DETERMINANTS OF PRIVATE SAVING IN ETHIOPIA
(JOHANSEN CO-INTEGRATION APPROACH)

Tizita Gebeyehu

ABSTRACT

The main objective of this research is to empirically examine the main determinants of private saving in Ethiopia for the period ranging from 1971-2015 by using Johansen maximum likelihood co-integration approach. The result shows that level of real per capital income, inflation, urbanization ratio, bank branch and the dummy variable for political instability are significant variables to determine private saving of Ethiopia in the long run. Moreover, level of per capital income, urbanization ratio, bank branch and the dummy variable for political instability have significant positive effect on private saving of Ethiopia. However, inflation rate influencing private saving negatively and significantly. In addition, in the short run only level of per capital income, Urbanization ratio and bank branch at their difference are statistically significant in determining private saving. Gross domestic product per capital income and urbanization ratio have positive effect on private saving whereas Bank branch has negative effect on private saving of Ethiopia in the short run. Since the effects of a change in a given saving determinant are fully utilized both in the long term and short term, measures such as bank branch expansions, creating awareness among public and improving both the quality and the quantity of export have to be considered by the concerned authorities.

KEY WORDS: Private saving, Ethiopia, Johansen Co-integration, Endogenity problem and Granger causality
1. INTRODUCTION

An economic system must be able to produce capital if it is to satisfy the want and needs of its people. To produce capital people must be willing and able to save, which release produce for use elsewhere. When people save, they make funds available to others. When business borrows these savings, new business and services are created, plants and equipment’s are produced and new jobs become available (William, 2003).

In Ethiopia, private saving does not have a deep-rooted history because of frequent policy changes following the changes of government. The general trend of private saving as a percentage of GDP was falling after the year 1972/73. Ethiopia’s private saving was lower in the Derg regime than the imperial era since it was above 10 percent before 1974 as compared to below 4 percent for the years 1973/74-1990/91. Despite its recovery in 1989/90, it fell again consistently and became negative for the year 1992/93. This is in spite of the introduction of a new interest rate structure which resulted in positive real interest rate (WB, 2013).

Even in the present, EPRDF government there is still a fluctuation over time though there exists a significant change in private saving as compared to past times. And according to statistical reports a considerable proportion of total approved saving projects fail to be implemented due to several reasons in which many of them and attributed to the negative effects of determinants of private saving. Technology, higher employment, low level of poverty and others, which are the most common indicators of growth and development, are not yet attained in Ethiopian economy. And all these factors are related to saving where their long-term solutions can be reached through investment (Zewdu, 2006).

Economic growth is the main target of all countries all over the world including both developed and developing countries. Among other things, rise in Gross Domestic Product (GDP) is a good indicator of economic growth; higher GDP implies higher income and thus higher standard of living. One of the important ingredients of GDP is saving. Therefore, most efforts to increase GDP and thus increase economic growth rely on saving.

Private saving is a very important factor in bringing economic development, its working or efficiency is determined by different socio economic and political factors. Moreover, these different factors have different effects on private saving either in the negative or positive sense.
Therefore, in order to study the effects of private saving on the performance of an economy, one needs to identify first, the factors that are affecting it. By doing so, the researcher could understand why and how changes in private saving occurred and pose possible remedies to correct prevailing problems of private saving by looking at the current situation of the determinants.

Previous studies in case of Ethiopia i.e. Ayalew (1995) and Hadush (2012) did not use important variables in the saving model, which may have significant effect on private saving. There are a number of determinants of private saving which are not still well explained. This paper tries to fill this variable gap by incorporating important variables such as Urbanization ratio, bank branch and political instability. Besides to above variable gap, studies on determinants of private saving on others (not Ethiopia) country cases have been carried out during 1990s and early 2000s. Furthermore, Ayalew’s study on the determinants of private saving in Ethiopia has been carried out before the world 2007 financial crisis. These imply there is the time gap in these areas. Therefore, this paper is also significant by filling the time gap using data’s ranging from the year 1971-2015. As a result, the study is motivated by the basic questions raised in the following section to partially fill in the existing literature, time and variable gap by examining the determinants of private saving from the context of Ethiopia. Therefore, the central task of this paper is to analyze factors determining the private saving in Ethiopia for the period between 1971 and 2015 with methodology at hand.

