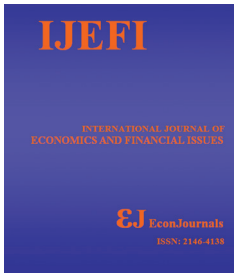

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Original Sin, Currency Depreciation and External Debt Burden: Evidence from India

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ABSTRACT

Indian Rupee has depreciated around 50% against the US Dollar for the last two decades. This depreciating trend generally does not call for any policy interventions as the conventional theories state that it is advantageous for the domestic economy through the competitiveness effect. However, depreciation is expected to increase the external debt burden when the country borrows abroad in foreign currency. At present, more than 63% of India's external debt is foreign currency-denominated. Given this, the ramifications of a depreciating rupee through the balance sheet channel invite greater attention. This paper makes an attempt to understand the impact that a depreciating Indian Rupee will have on India's external debt dynamics. To this end, we estimated an Autoregressive Distributed Lag (ARDL) model using quarterly data for the period 2001-2018. The empirical evidence shows that the depreciation of rupee increases external indebtedness significantly. In the short run, one rupee depreciation increases external debt to GDP ratio by 0.75% while in the long run, the increase is 1.26%. The study also finds a causal link between external debt and economic growth in the Indian context, which makes the depreciation - debt valuation problem highly relevant.

Keywords: External Debt, Original Sin, Balance Sheet Effect, Exchange Rate Depreciation, India
JEL Classifications: F30, F34, H63, H87

1. INTRODUCTION

Indian rupee has been experiencing a steady and continuous depreciation against most of the world hard currencies[1]. This trend may continue for some time as a result of depleting energy resources, increasing oil prices and the current trends of international trade. The central banks usually do not intervene when the currency value shows a depreciating trend. This non-interventionist policy is the result of the conventional belief that depreciation of domestic currency promotes trade and thereby economic growth. However, one of the major consequences of the depreciation is on country's foreign liabilities. When the country is supposed to settle its foreign liabilities in the foreign currency, the depreciation of domestic currency increases the debt burden in terms of its own domestic currency. Thus a depreciating Indian Rupee is costing the nation so much more than what India actually owes to its foreign creditors. In this context, this paper makes an attempt to understand the impact of exchange rate depreciation on India's external debt valuation and the implications it will have on India's growth ambitions.

Most of the countries, especially the developing and emerging economies that face saving constraint, consider foreign investments and external borrowings as the engines of economic growth. However, the attempts to raise funds from domestic or international financial markets particularly by emerging or developing economies are associated with certain inherent difficulties. One of such problems was highlighted by

1 Indian Rupee had lost around 16%, 19%, 15% and 12% against US dollar, Euro, Pound and Yen respectively just in the first three quarters of 2018.

Eichengreen and Hausmann (1999), which is known as original sin, the inability of a country to borrow abroad in its own currency. Later, Eichengreen et al. (2003) developed a measure to quantify original sin. To this end, they measured the inability of a country to borrow abroad in its own currency on a scale of 0 to 1 (where zero is the score given to a country that is able to issue all of its foreign liabilities in its own currency). Hausmann and Panizza (2010) states that the original sin had barely moved and went from 1 in 1993 to 0.96 in 2008 for all the developing, transition and emerging market countries, implying that these nations are far from a significant redemption.[2] According to the statistics the Latin American countries continued to suffer from original sin followed by the Asian nations, with median original sin scores of 0.99 and 0.95 respectively.

Given the original sin, many of the emerging and developing countries are compelled to borrow in foreign currency. India is also not an exception. In case of India, more than 63% of total external debt is denominated in foreign currencies. When the domestic currency depreciates, it increases the amount of repayment in terms of domestic currency and thereby the debtors should allocate more funds for debt redemption. A study by the State Bank of India (September, 2018) reported that at the current exchange rate India will have to pay an additional 68, 500 crores rupee to its foreign creditors only due to the depreciation of its domestic currency, which amounts to be 0.3% of India's current GDP. The report also states that most of India's external debt will come to maturity in the coming years. Hence the depreciation is supposed to increase the additional burden. Rolling over debt to postpone this additional burden is never a sustainable solution and will cast doubt on the intergenerational equity aspect of mounting debt.

At the same time, India experienced considerable amount of depreciation in the value of rupee. The theoretical arguments concerning the impact of an exchange rate depreciation on an economy surrounds mainly along the discussions on expenditure switching effect and balance sheet effect. Depreciation or devaluation of domestic currency is always sorted by economies worldwide as a potential instrument to stimulate export competitiveness. Arguments for a flexible exchange rate regime, advanced by Friedman (1953), Mundell (1961) and Fleming (1962), emphasize the expenditure switching effect. When countries face an adverse real shock, a nominal depreciation is expected to stabilise output by boosting net exports, it switches the demand to domestically produced goods. The famous Marshall-Lerner condition[3] also argued that, via competitiveness effect, (an increase in net export and at the same time reduction in import dependency) exchange rate depreciation can foster economic growth.

However, exchange rate depreciation can potentially have a negative impact on the economy through the wealth effect and/or the balance sheet effect (Céspedes et al., 2004; Cook, 2004; Choi and Cook, 2004; Devereux et al., 2006; Gertler et al., 2007). The wealth effect of exchange rate describes the influence of exchange rate movements on consumption and investment. Given a foreign currency denominated loan, the exchange rate depreciation results in a rise of the net present value of the liability expressed in domestic currency, which will in turn reduce the consumption and investment opportunities. Similarly, this can also have a negative impact on the availability of bank loans. Bordo et al. (2010) found that grater accumulation of hard currency debt are highly correlated with increased risk of debt or currency crisis, and at the same time it also lead to significant permanent output loss.

