

Does Stock Market Development Affect the Savings Rate?

An Empirical Analysis using Instrumental Variable Approach

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Abstract

The present study provides an analysis of the impact of stock market development on savings rate in developing economies using an instrumental variable approach. This methodology is unique and hitherto unattempted in literature in the context of the research problem analysed in the paper. The empirical analysis presented in the paper is carried out in two parts. First, taking the cross-section data for a sample of countries we examine the relation between stock market development and savings. At the next stage, we examine the same research problem but taking a separate set of data for a set of 16 emerging countries for the time period 1990-2012. Recognising the possibility of endogeneity in our regression, we first check for the presence of it in our model. Next, we deploy an instrumental variable approach to find out the true impact of stock market development on savings rate of the countries. In both the cases, the empirical findings suggest that stock market does not seem to have significant influence on the savings rate of the country. These results corroborate the finding of some of the past studies which concluded that a growing or deepening stock market need not be necessarily associated with higher savings rate of the country. Instead, cross-country variations in savings rate are mostly explained by the macroeconomic environment in the real sector across countries.

I: Introduction

“Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done. The measure of success attained by Wall Street, regarded as an institution of which the proper social purpose is to direct new investment into the most profitable channels in terms of future yield, cannot be claimed as one of the outstanding triumphs of laissez-faire capitalism — which is not surprising, if I am right in thinking that the best brains of Wall Street have been in fact directed towards a different object.”

-John Maynard Keynes, The General Theory of Employment, Interest and Money, 1935

The interrelationship between finance and growth is well established in the theory as well as empirical literature. It has been argued that there are three main channels through which efficiency of financial sector can foster economic growth (Garcia et al, 1999). Firstly, an efficient financial market stimulates savings by providing greater choice of financial products

(Pagano, 1993). Secondly, as the financial system becomes more efficient, the information and transaction costs decline. Thirdly, it fosters efficient allocation of resources by enabling investors to distinguish between investments and lenders in screening projects (Diamond, 1984; Boyd and Prescott, 1986).

The debate over the role of stock market in a country's development can be traced back to the early 20th century when Keynes, for the first time, articulated the possible ill-effects of speculations in the stock exchange reining the activities of the real economy. Nevertheless, privatization and development of capital markets remained the key agenda of many developing countries during the last five decades, though the impact of the same on a country's long term growth and industrialization was never immune to criticism. During recent times, the interconnectedness of financial system across the world has added a new dimension in the existing debate on the role of stock market. During the financial crisis of 2008-09, the stock markets across countries play a catalyst in spreading the contagion. Also, the massive quantitative easing undertaken by several developed economies as a policy response to boost their economies after the crisis affected the macroeconomic stability of many developing countries through capital inflow in the emerging economy stock markets. This recent developments induce us to re-look at the role of stock market development in fostering the growth of developing countries.

Research Problem

The present paper empirically examines the impact of stock market development on the savings rate of the country. In the past, there are few attempts to probe the aforementioned issue. The contribution of the present paper lies in the unique and robust methodology adopted to tackle the issue of simultaneity between stock market development and savings rate. We deploy an instrumental variable approach to get rid of the simultaneity bias.

The paper is divided into the following sections. This section (section I) outlines the introduction. Section II provides some details of past literature on the empirical relationship between financial development and savings rate. Section III is on the baseline model which has been estimated using the cross-section data of 94 countries for the year 2011. In Section IV, the same model has been estimated using a pooled data for 16 emerging market economies for the time period 1990-2011. Section IV concludes.

Section II: Theoretical Underpinning and Review of Literature

According to the theory of finance the development of stock market affects savings rate due to the following reasons:

1. It affects both the risk and return on savings. The theory predicts that return on savings should affect due to development of stock market as a) the ability of adding new stocks to the portfolio increases the return b) if capital control prevents efficient allocation of resources, then removing those barriers will lead of efficient allocation of resources (Bosner-Neal *et al*, 1999).
2. Stock market development should lead to diversification of risk by expansion of portfolio (Levine, 1991).

However, regardless of how the stock market affects the risk and return of portfolio, the theoretical predictions on development of stock market on savings are indeterminate. The effect of change in rate of return on savings is indeterminate and the net effect depends on the

relative strength of substitution and income effects. The substitution effect makes current consumption dearer due to increased return on savings and thus reduces current consumption and increases current savings. The income effect, on the contrary, increase current consumption and reduces current savings.

