

Can Stock Market Development Put Chains on Inflation? A Panel Co-integration Analysis on SAARC Countries

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Abstract: This study investigates the impact of stock market development on inflation in SAARC countries using panel data approach. The estimated results of Panel OLS, FEM model and REM model have revealed that OLS model is not applicable and we have use panel co-integration to find out unbiased and normally distributed coefficient estimates like Kao Residual Co-integration, and Long run estimates FMOLS to find out how stock market development influence inflation. The results of long run estimates FMOLS suggest that market capitalization is decreasing inflation by -0.152%, total value of stock traded is increasing inflation by 0.164% and turnover ratio is decreasing inflation by -0.191% in the long run. Thus, the results suggest that stock market development can help put chains on inflation in SAARC countries by introducing more firms to increase size and volume of share transaction, as they will load to rise in production.

Key words: inflation; stock market development; fully modified OLS; Kao residual co-integration **JEL codes:** E44, O43, E31

1. Introduction

Stock market can be an important part of an economy and its acts as a catalyst. The function of the catalyst is simple, not influence or change but to regulate and accelerate other economic activities. Some theories suggest that the Stock market collects the money and distributes the money in the more productive and efficient sector of the economy (Caporale et al., 2004; Billmeier & Massa, 2009; Cooray, 2010). In addition, stock market can encourage economic growth in a country by attracting people with cash to investment and providing them a platform and creating cash movement from investors to businesses that require capital and share their risk (Levine, 1991; Levine & Zervos, 1996; Rousseau & Wachtel, 2000; Arestis et al., 2001; Enisan & Olufisayo, 2009; Hou & Cheng, 2010).

Hence, it is easy to expect that stock market contribution is just as important as other economic sector because stock market have direct link with the efficient and productive businesses of the economy. Therefore, stock market is the leading economic activity in a country (Pierce, 1884). While the stock market development

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could be the cause of economic development in the country, it is still questionable to say that these factors may follow either positive direction or negative direction but it is also possible that causality will happen in both directions (Bosworth, 1975; Nieuwerburgh et al., 2006).

The South Asian Association for Regional Cooperation (SAARC) countries like Pakistan, Bangladesh, India, Sri Lanka and Nepal are all in developing state and their economic sectors are growing. The stock market are of these countries are also evolving and we need to make sure whether it is a good idea to let it grow freely or do we need to have a regulation to control stock market because there is a chance that stock market can have an impact on inflation.

The purpose of this study is to test whether stock market development has positive or negative impact on inflation and can it help control inflation in the long run or not. For this purpose, we will use data from SAARC (South Asian Association for Regional Cooperation) countries and use panel data to conclude the result of this theory by comparing our finding.

1.1 Impact of Stock Market Development on Inflation

To understand how stock market development is going to impact inflation lets further explain the discussion.

Market capitalization is our first proxy of stock market development, which represents the total size of a market. When an investor wants to invest in stock market, they may look at the returns. The more money investor invest in the company, the company uses the money and high performance lead to higher sale price of stock which benefit the shareholder. The logic behind this is that increased level of activity in the stock market may attract more investors in the market (Daferighe, 2012).

Total value of traded stocks is our second proxy of stock market development and is a real variable because it shows the total number of traded stocks in a stock market during a specific period. When stocks are traded in the stock market, the company uses the money for their operations and growth which can lead to more shares being floated showing stock market development.

Turnover ratio is our third proxy for stock market development. A stock market's turnover ratio measures how often shares change hands. High turnover means that the same share has been bought and sold many times just like cash velocity in an economy, thus shocks are liquid assets and this liquidity makes this indicator just as important for our research.

All the above proxies, market capitalization, turnover ratio and total value of traded stocks are used in this study and since they show different aspect they will have same or different effect on inflation.

1.2 Organization of the Study

This part of the study called as the organization of this study gives the reader a brief introduction of what the research is going to discuss further below in the research. Literature Review section tells about the current and theoretical knowledge about the selection of dependent and explanatory variables. Methodology section contains all the research questions, methods used and the type of data used for this study. Next is estimations, which contains table used in this study and acceptance or rejection of research question hypothesis. Conclusion consists of conclusion, policy implication and limitation in this study.

2. Literature Review

The pattern of the causal effect on the relationship between inflation and stock market development is mixed because some studies has found a positive relationship between stock market and inflation and some studies has found negative relationship whereas no relationship was also found between stock market and inflation.