The relationship between exchange rate and external debt is multi-faceted. Certain studies report external debt as a significant determinant of exchange rate, few among those studies showed that the maladjustments of real exchange rates in sub-Saharan countries are due to mounting accumulation of the external debt (Mongardini, 1998; Lane and Milesi-Ferreti, 2000; Bunescu, 2014). There are many other studies which argue that exchange rate plays a significant role in the accumulation of external debt which include Ferraro and Rosser, 1994; Barungi and Atingi, 2000; Roodman, 2001; Easterly, 2002; Bilquees, 2003; Bader and Magableh, 2009; Colombo, 2009; Awan et al., 2011; Imimole et al., 2014; Awan et al., 2015; Fida et al. (2012) reports a long-run cointegrating relationship between exchange rate and external debt.

This paper particularly focuses on the negative impact that exchange rate depreciation can have on the economy through balance sheet effect. This impact manifests through foreign currency liabilities and potential capital flight that a country might experience after devaluation. Advanced countries will issue their debt, (public or external) mostly in domestic currency (Panizza and Presbitero, 2012) and therefore there isn't much evidence from these countries on the ill effect of having high net foreign liabilities. The existing empirical studies have focussed on emerging and developing economies to study this phenomenon. Most of these studies concluded that the above said impact is more detrimental when there is a high composition of foreign currency denominated external debt. Devereux et al. (2001) finds that for emerging economy markets exchange rate depreciation increases foreign borrowing through nominal and real interest rate. Hargreaves et al. (2011) suggested exchange rate depreciation in New Zealand since external debt of the country was denominated primarily in New Zealand dollars. Hence, depreciation could have a significant and positive effect on the gross domestic product of this country, through increased export competitiveness and the negative effect through rising external debt burden was almost insignificant.

Carrera and Vergara (2012) conducted a study to understand the fiscal cost of a real exchange rate devaluation in five Latin American countries and found that, the fiscal adjustment needed after a devaluation will be greater if there is a large accumulation of foreign currency debt. Palić et al. (2018) analyses the long run impact of nominal exchange rate depreciation on external

2 Another measure of Original Sin (which was introduced to overcome the limitations of the initial measure) shifted its value to 0.82 in 2008.

3 Marshall-Lerner condition hypothesises that if the sum of import and export price elasticity is greater than unity, depreciation of currency will improve balance of trade, otherwise not.

indebtedness in the Croatian context and concludes that though there is a positive effect for exchange rate depreciation through competitiveness effect, it is not advisable for Croatia as it will increase the external debt burden of the country, since most of its external liabilities are denominated in foreign currency (particularly in euro). A finding similar to this was given by Neaime (2009) for Jordan; the country was suggested to continue to follow the fixed exchange rate policy to US dollar considering the external indebtedness trap awaited it otherwise.

Given this background, it is crucial to study the impact of this continuous exchange rate depreciation in the Indian context. India provides a good case, being a country that still suffers from the ill effects of original sin and the rupee depreciated around 50% since the last 18 years. Our study enriches the literature in this area in the following ways: firstly, to the best of our knowledge, there have been no studies on India so far analyzing the impact of depreciation on the valuation of external debt. Secondly, we use an Autoregressive Distributed Lag Model to quantify the impact of depreciation; this gives us an idea of both the short run and long run dynamics among the variables. Further the paper tries to examine whether there is any causal relationship between external debt and economic growth.

The remaining part of the paper is organized as follows: section 2 discuses India's External debt and exchange rate dynamics, section 3 deals with the determinants of external debt, details of data used and methodology implemented is described in section 4, section 5 combines the empirical results and discussion and section 6 provides the concluding remarks and policy suggestions.

2. INDIA'S EXTERNAL DEBT AND EXCHANGE RATE DYNAMICS

India's external borrowings have grown quite rapidly in the recent past. Raising fresh loans to overcome balance of payment obligations adds to country's external indebtedness. According to the Reserve Bank of India's external debt report published in June 2019, India's external debt stood at US$ 543 billion at end-March 2019. This records a 2.6% increase over its March 2018 level. India's external debt-to-GDP ratio was estimated to be 19.7%, lower than the estimate of 20.1% last year. Though the ratio seems to be pretty low compared to many emerging economies, the real burden of this debt in Rupee terms is around 37738 billion[4].

Most of India's external debt is non-government and are long term borrowings. Multilateral and bilateral borrowings, export credit, rupee debt, commercial borrowings, and NRI deposits are the main constituents of India's external debt; among these the last two has the dominant share. And the country's main lenders are international financial institutions like international monetary fund (IMF), international bank for reconstruction and development (IBRD), the international development association (IDA) and the international finance cooperation (IFC). These institutions give loans to member countries for a short term period covering temporary balance of payment difficulties and for long term to finance developmental projects. Many a times, in case of bilateral borrowings, external debt takes the form of a tied loan; that is the funds secured must be spent back into the nation that is providing the financing.

