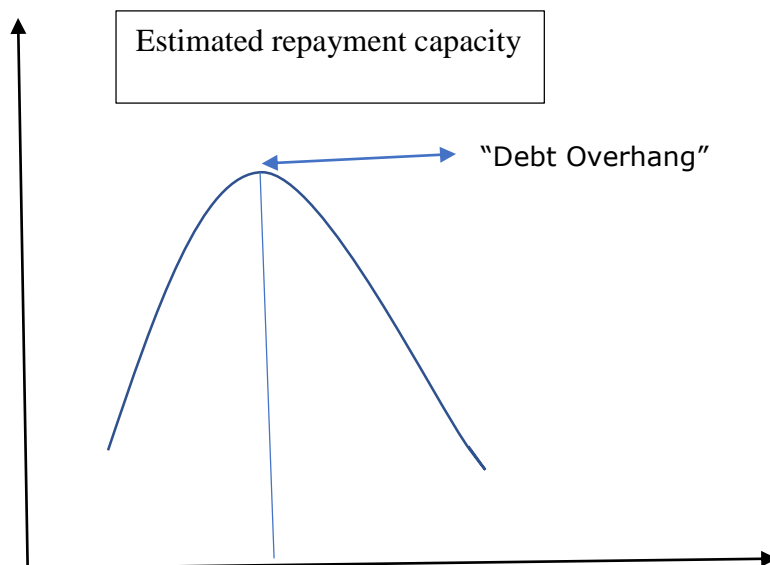
According to Keynesians and classical economists, external debt should affect the economy through investment and labor productivity because the primary goal of acquiring external loans is to finance investment projects and expenditures, so an increase in outside borrowing stimulates investment and capital formation, thereby increasing GDP potential (Amin & Audu, 2006; Joshua, Bekun, & Sarkodie, 2020). Foreign loans, on the other hand, can pose problems for governments if they are utilized for short-term goals such as financing the economy's mounting deficit (Hassan & Meyer, 2021). Foreign debt should therefore have a positive impact on the economy through investment and labor output. As a result, multiple techniques to evaluate the correlation between external debt and economic growth exist. Some growth theories maintain that external debt had a beneficial influence on economic growth, highlighting that credit is a source of capital production that may boost economic progress. Some have contended that raising the debt stimulates constructive government expenditure and positively influences the economy. On the other hand, many believe that when debt grows more significant, a country's economic development is always lowered, (Reinhart & Rogoff, 2010).

### **1.2. The Debt Overhang Theory and Laffer curve**

"Debt overhang hypothesis" is a popular theory that says having too much debt is a negative thing. A debt overhang occurs when the probable repayment of external debt is less than the loan's pledged value. According to (Krugman, 1988), "*if a country's debt is predicted to exceed its repayment capability with some likelihood in the future, expected debt payments are likely to be a rising function of the country's production level*". As a result, existing external debtors tax certain domestic economic returns, inhibiting investment and economic development. According to Sachs and Kenen (1990), external debt is the principal driver of stifled economic advancement in heavily indebted countries. The explanation for this negative effect is two-fold. First, even if some countries implement drastic adjustment plans, their chances of returning to development are slim. This is due to the size of their debt service payments. Second, the existence of a huge debt overhang constrains private investment plans due to uncertainty and the unfavorable incentive effects it causes. According to academic literature, foreign debt has a favorable influence on growth up to a certain point after that threshold; it has negative effect on growth, (Arnone, Bandiera, & Presbitero, 2005).

Due to its effects on human capital, external debt can also be detrimental to economic growth. Debt payment constraints on governments cause them to cut public spending on social investments like education and health, which are critical for economic growth. Education and excellent healthcare delivery systems are indeed required for the generation of quality human resources. As a result, the government's unwillingness to invest in health and education diminishes human capital, slows productivity, and, as a result, inhibits economic growth consistent with the endogenous growth model (C. Pattillo, Poirson, & Ricci, 2011).

**Figure 1: Laffer curve**



Debt stock  
Source: Krugman (1988) and Sachs (1989)“

### 1.3. TFP and Economic Growth

Economists, policy makers, and politicians are always apprehensive about a country's ability to achieve high and sustained economic growth. According to the known growth literature, the two key factors of growth are productivity and total factor productivity (Garzarelli & Limam, 2019). Since Adam Smith's time, the notion of TFP has been at the core of economic development and production efficiency research, assessing how successfully revenue is employed in production. Productivity per unit of productive-enhancing inputs may be increased by factors such as technological innovation, strong economic policy, and institutional quality. Moreover, increased productivity can boost the rate of return on investment (Mansha, Yang, ul Mustafa, & Nasim, 2022; Munir & Mehmood, 2018).

Capital stock and labor are economic growth variables. The effect of endogenous capital stock and labor on economic growth diminishes when the economy approaches a long-term sustainable growth balance. As a result, TFP is a fundamental predictor of economic development and an endogenous component of economic expansion, according to endogenous growth theory, because economic dynamics influence technological change. The GDP growth rate therefore in affluent nations is connected to TFP, but in developing countries, fixed capital investment and labor force growth are considered economic progression elements (Erken, Donselaar, & Thurik, 2018). TFP is regarded as a crucial predictor of long-term economic growth since it shows the rise in factors of production concerning technical advancement. The computation of TFP is shown in (Appendix-A) based on (Yalçinkaya, Hüseyini, & Çelik, 2017).