These studies report a positive link between inflation and stock market in the long run and short run (Dhakal et al., 1993; Abdullah & Hayworth, 1993; Groenewold et al., 1997; Ratanapauorn & Sharma, 2007). A positive relationship between stock market returns on inflation rate was investigated by Choudhry (1998) in four high inflation countries (Argentina, Chile, Mexico & Venezuela) and it was concluded that the stock returns act as a hedge against inflation. Caporale & Jung (1997), found a causal relationship between both expected and unexpected inflation and real stock returns, and found that a positive relationship does exist. Hess and Lee (1999), they claim that the sign of the correlation between stock prices on inflation depends on the nature of the shock creating inflation. According to them negative relationship is due to supply (real output) shocks and positive relationship is due to demand (monetary) shocks. In addition, Graham (1996) discovers a positive relationship between stock returns on inflation.

However, other studies suggest that the relationship between stock price index and inflation is negatively related in the short and long-term inflation because stock market influences the economic activities but more specifically, it influences the industrial activities (Fama & Schwert, 1977; Fama, 1981; Chen et al., 1986; DeTina, 1991; Humpe & Macmillan, 2009). Bakshi and Chen (1996), discuss that a negative correlation between stock prices on inflation has become one of the most commonly recognized practical facts. In addition, Chatrath A., Ramchander S., & Song F. (1997) found negative stocks return on inflation was explained in the Indian economy. The results indicate a partial support to Fama's hypothesis. Zhao (1999) finds a significant negative relationship between stock prices on inflation in Chinese economy. This result is consistent with Fama (1981). Spyrou (2001) examines the relationship between stock returns on inflation rate in Greek by using monthly data from January 1990 to June 2000. The result for the period 1995-2000 show a negative but insignificant relationship, while for the period 1990-1995 there is a significantly negative relationship. Omran and Pointon (2001) use co-integration analysis and error correction model to analyses the impact of the Egyptian stock market on the inflation. The results show that the stock market has a definite negative impact on the inflation in Egyptian. Saleem et al. (2013) has found negative relationship between stock market and inflation for the case of Pakistan because it is an under develop country and when inflation occurs the economy is effected which effects the stock market as well.

Studies like Morley (2002), Pradhan (2011), & Cakan (2013) found existence of bidirectional causality between stock market and inflation because stock market is used as a hedge against inflation. Hardouvelis (1988), found no significant relationship between the two variables.

The study will use panel data because the study contains five countries from SAARC, which are highly connected or influential on each other and for estimation purpose, study will use three proxies of stock market.

3. Methodology

This study has used the time series data of SAARC countries, including on average 22 time periods, making total of 114 observations. The data is taken from World Development Indicators. In addition to it, one control variable money supply.

3.1 Research Objectives & Research Questions

The first objective is to find co-integration relationship between both stock market development and inflation and the second objective of this study is to find out whether there exist any positive or negative impact of stock market development on inflation. Based on the objectives the questions are following:

(1) Do inflation and stock market indicators form long run equilibrium relationship for the selected SAARC countries?

(2) Does this equilibrium show significant convergence for the selected SAARC countries?

(3) Which of these indicators of stock market is able to put chains on inflation in long run for selected SAARC countries?

4. Data Description

This section of the study will discuss whether the data set is normally distributed and whether there is correlation between the variables.

Table 1 Descriptive Statistics						
	CPI	MP	ST	TR	M2	
Mean	3.909	2.620	1.228	3.263	3.797	
Median	3.959	2.730	1.173	3.241	3.778	
Std. Dev.	0.535	1.024	2.100	1.521	0.284	
Skewness	-0.371	-0.480	-0.366	-0.138	0.050	
Kurtosis	2.599	3.118	2.831	2.272	2.820	
Jarque-Bera	3.379	4.443	2.677	2.877	0.200	
Probability	0.185	0.108	0.262	0.237	0.905	

The Table 1 of descriptive statistics is used to check the normality of data series. The normality of data series is tested by using the values of Skewness, Kurtosis and the probability value of Jarque-Bera which shows that data set is normally distributed.

The correlation between the variables is tested in the Table 2 of correlation matrix and in this table there is weak positive correlation between consumer price index and market capitalization, and stock traded, and turnover ratio; there is high positive correlation of consumer price index with money supply.

Table 2 Correlation Matrix					
	CPI	MP	ST	TR	M2
СРІ	1				
MP	0.297	1			
ST	0.301	0.732	1		
TR	0.210	0.366	0.896	1	
M2	0.580	0.639	0.514	0.286	1

4.1 Model

For the estimation purpose, the study will use the stochastic form mentioned in equation (1) below.

 $LNCPI_{it} = \beta_0 + \beta_1 LNMP_{it} + \beta_2 LNST_{it} + \beta_3 LNTR_{it} + \beta_4 LNM2_{it} + e_t$

In this equation (1), all the variables are converted to natural logarithmic form so that all of the variables are converted into linear homogeneous units of percentage which will generate the elasticities as compared to coefficients which are comparable across the equation.