Figure 1 traces the path of India's external debt in its absolute value since 2004 (expressed both in terms Indian Rupee and US Dollar). The graph shows that India's external debt is displaying a rising trend, particularly the external debt in rupee terms had been considerably increasing, and the gap between debt expressed in Rupee terms and dollar terms is widening over the years. This point directly to the role exchange rate plays in determining the total external debt burden of the country. Though external debt is raised in different currencies, the US dollar is the international numeraire for expressing the total value of external debt of a country.[5] US Dollar, Japanese Yen, Euro and Sterling pound are the major foreign currencies in which India holds its external liabilities along with a small share of special drawing rights (SDR). The currency composition of India's external debt suggests that the US dollar continues to constitute the largest share of debt via 49.6% as on December 2018, followed by the Indian rupee (36.3%), SDR (5.1%), Japanese yen (4.9%), and Euro (3.1%). Other currencies accounted for the balance. Over the years there has been an increase in the Rupee denominated debt in India's total external debt. Total foreign currency denominated debt stood at 85.2% in 1994; it reached a peak in 1999 when almost 89% of India's external debt was denominated in foreign currencies. As on December 2018, foreign currencies constituted 63.7% of total external debt. This in turn provides room for an exchange rate shock via Rupee depreciation to increase the external debt burden of India significantly.

Rupee has lost more than 67% of its value against dollar since 2000 and in 2017 became the worst performing Asian currency. In the early 2000s the exchange rate of Indian Rupee was 43.5 per US dollar; it has witnessed a huge depreciation in the past 18 years to touch an unprecedented low of 73 in October 2018. Figure 2 traces the year on year growth rate in India's gross external debt (in rupee terms), the real effective exchange rate (REER)[6] and Rupee – US Dollar nominal exchange rate.[7] It is clear that all spikes in growth rates of external debt (in rupee terms) are associated with depreciation in the exchange rate of Indian rupee. Even though there are few years in which Rupee witnessed an appreciation, the magnitudes of those appreciations were very less compared to those of the depreciating episodes.

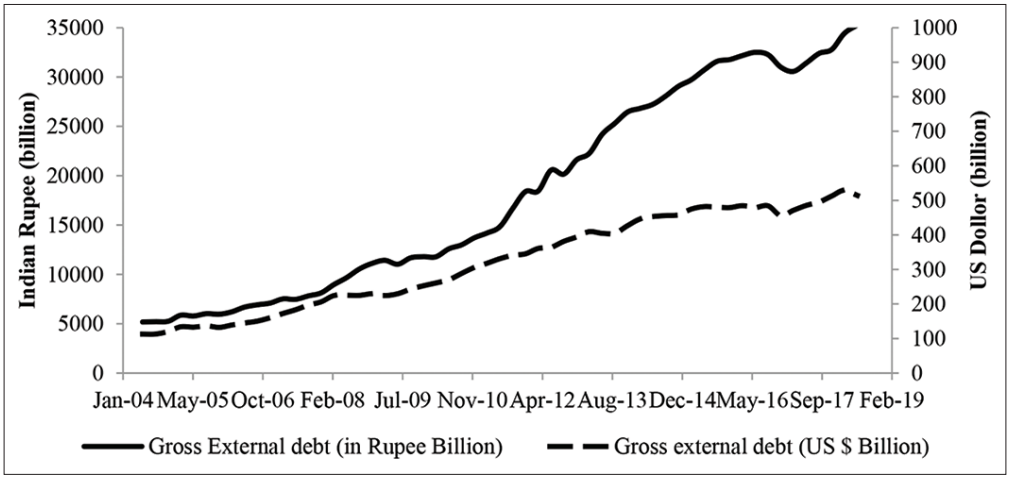
4 Calculation is based on the exchange rate of 69.5 Rupee per US dollar, as on July, 2019.

5 Since external debt is expressed in US dollar, there are valuation gains and losses that arises from the fluctuations of the US dollar over time vis-à-vis other major currencies. The external debt statistic reports issued by the RBI discuss about these impacts in detail. In this paper the valuation effect that we talk about is different; here it is about rupee losing (or gaining) its value vis-à-vis other major currencies including US dollar.

6 Calculations are based on the trade-weighted REER and NEER data (36 currency bilateral weights, Monthly Average); 2004-05 is considered as the base year for computations. By the construction of these indices a decline in the value of the index represents depreciation of Rupee and vice-versa.

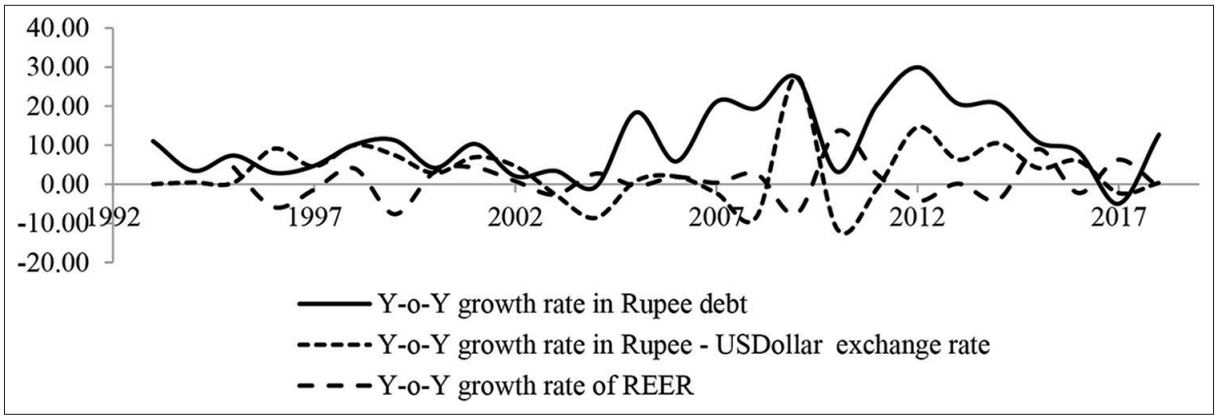
7 The y-o-y growth rate of Rupee-dollar exchange rate is calculated based on the end Month values of exchange rates. Here a positive change signifies depreciation of Rupee and vice-versa.

