Optimal Fiscal and Price Stability in Germany: Autoregressive Distributed Lags (ARDL) Cointegration Relationship

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Abstract

The impact of fiscal policy measures in a managed fixed exchange rate system were questioned in this study, to evaluate the extent of Fiscal Policies measure using quarterly time series data for Germany,for the period ranged between1991q1 to 2017q4. The study shows that, utilization of fiscalstrategies for economic growth by examining tax revenue, public debt and consumer price index. The Autoregressive Distributed Lag (ARDL) and OLS model were employed to establish co-integration and causal relationship among the variables respectively. The choice of ARDL is considered due to thefact that the parameters are not at uniform stationarity; Three of the variables are I(1) and one is I(0) from both ADF and PP. Numerous tests were employed to identify the stability, homoscedasticity andLM Test for the variables. Breusch Godfrey LM test and heteroskedasticity test are applied, respectively. The results shows that, there is existence of positive and negative causality amongst real GDP and tax revenue to CPI and tax revenue cause total public debt positively in Germany similarly, total public debt positively cause real GDP in short-run. Only one bidirectional exist between CPI and Total Public Debt, three unidirectional occurred between Tax revenue and real GDP, Total public debt and real GDP and CPI and Total public debt.This shows the evidence of higher tax rate leading to inflation and more public debt in the country. The researchers suggest that, there is need for the Germany's expansionary fiscal policy stance with combination of monetary policy which wills helps to contribute to the rapid growth of the economy

1.0 Introduction

Fiscal Policy is a strategy to guarantee long-run indebtedness to bear the ability (Bonam and lukkezen, 2018). Additionally, it is considered as a standout among the most significant financial policy instruments for the adjustment of output (Markus Eller et al, 2016). Similarly is considered among the most dominant switches of crude accumulation (Marcelo, 2017) the viability of financial policy in balancing out recurrent variances in product and employment is significant to the extent that vacillations influence social welfare (Staehr, 2007).

However, unsustainable monetary deficiencies and open obligation levels made the spectra of financial predominance in numerous nations, prompting high and unstable expansion and raised hazard premix on government obligation. On the other way round price steadiness and the economy rapidly keep running into a noteworthy barricade: there is no accord on the most proficient method to quantify the size and heading of changes in money related approach. The customary methodology, which distinguishes changes in monetary policy with changes in the stock of money, isn't satisfactory since practically speaking the development rates of money related totals rely upon an assortment of non-policy impacts. For instance, on the grounds that the role that monetary policy plays in the economy and the manner in which it ought to be directed by the Apex banks relying upon the manner in which the policy influences every economy. While fiscal policy includes the utilization of instruments, for example, taxes, spending or grant by government institutions that could make ready for the accomplishment of certain preordained macroeconomic goals. Ideal fiscal approach inside the c of context incorporated European fiscal policy framework is progressively confronting serious difficulties, for example, many years of financial meltdown and GDP growth rates, inflation rate and instability in the segment (Vitor 2015).These present clear difficulties for the way toward accomplishing growth, which requires the utilization of indispensable instruments and ideal use for improved fiscal development. The impact of fiscal strategy in improving economic situations is, however, a flawed demonstration and necessary review on the subject matter become significant. Utilizing expense measures can impact economic changes either emphatically or adversely. reducing tax estimates prompts an expansion in the extra cash that changes the monetary interest causing inflationary pressures, as demonstrated by Shahid and Ahmad (2010).

1.1 Objective of this study:

1. To examine the instrument of fiscal policy measures and Price stability on economic growth of Germany
2. To determine the influence (relationship) of the tax rate, government (public) debt and consumer price index on the economic growth of Germany
3. To determine the influence of public debt on inflation

1.2 Hypotheses of the Study

Coming up next are the theories to be tried in the examination.

Ho: $\gamma = 0$ Yt residuals are not sequentially connected and residuals are not heteroscedastic but rather are homoscedastic and ordinarily conveyed

H1: $\gamma \neq 0$ Yt residuals are sequentially connected, residuals are heteroscedastic and are not ordinarily conveyed.

