INTERNATIONAL JOURNAL OF INDUSTRIAL MANAGEMENT (IJIM)
ISSN: 2289-9286 e-ISSN: 0127-564X
VOL. 13, ISSUE 1, 458 – 463
DOI: https://doi.org/10.15282/ijim.13.1.2022.7265

ORIGINAL ARTICLE

FINANCIAL SECTOR STABILITY AND GROSS DOMESTIC SAVINGS IN GHANA

Ibrahim Nandom Yakubu[1*], Seydou Oumarou[2], and Iliasu Abdallah[3]

[1]Department of Banking and Finance, Ankara Yildirim Beyazit University, Turkey
[2]Swiss Umef University of Niger, Niamey, Niger
[3]Department of Islamic Economics and Finance, Marmara University, Turkey

ABSTRACT – Domestic savings are the primary source of financing for domestic investments, hence, they play an essential role in a country's economic growth. Therefore, understanding the determinants of domestic savings is critical for policy formulation.This study investigates the impact of financial sector stability on gross domestic savings in Ghana over the period 1970-2017. Applying the Fully Modified Ordinary Least Squares (FMOLS) technique, the findings show that financial sector stability exerts a positive significant effect on gross domestic savings. Broad money supply also influences savings positively although the effect is insignificant. Also, while inflation positively and significantly impacts savings, economic growth reduces domestic savings in Ghana. The study presents some policy implications.

ARTICLE HISTORY
Received: 22-12-2021
Revised: 8-2-2022
Accepted: 17-3-2022

KEYWORDS
Financial sector stability
Domestic savings
Fully Modified Ordinary Least Squares
Ghana

INTRODUCTION

The main goal of an optimization problem is to obtain the best combination of variables of a fitness function such that the value of the fitness is maximum or minimum. This can be done effectively by using a population-based optimization algorithm. A new population-based optimization algorithm termed as simulated Kalman filter (SKF) is inspired by the estimation capability of Kalman filter (Shaharudin et al., 2021). Designed from the procedure of Kalman filtering, which incorporates prediction, measurement, and estimation, the global minimum or maximum can be estimated. Measurement process, which is needed in Kalman filtering, is mathematically modelled and simulated. Agents interact with each other to update and optimize the solution during the search process.

The concept of opposition-based learning (OBL) can be used to improve the performance of population-based optimization algorithm (Fernando, 2020). The important idea behind the OBL is the concurrent consideration of an estimate and its corresponding opposite estimate which is closer to the global optimum. OBL was initially implemented to improve learning and back propagation in neural networks (Ashraf, 2019), and until now, it has been employed in various optimization algorithms, such as differential evolution, particle swarm optimization and ant colony optimization (Senthil, 2020).

In this research, inspired by the concept of current optimum opposition-based learning (COOBL), we propose a modified SKF which is called as current optimum opposition-based simulated Kalman filter (COOBSKF) to enhance the performance of SKF. From the SKF perspective, this is the first attempt to improve its performance through COOBL strategy. The COOBSKF compares the fitness of an individual to its opposite and maintain the fitter one in the population. Experimental results show that the proposed algorithm can achieve better solution quality.

The remainder of this paper is organized as follows: Section 2 briefly presents an overview of optimization algorithms and opposition-based learning application. Section 3 explains the standard simulated Kalman filter algorithm, the concept of opposition-based learning and the proposed enhance version of SKF. Section 4 provides the experimental settings and discusses the experimental results. Section 5 concludes the paper.

RELATED WORK

The conventional models of the life-cycle hypothesis (Modigliani & Brumberg, 1954), the permanent income hypothesis (Friedman, 1957), and the buffer-stock theory (Carroll, 1992) are the three basic theories linked to depositors' savings behaviour. According to the life-cycle savings behaviour, consumption is determined by lifetime income projections in a particular period, signifying that people save to normalize their consumption levels over time. Considering that income fluctuates regularly during a person's lifetime, saving behaviour is influenced by the stage of life in which a person is either a net saver while employed or a dissaver while retired. Per the presumptions of the permanent-income theory, increasing future income diminishes the present level of savings. It makes a distinction between permanent and temporary income. Consumption smoothing is used to overcome temporary income swings, in which a portion of today's windfall is stored to support increased spending tomorrow. In contrast, a permanent income increase does not justify present savings because more can be spent either now or in the future. The buffer-stock hypothesis of saving asserts that individuals maintain assets in order to safeguard themselves from unexpected income volatility. The hypothesis postulates

