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An Empirical Analysis of the Degree of Independence and Transparency of Central Bank of Rwanda

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Abstract: The aim of this paper is, thus, to evaluate the degree of independence and transparency of the Central Bank of Rwanda. The econometric time series using ARDL model estimated the counterfactual effect of the side effect of the policy from the period of 1980 to 2015. Macroeconomic variables were used to predict each outcome from past inflation, openness, GDP per capita, and various measures of the strength of institutions as explanatory variables. The results showed that inflation and interest rate remained inconclusive to have a long run relationship while the participatory labor rate has a long run relationship with trade openness. In conclusion, the empirical analysis fails to explain the fluctuation in the interest rate or keeping the inflation under control may not mean the low level of independence or transparency from Central Bank of Rwanda.

Keywords: Independence, Transparency, Central Bank, ARDL

1 Introduction

In 2007, the law governing Central Bank of Rwanda (BNR) had been restructured to become a national institution with legal personality, operate independently including administrative and financial areas in Rwanda under the law N° 55/2007 of 30/11/2007 [1]. The Central Bank has an autonomy or at least a very large degree of freedom when formulating and implementing monetary policy [2, 3]. A comprehensive edifice of monetary policy is normally arranged to be favorable to an efficient and accountable conduct of policy.

The independent operative of the central bank has emerged as a significantly debatable theme in modern monetary theory. Indeed, the effective monetary policy refers to the ability of the monetary authority to affect the real economy (employment, investment or production) with the aim of achieving its prime objective of price stability. However, this objective always coupled with an objective of ensuring stable financial system, reducing unemployment and contributing to economic growth.

The central bank independence and transparency are an institutional instrument for optimizing the contribution of monetary policy to attaining the overall goal of steering the economy. The basic theoretical argument for independence and transparency are that higher long-run economic growth requires price-level stability and that an independent central bank has fewer incentives to inflate than the government and enhances fiscal responsibility of the latter.

To prevent any conflicts of interest proponents of independence and transparency suggest that there should be a clear distinction between the Central Bank and government. The entity that creates money must be independent of the entity that spends the money [4]. It is especially true in African countries where in many cases there are substantial fiscal deficits coupled with weak internal institutions.

The traditional origin of theoretical studies on central bank independence and the governor's degree of conservatism is the time-inconsistency problem of political choices [5]. An independent central bank is associated with lower inflation, while transparency thus allows the central bank to communicate with the markets more effectively. It helps it to commit credibly. It is a way for monetary policy makers to communicate the importance they attach to price stability.

Measuring the degree of independence and transparency can be tricky and viewed by different outcomes, i.e. per capita GDP is a robust determinant of overall transparency

and transparency should rise with the general level of economic and institutional development. The greater openness is associated with greater transparency if the country in question has a relatively flexible exchange rate, but with less transparency, if the country has a relatively rigid currency.

The aim of an empirical analysis is, thus, to evaluate the degree of independence and transparency of the Central Bank of Rwanda. And the following questions were based on understanding how operationally independent are the Central Bank in Rwanda? How much policy independence and act reflecting the level of transparency does the Central Bank of Rwanda have? And finally, what are the levels of monetary policy convergence within the Central Bank in Rwanda?

2. Literature Review

Ensuring independence and transparency of Central Bank can be evaluated at different points such as (re) appointing all members of the Board of Directors. For example, in Rwanda, the governor and vice governor should be appointed for six years, renewable under presidential order while the Board of Directors appointed under the Prime Minister order [1].

The ability of a central bank to operate, in particular in the realm of monetary policy, independently of government widely accepted as desirable [6]. And the role of a central bank in the economy is certainly crucial: by influencing short-term interest rates, undertaking open market operations and enforcing reserve requirements, the central bank influences the economy. Each Central Bank is guaranteed to design monetary policy for stabilizing, limiting or augmenting effects on the rates of inflation, unemployment, and economic growth. Thus, it is important to have a separate and autonomous monetary entity to restrict government intervention in the making of monetary policy.

In general, Central Bank Independence (CBI) could define as an institutional capacity of the central bank typically derived from an institutional mandate to conduct monetary policy free from directives, instructions and other forms of interferences from the side of government, industry and other interest groups. Kydland & Prescott refer to the dynamic inconsistency theory of monetary policy [5]. The theory suggests that central government will try to abuse the Central Bank to finance fiscal deficits. It is based on political considerations and will be in conflict with the stated aim of a Central Bank which is price stability.

