

## **FINANCIAL DEVELOPMENT AND THE SAUDI ARABIAN ECONOMY: RE-EXAMINING MCKINNON'S HYPOTHESIS**

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### **Abstract**

*This paper focuses on exploring the existence of complementarity hypothesis by Mckinnon in Saudi economy covering the period of 1985-2015. Such existence means, financial repression. Regardless of the efforts in last twenty years or so of heavy work to accelerate Saudi economic growth, the reforms marred by serious difficulties. In order to reach a conclusive evidence, the short and long-run relationships are estimated using co-integration techniques. The tests will dig deep to see whether money supply and capital are complement. Following Khan, et al.(1998) model, I included the money demand for real balances as an independent variable in the saving function with some modifications of some of the independent variables. The VAR results supports the existence of negative effects of broad money supply against the real private saving RPS1. Although, the variables are not significant, the results do not clearly support the Mckinnon's hypothesis. Thus, the complementarity issue is not conclusive.*

*Keywords: Financialization, Saudi Arabia, Co-integration Analysis, Economic growth. Complementarity*

### **INTRODUCTION**

Financial repression refers to the notion that there is a set of regulations and laws and other governmental restrictions that prevent financial intermediaries from performing to full capacity. Interests ceiling, high reserve requirements, capital control; such measures under taken by governments especially less developed countries to save on resources. Mckinnon and Shaw (MS, henceforth) argue that historically developed and underdeveloped countries, especially underdeveloped, have restricted competition in financial sector with regulations. Repressed

financial sector discourages both saving and investment because of low rates of return. This rate of return could be higher in a market efficient environment. As a result of that, financial intermediaries do not function as supposed to be. This cause failure to channel savings into investment, thereby impeding economic growth. In order to control resources, governments tend to implement policies that repress the financial system and funnel funds, otherwise channeled through competitive market system (Barnebeck, and Trap 2003).

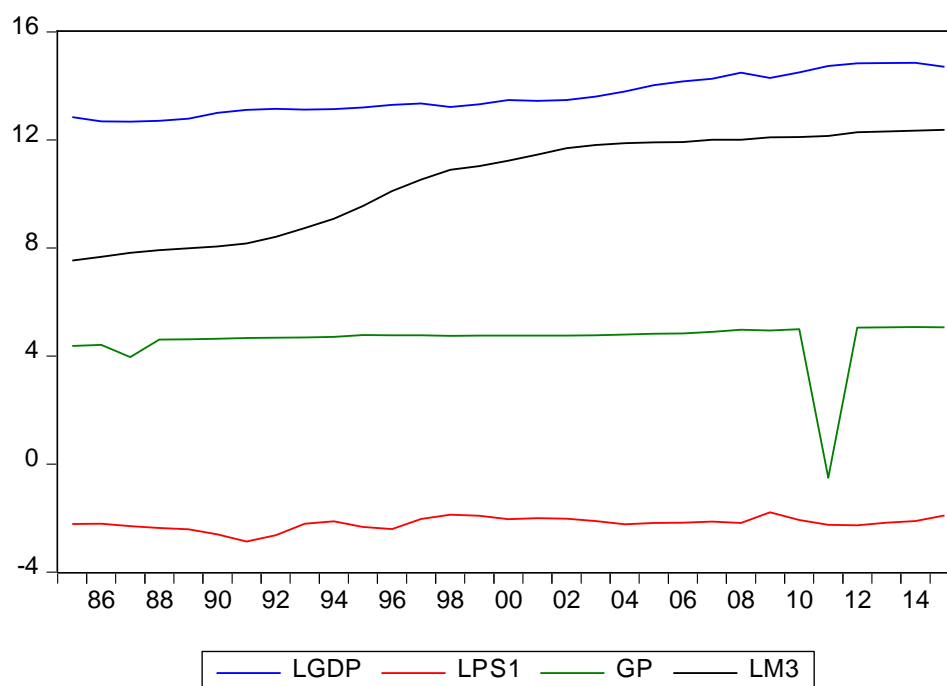
No doubt, that efficient financial system promotes growth through forwarding resources to the most productive uses. Hence, efficient financial system lifts growth by channeling saving and investment, and hence, physical capital accumulation. Estrada, *et.al.* (2010), pointed out, overall of function of financial system is to reduce information and transaction costs impeding economic activities, and its main functions: produce *ex ante* information about alternative chances for investment, monitor investment after providing finance, mobilize savings from savers to investors, and ease the exchange of goods and services.