2.0 Literature Review

Fiscal policy is worked by utilizing charge, spending (consumption) and different devices or instruments that have an immediate bearing on the lives of citizens inside its regions. These methodologies are acknowledged everywhere throughout the world and are especially identified with income and spending programs. These strategies can influence the economic prosperity in this way affecting the control of fiscal frameworks at both smaller scale and large scale levels. Shahid and Ahmad (2010) examined the impact of fiscal strategy on economic development utilizing time series information from Pakistan. They distinguished fiscal strategy as an administration exertion that can impact the course of the economy through a change in expenses or consumption or both after some time, further expressed that the fiscal methodology under the traditional framework has a negative outcome if government activity just includes the decrease of tax without diminishing public spending. So also, Khilji and Hamood (1997) saw fiscal deficiency as a factor that prompts economic development challenges. This repudiates the supposition of Haq (2003), who accepted that fiscal shortfall has no impact on the major macroeconomic factors like Gross domestic product development, investment, and high price level. KarstenStaehr (2008) portrayed the fiscal policy as a significant topic of discourse in the EU today, which is probably going to assume a noteworthy in future. The use of financial approach has been a standout amongst the most argumentative issues in the task of the Europeans Monetary Union (EMU). The advantages of fiscal and monetary policies in the EMU and the impact of monetary strategy and financial variances have been generally talked about; see, for instance, (Ballabriga and Martiniez-Mongay, 2003; Wyplosz, 2006) similarly the adequacy of fiscal policy in settling value vacillations in productivity and employment is significant to the extent that changes influence social welfare.

In fiscal or monetary policy, the objective of an economic policy is to accomplish some macroeconomic ambitions such as broad employment, economic betterment, peak resource apportionment and objective income dispositionWalter (2018)

Economic consolidation encourages the movement of products and services, capital and people, this advancesthe inherent for mobility of tax infrastructures among countries. Thereafter, constituent countries may plan to increase their personal tax rates by involving income contention. Thus,techniques that are generally expected to induce the less prime tax rates and government spending levels. It is also spontaneously agreed that one can forestall such scarcity by following certain tax adjustment policies Helmuth and Firouz(1999).

Public debt is a particular kind of imaginary capital and that the last is the result of a rationalistic improvement in the substantiation of various sorts of capital, (Marcelo, 2017).

Furthermore, El-Khoury 2017 public debt is a key source to finance the spending shortfall, and as a percentage of GDP has as of late exhibited a rising pattern in developed nations (Kazumasa and Motohiro, 2014) public debt is reasonable just under the condition that the state separates an essential excess. The estimation of this essential surplus relies upon the development rate of the economy (Yeşim et al, 2007) public debt impartiality has been a standout amongst the most discussed issues in macroeconomics literatures. Among others, (Phelps and Taylor, 1977) think about the connection among commotion and a functioning adjustment policy

2.1 Empirical Review

Joseph – Omodero (2020) Using regression techniques of OLS examined the relationship between tax revenue, Value added and economic growth of Nigeria within the periods 1981-2018, and the finding revealed that, there is positive and moderate relationship between revenue received and value added to economic growth of Nigeria.Ihenyen - Mieseigha (2014) examined tax assessment as an instrument of economic development in Nigeria. Using time series generated from the Central Bank of Nigeria data quarry, during the period of 1980–2013, Corporate Income Tax (CIT), VAT and Economic Growth (GDP) studied with application of the Ordinary Least Square (OLS) procedure. The result displayed that the connection among corporate annual expense, esteem included in assessment and financial growth smoothly flows in the Nigeria. Similarly, the outcome gives enticing proof that tax collection is an instrument of economic development in Nigeria. Jibril and Buba (2016) studied the relationship between inflation (Price) and growth of economy using data for time series annually ranging from 1961 -2014 and applied OLS, Johansen method of co-integration, ECM and granger causality to ascertain the influence and relationship between inflation and economic growth. The outcome shows negative relationship between the two variables (Inflation to Economic growth) in Nigeria and there is no causality relations between economic growth and inflation rate in Nigeria.

In related studies, Kiminyei (2018) Examined the nexus between Kenya's revenue on tax and public expenditure using annual data sourced from Kenya economic survey amidst of 1960 - 2012 also employed ADF and PP for stability test of the data (unit root test) and cointegration method of Johansen and Juselius was used to establish the long-run relationship, the finding reveal direct relationship between income and expenditure. Al-Khulaifi (2012) studied the connections between taxes and expenditure of Qatar economy on annual time series data with time frame 1980-2011.

