THE EFFECT OF PUBLIC DEBT ON FOREIGN EXCHANGE RATES VOLATILITY: EVIDENCE OF KENYA

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ABSTRACT

The study sought to find out the effect of domestic public debt, foreign public debt and foreign exchange reserves on the local currency exchange rate volatility (USD/KES) from 2007 to 2017. The domestic public debt and foreign public debt are negatively related to foreign exchange volatility, while foreign exchange reserve has a positive impact on foreign exchange volatility. The variables are statistically significant on determining the volatility of USD/KES and there is also a long run relation between the variables. The policy makers should model a mix of the two sources of debt, to help achieve the monetary policy objective of price stability. They also need to keenly evaluate terms of the foreign public debt, come up with strategies for fiscal deficit reduction as well as bear fruits on the fight against corruption. There is need to carry out further studies on the utilization of borrowed public funds and its impact on the wellbeing of the economy.

KEY WORDS: *Foreign public debt, Domestic public debt, and Foreign exchange rate volatility*

INTRODUCTION
Background of the Study

The global public debt has increased rapidly in recent times to exceed $63trillion in 2017, with USA leading at 31.8% share of global debt worth $20 trillion (Desjardins, 2017). Ideally governments borrow to cover short term budget deficits. When a government spends more than it receives in taxes and other revenue sources in any given year, it suffers a budget deficit commonly known as fiscal deficit (Stiglitz, 2000).

The situation in Africa is not any less worrying and IMF has warned African countries on rising debt, mainly caused by falling commodity prices and overspending in some countries. The debt in Kenya has grown over time to Kes 4.5 trillion which is 57% of the country's GDP. The growth has been fueled by the country's investment in infrastructural projects like the Standard Gauge Railway line which is assumed to accrue long term economic benefits to the country according to Kenya vision (2030). The growth of Kenya's public debt has begun to attract scrutiny with concerns on sustainability of the debt.

Maana, Owino, and Mutai (2008) argue that, to finance the mega projects it requires massive external loans. At the end of year 2000 the foreign debt was 68% of the total debt and only 32% was funded domestically, according the CBK data. Ugo (2008) argues that developing counties have traditionally focused on foreign debt; however, in the recent years some countries have adopted aggressively policies aimed to substitute foreign debt with domestic debt. This has been the case for Kenya since by end of year 2017 the ratio for the foreign to domestic debt was 48:52 of the total public debt according to the CBK public debt numbers.

Kenya currently practices a flexible exchange rate - managed-floating with no predetermined exchange rate path- regime. The monetary authority in this regime tries to influence the exchange rate with no specific exchange rate target /path according to IMF classification of exchange rate arrangement and frameworks of monetary policy.

There has been a continuous trend of exchange rate fluctuations in Kenya and this has translated into a high level of uncertainty for the dual main monetary policy objectives that are often sought to be achieved; price stability and economic growth (Kibiy and Nasieku, 2016). Odera (2015) argues that since the 1980s, the foreign exchange rates have been on a downhill trend until the 21st century when it achieved relative stability due to economic and political transformation.

Gokhale & Ramana (2013) argue that exchange rate of a currency can be affected by various economic and non-economic factors like capital inflows, prevailing interest rate, inflation rate, volume of foreign exchange reserves, current account balance, GDP growth rate, fiscal deficit, imports and export to GDP ratios, political stability, corruption, development indices and health global economy.

LITERATURE REVIEW
The Natural Real Exchange Rate (NATREX) Model

The NATREX Model is a dynamic model which seeks to explain the equilibrium real exchange rate fundamental determinants and the transmission mechanism between equilibrium real exchange rate and the real determinants (Stein, 2006). It's an equilibrium real exchange rate that satisfies both the goods market equilibrium as well as the balance of payments. In this model, output is considered to be at its potential level and there is absence of speculative capital movements and change in foreign exchange reserves (Couharde, Rey and Sallenave, (2015). This model is an analytical framework to analyze the medium term and long term effects of government policies and foreign variables on foreign debt/GDP ratio and the real exchange rate, (Dikmen N, 2009).