## 2. Literature Review

The existing literature on growth theory and external debt can be divided into three categories. The first set of beliefs associates moderate debt levels with positive effects on economic growth, while the second set of beliefs links high levels of accumulated debt with negative effects on economic growth. A third set of hypotheses combines these two effects and asserts that the relationship between debt and growth is inherently non-linear. Beyene and Kotosz (2022) explored how external debt impacts total factor productivity (TFP), GDP growth,

and the TFP as a corridor by which it affects the economies of severely indebted poor countries (HIPCs). The study revealed that debt considerably lowers TFP and GDP growth. It also emphasizes the non-linear relationship between external debt, TFP, and GDP growth. Hassan and Meyer (2021) investigated the 30 Sub-Sahara African nations, using the GMM estimation approach from 1985 to 2019. According to the study's findings, the external debt in SSA nations transmits a non-linear influence on economic growth mainly through three channels: total factor productivity, governmental investment and Private sector investment.

Makun (2021) investigated the link between economic development and external debt in Fiji, a Pacific island country, between 1980 and 2018. Long-term linear and non-linear associations among variables were studied, with exports and total factor productivity included. The outcomes indicate that external debt has a negative influence on GDP growth. According to the study, increasing debt stock has a significantly greater adverse impact on growth than reducing external debt shock. Munir and Mehmood (2018) discovered an inverted U-shaped association between debt and economic development in South Asian nations. Private, governmental investment, as well as TFP, are the most influential channels via which debt influences economic development. From 1990 to 2013, annual data for South Asian nations, namely Bangladesh, India, Pakistan, and Sri Lanka, was utilized. The study also suggests that debt boosts economic growth to a certain point, after which it has a negative impact. Shahzad and Javid (2015) observed the link between debt, investment, and productivity in emerging Asian economies from 1984 to 2007. In order to cope with the endogeneity issue, two models with different specifications were estimated for the data with yearly frequency. GMM was used as an estimation technique. The lag explanatory variables were employed as instruments. They observed that debt has an adverse and substantial connection with aggregate investment, private investment, and private per capita investment, as well as a negative and significant relationship with total factor productivity and labor productivity.

Afonso and Jalles (2013) examined cross-sectional and time-series data for 155 developed and developing countries from 1970 to 2008 to analyze the possible relationship between fiscal policy advances and GDP growth. Their observed results indicate that the government debt ratio harms the whole sample in their data set. Furthermore, debt maturity fluctuates depending on whether one has short- or long-term debt as a proportion of GDP or as a percentage of total debt. They discovered that short-term debt has a favorable effect on growth and found that the greater the average duration of government debt, the higher the growth rate. Higher debt ratios are favorable to TFP growth and the expansion of capital stock per worker from a growth accounting standpoint. Checherita-Westphal and Rother (2012) found evidence of a quasi-link between public debt and per-capita GDP growth in twelve Eurozone countries from 1970 to 2008. The connection between the public debt ratio and the pace of economic growth is concave (inverted U-shaped), with the debt turning point at about 90–100% of GDP. In general, weaker long-term growth rates are linked to public debt levels over the range of 90 to 100 percent of GDP. The long-term perspective is supported by the data showing that public debt has a similar impact on the potential GDP growth rate. Total factor productivity is found to be the channel through which public debt have a non-linear impact on the GDP growth rate.

C. Pattillo et al. (2011) scrutinized the pathways through which debt influences growth, via (TFP) development. The impacts of debt on the various sources of growth were also tested for non-linearity. The study makes use of a sizable panel dataset that spans the years 1969 to 1998 and includes 61 developing nations. The findings show that high levels of debt have a detrimental effect on growth, which is seen in both a severe negative impact on the buildup of physical capital and a growth in total factor productivity. Kumar and Woo (2010) used the GMM estimation approach to investigate 38 advanced and developing economies from 1970 until 2007 and discovered that initial government debt had no significant influence on TFP growth. Schclarek and Ramon-Ballester (2005) attempted to identify the mechanism via which external debt influences economic development by examining its impacts on TFP, capital accretion, and private investments of Latin American nations. The findings reveal that lower debt levels are linked with greater growth rates and that this adverse association is controlled by the incidence of government external debt rather than private debt levels. The findings show that the incidence of capital accumulation growth drives the mechanisms through which debt accumulation influences growth and TFP or private savings rates are not driven by foreign debt; as no evidence of non-linear effects for these connections was observed.

Akinlo (2005) examined the impact of external debt on TFP in 34 Sub-Saharan African countries from 1980 to 2002 and discovered that debt has a negative and significant impact on TFP. The study also discovered that human capital, FDI, and the export GDP ratio all have a positive and significant impact on TFP growth. Schclarek (2004) investigated the link between debt and growth in a variety of emerging and developed states. The data set comprises of 59 developing and twenty-four industrial nations, with data, averaged throughout each of the seven 5-year periods between 1970 and 2002. The study also suggests that debt boosts economic growth to a certain point, after which it harms economic growth. The non-linear link between debt and economic development is determined by how debt is utilized. According to the study, lower overall external debt levels are allied with greater growth rates in developing nations, and this negative association is driven by the occurrence of government external debt rather than private external debt. In terms of the pathways via which external debt addition influences growth, the findings indicate that capital accumulation growth is primarily responsible, with relatively weak proof on the link between foreign debt and TFP growth.