In the past, foreign aid is considered one of the important ways to ease the financial difficulties of accumulating capital and helps attain economic development in LDC's. Keen attention has been drawn of both monetary and development on the role of money holdings in capital accumulation in some LDC's (Yoo, 1977). Although financial sources are of importance, but the existence of alternative causes hindrance of achieving it. Shaw (1973) and Mckinnon (1973), has pointed out that saving and investment depend in LDC's largely on intermediation role of monetary system. Through this system, individuals hold money, save it, and finance their investments. So, money can be viewed as complementarity instead of substitute of physical capital. The Mckinnon-Shaw thesis stands on the fact that low or negative interest rate discourages saving and, hence reduces the availability of loanable funds, which constrains investment and in turn lower the rate of economic growth (Ahfaque, *et al.*, 1998).

The transmission mechanism of LDC's is far different from developed nations DC's. The money holdings in less developed countries constitute big portion of savings because there are no well-organized financial markets and as a result of that higher transaction and inventory costs for physical capital in comparison with holding money. On the other hand, investment is closely related to monetary mechanism through which investors had no access to gather information about alternative investment choices due to higher cost of information about marginal efficiency of capital. Thus, money becomes a conduit through which capital accumulates (Yoo, 1977). Given the characteristics of LDCs, Saudi Arabia reflects an example that should be examined and tested. Saudi Arabia has characteristics similar to those of less developed countries, LCDs: dependence on one exhaustible resource, i.e. oil, great participation by the public sector in economic activities, limited integration between the dominant

foreign exchange earner (the oil sector) and the rest of the economy. The quadrupling of oil prices which started 1973/74 has benefitted the economy by providing financial resources for investment and to further economic growth and development. The oil windfall also influenced the macro variables in a positive manner (Figure 1).

Figure 1: Real private saving, real GDP, real money supply, and inflation



Source: Data from Saudi Arabian Monetary Agency(SAMA), using Eviews 9

Furthermore, Saudi Arabia under took several measures to liberalize its economy. According to Saudi vision 2030, the goals are to lower rate of unemployment to about 7 percent, increase small and medium sizes enterprises contribution to GDP to about 35 percent, and increase women's participation into the workforce to about 30 percent. In addition, the aim is to encourage ongoing privatization of state-owned assets including leading companies, property and other assets, including leading companies, property and other assets. This will bring in new and more diverse revenues for Saudi government. These ramifications will enhance financial resources and promote economic growth and stability. The ambition is to move the kingdom from 19<sup>th</sup> largest economy in the world into to the 15<sup>th</sup>.

This study is motivated by the desire to see whether the latest reforms in the kingdom which implemented a time ago affected the economy as a whole, especially after more than a decade of establishing the Authority of Financial Market. However, on top of the economic reforms is privatization.

The purpose of this paper is to review and examine empirically the existence of complementarity in the Saudi financial sector. This proposition is acceptable before the reforms which took place long time ago. Hence, the expectations would be channel towards the substitution rather than complement between private saving and the broad money supply.

## REVIEW OF LITERATURE AND EMPIRICAL STUDIES

MS (1973), showed that, due to deregulations in financial markets, interest rates will go up, and hence savings ends up too thereby, financial intermediation improve efficiency. The expected positive impact of real interest rate and real money balances on the growth of output is obvious (Rehmat, *etal.* 2010). This expresses the validity of MS hypothesis about financial liberalization. Moreover, MS ascribed the poor performance of growth in developing countries isto interest rate, high reserve requirements, credit rationing and quantitative restrictions in credit allocation mechanism (Arestis, 2005). These restrictions known as financial repression. Some scholars argue that financial repression has detrimental effects on real economy. Moreover, Goldsmith (1969) points out that the main effect of financial repression is over efficiency of capital, whereas, MS stressed two channels. First, through the efficiency of allocation of investment. Second, through the effect of return on savings. Hence, the investment in the long-run suffers not only from quantities, but quality (Aresties, 2005). To overcome this problem, Aresties (2005), suggests liberalize financial markets, such as run over interest rate ceilings. A two-way causal relationship between financial intermediation and economic growth exists. Growth stimulates participation in financial market thereby, the promotion of financial intermediation and hence, financial intermediation encourages efficient allocation of funds for investment. On the other hand, structural features of finance stemmed from the fact that whether financial structure matters. This stresses the importance of banks and capital markets. Aresties (2005), concluded that, available evidence of empirical investigations does not offer much support for financial liberalization hypothesis.