The unit root tests using Philips Peron and Augmented Dickey Fuller methods were used and the two-step Engle Granger cointegration technique was used to test the order of integration in the series. The outcomes shows that, the studied variables were stationary in their I(1) first difference and that they were co-integrated. Examining the causal direction using Granger causality analysis, it shows the evidence of causality between tax revenue and expenditure. Carneiro et al, (2005) investigated the correlation between Tax revenues and public expenditures in Guinea Bissau over 1981-2002, unit root test was conducted using Philips Peron and ADF test also, for more clarification due to the size of the variable Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test was jointly tested in addition. The tests shows integration of order one (I(1)) among the variables. The result of the analyses revealed evidence short-run cause to spending and revenue hypothesis with application of both traditional Granger test and the Error correction framework. Umar - Zubairu (2012) investigated the influence of inflation (price) on economic growth in Nigeria from 1970 to 2010 using Granger causality test to test the causal relationship between inflation and economic growth, the results shows that, GDP causes inflation in one side in the way round inflation does not cause GDP and the relationship between the two variables is positive (Inflation to economic growth). Their finding uncorroborated with (Naz et al, 2012; Mallik – Chowdhury, 2001) whose findings revealed divergent ideas about their correlation (between inflation and economic growth). For instance, Naz et al (2012) opinion that high inflation is decreasing an economy due to the negative influence it has on economic growth of a country while very low or zero inflation is similarly detrimental to the economy. They suggest that a small level of inflation is desirable for a meaningful economic growth to ensue. Mallik - Chowdhury (2001) on the other hand discovered that there are lots of controversial issues concerning the relationship between inflation and economic growth. Some studies observed inflation as being essential for a tangible economic growth; others believe that it hinders economic performance.

3.0 Methodology and empirical results

3.1 Data generation and selected variables

Quarterly data for German on Real GDP, Total Revenue to GDP, Total Public Debt and Consumer Price Index (General Price Level), which covers the period from 1991Q1-2017Q4. The source of data includes among others GermanApex Bank statistical page, World Bank Data page, etc.

RGDP = (TPDEBT, TRGDP, CPI) (1)

To change the equation in to econometrics form, the mathematical terms can simply rewrite to a multiple regression forms as follows:

$$RGDP_t = \beta 0 + \beta_1 TRGDP_t + \beta_2 TPDEBT_t + \varepsilon_t \quad (2)$$

Where

$RGDP_t$	Real Gross Domestic Product
$TPDEBT_t$	Total Public debt
$TRGDP_t$	Tax Revenue to GDP
CPI	Consumer Price Index (General Price level)

3.2 Unit roots tests

To enable the researchers to determine the stability of the data under review, Augmented Dickey Fuller (ADF) and Phillips and Peron (PP) (1988) tests, were used to signify the stationarity of the data.

ADF Model

$$\Delta Y_t = \alpha_0 + p1 Y_{t-1} + \alpha_2 T + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-1} + u_t \quad (3)$$

$$\Delta yt = \rho yt{-}1 + (\text{constant, time trend}) + ut \quad (4)$$

The α_0 mean constant, T stand as trend $\sum_{i=1}^{k}$ refers to summation observation at various times u_t is a white noise. ADF test result indicates both at I(0) and I(1) at different level of significant as shown in Table1.

Table 1: Augmented Dickey Fuller (ADF) and Philips Peron (PP) Unit Root Test Result

	ADF								
Variables	**Intercept (Level)**		**Intercept (First Diff)**		**Trend & Intercept (Level)**		**Trend & Intercept First Diff**		**Class**
	P-V	**T-V**	**P-V**	**T-V**	**P-V**	**T-V**	**P-V**	**T-V**	
LRGDP	0.9250	-0.2669	0.0000 *	-7.5213	0.0612***	-3.3687	-	-	
LTRGDP	0.0388**	-2.9919	-	-	0.8019	-1.5608	0.0000*	-10.5508	**I(1)**
LTPDEPT	0.5939	-1.3709	0.0000 *	-11.235	0.4676	-2,2307	0.0000*	-11.245	
CPI	0.8930	-0.5629	0.0037 *	-3.8186	0.0674***	-3.2385	-	-	**I(1)**
	PP								
Variables	**Intercept (Level)**		**Intercept (First Diff)**		**Trend & Intercept (Level)**		**Trend & Intercept First Diff**		**Class**
	P-V	**T-V**	**P-V**	**T-V**	**P-V**	**T-V**	**P-V**	**T-V**	
LRGDP	0.9507	-0.0542	0.0000*	-7.5213	0.1100	-3.1069	0.0000*	-7.4914	**I(1)**
LTRGDP	0.0362	-3.0192	-	-	0.8066	-1.5480	0.0000*	-10.549	**I(1)**
LTPDEPT	0.5952	-1.3683	0.0000*	-11.235	0.4739	-2.2192	0.0000*	-11.245	**I(1)**
CPI	0.2196	-2.1669	0.0000*	-9.3928	0.0132**	-3.9509	-	-	**I(0)**