C. A. Pattillo, Poirson, and Ricci (2004) discovered that a high level of external debt had a negative influence on TFP growth for 61 developing countries from 1969 to 1998 using five estimating approaches such as OLS, fixed effects, diff-GMM and system GMM etc. Empirical studies on the TFP channel, which affects growth through external debt, are insufficient and do not exist for LMICs. Though there are several studies on the impact of external debt on growth, studies that focus on the linear relationship are lacking for LMICs, resulting in a knowledge gap. Furthermore, with the exception of a few studies, the majority of studies used conventional estimation techniques, even though some used GMM, which has a limitation. As a result, this study fills existing gaps in scope, methodology, and literature.

### 3. Methodology

The study used cross-sectional panel regression across 30 lower-middle-income countries. In June 2020, the World Bank's provide list of countries based on per capita income classification, so the LMIC group consists of approximately 50 countries from all continents. However, due to data limitations, only 30 countries were examined in this research. During the 20 years (1999-2021), countries' debt levels fluctuate from heavy to moderate, reflecting the longer-term consequences of the financial crisis of 2008 and the current recession on external borrowing and development. As a result, a sensitivity analysis is done from a data set of 30 LMIC nations to estimate the influence of Asian and African countries in the post-financial crisis eras. List of sample countries are mentioned in (Appendix-B). LMIC with period of 1999-2019 and 2010-2019 (post- financial crises). Asian countries with period of 1999-2019 and 2010-2019 (post-financial crises). African countries with period of 1999-2019 & 2010-2019 (post-financial crises).

#### 3.1. Empirical Model

The key objective of this empirical study is to identify the relationship between foreign debt and economic development via the channel of total factor productivity, in accordance with existing literature proposed by (Beyene & Kotosz, 2022; Silva, 2020). Moreover, Beyene and Kotosz (2022); Checherita-Westphal and Rother (2012) have previously used the relationship between TFP, external debt, and GDP growth. While (Beyene & Kotosz, 2022; Hassan & Meyer, 2021; Shahzad & Javid, 2015) have attempted to establish a connection between TFP and other variables such as labor force, inflation, debt service payments, and trade openness. Previous studies have shown that these variables does affect the TFP directly or indirectly (Afonso & Jalles, 2013). Model is stated below.

$$(TFP)_{it} = \alpha_0 + \alpha_1 (ED)_{it} + \alpha_2 (GDPgr)_{it} + \alpha_3 (LAB)_{it} + \alpha_4 (INF)_{it} + \alpha_5 (OPPN)_{it} + \alpha_6 (GCF)_{it} + \alpha_7 (DSR)_{it} + e_{it} \quad (1)$$

**Table 1: Data information and Sources**

Variables	Definitions	Data Source
TFP	TFP is the portion of GDP growth that cannot be explained by factor inputs. TFP may also boost economic growth by allocating inputs more appropriately and efficiently, resulting in production approaching the optimal combination of inputs and outputs. The	Authors own calculation (using capital stock, real GDP,

	value shows how efficiently the factors of production are utilized. Earlier used by (Beyene & Kotosz, 2022; Checherita-Westphal & Rother, 2012).	and labor data from Penn world table 10)
GDPgr	GDP growth. Annual % growth of GDP at market prices based on constant local currency. Variable previously used by (Hassan & Meyer, 2021; Munir & Mehmood, 2018).	WDI
ED	External debt (% GDP). The outstanding amount of actual current liabilities owed to non-residents of an economy that require the debtor to pay interest and/or principal at some point(s) in the future. Previously used by (Beyene & Kotosz, 2022; Hassan & Meyer, 2021; Shahzad & Javid, 2015).	WDI
IAB	Labor force (% of the total population). The labor force, often known as the "currently active workforce," includes all those who meet the conditions for employment (civilian work plus military service) or are jobless. Earlier used by (Beyene & Kotosz, 2022; Schclarek & Ramon-Ballester, 2005).	WDI
INF	Inflation, GDP deflator (annual %). The average yearly consumer price index is used to calculate the average rise or reduction in general prices. Variable formerly used by (Afonso & Jalles, 2013; Beyene & Kotosz, 2022; Hassan & Meyer, 2021).	WDI
OPPN	Trade openness as a proxy (% of GDP). Trade is used as a proxy variable for openness, with the totality of goods and services exports and imports expressed as a % of GDP. Beforehand used by (Akinlo, 2005; Beyene & Kotosz, 2022; Checherita-Westphal & Rother, 2012).	WDI, OECD
GCF	Gross capital formation (% GDP). Gross capital formation comprises both expenditures on additions to the economy's fixed assets and net changes in inventory levels. Formerly used by (Akinlo, 2005; Beyene & Kotosz, 2022; Hassan & Meyer, 2021).	WDI
DSR	DSR (Debt service as a % of GDP). Refers to payments for both principal and interest on long-term and short-term debt. Variable earlier used by (Akinlo, 2005; Beyene & Kotosz, 2022).	WDI