Ashfaque, and Hasan, (1998), tested for complementarity hypothesis of Mckinnon for the period 1959-1995 in Pakistan. They found strong support for Mckinnon's hypothesis. The coefficient of saving ratio in money demand function and of real money balances in the saving function are both positive and statistically significant. So, financial liberalization in Pakistan leads to economic deepening. Contrary to common findings, domestic and foreign savings are found to be complementary. Hence, the positive effect of foreign savings on national savings is realized after a lag of 1 year.

Adebiyi, M. (2003), empirically re-examines McKinnon-Shaw financial hypotheses (McKinnon's complementarity hypothesis and Shaw's financial deepening hypothesis) on

money demand function for seven African Less Developed Countries (LDCs). Those countries are empirically examined, and the findings are partly support the Shaw's financial deepening hypothesis. The policy implications is that, the correct description of transmission mechanism between savings and economic growth, whether it is Shaw's financial deepening hypothesis or McKinnon's complementarity hypothesis, depends upon the degree of economic and financial development of the economy.

Barnebeck, and Trap (2003), survey the finance-growth theoretically and empirically. New theories linking financial development and economic growth do not pay attention to insight emerging from modern information economies. Markets with a symmetric information in general is Pareto insufficient. In addition, banking competition may not yield efficient intermediaries. They show that the alleged first effect whereby, financial development causes growth is not adequately supported by econometric work. In their review of literature, they specified three strands (Bernbeck and Trap, 2003):

#### 1-Mckinnon-Shaw (MS) hypothesis

During 1960s and 1970s, MS model addressed the policy of financial repression including, ceiling on interest rates, higher reserve requirements, administrative credit allocation and other governmental distortions which prevailed in LDCs. Ceiling on nominal interest rate will stall financial deepening and thereby, economic growth. The interest rate ceiling lead to low or negative interest rates which reduces savings and marginal production of capital.

#### 2-Financial Endogenous-Growth Models

The main characteristic of these models, are the incorporation of endogenous financial structures as well as endogenous growth. Financial endogenous models (FEGD) can show how utility maximizing agents choose from Pareto-improving financial intermediary structures by including a stochastic environment. Thus, adding externality leading to endogenous growth. FEGMs introduce a link from financial development to long-run economic growth. The risk-sharing device is the tool through which financial system affect growth.

#### 3-Asymmetric Information

Due to a symmetric information, the simple first-order link between financial development and economic growth is distributed because with asymmetric information the decentralized price system leads to an efficient allocation of scarce resources. So, the result is a constrained Pareto optimum.

There are a number of plausible channels through which financial development affects economic growth positively (Estrada, *et al.* 2010). The literature stresses examinations of the relationship between finance and growth. The impact on GDP could be through: the depth of financial system as measured by the rate of total liquid liabilities to GDP, and also, the structure

of financial system as measured by indicators such as: the ratio of bank credits, and stock markets capitalization to GDP. Empirical evidence shows that financial depth has strong and positive effect on growth, whereas financial structure (relative weight of banks versus capital market), does not have any appreciable effect on growth.

Odhiambo, M. (2004), has used two models to test the relevance of Mckinnon complementarity hypothesis in Kenya. In the first model, the demand for money has been included in the saving function. Similarly, the saving rate has been included in the real money balances function. In the second model, investment variable has been included in the money demand function. In his paper, he found strong support for Mckinnon's hypothesis in both models. This applies irrespective of whether the models are estimated in static long-run (co-integration) or in the dynamic formulation (error correction model). The money and capital are complementarity in the case of Kenya.

Rahman, H. *et al.* (2005), attempted to test the complementarity hypothesis presented in Mckinnon using VECM for Pakistan over the period 1964-2003. The results failed to find clear evidence for complementarity between money supply and capital. However, their results are in line with Fry (1978), who found little evidence in support of Mckinnon's hypothesis.

Omar and Khan (2007), seek to evaluate the impact of liberalization on country's economic growth, by analyzing the 1974-2002 data using co-integration and error correcting models. Their empirical results suggest that long-run economic growth in Bangladesh, is largely explained by physical capital and real interest rate and enrolment ratio. The sign of financial liberalization on growth is negative indicating that reforms failed to attract new investment.