Note: P-V and T-V stand as probability value and calculated table value respectively, column with (-) mean the variable is stationary before that stage. *, **, and *** represent 0.01, 0.05 and

ARDL Bounds tests for cointegration

Procedure for Estimation: Autoregressive Distributed Lag (ARDL) model to Cointegration Relations

Pesaran 2001 model of analysis i.e. ARDL (Autoregressive Distributed Lag) were employed by the researchers considering the numerous advantages attached to the model compared to other methods, which is aimed to solve stationarity issues on time series data. For example, ARDL is the only model that can accommodates series with different level of stationarity such as I(0), I(1) or combinations of the two but it does not allow a series with I(2) level of stationarity. It also has advantage over Eagle and Granger (1987) in determine the causality relations of more than two variables. Similarly according to (Pesaran – Shin, 1999) the model disclosed unbiased outcome in small sample size also Laurenceson and Chai, 2003 viewed that, ARDL method can be used to obtain ECM (Error Correction Model) and equilibrium of long and short period relationship, and also through Ordinary least Squares (OLS) model to obtain the causal directions of the relationship. This model equally become more dynamic by establishing lags in the regression.

Unrestricted error correction was applied to the ARDL regression analysis: Each variable is estimated independently at different equation in order to obtain the coefficient using OLS (ordinary least squares) (Ahmad et al 2019) and it is conceivable to accomplish fair-minded appraisals of the long-run model (Harris and Sollis, 2003)

To test for cointegration using ARDL (P, q1,q2, q3)

$Ho = \beta 1j = \beta 2j = \beta 3j = \beta 4j$ (5)

$H1 \neq \beta 1j \neq \beta 2j \neq \beta 3j \neq \beta 4j$ (6)

$$\Delta LnRGDP_t = a_{10} + \boldsymbol{\beta_{11} LnRGDP_{t-i}} + \beta_{21} LnTPDEBT_{t-1} + \beta_{31} LnTRGDP_{t-1} + \beta_{41} CPI_{t-1} + \sum^{p}_{i=1} a_{1j} \Delta LnRGDP_{t-1} + \sum^{q1}_{i=1} a_{2j} \Delta LnTPDEBT_{t-1} + \sum^{q2}_{i=1} a_{3j} \Delta LnTRGDP_{t-1} + \sum^{q3}_{i=1} a_{3j} \Delta CPI_{t-1} + \square_{ij} \quad (7)$$

$$\Delta LnTPDEBT_t = a_{20} + \beta_{12} LnRGDP_{t-i} + \boldsymbol{\beta_{22} LnTPDEBT_{t-1}} + \beta_{32} LnTRGDP_{t-1} + \beta_{42} CPI_{t-1} + \sum^{p}_{i=1} a_{1j} \Delta LnTPDEBT_{t-1} + \sum^{q1}_{i=1} a_{2j} \Delta LnRGDP_{t-1} + \sum^{q2}_{i=1} a_{3j} \Delta LnTRGDP_{t-1} + \sum^{q3}_{i=1} a_{3j} \Delta CPI_{t-1} + \square_{ij} \quad (8)$$

$$\Delta LnTRGDPt = a_{30} + \beta_{13} LnRGDP_{t-i} + \beta_{23} LnTPDEBT_{t-1} + \boldsymbol{\beta_{33} LnTRGDP_{t-1}} + \beta_{43} CPI_{t-1} + \sum^{p}_{i=1} a_{1j} \Delta LnTRGDP_{t-1} + \sum^{q1}_{i=1} a_{2j} \Delta LnRGDP_{t-1} + \sum^{q2}_{i=1} a_{3j} \Delta LnTPDEBT_{t-1} + \sum^{q3}_{i=1} a_{3j} \Delta CPI_{t-1} + \square_{ij}.. \quad (9)$$

