Savings-Growth Nexus in Malaysia

Sook Ching Kok[1], Qaiser Munir[2]

[1] Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia

[2] Institute of Business Administration (IBA), Karachi, Pakistan

ABSTRACT

In this study, we look into the savings-growth nexus for the case in Malaysia. We employ annual data which spanning from 1960 to 2018. We find a long-run cointegration relationship for economic growth and savings growth. Besides that, our findings show unidirectional causality running from economic growth to savings growth. Our findings are in favour of the Keynesian view that savings cannot act as a spur to economic growth, and against the capital fundamentalists view that savings provide capital to stimulate economic growth. Policy makers in Malaysia may implement policy to increase economic growth instead of to raise interest rate to encourage savings.

Keywords

Saving, economic growth, capital, interest rate

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

A number of past empirical studies found evidence of savings-led growth consistent with the idea of Solow (1956), Romer (1986), Lucas (1988), and Mankiw *et al.* (1992). The long-run growth model of Solow (1956) accepts the thought of the Harrod-Domar (Harrod, 1939; Domar, 1946) model of economic growth that the long-run economic system is at best balanced on a knife-edge of equilibrium growth. On the contrary, the Keynesian believes that savings cannot act as a spur to prompt economic growth. The Keynes theory states that savings is leakage and depending on economic growth. (Keynes, 1936). This study aims to investigate the savings-growth nexus for the case in Malaysia based on annual data from 1960 to 2018. Malaysia is a developing country which needs capital formation to foster economic growth, and savings can be transformed into capital.

Literature Review

Tang and Chua (2009) carried out a nonparametric analysis to study savings-growth relationship in Malaysia for the period of March 1991-September 2006. The findings showed long-run cointegration between economic growth and savings, and a bilateral causal relationship between the variables. This implied that savings spurred economic growth and the effect was through capital formation. Tang and Tan (2014) showed findings that are in favour of the savings-led growth hypothesis for Pakistan from 1971-2011. The study found a long-run cointegration relationship for per capita real GDP and per capita real gross domestic savings through the Bartlett-corrected trace cointegration test and the bounds test for cointegration. The results of different long-run estimators including ARDL showed that savings affected economic growth positively. For short-run, the results of error correction model (ECM) indicated savings positively affect economic growth. The Granger causality test results indicated that economic growth was Granger-caused by savings. Patra *et al.* (2017) studied the savings-growth nexus for the case of India. The Bi-Perron test with unknown time was used to identify structural break. The structural break was found in the year 1980. Thus, the full sample period was divided into two, namely, the period of pre-break from 1950-51 to 1979-80; and the period of post-break from 1980-81 to 2011-12. The results of Johansen cointegration test indicated that gross domestic saving rate and real GDP are integrated. Long- and short-run causalities were assessed based on VECM. It was found that savings caused growth in the long-run for pre- and post-break periods. There was a short-run unidirectional causal relationship running from economic growth to savings which only valid in the pre-break period. Hence, it was concluded that domestic savings played an important role to accelerate investment and growth.

Other studies showed a reverse in the savings-growth nexus. Odhiambo (2009) applied the data of South Africa for the period from 1950-2005 to investigate the causal relationship of economic growth and savings. As a whole, the study indicated growth-led savings. The causality between real GDP per capita and gross domestic savings as a ratio of GDP was estimated using a trivariate Granger causality model by adding another variable, namely, foreign capital inflow. The Johansen-Juselius cointegration test results supported the long-run relationship for the variables. The vector error-correction model (VECM) was derived from cointegration vector and the results showed several directions of causality. In the short-run, economic growth and savings had a bilateral causal relationship. Economic growth is found to Granger-caused savings in the long-run. A bilateral relationship between foreign capital inflow and savings was detected in the short- and long-run. Meanwhile, growth Granger-caused foreign capital inflow. It was suggested that short-run policy should aim at attracting foreign capital inflow by increasing economic growth and savings. In the long-run, achieving higher growth is a way to sustain savings as well as foreign capital inflow.