The main objective of this study is to identify the major factors that determine private saving in Ethiopian context from 1971 to 2015. In addition to this, the specific objectives of the paper are to:

- Show trends and performance of private saving during the period under consideration.
- Determine the effects of bank branch, urbanization ratio and political instability on private saving.
- Empirically examine the short run and long run effect of determinants of private saving in Ethiopia.

Based on the determinants of private saving conducted in different parts of the world the researcher can hypothesize that political instability and bank branch will positively and
significantly affect private saving. Whereas urbanization rate will negatively and significantly affect private saving.

The remaining part of the paper is organized as follows: The next section looks into methodological issues. The third section provides discussion of results and the final section deals with a brief concluding remarks.

2. Methodology of the study

2.1 Source and type of data

Secondary data were employed in this study for time series data running from 1971 to 2015. This is because most of the data’s used for this study are available after the year 1970s and issues related to determinants of private saving gained a great interest of researchers and decision makers in both developing and developed countries after the 1970s. The sources of the data were from different domestic and international bureaus and organizations. The domestic sources are a variety of organizations and ministries like National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED), Ethiopian Economic Association (EEA) and also the researcher used data’s from international sources like the World Bank (WB).

2.2 Model-Specification

In developing a saving model, it is difficult to include all the determinants of private saving because of unavailability of all the data required, unquantifiability of some determinants and small observation. Considering this, the following explanatory variables are used: Level of real per capital income, Terms of Trade, interest rate, inflation, urbanization ratio, number of bank branch and political instability measured by dummy variable.

Using the literatures on the determinants of private saving and following the works of previous researchers such as Tochukwu and Fetu (2007), Said Hallaq (2003), Ayalew (1995) and Hadush (2012) the model employed in this study is expressed in the following manner:

\[ Y_t = \alpha + \beta X_t + \varepsilon_t \]

Where \( Y_t \) is private saving (PS) at period \( t \).

\( X_t \) is a vector of explanatory variables included in the model at period \( t \).
\( \varepsilon_t \) - is the error terms at period \( t \).

More specifically, the following model is fitted to analyze the impacts of explanatory variables on private saving.

\[
\ln PS_t = \beta_0 + \beta_1 \ln RGDPPC_t + \beta_2 \ln TOT_t + \beta_3 \ln IR_t + \beta_4 \ln CPI_t + \beta_5 \ln UR_t + \beta_6 \ln BB_t + \beta_7 D_t + \varepsilon_t
\]

(2)

Where; \( \beta_0 \) is an intercept term and \( \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6 \) and \( \beta_7 \) are the long run coefficients.

\( \ln PS = \) Natural logarithm of Private savings at period \( t \)

\( \ln RGDPPC_t = \) Natural logarithm of level of real per capital income at period \( t \) (+)

\( \ln TOT_t = \) Natural logarithm of Terms of Trade at period \( t \) (- or +);

\( \ln IR_t = \) Natural logarithm of interest rate at period \( t \) (+)

\( \ln CPI_t = \) Natural logarithm of consumer price index (-) at period \( t \) (proxy for inflation), measured as a proxy of macroeconomic uncertainty,

\( \ln UR_t = \) Natural logarithm of Urbanization ratio at period \( t \) (- or +)

\( \ln BB_t = \) Natural logarithm of Bank branch at period \( t \) (+)

\( D_t = \) is the dummy variable taken for political instability. Setting 1 for the stable period and 0 otherwise.

\( \varepsilon_t = \) Stochastic error term

In addition, all variables are expressed in log form and hence log linear form of the model is used for private saving model as opposed to linear model. As Gebeyehu (2010) pointed out that results obtained from linear form of the model are not significant and consistent; thus, in order to control the size of data and obtain consistent and reliable estimates log linear model is superior to linear model. Additionally, as Fredric (2003) suggests that log linear model produces better results than linear form of the model.