The interdependence between financial sector and real sector is well established by empirical findings of researchers, though there have been some debates on the direction of causality in such a relationship (Jung, Patrick, Byron (1997), Goldsmith (1969), Rousseau et al (1998)). However, very few studies focus exclusively on the relationship between development of stock market and growth/savings rate of the country. It is also noteworthy that there is no consensus among researchers on the issues of development of stock market influencing growth/savings positively. In such a study by Beck and Levine (2004), where a sample of 40 country has been examined taking data for 1976-1998, it has been observed that there is a stable and positive relationship between long term growth and development of financial markets (banks and stock market).

On the contrary, several studies by Ajit Singh (1991, 1996, 1997) concludes that liberalization of financial markets and boom of stock markets in developing countries is unlikely to help those countries towards achieving faster economic growth or industrial development, mainly due to the high volatility and arbitrary pricing process and many of the developing stock markets are subject to. The same conclusions were reached by Rousseau and Wachtel (2000) in their study on impact of stock market growth on countries' long term development using panel data model for 47 countries for the time period 1980-1995. Study by Philip *et al* concludes that (2001) though there may be positive association between banks and stock market development and growth in longer run the effect of banks has proven to be more robust it this context. Akino *et al* (2009), found a significant positive relationship between stock market development and long run economic growth in case of seven Sub-saharan countries, using autoregressive distributed lag (ARDL) models.

The present study takes the regression framework suggested by Bosner-Neal *et al* (1999) as well as Masson *et al* (1995) to examine the determinants of savings rate, with special reference to the stock market development indicators. In the study by Bosner-Neal *et al* a panel of 16 emerging market economies for the time period 1982-1993 has been examined. The major conclusion was that, after removing the outliers, the regression analysis results suggested no significant correlation between stock market development and savings for these emerging market economies.

Section III: Developing the Model

Data sources and Methodology

In order to find out the impact of stock market development on savings, we used a regression framework where the possible determinants of savings rate are economic, demographic and stock market indicators. The model is represented as:

$$S_j = a + bZ_j + cSMD_j + e_j$$

Where:

S_j = Savings rate of country j

Z_j = Set of economic variables affecting savings rate

SMD_j=Set of stock market indicators affecting savings rate

e_j=The stochastic error term of regression

Following are the set of economic, demographic and stock market indicator variables included in the regression:

GDP growth rate: This is expected to affect the savings rate of the country positively

Per capita GDP: Economic theory suggests that the relationship between per capita GDP and savings rate is best represented by a hump-shaped curve (Masson, 1995). When per capita GDP is at a very low level, increasing the same increases the savings rate. However, for countries with per capita GDP at quite high level, rising per capita GDP may affect savings rate negatively. Hence in the regression analysis, both the log of per capita GNP as well as the square of the variable has been included as dependent variables to capture the non-linear relationship between these two variables.

Real interest rate: As discussed earlier, the effect of real interest rate on savings rate could be either negative or positive, depending on the relative strength of substitution and income effects.

Current account surplus (as per cent of GDP): The relationship between these two were found to ambiguous by the past studies. For developing countries, it was found that increase in inflow of foreign savings, represented by current account deficit affects the savings rate (private) negatively. Hence in the regression, the coefficient of CAD was found to be positive in case of developing countries. However, the same was found negative in case of developed countries.

Age dependency ratio: This represents the number of people younger than 15 or older than 64 as a proportion of working age population (15-64) of a country. As expected, people in these age groups dissave and an increase in their proportion would influence the savings rate of a country negatively.

Stock market capitalization ratio (as per cent of GDP): Market capitalization (also known as market value) is the share price times the number of shares outstanding. This ratio indicates size of the stock market.

Total value traded (as per cent of GDP): Stocks traded refers to the total value of shares traded during the period.

The regression has been carried out taking data of 94 countries from the database of World Bank for the year 2011 (except current account balance data, which was obtained from the IMF database, due to large gaps in the World Bank data on the current account balance). Country selection is based on availability of data, especially for stock market indicators.