In the case of certain country, the findings are mixed due to different methodologies used. Employing the same annual data set of Mexico, Sinha and Sinha (1998), and Masih and Peters (2010) examined the savings-led growth hypothesis for the period from 1960-1996. The two studies distinctively contributed to the literature of savings-growth nexus in Mexico. In the study of Sinha and Sinha (1998), it was shown that there existed a long-run cointegration between the variables. Through multivariate causality tests, they found evidence of GDP growth Granger-caused public and private savings' growths but not the reverse direction. They could not detect any causality using bivariate causality test. Masih and Peters (2010) found savings led growth in Mexico during the 1960-1996 period based on the findings of long-term causality. Based on the estimated results of Toda-Yamamoto Granger non-causality test, there exits bilateral causality between public savings ratio and real GDP in the long run. The results did not indicate any causality between private savings ratio and real GDP, as well as with public savings ratio. Lean and Song (2009) analysed the savings-growth nexus for the case in China based on the data of economic growth of China and its four provinces, namely Beijing, Shanghai, Guizhou, and Xinjiang, enterprise savings, and household savings. The findings indicated that at the country level, there existed long-run cointegration relationship between savings and economic growth. A bilateral causality was found in the short-run. A unidirectional causality was found in the long-run which running from savings to economic growth. At the province level, no causality was found for Shanghai and Xinjiang. In the case of Beijing, the results suggested a bilateral causal relation for economic growth and enterprise savings. Meantime, for Guizhou, a short-run unidirectional causal relation was found running from economic growth to household savings. The findings suggested that economic growth and household savings could be independent in the developed provinces in the short-run, i.e. Beijing, and Shanghai; Furthermore, enterprise savings did not enhance economic growth of the technological advanced province, i.e. Shanghai.

Data, Econometric Methodology and Empirical Results

3.1. Data

Our study uses the annual data of GDP per capita (constant 2010 US$) and gross domestic savings per capita (GDS) from 1960 to 2018. The source of data is from the World Development Indicators of World Bank. We transform the data into natural logarithm; thus, the parameters can be interpreted as elasticities.

3.2. Empirical Model

A bivariate model is applied to examine the savings-growth nexus for Malaysia. The model is written below:

$$\ln \mathrm{GDP_t} = \alpha + \beta \ln \mathrm{GDS_t} + \varepsilon_t \quad (1)$$

where lnGDP is the natural log of real GDP per capita, lnGDS is the natural log of gross domestic saving per capita, and ε_t is a random error term.

To analyze the relationship between GDP and GDS, we use the Pesaran et al. (2001) Autoregressive Distributed Lag (ARDL) bound approach of cointegration. The directions of Granger causality are determined through the Granger causality test. There can be a few different outcomes from the Granger causality test. If GDP and GDS do not cause each other, the variables are statistically independent. If GDS Granger-causes GDP, that indicates savings growth leads economic growth. If GDP Granger-causes GDS, it shows that economic growth leads savings growth. It is also possible to obtain an outcome of a bilateral causality between GDP and GDS, indicating that the two variables Granger-cause each other.

Univariate Unit Root Test:

A common practice to avoid spurious regression results is to investigate the time series properties of each series (Granger and Newbold, 1974). In this study, the ADF and PP unit root tests are employed to determine the order of integration for each series. Table 1 shows the results of ADF and PP tests which consistently suggest that GDP and GDS are non-stationary at level. All series become stationary after taking the first difference. Therefore, all series are integrated of order one I(1) and we can proceed with the cointegration test.

Table 1: ADF and PP Unit Root Tests

Variables	ADF		PP	
	Level	Ist. diff	Level	Ist.diff
GDP	-1.115	-6.638***	-1.091	-6.615***
GDS	-1.725	-9.196***	-2.335	-9.153***

Notes: The asterisks *** denote significance at the 1% level. The values are *t*-statistics.