Governments may try and use monetary authorities to mitigate the political, business cycle, without considering the impact of monetary policy and price stability [7]. There is a complex relationship between government and the Central Bank. The government appoints the Central Bank Governor and board members, but at the same time, the board is considered independent from government.

Henning defines CBI as "the ability of a Central Bank to use its instruments of monetary control without instruction, guidance or interference from the government" Measuring the level of the CBI can be done using some criteria or dimensions [8]. CBI can lead to improved macroeconomic performance [6]. It based on the suggestion that higher levels of the CBI will lead to a more stable monetary policy environment, lower inflation, foster greater fiscal policy discipline and reduce the impact of political business cycles on the economy.

Walsh argues that high levels of CBI may weaken the levels of transparency and accountability of Central Banks [9]. It is especially true in countries where the monitoring and enforcement mechanisms are weak, as which is the case in the most third world and African countries. To overcome this most country split responsibility between goal independence and instrument independence [10]. Macroeconomic goals such as Inflation targets set by the legislature, but it is up to the Central Bank to determine which instruments should be used to attain those goals.

3. Methodology

An empirical analysis of the degree of the independence and transparency need to accommodate different types of information. Among of them are top secret both qualitatively and quantitatively that is why in this paper, the secondary data used have corrected from world development indicators [11]. The counterfactual technique is preferred to estimate the side effect of the policy given to the certain period.

3.1. Data Source

Examining the degree of independence and transparency of the Central Bank of Rwanda, the annual data collected from world development indicators for the period 1980-2015 more specifically for the macroeconomic variables impacted by the monetary policy. The dependent variables are the inflation rates [12], interest rate and labor participatory rate proxies the unemployment rate data. The independent variables were the lagged variable for the dependent variable followed by Per capita GDP and the openness.

3.2. Model Specification

The basic specification used to analyze the correlates of central bank independence is similar to that used above to analyze the correlates of transparency since the two variables are broadly thought to respond to similar factors. The respective regressions best understood as reduced-form estimates of the determinants of the respective variables. In the case of independence, there past inflation, openness, GDP per capita, and various measures of the strength of institutions were included as explanatory variables.

This study adopted the Autoregressive Distributed-Lag Model (ARDL) which allows accounting for the presence of exogenous variable shock to the endogenous variable and the importance of stickiness of the dependent variable in adjustment to the long-run equilibrium. The ARDL model was introduced by Pesaran et al. to incorporate I (0) and I (1) variables in the same estimation so if the variables are stationary I (0) then OLS is appropriate and if all are non-

stationary I (1).

The general models concerning with the co-integration between the dependent variables and explanatory are in the following form:

$$Inf_t = \alpha_0 + \alpha_1 Inf_t(-1) + \alpha_2 GDPCap + \alpha_3 Openness + u_t \quad (1)$$

$$Int\_rate_t = \beta_0 + \beta_1 Int\_rate_t(-1) + \beta_2 GDPCap + \beta_3 Openness + v_t \quad (2)$$

$$Lfp\_rate_t = \varphi_0 + \varphi_1 Lfp\_rate_t(-1) + \varphi_2 GDPCap + \varphi_3 Openness + \varepsilon_t \quad (3)$$

Where, equation (1), (2) and (3) represent the model 1, model 2 and model 3 respectively, Inf_t indicates the inflation rate, Inf_t(-1): the lagged variable of the inflation rate; Int_rate_t and $Int\_rate_t(-1)$ indicate the interest rate on deposit and its lagged variable. Lfp_rate_t and $Lfp\_rate_t(-1)$: indicate the labor force participatory rate and its lagged variable; *GDPCap*: GDP per capita and *Openness* indicates the trade openness.

The ARDL bound test approach to cointegration involves two stages. The first stage is to establish an unrestricted error correction model (UECM). Secondly, after a co-integration relationship observed between the series, ARDL models are set up to the long-run and short-run relationship.

Checking for the presence of the co-integration for each and the F tests assigned for testing the existence of long-run relationships. When long- run relationships, presence, the F tests indicate which variable should be normalized. This F-test is in a generalized Dickey-Fuller regression, which is applied to test the significance of lagged levels of the variables in a conditional unrestricted equilibrium correction model [13].