### 3.2. TFP Calculations

A production function in the neoclassical sense, with physical capital K and labor L, real GDP Y, and capital share, is used to construct TFP data. Moreover, it is supposed that all nations have the same Cobb-Douglas type of production function, (Schclarek, 2004) so the aggregate output for each country i,  $Y_i$ , is given by:

$$Y_i, \text{ is given by } Y_i = A_i K_i^\alpha L_i^{1-\alpha} \quad (2)$$

Where,  
 Y= Real GDP  
 A= Total factor productivity  
 K=Capital stock  
 L= Labor  
 $\alpha$  = Factor elasticity

Real GDP, capital stock, and labor are log transformed. The log of output is regressed on the log of input components to determine the production function. As a result, the coefficients describe the elasticity of output with respect to each input element. (Authors own calculations) based on (Schclarek, 2004).

### 3.3. Econometric Technique

Model estimating methodologies used in formal regression analysis include OLS and the generalized method of moment's technique. Yet, there are biases in panel regression analysis that may result in conflicting coefficient values. To account for any potential biases, the dynamic panel model would be estimated using a two-step system GMM estimation technique (Iftikhar & Iftikhar, 2018). This method is considered the best panel regression estimation approach since it removes the endogeneity problem by employing lagged values of explanatory variables as instruments to be used in the equation underestimate (Roodman, 2009). As the system GMM employs a large number of data for each entity (country) throughout time, the issue of information loss associated with cross-sectional regression is avoided. System GMM can produce reliable and unbiased parameter estimates even for short periods (T) and large no of countries

(N). (Pesaran, 2021). This study performs certain diagnostic tests to ensure that the estimation model is unbiased in the panel regression analysis. Sensitivity tests such as autocorrelation, Multicollinearity and Sargan are done to confirm the generalizability of the model and variables.

#### 4. Estimations Results and Deliberations

In this section, findings from the estimation for lower-middle-income countries (LMIC) are presented and discussed. The empirical analysis uses annual data on 30 LMICs for 20 years (1999–2019). Owing to the absence of data on specific factors for some of the countries, the figures are based on 30 LMIC nations out of the 50 in the group for the period 1999–2019.

**Table 2: Summary Statistics**

		<b>Avg</b>	<b>Standard deviation</b>	<b>Min</b>	<b>Max</b>
TFP	630	.373	.154	.09	1.48
GDPgr	630	4.733	3.748	-17.67	19.68
ED	630	48.135	34.872	2.5	243.56
OPPN	630	70.65	29.794	11.855	178.69
DSR	630	4.051	5.508	.05	82.54
GCF	630	25.113	10.062	1.53	69.48
INF	630	11.142	34.894	-16.8	557.5
LABOR	630	39.192	7.29	23.4	58.25

Table 2 illustrates that TFP has a slight deviation, the lowest (0.09) and highest (1.48). It likewise has an average of 0.373. External debt fluctuates significantly, ranging between 2.5 and 243.56, suggesting that governments rely heavily on external borrowing to support their operations. GDP<sub>gr</sub> and DSR had average values of 3.748 and 5.508, respectively. GDP<sub>gr</sub> has a range of -17.67 to 19.68, but DSR has a range of 0.05 to 82.54. In general, descriptive statistics show that the labor force has the highest standard deviation, while GDP growth has the lowest. Whereas the highest range is in inflation (INF), the minimum range is in total factor productivity (TFP).

**Table 3: Pair Wise Correlation**

	<b>TFP</b>	<b>GDPgr</b>	<b>ED</b>	<b>OPPN</b>	<b>DSR</b>	<b>GCF</b>	<b>INF</b>	<b>LABOR</b>
TFP	1.000							
GDPgr	-0.1093	1.0000						
ED	0.0843	-0.1256	1.0000					
OPPN	0.0304	0.0208	0.3562	1.0000				
DSR	0.1545	-0.1452	0.5876	0.3247	1.0000			
GCF	0.0109	0.2485	0.0520	0.1980	0.0476	1.0000		
INF	-0.0337	-0.0252	0.1665	0.1642	0.2020	-0.0183	1.0000	
LABOR	-0.2297	0.1520	0.1865	0.1875	0.1189	-0.0120	0.0791	1.0000

In table 3, pairwise correlation shows external debt has positive relation with TFP and a negative correlation with GDP growth rate.