Data Analysis and Model testing

Table 1 and 2 reports the baseline regression analysis, with all the countries, and after removing the outliers, respectively.

Variables in regression (expected signs of coefficients in brackets):

AS=Savings rate (%), dependent variable

CAB=trade deficit/surplus (%) (+/-)
 ADR=age dependency ratio (%) (-)
 RI=Real interest rate (+/-)
 LNGDPPC=log (per capita GDP) (+)
 LNGDPPCSQ=Square of LNGDPPC (-)
 MCAP=Stock market capitalization ratio (+/-)
 STR=Stock volume traded ratio (+/-)
 GDPGR=Annual growth of GDP (+)

Table 1: Baseline Regression on all Countries

Variable	Coefficient	Standard error	t	P> t
ADR	0.006	0.094	0.630	0.528
RI	-0.192	0.178	-1.080	0.285
LNGDPPC	41.828	37.626	1.110	0.269
LNGDPPCSQ	-5.068	4.600	-1.100	0.274
MCAP	0.018	0.022	0.790	0.431
STR	0.038	0.020	1.880	0.064
GDPGR	0.868	0.332	2.610	0.011
CAS	0.919	0.208	4.410	0.000
Cons	-69.529	79.547	-0.870	0.385
F statistic				6.040
Prob>F				0.000
R square				0.362
Adjusted R square				0.302
Root MSE				9.088

Table 2: Baseline Regression Results after Removing Outliers¹

Variable	Coefficient	Standard error	t	P> t
ADR	0.018	0.071	0.260	0.528
RI	-0.251	0.131	-1.920	0.285
LNGDPPC	22.200	29.258	0.760	0.269
LNGDPPCSQ	-2.594	3.588	-0.720	0.274
MCAP	0.025	0.017	1.500	0.431
STR	0.025	0.016	1.510	0.064
GDPGR	1.089	0.251	4.340	0.011
CAS	0.927	0.158	5.860	0.000
Cons	-28.850	61.811	-0.470	0.385
F statistic				12.400
Prob>F				0.000
R square				0.570
Adjusted R square				0.524
Root MSE				6.352

¹ The studentized t-ratios and Cooks-D measure has been used to remove the outliers from sample. The outlier countries were Zimbabwe, Oman, UAE, Montenegro, South Africa, Nepal, Turkey, Singapore, China, and Namibia

In the second regression, after removing the outliers, we get expected signs for variables, except age dependency ratio. Also, barring the coefficient of current account surplus and GDP growth rate, all other variables came out to be statistically insignificant. This could be due to the heterogeneity in the set of countries selected for the regression analysis. The important point that stood out of the analysis is that both indicators of stock market development did not show any statistically significant impact on savings rate.

The issue of heteroscedasticity:

Both the Breusch-Pagan test as well as White test have been used to detect heteroscedasticity in the dataset. Both tests fail to reject the null hypothesis of homoscedasticity, implying the problem of heteroscedasticity is not prominent in the data.

	Value of Statistic	P-value
Breusch-Pagan Test	1.22	0.2696
White Test	63.96	0.4778

Checking adequacy of the model

Ramsay reset test has been deployed to check the adequacy of the model. The test fails to reject the null hypothesis of having no omitted variable bias even at 10 per cent. Hence the possibility of omitted variable in our model has been ruled out.

Ramsay Reset Test	
Null hypothesis: Model has no omitted variables	
F(3,72)	0.16
P>F	0.9206

The issue of endogeneity

One important issue that required attention while carrying out the regression analysis is endogeneity among the regressors. This could be due to the fact that the stock market indicators as well as GDP growth rate both affects and get affected by the savings rate of the country. This leads to a potential simultaneity problem leading the case of OLS being inconsistent.

In order to test for endogeneity, we deployed the Hausman test statistic. For this, we first look at the regression taking the potential x-variables assumed to be responsible for endogeneity as dependent variables and all instrumental variables as independent variables. The instrumental variables were 2 period lagged values of the stock market indicators and the portfolio investment as percent of GDP. The rationale for using the two period lagged values of stock market indicators were that these variables would be highly related with the present values of stock market indicators and also, after running a separate regression with all the usual variables and lagged values of the stock market indicators, it was found that lagged values were not statistically significant in determining the savings rate, indicating weak

correlation between these variables and savings rate. Hence the lagged values could act as potential instrumental variables. The other IV, *i.e.*, portfolio flow as percentage of GDP is used because this variable could be well linked with the stock market development of the country, but not related significantly with the savings rate.