Figure 1: India's gross external debt



Source: Reserve bank of India's public debt statistics and CMIE economic outlook

Figure 2: Growth rates of external debt in rupee terms and exchange rates



Source: Public debt statistics and handbook of statistics on Indian economy, reserve bank of India

3. DETERMINANTS OF EXTERNAL DEBT

The theoretical model to explain the external debt burden of a country was originally developed via the dual gap theory (Chenery and Strout 1966). According to the theory a country will resort to external borrowing when there is a soaring savings – investment gap (domestic gap) and foreign exchange gap (external gap). Domestic gap implies that savings in a country is far less than its investment requirements, whereas external gap implies that countries lack enough foreign exchange to acquire capital goods mostly due to the lack of adequate export earnings. The determinants of these two gaps vary significantly and therefore as per the theory major determinants of external debt are the factors that contribute to the widening of these two gaps. This dual gap model was extended by Bacha (1990) to include one more constraint that countries face – fiscal gap. According to him, widening fiscal deficits as a result of high government expenditure requirements coupled with low taxable capacity in countries necessitate external borrowing.

The empirical studies that aimed at identifying the determinants of external debt shows that all the major factors established by them are in turn determinants of one of the three gaps mentioned above. Majority of the studies identify gross domestic product of a country or its growth rate as a major determinant of external indebtedness. There is no consensus among researchers on the impact GDP growth can have on external borrowing. Some argue that high output growth acts as a proxy for a country's ability to provide its foreign lenders with collateral, and therefore, the more the national income higher is the probabilities of getting external finance. Thus GDP growth affects external debt positively. On the other hand, higher GDP can also imply that funds from external sources are not necessary to finance country's expenditure requirements. At the same time it will also help in paying back the principal and interest, thereby reducing external debt. This implies that GDP can negatively impact external debt of a country. On the contrary lowering debt burden resulting from a rising GDP may also encourage new borrowings. Thus there is no certainty about the relationship between external debt and GDP growth rate.

Exchange rate of a country is identified as one other important determinants of external debt. Particularly relevant for countries with high foreign currency denominated debt. A depreciating currency will increases the external indebtedness for a country, as it will increase the debt burden in terms of domestic currency, whereas the opposite is expected to be true for countries with an appreciating currency. Thus the impact of exchange rate might vary significantly among countries. Studies also highlight that interest

rate is a significant factor in the determination of external debt. It is argued that higher interest rate reduces domestic investment opportunities, and the economic agents will resort to borrowing from abroad to raise funds. At the same time, higher interest burden on external debt will necessitate further borrowing to repay the accumulated debt. Therefore interest rate is expected to have a positive impact on external debt.

Foreign exchange reserve of a country is another important predictor of a country's foreign indebtedness. Higher foreign exchange reserves are seen as an alternative to external debt, which can in turn reduce the willingness to borrow. On the contrary, huge reserves may also signal an enhanced ability to manage debt as in some cases new debt may be used to build up reserves, hence, the effect of foreign reserves is ambiguous. Rising fiscal deficit of the governments is also expected to increase a countries external debt significantly.

While some studies consider trade openness as a major predictor of external gap, few other studies use current account balance or balance of payment position. A recurring deficit in the balance of payment will increase the need for external financing to fill the gap leading to higher debt obligations. Trade openness can have a positive or negative effect on external debt burden depending on the quantum of imports and exports. When exports are greater than imports trade openness reduces debt burden as higher level of trade ensures the availability of foreign currency for debt repayment; but if imports are greater than exports trade openness will lead to an increase in debt. In countries where imports are growing faster than exports the effect is expected to be positive. Thus economies that trade in higher volumes are expected to have higher level of external debt. Terms of trade also appears in many studies as a factor explaining external debt accumulation. An improvement in terms of trade is expected to reduce the external liabilities.

Many studies also consider inflation, the level of financial development in the country, foreign direct investment, the extent of capital flight, foreign aid, NRI remittances and debt service payments as factors that influence external debt position[8]. For the purpose of analysis in this study, we are considering the following variables, growth rate of GDP, interest rate, exchange rate, foreign exchange reserves, trade openness and fiscal deficit as the main determinants of external debt. The primary variable of interest here is exchange rate.

4. DATA AND METHODOLOGY

4.1. Data

This study uses time series data (quarterly) for the period 2001 Q1 to 2018 Q2. The data on all the variables are collected from the Reserve Bank of India's DBIE (Data Base on Indian Economy) and economic outlook data base of CMIE (Centre for Monitoring Indian Economy). The variables used in the study are External Debt to GDP ratio, Growth Rate (year on year) of Real GDP, interest rate on 91 day treasury bills, Nominal exchange rate of Indian rupee vis-à-vis US dollar, foreign exchange reserves, gross fiscal deficit as a percentage of GDP, and Trade openness. The months from January to March are referred as first quarter of a year in the analysis.

The variable external debt to GDP ratio(ED) is calculated through finding the ratio of quarterly external debt[9] and the corresponding quarter's Nominal GDP. Quarterly growth rate of real GDP (GR_t) is the year-on-year growth rate of GDP at factor cost (2004-05 base prices). Interest rate on 91 day treasury bills is considered as the proxy for interest rate (IR). The nominal exchange rate of Indian rupee against US dollar is the proxy for exchange rate; a one rupee increase in exchange rate implies depreciation of rupee. Foreign exchange reserves include India's foreign currency assets, Special drawing rights, Gold reserves and the International Monetary Fund tranche position. Trade openness is the ratio of absolute sum of imports and exports over corresponding quarter's Nominal GDP.