**Table 4: Two-step GMM Panel regression of all LMIC countries from (1999-2019)**

<b>TFP</b>	<b>Coefficient</b>	<b>SE</b>	<b>z</b>	<b>P&gt;z</b>
L1.	0.8506631	0.0072488	117.35	0.0000
GDPgr	0.0013261	0.0001263	10.5	0.0000
ED	0.0002115	0.0000546	3.87	0.0000
OPPN	-0.0013224	0.0001345	-9.83	0.0000
DSR	0.0004857	0.0002778	1.75	0.0800
GCF	0.0033165	0.0005709	5.81	0.0000
INF	-0.0002108	0.0000486	-4.34	0.0000
LABOR	0.0013627	0.0008638	1.58	0.1150
cons	-0.0066777	0.0301422	-0.22	0.8250
Wald chi2(8)	116916.43			
Prob > chi2	0.0000			

The results in Table 4 suggests that all variables are significant except the labor force. External debt has a favorable association with TFP as it rises by 0.0212% for every percentage point increase in ED. Furthermore, a percent rise in GDP leads to a 0.132% surge in TFP, indicating that TFP is critical for GDP growth and vice versa in an economy consistent with

findings of (Makun, 2021). Other factors that have a positive and substantial link with TFP include debt service payments and gross capital creation, whereas inflation has a negative and substantial association with TFP. Debt service payments lower external debt inventories, allow governments to invest in productivity development. The estimation results between external debt and TFP (GDP growth) are in line with the findings of by (Checherita-Westphal & Rother, 2012; Hassan & Meyer, 2021).

**Table 5: Autocorrelation Test**

Order	z	Prob > z
1	-4.3335	0.00000
2	-1.6339	0.1023

**Table 6: Sargan Test for over Identifying Restrictions**

H0: over identifying restrictions are valid	
chi2 (208)	29.20501
Prob > chi2	1.0000

Considering the post-2008-09 financial crises in all LMIC, we discovered a considerable beneficial impact of external debt on TFP and GDP growth as per the results mentioned in Table 7. An increase in ED results in a 0.035% rise in TFP. In addition, a 1% rise in GDP corresponds to a 0.468% increase in TFP. Trade openness, inflation, and labor force have a negative and substantial relation with TFP in the post-financial crisis era, whereas gross capital formation and debt service payment have a negative but negligible relationship with TFP. Many LMIC countries came out of crises, as they were not directly connected with US or European financial system; however, their trade with other countries particularly with advanced economies were effected resulting in a negative impact on TFP (Aizenman, Jinjark, Estrada, & Tian, 2018).

**Table 7: Two-step GMM- Panel regression of all LMIC countries (2010-2019)**

TFP	Coefficient	SE	z	*P>z
L1.	0.8177733	0.0075806	107.88	0.000
GDPgr	0.0046831	0.000392	11.95	0.000
ED	0.0003578	0.0000867	4.13	0.000
OPPN	-0.0005471	0.0001182	-4.63	0.000
DSR	-0.0002989	0.0001852	-1.61	0.107
GCF	0.0005832	0.0003874	1.51	0.132
INF	-0.0000667	0.0000265	-2.52	0.012
LABOR	-0.0051171	0.0005734	-8.92	0.000
_cons	0.2792152	0.0265978	10.5	0.000
Wald chi2(8)	27236.14			
Prob > chi2	0.00000			

\*Significance at 5% level

**Table 8: Two-step GMM- Panel regression of all Asian countries (1999-2019)**

TFP	Coefficient	SE	z	*P>z
L1.	0.8856423	0.165911	5.34	0.00000
GDPgr	0.0008039	0.0008573	0.94	0.34800
ED	0.0002684	0.0002844	0.94	0.34500
OPPN	-0.000273	0.0005021	-0.54	0.58700
DSR	0.0000742	0.0008033	0.09	0.92600
GCF	0.0003492	0.0017178	0.2	0.83900
INF	-0.001398	0.0007516	-1.86	0.06300
LABOR	-0.00106	0.0040159	-0.26	0.79200
cons	0.0787902	0.1648501	0.48	0.63300
Wald chi2(8)	1233.38			
Prob > Chi2	0.00000			

\*Significance at 5% level

Studying the specific Asian countries in the lower middle-income category from 1999 to 2019, it is found that all variables have an insignificant connection with TFP. The results in table-8 illustrates that external debt, GDP growth, debt service, and gross capital formation, have a positive link with TFP, whereas trade openness, inflation, and the labor force have a negative but negligible influence. TFP increases by 0.0268% and 0.0803% for every percentage point rise in ED and GDP growth, respectively. It backs the notion that TFP is a modest passage via



which debt drives economic development in some Asian countries (Wanniarachchi, Mathrani, Susnjak, & Scogings, 2020).

**Table 9: Two-step GMM- Panel regression of Asian countries (2010-2019)**

TFP	Coefficient	SE	z	*P>z
L1.	0.82460	0.2058665	4.01	0.000
GDPgr	-0.00140	0.0026145	-0.53	0.593
ED	0.00061	0.000559	1.09	0.274
OPPN	-0.00080	0.0008246	-0.98	0.329
DSR	-0.00038	0.0005791	-0.65	0.516
GCF	0.00240	0.0020718	1.16	0.246
INF	-0.00092	0.000768	-1.2	0.230
LABOR	-0.00158	0.0087102	-0.18	0.856
cons	0.11719	0.40686	0.29	0.773
Wald chi2(8)	261.77			
Prob > Chi2	0.00000			

\*Significance at 5% level

In the post-financial crisis period, all variables have an insignificant relationship with TFP. The results tabulated in table -9 reflects it. External debt and gross capital formation have a variation of 0.06% and 0.24% on TFP respectively, while GDP growth, debt service payment, inflation, and labor force have a negative insignificant relationship of 0.139%, 0.08%, 0.037%, 0.0922%, and 0.158%, respectively, with TFP. The debt service payment on piled-up external debt stock resulted in less focus by governments on technological progress in the post-financial crisis period in Asian countries (Brunschwig, Carrasco, Hayashi, & Mukhopadhyay, 2011).