Pesaran et al. developed two sets of critical values for F-test in which upper and lower bounds provided for I (0), I (1) or mutually co-integrated regressors [13]. If the calculated F-statistics exceeds upper bound, then the variables are the co-integrated and null hypothesis of no cointegration amidst the variables are rejected while the variables fall below lower bound than the null hypothesis of no cointegration is accepted.

4. Results and Discussion

4.1. Stationarity Test

The study employs Augmented Dickey-Fuller, Philip Perron and Kwiatkowski-Phillips-Schmidt-Shin test statistic test for stationarity in the individual variables. From theses test rules of thumb has been applied to decide the stationary level, a variable is declared stationary when it's t-calculated value is smaller than the t-critical value or less than 5% level of probability.

Table 1. *Unit Root test for all variables.*

P-values						
	H_0: Series has a unit root				**H_0: Series is stationary**	
	ADF Tests		**PP Tests**		**KPSS**	
	Intercept	**Trend**	**Intercept**	**Trend**	**Intercept**	**Trend**
Inflation[+]	Inflation rate					
Level	0.0802	0.2463	0.0709	0.2264	P<0.01	P>0.10
First diff.	0.0005	0.0029	0.0000	0.0000	P<0.01	P>0.10
Second diff.	0.0003	0.0023	0.0000	0.0000	P<0.01	P>0.10
Lfp_rate [¥]	Labour force participation rate					
Level	0.0316	0.0916	0.0448	0.1806	P<0.01	P>0.10
First diff.	0.4126	0.8332	0.4088	0.8250	0.01<P<0.05	0.01<P<0.05
Second diff.	0.0001	0.0004	0.0001	0.0004	P<0.01	P<0.01
Int_rate[+¥]	Interest rate on deposit					
Level	0.0193	0.0726	0.0184	0.0814	P<0.01	0.01<P<0.05
First diff.	0.0000	0.0002	0.0000	0.0001	P<0.01	P<0.01
Second diff.	0.0112	0.0416	0.0001	0.0000	P<0.01	P>0.10
Capita[+]	GDP per Capita					
Level	0.7573	0.7096	0.8194	0.7775	0.01<P<0.05	P>0.10
First diff.	0.0000	0.0001	0.0000	0.0000	P<0.01	P<0.01
Second diff.	0.0000	0.0000	0.0000	0.0000	P<0.01	P<0.01
Openness[¥]	Openness					
Level	0.0270	0.0061	0.0190	0.0059	0.01<P<0.05	0.01<P<0.05
First diff.	0.0000	0.0001	0.0000	0.0000	P<0.01	P<0.01
Second diff.	0.0000	0.0000	0.0001	0.0000	P<0.01	P<0.01

[+] Integrated at first difference, integrated at second difference [¥]integrated at level (~P<10%).

Table 1, the inflation rate, the labor participation rate, interest rate and GDP per capita were not stationary at the level. The test statistic is more than the critical value at all levels. While some variables became stationary at first different for all tests applied means that the inflation rate, interest rate and GDP per were integrated into the order one.

And labor participation rate was not stationary at first difference, but stationary at the second difference means the labor participation rate integrated at order two.

On the contrary, openness was stationary at the level, means it has integrated of order zero. The unit root failed to reject the null hypothesis, neither by ADF nor by the PP test, but confirmed for another side of KPSS for the labor participation rate at a level, and so are the series non-stationary in the level. Hence, the same test on the first difference of these series found to be stationary. Inflation rate ~I (1), interest rate ~I (1), GDP per Capita ~I (1) and openness ~I (2). Hence, the autoregressive distributed lags are more likely to be used for testing the existence of the long run relationship between macroeconomic variables against the rules and discretionary policies applied by the Central Bank of Rwanda.

4.2. Tests of Cointegration and ARDL Bounds Testing Approach

Autoregressive distributed lag models (ARDL model, *hereon*) widely employed in the analysis of long-run relations. The data generating process underlying the time series mixed with a different level of integrated order (i. e. I (0) and I (1), or I (0), I (1) and I (2)). Recently, the application of the ARDL model procedure to difference-stationary series has involved [13, 14].