*CORRESPONDING AUTHOR | I. N. Yakubu | ✉ kassiibrahim@gmail.com

that when consumers confront significant income uncertainties, they become both impatient and prudent. They exhibit impatience given the fact that they borrow against future income to fulfill present consumption needs, and they are careful as a result of their precautionary impulses. To avoid future income swings and to maintain a stable consumption pattern, consumers are required to build precautionary reserves by reducing current spending in order to save for contingent events. As a result, the savings rate becomes pro-cycle, which means that people tend to save more while their incomes are greater to ensure smooth consumption during challenging times.

Empirically, the extant literature has examined several factors as drivers of savings. For instance, Ayalew (2013) used the ARDL bounds testing technique to examine the drivers of Ethiopia's domestic savings from 1970 to 2011. The findings revealed that income growth, budget deficit ratio, and inflation rate significantly influence domestic savings in the short and long run. Arok (2014) investigated the main factors affecting the gross domestic savings rate (GDS) in Kenya using data covering the period 1971 to 2012. The study found that in the long run, real per capita income significantly and positively affects the domestic savings rate in Kenya while interest rate on deposits and current account deficit adversely influences Kenya's domestic savings. In Tanzania, Epaphra (2014) empirically analyzed the drivers of savings using annual data covering from 1970-to 2010. The author revealed that GDP growth rate, disposable income, life-expectancy rates, and population growth rate positively affect Tanzanian national savings while inflation adversely affects savings. Keino and Kariuki (2016) noted that remittances and foreign capital inflows have a negative and statistically significant influence on saving rates in Uganda. Nagawa et al. (2020) found that GDP growth rate and broad money have positive and statistically significant effects on gross domestic savings, while current account balance and gross national expenditure have negative impacts on savings in Uganda. Using the ARDL method, Abdulmumin et al. (2020) reported that gross domestic saving in Nigeria is significantly determined by remittances and financial development.

Nawaz et al. (2021) observed that age dependency has a detrimental impact on long-term gross savings in Pakistan. Kudaisi (2013) evidenced that inflation and government budget surplus significantly affect savings levels in West Africa. Applying the cointegration tests, Ozioma et al. (2016) investigated the determinants of private savings in Nigeria. The results showed that whereas interest rate has a positive significant effect on domestic private savings in the long run, income level significantly and negatively affects domestic private savings in the long term. In the Ghanaian context, Issahaku (2011) used microeconomic data to analyze the drivers of saving in the Nadowli District of the Upper West Region in Ghana. The study established a positive impact of levels of income, educational status, and occupation on savings. However, the findings revealed a negative relationship between the number of dependents and savings. Kwakwa (2013) found that while income and terms of trade have a positive significant impact on savings level in Ghana, dependency ratio, political instability, and real interest rate negatively drive savings in the long run. Larbi (2013) revealed that the private savings rate in Ghana is positively and significantly driven by financial liberalization, per capita income, and inflation. Using primary data, Baido and Akoto (2019) noted that increasing individuals' trust in financial institutions is crucial for savings in Ghana. Sakyi et al. (2021) investigated the factors determining savings among individuals in the informal sector of Ghana. The study relied on primary data with a focus on commercial drivers. Applying the binary probit model, the researchers found that access to financial institutions and drivers with secondary occupation induce savings. However, the study reported that age, education, and financial literacy have a negative impact on savings.

METHODOLOGY

Data and Variables

The study employed annual data spanning 1970-2017. Data were gleaned from the World Development Indicators of the World Bank. Gross Domestic Savings (*GDS*) served as the dependent variable which was measured by Gross Domestic Savings (% of GDP). Financial stability (*FS*) was the main independent variable. Given the bank-based nature of the Ghanaian financial sector, the study used the Z-score value of the banking sector as a proxy of financial stability. This measure captures the probability of default in the banking system. This measure compares the banking buffers (capitalization and returns) with risk (returns volatility). The other independent factors include money supply (MS), economic growth (GDPG), and inflation (INF). Money supply was measured by broad money (% of GDP). Economic growth was the gross domestic product (GDP) in annual percentage. Inflation was gauged by Consumer prices (annual percentage).