LNCPI = Log of Consumer Price Index

LNMP = Log of Market Capitalization

(1)

LNST = Log of Total Value of Stock Traded LNTR = Log of Turnover Ratio LNM2 = Log of Money Supply

5. Estimation

In this section the econometric estimation of the model will be done. Through these estimates, the proposed hypothesis will be answered to achieve the research objectives. Gujarati (2004) provides the assumptions which should be fulfilled in order to generate reliable estimates using OLS framework. One of the assumptions which is relevant under current nature of long time series dataset is "independent variable values are fixed in repeated sampling"¹ since it cannot be checked for the macroeconomic data by repeating sampling, hence the weak form of the assumptions is that the mean and the variance of the model must be constant. For this unit root test are used to confirm, if the mean and variance are constant, it will mean that the variables are stationary hence OLS will be applicable under such condition.

AT LEVEL										
	Levine, L	in & Chu	IM, Pesa	ran & Shin	ADF F	isher	PP Fi	sher	Had	lri
	Cal-Value	P. Value	Cal-Value	P. Value	Cal- Value	P. Value	Cal- Value	P. Value	Cal-Value	P. Value
LNCPI	1.01	0.84	4.30	1.00	1.76	0.99	1.90	0.99	7.97	0.00
LNMP	-1.24	0.10	-0.99	0.16	13.45	0.20	13.49	0.20	4.93	0.00
LNST	-1.70	0.04	-1.18	0.12	14.17	0.17	18.58	0.05	5.35	0.00
LNTR	-2.42	0.01	-1.94	0.03	18.70	0.04	27.39	0.00	3.95	0.00
LNM2	-0.08	0.47	1.09	0.86	5.77	0.83	5.78	0.83	6.95	0.00
AT FIRST	DIFFERENC	Ъ								
DLNCPI	-4.56	0.00	-3.50	0.00	30.21	0.00	31.17	0.00	0.45	0.33
DLNMP	-9.15	0.00	-7.95	0.00	69.74	0.00	71.20	0.00	-0.96	0.83
DLNST	-6.75	0.00	-6.49	0.00	55.56	0.00	61.37	0.00	1.27	0.10
DLNTR	-4.20	0.00	-4.92	0.00	47.17	0.00	67.90	0.00	2.39	0.01
DLNM2	-6.34	0.00	-5.87	0.00	49.47	0.00	49.42	0.00	-0.60	0.73

Table 3 U	nit Root	Test
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Table 4 Kao R	Residual Co-integration Test		
Augmented Diskey Fuller	t-Statistic	Prob.	
Augmented Dickey Funer	-3.509	0.000	
Null Hypothesis: No Co-integration			

Table 5	Long Run	Estimates	FMOLS
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Dependent variable: Consumer Price Index		
Variable	Coefficient	Prob.
Market Capitalization	-0.402	0.000
Total Value of Stock Traded	0.530	0.000
Turnover Ratio	-0.525	0.000
Money Supply	0.642	0.000
R-Squared	0.437	

¹ Assumption 2, Ch. 2 (Gujarati, 2004).

The estimated values of Table 3 are used to check whether there exist unit root problem in the model. The estimated values at level suggest that there is mixed level of co-integration in the model and at first difference the probability value of all the variable is less than 0.05 accepting the alternative hypothesis that there does not exist problem of unit root in the model. So we now have to make sure, if there is co-integration.

The Table 4 is used to test whether there exists co-integration in the model. The probability values of Kao residual co-integration test suggests that there exist long run relationship between the variables in the model (Kao, 1999). The estimated values of FMOLS model shown in Table 5 suggest that there is significant long run relationship between the variables which is also suitable for inference as the residuals are normal as suggested by the JarqueBera Test.

Here, if market capitalization increases by 1%, it will decrease inflation by -0.402%. If total value of stock traded increases by 1%, then it will increase inflation by 0.530%, inflation will decrease by -0.525%, if turnover ratio increases by 1% and If money supply increased by 1%, it will increase inflation by 0.642% which is fulfilling with the quantity theory of money.

The advantage of the FMOLS is that it provides country specific intercepts, which represent the average influence of all other variables, which are not included in the model on the Inflation (Phillips & Hansen, 1990). Here in Figure 1, the intercept values are shown, since all values are positive hence, they indicate that all other excluded variables are jointly contributing in increase in inflation on average of all the included time periods. Since there is not threshold, which can show how high, or low it is, nonetheless it can still be compared across the countries. Here we can see that in terms of relative policy, India and Pakistan have strict policy to control inflation as compared to other countries in the sample. Here the higher value shows the average upward pressure on the inflation considering this model, certainly it might not be the actual inflation when economy might be trying to control is as per some other model not incorporated in this study.





