Inflation and Gross Domestic Savings nexus in Ethiopia

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Abstract: *The paper Endeavors to investigate the magnitude and direction effect of inflation on the gross domestic savings. In doing so, the writers undertake different diagnostic tests such as Augmented Dicky Fuller unit root tests, Ramsey functional misspecification test (RESET) hetroscedasticity, autocorrelation etc. Moreover, we use the Engle-granger co-integration approach to test the existence of long run associations among economic variables. Accordingly, the model doesn't confirm the existence of long run relationships and hence the short run model suggests that there appears an inverse relationship between macroeconomic uncertainty (inflation) and gross domestic savings. Moreover, the result reveals insignificant influence of real interest rate and a significant and positive effect of real GDP on savings.*

Keywords: inflation, savings, Ethiopia

1. Introduction

It is a styled fact that the effectiveness of both fiscal and monetary policy and hence Proper policy design for economic growth requires understanding the impact of various macro economic variables to the economy. Among others, inflation (which can be seen as proxy for macroeconomic uncertainty), and domestic savings are the major once (Tsega H. 2014). Moreover, different economists argued the importance of mobilization of domestic savings especially for the progress of developing nations' economic growth (Vaibhav C. et.al, 2009). Accordingly, domestic gross savings become interesting contemporary variables in developing nations including Ethiopia.

Empirical results seem inconclusive about the real effect of macroeconomic uncertainty of Inflation rate on domestic savings. For instance Mohamed S. (2009), Vaibhav C. et.al (2009), reveals a positive and significant effect of inflation on national saving rate. Moreover, a positive and statistically a significant effect of inflation on the national savings is evidenced in the work of Qun C., (2014), Imran S. (2014), Cyril A. et al. (2014) and Haile A. (2013).

On the other hand, literatures argued that nations' saving is subject to macroeconomic uncertainties especially the level of inflations. Khalil A. et.al, (2013), Hanaa A. (2014), Faraji K. et.al (2013) and Tsega H (2014) argued an adverse effect of inflation rate on national saving. Their argument basically relies that a rational consumer will respond to such uncertainty that is increase in inflation dampens the incentive to save.

Thus the relationship between saving and inflation remains an empirical issue especially in developing countries wherein a special attention is given to this contemporary issue. Therefore, this paper tries to investigate the statistical effect of the inflation rate on domestic saving in the context of Ethiopia.

2. Model Specification

Theoretical model and econometrics model specifications
There may be different approaches to develop a model for savings like, behavioral function of household savings developed by Gulnur M.(1996), Klaus S. et al (1992) model of savings based on consumption hypothesis, F. Thomas J et al (1998) a model based on durable goods expenditure models and Houthakker and Taylor (1971) model of savings behavior. But for our case the model used to test the effect of inflation on personal saving is that developed by Houthakker and Taylor (1971) from a simple behavioral hypothesis. This is due to mathematical simplicity and widely applicable form of models for savings equation. Accordingly, the Houthakker-Taylor model is based on the following saving function:

$$S_t = \alpha + \beta K_t + \sum_{i=1}^{n} \alpha_i Y_i \ \ldots\ldots\ldots\ldots\ (1)$$

Where, S = personal savings K = stock of assets Y; = components of income and any other variables entering the saving function. Moreover, majority of the papers such as Irwin (1994) and wachtel (2004) arguing that, personal income tax, real interest rate, real GDP and macroeconomic uncertainty (inflation) are major determinants of personal saving.

Therefore, from the theoretical and empirical perspectives, the saving model could be modified in to an estimable model via incorporating real GDP (which is proxy for income variable), inflation, real interest rate, and personal income tax as independent variables.

Thus, it could be developed as:
$$S_t = \beta 0 + \beta 1 INF_t + \beta 2 R_t + \beta 3 PIT_t + \beta 5 RGDP + \varepsilon t \ (2)$$
Where, INF – inflation rate
R- Real interest rate
PIT –personal income tax
RGDP- real growth domestic product and ε - Stochastic error term, random variable, to account the unobservable variable effects.

From the economic theories, real interest rate and real GDP variables are expected to have positive impact on saving.

However, personal income tax potentially may reduce the disposable income and hence the income left after consumption. Thus, one could expect a significant and negative coefficient for personal income tax (PIT). The coefficient for inflation is an empirical issue because different literatures argued differently about the direction of its impact on saving. Some argued that it may encourage precautionary saving due to the uncertainty effect where as others state that inflation may reduce the real value of future asset values and real returns of creditors in which savers are considered as creditors and hence inflation may have negative effect on saving.

1.2 Results and Discussion

The paper has been conducted on the basis of time series analysis obtained from Ethiopian economic association (EEA) and central statistical authorities (CSA) from 1975 to 2014. This time period is deliberately chosen to show the nature and progress of saving behaviors in the two consecutive governments in Ethiopia.

The first task to undertake any econometrics packages is to determine the order of variables that is determine which variables are I(0) and which are I(1). Accordingly, as shown in the following table, the researcher used Augmented Dickey Fuller (ADF) test of unit root developed by Dickey and Fuller in 1978. Following determination of order of integration of variables, Engle- granger co-integration test is conducted to investigate the existence of long run associations among economic variables.

Table 1.1: Unit root test (test of stationrity of variables)

Series	ADF test with trend and intercept, ADF critical values, 5%=-3.04 1%=-3.86			Lag length
	level	Lag length	Difference	
INF	-2.328	2	-6.336**	1
GS	-2.261	0	-6.099**	0
RGDP	2.737	0	-8.100**	0
R	- -2.795	0	-4.156**	1
PIT	-0.9854	0	-3.962**	1

Notes: The null hypothesis is that the series is non-stationary, or contains a unit root. ** (*) denotes the rejection of null hypothesis of unit root at the 1% and 5% significance levels respectively. All results are obtained from oxmetrics (PcGive) econometric package. Lag length is selected using the Akaike Information Criterion (AIC).

