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Remedial measures to sustain indebted economy: A time series analyses of Pakistan economy

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Most of the studies on the impact of debt on Pakistan economy are backdated to a decade and hence the need to re-investigate the impact to ascertain the level of effect is encouraged. To investigate the target research, the neoclassical growth equation was expanded by augmenting the equation with other variables of interest (Trade openness and FDI) with the intent of proffering solution in reviving the economy via policy implication. Pakistan's annual data of 1970–2016 were estimated with ARDL and Granger causality approaches for both short- and long-run effects. The main variable external debt is negatively and significantly related to Pakistan's GDP both in the short and long run; Trade openness has a positive and significant impact on the GDP; FDI also has a negative and significant relationship with GDP in the short run but a positive and significant impact on GDP in the long run; and investment has a significantly positive impact on GDP in the short run. Basically from the findings, it is observed that the debt swelling is of hurting effect to the economy. The policy implication should be framed around encouraging the trade openness, but with care, as the first lag is depicting negative impact, FDI must be encouraged with an eye on its long-term impact on the economy and finally, investment should be given maximum attention in order to crowd out the effect of external debt in the economy.

KEYWORDS
ARDL, economic growth, external debt, FDI, investment, Pakistan, trade openness

1 | INTRODUCTION

The rising external debt and fiscal sustainability have been among the major concerns of economic performance and policy of many countries, especially the developing countries, Reinhart and Rogoff (2010). Pakistan is not spared from the menace of external debt. The state of any economy is best known from the voice of the handlers of the economy. It is obvious from the direct comment of the Pakistan Prime Minister, Imran Khan that the Pakistan economy is in the worst state due partly to swelling of foreign debt (Xin, 2018). This caught the attention of the author and sparks the interest to do additional study and investigate the effect of external debt overhauling on Pakistan's economic growth. From the inception of the sovereign debt crises, the term external debt has been traced to be the root of problems of most developing countries. The unclear nature of the word "external debt" has led so many platforms, especially the media, take the term for granted. The reports from these platforms have profoundly misled and failed to alarm the masses on the consequences of the external debt due to sheer perception on the volume of external debt outstanding against their countries. Public debt, be it external or internal, is considered as among the many sources of financing, which the government depends on to realize her economic and social objectives, especially in the case of most developing countries with less capacity to savings, which creates a savings–investments gap. Countries resort to external debt due to various reasons such as financing capital projects, meeting short-term and long-term obligations, access to foreign currencies, and buying of (military or developmental) equipment. These reasons of incurring debts are sometimes left unattended and the debt obtained will be shifted to personal gains or private use. Whatever the reason or motivation behind the incurring of the debt,

the external debt so acquired creates liability on the part of the country to pay the amount borrowed. It is on this premises that Reinhart and Rogoff (2010) revealed the existence of strong negative correlation between high public debt and economic growth. They buttressed their point with a simple descriptive statistic, thereby arguing with evidences that economic growth is negatively affected by the excessive public debt-to-GDP ratio above the threshold of 90%.

No doubt Pakistan is not missing in the economic truncated debt dilemma. Pakistan's external debt is considered the reason for all ills battering the economy (Shahzad, Zia, Zulfiqar, 2014). Beginning from 1980s, the debt trend of Pakistan has been upward, which means the increase in the debt servicing, and this is not good to any economy if the money borrowed is not utilized efficiently into productive ventures. In 1980, the external debt was $869 billion but this has expanded to $1901.90 million in 1990 to $2944.80 million in 1999 and further to $37.362 billion by 2007. From the statistics, it is obvious that Pakistan is trapped in a debt overhang effect. According to this, when the debt level of a country increases, there is a rising tendency of future increase of taxes, this will negatively affect the consumption and investment of the economy, and hence triggers low economic growth. The crowding effect shows the situation in which private sector investment decreases because of higher interest rates adopted by the government to pay its debt and hence resulting in decrease of private investment (Afonso & Jalles, 2013). The picture of the current Pakistan's economic situation is well painted by the Prime minister by his speech. In his first speech to the nation after being elected as prime minister, Imran Khan said that Pakistan is in traumatic economic condition, he vows to take measures to reduce the tramp on the economy by tackling the country's foreign debt, which is over 95 billion U.S dollars (Xin, 2018). Pakistan is among the developing countries and faces serious debt problems; according to Anwar (2018), Pakistan's external and public debt skyrocketed over a decade because of heavy dependence on borrowing. The country resorted to borrowing due to lack of improvement in the tax-to-gross domestic product (GDP) ratio and declining exports and foreign investment. Pakistan's debts (external and public) are increasing at a threatening pace for the last 8 years (2008–2015), inducing fiscal profligacy on the one hand and substantial decline in non-debt creating inflows, as well as a decline in exports, on the other (Choudhary, Khan, Pasha & Rehman, 2016). It is revealed that the recent pace of accumulation of debt pointed to the fact that if it remains uncontrolled, Pakistan's public debt would reach an unsustainable level in the near future. Rising debt is a threat to the macroeconomic stability of Pakistan and hence to economic growth, employment generation, and poverty. Theoretically, it is proven that high and rising debt depresses investment by creating uncertainty. The amount of the external debt in particular would be large and accumulating for Pakistan to service its external debt obligations in an orderly manner.

Not undermining the need for countries to embark on debt acquisition, the dependence on public debt by various developed and developing economies of the globe has created many crucial issues for economic policy-makers. External debt plays both good and destructive part in forming economic growth, especially for developing nations like Pakistan. External debt is useful when the legislature uses it for investment-oriented projects such as power sector, base, and agricultural sectors. Also, it would influence contrarily when it is utilized for private and open utilization purposes, which do not generate any developmental return. Neary (1988) gave insight on the need for external debt by saying that the outer obligation of creating nations was essentially little and authority sensation; the larger part of banks being outside government and worldwide money related organization offer advantage for development project. In a bit to survive with the fiscal imbalances and nonavailability of revenue sources, public debt is taken in order to fill the gap. The borrowing of the government may induce economic growth in the short run but there are long-term consequences of public debt.