**VARIABLE DESCRIPTION**

**Level of real per Capital Income (RGDPPC):** An increase in GDPPC has a positive effect on private saving. This is due to the fact that an increase in GDPPC means an increase in income. It is known from economic theories that as income increase the marginal propensity to consume
out of the additional income decreases. Thus the higher the per capital income gets the share of consumption decreases and more out of the income will be saving. As a result, this increase in saving makes a lot of finance to be available to private investors. RGDPPC is measured by RGDP/ total population.

**Terms of trade:** Equals PX/PM, where PX and PM are the price index of exports and imports price index respectively (both in domestic currency), the expected sign of TOT is either negative or positive. Deterioration in the terms of trade, that is, a reduction in the price of domestically produced goods relative to that of foreign goods, reduces real income and hence saving. By contrast, a term of trade deterioration that is perceived to permanent may induce domestic residents to increase their savings at the current period in order to sustain their real standard of living in the future.

**Interest rate:** implies that when there is deposit money at the bank, the bank may earn interest on that money especially in savings accounts or certificates of deposit. In a sense, you are lending money to the bank so they can use it elsewhere. In return, you get interest income. The interest rate is generally quoted as annual percentage yield. As a result, interest rate and private saving move in the same direction, which leads to an expectation of a positive sign on saving interest rate in the regression.

**Inflation:** A fourth issue relates to the role of inflation in determining saving. Inflation is defined as a sustained increase in the general level of prices for goods and services. It is measured as an annual percentage increase. When inflation goes up, there is a decline in the purchasing power of money (Aberu,2010), so we expect a negative sign for inflation in the regression because, as inflation exists the ability to save will decreases.

**Urbanization ratio:** Urbanization ratio is compiled under the heading of demographic variables. Demographic variables are sometimes termed as life-cycle variables, as they operate under the predictions of the life-cycle and precautionary saving theories. In their seminal article Ando and Modigliani (1963), show that demographic variables negatively affect savings rates. Urbanization ratio, defined as the percentage of the total population living in urban areas. This variable is also expected to have a negative impact on saving, as increased urbanization reduces the need for precautionary saving, which is high in rural societies with greater
volatility in income. In the empirical work, the signs of the demographic variables have usually been found negative. However, as in the case of many other variables, the empirical significance varies a lot across studies.

**Bank Branch:** Bank branch is measured by number of banks available for users. Researchers like Athukorala and Sen (2004), Johnson (2011) also used number of banks to measure bank branches to conduct investigation. As number of bank branch increase all the society will have accesses for banking services, one of which is saving. We expect positive sign for bank branch in the regression because as a branch of bank increases private saving will increase.

**Political instability:** The variables that capture the effects of uncertainty about the future bear on saving rates primarily via their impact on precautionary savings. These variables can be termed broadly as macroeconomic uncertainty (proxies by inflation) and political instability. Political instability, which creates an uncertain economic environment for agents, would be expected to act positively on savings. Political instability brings about uncertainty in future income streams and can thus lead to higher saving on precautionary grounds. This may be particularly true for households in developing countries whose income prospects are much more uncertain than their counterparts in developed countries. It is also possible to consider uncertainty at the individual level by the extent and coverage of government-run social security and insurance programs and/or the urbanization ratio–implying decreased volatility of income, which had been discussed under different headings. Athukorala and Sen (2009) also used 1 for political stability for period 1991 up to date and zero for instability for period 1971 -1991 to conduct his study.

3. **Discussion and estimation of results**

3.1 **Results of Unit Root Test**

Testing for the existence of unit roots is of major interest in the study of time series Models and co-integration. In this study, the Augmented Dickey Fuller (ADF) test is employed to test the stationary of the variables and the test result is given in Table 3.1.