The NATREX Model looks at both the long term real equilibrium and the adjustment dynamics of the medium term equilibrium to the long term equilibrium. In the medium term equilibrium, the foreign debt to GDP ratio is predetermined while the real exchange rate is related to both internal and foreign balance. Therefore in the medium term the real exchange rate and the debt to GDP ratio are both endogenous variables. In the long term, equilibrium real exchange rate and foreign debt to GDP ratio are exogenous variables, depended on fundamentals that vary with time such as country productivity and thrift compared to the rest of the world (Stein, 2006).

Economies are considered to be vulnerable if their exchange rates are overvalued or they have excess debt. A study carried out in the Eurozone shows that increasing foreign debt positions had exerted pressure on the dynamics of real exchange in the area. The results further reflect that beyond a certain external debt to GDP ratio threshold, the Eurozone countries can reach a vulnerable position which triggers an adjustment process. This adjustment process pushes real exchange rates towards the long run equilibrium (Courhed et al, 2015).

Empirical Review

Fida et al (2012), in their research, they found out that there is a short run and long run relationship between foreign debt and exchange rate, whereby an increase in foreign debt causes volatility on the exchange rate through the risk premium and therefore the real exchange rate depreciates over time. They argue that Pakistan like most developing countries heavily depend on imports of; petroleum and oil products, manufacturing goods and other commodities.

Regionally, many African countries are struggling with huge public debts because of their budget deficits. A research conducted by Saheed et al (2015) in Nigeria established that national debt had a direct impact on foreign exchange rates. Foreign debt is among the significant variables that cause exchange rate to be volatile over short period as well as long period of time (Fida, Khan and Sohali, 2012)

In sub-Saharan African countries, Greene J. (1989), in his study on the external debt problem in SSA, he finds out that the countries continue to face a very serious growing external debt problem. The ratio of external debt to GDP had raised 3 folds since 1980, this confirms that the debt problem has been there for decades and still continues to pose a challenge in the present time.

A survey by Odera (2015) investigated the impact of external public debts in Kenya on foreign exchange volatility. The study established that unsustainable external liabilities resulted in high volatility of foreign exchange in the country. She argues that external debt and interest rates are significant in determining the real effective exchange rates volatility in Kenya, whereby the external public debt has negative effect on exchange rate volatility.

Kibiy et al (2016) the study sought to analyze interest rates, inflation, external public debt and money supply as determinants of volatility of Kenya shilling against world major currencies (USD, EUR and YEN). External debt had a positive relationship with Kenya shilling against the USD & EUR, whereby an increase in the external debt would increase the volatility of their exchange rate.

Objectives of the Study

1. To determine the effect of domestic debt amount on foreign exchange rate volatility.
2. To determine the effect of foreign debt amount on foreign exchange rate volatility.
3. To determine the moderating effect of foreign exchange reserves on public debt on the foreign exchange rate volatility.

Statement of the Problem

The increasing level of debt has an impact on the exchange rate which is a major point of concern for countries involved in international trade, as the exchange rate is the price of a country's currency in the global market. Mweni, Njuguna and Oketch (2016) state that global trade is driven by export and import processes making the value of local currency against foreign currencies critical.

A major concern arising is the volatility of the exchange rate in Kenya which has seen trends of weakening and strengthening of the shilling against major global currencies. This is a key concern in monetary policy achievement of price stability and economic growth objectives (Kibiy et al., 2016). The exchange rate volatility affects the economy through domestic price determination, trade flows and competitiveness of domestic industries in the international market (Odera, 2015).

Researchers have sought to understand the impact of different components of public debt on the exchange rate volatility, largely leaving out the effects of domestic debt on foreign exchange rate and there has been no consensus on their findings between foreign exchange rate and its variables. Also, the statistical significance changes over different time horizons and in different countries. This is because countries are at different levels in both economic and non-economic factors that influence the foreign exchange rate. Therefore, a further study along these lines is necessary in order to ascertain more comprehensively the effects of each determinant factor on the exchange rate volatility in Kenya (Kibiy et al., 2016).

RESEARCH METHODOLOGY
Research design

This study used quantitative research design relying on secondary time series data to analyze the impact of public debt on rate of exchange in Kenya. The sampling frame for this study is the data for the exchange rate, foreign debt, domestic debt and foreign exchange reserves servicing from 2007-2017 from the website of Central Bank of Kenya.To achieve the objectives of the study, a model for linear regression will be used.