External debt may induce economic growth in the short run or even in the long run so far it is utilized in profitable ventures till it gets to a certain level, which most literature terms threshold. The threshold is sometimes called turning point of the debt liability, which is suspected to be mostly negatively related to the GDP growth. A quite number of scientific studies have broadly confirmed that for a similar set of countries, the turning point beyond which economic growth slows down sharply is around 90% of GDP (Cecchetti et al., ; Padoan et al., 2012) for OECD countries. Also, the same level of 90% threshold was confirmed by Cecchetti (2011) and Baum et al. (2013) for the euro area countries. However, Thomas Herndon et al. (2014) throw more light on a number of errors in the estimation of Reinhart and Rogoff, and showed that economic growth did not decline sharply above the 90% in the Reinhart and Rogoff dataset. Recent scientific studies also pointed out that a country's geographical coverage matters substantially for the threshold impact. The tipping point is 77% if a larger set of developing and emerging economies is analyzed (Caner et al., 2010). Elmeskov and Sutherland (2012) estimated the threshold at 66% for a narrow sample of OECD countries. Other researchers could not identify a robust negative nonlinear relationship between public debt and growth (Baglan & Yoldas, 2013; Eberhardt & Presbitero, 2013; Minea & Parent, 2012; Pescatori et al., 2014). Also, Panizza and Prebitero (2014) argued that a negative correlation between debt and growth does not imply causality as lower growth can result in a higher debt to GDP ratio.

Many research works including Atique and Malik (2012), Ramza and Ahmad (2014), Waheed (2006) were done to investigate the impact of public debt on economic growth of Pakistan. Majority of the studies came up with the evidence that external debt tends to have negative effect on economic performance and growth for the long run in the context of Pakistan. Despite the fact that the economic theories are of different opinions, suggesting the level of negative effect of debt to the economic growth, some theories suggest that a reasonable level of public debt is acceptable to enhance economic growth (Pattillo, Porison, & Ricci, 2002) provided that this debt is considered only for productive investments with rates of return higher than the interest rate of borrowed funds.

It is against this background that this present study is embarked upon to determine: First, if the economic growth is affected by public debt. Second, if yes, what kind of relationship (positive or negative)

between public debt and the economic growth of Pakistan determines the effect. Third, if the findings are established in support of negative relationship, what are the measures that ameliorate the negative impact.

This study investigates the impact of external debt to recent happenings in the Pakistan economy and measures to revitalize the economy if the result found negative effect of debt to the economic growth of the country. In an attempt to make a contribution to the existing literature on this topic, the study tends to contribute in the following ways: first, augmenting some key macroeconomics variables (such as Trade openness and Foreign Direct Investment [FDI]) into the existing neoclassical growth mode and expand the model, and test the impact of the augmented variables to Pakistan's economic growth in an extended growth accounting framework. This is an attempt by the author to leverage on the positive inducement of the added indicators (such as closing the savings–investment gap) in establishing a remedial effect if found negative impact of debt on the growth; second, we adopted the ARDL method backing it up with Granger causality test to show both the relationship and the direction of the causality among the variables; third, most of the studies on this topic are within the space of 1980–2008 but our work expanded to cover from 1970 to 2016. This gives insight into the recent performance of Pakistan's economy within the space of moderately one decade.

The remaining part of this study is organized as follows: Section 2 reviews the literature; Section 3 describes the methodology in terms of the analytical framework and data sources; Section 4 presents the empirical results; and Section 5 is about discussion and conclusions, and implications for policy.

2 | REVIEW

The review will be based on a comparative manner, which is reviewing the existing literature studies that deal with each variable on economic growth. The steps will be external debt and growth, trade openness and economic growth, FDI and economic growth.

2.1 | Studies analyzing the relationship between external debt and economic growth

Numerous studies have investigated the effects of debt (external and public) to the economic growth of Pakistan. Akram (2011) utilized autoregressive distributed lag (ARDL) techniques with the data of 1972–2009 to study the effect of external debt on Pakistan's economic growth, and he found a negative relationship between external debt and the economic growth of Pakistan. However, he did not confirm the significant relationship between debt service and economic growth. Atique and Malik (2012) utilized ordinary least square (OLS) approach with a Pakistan annual data of 1980–2010 to study the impact of external debt to the economic growth of Pakistan; they found a negative relationship between the external debt and the economic growth. Raise and Anwar (2012) applied ordinary least square (OLS) approach with Pakistan's annual data of 1972–2010) to study the effect of external debt to economic growth of Pakistan and found a negative relationship. Ramzan and Ahmad (2014) utilized ARDL bound approach with a Pakistan annual data of 1972–2014 to investigate both the long- and short-term two-way relationship between both GDP and GNP, and external debt and their findings confirmed the significant negative relationship in both GDP and GNP with external debt. Kumar et al. (2010) studied Pakistan's economic growth with the domestic debt implication. The authors applied the use of OLS with annual data of 1972–2009 and found a positive relationship between the domestic debt and the GDP growth. They also found a highly significant and negative relationship between the domestic debt servicing and the GDP growth. Waheed (2006) also examined the various factors responsible for economic growth of Pakistan along with the burden of domestic debt and found the burden of domestic debt to be inversely related to the economic growth via debt services in Pakistan.

Besides the Pakistan study, there are a number of other studies that have examined the debt implication to the economic growth of other economies. From theoretical perspectives, external debt has adverse effects on economic growth. For instance, Karagol (2012) found a negative effect of external debt on the GNP of Turkey for a long-term period of 1956–1996. Jayaraman and Lau (2009) found a positive effect but for the short period of time but a negative effect was recorded in the long run on the economic growth of six major pacific Island countries. Also, Afonso and Jalles (2013) studied public debt, its productivity, and growth for 155 countries using panel data analysis. They found adverse effects of public debt on GDP. In support of the panel study, Checherita-Westphal et al., (2012) extended the study for 12 European countries by investigating the relationship of the public debt with the GDP growth for 1970–2008, and they found significant negative long-run effect of government debt on GDP growth. Bal and Rath (2014) applied the same method in the case of Indian economy for the period 1980–2011 with ARDL approach and found a significant negative relationship between both the internal and external debts on the economic growth in the longer period.

2.2 | Studies analyzing the relationship between trade and economic growth

The trade-growth led economic performance could be either productive and efficient or counterproductive in impacting the economic performance of a giving country. The following literature makes attempt in the justification of this assertion. Dollar (1992), Frankel and Romer (1999), Dollar and Kaaray (2001) are of opinion that trade when liberalized impacts positively to the positive economic performance of a country, thereby impacting the GDP growth positively. Rahman (2006) is also in support of the positivity of trade openness to the economic growth of a country. Similarly, Frankel and Romer (1996) in their cross country regression found that trade has a good, significant, and robust positive effect on economic growth. S. Ahmed

and Sattar (2004) found that trade has a large and positive influence on the economic growth of the cross countries they researched on.