Owing to the severe recession in the advanced countries and the breakdown of global trade, the majority of Asian nations' exports and growth fell precipitously in the fourth and first quarters of 2008. Substantial fiscal and monetary assistance, on the other hand, enabled the region to develop a solid recovery. Essentially, the region was spared the financial instability and credit market seizures that afflicted the USA and the European Union. Contrary to common assumption, Asia did not face a big financial crisis, but it did have a trade crisis, spillover effect, which hampered its GDP growth, (Park, Majuca, & Yap, 2010).

**Table 10: Two-step GMM- Panel Regression of all African Countries (1999-2019)**

TFP	Coefficient	SE	z	P>z
L1.	0.9785176	0.0435575	22.46	0.0000
GDPgr	0.0020083	0.0006137	3.27	0.0010
ED	-0.0000952	0.0001884	-0.51	0.6130
OPPN	-0.0005214	0.0001389	-3.75	0.0000
DSR	-0.0022227	0.0008347	-2.66	0.0080
GCF	0.0008984	0.0003913	2.3	0.0220
INF	-0.0000726	0.0000168	-4.32	0.0000
LABOR	-0.0006376	0.0041023	-0.16	0.8760
_cons	0.0501585	0.1478026	0.34	0.7340
Wald chi2(8)	1297.41			
Prob > chi2	0.0000			

\*Significance at 5% level

**Table 11: Two-step GMM- Panel regression of all African countries (2010-2019)**

TFP	Coefficient	SE	z	*P>z
L1.	0.93771	0.0276311	33.94	0.000
GDPgr	0.00475	0.0005352	8.88	0.000
ED	0.00022	0.0002857	0.78	0.435
OPPN	0.00011	0.0003157	0.34	0.732
DSR	-0.00483	0.0020308	-2.38	0.017
GCF	-0.00113	0.0008431	-1.34	0.182
INF	-0.0000259	0.0000838	-0.31	0.757
LABOR	-0.00522	0.0053948	-0.97	0.333
_cons	0.23952	0.2117725	1.13	0.258
Wald chi2(8)	31615.98			
Prob > chi2	0.0000			

\*Significance at 5% level

Table 10 shows the estimated results of 15 LMICs from Africa. GDP growth and GCF have a significant and positive relationship with TFP, while debt has a significant but negative relationship with TFP. TFP has a strong and negative relationship with debt service, trade openness, and inflation, whereas employment has a weak and negative relationship. External debt harms the economy because it is followed by a significant debt service obligation, resulting in a decrease in investment. The implication is that infrastructure development suffers, which is crucial for stimulating economic growth. The findings are also consistent with that of (Garzarelli & Limam, 2019; Hassan & Meyer, 2021).

Table 11 discusses about the post-financial-crisis period of African nations that were already heavily indebted. GDP growth has a positive and substantial link with TFP, with 1% increase resulting in a 0.475% rise in TFP. Some variables, such as external debt and trade openness, have a favorable but minor influence on TFP. TFP has a negative and negligible association with debt service payments, gross capital formation, inflation, and the labor force. After the shock of the 2008–09 financial crises, when most African countries' real GDP growth was negative, most of these countries recovered and subsequently registered positive real GDP because they were not directly connected to the US or European financial systems, even though their trade and exchange rate severely fluctuated (Allen & Giovannetti, 2011).

## **5. Conclusions**

The outcomes of this research reveal that external debt has a substantial influence on GDP growth via the total factor productivity channel. Panel data from 30 LMIC nations was estimated using the two-step GMM estimation approach from 1999 to 2019. The study was then separated into African and Asian LMIC nations to examine their influence based on a full sample from 2010 to 2019, which is the post-financial crisis period.

Based on a full sample, the results demonstrated that external debt via the TFP channel had an affirmative and considerable link with economic progress; even in post-financial crises, the correlation was significant. Asian countries showed an insignificant but positive correlation; however, looking at the post-financial crisis period in Asian countries, economic growth was negative, indicating that the countries were adversely affected due to low investment in technological updating and progress and had a spillover effect of global crises.

Based on the entire sample data, it was also discovered that external debt harmed TFP in African countries. When studying the post-financial crisis era, the chosen African nations appear to have recovered from the devastating effects of the financial crisis because their financial systems were not directly linked to the advanced US or European derivative-based systems.

The overall results show that external debt does influence LMIC economic development through the TFP channel. As a result, this paper makes some policy recommendations that LMICs develop strong macroeconomic policies, institutions, and debt oversight approaches to address their stockpiled foreign debt, ensure its sustainability, and mitigate its negative impact on TFP and economic development. Furthermore, LMICs should reinvest borrowed funds in productive businesses that generate external exchange. To increase TFP, more emphasis and resources should be directed towards science and technology, automation of timeworn and outdated processes, and engineering education.