Model specification

FXV- Foreign Exchange Rate volatility
DPD- Domestic Public Debt
FPD- Foreign Public debt
RSV- Foreign exchange reserves

Stationarity test

The unit root will be tested using Augmented Dickey Fuller test (ADF). Differencing will be undertaken in an attempt to make the variables stationary. The variables are expected to become stationary within the first differencing. The guideline for the decision is that if the absolute ADF t-statistic value is higher than critical value at 1%, 5% and 10%, we reject the null hypothesis that there is unit root. Otherwise, if ADF t-statistic is lower than critical value at the 1%, 5% and 10%, then we do not reject the null hypothesis (Nkoro and Uko, 2016).

Cointegration test

Autoregressive distribute lag model (ARDL) approach was used for this test. This test is applicable if the underlying variables are 1(0), 1(1) or a combination of the two. ARDL models are least square regression that uses lags of the dependent variables and independent variables as regressors. The null hypothesis for F bound test is that there is no levels relationship; the f-statistics was used to test for bound test.

The criteria is that if the f-value is below the lower bound I (O) value we can't reject the null hypothesis and if the f-statistic value is higher than I (1) we reject the null hypothesis of no cointegration (Pesaran, M.H., Shin,Y., & Smith,R.J. 2001). ARDL model has a long run relationship and the ECT-Error correlation term it is the speed of feedback effect. It shows how much disequilibrium in a previous period has been adjusted in current period (yt).

RESEARCH FINDINGS

The unit root test revealed that the foreign exchange volatility was found to be stationary at level and the domestic public debt, foreign public debt and foreign exchange reserves were stationary at first differencing. None of the variables is stationary at second difference which is a prerequisite of using the ARDL model (Pesaran, et al., 2001).

The long run results show how the independent variables relate to the dependent variable as shown in table 4.1. The coefficient of the domestic public debt is -3.6984 which means that a percentage change in domestic public debt is associated with a 3.6984% opposite impact on the foreign exchange rate volatility on average ceteris paribus in the long run. The foreign public debt has coefficient of -1.5431, a unit change in the foreign public debt is associated with a 1.5431% change in the foreign exchange rate volatility on average holding other factors constant in the long run. An increase in the domestic public debt and domestic public debt will result to a decrease in the foreign exchange rate volatility.

The foreign exchange reserves are associated with a 2.7995% change in the foreign exchange rate volatility on average ceteris paribus in the long run. An increase in foreign exchange reserves, results to a 2.7995% increase in foreign exchange rate volatility. Therefore it has a positive effect on foreign exchange rate volatility.

Table 4.1: ARDL Long Run Form

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Domestic Public Debt Model	DPD	-3.6984	1.3767	-2.6864	0.0082
	RSV	2.7995	1.4401	1.944	0.0541
	C	9.6308	3.1658	3.0421	0.0029
	EC = FXV - (-3.6984*DPD + 2.7995*RSV + 9.6308)				
Foreign Public Debt Model	FPD	-1.5432	0.8676	-1.7787	0.0777
	RSV	0.5643	0.9266	0.609	0.5436
	C	8.865	3.3802	2.6227	0.0098
	EC = FXV - (-1.5432*FPD + 0.5643*RSV + 8.8650)				

The bound test results at table 4.2 show that there is a long run relationship between the variables. The F statistic is 16.90687 and 15.6630 respectively for the domestic and foreign public debts, which are above both the lower and upper bound respectively and are significant at 1% levels revealing that there is cointegration.

Table 4.2 F-Bounds Test

Null Hypothesis: No levels relationship	k=2	Actual sample size=131	
Significance	10%	5%	1%
1(0)	2.713	3.235	4.358
1(1)	3.453	4.053	5.393
Test statistics	F statistics		
Domestic Public Debt Model	16.9068		
Foreign Public Debt Model	15.663		

The ECM regression in table 4.3 has the coefficient of the error correction term. The coefficient is significantly negative and this is the speed of adjustment of variables towards the long run equilibrium. The Coefficient of the error correction term is -0.7075 and 66.54% which shows that the previous period deviations from the long run equilibrium are corrected in the current period at a speed of 70.75% and 66.54% respectively for the domestic and foreign public debt.