However, some studies shifted their approach to causality study and deviated on this finding with some proofs from their counter findings. Greenaway and Sapsford (1994), using a production approach with a time series data, did a study on 19 countries and found little or no support for the export–growth relationship. Giles and Williams (2000) also found neither meaningful relationship nor causality between trade and growth. Hönekopp and Werner (2000) found the possibility of bidirectional causality between export-based trade and economic growth. Alıcı and Ucal (2003) in their study found only unidirectional causality between trade and economic growth for Turkey with a quarterly data from 1987 to 2002. Dritsaki, Dritsaki and Adamopoulos (2004) found bidirectional causality between economic growth and trade in Greece in their work. Cuadros et al. (2004) examined a panel study of three South American countries (Mexico, Argentina, and Brazil) with seasonal adjusted quarterly data of 1970–2000 and found a mixed causality. They found unidirectional causality between the trade and the GDP for Mexico and Argentina, while for Brazil they found unidirectional causality between the real GDP and trade. Khundker and Nasreen (2002) did a study on Asian developing countries and found similar result. Ahmad, Alam and Butt (2004), using an annual data of 1972–2001, examined Pakistan s economic growth and found a unidirectional causality from trade to GDP. This is reconfirmed by Ullah, Zaman, Farooq and Javid (2009), Shirazi and Manap (2004) and Shahbaz and Lean (2012). However, in the work of Darrat (1986), no evidence of causality from trade to economic growth was found in the case of Hong Kong, Taiwan, Singapore, and South Korea.

2.3 | Studies analyzing the relationship between FDI and economic growth

Here, the present study explores some works on causality or relationship between the FD and the GDP growth. Anyanwu (2012) found that among the drivers of FDI is a traceable good robust economic growth rate, which he observed in the economy of East and South African regions. Reyath Y, Faras & Khalifa, H Ghali (2009) studied the Gulf cooperation council and found no causality between FDI and economic growth. Frimpong and Oteng-Abayie (2010) examined the Ghanaian economy and found no causality between FDI and growth. On the same note, Karimi and Yusop (2009) did a work on Malaysian economy, and finding shows no causality between the FDI and economic growth. Also, Ericsson and Irandoust (2001) did a work on FDI and growth and found no causality between them. Chakraborty and Basu (2002) explored the causality between FDI and economic growth with Granger causality test and found unidirectional causality between FDI and economic growth. Ericsson and Irandoust (2001) utilized Toda and Yamamoto to test a Granger causality relationship between the economic growth and FDI on Scandinavian countries (Denmark, Norway, Finland, and Sweden), they found bidirectional causality between the variables in Sweden and a unidirectional causality from FDI to economic growth for Norway but n causality relationship for Denmark and Finland.

3 | THEORETICAL BACKGROUND

The economic models are inevitably incomplete in analyzing the reality of life (Cochrane, 2011). Formulating a sufficiently general initial model to capture relevant influence is a fundamental challenge encountered in most if not all empirical modeling procedures (Sousa, 2010).

Following both the relevant economic theories and the previous empirical results, we incorporate growth model specification and estimation of the equation based on the growth literature (Barro & Sala-i-Martin, 2014) in our strategy, and we expanded the growth equation by augmenting it with external debt to investigate if the external debt has an impact on economic growth over and above other indicators.

The initial empirical specification is derived from the neoclassical growth model of Solow, where the rate of real per capita GDP (Yt) for a given country is as follows:

$$g_t = a + \gamma y_{t-1} + \sum_{i=1}^{n} \left(\delta_i z_{it} + \beta d_t + x_{\mu t}\right), \quad (1)$$

where y_{t-1} is the logarithm of the initial real per capita GDP (to capture the conditional convergence of the economy to its steady state), z_{it}(i = 1,…,n) is a set of independent or explanatory variables, and d_t is the net external debt-to-GDP ratio.

Regarding z_{it}, the author considered a set of explanatory variables that have proved to be consistency in the construction of growth analyses in the literature: openness to trade, measured by the absolute sum of export, and import over GDP(OPEN); Foreign Direct Investment inflow (FDI); Investment, measured by the gross capital formation as a ratio to GDP(LNINV); human capital, measured by secondary school enrolment (LNCAP); population, measured by the urban population (LNPOP); inflation, measured by logarithm of CPI = 2010 constant (INFL).

The justification of the selected variables is based on neoclassical economic growth literature, the labor growth rate used in the production process, and accumulation of physical capital as investment are the key determinants of growth (Frankel, 1962; Solow, 1956). Empirical evidences have shown the relationship between population and economic growth in a mixed manner and differ between countries. Levin and Renelt (1992) are of opinion that there exists negative relationship and insignificant. Mankiw et al. (1992) are of opinion supporting the negative and significant relationship, while Sachs and Warner (1997) support positive relationship. Population has been found to exhibit either a positive or a negative relationship with economic growth. Also, according to many literature reports, a positive and statistically significant impact of investment on economic growth is expected. Many studies in the literature have found human capital in growth studies because of its attractive nature to the investors, capability of absorbing ideas from the rest of the world, and enhance innovative contribution (Grossman & Helpman, 1991) and this is confirmed from the evidence of its positive relationship with economic

growth (Radelet, 2001), notwithstanding, Barro (2003) found negative relationship. Consequently, the effect of human capital could either be positive or negative. On the other hand, trade openness (OPEN) is suggested to boost productivity via transfer of knowledge and efficiency gains (Seghezza & Baldwin, 2008). Many studies in the literature found openness to impact the economic growth positively (Barro & Sala-i-Martin, 1995; Romer, 1992 [44]; Edwards, 1998). With regards to inflation rate (INFL), it has been argued that inflation is a good macroeconomic indicator of the economy if it is managed (Barro, 2003; Fisher, 1993). Low inflation brings about economic growth because, through the price mechanism, economies are able to allocate scarce resources to their best economic application (Rich, 1990). However, inflation could either be positive or negative as informed by the divided opinion on this. De Gregorio (1993), Friedman (1977, 1993), Bruno and Easterly (1998) are of opinion that inflation has a negative relationship with economic growth. He backs his claim with the cost of capital and reduction of capital accumulation and lowering its productivity, which will eventually bring about long-run growth, while Tobin (1965) argued that inflation can increase capital per head as households shift their assets away from real money balance, also Dotsey and Sarte (2000) are among the defenders of the inflation with opinion that it increases precautionary savings and, in response to higher expected inflation, the investment pool enhances economic growth.