ARDL Cointegration Test:

The bounds testing approach to cointegration is used to analyze the relationship between GDP and GDS. Below is the autoregressive distributed lag (ARDL) model which we estimate using the Autoregressive Distributed Lag (ARDL) test:

$$\Delta \ln GDP_t = a_1 + \pi_1 \ln GDP_{t\text{-}1} + \pi_2 \ln GDS_{t-1} + \sum_{j=1}^{k} b_{1j} \Delta \ln GDP_{t-j} + \sum_{j=0}^{k} b_{2j} \Delta \ln GDS_{t-j} + \xi_t \quad (2)$$

where lnGDP is the natural log of real GDP per capita, lnGDS is the natural log of gross domestic saving, and Δ is the first difference operator. The standard Wald test or the F-test is used to test for the joint significance of the lagged level variables in Eq. (2). If the F-statistic is larger than the upper bound critical values, that indicates the null hypothesis of no cointegration relationship ($H0 : \pi1=\pi2=0$) can be rejected I(1). If the F-statistic is smaller than the lower bound critical values, that indicates the null hypothesis of no cointegration relationship cannot be rejected I(0). The cointegration inference is indecisive if the F-statistic falls between the lower and upper bound critical values. Table 2 shows the results that the two variables are cointegrated. Therefore, the long-run relationship between GDP and GDS exists and the results are robust.

Table:2 The Results of Bounds Test for Cointegration

Model	Calculated F-Statistics	
F_{GDP} (GDP/GDS)	26.06***	
F_{GDS} (GDS/GDP)	23.9*	
#Critical bounds of F-statistics		
Significance level (F_{GDP} (GDP/GDS)	Lower *I*(0)	Upper *I*(1)
1%	5.385	6.033
5%	3.803	4.363
10%	3.127	3.650
Conclusion	Cointegrated	

After having found that GDP and GDS are cointegrated, next is to estimate the long-run and short- run relationships. Table 3 shows the estimation results. The results indicate that the economic growth in Malaysia receives a significant positive effect from GDS in the long-run. The coefficient is 0.301 and it is significant at the 1% level. The error correction model (ECM) is used to estimate the short-run relationship. The coefficient for one period lagged error-correction term ε_{t-1} is −0.025 and it is at the 1% significance level, confirming that the cointegration relationship is valid. The results show that about 2.5% of the variation of economic growth in Malaysia is due to disequilibrium. Besides that, savings have a significant positive effect about 2.2% on economic growth in the short-run.

We employ diagnostic tests to validate the appropriateness of the selected ARDL model. Based on the Jarque-Bera statistic, the residuals are normally distributed. The Breusch–Godfrey serial correlation LM test shows that the residuals are not serially correlated up to the order of two. The autoregressive conditional heteroskedasticity

(ARCH) LM test shows there is no conditional heteroskedasticity. We can conclude that the selected ARDL model do not have heteroskedasticity and the serial correlation problems. The null hypothesis of no specification error cannot be rejected by the Ramsey RESET test. The plots of the CUSUM and CUSUM of squares statistics are seen fluctuated within the 5% critical bounds, indicating that the parameters are stable (see Fig. 1).

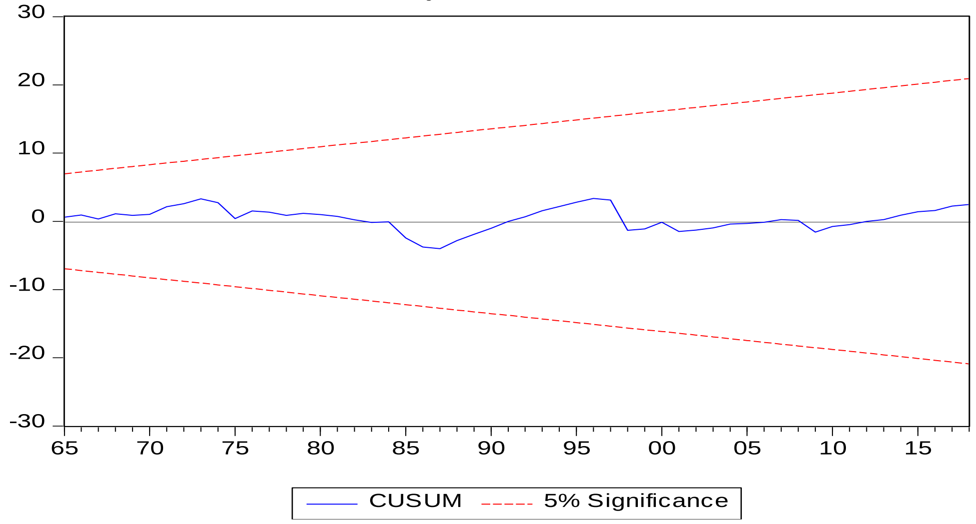
Table 3: The Results of Long-run and Short-run Elasticities.