Empirical Model

In assessing the impact of financial stability and the other independent factor on savings, the following model is specified:

$$GDS_t = \alpha_0 + \beta_1 FS_t + \beta_2 MS_t + \beta_3 GDPG_t + \beta_4 INF_t + \varepsilon_t \quad (1)$$

where the time dimension is indicated by t and α is the constant. β represents the coefficients of the regressors and ε is the error term.

Estimation Approach

To avoid erroneous regression results, the study checked for stationarity of the variables using the Augmented Dickey-Fuller unit root test. The study also applied the Johansen cointegration test to determine if there is a long-run relationship among the variables. After the cointegration of the variables was confirmed, the Fully Modified Ordinary Least Squares

(FMOLS) approach was used to investigate the influence of financial stability on savings. The FMOLS technique produces superior results and overcomes the problem of bias as compared to other least squares techniques which are employed in most studies (Nordin, 2020; Adeleke et al., 2021; Sapuan & Roly, 2021; Yakubu, 2021).

FINDINGS AND DISCUSSIONS

Stationarity Test Results

In the regression analysis, if the time series variables are non-stationary, the estimated results may be inaccurate. Stationary tests should be performed to establish the unit root properties of the series to avoid this problem. Therefore, this study employed the Augmented Dickey-Fuller (ADF) unit root test to understand the variables' unit root features. Table 1 shows the results of the ADF test in terms of intercept and trend and intercept. It is indicated that at intercept, only gross domestic savings (GDS) is integrated at level and the rest of the variables are integrated or show stationarity at first difference. In terms of trend and intercept, none of the factors is integrated at level, but show stationarity at first difference. Given the integration of all the factors at first difference, the application of the FMOLS technique is appropriate.

Table 1. Augmented Dickey-Fuller (ADF) Unit Root Test Results

	Intercept		Trend and Intercept	
	Level	*First Difference*	*Level*	*First Difference*
GDS	-2.670*	-6.569***	-2.564	-4.273**
FS	-2.446	-3.799**	-2.897	-3.529*
MS	-2.209	-4.381***	-3.123	-4.209**
GDPG	-2.535	-4.243***	-2.469	-4.053**
INF	-2.034	-7.970***	-2.011	-3.633*

Note: *, **, *** indicate stationarity at 10%, 5%, and 1% respectively

Cointegration Test Results

To check for the presence of a long-term relationship among the variables, the study used the Johansen cointegration test and the results are presented in Table 2. It can be observed from both the Trace test and Max-eigenvalue test, there are two cointegrating equations, indicating that the variables have a long-run relationship.

Table 2. Cointegration Results

Cointegration test based on Trace of the Stochastic Matrix.				
Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.965	101.903	69.819	0.000
At most 1 *	0.875	48.371	47.856	0.045
At most 2	0.446	15.068	29.797	0.776
At most 3	0.286	5.628	15.495	0.739
At most 4	0.015	0.2441	3.841	0.621
Cointegration test based on Maximal Eigenvalue of the Stochastic Matrix				
Hypothesized No. of CE(s)	*Eigenvalue*	*Max-Eigen Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.965	53.532	33.877	0.000
At most 1 *	0.875	33.302	27.584	0.008
At most 2	0.446	9.440	21.132	0.795
At most 3	0.286	5.384	14.265	0.693
At most 4	0.015	0.244	3.841	0.621

Trace test and Max-eigenvalue test indicate 2 cointegrating equations
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Regression Results

Table 3 shows the long-run regression estimates on the impact of financial stability and the other independent factors on domestic savings. From the results, financial stability has a positive significant effect on gross domestic savings. This suggests that the stability of the financial sector boosts domestic savings in Ghana. The implication is that in a stable financial sector, individuals have confidence that their funds are safe given the less possibility of financial institutions collapsing and take-overs. Money supply shows a positive effect on domestic savings though the impact is insignificant. The positive relationship between money supply and savings is in line with the finding of Nagawa et al. (2020) in the case of Uganda. Economic growth negatively and significantly influences gross domestic savings. This depicts that as economic activities increase, individuals feel reluctant to save. The reason might be that, in higher growth periods,

individuals may opt to commit their funds into projects that may provide better benefits than mere savings. The impact of inflation on savings is positive, depicting that despite the rising inflation level, individuals are still motivated to commit their funds into savings. This result, however, contradicts economic reality given that in periods of high inflation, individuals spend more on the purchase of goods and services, and therefore may not have sufficient funds available to save. The finding also opposes prior studies (Premik & Stanisławska, 2017; Dash & Kumar, 2018).