4 | DATA

The current study uses annual data for Pakistan that span from 1970 to 2016 (i.e., a total of 44 annual survey) to investigate the dimension of historical specificity and to capture the underlying relationship between the external debt and growth with other controlled variables such as Trade openness, FDI, Human capital, Investment, population, Inflation, and debt services. We sourced our data from the World Bank's world development indicator (WDI). As mentioned earlier, we made use of per capita GDP at 2010 market prices, debt ratio to GDP as a measure of external debt, population as a measure of urban population, inflation as a measure of CPI 2010 constant, investment as measured by gross capital formation ratio to GDP(gcf/gdp), secondary school enrolment as a measure of human capital, trade openness (exp + imp/gdp), foreign direct investment (FDI), and debt services. The definition and summary of the variables are presented in Table 1 below.

4.1 | Analytical framework and data description

The analytical framework used in this study involves the augmented Dickey–Fuller (ADF) Test for unit root, VAR Lag Order Selection Criteria for Optimal lag selection criteria, descriptive statistics for the identification of the mean, minimum, and maxim range of the variables, autoregressive distributed lag (ARDL) bound test (both short run and long run) were utilized in the work as proposed by Pesaran et al. (2001) to measure both long run and short run relationship between economic growth and debt. We adopt this because of the mixture of our unit root test result (i.e., 1(0) and 1(1)) and also because of the moderate number of our observation at 44.

TABLE 1 Variables and their measurements

Full description of the variable	Short name of the variable	Measurement/ Calculation
Real GDP per capita	GDP	Constant 2010 US dollars (ΔlogGDP)
Trade Openness	OPEN	Exp + Import/GDP
External Debt	LNDEBT	Debt/GDP
Inflation	LNINF	ΔlogCPI
Human Capital	LNCAP	Secondary School Enrolment %
Urban Population	LNPOP	ΔlogPop
Foreign Direct Invest Inflow	FDI	FDI%GDD
Investment	LNINV	GCF/GDP%
Debts servicing	LNDS	Debt service on external debt

Source: Author's compilation.

4.2 | Empirical model and specification: ARDL-bounds testing approach

For the proper model specification and to reduce the likelihood of arriving at misleading or spurious results, it is essential to survey the time series features of the data by testing for the cointegration. This also includes tests for the order of integration of the variables. The augmented Dickey–Fuller (ADF) tests for unit roots show that all variables are integrated to the order of one 1(1), or are nonstationary, (the details and results are excluded in the text because of space constraint, see Appendix A for the details and result).

After the ADF result, we found a mixture of the stationarity, and following this, we consider ARDL appropriate techniques for this analysis, which we adopt because of the mixture of our unit root test result (i.e., 1(0) and 1(1)) and also because of the insensitivity of number of our observation at 44 (see Pesaran et al., 2001).

The econometric specification of ARDL equation can be written as follows:

$$Y = C + B_1 ED_Y + B_2 OPN + B_3 FDI + B_4 CAP + B_5 INV + B_6 INFL + B_7 POP + B_8 DS + + \in t, \quad (2)$$

where Y is the log of GDP, ED_Y is log of external debt, OPEN is trade openness, FDI is the FDI inflow, CAP is the log of human capital, INV is the log of investment, INFL is the log of inflation, POP is the log of

population, and DS is the log of debt service, and ∈t is the error term. B_2, B_3, B_4, B_5, B_6, B_7, *and* B_8 are the coefficients, respectively. Equation (2) is formulated into ARDL equation. Further expression and specification of the ARDL model are the expansion of the model into ARDL long run and short run model. The long-run relationship between GDP and the external debt is represented in Equation (3) while the short-run relationship between the external debt and GDP is represented in Equation (4). Hence,

$$Y_t = C + B_1 y_{t-1} B_2 ED\_y_{t-1} + B_3 OPEN_{t-1} + B_4 FDI_{t-1} + B_5 CAP_{t-1} + B_6 INV_{t-1} + B_7 INFL_{t-1} + B_8 POP_{t-1} + B_9 DS_{t-1} + + \in t \quad (3)$$

$$\Delta Y_t = C + a_1 \sum_{i=1}^{n} \Delta y_{t-1}\, a_j \sum_{j=1}^{n} \Delta ED_{y_{t-j}} + a_k \sum_{k=1}^{n} \Delta OPEN_{t-1} + a_l \sum_{l=1}^{n} \Delta FDI_{t-l} + a_m \sum_{m=1}^{n} \Delta CAP_{t-m} + a_n \sum_{n=1}^{n} \Delta INV_{t-n} + a_o \sum_{o=1}^{n} \Delta INFL_{t-o} + a_p \sum_{p=1}^{n} \Delta POP_{t-p} + a_q \sum_{q=1}^{n} \Delta DS_{t-q} + ECM_{t-1} + \in t, \quad (4)$$

where the parameters in Equation (3) are as follows: B_1,B_2, B_3, B_4, B_5, B_6, B_7, *and* $B_8$are long-run coefficients, while in Equation (4): a_1,a_j, a_k, a_l, a_m, a_n,a_o, a_p, *and* $a_q$are the short-run coefficients. In Equation (4), Δ

TABLE 2 Descriptive statistics of the variables

Variables	LNGDP	LNDEBT	OPEN	FDI	LNCAP	INV	INFL	POP	LNDS
Mean	774.83	31,786	19.018	0.7559	60.519	22,495	41.520	39,095	1.8000
Median	794.62	31,358	17.839	0.5685	60.898	23,868	24.028	36,576	2.0000
Maximum	1178.7	61,670	36.557	3.6683	66.481	30,216	150.75	75,782	4.1000
Minimum	453.79	72,012.	9.0609	−0.0632	52.837	13,338	2.8915	14,416	1.7300
SD	216.44	15,908	5.6033	0.8049	3.9177	48,878.	42.799	18,069	1.1700
Skewness	0.1010	0.3049	1.3239	2.1652	−0.2447	−0.4854	1.3050	0.3934	0.0813
Kurtosis	1.8570	2.1020	4.9839	7.6058	1.9461	2.0230	3.5659	1.9981	1.7972
Jarque–Bera	2.6381	2.3074	21.438***	78.266***	2.6440	3.7149	13.969***	3.1781	2.8847
Probability	0.2673	0.3154	0.0000	0.0000	0.2665	0.1560	0.0009	0.2041	0.2363
Sum	36,417.	1.4900	893.85	35.530	2844.3	1.0600	1951.4	1.8400	8.4700
Sum Sq. Dev.	21,550.	1.1600	1444.2	29.805	706.06	1.1000	84,263.	1.5000	6.2800
Observations	47	47	47	47	47	47	47	47	47

*, **, and *** signify statistical significance at 10%, 5%, and 1%, respectively.
Source: Authors own computation.

