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Government borrowing as a Ponzi scheme: The case of Bangladesh

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Abstract

This study investigates whether government borrowing can be likened to a Ponzi scheme which will allow the government to roll-over its debt perpetually. The results show that, on the basis of the condition of maintaining real economic growth rate above and beyond the real interest rate on government debt, it will not be possible to sustain a perpetual Ponzi scheme of all four types of National Savings Certificates in Bangladesh. The government's debt may be rolled over perpetually for two types of National Savings Certificates, following the condition outlined in Ball, et al. (1998), or for three types of National Savings Certificates following the condition outlined in Mehrotra (2017). Additionally, following the condition outlined in Trehan and Walsh (1991) and Ahmed and Rogers (1995) Bangladesh's budget deficit cannot be perpetually Ponzi-financed. However, using the conditions put forward by Quintos (1995) and Bergman (2001), it may be possible to perpetually Ponzi-finance Bangladesh's budget deficit. Overall, the findings cast a shadow of doubt on the fiscal sustainability of National Savings Certificates in Bangladesh, but should be interpreted with discretion due to the possible presence of confounding factors and uncertainty.

Keywords: Ponzi scheme; budget deficit; government borrowing
JEL Classification Codes: H63, H74, H81

1. Introduction

The real weighted average deposit rate offered by scheduled banks in Bangladesh has been below zero since January 2017 (Bangladesh Bank, 2019). Hence, the general public have little incentive to save their hard-earned money in the banks and watch it lose its value over time. On the other hand, the real interest rates on various forms of the National Savings Certificates in Bangladesh were around 6 per cent. Thus, savings continued to be diverted into the National Savings Certificates and away from the banks. This disconcerting phenomenon has been occurring for some time now. In the absence of adequate social protection, the National Savings

Certificate has transcended its role of a financial product and transformed into a de facto social safety net mechanism. Consequently, the government has dug itself into an abyss which is proving to be difficult to escape. The high real rate of interest on the National Savings Certificates means that the government is engaging in expensive borrowing to finance public expenses. If national savings are directly channelled from the public to the government, then not only will banks become deprived of deposits, but also the role of the banks as financial intermediaries will be seriously compromised.

A Ponzi scheme is an investment fraud that involves the payment of supposed returns to existing investors from funds contributed by new investors (US Securities and Exchange Commission, 2013). Interestingly, National Saving Certificates in Bangladesh share a number of characteristics with Ponzi schemes. For example, both National Saving Certificates and Ponzi schemes are characterised by: i) high investment returns with promise of little risk; ii) consistent returns, despite market conditions; iii) inability of investors to review how funds are being invested; and iv) investors with limited information and knowledge. Therefore, by rolling over debt from National Saving Certificates indefinitely, the government may run a Ponzi scheme perpetually – provided certain conditions are met.

One of the conditions for running perpetual Ponzi financing of budget deficits is to ensure that the long run economic growth rate exceeds the long run interest rate on government debt (Bartolini & Cottarelli, 1994). Ball, et al (1998) states that a government may perpetually roll over its debt if the debt to income ratio is less than one, or more precisely if

$$\frac{(1 + rate\ of\ interest\ on\ debt)}{(1 + rate\ of\ economic\ growth)} < 1$$

Mehrotra (2017) mentions that as long as the rate of interest on government debt is less than the sum of the rate of economic growth and rate of population growth, then the government may be able to roll over its debt perpetually. Other conditions for sustaining perpetual Ponzi financing of budget deficit include: i) budget deficit is stationary at level over time (Trehan & Walsh, 1991) (Ahmed & Rogers, 1995); ii) budget deficit is stationary at first difference over time (weak form of government solvency) (Quintos, 1995); and iii) budget deficit is stationary at any finite order of differencing over time (strong form of government solvency) (Bergman, 2001).

2. Methods

In order to check if the government of Bangladesh can sustain a perpetual Ponzi scheme, the real economic growth rate and the real rate of interest on National Savings Certificates is compared using annual data during the period from fiscal year 1999 to fiscal year 2019. Additionally, using the annual data of budget deficit as a percentage of Gross Domestic Product (GDP) (IMF, 2019) during the period 1980 to 2017, it is possible to test for stationarity by running augmented Dickey-Fuller (Dickey & Fuller, 1979) (Dickey & Fuller, 1981) and Phillip-Perron (Phillips & Perron, 1988) unit root tests.