Sulaiman, *et al.* (2012), critically investigates the effect of financialization on economic growth in developing countries with the emphasis on Nigeria. They employ GDP as a proxy of growth and independent variables, lending rate, financial deepening ( $M^2/GDP$ ), exchange rate, inflation, and degree of openness as its financial liberalization indices. The study covers the period of 1987-2009, using co-integration methodology. Thus, there exists long-run equilibrium relationship among the variables. They concluded that financial liberalization has a stimulating effect on growth.

Samsi, S., *et al.* (2012), analyze the financial sector and economic growth for Malaysia using generalized impulse functions (IRFs). This revealed that innovations in stock market, real estate market and banking sector have significant impact on economic growth. Variance decomposition confirms that variance in economic growth is explained most by innovations in stock market and real estate market. Hence, banking sector is not the major source of output variability.

Arouri, M. *et al.* (2013), explore the relationship between financial development, economic growth and trade openness in case of Bangladesh over the period 1975Q1-2011Q4. The ARDL bounds testing approach to co-integration and the innovative accounting approach for causality are used. Their results show that financial development, trade openness and economic growth are linked over the long-run. They find evidence in favor of the supply-side hypothesis while financial development and economic growth cause exports. Economic growth causes imports and feedback effect exists between trade openness and economic growth.

Hossain, M. (2013), seeks to untangle the link between economic liberalization and GDP growth in Bangladesh. To do so, a time series analysis is done on data set ranging from 1980-2009 using co-integration and OLS methods. Three reform variables as proxies for trade liberalization, financial reforms, and capital market liberalization are analyzed against the level of per capita GDP. Empirical findings of this study support a positive relationship between long-run economic growth and the proxies picked to represent liberalization reforms in Bangladesh. Causality test indicates a strong unidirectional long-run causal flow stemming from reform indicators to per capita GDP.

Owusu, E., *et al.* (2013), examine the relationship between financial liberalization policies and economic growth in Ivory Coast. This study employs the autoregressive distributed lag (ARDL)-bounds testing approach to examine the long-run relationship between economic growth, which is measured by real GDP per capita and financial liberalization, which is represented by an index – calculated by using principal component analysis (PCA). The empirical findings show that the effects of financial liberalization policies on economic growth are negligible in the short run as well as in the long run. This finding is consistent with a number of previous studies in which negative or inconclusive results regarding the effects of financial liberalization on economic growth.

Shahbaz, M., *et al.* (2015), revisits the relationship between financial development and economic growth in Bangladesh. They incorporate trade openness in the production function using quarter data over the period 1976-2012. They applied combined Bayer-Hanck co-integration approach to examine co-integration among the series. Their findings suggest development of financial sector facilitates economic growth, but capitalization impedes it. Trade openness stimulates growth. Labor is positively linked to growth. The evidence suggests, bidirectional causality running from financial development and per capita to growth.

Oyeniran and Temitope (2015), examine the effect of financial integration on economic growth in Nigeria. They used series from 1981-2012. They employed ARDL bounds testing approach proposed by Pesaran *et al.* (2001), to examine the long-run and short-run effect of financial integration and development on economic growth. The co-integration results showed

persistence of long-run relationship between dependent and all independent variables. Financial integration has no short-run effect on economic growth. It's long-run effect on growth is negative and significant.

## RESEARCH METHODOLOGY

### The Theoretical Model, Estimation and discussion

In order to examine the existence of the hypothesis of Mckinnon's complementarity, the model developed by Khan, *et al.* (1998), will be followed with slight modification concerning some of the independent variables, such as foreign investment. Since Saudi Arabia has no shortage of availability of funds, and the smaller the foreign investment of total investment, government investment will replace the foreign investment. The complementarity is represented by the following equations:

$$(M/P) = f ( y, I_p/y, r-\dot{P}^e ) \quad (1)$$

$$f_2 > 0$$

$$(I_p/y) = g ( y, I_g/y, r-\dot{P}^e ) \quad (2)$$

$$g_2 > 0$$

We notice that, equation (1) is the standard long-run real money demand with real income  $y$  as a scale variable. Real interest rate ( $r-\dot{P}^e$ ) which is the opportunity cost variable. The inclusion of ( $I_g/y$ ) in equation (2) is to show complementarity and substitution of public sector investment in private investment function. The argument holds if:  $f_2 > 0$ , and  $g_2 > 0$  in both equations. This suggests that the constraints to investment is the availability of finance rather than the cost of capital. If real deposit rate goes up, investment goes up. However, due to the limitation of supply of saving and the reliance on government investment, saving function may be a substitute of investment and hence equation (1) rewritten as:

$$(M/P) = k ( y, S/y, r-\dot{P}^e ) \quad (3)$$

As far as we know, complementarity works both ways, money supply has an impact on saving and investment, the saving is specified as follows:

$$(S/y) = h ( y, M/P, S_g/y ) \quad (4)$$

In this case, complementarity holds as:

$$k_2 > 0 \text{ and } h_2 > 0.$$

Using  $S_g$  in this paper instead of  $S_f$  is warranted. The foreign investment constitutes a small portion of total investment. The heavy load of investment relies on the government's shoulder. To determine the effect of liberalization on economic growth, one looks at the results obtained from the tests. If negative, it means no complementarity between capital and money supply and



hence, positive economic growth. Given the above analysis, It is easy to specify the model in the following form:

$$RPS_1 = \alpha_0 + \alpha_1 LRGDP + \alpha_2 LRM_3 + \alpha_3 GP + e_t \quad (5)$$

Where:

$RPS_1$ : real log private saving,  $\log(PS/GDP \div P)$ .

$LRGDP$ ; real log GDP,  $\log(GDP/P)$ .

$LRM_3$ ; real log broad money supply M3,  $\log(M3/P)$ .

$GP$ : log wholesale price as a proxy for change in inflation.

$e_t$ : random error term.

With the error correcting model ECM, the above equation becomes:

$$\Delta RPS_1 = \beta_0 + \beta_1 \sum_{i=0}^n LRM3t - 1 + \beta_2 \sum_{i=0}^n LRGDPt - 1 + \beta_3 \sum_{i=0}^n GPt - 1 + \sum_{i=0}^n ECMt - 1 + \sum_{i=0}^n t \quad (6)$$

Where  $\sum_{i=0}^n t$  is white noise, and t-1 is variable lagged one period.

### The Unit Root Test

Due to the stationarity of economic variables, it is of interest to perform the unit root tests and the error-correcting methodology. Three regression models intercept and trend, intercept, and none are used in this study to test for unit root. Two extensively used unit root test, namely Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) tests are employed to examine the stationarity of the time series. The ADF test is performed using the following equation:

$$\Delta Y_t = \alpha + \beta T + \lambda \Delta Y_{t-1} + \delta \sum_{i=1}^n \Delta Y_{t-i} + e_t \quad (7)$$

Where,  $\alpha$  is a constant,  $\beta$  is the coefficient of time trend  $T$ ,  $\lambda$  and  $\delta$  are the parameters where,  $\lambda = \rho - 1$ ,  $\Delta Y$  is the first difference of  $Y$  series,  $n$  is the number of lagged first differenced term, and  $e_t$  is the error term.

Phillips and Perron test is performed using the following equation:

$$\Delta Y_t = \alpha + \beta T + \lambda \Delta Y_{t-1} + e_t \quad (8)$$

Where,  $\alpha$  is a constant,  $\beta$  is the coefficient of time trend  $T$ ,  $\lambda$  is the parameter and  $e_t$  is the error term. To achieve this task, Augmented Dickey-Fuller (1987), (ADF), and Phillips and Perron (PP) (1990) tests are executed. Results for these tests are close to each other, and reported in table 1. Both tests showed that variables are stationary at the difference in the ADF and PP tests. Some of the variables are not stationary at level  $I(0)$ , whereas stationary at difference  $I(1)$ . However, in order to carry out short and long-run analyses, it is necessary to have all relevant variables stationary in the same order,  $I(1)$ . To test the stability of the long-run relationship, estimate of VEC model in this case is needed.

Table 1: Augmented Dickey-Fuller and Phillips-Perron tests

Series	Augmented-Dickey Fuller (ADF)						Phillips Prron(PP)					
	LEVEL			1 <sup>st</sup> DIFFERENCE			LEVEL			1 <sup>st</sup> DIFFERENCE		
	Intercept	T&I	None	Intercept	T&I	None	Intercept	T&I	None	Intercept	T&I	None
LRGDP	3.68**	3.79**	1.82***	4.23*	5.29*	8.97*	3.85*	5.26*	0.16	26.09*	25.24*	17.41*
RPS1'	5.73*	5.78*	0.493	3.97*	4.06**	9.49*	5.79*	7.24*	0.17	29.54*	28.76*	30.59*
LRM3	2.25	4.78*	0.35	8.87*	3.36***	8.87*	2.02	4.78*	0.42	15.34*	23.13*	10.60*
GP	5.80*	5.71*	0.49	4.40*	4.90*	4.49*	6.25*	6.19*	0.30	28.72*	27.92*	28.23*

(\*), (\*\*), and (\*\*\*) are statistically significant at 1%, 5% and 10% level respectively.