From the table shown above, real interest rate is stationary at level at 5% level of significance, [I(0)], while the rest are stationary at their first difference, [I(1)],. Therefore, one can not apply the cointegration tests of Engle and Granger (1978) incorporating this stationary variable in the static model. Thus, the researcher tests the existence of cointegration via excluding real interest rate variable in the static model. Hence, the linear combination of non-stationary variables may be stationary. Therefore, testing the stationary of the linear combination of variables does mean testing the residual term. Accordingly, if the residual is stationary we can conclude that there will be cointegration or long run association among the variables involved.

Table 1.2: Test of stationary of the residual obtained from the static model

Series	ADF test with trend and intercept, ADF critical values, 5%=-3.04 1%=-3.86	
	level	Lag length
ECM	-2.482	0

N.B. The unit root test is taken from the oxmetrics (PcGive) econometrics packages; as usual the null is there is unit root. Here, the table shows the null is rejected at 1% level of significance.

As it is clearly shown in the above table, the residual is non-stationary and hence one could conclude that there is no co-integration among the variables involved. Therefore, it is better to see short run or immediate impact of a change in each of regressors on the dependent variable only.

Table 1.3: The short-run model (to see immediate relationships)

Dependent variables gross domestic savings (GS)				
Variable	Coefficient	St. error	t-value	T-Probability
CONSTANT	-0.705536	0.8655	-0.815	0.4277
DINF	-0.055	0.02466	-2.23	0.0354*
DR	-1.506	1.664	-0.9050	0.3309
DRGDP	0.0976009	0.005500	17.7	0.0000**
DPIT	-3.37804	0.4878	-6.93	0.0005**
Diagnostic test R^2 = 0.962251, Adj. R^2 = 0.952184				
Normality test X^2 = 7.8825 [0.194]				
RESET test: : $F_{(2,13)}$ = 11.545 [0. 00013]**				

Note; (*) and (**) denotes significance at 5% and 1% level of significance respectively. The diagnostic tests show as there is the model is normally distributed. D – Stands for difference

Here, short run denotes the immediate effect of independent variables on dependent variable though how 'short run is short' is ambiguous, While long run mean cumulative impact of a variable on another variable after some long period may be it after 10 or above it years.

Adjusted R2 shows that about 95% of the variation in the dependent variable (gross domestic saving) is well explained by the variation in the independent variables involving in the model.

The result confirms that real gross domestic product (RGDP) has a positive impact on gross domestic saving in the short run (as GDP changes, immediately it will have pulling factor for inflation). On the other hand, in line with economic theories, personal income tax has negative effect on saving because as personal income increases individuals' disposable income is expected to be declining in such way net income left after consumption (saving) will diminish. Moreover, inflation may harm the real value of your saving if inflation rate is higher than the interest earned in the saving in the bank. During inflation if interest rates do not rise accordingly, the real interest rates decrease. The incentive to save decrease people will look for other alternatives place for their money. When inflation is high, people increasingly fear that will erode their future purchasing power. Most of the models analyzing the effect of inflation on savings find a considerable negative effect

(heor and Ibrahim, 1996), if the incomes are not indexed, unanticipated inflation will cause unanticipated cuts in the real income and hence decreased the saving rates. The result is also in line with the study of Matthias D.et al (2006, Khaled A. et al (1999) and F. Thomas J et al (1998). Deaton,(1999) also defined high inflation can increase the opportunity cost of holding money and increase the rewards for search activities in shopping wasting real resources and thereby reducing savings. on the other hand, this result in is in contrary to the study of willer and Benjamin (2008), Vaibhav C. et al, (2009) and Dr. Mohamed S. (2014) who proposed that if the real income is correctly anticipated either by indexation or wage inflation, unanticipated inflation will increase the saving rate. That is, inflation is a good proxy for macroeconomic uncertainty and hence, higher uncertainty induces people to save a larger portion of their money for precautionary motives.

The result also shows the insignificant effect of real interest rate. It may not be exciting to see insignificant coefficient for real interest rate in developing nations like Ethiopia, because of the under developed financial markets. Moreover, observing a significant and positive coefficient for real GDP confirms the simple accelerator theory in which saving is a linear function of output.

3. Conclusions

The paper trays to investigate the magnitude and direction effect of inflation on the gross domestic savings. In doing so, the writers use the Engle-granger co-integration approach to test the existence of long run associations among economic variables. Accordingly, the model doesn't confirm the existence of long run relationships and hence the short run model suggests that there appears an inverse relationship between macroeconomic uncertainty (inflation) and gross domestic savings. Moreover, the result reveals insignificant influence of real interest rate and a significant and positive effect of real GDP on savings.

4. Recommendations

Following the inverse relationship between inflation and saving levels, it is better to focus on the factors that incite the prevalence of inflations. Though it may be an empirical issue, the national bank of Ethiopia (NBE) has to careful in managing the flow of currency in the economy. This because of the fact that long run growth of an economy is expected to be driven by investment which in turn affected by today's gross savings; thus, if savings diminish it will have a long lasting effect on tomorrow's investment.

However, it is our stand that inflation may not be always harmful, rather it may be harmful if it goes up beyond some acceptable level(threshold levels) and hence it is open for further studies to investigate the magic number(threshold level).

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