The augmented Dickey-Fuller test (Dickey & Fuller, 1979) (Dickey & Fuller, 1981) constitutes of estimating one or more equations using ordinary least squares in order to obtain an estimated value for the coefficient of interest, γ, and the associated standard error. Comparison of the subsequent t-statistic with the corresponding value reported in the Dickey-Fuller results enables us to decide whether to reject or not to reject the null hypothesis of $\gamma = 0$. The unit root can be detected using the Dickey-Fuller statistic. If the model has no intercept or trend, then we use the τ statistic, if the model has an intercept then we use the τ_μ statistic, and if the model has both an intercept and a trend then we use the τ_τ statistic (Enders, 2015). The augmented Dickey-Fuller test uses the pth order autoregressive process defined as:

$$\Delta y_t = a_0 + \beta t + \gamma y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta y_{t-i+1} + \varepsilon_i \tag{1}$$

where,

$$\gamma = -\left(1 - \sum_{i=1}^{p} a_i\right) \text{ and } \beta_i = -\sum_{i=1}^{p} a_j \tag{2}$$

The null hypothesis is that the variable contains a unit root. The alternative hypothesis is that the variable was generated by a stationary process. If $\gamma = 0$, then we cannot reject the null hypothesis that the variable has a unit root. The augmented Dickey-Fuller test assumes that the errors are uncorrelated with each other and have constant variance.

The Phillips-Perron test (Phillips & Perron, 1988) is non-parametric unit root test that modifies the test statistics after estimation in order to consider the effect of autocorrelated errors. This procedure allows for drawing valid inferences from large samples without estimating additional parameters in the regression model (Banerjee, Dolado, Galbraith, & Hendry, 1993). The error term in the Phillip-Perron test regression model does not follow a white-noise process.

3. Data

Data of the growth rate of the real GDP of Bangladesh and the real interest rate of 4 different types of National Savings Certificates in Bangladesh (3 monthly profit bearing savings certificate, 5-year Bangladesh savings certificate, 5-year pensioner savings certificate after 3-month interest and 5-year family savings certificate after monthly interest) were collected from was collected from the Monthly Economic Trends database (Bangladesh Bank, 2019) of Bangladesh Bank. Data of the Bangladesh government's budget deficit as a percentage of GDP was collected from the World Economic Outlook Databases (WEO) (IMF, 2019) of the International Monetary Fund (IMF).
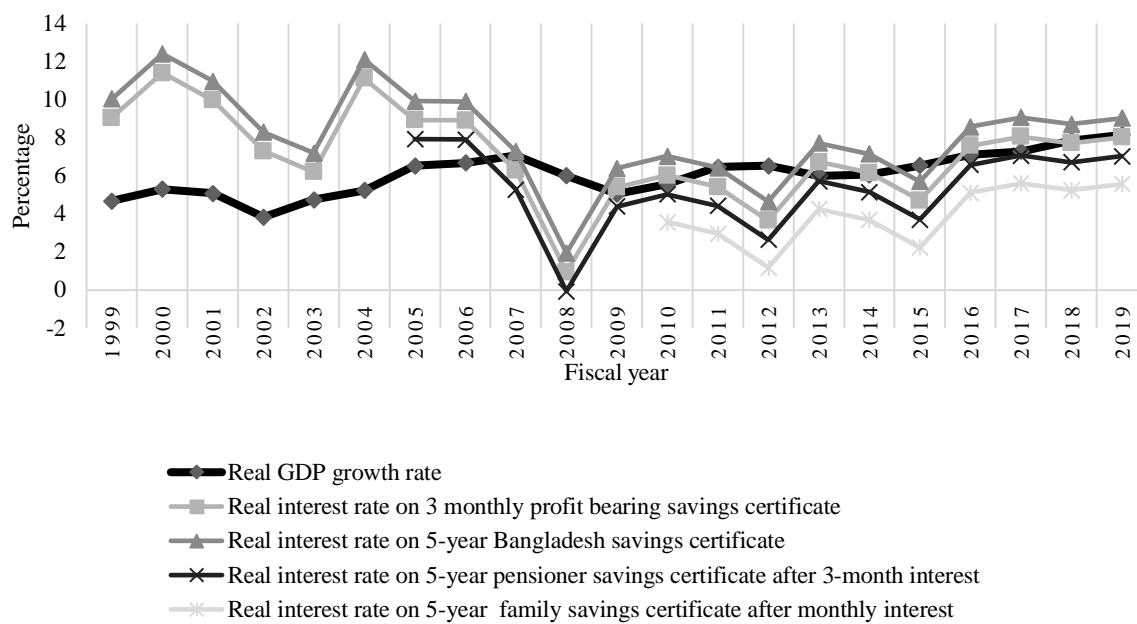
4. Results

Data from fiscal year 1999 to fiscal year 2019 (Bangladesh Bank, 2019) shows that the real rate of economic growth has not always been higher than the real rate of interest on various forms of the National Savings Certificates (Figure 1).