T&I: trend and intercept.

Table 2: OLS estimates of the real private saving coefficients

Dependent Variable: RPS1	
Constant	-0.902274 (-1.55E+13)
LRGDP	-0.216589 (-3.95E+13)*
LRM3	0.153753 (6.95E+13)*
GP	-1.052965 (-2.33E+14)*
$e_{t-1}$	1.000000 (8.60E+14)*
$R^2$	1.00000
F statistics	6.56E+28
D-W statistics	2.00795

t-statistics are in parentheses. (\*) denotes significance at 1% level.

Using equation (5), and utilizing Engle and Granger (1987), a single equation method is built on the assumption that all variables in the model have to be integrated of the same order. Thus, in our model, all variables implemented are integrated of order one,  $I(1)$ . To examine the long-run relationship between  $RPS1_t$ , LRGDP, LRM3 and GP, one would test for short run coefficients first and look at their results.

Utilizing OLS the above equation (5), the endogenous growth model, is estimated and the residual saved and tested for stationarity. Moreover, if residual  $e_t$  is stationary, then RPS1 and the rest of the independent variables are co-integrated and have long-run relationships. Applying ECM, all short run variable is significant at 5 percent level, table 2 (above). The residual ( $e_{t-1}$ ) has been tested for stationarity, and the results came up significant at 1 percent level, with a positive sign indicating no long-run relationship between real log private saving, real GDP, real M3 and GP (Proxy for wholesale price).

### Co-integration Methodology

Once unit root tests have been confirmed, the next step is to examine the long-run equilibrium relationship among the variables. The existence of long-run equilibrium (stationary) relationship is called a co-integration, and is an important to rule out spurious regression. Johansen co-integration test is sensitive to the choice of lag length. To find out the lag length, VAR model is fitted to the time series.

From the table 3, trace statistic test confirms the existence of 1 co-integrated equation at the 5 percent level. The null hypothesis for the trace test is that, there is no co-integration between real private saving and LRGDP, LRM3, and GP (growth rate of Wholesale price). So, the null hypothesis of None is rejected, indicating that there is at most one co-integration equation.

When normalized for a unit coefficient on RPS1, the co-integrating regression of complementarity in Saudi Arabia can be given as follows (standard errors in parentheses):

$$RPS1 = 1.00 - 0.01423 LRGDP - 0.11435 LRM3 + 0.7014 GP \quad (8)$$

(0.1644)      (-0.0387)      (0.1195)

In the estimated model above, a 10 percent decrease in the money supply will cause a 11 percent rise in the private saving. The above results do not support the Mckinnon's hypothesis. None of the coefficients of explanatory variables of the real private saving is found to be greater than unity, indicating low responsiveness of real private saving to changes in these variables. The sign of price is as expected in the literature, a fear of erosion of real power of the money encourages people to save which will channel more loanable funds for investment. Hence, this is in line with the findings of Ashfaque and Lubna (1998). Moreover, the RPS1 variables and the rest of the independent variables are co-integrated and have long-run relationship and is plausible to run vector error correcting model VECM.

Table 3: trace statistic test indicate 1 co-integrating equation at the 0.05 level

Hypothesized No of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.56025	49.4265	47.8561	0.0350
At most 1	0.38336	26.4593	29.7971	0.1156
At most2	0.25693	12.9222	15.4947	0.1177
At most3*	0.15172	4.60715	3.84147	0.0318

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.56025	23.0032	27.584	0.1733
At most 1	0.38336	13.5371	21.132	0.4041
At most2	0.25693	8.31503	14.265	0.3476
A most3*	0.15172	4.60715	3.8415	0.0318

\*denotes rejection of the hypothesis at the 0.05 level.

\*\*Mackinnon-Haug-Michelis (1999) p-values.

Before indulging into VECM analysis, it is worthwhile to mention that VAR lag order selection criteria is applied. According to lag structure, FPT, AIC, SC, and HQ criterion, two lag period is suggested. We estimate the error correction model in order to determine the dynamic behavior of the real private saving which is reported in table 4. The coefficient of the co-integrated model, or the error correction term, explains the speed of adjustment towards equilibrium. Since this coefficient is negative and significant at 5 percent level, there exists long-run stable relation between real private saving and the real GDP, real money supply and inflation. This suggests that the system corrects its previous period's disequilibrium by 4.6. This results also suggest that causality is running from RPS1 to LRGDP, LRM3, and GP, evidence from table 6. However, from the results of table 4, real GDP lagged two periods is significant at 5 percent level and has an effect on real private saving with income elasticity greater than unity in the short run. This is consistent with Ashfaq and Lubna (1998) findings.