Table 3. Fully Modified OLS Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FS	1.884	0.638	2.955	0.012
MS	0.312	0.175	1.780	0.100
GDPG	-0.720	0.220	-3.270	0.007
INF	0.202	0.108	1.865	0.087
C	-17.110	8.369	-2.044	0.064
R-squared	0.498			
Adjusted R-squared	0.331			
S.E. of regression	3.086			
Long-run variance	4.561			

CONCLUSION AND RECOMMENDATIONS

This paper examines the effect of financial sector stability on gross domestic savings in Ghana. To achieve this objective, the study applied the Fully Modified Ordinary Least Squares (FMOLS) on annual data spanning from 1970 to 2017. The findings show that financial sector stability exerts a positive significant effect on gross domestic savings. Broad money supply also influences savings positively although the effect is insignificant. Also, while inflation positively and significantly impacts savings, economic growth impedes domestic savings in Ghana. The study has some policy implications. Given the positive significant influence of financial sector stability on domestic savings, the study suggests the Bank of Ghana implements policies to increase individual confidence in the financial system, particularly banks. To guarantee stability, supervisory and monitoring activities must be reinforced. Also, policymakers need to keep inflation at an optimum level to ensure that individuals maintain a balance between savings and their level of expenditure. The study is limited to a single developing country and the findings may not be pertinent to other developing economies. Therefore, the researcher suggests that future studies may consider a panel of developing countries to provide a more detailed analysis of the drivers of domestic savings.

REFERENCES

Abdulmumin, B. A., Olaniyan, T. O., & Bamigbade, D. (2020). Determinants of Gross Domestic Savings in Nigeria. *Research Journal of Financial Sustainability Reporting*, *5*(1), 66-76.

Adeleke, A. Q., Adeniyi, A. W., & Muuka, G. N. (2021). The Influence of Delay Factors on Pahang Malaysian Construction Industry: A Pls-Sem Approach. *International Journal of Industrial Management*, *11*, 206-216.

Arok, B. A. (2014). *Determinants of gross domestic savings in Kenya*. Dissertation (Masters), University of Nairobi, Kenya.

Ayalew, H. A. (2013). Determinants of domestic saving in Ethiopia: An autoregressive distributed lag (ARDL) bounds testing approach. *Journal of Economics and International Finance*, *5*(6), 248-257.

Baidoo, S. T., & Akoto, L. (2019). Does trust in financial institutions drive formal saving? Empirical evidence from Ghana. *International Social Science Journal*, *69*(231), 63-78.

Baidoo, S. T., Boateng, E., & Amponsah, M. (2018). Understanding the determinants of saving in Ghana: Does financial literacy matter?. *Journal of international development*, *30*(5), 886-903.

Bankole, A. S. (2020). Relationship between savings and economic growth in Nigeria. *ITALIENISCH*, *10*(1), 153-168.

Bariş, S. (2020). Are Savings the Determinant of Economic Growth in the D8 Countries?. *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, *18*(02), 403-414.

Carroll, C. D., Hall, R. E., & Zeldes, S. P. (1992). The buffer-stock theory of saving: Some macroeconomic evidence. *Brookings papers on economic activity*, *1992*(2), 61-156.

Dash, S. K., & Kumar, L. (2018). Does inflation affect savings non-linearly? Evidence from India. *Margin: The Journal of Applied Economic Research*, *12*(4), 431-457.

Drean, B. (2021). The Effect Of The Ratio Of The Money Supply, The Ratio Of Bank Credit, And The Ratio Of Domestic Savings To Economic Growth in Uzbekistan. *Tamansiswa Accounting Journal International*, *1*(1), 39-42.

Epaphra, M. (2014). Empirical investigation of the determinants of Tanzania's national savings. *Journal of Economics and Development Studies*, *2*(4), 223-241.