4.2. Econometric Methodology

In the earlier attempts to estimate the long run relationship among variables Engel and Granger proposed cointegration and error correction model (Granger, 1981; Engle and Grange, 1987; Johansen, 1991; 1995)). The fact that the initial methods had some inherent shortcomings and will be of less use when the variables are of different orders of integration, led to the development of more advanced models. Autoregressive distributed lag (ARDL) Model developed by Pesaran and Shin (1998), Pesaran et al. (1999), and Pesaran et al. (2001) solved some of the major problems that the existing cointegration technique had. For the purpose of our analysis we make use of the ARDL model to understand the relationship primarily between exchange rate and external debt along with all the other variables used in the estimation. This approach provides a method for assessing short run and long run effects of one variable on the other simultaneously by providing separates short run and long run coefficients.

Under ARDL estimation, the OLS estimators obtained for the short run parameters are consistent and asymptotically normal and also the corresponding estimators of the long run parameters are super consistent if the regressors are integrated at the first order I(1), along with being asymptotically normally distributed irrespective of the order of integration. And for this reason, ARDL model does not impose the restriction that all the data series under consideration should have the same order of integration. The variables can be integrated at first order I(1) or integrated of order zero I(0) or a mix of both I(0) and I(1). Additionally, endogeneity is less of a problem while using the ARDL technique because it is free of residual correlation and each of the underlying variable

8 For a detailed explation of various determinants of external debt, one can refer the following research papers: Hajivassiliou, 1987; Pohit, 1991; Ferarro et al., 1994; Atingi, 2000; Kemal, 2001; Roodman, 2001; Easterly, 2002; Bilquees, 2003; Selami, 2004; Tiruneh, 2004; Bader et al., 2009; Colombo, 2009; Awan et al., 2011; Forslund et al., 2011; Batool et al., 2012; Bittencourt, 2013; Imimole et al., 2014; Awan et al., 2015; Bittencourt, 2015; Chiminya et al., 2015; Lau et al., 2015; Qian et al., 2017; Waheed, 2017.

9 Gross external debt, is defined as the outstanding amount of those actual current, and not contingent, liabilities that require payment(s) of principal and/or interest by the debtor at some point(s) in the future and that are owed to non-residents by residents of an economy (External Debt Statistics - Guide for Compilers and Users, IMF, 2003). Here the external debt refers to both private and public external liabilities.

stands as a single equation. Pesaran et al. (1999) have shown that the ARDL method can distinguish between dependent and explanatory variables and the estimation is possible even when the explanatory variables are endogenous (Pesaran and Shin, 1998; Pesaran et al., 2001). Pesaran et al. (1999) also notes that ARDL estimators produce the true parameters as compared to Johansen and Juselius's cointegration technique in the case of small sample and coefficients from the ARDL estimators are super consistent in small sample sizes. Considering all these advantages, ARDL model is identified as the most appropriate method for the analysis. However, ARDL model requires the dependent variable to be integrated of order one and the explanatory variables to be integrated at an order which is not higher than one. All the variables in our model satisfy this condition.

A general representation of ARDL model $(p, q.... q)$ is the following:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \gamma_i Y_{t-i} + \sum_{i=0}^{q} \beta_i' X_{t-i} + u_t \quad (1)$$

Where Y_t is the dependent variable and X_t forms the set of independent variables (for simplicity assuming that q is the lag for all the variables in vector X_t and p is the lag taken by Y_t). The optimal lag order for p and q (which can possibly be different across regressors) can be chosen using any one of the lag length selection criteria. The error correction term (ECT) that is obtained post estimation is expected to be negative and represents the speed of adjustment of the dependent variable towards its equilibrium value.

To understand the long run cointegration relationship between exchange rate and external debt the following unrestricted error correction model (UECM) is estimated, where, ED refers to External debt to GDP ratio, GR is the growth rate of Indian economy, IR is the interest rate proxied using the interest rate on 91 day treasury bills, EX is the nominal exchange rate of Indian Rupee vis-à-vis US dollar, RE refers to the country's foreign exchange reserves, FD is the gross fiscal deficit to GDP ratio and OP refers to India's trade openness. The coefficients $\beta_i, \delta_i, \gamma_i, \pi_i, \lambda_i, \mu_i, \sigma_i$ captures short-run dynamics of the model; thetas are long-run coefficients and captures the long-run dynamics; and ε_t is the white noise error term. The procedure followed is to first estimate an unrestricted error correction model and if the variables have a long run relationship (which is estimated using bound test), we can proceed to estimating long run coefficients and the corresponding error correction model.

$$\begin{aligned}\Delta ED = {} & \alpha_0 + \alpha_1 t + \sum_{i=1}^{n1} (\beta_i \Delta ED_{t-i}) + \sum_{i=0}^{n2} (\delta_i \Delta GR_{t-i}) \\ & + \sum_{i=0}^{n3} (\gamma_i \Delta IR_{t-i}) + \sum_{i=0}^{n4} (\pi_i \Delta EX_{t-i}) + \sum_{i=0}^{n5} (\lambda_i \Delta RE_{t-i}) \\ & + \sum_{i=0}^{n6} (\mu_i \Delta FD_{t-i}) + \sum_{i=0}^{n7} (\sigma_i \Delta OP_{t-i}) + \theta_1 ED_{t-1} \\ & + \theta_2 GR_{t-1} + \theta_3 IR_{t-1} + \theta_4 EX_{t-1} + \theta_5 RE_{t-1} \\ & + \theta_6 FD_{t-1} + \theta_7 OP_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