TABLE 3 Bound F-tests showing evidence from cointegration

Country	F-statistic value	Lag length	Bound critical values		
			significant	I(0)	I(1)
Pakistan	8.975905	3	1%	2.79	4.1
		3	2.5%	2.48	3.7
		3	5%	2.22	3.39
		3	10%	1.95	3.06
K = 8	observations = 47				
R^2 = 0.999839	F-statistics = 2400.275				

TABLE 4 Bound T-tests showing evidence from cointegration

Country	T-statistic value	Lag length	Bound critical values		
			significant	I(0)	I(1)
Pakistan	−11.60339	3	1%	−3.43	−5.37
		3	2.5%	−3.13	−5.02
		3	5%	−2.86	−4.72
		3	10%	−2.57	−4.4
K = 8	observations = 47				
R^2 = 0.965443	F-statistics = 24.29392				

TABLE 5 Test for ARDL specification

Long-run equation results					Short-run equation results				
ARDL model (1, 3, 3, 3, 2, 2, 3, 3, 3)					ARDL model (1, 3, 3, 3, 2, 2, 3, 3, 3)				
Variable	Coefficient	SE	t-statistics	prob	Variable	Coefficient	SE	t-statistics	prob
c	−3716.9	1746.8	−2.127	0.0548*	c	−3716.9	1746.8	−2.127	0.0548
LNDEBT	−9.33	1.89	−4.92	0.0004***	D(LNDEBT)	−3.40	5.92	−5.741	0.0001***
OPEN	5.753	0.888	6.477	0.0000***	D(LNDEBT[−1])	7.04E	6.70E	10.51	0.0000***
FDI	−7.715	11.12	−0.693	0.5011*	D(OPEN)	0.60	0.255	2.365	0.0357**
LNCAP	5.75	2.23	2.465	0.0297**	D(FDI)	10.62	2.935	5.069	0.0000**
LNINV	−4.16E	2.99E	−1.390	0.1896	D(FDI[−1])	12.97	4.172	6.05	0.0000***
LNINF	0.246	1.226	0.200	0.8443	D(LNCAP)	13.7	4.46	3.66	0.0000***
LNPOP	8.20E	3.71E	0.220	0.8291	D(LNINV)	6.25	8.11	0.771	0.4554
LNDS	4.41E	7.25E	0.608	0.5543	D(LNINV[−1])	5.00	8.45	5.915	0.0001***
					D(LNINF)	−3.40	0.793	−4.297	0.0000***
					D(LNPOP)	0.001	5.77	1.912	0.0799*
					LNPOP(−1)	−0.001	0.001	−1.455	0.1711
c	−3716.9	1746.8	−2.127	0.0548	D(LNDS)	1.23	2.06	5.970	0.0001***
Speed of Adjustment **ECT (−1)***	−1.200790	0.103486	−11.60339	0.0000	c	−3716.9	317.8	−11.69	0.0000
Dependent Variable	GDP								
R-Square	0.999				Dependent Variable	GDP			
Adjusted R-Square	0.999				R-Square	0.999			
F-statistics	2400.3				Adjusted R-Square	0.999			
Prob	0.000000				F-statistics	24.29			
LM Test					Prob	0.000000			
DW-Stat					LM Test				
					DW-Stat				

*, **, and*** signify statistical significance at10%, 5%, and 1%, respectively.
Source: Authors computation.

represents the first difference of variables while ECM_{t-1} shows the speed of adjustment over the long run. Before estimating the ARDL model, it is necessary to check the long-run relationship between the underlying variables using bound testing procedure.

The null hypothesis of the specified model of no cointegration is given as follows:

Ho: $a_{1=}a_j = a_k = a_l = a_m = a_{n=}a_o = a_p = a_q = 0$ against the alternative by comparing the estimated F-statistics with critical lower and upper bound values detailed below. The bound testing is always representing Wald test or F-test that is carried out for checking long-run relationship. The calculated F-test value through bound testing procedure is compared to the estimated critical values (Pesaran et al., 2001). If the estimated value of f-test is greater than the tabulated value, then there exists long-run relationship between variables, hence the null hypothesis of no cointegration is rejected. Alternatively, we fail to reject the null hypothesis of no cointegration when the F-statistics is lesser than the lower bound critical value, and an inconclusive result is noticeable when the F-statistics is between the two (upper and lower) bounds critical values. The approach of the employed ARDL-bound test model uses a more general expression of the conditional error correction model (ECM). This is combined with the option of imposing a restriction on intercept, trend, and/or both as shown in the general model of Equation (4) expressed in the above specification.

4.2.1 | Long-Run Relationship Estimation

Before estimating the long-run association between the variables, we carried out bound testing to check whether there is existence of long-run liaisons between variables. Upon this, we estimate the optimal lag selection criteria. The lag selection criterion is based on Akaike Information criteria (AIC), see Appendix A. The results of bound testing are presented in Tables 3 and 4. The analyses are carried out by tabulating both F&T-statistics values for the model. The estimations show that both

TABLE 6 Pairwise granger causality tests (Short-run causality test result)