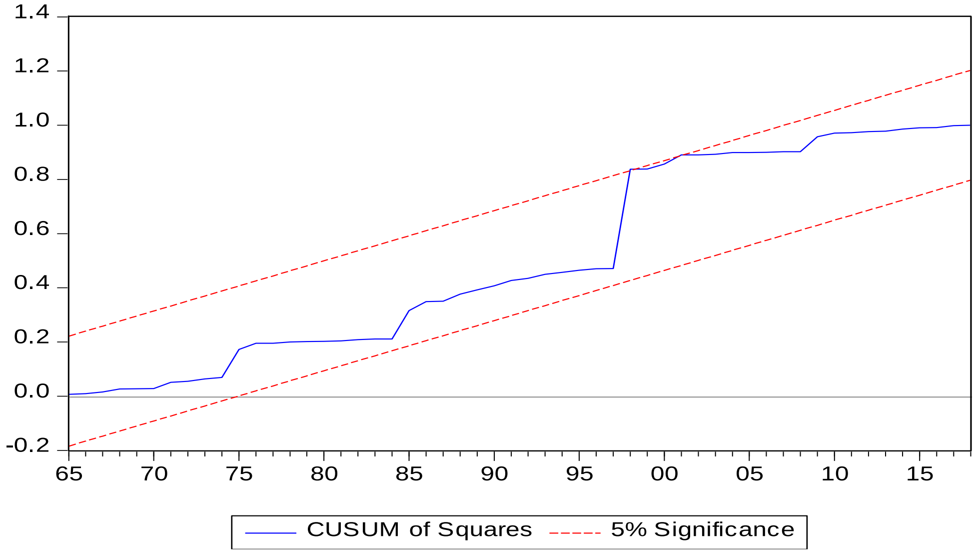
Long-run elasticities		Short-run elasticities	
Constant	7.922***	Constant	3.237**
GDS	0.301***	ΔGDS	0.022**
		ε_{t-1}	−0.025***
Diagnostic tests			
SERIAL	ARCH	RESET	NORMAL
0.792 (0.458)	0.102 (0.751)	0.417 (0.678)	96.533 (0.000)

Note: The asterisks *** and ** denote significance at the 1 and 5% levels, respectively. (.) refers to the p-values.

SERIAL is the Breusch–Godfrey LM test for serial correlation; ARCH is the LM test for Autoregressive Conditional Heteroskedasticity (ARCH); RESET is the Ramsey RESET LM test for omitted variables or functional form; NORM is the Jarque–Bera test for normality.

Fig. 1. Plots of CUSUM and CUSUM of Squares Statistics





The Causality Analysis

Next, we proceed to employ the Granger causality test and the Toda Yamamoto (1995) Modified Wald (MWALD) causality test within the augmented vector autoregressive (VAR) framework to analyze the causality between GDP and GDS. We use a bi-variate VAR (p + d_{max}) comprised of *lnGDS* and *lnGDP* and examine the non-causality between these variables:

$$\ln GDP_t = \psi_0 + \sum_{i=1}^{p} \psi_i \ln GDP_{t-i} + \sum_{i=p+1}^{p+d_{max}} \psi_i \ln GDP_{t-i} + \sum_{i=1}^{p} \varphi_i \ln GDS_{t-i} + \sum_{i=p+1}^{p+d_{max}} \varphi \ln GDS_{t-i} + \nu_{1t}$$

$$\ln GDS_t = \eta_0 + \sum_{i=1}^{p} \eta_i \ln GDP_{t-i} + \sum_{i=p+1}^{p+d_{max}} \eta_i \ln GDP_{t-i} + \sum_{i=1}^{p} \lambda_i \ln GDS_{t-i} + \sum_{i=p+1}^{p+d_{max}} \lambda \ln GDS_{t-i} + \nu_{2t} \quad (3)$$

The null of non-causality from *lnGDS* to *lnGDP* can be expressed as $H_0 : \varphi_i = 0, \forall i = 1,2,..., p.$ The estimated results of the Granger causality test and the WALD causality test of Toda Yamamoto (1995) are reported in Table 4. The two tests consistently indicate that GDP Granger-causes GDS in Malaysia. Both tests' results are at the 5% level of significance. Based on the results, economic growth leads savings growth meaning that economic growth can stimulate savings. There is no indication of savings growth leads economic growth, and no sign of savings can stimulate economic growth in Malaysia.