The Bound test for cointegration is developed for testing the existence of a long run relationship based on the Error Correction representation of the underlying ARDL model. To this end, bound F statistic is computed for the joint null hypothesis that there exists no long run relationship among the variables.

$$H_0 : \theta_j = 0 \text{ for all } j \quad (3)$$

$$H_0 : \theta_j \neq 0 \text{ for atleast one } j \quad (4)$$

Pesaran et al. (2001) provide asymptotic critical values that span a band from all regressors being purely I(0) to all regressors being purely I(1). These critical values will vary based on the number of regressors, their order of integration and whether the ARDL model contains an intercept and/or trend components. Narayan (2005) has computed corresponding small sample critical values for various sample sizes. The existence of long run relationship is confirmed through rejecting the null hypothesis. If the computed F-statistic is greater than the upper-bound critical value then the null hypothesis of no long-run relationship is rejected in favour of the alternative hypothesis that there exists a long-run relationship. If F-statistics is less than the lower-bound critical values, the null hypothesis is accepted implying that there is no long-run relationship. And, if the F-statistics lies between the lower and upper bound critical values the test is inconclusive for the given level of significance.

5. EMPIRICAL RESULTS AND DISCUSSION

5.1. Unit Root Test

In order to understand the time series properties of the variables, we employed the augmented dickey fuller (ADF) test and Phillips Perron test. The results from these unit root tests are presented in Table 1. In order to employ the ARDL model the variables must have the order of integration of I(0) or I(1) or a they must be a mixture of both, the unit root test help in ensuring the same.

The results show that all the variables except growth rate of GDP are integrated of order one and GDP growth rate is stationary at level, all at 1% level of significance. The only contradiction is about the variable fiscal deficit, while ADF test reports it to be stationary at first difference, Phillips-Perron test shows that the variable is stationary at level. The fact that its order of integration is not more than one is enough for the estimation of ARDL. Thus, since we have a mixture of variables which are stationary at level or first difference, it provides a strong case for employing the ARDL model for our analysis.

5.2. Bound Test for Cointegration

After estimating the unrestricted ARDL model, bound test is carried out to estimate the existence of long run relationship among the variables. The results are reported in Table 2. The findings from Table 2 show that for the external debt specification that is under consideration, at all levels of significance the calculated F statistic value is greater than the upper bound critical values. This implies that there exist a long run relationship between external debt, economic growth rate, interest rate, exchange rate, foreign exchange reserves and trade openness in the Indian context.

5.3. External Debt Specification

Once the long run relationship between the variables is confirmed from the bound test, we estimated the short run and long run

Table 1: Results of unit root test

Variables	Augmented dickey-fuller test		Phillips-Perron test	
	Level	First difference	Level	First difference
ED	(0.601)	(0.005)***	(0.598)	(0.000)***
GR	(0.001)***	-	(0.001)***	-
IR	(0.139)	(0.000)***	(0.087)*	(0.000)***
EX	(0.985)	(0.000)***	(0.976)	(0.000)***
RE	(0.791)	(0.000)***	(0.737)	(0.000)***
FD	(0.140)	(0.000)***	(0.000)***	-
OP	(0.771)	(0.000)***	(0.746)	(0.000)***

P values are presented in the parenthesis. ***Indicates significance at 1% level. *Indicates significance at 10% level

Table 2: Results of the bounds test of cointegration

Significance level (%)	Critical value		Calculated F statistic
	Lower bound	Upper bound	
1	3.6	4.9	
5	2.87	4.0	14.63
10	2.53	3.59	

The Wald/F statistic and critical values for bounds test are proposed by Pesaran et al. (2001)

coefficients of the external debt specification using the coefficients of the unrestricted ARDL model. Table 3 summarises these short run and long run coefficients.

The long run results show that, in the long run one rupee depreciation in Rupee increases India's external debt to GDP ratio by 1.26%. The impact is humungous since India's external debt to GDP ratio is relatively a small number and an increase in it by 1.26% typically resulting from an exchange rate shock is worrisome. Most of the variables in the estimation are significant at 1% level of significance and the rest are significant at 5% level. The results are similar even in case of the short run analysis, one rupee depreciation in exchange rate increases external debt to GDP ratio by 0.75%. GDP growth rate is impacting external debt negatively. As growth rate increases by 1% external debt to GDP ratio declines by 1.65% and 0.29% respectively in the long run and short run. All the other variables such as interest rate, fiscal deficit, foreign exchange reserves and trade openness have a positive impact on the external debt to GDP ratio both in the long run and short run.

The signs of coefficients that are obtained from the analysis in case of each of the variables are consistent with the existing literature. The error correction term (ECM_{t-1}) shows that in every quarter 39% of the disequilibrium is corrected and thus external debt is expected to return to equilibrium in 3 quarters. The negative and statistically significant coefficient of the error correction term reinforces the existence of long run relationship.