In fact, the average real rate of economic growth during fiscal year 1999 and fiscal year 2019 was 6.08 per cent while the average real rates of interest on various forms on the National Savings Certificates were 4.66 per cent, 6.12 per cent, 7.12 per cent and 8.12 per cent respectively during the same period (Bangladesh Bank, 2019).

In the case of Bangladesh, it is found that the debt-income ratio is less than 1 for two types of National Savings Certificates over a time period of 21 years from 1999 to 2019 (Table 1). Additionally, it is found that the real rate of interest on 3 types of National Saving Certificates is less than the sum of rate of real GDP growth and rate of population growth, on average over a period of 21 years from 1999 to 2019. Therefore, the government's debt may be rolled over perpetually for two types of National Savings Certificates, following the condition outlined in Ball, et al. (1998), or for three types of National Savings Certificates following the condition outlined in Mehrotra (2017). However, none of these conditions are fulfilled for sustaining a perpetual Ponzi scheme of all four types of National Savings Certificates in Bangladesh.

The results of the augmented Dickey-Fuller and Phillips-Perron tests show that Bangladesh's budget deficit as a percentage of GDP is not stationary at level, but stationary at first and second difference (Table 2).

Figure 1. Real GDP growth rate and real interest rate on National Savings Certificates (in percentage).

- ◆ Real GDP growth rate
- ■ Real interest rate on 3 monthly profit bearing savings certificate
- ▲ Real interest rate on 5-year Bangladesh savings certificate
- ✕ Real interest rate on 5-year pensioner savings certificate after 3-month interest
- ✳ Real interest rate on 5-year family savings certificate after monthly interest

Source: Author's illustration based on data from Monthly Economic Trends database of Bangladesh Bank (Bangladesh Bank, 2019). *Note*: i) 5-year pensioner savings certificate was introduced in 2005; ii) 5-year family savings certificate was introduced in 2010

Table 1. Debt-income ratios of real interest rates on National Savings Certificates and real GDP over time.

	3 monthly profit bearing savings certificate	5-year Bangladesh savings certificate	5-year pensioner savings certificate after 3-month interest	5-year family savings certificate after monthly interest
1999	1.7722	1.9485		
2000	1.9719	2.1308		
2001	1.8056	1.9701		
2002	1.7170	1.9239		
2003	1.2557	1.4299		
2004	1.9416	2.1019		
2005	1.3174	1.4501	1.1847	
2006	1.2915	1.4219	1.1612	
2007	0.9034	1.0275	0.7793	
2008	0.2775	0.4201	0.1349	
2009	1.0580	1.2235	0.8926	
2010	1.0692	1.2213	0.9170	0.6949
2011	0.8609	0.9949	0.7270	0.5314
2012	0.6179	0.7508	0.4849	0.2908
2013	1.1012	1.2438	0.9587	0.7505
2014	1.0129	1.1545	0.8713	0.6645
2015	0.7556	0.8880	0.6232	0.4299
2016	1.0580	1.1812	0.9347	0.7548
2017	1.0942	1.2149	0.9734	0.7971
2018	0.9839	1.0968	0.8710	0.7063
2019	0.9864	1.0957	0.8771	0.7175
Overall average	1.1834	1.3281	0.8261	0.6338

Source: Author's calculations based on data from Monthly Economic Trends database of Bangladesh Bank (Bangladesh Bank, 2019). Note: i) $Relative\ average = \frac{(1+rate\ of\ interest)}{(1+rate\ of\ economic\ growth)}$; ii) 5-year pensioner savings certificate was introduced in 2005; iii) 5-year family savings certificate was introduced in 2010

Table 2. Results of augmented Dickey-Fuller and Phillips-Perron tests.