Since long run model has been constructed, now this study has used residuals of the long run FMOLS model to form Error Correction Model to generate the short run coefficients. The estimated results of Table 6 shows short run estimates using OLS and is suggesting that there exist convergence in the model as the coefficient of ECM(-1) is negative and significant (Bannerrje et al., 1998). The reason behind slow convergence could be that the stock market in the SAARC countries is not mature rather it is in its developing, hence it is taking more time to influence inflation though the stock market development.

Dep variable: Consumer Price Index							
Sample Size: 104							
Variable		Coefficient		Prob.			
D(LNMP)		0.010		0.419			
D(LNST)		-0.013		0.448			
D(LNTR)		0.010		0.527			
D(LNM2)		-0.148		0.004			
ECM(-1)		-0.028		0.031			
С		0.080		0.000			
R-Squared	0.625	Prob (F-Statistics)	0.000	F-Statistics	4.060		

Table 6 Short Run Estimates OLS

6. Conclusion

The stock market development is treated as an important part of an economy because stock market development can improve the productive sector of the economy. Stock market development can help control inflation because when an investor has enough money to spend, they come to the stock market. The stock market gives a platform to the company and investor, so that the saving from investor are properly utilized. When investment from household is provided to the company through stock market, the company has two choices to make, either spend the money on expansion of business to meet the demand hence inflation is decreased or product differentiation by changing the appearances of the product to make it more attractive and increase in price hence inflation is increases. For SAARC countries, this research is important because these countries are in developing state and inflation can make it difficult for any country in development process. If stock market development can help reduce inflation in SAARC countries, then it can create a big difference because first, it will help industries to grow and generating employment. This scenario is possible, if there is negative relationship between stock market development and inflation. However, if relationship is positive then this research is still helpful in a way that it will suggest that companies in stock market are using money not to increase production but for debt management.

The study has used Kao Residual Co-integration, Long Run Estimates using FMOLS and Short Run Estimates using OLS, to check if there is a long run relationship of stock market development on inflation, the results have suggest that there is long run and short run of stock market development on inflation.

Market capitalization means the size of the market and is reducing inflation in the long term, which means that companies are using money to increase production to meet the demand in the economy. Total value of stocks traded is increasing inflation because the new firms are using stocks to decrease their debt and not for expansion of businesses. Therefore, if restrictions are imposed on new firms to stop them trading for deficit financing then number of traded stocks can be reduced; hence, inflation can be controlled in the long term. Turnover ratio is the velocity of shares changing hands in the stock market and is reducing inflation in the long term. All of these proxies show the effect of stock market development on inflation. The control variable money supply is increasing inflation as proposed by Quantity Theory of Money. However, the household with saving is investing their money and some of that idle saving is used to buy stocks in the stock market. The firms are using that money for expansion of production capacity to meet the demands, which is causing deflation in the economy. The study suggests that even though we are able to prove that there is co-integration among these variables, but the effect of

stock market development on inflation is weak when we see the SAARC countries altogether which maybe because of the fact that stock market development in these countries are not potent enough to influence the goods market.

6.1 Policy Implication & Limitations

The findings from our estimation results suggest some possible policies for our model. The results of Kao Residual, Long Run Estimates FMOLS and Short Run Estimates OLS have suggested that there is long run, short run in the model but also there is convergence, which suggest that this model can be used to achieve the target of reducing the inflation rate through stock market development.

The results shows that if the size of the stock market is increased through increase in the market capitalization then it helps to reduce inflation at the rate of 0.15%, this is because the size of the stock market increases when firms performs better or increase its capacity which consequently lead to reduction in the prices. Here policy makers can promote the big firms to participate in expanding the businesses which will ultimately lead to higher production, higher employment and through the consequence of outcome presented in this study lower inflation.

According to the results, if only number of stocks increase, which happens when new firms enter into the listing of stock market, it will lead to increase in the inflation probably most of the companies when they first enter into the market their objective is to finance their existing deficit (paying off the debts) using the investment received from stock sales. Which is because the counties in the sample are developing with immature stock markets, companies use this source as the last resort to sale portion of the business to get the resources. Here policy makers can restrict firms to issue asset based shares only.

Turnover ratio as an indicator of stock market development represent the rate at which shares are changing hands, showing the times with the shares are sold and resold. Shares usually change hands frequently if its price is changing, if the price increases then people become interested in investing in the stock market hence more firms are benefited by receiving idle savings of the household. Policy makers can improve the sale and purchase procedure of the shares that wider net of investors can be tapped in.

The limitations this study highlighted was that when the data was collected from all seven countries, the data for Afghanistan, Bhutan and Maldives was not available, so the study had to be conducted for only five countries. Secondly, if a disaggregated analysis of the stock market is done to see which firm is selling shared for expansion and which is selling for differentiation can yield more in-depth outcomes.

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