The positive impact through the competitiveness effect of depreciation, by making domestic goods cheaper and foreign goods costlier can be seen as a successful strategy only if it outweighs the negative impact of balance sheet effect. According to conventional macroeconomics, a higher valued Indian Rupee makes the price of India's goods and services more expensive in competitive markets and thus those products will become less attractive to potential importers elsewhere. Panda et al. (2016) analysed whether depreciating Indian rupee is an effective way to improve

Table 3: Results from the Long run and short run analysis

Variables	Coefficient	t-Statistic
Long run coefficients		
Constant	−41.02	−2.07**
Trend	−2.86	−4.14***
GDP growth	−1.33	−2.54**
Interest rate	3.10	3.08***
Exchange rate	1.26	4.73***
Fiscal deficit	6.72	2.95***
Foreign exchange reserve	0.006	3.65***
Trade openness	1.75	4.04***
Short run coefficients: ARDL Model (4,2,4,1,3,2,4)		
Trend	−1.11	−5.94***
ΔED_{t-1}	−0.39	−4.38***
ΔED_{t-2}	−0.60	−8.67***
ΔED_{t-3}	−0.47	−6.36***
$\Delta GDP\ growth_{t}$	−0.28	−1.82*
$\Delta GDP\ growth_{t-1}$	0.23	1.66*
$\Delta Interest\ rate_{t}$	0.41	0.89
$\Delta Interest\ rate_{t-1}$	−0.51	−1.05
$\Delta Interest\ rate_{t-2}$	0.12	0.25
$\Delta Interest\ rate_{t-3}$	0.95	2.27**
$\Delta Exchange\ rate_{t}$	0.75	4.42***
$\Delta Fiscal\ deficit_{t}$	0.81	2.77***
$\Delta Fiscal\ deficit_{t-1}$	−0.79	−2.27**
$\Delta Fiscal\ deficit_{t-1}$	−0.40	−1.21
$\Delta Foreign\ exchange\ reserve_{t}$	0.003	5.23***
$\Delta Foreign\ exchange\ reserve_{t-1}$	−0.003	−3.41***
$\Delta Trade\ openness_{t}$	0.06	0.42
$\Delta Trade\ openness_{t-1}$	−0.24	−1.41
$\Delta Trade\ openness_{t-2}$	0.07	0.43
$\Delta Trade\ openness_{t-3}$	−0.46	−3.34***
ECM_{t-1}	−0.39	−4.86***

External debt as a ratio of GDP (ED) is the dependent variable. *, **, ***Indicates significance at 10, 5 and 1% levels respectively

the trade deficit with China. Using the data that cover around three decades the study rejects the validity of Marshall-Lerner condition for the Indian Economy and showed that there is no J curve effect for India. Veeramani (2007) opined competitiveness effect, though positive, has not been the major contributing factor to the acceleration in the growth rate of merchandise exports in recent years; though, exports have been adversely affected by the appreciation of the real effective exchange rate during the post-reform period. Apart from this India's export depends highly on its imported inputs thanks to the integration in to the global value chain; and depreciation acts as a punitive tax on imports. Adding to this the invoicing of India's international trade is done in foreign currency and this is a disadvantage for the exporters as it does not let the country's competitiveness to improve immediately

upon the depreciation of Indian Rupee (Gopinath, G., 2016). Given all these, should the Reserve Bank of India intervene to avoid the depreciation of Rupee is a larger question of overall macroeconomic management. But the existing literature doesn't support the case of a significant expenditure switching effect and hence it is important to address the immediate impact that arises through balance sheet effect.

5.4. Diagnostic Tests

The final specification satisfies all the diagnostic checks. We have tested for serial correlation using the LM test, the homoscedasticity of error terms using the White test for heteroscedasticity and undertook the Jarque–Bera (JB) test for normality of the residuals. Ramsey RESET test was carried out to check whether there is any specification error in our model. The Plot of cumulative sum of recursive residual (CUSUM) and Cumulative sum of square of recursive residual (CUSUMSQ) statistic indicates that there is no any misspecification or structural instability for the estimation period. The results of these tests and the plots of the residuals are shown in Table 4, Figures 3 and 4.

In the case of the LM test the null hypothesis is that there is no autocorrelation, our model does not suffer from serial autocorrelation since we fail to reject this null. Similarly, the null hypotheses for White test, JB test and Ramsey's RESET test are the error terms are homoskedastic, the distribution is normal and the functional form is correctly specified, respectively. With respect to all these tests the table shows that it is not possible to reject the null. The CUMSUM and CUMSUMQ (tests on the residuals) plots show that the estimated parameters are stable.

Figure 3: Plot of cumulative sum of recursive residual (CUSUM)

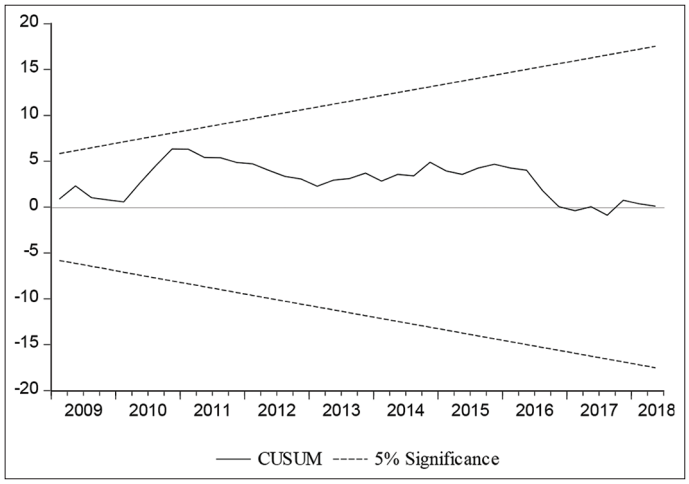
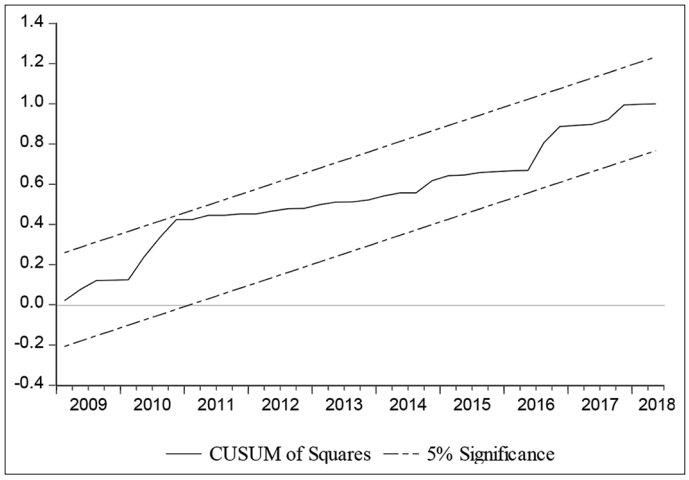