**Table 3.1: Result of test of stationarity**
**Unit Roots**

**ADF Unit-Root Test Results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF Test Statistic</th>
<th>Critical Value</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNPS</td>
<td>-3.424343</td>
<td>-2.938987</td>
<td>I(1)**</td>
</tr>
<tr>
<td>LNRGDPPC</td>
<td>-5.197052</td>
<td>-3.610453</td>
<td>I(1)**</td>
</tr>
<tr>
<td>LNTOT</td>
<td>-4.390098</td>
<td>-3.610453</td>
<td>I(1)**</td>
</tr>
<tr>
<td>LNSIR</td>
<td>-2.958534</td>
<td>-2.936942</td>
<td>I(1)**</td>
</tr>
<tr>
<td>LNCPI</td>
<td>-2.847738</td>
<td>-2.606857</td>
<td>I(1)*</td>
</tr>
<tr>
<td>LNBB</td>
<td>-5.729183</td>
<td>-3.605593</td>
<td>I(1)**</td>
</tr>
<tr>
<td>LNUR</td>
<td>-2.753151</td>
<td>-2.607932</td>
<td>I(1)*</td>
</tr>
<tr>
<td>Residual</td>
<td>-6.034188</td>
<td>-3.632900</td>
<td>I(0)**</td>
</tr>
</tbody>
</table>

*, ** and *** shows 10%, 5% and 1% level of significance respectively; the null hypothesis is that there is a unit root.

*Source: Eviews version 6 outputs*

The test has shown that all variables are non-stationary in level (and they become stationary at first difference). Thus the researcher can conclude that all variables included in the private saving model are I (1). Hence, it is possible to employ Johansen procedure to test co-integration.

The result of the ADF stationary tests for the residuals indicates that the residual is stationary at 1% level of significance (i.e. I (0)) showing that there is a long run relationship between the explanatory variable and private saving. In other words, the linear combination of the variables of the model is stationary and they are co-integrated.

Johansen co-integration analysis is very sensitive to the number of lags included in the model. The selected lag length is one. This is because both AIC and SC of optimal lag selection suggest an optimal lag of one at 5% level of significance.

Johansen co integration test result clearly shows that the null hypothesis of no co-integration is rejected by both the $\lambda_{\text{max}}$ and the $\lambda_{\text{trace}}$ statistics.

**Table 3.2: Johansen co integration test result**
Table 3.2 clearly shows that the null hypothesis of no co-integration is rejected by both the $\lambda_{\text{max}}$ and the $\lambda_{\text{trace}}$ statistics. While the trace statistics shows two co-integration equations at 1% level of significance, maximum Eigen value statistics shows 1 co-integration equations at 1% level of significance. According to Harris (1995) in Johansen approach to co-integration trace statistics rejects null hypothesis whenever it is true because of small sample size of the data. Thus, the rejection of one co-integration approach by trace statistics may be due to small sample size. Hence, taking the major objective of investigating the determinants of private saving into consideration, the researcher use only one co integrating vector that relates private saving which is the dependent variable to its determinants.

After establishing the existence of one co-integrating relationship between the variables in the private saving model, the next step is to test for the existence of weak exogeneity. The test for zero restrictions on adjustment coefficient is referred to as the test for exogeneity. The results,