Table 4.3 ECM Regression

|	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Domestic Public Debt Model	CointEq(-1)*	-0.70752	0.085036	-8.320155	0.0000
	R-squared	0.347218	Adjusted R-squared	0.347218	
Foreign Public Debt Model	CointEq(-1)*	-0.66542	0.083091	-8.008255	0.0000
	R-squared	0.330093	Adjusted R-squared	0.330093	

Model diagnostic tests

Testing the residual of the model for serial correlation using the Breusch-Godfrey serial correlation LM (Lagrange Multiplier) test in table 4.4, the probability of the F-statistic is above 5% which shows that the model has no serial correlation. The heteroscedasticity test using the Breusch Pagan-Godfrey test, the results in table 4.4, show that the residuals of the model are homoscedastic, as the probability of the f-statistic is also above the 5%.

Table 4.4: Serial correlation and heteroscedasticity results

Domestic Public Debt Model	Breusch-Godfrey Serial Correlation LM Test	F statistics	0.5166	Prob. F(2,125)	0.5978
		Obs*R-squared	1.0739	Prob. Chi-Square(3)	0.5845
	Breusch-Pagan-Godfrey Heteroscedasticity Test	F statistics	0.1232	Prob. F(3,127)	0.9463
		Obs*R-squared	0.3801	Prob. Chi-Square(3)	0.9443
		Scaled explained SS	0.2694	Prob. Chi-Square(3)	0.9657
Foreign Public Debt Model	Breusch-Godfrey Serial Correlation LM Test	F statistics	0.227553	Prob. F(3,127)	0.8771
		Obs*R-squared	0.700395	Prob. Chi-Square(3)	0.8731
		Scaled explained SS	0.452041	Prob. Chi-Square(3)	0.9293
	Breusch-Pagan-Godfrey Heteroscedasticity Test	F statistics	0.1232	Prob. F(3,127)	0.9463
		Obs*R-squared	0.3801	Prob. Chi-Square(3)	0.9443
		Scaled explain	0.2694	Prob. Chi-Square(3)	0.9657

The stability diagnostic using recursive estimation; CUSUM test as presented below in figure 4.1 and 4.3 also the CUSUM of square test in figures 4.2 and 4.4 the models are stable at 5% significance level.