Table 4: Estimates of the VEC

Dependent Variable: RPS1			
Series	Coefficient	t-statistics	Prob.
ECT	-4.6091	(-2.8779)**	0.0100
D(RPS1(-1))	1.3100	(0.85772)	0.4023
D(RPS1(-2))	2.4371	(1.80068)	0.0885
D(LRGDP(-1))	-0.13258	(-0.04273)	0.9664

D(LRGDP(-2))	-6.63029	(-2.58641)***	0.0186
D(LRM3(-1))	0.068663	(0.02445)	0.9808
D(LRM3(-2))	-0.23508	(-0.07796)	0.9374
D(GP(-1))	1.293597	(0.22073)	0.8278
D(GP(-2))	-4.50658	(-0.94032)	0.3595
C	0.479810	(1.03828)	0.3129
R <sup>2</sup>	0.73	F 5.28	

Table 4...

t-statistics are in parentheses. The asterisk denotes significance at 0.05% level.

Table 5, reports the VAR estimates. In accordance, last one period and two periods money supply influences saving. The coefficients are insignificant at 5 percent level. However, this effect tends to be small and mixed (positive when variable lagged one period and negative when variable lagged two periods). In contrast, it is notable that all coefficients have the right sign but unfortunately insignificant. The income elasticity is positive and bigger than unity, which is consistent with the findings of Ashfaque and Lubna, 1998). The reality is that, the long-run effect of money supply over private saving is somewhat negative and unclear. The WALD test indicates that money supply lagged one and two periods jointly is hard to influence the private saving, with probability of 0.154. This finding is in line with Rahman, *et. al.* (2005), Owusu, *et. al.*(2013), and Oyeniran and Temtope (2015), which is consistent with Fry (1978) findings. This indicates that the reforms in the financial system is not going as fast as planned to. The income elasticity of money demand is found to be higher than unity, which suggests that the demand for money has been rising at a rate greater than income growth despite the insignificance of its coefficient.

Table 5. Results of VAR estimates

Dependent Variable RPS1			
Variables	coefficient	t-statistic	Prob.
RPS1(-1)	1.20589	(0.62258)	0.5406
RPS1(-2)	2.67594	(1.89364)	0.0728
LRGDP(-1)	3.94318	(1.32565)	0.1999
LRGDP(-2)	-2.41688	(-0.8994)	0.3791
LRM3(-1)	0.48459	(0.32385)	0.7494
LRM3(-2)	-1.2358	(-0.77713)	0.4462
GP(-1)	5.95513	(1.21116)	0.2400
GP(-2)	-0.79309	(-0.20575)	0.8391
C	-13.79975	(-1.84268)	0.0802
R <sup>2</sup>	0.33	F 1.239	D-W 1.71

Looking at causality between RPS1 and LRM3, the standard Granger causality test aims to show the effects of past values of a variable on changes in another variable. The specifications set as follows:

$$RPS1_t = \lambda_0 \sum_{i=0}^n \lambda 1iRPS1t - i + \sum_{i=0}^n \lambda 2LRM3t - 1 + \mathcal{E}_{1t} \quad (9)$$

$$LRM3_t = \delta_0 \sum_{i=0}^n \delta 1iLRM3t - 1 + \sum_{i=0}^n \delta 2iRPS1t - i + \mathcal{E}_{2t} \quad (10)$$

Where  $\mathcal{E}_{it}$  is uncorrelated stationary random process.