<table>
<thead>
<tr>
<th>Hypothesized No. of co-integration eqn(s)</th>
<th>Trace statistic</th>
<th>0.05 critical value</th>
<th>0.01 critical value</th>
<th>P-value</th>
<th>Max Eigen statistic</th>
<th>0.05 critical value</th>
<th>0.001 critical value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>215.12</td>
<td>159.53***</td>
<td>171.10***</td>
<td>0.0000</td>
<td>69.16</td>
<td>52.36***</td>
<td>58.67**</td>
<td>0.0005</td>
</tr>
<tr>
<td>At most 1</td>
<td>145.96</td>
<td>125.62***</td>
<td>135.97***</td>
<td>0.0016</td>
<td>43.33</td>
<td>46.23</td>
<td>52.31</td>
<td>0.0992</td>
</tr>
<tr>
<td>At most 2</td>
<td>102.63</td>
<td>95.75</td>
<td>104.96</td>
<td>0.0155</td>
<td>33.56</td>
<td>40.10</td>
<td>45.87</td>
<td>0.2254</td>
</tr>
<tr>
<td>At most 3</td>
<td>69.10</td>
<td>69.82</td>
<td>77.82</td>
<td>0.0573</td>
<td>21.44</td>
<td>33.88</td>
<td>39.37</td>
<td>0.6508</td>
</tr>
<tr>
<td>At most 4</td>
<td>47.63</td>
<td>47.86</td>
<td>54.68</td>
<td>0.0525</td>
<td>18.31</td>
<td>27.58</td>
<td>32.72</td>
<td>0.4697</td>
</tr>
<tr>
<td>At most 5</td>
<td>29.32</td>
<td>29.80</td>
<td>35.48</td>
<td>0.0567</td>
<td>16.43</td>
<td>21.13</td>
<td>25.86</td>
<td>0.2008</td>
</tr>
<tr>
<td>At most 6</td>
<td>12.90</td>
<td>15.50</td>
<td>19.94</td>
<td>0.1188</td>
<td>12.86</td>
<td>14.26</td>
<td>18.52</td>
<td>0.0822</td>
</tr>
<tr>
<td>At most 7</td>
<td>0.03</td>
<td>3.84</td>
<td>6.63</td>
<td>0.1600</td>
<td>0.87</td>
<td>3.84</td>
<td>6.63</td>
<td>0.8665</td>
</tr>
</tbody>
</table>

** and *** shows rejection of null hypothesis at 5% and 1% level of significance respectively
Source: Eviews version 6 outputs
using the likelihood ratio (LR) test confirm that dependent variable rejects weak exogeneity at 1% level of significance.

3.2 The long run equation

Finally, the structural long run relationship derived from the co-integrating vector normalized with respect to LNPS can be represented as:

\[
\text{LNPS} = 1.40\text{LNGDPPC} + 0.10\text{LNTOT} + 0.53\text{LNIR} - 1.17\text{LNCPI} + 1.40\text{LNUR} + 1.89\text{LNBB} - 1.10\text{DUMMY} + 7.42 \\
(0.096*) (0.451) (0.186) (0.004***) (0.047**) (0.040**) (0.011**) \\
\]

Having identified the co-integrating vector using Johansen, the next step is to proceed investigates the long run dynamics of the saving process. The long run equation suggested that level of per capital income; Terms of trade, interest rate, urbanization ratio, bank branch and the dummy variable for political instability are positively affecting private Savings in the long run. Whereas inflation has negative influence on private saving in the long run. The results are statistically significant for all variables except for Terms of trade and interest rate.

The long run relationship between private saving and level of per capital income has a positive coefficient and statistically significant. Thus the Ethiopian experience provides support for the argument that, private saving highly responds to changes in RGDPPC. Out of 1 percent increase in level of per capital income 1.40 percentage points being saved. A one percent increase in urbanization ratio increases private saving by 1.40 percent over the long run period. As bank branch increase by one percent private saving will increase by 1.89 percent which proves that the expansion of bank branches will result in reducing the cost of banking transactions and thus motivate private sector to save. The dummy variable to capture political instability shows that positive and significant coefficient. Individuals increase precautionary saving in the face of increased uncertainty in the economic environment. An increase of one percent in inflation decreases private Savings by 1.17 percent over the long run period holding others constant.

However, Terms of trade (LNTOT) and Interest rate (LNIR) have positive and insignificant impact on private saving.
3.3 Vector error correction model (short run equation)

After determining the long run model and its coefficients, the next step is the determination of short run dynamics. The coefficient of difference represents the coefficients of short run dynamics whereas the coefficient of lagged error correction term ECM (-1) captures the speed of adjustment towards the long run equilibrium relationship.

Table 3.2 indicates that only Level of per capital income, urbanization rate and Bank branch at their difference are statistically significant in determining private saving in the short run at 1%, 10% and 1% level of significance respectively.