Creditors should lend to viable, expanding ventures while closely monitoring their implementation. While TFP significantly boosts GDP growth, LMICs should implement measures to improve it, such as focusing on and supporting invention, research and development, human resource growth, improving institutions quality to control financial corruption, providing a favorable environment for fruitful investments, and implementing sound economic policies that encourage high GDP growth.

This study has some limitations despite filling gaps in the literature and methodologies. The research work was limited to 30 LMICs out of 50 LMICs (as classified by the World Bank) due to a lack of available data. There are other ways that external debt influences growth, but this study only looked at TFP. Aside from that, the study only spanned the years 1999–2019, with the possibility of extending to the post-COVID-19 period. As a result, future research studies can dig deeper into these subjects.

## References

- Abro, A. A., Ul Mustafa, A. R., Ali, M., & Nayyar, Y. (2021). Does Ramzan effect the returns and volatility? Evidence from GCC share market. *The Journal of Asian Finance, Economics and Business*, 8(7), 11-19. doi:<https://doi.org/10.13106/jafeb.2021.vol8.no7.0011>
- Afonso, A., & Jalles, J. T. (2013). Growth and productivity: The role of government debt. *International Review of Economics & Finance*, 25, 384-407. doi:<https://doi.org/10.1016/j.iref.2012.07.004>
- Aizenman, J., Jinjara, Y., Estrada, G., & Tian, S. (2018). Flexibility of adjustment to shocks: Economic growth and volatility of middle-income countries before and after the global financial crisis of 2008. *Emerging Markets Finance and Trade*, 54(5), 1112-1131. doi:<https://doi.org/10.1080/1540496X.2017.1422430>
- Akinlo, A. E. (2005). *Impact of macroeconomic factors on total factor productivity in Sub-Saharan African countries* (Vol. 39): United nations university. World institute for development economics ....
- Allen, F., & Giovannetti, G. (2011). The effects of the financial crisis on Sub-Saharan Africa. *Review of Development Finance*, 1(1), 1-27.
- Amin, A. A., & Audu, I. (2006). External debt, investment and economic growth: Evidence from Nigeria.
- Arnone, M., Bandiera, L., & Presbitero, A. F. (2005). External debt sustainability: Theory and empirical evidence. *Catholic University of Piacenza Economics Working Paper*, 33, 1-47.
- Beyene, S. D., & Kotosz, B. (2022). The impact of external debt on total factor productivity and growth in HIPCs: non-linear regression approaches. *International Journal of Development Issues*, 21(2), 173-194. doi:<https://doi.org/10.1108/IJDI-07-2021-0145>
- Brunschwig, S., Carrasco, B., Hayashi, T., & Mukhopadhyay, H. (2011). The global financial crisis: Impact on Asia and emerging consensus.
- Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the euro area. *European economic review*, 56(7), 1392-1405. doi:<https://doi.org/10.1016/j.euroecorev.2012.06.007>
- Erken, H., Donselaar, P., & Thurik, R. (2018). Total factor productivity and the role of entrepreneurship. *The Journal of Technology Transfer*, 43, 1493-1521. doi:<https://doi.org/10.1007/s10961-016-9504-5>
- Fiagbe, A. K. (2015). The effect of external debt on economic growth Sub-Saharan Africa. *University of Ghana Master thesis in Economics*.
- Garzarelli, G., & Limam, Y. R. (2019). Physical capital, total factor productivity, and economic growth in sub-Saharan Africa. *South African Journal of Economic and Management Sciences*, 22(1), 1-10.
- Hassan, A., & Meyer, D. (2021). Exploring the channels of transmission between external debt and economic growth: Evidence from sub-Saharan African countries. *Economies*, 9(2), 50. doi:<https://doi.org/10.3390/economies9020050>
- Iftikhar, K., & Iftikhar, S. F. (2018). The impact of business cycle on capital buffer during the period of Basel-II and Basel-III: Evidence from the Pakistani banks. *International Journal of Financial Engineering*, 5(04), 1850036. doi:<https://doi.org/10.1142/S2424786318500366>
- Joshua, U., Bekun, F. V., & Sarkodie, S. A. (2020). New insight into the causal linkage between economic expansion, FDI, coal consumption, pollutant emissions and urbanization in South Africa. *Environmental Science and Pollution Research*, 27, 18013-18024. doi:<https://doi.org/10.1007/s11356-020-08145-0>
- Krugman, P. (1988). Financing vs. forgiving a debt overhang. *Journal of development Economics*, 29(3), 253-268. doi:[https://doi.org/10.1016/0304-3878\(88\)90044-2](https://doi.org/10.1016/0304-3878(88)90044-2)
- Kumar, M., & Woo, J. (2010). Public debt and growth.
- Makun, K. (2021). External debt and economic growth in Pacific Island countries: A linear and nonlinear analysis of Fiji Islands. *The Journal of Economic Asymmetries*, 23, e00197. doi:<https://doi.org/10.1016/j.jeca.2021.e00197>
- Mansha, M., Yang, X., ul Mustafa, A. R., & Nasim, M. M. (2022). Empirical Analytics of SAARC vs ASEAN in Perspective of Economic Growth and Capital Accumulation. *iRASD Journal of Economics*, 4(2), 337-351. doi:<https://doi.org/10.52131/joe.2022.0402.0083>
- Munir, K., & Mehmood, N. R. (2018). Exploring the channels and impact of debt on economic growth: Evidence from South Asia. *South Asia Economic Journal*, 19(2), 171-191. doi:<https://doi.org/10.1177/1391561418794692>