Friedman, M. (1957). *Theory of the consumption function*. In *A theory of the consumption function*. New Jersey: Princeton University Press.
Issahaku, H. (2011). Determinants Of Saving and Investment in Deprived District Capitals in Ghana-A Case Study of Nadowli in The Upper West Region of Ghana. *Continental Journal of Social Sciences*, *4*(1), 1-12.
Keino, D. E., & Kariuki, N. (2016). Effect of remittances on gross domestic savings in Uganda. *International Journal of Management and Business Studies*, *6*(4), 343-353.
Kudaisi, B. V. (2013). Savings and its determinants in West African countries. *Journal of Economics and Sustainable Development*, *4*(18), 107-119.
Kwakwa, P. A. (2013). Determinants of National Savings: A Short and Long Run Investigation in Ghana. *KCA Journal of Business Management*, *5*(1), 1-15.
Larbi, D. A. (2013). The long-run determinants of private domestic savings in Ghana: a cointegration approach. *Journal of Economics and Sustainable Development*, *4*(4), 125-136.
Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani*, *1*(1), 388-436.
Nagawa, V., Wasswa, F., & Bbaale, E. (2020). Determinants of gross domestic savings in Uganda: an autoregressive distributed lag (ARDL) approach to cointegration. *Journal of Economic Structures*, *9*, 1-19.
Nawaz, M. A., Chaudhry, I. S., Shehzad, M. A., & Sheikh, M. R. (2021). An Analysis of Age Dependency Burden and Saving Rates in Pakistan. *Review of Applied Management and Social Sciences*, *4*(2), 531-546.
Ndirangu, E., & Muturi, W. (2015). Determinants of Gross Domestic Savings in Kenya (1970-2013). *International Journal of Economics, Commerce and Management*, *3*(7), 157-178.
Nordin, N. (2020). Green entrepreneurial intention of MBA students: a Malaysian study. *International Journal of Industrial Management*, *5*, 38-55.
Olayiwola, A. S., Okunade, S. O., & Fatai, M. O. (2021). Savings-Growth Nexus Revisited: An Empirical Analysis from Nigeria. *African Journal of Economic Review*, *9*(4), 223-237.
Ozioma, E. O. F., Idenyi, O. S., Chinyere, U. C., & Eze, A. O. (2016). The determinants of domestic private savings in Nigeria. *Journal of Economics, Management and Trade*, *15*(2), 1-16.
Premik, F., & Stanisławska, E. (2017). The impact of inflation expectations on Polish consumers' spending and saving. *Eastern European Economics*, *55*(1), 3-28.
Quartey, P., Blankson, T. (2008). Low savings in Ghana: Does policy matter? In E. Aryeetey & R. Kanbur (Eds.), *The economy of Ghana: Analytical perspectives on stability, growth and poverty*. Oxford, UK: James Currey.
Ribaj, A., & Mexhuani, F. (2021). The impact of savings on economic growth in a developing country (the case of Kosovo). *Journal of Innovation and Entrepreneurship*, *10*(1), 1-13.
Sakyi, D., Onyinah, P. O., Baidoo, S. T., & Ayesu, E. K. (2021). Empirical determinants of saving habits among commercial drivers in Ghana. *Journal of African Business*, *22*(1), 106-125.
Sapuan, N. M., & Roly, M. R. (2021). The impact of ICT and FDI as drivers to economic growth In ASEAN-8 countries: A panel regression analysis. *International Journal of Industrial Management*, *9*, 91-98.
Yakubu, I. N. (2021). The effect of working capital management on dividend policy: An empirical analysis of listed firms in Ghana. *International Journal of Industrial Management*, *9*, 25-31.

CONFLICT OF INTEREST

The author(s), as noted, certify that they have NO affiliations with or involvement in any organisation or agency with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, jobs, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, expertise or beliefs) in the subject matter or materials addressed in this manuscript.

AUTHOR'S BIOGRAPHY

Ibrahim Nandom Yakubu
kassiibrahim@gmail.com

Ibrahim Nandom is a PhD Candidate in Banking and Finance at Ankara Yildirim Beyazit University, Turkey. His research focuses on banking, corporate finance, and international business. His research works have appeared in various internationally ranked journals and he has presented his research findings in international and national conferences. Ibrahim also serves as an ad hoc reviewer for a number of journals published by Emerald, Taylor & Francis, SAGE and Springer.