Figure 4: Plot of cumulative sum of square of recursive residual (CUSUMSQ)



5.5. Granger Causality Test

The results from ARDL model showed that there exists a long run relationship among the variables and the impact of exchange rate on external debt is significant in the short run as well. We conducted granger causality test to understand the causality among the variables. Table 5 reports the results.

The results show that exchange rate granger causes external debt and which in turn granger causes economic growth. This causality makes it clear that any change in external debt burden induced by exchange rate will have an impact on India's economic growth as well. There are various studies which establish a negative impact of external debt on economic growth, at times becomes operational beyond a threshold. This highlights the importance of the issue that the paper is concerned about.

6. CONCLUSION AND POLICY IMPLICATIONS

The paper made an attempt to understand the impact of a continuing depreciation of Indian Rupee on India's External indebtedness. The study is relevant since more than 63% of country's external debt is denominated in foreign currency, even though India is able to maintain a low External debt to GDP ratio of around 20%. Using quarterly data between 2001 Q1 to 2018 Q2, the results obtained from an autoregressive distributed lag (ARDL) Model showed that exchange rate, interest rate, fiscal deficit, foreign exchange reserves and trade openness impact external debt positively and significantly. At the same time, economic growth has a negative impact on external debt to GDP ratio. The positive impact of exchange rate on external debt implies that, exchange rate depreciation comes with a higher cost on the economy; it is increasing the external indebtedness of the country through

Table 4: Results of diagnostic tests

Test statistic	F statistic	Probability value
Breusch-Godfrey serial correlation LM test	0.269	0.766
White test for heteroscedasticity	0.924	0.578
Ramsey's RESET for functional form	0.589	0.448
Jarque–Bera test for normality	0.373	0.829

Table 5: Granger causality test results

	EXR	GR	ED
Exchange rate (EXR)	-	0.09	0.00
Growth rate of GDP (GR)	0.93	-	0.41
External debt to GDP ratio (ED)	0.78	0.05	-

Values given in the table are P values

Table 6: Emerging economies external debt and exchange rate scenario

Country	Gross ED (in US $ billion) as on 2018	ED/GDP (as percentage) as on 2018	Percentage of foreign currency in total external debt as on 2018	Percentage change in exchange rate (domestic currency vis-a-vis US $) between 2000-2018
India	521.39	19.32	63	49.29
Brazil	557.82	30.31	76	98.21
Chile	180.94	61.80	92	21.48
China	1962.30	14.47	89	17.21
Colombia	134.94	42.29	96	49.75
Hungary	150.40	100.50	78	1.33
Mexico	452.99	38.02	75	105.63
Peru	66.70	31.28	99	4.34
Philippines	78.82	19.85	97	5.45
Poland	375.18	64.00	64	9.26
Russia	453.94	28.09	73	146.70
South Africa	179.31	50.56	46	89.95
Thailand	169.24	35.09	66	25.00
Turkey	445.14	58.97	94	681.97
Argentina	280.52	56.13	89	3661.88
Bulgaria	39.87	60.29	97	18.73
Romania	112.12	47.98	85	57.12
Ukraine	114.51	89.63	99	409.49

the balance sheet effect. According to our findings one rupee depreciation of the exchange rate is associated with an increase in external debt to GDP ratio of 1.26% in the long run and 0.75% in the short run. Further, the granger causality test results showed that there is a causal relationship running from external debt to economic growth, previous studies also highlights how harmful external debt can be to the growth trajectory. Thus the results showcase the importance of nominal exchange rate in explaining the external debt accumulation in any country.

Researchers have pointed out that high foreign currency debt can affect the economic growth of a country and increase its vulnerability to an economic crisis. A bird's eye view on the external debt position of emerging economies is presented in Table 6. The data reveals that, majority of these countries' external debt have a foreign currency composition of more than 80% and their currencies had been experiencing depreciation of larger magnitudes since past two decades. This reinforces the significance of the issue. Arranged in descending order of absolute value of external debt, India is at the third position; where as if we rank countries based on external debt to GDP ratio India is second last and the foreign currency composition is also 63% only, one among the lowest in the list. Despite of all these facts depreciation is having a positive and significant impact on India's external debt, which was estimated to be 1.26% increase of external debt. A similar impact can be humungous and detrimental to economic progress in most of the other emerging economies given the external debt and depreciation trends that they display. Due to all these reasons this area invites more attention from researchers and policy makers.

Every increase in external debt will generally be followed by a set of corrective measures within the domestic economy, so as to maintain debt at a sustainable level. This definitely comes with a cost. Imposing higher taxes on the taxpayers and/or various expenditure pruning policies implemented by government in order to finance any kind of extra debt burden could have actually been spent for other productive purposes. This becomes a more serious issue for India as the government is committed to fund various social welfare policies.

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