- Park, C.-Y., Majuca, R., & Yap, J. (2010). *The 2008 Financial Crisis and Potential Output in Asia: Impact and Policy Implications*. Retrieved from <http://hdl.handle.net/10419/109556>
- Pattillo, C., Poirson, H., & Ricci, L. (2011). External debt and growth. *Review of Economics and Institutions*, 1-30.
- Pattillo, C. A., Poirson, H., & Ricci, L. A. (2004). What are the channels through which external debt affects growth?
- Pesaran, M. H. (2021). General diagnostic tests for cross-sectional dependence in panels. *Empirical economics*, 60(1), 13-50.
- Reinhart, C., & Rogoff, K. (2010). Debt and growth revisited.
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, 9(1), 86-136. doi:<https://doi.org/10.1177/1536867X0900900106>
- Schclarek, A. (2004). *Debt and economic growth in developing and industrial countries*. Retrieved from <http://hdl.handle.net/10419/259917>
- Schclarek, A., & Ramon-Ballester, F. (2005). External debt and economic growth in Latin America. *Paper not yet published*. Download at <http://www.cbaeconomia.com/Debt-latin.pdf>.
- Shahzad, H., & Javid, A. Y. (2015). *Impact of debt on aggregate investment and productivity in developing Asian countries: PIDE*.
- Silva, J. (2020). Impact of public and private sector external debt on economic growth: the case of Portugal. *Eurasian Economic Review*, 10(4), 607-634. doi:<https://doi.org/10.1007/s40822-020-00153-2>
- ul Mustafa, A. R., Abro, A. A., & Awan, N. W. (2021). Social Protection and Economic Growth: An Empirical Analysis for Emerging Economies. *Elementary Education Online*, 20(5), 6932-6932. doi:<https://doi.org/10.17051/ilkonline.2021.05.781>
- ul Mustafa, A. R., Nishat, M., & Abro, A. A. (2022). Social Protection Spending in Context of Structural and Institutional Performance: A Global Empirical Analysis. *Social Indicators Research*, 163(2), 875-899. doi:<https://doi.org/10.1007/s11205-022-02933-6>
- Wanniarachchi, V. U., Mathrani, A., Susnjak, T., & Scogings, C. (2020). A systematic literature review: What is the current stance towards weight stigmatization in social media platforms? *International Journal of Human-Computer Studies*, 135, 102371. doi:<https://doi.org/10.1016/j.ijhcs.2019.102371>
- World Bank, w. (2017). *International Debt Statistics*. Retrieved from Washington, DC: World Bank:
- World Bank, w. (2020). *International Debt Statistics*. Retrieved from Washington, DC: World Bank:
- Yalçinkaya, Ö., Hüseyini, İ., & Çelik, A. K. (2017). The impact of total factor productivity on economic growth for developed and emerging countries: a second-generation panel data analysis. *Margin: The Journal of Applied Economic Research*, 11(4), 404-417.

## Appendix-A

TFP computation:

$$Y_t = A_t K^{\beta_1} L^{\beta_2} \quad (2)$$

Taking natural logarithms of both sides in equation (1) the term  $(\ln L_t)$  is subtracted. Equation (2) is obtained as the following:-

$$\ln Y_t = \ln A_t + \beta_1 \ln K_t + (1 - \beta_1) \ln L_t \quad (2)$$

Equation (2) is reduced which characterizes TFP as follows:

$$\ln A_t = \ln (Y_t / L_t) - \beta_1 \ln (K_t L_t) \quad (3)$$

**Table A1: List of Countries in the Sample**

<b>Lower Middle Income Countries</b>	<b>Classification</b>
Algeria	African
Angola	African
Bangladesh	Asia
Benin	African
Bhutan	Asia
Cambodia	Asia
Cameroon	African
Comoros	African
El Salvador	Latin America & Caribbean
Eswatini	African
Ghana	African
Honduras	Latin America & Caribbean
India	Asia
Kenya	African
Mauritania	African
Mongolia	Asia
Morocco	African
Myanmar	Asia
Nepal	Asia
Nicaragua	Latin America & Caribbean
Nigeria	African
Pakistan	Asia
Philippines	Asia
Senegal	African
Sri Lanka	Asia
Tunisia	African
Ukraine	Europe & Central Asia
Uzbekistan	Europe & Central Asia
Zambia	African
Zimbabwe	African

**Expected sign of variables**

TFP as a dependent variable

**Table A2**

<b>Independent Variables</b>	<b>Expected Sign</b>
Gross domestic product growth- $GDP_{qr}$	Positive
External Debt- ED	Negative
Trade Openness- OPPN	Positive
Gross capital formation – GCF	Positive
Labor force-LABOR	Positive
Debt Service- DSR	Negative
Inflation-INF	Negative