Table 4: The Results of Granger and Modified Granger Causality Test.

Null hypotheses	*df*	Granger F-stats	MWALD Statistics
GDS does not Granger-cause GDP	1	0.036	0.282
GDP does not Granger-cause GDS	1	5.37**	2.821**

Conclusion

In this study, we aim to investigate the savings-growth nexus in Malaysia. Annual data from 1960-2018 are used in this study. We employ the bounds testing approach to analyze the long-run relationship between GDP and GDS. The Granger causality and the MWALD tests are then used to indicate the directions of causality between GDP and GDS. The estimated results show a long-run cointegration relationship between the variables. Besides that, economic growth receives a positive effect from savings growth. The positive effect occurs in long-run as well as in short-run. The Granger causality and MWALD tests' results indicate that savings growth is Granger-caused by economic growth. This allows us to conclude that economic growth leads to savings growth for the case of Malaysia. Policy makers in Malaysia may implement policy to increase economic growth instead of to raise interest rate to encourage savings.

References

[1] Domar, E.D. (1946). Capital expansion, rate of growth, and employment. Econometrica, 14 (1), 137-147.

[2] Dolado, J.J. and Lütkepohl, H. (1996). Making Wald tests work for cointegrated VAR systems. Econ. Rev. 15 (4), 369–386.

[3] Granger, C.W.J. (1969). Investigating causal relationship by econometric model and cross-spectral methods. Econometrica, (37), 424-438.

[4] Granger, C.W.J., Newbold, P. (1974). Spurious regressions in econometrics. J. Econ., 2 (2), 111–120.

[5] Harrod, R.F. (1939). Toward a Dynamic Economic. Macmillan and Co. Ltd, London.

[6] Lean, H.H. and Song, Y. (2009). The domestic savings and economic growth relationship in China. Journal of Chinese Economic and Foreign Trade Studies, 2 (1), 5-17.

[7] Johansen, S. (1991). Estimation and hypothesis testing of cointegrating vectors in Gaussian vector autoregressive models. Econometrica, 59, 1551-1580.

[8] Keynes, J.M. (1963). The General Theory of Employment, Interest and Money. Harcourt Brace, New York.

[9] Masih, R. and Peters, S. (2010). A revisitation of the savings-growth nexus in Mexico. Economics Letters, 107, 318–320.

[10] Odhiambo, N.M. (2009). Savings and economic growth in South Africa: A

multivariate causality test. Journal of Policy Modeling, 31, 708–718.

[11] Patra, S.K., Murthy, D.S., Kuruva, M.B. and Mohanty, A. (2017). Revisiting the causal nexus between savings and economic growth in India: An empirical analysis. Economia, ECON-117, No. of Pages 12.

[12] Pesaran, M.H., Shin, Y., 1999. An autoregressive distributed lag modelling approach to cointegration analysis. In: Strom, S. (Ed.), Econometrics and Economic Theory in the 20th Century, Chapter 11. Cambridge University Press, Cambridge.

[13] Pesaran,M.H., Shin, Y., Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationship. J. Appl. Econ. 16 (3), 289–326.

[14] Sinha, D. and Sinha, T. (1998). Cart before the horse? The saving-growth nexus in Mexico. Economics Letters, 61, 43-47.

[15] Tang, C.F. and Chua, S.Y. (2009). The savings-growth nexus in Malaysia: Evidence from nonparametric analysis. The IUP Journal of Financial Economics, VII, 3 & 4, 83-94.

[16] Tang, C.F. and Tan, B.W. (2014). A revalidation of the savings-growth nexus in Pakistan. Economic Modeling, 36, 370-377.

[17] Toda, H.Y., Yamamoto, T., (1995). Statistical inferences in vector autoregressions with possibly integrated processes. J. Econ., 66 (1–2), 225–250.