Null hypothesis	F-stat	*p*-value	Causality	Direction
LNDEBT→LNGDP	2.07856	0.1197	YES	UNI-DIRECTION
LNGDP→LNDEBT	9.44900	9.E-05***		
OPEN→LNGDP	0.55796	0.6461	NO	INDEPENDENT
LNGDP→OPEN	1.31441	0.2843		
FDI→LNGDP	2.68445	0.0607*	YES	BI-DIRECTION
LNGDP→FDI	4.74576	0.0067***		
INV→LNGDP	0.66670	0.5779	YES	UNI-DIRECTION
LNGDP→INV	10.4807	4.E-05***		
LNCAP →LNGDP	3.15743	0.0360**	YES	BI-DIRECTION
LNGDP→ LNCAP	5.50860	0.0031***		
OPEN→LNDEBT	0.94132	0.4305	NO	INDEPENDENT
LNDEBT→OPEN	1.38680	0.2620		
FDI→LNDEBT	6.34417	0.0014***	YES	BI-DIRECTION
LNDEBT →FDI	3.09545	0.0385**		
FDI→OPEN	2.38772	0.0845*	YES	UNI-DIRECTION
OPEN →FDI	0.75037	0.5291		
INV→LNDEBT	3.34181	0.0313**	YES	BI-DIRECTION
LNDEBT→INV	3.14011	0.0387**		
LNCAP→ LNDEBT	3.71942	0.0196**	YES	BI-DIRECTION
LNDEBT→LNCAP	11.6543	2.E-05***		
INV→OPEN	2.87499	0.0491**	YES	UNI-DRETON
OPEN→INV	2.19514	0.1050		
LNCAP→ OPEN	3.98641	0.0148**	YES	UNI-DRETON
OPN→LNCAP	0.18977	0.9027		
LNCAP→ FDI	2.16081	0.1091	YES	UNI-DRETON
FDI→LNCAP	24.9031	5.E-09***		
INV→FDI	1.41246	0.2545	YES	UNI-DRETON
FDI→INV	7.11008	0.0007***		

*, **, and*** signify statistical significance at 10%, 5%, and 1%, respectively.
Source: Author's own computation.

F&T-statistics are higher than both the upper and lower bounds, and hence according to Pesaran et al. (2001), there is a long-term equation and relationship between the variables in the model. Hence, we can now analyze the long-run and short-run relationship using the ARDL model. The result is presented in Table 5 while the analyses are presented on the section of empirical results and discussion.

4.2.2 | Causality Test

Although the cointegration, which the author has estimated with the ARDL-bound approach, confirmed the presence of causality, it is limited in determining the direction of the causality or transmission. This gives the author the sense of testing further the model with Granger causality test to ascertain the transmission direction of the choice variables, which will aid in forming the policy for remedial and sustainability of the economic growth of Pakistan.

The causality is referred to as the ability of one variable to predict and cause variables. If two stationary variables, for example, Debt and GDP, affect or cause each other, the relationship can be captured by a VAR model. There are three possible kinds of causation that are likely to occur. They are unidirectional causality, a one-way transmission (i.e., GDP Granger cause Debt or Debt granger cause GDP). A bi-directional causality, a two-way transmission (i.e., GDP Granger cause debt and debt also Granger cause GDP) and finally, independence, no transmission (i.e., GDP does not Granger cause debt and vice versa.

The theoretical view of Granger causality is expressed with the Gregory and Hansen (1996) model. This is a two-stage estimation process, of which the first step is to estimate the following multiple regression:

$$z_{1t} = c + \beta_t + \gamma \Delta U_t(\lambda) + \theta_i z_{2t} + E_t, \quad (5)$$

where z_{1t} and z_{2t} are of 1(1) and z_{2t} is a variable or a set of variables; and $\Delta U_t(\lambda)$ =1 for t > $T\lambda$, otherwise $\Delta U_t(\lambda)$ =0; λ=T_B/T represents the location where the structural break lies; T is the sample size; T_B is the date when the structural break occurred. The second step is to test if E_t in Equation (6) is of 1(0) or 1(1) via ADF technique. If E_t is found to be consistent with 1(1), it will be assumed that cointegration exists between z_{1t} and z_{2t}. Once the statistical property of E_t is confirmed, one can adopt the bivariate VAR model to test the Granger causality. Also, if the cointegration is found between z_{1t} and z_{2t}, an error correction term is required in testing Granger causality, which is shown as follows:

$$\Delta z_{1t} = \alpha_0 + \delta_1(\Delta z_{1t-1} - y\Delta z_{2t-1}) + \sum_{i=1}^{k} a_{1i}\Delta z_{1t-1} + \sum_{i=1}^{k} a_{2i}\Delta z_{2t-1} + E_{1t} \quad (6)$$

$$\Delta z_{2t} = \beta_0 + \delta_2(\Delta z_{1t-1} - y\Delta z_{2t-1}) + \sum_{i=1}^{k} \beta_{1i}\Delta z_{1t-1} + \sum_{i=1}^{k} \beta_{2i}\Delta z_{2t-1} + E_{2t}, \quad (7)$$

where δ_1 and δ_2 represent speed of adjustment. According to Engle and Granger (1987), the existence of the cointegration implies a causality among the set of variables as shown by [δ_1] + [δ_2] > 0. Failing to reject H_0: $a_{21} = a_{22} = \ldots a_{2k} = 0$ and $\delta_1 = 0$ implies that LNDEBT do not Granger cause GDP while failing to reject H_0: $\beta_{11} = \beta_{12} = \ldots \beta_{1k} = 0$ and $\delta_2 = 0$ indicates GDP does not Granger cause LNDEBT. Hence, to test whether LDEBT Grange cause GDP, we examine the null hypothesis H_0: $a_{21} = a_{22} = \ldots a_{2k} = 0$ and $\delta_1 = 0$. Conversely, to test if GDP Granger cause LNDEBT, the author examines H_0: $\beta_{11} = \beta_{12} = \ldots \beta_{1k} = 0$ and $\delta_2 = 0$ Hence, we noticed that including the error correction terms does not alter the lead–lag relations noticeably [Equations (6) and (7) in Table 5], even at the lead–lag there is confirmation of causality between the LNDEBT and GDP, and for this, the author fails to accept the two hypothesis that there is no Granger causality among the two variables. This is just for the LNDEBT and GDP. We equally tested for other variables, and interestingly we found Granger causality between GDP and all the variables in the short run. Even to the extent of first lag of some of the variables (FDI, INV, and POP). Both estimated δ_1 and δ_2 are significant and with expected negative sign suggesting a long-term equilibrium relations among the author's choice variables. More details of the result are given in the empirical result and discussion section.