The short run result of BB contradicts with the view that the expansion of banking facilities since the 1970s seems to have contributed significantly to improvements in saving propensity in the economy of Ethiopia.

The result shows that the coefficient of the error-term (or the Speed of adjustment term) for the estimated private saving equation is statistically significant and negative as expected. The Coefficient -0.151013 shows that 15.10 percentage points’ adjustments takes place each year towards long run equilibrium.

Table 3.3: The result of Short run model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLNPS(-1)</td>
<td>-0.622807</td>
<td>0.262136</td>
<td>-2.375895</td>
<td>0.0235**</td>
</tr>
<tr>
<td>DLNRGDP(-1)</td>
<td>1.353512</td>
<td>0.245654</td>
<td>5.509829</td>
<td>0.0000***</td>
</tr>
<tr>
<td>DLNUR(-1)</td>
<td>5.768000</td>
<td>3.287088</td>
<td>1.754745</td>
<td>0.0886*</td>
</tr>
<tr>
<td>DLNBB(-1)</td>
<td>-2.656391</td>
<td>0.610239</td>
<td>-4.353034</td>
<td>0.0001***</td>
</tr>
<tr>
<td>DDUMMY(-1)</td>
<td>0.204002</td>
<td>0.164818</td>
<td>1.237741</td>
<td>0.2245</td>
</tr>
<tr>
<td>C</td>
<td>0.182390</td>
<td>0.061803</td>
<td>2.951156</td>
<td>0.0058***</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.151013</td>
<td>0.058386</td>
<td>-2.586447</td>
<td>0.0143**</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.941570</td>
<td>Mean dependent variable</td>
<td>0.036250</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.930947</td>
<td>S.D dependent variable</td>
<td>0.564849</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
<td>------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>S. E of regression</td>
<td>0.148431</td>
<td>Akaike information criterion</td>
<td>-0.819767</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>0.727047</td>
<td>Schwarz criterion</td>
<td>-0.524213</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>23.39534</td>
<td>F-statistic</td>
<td>88.63049</td>
<td></td>
</tr>
<tr>
<td>Durbin – Watson test</td>
<td>2.035176</td>
<td>Prob (F-statistic)</td>
<td>0.000000***</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Eviews version 6 output Note: ***,** and * shows significance level at 1%, 5% and 10% level respectively*

The model passed all the diagnostic tests. The model and parameters of the model are stable as the stability test reported.

4. **Conclusion and policy implications**

4.1 **Conclusion**

The study analyzed the determinants of private saving in Ethiopia during the period 1971 – 2015. The researcher established the relationship of variables in the long run as well as in the short run.

In the long run, the study concludes that Level of real per capital income, Terms of trade, Interest rate, urbanization ratio, bank branch and the dummy variable for political instability are positively affecting private Savings. Whereas inflation rate has negative influence on private saving.

In the short run only Level of per capital income, Urbanization ratio and bank branch at their difference are statistically significant in determining private saving.

4.2 **Policy implication**

Based on the result found from the descriptive and econometric analysis, the following policy implications are forwarded as alternatives to enhance the performance of the private sector and of course to increase its level, having in mind the contributions it makes to the development of the economy.

- Core efforts may be taken to improve economic activity and accelerate per capita GDP through creating conducive investment to the private sector.
- Controlling birth is also vital to achieve high level of real per capital income.
➢ Promote the export of industrial products and reduce excessive dependency on the export of primary agricultural products.

➢ The government of Ethiopia should work to create awareness in the reduction of extravagant activities.

➢ Increase number and services of banks to meet the demands of people for saving.

➢ Overall, improve the skill, knowledge and training levels of labors through establishing training and skill formation institution that helps for job creation efforts.

➢ In addition, expand small scale enterprises so that unemployed youths and women participate in income generation activities.

The present study tried to meet gap between the existing literatures by examining the determinant of private saving from the context of Ethiopia but it also has its own limitations and those limitations can be addressed by researchers in future. Hence the researcher suggests future researcher’s to change their attention to study determinants of saving in the household level (helps to fully understand the behavior of saving in Ethiopia).

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