$$\Delta LnCPIt = a_{40} + \beta_{14} LnRGDP_{t-i} + \beta_{24} LnTPDEBT_{t-1} + \beta_{34} LnTRGDP_{t-1} + \boldsymbol{\beta_{44} CPI_{t-1}} + \sum^{p}_{i=1} a_{1j} \Delta CPI_{t-1} + \sum^{q1}_{i=1} a_{2j} \Delta LnRGDP_{t-1} + \sum^{q2}_{i=1} a_{3j} \Delta LnTPDEBT_{t-1} + \sum^{q3}_{i=1} a_{3j} \Delta LnTRGDP_{t-1} + \square_{ij} \quad (10)$$

Lag Selection

To run an ARDL bound test there is need to determine the lag legs of the model using Akaike Information Criteria (AIC) and Schwarz criterion among the most popular methods of selecting the best lags.

Short-run Model Specifications

$$\Delta LRGDP_t = a_{01} + \sum_{i=1}^{p} a_{1i}\ \Delta LRGDP_{t-1} + \sum_{i=1}^{q} a_{2i}\ \Delta LTRGDP_{t-1} + \sum_{i=1}^{q} a_{3i}\ \Delta LTPDENT_{t-1} + \sum_{i=1}^{q} a_{4i}\ \Delta CPI_{t-1} + \varepsilon_t \quad (11)$$

d(LRGDP) c d(LRGDP(-1)) d(LRGDP(-2)) d(LTRGDP(-1)) d(LTRGDP(-2)) d(LTPDEBT(-1)) d(LTPDEBT(-2)) d(CPI(-1)) d(CPI(-2)) (12)

$$\Delta LTRGDP_t = a_{01} + \sum_{i=1}^{p} a_{1i}\ \Delta LTRGDP2_{t-1} + \sum_{i=1}^{q} a_{2i}\ \Delta LRGDP_{t-1} + \sum_{i=1}^{q} a_{3i}\ \Delta LTPDEBT_{t-1} + \sum_{i=1}^{q} a_{4i}\ \Delta CPI_{t-1} + \varepsilon_t \quad (13)$$

d(LTRGDP) c d(LTRGDP(-1)) d(LRGDP(-1)) d(LTPDEBT(-1)) d(CPI(-1)) (14)

Long-run Model Specifications

The significance statistic of the basis which associated the long run error correction and connected the ECM shows the mechanism for correction which redirects the variables at equilibrium in the short term. The model of the ECM is shown below:

$$LTPDEBT_t = a_{01} + \beta_{11} LTPDEBT_{t-1} + \beta_{21} LRGDP_{t-1} + \beta_{31} LTRGDP_{t-1} + \beta_{41} CPI_{t-1} + \varepsilon_t \quad (16)$$

LTPDEBT c LTPDEBT (-1) LRGDP (-1) LTRGDP (-1) CPI (-1) (17)

long run model for making a residual from the regression

$$\Delta LTPDEBT_t = a_0 + \sum_{i=1}^{p} a_{1i}\ \Delta LTPDEBT_{t-1} + \sum_{i=1}^{q} a_{2i}\ \Delta LRGDP_{t-1} + \sum_{i=1}^{q} a_{3i}\ \Delta LTRGDP_{t-1} + \sum_{i=1}^{q} a_{4i}\ \Delta CPI_{t-1} + \delta ECT_{t-1} + \varepsilon_t \quad (18)$$

Short and long run model for error correction to run using OLS method

d(LTPDEBT) c d(LTPDEBT(-1)) d(LRGDP(-1)) d(LTRGDP(-1)) d(CPI(-1)) d(dumtpdebt(-1)) ECM(-1) (19)

This series confirmed that there was a slight deviation from 0.05 of CUCUM squares which mandated the use of dummy variable for the model. The dummy variable is taken to remove the slight break found on this model when (LTPDEBT) is the dependent variable.

$$CPI_t = a_{01} + \beta_{11}PCI_{t-1} + \beta_{21}LRGDP_{t-1} + \beta_{31}LTRGDP_{t-1} + \beta_{41}LTPDEBT_{t-1} + \varepsilon_t \quad (20)$$