For consistency, in the finding that causality exists from LNDEBT to GDP, the author applied the pairwise Granger causality test, which also

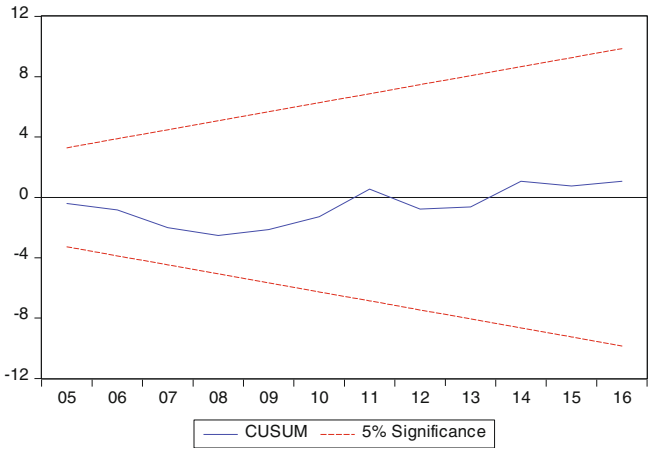

FIGURE 1 Plot of cumulative sum of recursive residuals

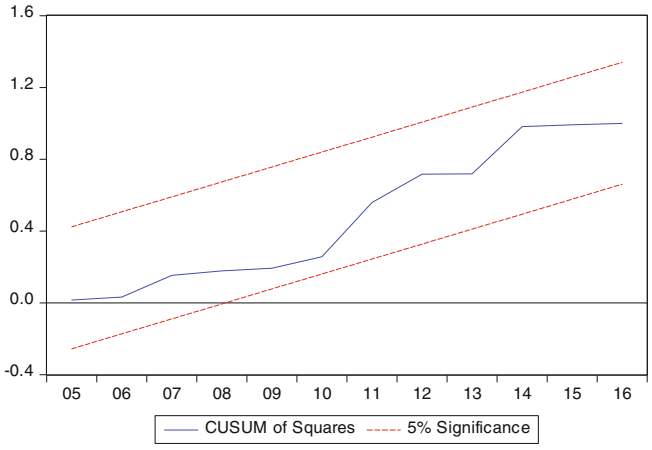

FIGURE 2 Plot of cumulative sum of square of recursive residuals

serves as a robust check to the findings from the error correction estimate. Hence, the pairwise granger causality test is displayed in Table 6 below.

4.3 | Diagnostic tests

In order to be sure that the study and its estimations are free from any form of wrong analyses or misspecification, which will eventually lead to a spurious result, we check the reliability of the short-run and long-run ARDL model, which we performed two important tests: (a) cumulative sum (CUSUM) tests and (b) cumulative sum of square test on residuals of the model. The finding from the tests established in Figure 1 clearly shows the evidence that the critical values lies under 5% level of significance of cumulative sum test. Similarly, CUSUM square is also between 5% level of significance level, which reveals that the model is fit as shown in Figure 2.

5 | EMPIRICAL RESULTS AND DISCUSSION

From Table 2, it is observed that apart from OPEN, FDI, and INF, every other variable strongly accepts the null hypothesis for normality. In the statistical tabulation, the dynamic nature of trade openness as regards to composition of export and import is not far from this obvious non-normality in open, and this is quite indicative of the obvious disparity between the maximum and minimum values of the variable and the other two (FDI and INF) variables that are not normally distributed. The non-normality of the few variables as seen from Table 3 should not be a threat to the model, hence the stability result from the CUSUM confirms the fitness of the model. Estimates of the bound tests shown in Tables 4 and 5 indicate a strong rejection for the null hypothesis of no cointegration at lower (1 0) and upper (1 1) bound of 1% significant level. For the selected model ARDL (1,3,3,3.,2,2,3,3,3) from Equation (4), both F-statistics of 8.975905 and T-statistics of 11.60339 are, respectively, greater than both lower (1 0) and upper (1 1) in both tests. This implies strong cointegration evidence in the model where GDP is the dependent variable. A speed of adjustment (indicated by error correction term) to long run in a situation of disequilibrium is 11.6 (pro = 0.000) at 1% significance level. The DEBT shows a negative relationship with GDP at 1% significance level in the short and long run. It implies that a percent point increase in DEBT will significantly cause −3.4% and −9.3% decrease in GDP in short run and long run, respectively. This is in support of many theoretical studies in the literature such as Akram (2011), Ramzan and Ahmad (2014). The OPEN shows a positive relationship with GDP at 5% significant level in the short run and at 1% in the long run. Considering the coefficients, it implies that a percent point increase in trade openness (OPEN) will lead to 0.61% increase in GDP in the short run and 5.8% increase in GDP in the long run. This is in consonance with the work of Fetahi-Vehapi et al. (2015) and Sikwila et al. () but not in support of Musila et al. (2015). As for FDI, it shows a positive relationship in the short run at 1% significant level but negative in the long run, though not significant. This result supports the findings of Udemba (2019a for China and Nigeria; 2020a, b for Nigeria and India); Udemba et al. (2019) for Indonesia and Udemba et al. (2020) for China and Udemba and Agha (2020) for Nigeria. Also, human capital (LNCAP) has a positive relationship with GDP both at short run and long run at 1%and 5%, respectively. At the same time, investment (LNINV) shows a positive relationship with the GDP but not significant while it shows a positive and significant relationship with GDP in the first lag of the short run at 1% significance, but negative and significant relationship in the long run. The inflation (INFL) has a negative and significant relationship with the GDP at 1% in the short run, while it shows positive and insignificant relationship in the long run with GDP. Population (LNPOP) shows a positive and significant relationship with the GDP at 10% but weak negative and significant in the first lag of the short run, while in the long run, it shows positive but insignificant relationship with GDP. The debt services (LNDS) show positive relationship with the GDP both in the short run and long run but significant in the short run while it remains insignificant in the long run.

The findings in this study have confirmed the cost implication of the external debt to Pakistan's economy. Thus, showing significantly negative relationship with the economic growth, both in the short and long run, which is in agreement the advocates of the negativity of debt to the economic growth (Akram, 2011; Ramzan & Ahmad, 2014). This is a pointer that debt burden is among the compounding forces working against the economic performance of Pakistan's economy.

From Table 6, we can see the Granger causality output almost tally with short-run causality, which is shown in the ARDL short-run result. There is a one-way causality without feedback that exist between LNDEBT and LNGDP; INV and LNGDP; FDI and OPEN; INV and OPEN; LNCAP and OPEN; LNCAP and FDI; INV and FDI, while a two-way causality exists with feedback between FDI and LNGDP; LNCAP and LNGDP; FDI and LNDEBT; INV and LNDEBT; LNCAP and LNDEBT. Additionally, we fail to reject the null hypothesis of the residuals tests of the models, an indication of strong reliability with the results shown in the bottom part of Table 5. The constant is significant, which means that other variables are also impacting on the economic growth. The higher value of R-square shows that the model is a good fit. The F-statistics is significant and revealed goodness of fit of the model.