After running the separate regressions as described above, we take the estimated residuals of the regressions and incorporate that in the original regression. An F test for testing joint significance of the coefficients associated with the residuals indicates that coefficients associated with the residuals are statistically significant, thus indicates towards potential simultaneity problem.²

Now, detecting the potential endogeneity problem in the data, the next step would be to use the instrumental regression method. The following table gives the IV estimates of the regression.

Table 3: Instrumental Variable Method Estimations

Variable	Coefficient	Standard error	z	P> z
MCAP	-0.0008058	0.0205764	-0.04	0.969
STR	0.0042015	0.0271232	0.15	0.877
GDPGR	2.1621	1.166897	1.85	0.054
ADR	-0.0489993	0.0789864	-0.62	0.535
RI	-0.1935602	0.147339	-1.31	0.189
LNGDPPC	-26.754	33.17807	-0.81	0.42
LNGDPPCSQ	4.1568	4.206086	0.99	0.323
CAS	0.582725	0.2552803	2.28	0.022
Cons	57.3638	67.84443	0.85	0.398
Wald chi square				74.730
Prob>chi square				0.000
R square				0.484
Root MSE				6.539

In this regression also, the stock market variables *i.e.*, MCAP and STR came out as statistically insignificant, indicating the limited role of stock markets in influencing the savings rate of the country.

After running the IV regression, we check the validity of the instruments. Following are the results of the test, indicating validity of all instruments used.

Sargan (score) chi2(1) = 2.1087 (p = 0.1465)

Basman chi2(1) = 1.90298 (p = 0.1677)

Section IV: Pooled Regression for Emerging Market Economies

² The F statistic was 3.22, which was higher than the critical value of F(3,71) at 5% L.S (2.7), thus rejecting the null hypothesis of non-significance of coefficients associated with residuals obtained at first stage regression.

This section focuses on the impact of stock market development on savings rate of emerging market economies. The development of stock market is a relatively new phenomenon in emerging market economies and in most of these countries; equity market gained momentum during 80's boosted by significant government intervention. Since the stock market indicator data was available for only 16 emerging market economies, we used a pooled regression model for estimation taking the data for the time period 1990-2012. After doing all usual tests as described in the previous section for the cross-section analysis, we kept the IV regression model of Table III in this case.

Table IV: Instrumental Variable Regression for Pooled Data of EMEs (1990-2012)

Dependent Variable: AS

Sample: 1990-

2012

Periods included: 22

Cross-sections included: 17

Total panel (unbalanced) observations: 312

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.264	5.793	3.671	0.000
AGDP	-0.141	0.048	-2.974	0.003
CAB	0.658	0.081	8.135	0.000
GDPGR	2.379	0.698	3.410	0.001
MCAP	-0.012	0.031	-0.391	0.696
PCGNI	0.000	0.001	0.541	0.589
PCGNI ²	0.000	0.000	-0.680	0.497
RI	-0.085	0.038	-2.260	0.025
SVT	0.079	0.058	1.368	0.172
R-squared	0.556294	Mean dependent var		25.00217
Adjusted R-squared	0.544579	S.D. dependent var		9.993742
F-statistic	47.48557	Durbin-Watson stat		0.438502
Prob(F-statistic)	0			

Here also, both the coefficients associated with stock market indicators came out as statistically insignificant, thus further corroborating the results found in the past studies that stock market indicators do not influence the savings rate of the emerging market economies significantly.

Section V: Conclusions

In this paper, the effect of stock market development on savings is examined in two levels. Firstly, using cross section data for a set of 94 countries and secondly using pooled data for 16 emerging market economies. The statistical analysis suggests that in none of the cases, stock markets exert a statistically significant impact on the savings rate of the country. This study broadly corroborates the findings of the two past studies on the same topic by Masson (1995) and Bosner-Neal *et al* (1999). Also, the results suggest that some of the economic variables like current account balance and GDP growth rate have greater influence on the

savings rate, rather than the stock market variables. These results do not provide empirical evidences in support of finance-led growth theories, especially in the context of emerging economies.

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