CPI C CPI(-1) CPI(-2) CPI(-3) CPI(-4) CPI(-5) LRGDP(-1) LRGDP(-2) LRGDP(-3) LRGDP(-4) LRGDP(-5) LTRGDP(-1) LTRGDP(-2) LTRGDP(-3) LTRGDP(-4) LTRGDP(-5) LTPDEBT(-1) LTPDEBT(-2) LTPDEBT(-3) LTPDEBT(-4) LTPDEBT(-5) (21)

long run model this will give way to form a residual from the regression

$$\Delta TC_t = a_0 + \sum_{i=1}^{p} a_{1i}\ \Delta TC_{t-1} + \sum_{i=1}^{q} a_{2i}\ \Delta G_{t-1} + \sum_{i=1}^{q} a_{3i}\ \Delta LE_{t-1} + \sum_{i=1}^{q} a_{4i}\ \Delta CO2_{t-1} + \sum_{i=1}^{q} a_{5i}\ \Delta UPDt_{t-1} + \delta ECM_{t-1} + \varepsilon_t \quad (22)$$

d(CPI) C d(CPI(-1)) d(CPI(-2)) d(CPI(-3)) d(CPI(-4)) d(CPI(-5)) d(LRGDP(-1)) d(LRGDP(-2)) d(LRGDP(-3)) d(LRGDP(-4)) d(LRGDP(-5)) d(LTRGDP(-1)) d(LTRGDP(-2)) d(LTRGDP(-3)) d(LTRGDP(-4)) d(LTRGDP(-5)) d(LTPDEBT(-1)) d(LTPDEBT(-2)) d(LTPDEBT(-3)) d(LTPDEBT(-4)) d(LTPDEBT(-5)) ECT(-1) (23)

combined short and long run model for error correction

Lags Selections

Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) are applied to choose the lag length of the series (Ahmad et al, 2018; Abbas, 2020; Adem et al, 2020). Equally applied the stages of Pesaran –Pesaran, 1997 method, to examine the stability of dynamic in short-run and coefficient of the long-run with testing of recursive residuals specifically on CUSUM-Squares and CUSUM As shown in figure

Table 2: Bounds Test For Cointegration Using Unrestricted Constant No Trend And Lags Selections

Variables	LAG	Decisions	F-Stat	T-Value	Co-integration Relations
LRGDP	2	ARDL	3.0612	-0.6791	Not Exist
LTRGDP	1	ARDL	2.3723	-1.2425	Not exist
LTPDEBT	1	ECM	5.5163	-2.342	Yes
CPI	5	ECM	5.6805	-4.6304	Yes
				Lower Bounds 1% 4. 29(-3.43) 5% 3.23 (2.86) 10%2.72 (2.57)	Upper Bounds 1% 5.61 (-4.37) 5% 4.35 (-3.78) 10% 3.77 (-3.46)

Note: F-Stat and T-Values mean F-Statistic and Table values, the values in ( ) are T-Stat values of Upper and lower Bounds

Table 3: Short-run and Long-run analysis

Dep. Variables	Causations	Coefficients	Prob	**ARDL**	
				Coefficients	Prob
	? (LTPDEBT(-1))	0.0498	0.0000*		
? LTRGDP	-	-	-	-	-
? LTPDEBT	? (LTPDEBT(-1))	0.6967	0.0188	-	-
	? (LTRGDP(-1))	0.3389	0.0143	ECM(-1) -0.9198	0.0035*
? CPI	? (CPI(-1))	0.9348	0.0592		
	? (CPI(-2))	-0.1669	0.0841	ECT(-1) -1.0460	0.0426**
	? (CPI(-4))	0.5657	0.0000		
	? (LRGDP(-1))	17.3427	0.0051		
	? (LRGDP(-2))	-16.3795	0.0993		
	? (LTRGDP(-1))	-1.3573	0.0568		
	? (LTRGDP(-2))	1.7387	0.0537		

Source: Authors calculation using Eviews 11 – Note: *, **, *** denotes to 0.001, 0.005 and 0.100 respectively, ? mean change in the variable

Diagnostic Tests

Diagnostic tests was conducted to examined the healthy conditions of the series, the serial correlation (Breusch-Godfrey LM test) and Heteroskedasticity Test were examined as showed in table 10 below., The results displayed that, the model for the analyses are free from serial correlation and are homoscedasticity thereforereflects the stability and the model satisfies the diagnostic tests. Using short-run dynamic were used to the ability of long run coefficient also CUSUM and CUSUM Squares are used to testify the stability of the variablesthe result is not presented (Pesaran and Pesaran (1997).