Table 2. *Estimate an equation with autoregressive distributed lags using least squares.*

	Model 1		**Model 2**		**Model 3**	
	Coef.	**t-test**	**Coef.**	**t-test**	**Coef.**	**t-test**
Past Inflation	0.463	2.395**				
Past Int_rate			0.623	4.811***		
Past Labour Part.					0.805	31.67***
GDP Per Capita	-0.38	-1.167	0.0121	0.268	-0.0096	-5.30***
Openness	0.524	0.798	0.0938	1.0747	-0.007	-1.945*
R Squared	0.276		0.593		0.98	
F (P-Value)	0.0739		0.000		0.000	

Refer to the table 3, the error correction coefficient was negative for each model as required, and were very significant. Importantly, the long-run coefficients from the co-integrating equation are reported, with their standard errors, t-statistics, and p-values (this conditions will ensure that there is convergence in the model which indirectly means that there is a significant long run relation).

Table 3. *Long-run relationship.*

	Model 1		**Model 2**		**Model 3**	
	Coef.	**t-test**	**Coef.**	**t-test**	**Coef.**	**t-test**
Constant	29.727	0.6833	2.312	2.659*	4.698	37.88***
GDP Per Capita	-6.1509	-0.559	-0.074	-0.507	-0.0012	-0.0592
Openness	3.9908	0.3719	0.2601	1.6908	-0.0592	-2.742**
ECM	-0.5888***		-0.3776***		-0.167***	

Before this method of co-integration, bounds testing is preferred to these other methods due to its relatively better performance when the sample size T is small and its applicability to a mixture of stationary and non-stationary time series. Bound testing as an extension of ARDL modeling uses *F* and *t*-statistics to test the significance of the lagged levels of the variables in a univariate error correction system when it is unclear if the data generating process underlying a time series is trend or first difference stationary [13].

Table 4. *ARDL Bounds Test.*

Model 1	**1%**	**2.5%**	**5%**	**10%**
F-Value	4.6207 with two equations			
I0 Bound	5.15	4.41	3.79	3.17
I1 Bound	6.36	5.52	4.85	4.14
Model 2 F-Value	4.608 with two equations			
I0 Bound	5.15	4.41	3.79	3.17
I1 Bound	6.36	5.52	4.85	4.14
Model 3	8.2011 with two equations			

Model 1	**1%**	**2.5%**	**5%**	**10%**
F-Value				
I0 Bound	5.15	4.41	3.79	3.17
I1 Bound	6.36	5.52	4.85	4.14

H_0: There is no long-run relationship exist.
H_a: Long-run relationship exists.

F-statistics value tells about the cointegration among variables if F value comes less than critical bound values, and concluded that there is no cointegration among variables.

For k=2, Table 4 shows that the F-value of 4.6207 and 4.608 for model 1 and model 2 respectively lie between the bounds of the critical bounds value of 6.36 and 4.85 for I (1). The F-statistic for the Bounds Test for 8.2011, and this clearly outside the 1% and 5% critical values for the upper bound. Accordingly, we strongly fail to reject the hypothesis of no long-run relationship to the model 3. Hence model one and two stays inconclusive, and model three has long run relationship.

5. Conclusion

From the monetary policy proxies used to estimate the degree of independence and transparency are less likely to fall prey to an expectations trap in which expectations drift off in ways that force them into unpalatable policy choices. The three models jointly are not confirming the level of independence and transparency in the long-run. And they can allow the central bank to predict the price stability on the markets, for example, more effectively. Hence, failing to explain the fluctuation in the interest rate or keeping the inflation under control may not mean the low level of independence or transparency.

The effects of independence and transparency on inflation and interest rate variability as well as participatory labor rate have shown in table 2 as instruments for independence and transparency were expected to have the same direction and significant in the long run relationship between macroeconomic variables. The Central Bank of Rwanda independence and transparency consistently enters with a negative coefficient that is significant at a p-value of 5 percent on trade openness for the participatory labor rate.

Hence, the above results cannot be used to conclude the degree of independence and transparency for the Central Bank of Rwanda. But, the results showed the contribution of monetary policies starting to applied on different macroeconomic impediments, which implies the political will towards the autonomy for certain influences on the economic environment.

Recommendations

The independence and transparency in Central Bank are complementary to each other to the improved solution in stabilizing the macroeconomic outcomes. The impact of monetary policy realized in price stability by keeping the inflation under control as well as interest rate, and other macroeconomic outcomes have been shown to be ambiguous in this paper. The combination of Central Bank Legislation information with macroeconomics variables is more likely to conclude the degree of autonomy and transparency for future researches.

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