6 | CONCLUSION AND POLICY IMPLICATION

This study investigates the current situation of Pakistan's economic performance amid high external debts. This can be seen from the expositions of the top government officials from the front page of Xinhua net, on September 11, 2018. The Prime minister stated categorically that Pakistan is in worst economic condition and vow to take measures to relieve the strain on the economy by the country's foreign debt, which is over 95 billion U.S dollars. Our findings in this study revealed and affirmed the statement attributed to the Prime minister of Pakistan. Our findings revealed a negative relationship between the external (foreign)

debt and the economic growth of Pakistan at 1% significant level both in the short run and long run. This shows a misplacement of priority in the utilization of the external loan to the country.

By policy implication, Pakistan's economy needs urgent attention in bringing it back to the minimum level of growth and sustainability. This is confirmed by the speech of the Prime minister. Also, the Speaker Asad Qaser stated that the top-most priority is a strong economy. In order to achieve this, Prime Minister Imran Khan took a bold step of forming an 18-member Economic Advisory Council, which includes economic experts from Pakistan, Britain, and United States, with the purpose of providing economic advice to the government of Pakistan (Xin, 2018). Among the advice provided are; the need to increase exports, rapid industrialization, high GDP growth rate, and modernization of agricultural sector to boost the economy.

Pakistan's economy is revivable if the economic policy should be channeled toward harnessing and maximizing the potentials of the variables found positively related to the GDP. Pakistan government should pursue export-growth led policy as rightly suggested by the newly formulated economic council by Pakistan. This is in support of Kaaray (2001), who is of opinion that trade, when liberalized, impacts positively to the positive economic performance of a country, thereby impacting the GDP growth positively. Also, effort should be made in attracting foreign investors as their impacts are revealed to positively impact the economic growth of the country. Among the factors that attract FDI is human capital, which is also found positive in our study here. Even Anyanwu (2012) found that among the drivers of FDI is a traceable good robust economic growth rate and human capital, which he observed in the economy of East and South African regions. Also, among the important policies needed to adopt is utilizing and boosting of the investment, which is also found positively related to the economic growth of Pakistan. According to traditional Keynesian theory, as part of GDP, government investment should enhance and promote economic growth. Thus, an expansion of government investment would promote economic growth in the short run through the provision of infrastructure and complementary public goods, whose positive externality can effectively improve the investment environment for the private sector.

Basically from the findings, it is observed that the debt swelling is of hurting effect to the economy. The policy implication should be framed around encouraging the trade openness but with care as the first lag is depicting negative impact, FDI must be encouraged with an eye on its long-term impact on the economy, and finally, investment should be given maximum attention in order to crowd out the effect of external debt in the economy.

With the findings in this work and adherence to the highlighted policy implications here, Pakistan economy would be made strong and vibrant.

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CONFLICT OF INTEREST

I wish to disclose here that there are no potential conflicts of interest at any level of this study.

ETHICAL STATEMENT

We confirmed that this manuscript has not been published elsewhere and is not under consideration by another journal. In addition, we also confirmed that this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. We have no conflicts of interest to disclose. Ethical approval and informed consent are not applicable for this study.

DATA AVAILABILITY STATEMENT

The data of the study will be made available through the corresponding author only request.

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APPENDIX

The author focuses on a time series study of Pakistan yearly data from 1970–2016 for accurate interpretation and justification of the findings of the study. This approach will and is likely to give an accurate idea of what underlies the debt-growth nexus in India.

Because of the obvious reason of the estimation approach, the appropriate econometric treatment of a model depends largely on the pattern of stationarity and non-stationarity of the variables under study. For a clear decision of the estimation approach, we first test for the order of integration of the variables with the Augmented Dickey Fuller (ADF) tests. This is a crucial step considering the non-stationarity of most macroeconomics data exhibit, and to ensure that all the variables in the regression equation have one form of order of stationarity or the other. This will form the order that inform the authors decision on the estimation approach to undertake. Whether a single variate equation or multivariate equation, whether Ordinary Least Square (OLS), Autoregressive Distribution Lag (ARDL), Vector Autoregressive (VAR) or Vector Error Correction Model (VECM). If the unit root test ascertains stationary of the variables at levels 1 (0), OLS will be the nicest approach to apply; if there is a mixture of stationarity at levels 1(0) and first difference 1(1), the estimation approach can take up ARDL; but if the stationarity is only ascertained at first difference 1(1), then, the best option can be VAR or VECM depends on the cointegration result. The results fail to rejects the null hypothesis of unit root in all the variables (LNGDP, LNDEBT, OPEN, FDI, INVEST, CAPITAL, LNPOP, LNDS and INFL) at conventional significance levels, suggesting that these variables can be treated as mix results of 1(0) and 1(1). The result can be seen in the following table:

Augmented Dickey–Fuller (ADF) test result

Variables	ADF@level	Critical value @ 5%	ADF @ First difference	Critical value @ 5%	Status
LNGDP	−2.727345	−3.513075	−4.369974	−3.513075	I (1)
LNDEBT	−4.539146	−3.533083			I (0)
LNDS	−4.384709	−3.510740			I (0)
OPEN	−4.854264	−2.926622			I (0)
FDI	−2.831705	−2.928142	−4.660620	−2.928142	I (1)
LNINVEST	−2.215259	−3.510740	−6.774108	−3.513075	I (1)
CAPITAL	−5.764696	−3.515523			I (0)
LNPOP	2.654839	−2.603064			I (0)
INFLATION	4.441386	−3.536601			I (0)

VAR lag order selection criteria

VAR lag order selection criteria						
Endogenous variables: LNGDP LNDEBT OPEN FDI LNCAP LNINV LNINFLATION LNPOP LNDS						
Exogenous variables: C						
Date: 01/16/19 Time: 17:12						
Sample: 1970 2016						
Included observations: 44						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	−3650.983	NA	1.44e+61	166.3628	166.7278	166.4982
1	−2948.237	1086.062	8.24e+48	138.1017	141.7511	139.4551
2	−2722.459	256.5655	1.83e+46	131.5209	138.4549	134.0923
3	−2505.260	157.9628[a]	1.75e+44[a]	125.3300[a]	135.5485[a]	129.1195[a]

Abbreviations: AIC, Akaike information criterion; FPE, Final prediction error; HQ, Hannan–Quinn information criterion; LR, sequential modified LR test statistic (each test at 5% level); SC, Schwarz information criterion.
[a]Indicates lag order selected by the criterion.