Table 4: Serial Correlation and Stability Diagnostic

Observed Dependent-Variables	Serial Correlations		Heteroscadesticity		Comments
	F-Stat	Obs R^2	F-Stat	Obs R^2	No S -C and is homoscedastic
LRGDP	1.098(0.338)	2.396(0.302)	0.994(0.446)	8.032(0.430)	Yes
LTRGDP	1.309(0.255)	1.370(0.242)	0.582(0.676)	2.388(0.665)	Yes
LTPDEBT	1.022(0.315)	1.094(0.296)	1.695(0.130)	9.875(0.130	Yes
CPI	0.481(0.790)	3.168(0.674)	1.307(0.196)	26.053(0.204)	Yes

Source: Authors calculation using EViews 11 SV (Students' version) Note: S-C means Serial Correlation, Obs R^2 (Observed R-square)

Table 5: Short-run and Long-run analysis

Dep. Variables	Causations	Coefficients	Prob	**ARDL**	
				Coefficients	Prob
? LRGDP	? (LTPDEBT(-1))	0.0498	0.0000*		
? LTRGDP	-	-	-	-	-
? LTPDEBT	? (LTPDEBT(-1))	0.6967	0.0188	-	-
	? (LTRGDP(-1))	0.3389	0.0143	ECM(-1) -0.9198	0.0035*
? CPI	? (CPI(-1))	0.9348	0.0592		
	? (CPI(-2))	-0.1669	0.0841	ECT(-1) -1.0460	0.0426**
	? (CPI(-4))	0.5657	0.0000		
	? (LRGDP(-1))	17.3427	0.0051		
	? (LRGDP(-2))	-16.3795	0.0993		
	? (LTRGDP(-1))	-1.3573	0.0568		
	? (LTRGDP(-2))	1.7387	0.0537		

Source: Authors calculation using EViews 11 SV (Students' version) Note: S-C means Serial Correlation, Obs R^2 (Observed R-square)

Table 5: Short-run and Long-run analysis

Dep. Variables	Causations	Coefficients	Prob	**ARDL**	
				Coefficients	Prob
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? LTRGDP	-	-	-	-	-
? LTPDEBT	? (LTPDEBT(-1))	0.6967	0.0188	-	-
	? (LTRGDP(-1))	0.3389	0.0143	ECM(-1) -0.9198	0.0035*
? CPI	? (CPI(-1))	0.9348	0.0592		
	? (CPI(-2))	-0.1669	0.0841	ECT(-1) -1.0460	0.0426**
	? (CPI(-4))	0.5657	0.0000		
	? (LRGDP(-1))	17.3427	0.0051		
	? (LRGDP(-2))	-16.3795	0.0993		
	? (LTRGDP(-1))	-1.3573	0.0568		
	? (LTRGDP(-2))	1.7387	0.0537		

Source: Authors calculation using Eviews 10 – Note: *, **, *** denotes to 0.001, 0.005 and 0.100 respectively, ? mean change in the variable

4.0 Conclusion

This research was designed to examine the fiscal policy measures in price stability to Germany by examine Real-GDP, Total Public Debt, Tax Revenue and Consumer price index.The Autoregressive Distributed Lag (ARDL) and Ordinary least squares are used to determine the co-integration and Causal relationshipamong the variables. The results shows that, the variables are free serial correlation and homoscedasticity in nature and there is existence of positive and negative causality amongst real GDP and tax revenue to CPI and tax revenue cause total public debt positively in Germany similarly, total public debt positively cause real GDP in short-run. Only one bidirectional exist between CPI and Total Public Debt, three unidirectional occurred between Tax revenue and real GDP, Total public debt and real GDP and CPI and Total public debt.

Speed of adjustment is required to address the errors of the current period at 91.98% against the next year for the total public debt and Tax revenueand for the errors in price stability to be maintaining (CPI), 104.60% speed of adjustment is required to correct the previous error in the current year period. This shows the evidence of higher tax rate leading to inflation and more public debt in the country. The researchers suggest that, there is need for the Germany's expansionary fiscal policy stance with combination of monetary policy which wills helps to contribute to the rapid growth of the economy

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