Figure 4.1

CUSUM ——— 5% Significance

Figure 4.2

CUSUM of Squares ——— 5% Significance

Figure 4.3

CUSUM ——— 5% Significance

Figure 4.4

CUSUM of Squares ——— 5% Significance
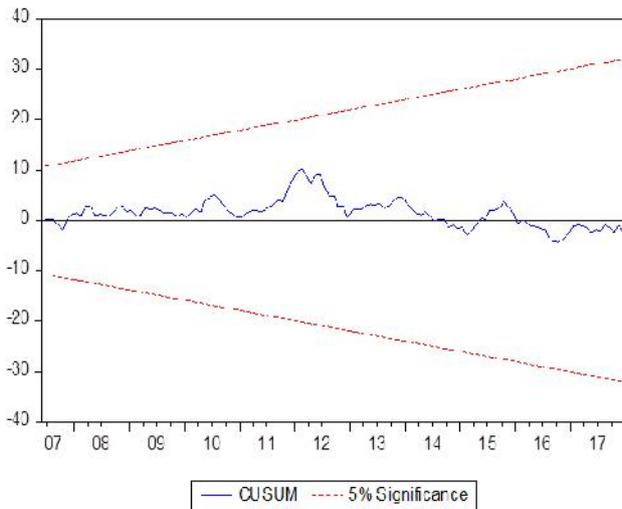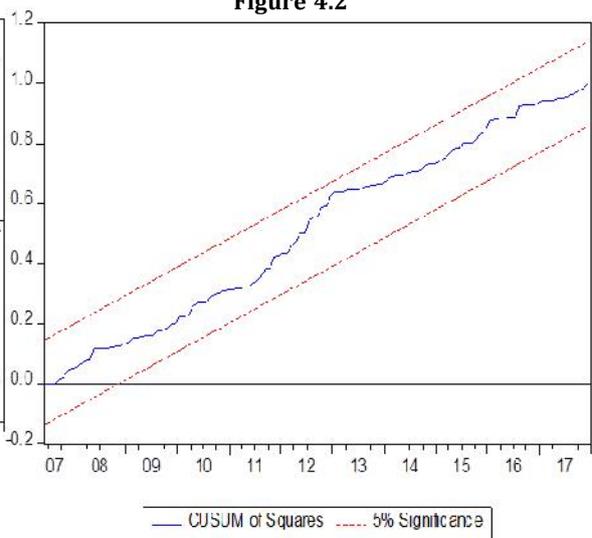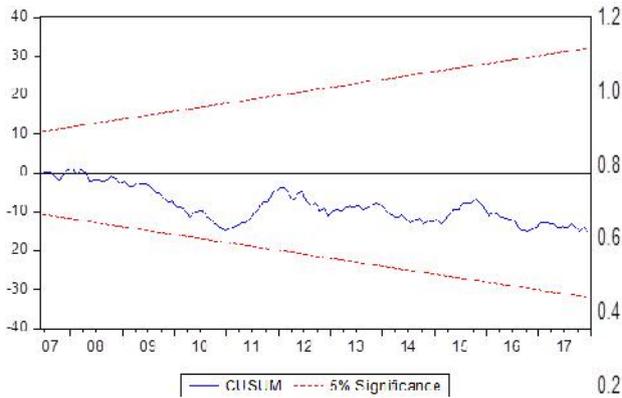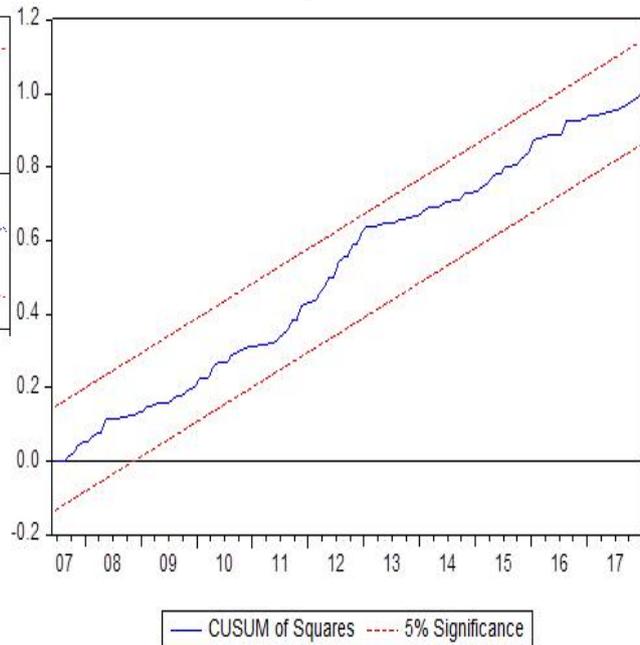
5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The objective of the study was to examine the impact of public debt on foreign exchange rate volatility in Kenya. The results reflect that the public debt has an impact on foreign exchange volatility in Kenya. The domestic public debt, foreign public debt and foreign exchange reserves affect the foreign exchange rate volatility. A unit increase in the public results to a decrease in the foreign exchange volatility in Kenya and it is statistically significant at 5% level and 10% respectively. The foreign exchange reserves are positively related to the foreign exchange rate volatility in the long run. A unit increase in the foreign exchange reserves, results to an increase in the foreign exchange volatility in Kenya it is statistically significant at 5% level

The prudent management of both domestic and foreign public debt, in the light of its effect on the foreign exchange volatility is very important to any economy. Therefore the ability of the monetary policy authority to manage effectively the foreign exchange volatility will go a long way in reducing the uncertainty and eventually attract more investment and economic growth will be achieved.

5.2 Recommendations

The first policy recommendation is on the structure of the debt, policy makers should check on the mix between domestic and foreign public debt with more bias on domestic debt. The percentage of foreign currency denominated debt is increasing with two Eurobonds already issued (one in 2014 and the other in 2018) and a third one in the pipeline. This increase in foreign currency denominated debt leaves Kenya vulnerable to exchange rate risks and external shocks.

Kenya also needs to slow down on the quick accumulation of public debt by taking steps to reduce the fiscal deficit. The tax policy makers need to broaden the tax base so that more citizens contribute to the country's revenues and reduce the deficit. Policy makers should also come up with strategies that will ensure tax collection especially from the informal sector which continues to pay less tax than they should. Loopholes that lead to tax evasion should also be sealed to enhance collection, as well as fight against corruption to yield fruits so that public resources can achieve the purpose intended without diversion.