	Augmented Dickey-Fuller T-statistic (probability)			Phillips-Perron Adjusted t-statistic (probability)		
	Level	**First difference**	**Second difference**	**Level**	**First difference**	**Second difference**
No intercept or trend	-1.6864 (0.0864)	-6.8079 (0.0000)	-4.1676 (0.0001)	-1.6855 (0.0866)	-6.8079 (0.0000)	-37.2072 (0.0000)
Including intercept	-2.5092 (0.1202)	-6.7549 (0.0000)	-4.1012 (0.0028)	-2.5193 (0.1179)	-6.7549 (0.0000)	-36.2018 (0.0001)
Including trend and intercept	-2.6020 (0.2816)	-6.7749 (0.0000)	-4.0381 (0.0159)	-2.3421 (0.4035)	-6.7747 (0.0000)	-35.4022 (0.0000)
Trend coefficient	-0.0147 (0.3740)	-0.0109 (0.4148)	0.0035 (0.8608)	-0.0066 (0.5825)	-0.0109 (0.4148)	-0.0005 (0.9788)

Source: Author's calculations based on data from World Economic Outlook database of IMF (IMF, 2019). *Note*: i) Automatic lag length selection based on Schwarz information criterion; ii) Barlett kernel spectral estimation method used; iii) Automatic Newey-West bandwidth selection.

Therefore, following the condition outlined in Trehan and Walsh (1991) and Ahmed and Rogers (1995), Bangladesh's budget deficit cannot be perpetually Ponzi-financed since the budget deficit is not stationary at level over time. However, using the conditions put forward by Quintos (1995) and Bergman (2001), it may be possible to perpetually Ponzi-finance Bangladesh's budget deficit, since budget deficit is stationary at first and second difference over time. Therefore, Bangladesh government's borrowing from National Savings Certificates achieves both the weak form of government solvency condition of Quintos (1995) and the strong form of government solvency condition of Bergman (2001).

5. Concluding remarks

The findings of this study should be interpreted with caution since previous research has shown that in the presence of uncertainty, a perpetual Ponzi game is not possible and a government cannot roll-over its debt indefinitely (Abel, 1992). Hence, concerns about the sustainability of budget financing through National Saving Certificates are legitimate. Nevertheless, it must also be kept in mind that in a small open economy like Bangladesh, there may be other confounding factors influencing the sustainability of government's debt which calls for future research on this topic.

References

Abel, A. (1992) Can the government roll over its debt forever?, *Business Review* (November-December 1992 issue), 3-18.

Ahmed, S., & Rogers, J. H. (1995) Government budget deficits and trade deficits Are present value constraints satisfied in long-term data?, *Journal of Monetary Economics*, 36(2), 351-374.

Ball, L., Elmendorf, D. W., & Mankiw, N. G. (1998). The Deficit Gamble, *Journal of Money, Credit and Banking, 30*(4), 699-720.

Banerjee, A., Dolado, J. J., Galbraith, J. W., & Hendry, D. F. (1993) *Co-integration, error-correction, and the econometric analysis of non-stationary data*, Oxford University Press Inc: New York.

Bangladesh Bank. (2019) *Monthly Economic Trends*, Bangladesh Bank: Dhaka.

Bartolini, L., & Cottarelli, C. (1994) Government Ponzi games and the sustainability of public deficits under uncertainty, *Ricerche Economiche*, 48(1), 1-22.

Bergman, M. (2001) Testing government solvency and the No Ponzi Game condition, *Applied Economics Letters*, 8(1), 27-29.

Dickey, D. A., & Fuller, W. A. (1979) Distribution of the estimators for autoregressive time series with a unit root, *Journal of the American Statistical Association*, 74 (366a), 427-431.

Dickey, D. A., & Fuller, W. A. (1981) Likelihood ratio statistics for autoregressive time series with a unit root, *Econometrica: Journal of the Econometric Society*, 1057-1072.

Enders, W. (2015) *Applied econometric time series* (Fourth Edition ed.), John Wiley & Sons, Inc: Alabama.

IMF. (2019, April 9) World Economic Outlook Databases (WEO), retrieved May 30, 2019, from IMF Data: https://www.imf.org/external/pubs/ft/weo/2019/01/weodata/index.aspx

Mehrotra, N. R. (2017). Debt sustainability in a low interest rate world, *Hutchins Center Working Paper #32*.

Phillips, P. C., & Perron, P. (1988) Testing for a unit root in time series regression, *Biometrika*, 75(2), 335-346.

Quintos, C. E. (1995) Sustainability of the deficit process with structural shifts, *Journal of Business & Economic Statistics*, 13(4), 409-417.

Trehan, B., & Walsh, C. E. (1991) Testing intertemporal budget constraints: Theory and applications to US federal budget and current account deficits, *Journal of Money, Credit and Banking*, 23(2), 206-223.

US Securities and Exchange Commission. (2013, October 9) Ponzi Schemes. Retrieved May 30, 2019, from US Securities and Exchange Commission, https://www.sec.gov/fast-answers/answersponzihtm.html