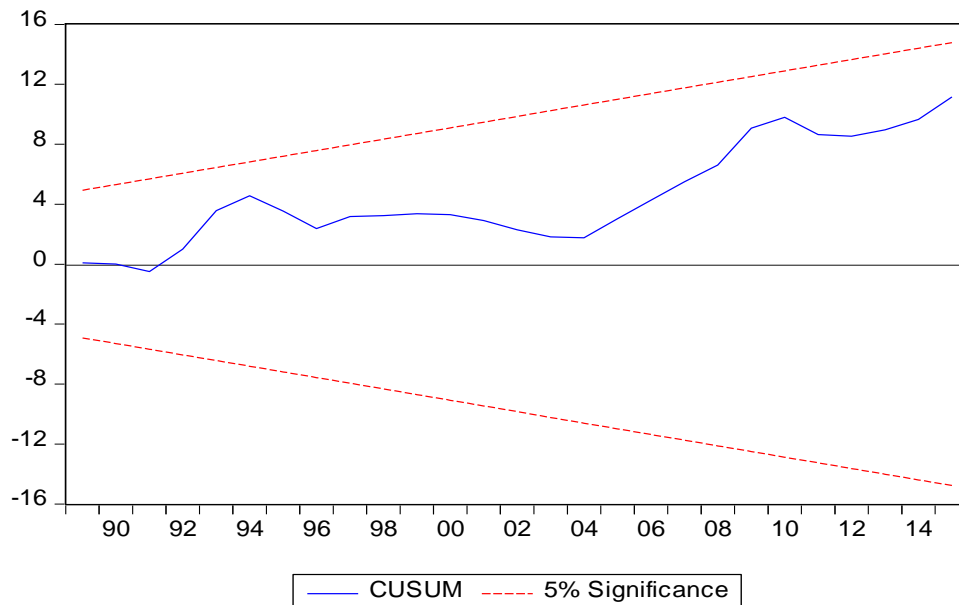
Table 6. Pairwise Granger tests

Lags: 2			
Null Hypothesis	Observations	F-Statistic	Prob.
LRM3 does not Granger cause RPS1	29	0.68916	0.5117
RPS1 does not Granger cause LRM3		6.15422	0.0070

Table 6 above, reports the results using two period lags. For first equation we reject the null hypothesis, which means that there is causality running from real private saving to the money demand. This proposes the existence of complementarity in another way.

Finally, it is of interest to check the degree of acceptance of the model.  $R^2$  is about 0.73, and the F statistics is significant at 5 percent level. The CUSUM stability test is presented in figure 2. In this test, the null hypothesis is that, blue line should exist between the upper and lower red lines which means, parameters are stable. The figure shows acceptance of the null hypothesis.

Figure 2. Stability Cusum test, using Eviews 9



## CONCLUSION AND POLICY IMPLICATIONS

In this paper, I have tested for the presence of Mickinnon's complementarity hypothesis in the Saudi economy, using co-integration and error correcting methods, covering the period of 1985-2015. This work shows that long-run effect on RPS1 is largely explained by real GDP lagged two periods. The evidence also shows that RPS1 is neither affected by long-run changes in price nor real money demand. The long-run effect of money demand on real private saving has the negative sign, but is not significant, indicating that there is no long run complementarity. Hence, one deduces that financialization has a positive effect on growth of Saudi economy. It also indicates that success of the government efforts to liberalize the financial sector is in the right direction.

From the decomposition approach, the innovative shock stemming in the dependent variable, RPS1 (real private saving) explains itself by about 98 percent. A one standard deviation shock in LRM3 explains about -2 to -3 percent in the RPS1 in the future. On the other hand, the innovative shock stemming in the dependent variable real log money supply (LRM3) explains itself by about 95 percent. So, a one standard deviation shock in RPS1 explains about -2 to -5 percent in LRM3 over time. Those shocks are temporary and fade as time passes by. Possible suggestion is to further this study to see the impact of liberalization on economic growth in a major oil producing country using the standard classical production function. Finally, the results are not solid to support complementarity hypothesis.

## RESEARCH LIMITATIONS

This research is carried out despite some limitations. Data on some of the variables are not available. The lack of historical data on interest rate and CPI for the 70s and early 80s, forced me to ignore the inclusion of interest rate in the private saving. Wholesale is used as a proxy for CPI. To see the effect of liberalization on economic growth in Saudi Arabia, it is possible for future extension of this study using the classical production function.

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## APPENDIX

Impulse response functions represent a dynamic simulations showing the response of an endogenous variable over time to a specific shock. Figure 3, shows an impulse response function result of a dynamic response of log real money supply, inflation rate, and real log GDP to real private saving. The LRM3 exhibited immediate positive response to RPS1 but became negative after the 2<sup>nd</sup> period. However, it continued to fluctuate until the 5<sup>th</sup> year, then became steady. On the other hand, RPS1 showed a positive response to LRM3 but became negative at the 2<sup>nd</sup> period. It continued fluctuations until the 8<sup>th</sup> year when it became negative and faded. This suggests the inclusivity of our case. Further investigations concerning the growth is needed.

Figure 3. Impulse response function result, using Eviews 9