Recommendation for further studies

As public debt increasing, countries are increasingly borrowing funds in order to settle previous debts. There is a growing concern that countries are borrowing funds for recurrent expenditure and settling previous loans rather than channeling borrowed funds in capital acquisition and infrastructural development which will result in growth in the GDP. Therefore, there is need to undertake additional studies on utilization of borrowed public funds and its impact on the wellbeing of the economy.

REFERENCES

1. Central Bank of Kenya, impact of interest arte capping in Kenyan economy, March 2018.Central bank Kenya [KE https://www.centralbank.go.ke/statistics/government-finance-statistics/]

2. Couharde, C., Rey, S.and Sallenave, A. (2015). External debt and real exchange rates' adjustment in the euro area: New evidence from a nonlinear NATREX model. Applied Economics. 48. 1-21. 10.1080/00036846.2015.1090554.

3. Desjardins, J. (2017). Here's what the world's $63 trillion in government debt looks like. Business Insider, Retrieved 10 February 2018.

4. Dikmen N., (2009). A new macroeconometric approach to the NATREX model of the equilibrium real exchange rate. International journal of Computational economics and Econometrics, 2009 Vol. 1, No. 2 pp 171 – 194.

5. Fida B.A., Khan M.M. and Sohali M.K. (2012). Analysis of Exchange rate Fluctuations and External Debt; Empirical Evidence for Pakistan. African Journal of business management Vol 6(4), 1760-1768. Science and Education Publishing.

6. Greene J. (1989). The External Debt Problem of Sub-Saharan Africa. Staff Papers (International Monetary Fund), Vol. 36, No. 4 (Dec., 1989), pp. 836-874.Palgrave Macmillan Journals on behalf of the International Monetary Fund

7. Gokhale S.M & Ramana J.V. (2013) Causality between Exchange Rate and Foreign   Exchange Reserves in the Indian Context Global Journal of Management and Business Research Volume XIII Issue VII Version I Online 2013 ISSN: 2249-4588 & Print ISSN: 0975-5853

8. IMF (2003) Classification of Exchange Rate Arrangements and Monetary Policy Frameworks as of June 30, 2003. IMF staff report, Recent Economic Developments and International Financial Statistics.

9. Kibiy.J & Nasieku.T. (2016).Determinants of Exchange Rate Volatility of the Kenyan Shilling Against World Major Currencies. International Journal of social sciences and information technology Vol.II, No. IX (Oct., 2016), 2412-0249.

10. Maana, I., Owino, R., & Mutai, N. (2008, June). Domestic Debt and its Impact on the Economy–The Case of Kenya. In 13th Annual African Econometric Society Conference in Pretoria, South Africa from 9th to 11th July.

11. Mugenda, O.M. and Mugenda, A.G. (2003) Research Methods, Quantitative and Qualitative Approaches. ACT, Nairobi.

12. Mweni, F. T., Njuguna, A., & Oketch, T. (2016). The Effect of External Debt on Inflation Rate in Kenya, 1972-2012. International Journal of Financial Research, 7(4), 198.

13. Nkoro, E. and Uko, A.K., 2016. Autoregressive Distributed Lag (ARDL) Cointegration Technique; Application and Interpration. Journal of statistical and econometric methods .Vol. 5, No. 4 2016, 63-91

14. Odera, Q. A. (2015). An Analysis on the Effect of External Public Debt On Exchange Rate Volatility In Kenya. http://erepository.uonbi.ac.ke/handle/11295/95259

15. Pesaran, M.H., Shin,Y., & Smith,R.J. (2001) bound testing approaches to analysis of level relationships. Journal of applied econometrics, 16 289-326.10.1002/ (ISSN) 1099-1255

16. Saheed, Z. S., Sani, I. E., & Idakwoji, B. O. (2015). Impact of public external debt on exchange rate in Nigeria. International Finance and Banking, 2(1), 15-26.

17. Stiglitz J. E. (2000). Economics of Public Sector, 3rd edition. New York: W.W. Norton & Company, Inc.

18. The World Bank- https://datahelpdesk.worldbank.org/knowledgebase/articles/474124-what-is-external-debt

19. Ugo, P. (2008) Domestic and external Public Debt in Developing Countries. (UNCTAD) Discussion Papers// United Nations Conference on Trade and Development (UNCTAD/OSFG/DP/2008/3)