



Identifying Spillover Effect and Bubble in Bangladeshi Asset Markets: An Analysis of Stock Market and Real Estate

Sisili Rahman^{1*}, Biplab Das², Tazrina Farah³

¹Department of Business Administration, University of Asia Pacific, Bangladesh, ²Venture Investment Partners, Bangladesh,

³Finance, University of Dhaka, Bangladesh. *Email: sisili_du@yahoo.com

Received: 04 August 2018

Accepted: 16 October 2018

DOI: <https://doi.org/10.32479/ijefi.7037>

ABSTRACT

This paper seeks to identify the spillover effect of remittance and private sector credit disbursement, on the capital market and real estate of Bangladesh during the period of 2003–2013. The paper applied vector auto regression and cholesky factorization to construct spillover index through covariance matrix. The remittance and private sector credit were taken as input variables where market capitalization and real estate sector contribution to gross domestic product were taken as outputs. The model tried to identify asset bubbles using calculated index scores. Both of the asset classes showed getting similar degree of influence by the inputs as their Return spillovers were around 40% and volatility spillovers were around 25%. The score for capital market indicated a bubble and the subsequent crash of 2010–11. As similar scenario was seen in case of real estate, it suggests that real estate too was experiencing a bubble which might lead to a crash soon.

Keywords: Asset Bubble, Spillover Index, Vector Auto Regression, Stock Market, Real Estate

JEL Classifications: G1, G15, G17, G29

1. INTRODUCTION

In every economy there is a strong linkage among the asset classes. As the correlation between asset classes can change dramatically, the investors become alert to effectively diversify the portfolio. Behavioural pattern of investors also influence the movement of a particular asset class. Most of our investors have no financial ground to analyse the capital market issues. To them, capital market is considered as the easiest medium to double or triple their investment within a very short time. As the attraction is strong towards the market, there is enough flow of investment into it. Unfortunately very few people realized that the capital market was experiencing an abnormal price rise in 2010 and thus the crash occurred.

Spillover effects are the economic externalities of specific economic activities or processes that influence those who are not related directly. Thus it is a simple way that seeks to identify

any possible interrelation among two or more unrelated things. And by judging that interrelation a spillover index can be devised which is a sufficient quantitative measure of interdependence among economic assets. The methodology for building spillover index produces gross values, which signifies spillover from one asset class to another, and net spillover values, which signifies the variance in the gross spillover between any two classes.

Observing return spillover, one can find a cycle that evolves gradually but there is no burst, whereas volatility spillover shows clear burst that are closely related to economic events. Volatility spillover arises due to the interdependence of different asset classes or economies. It is often known as contagion effect. As the asset classes are linked both in domestic market and globally, this interdependence creates significant shocks. That is, volatility spillover or contagion signifies the spread of market disturbances from one market to another, a manner observed through co-movements in stock prices, real estate prices and capital flows.

This paper is concerned with the return and volatility spillover or shocks to real estate sector and capital market of Bangladesh arising from two major macroeconomic parameter remittance and private sector credit disbursement. The capital market itself is not always responsible for all the shocks that occur. Because the return or volatility experiences some shocks that are coming from other macroeconomic parameters which are denoted as spillover effect.

When spillover studies first became prevalent, attention was mostly given to capital market. From there, emerging market equity began to capture the eyes of academia. Real estate is one of those. It only needs to glance at the cranes lining the skyline of any city to see how pivotal a role the sector plays to the greater economy. But few studies are dedicated to show the actual picture of the market.

Very few of the academicians have marked the fact that real estate is not directly market traded and an unproductive sector. The key issue of this paper is current the housing bubble. The major association of real estate organizations, Real Estate and Housing Association of Bangladesh, with current members of 1004 companies is continuously working to promote this industry both in local and NRB markets. One of the prominent macroeconomic variables was available credit that was granted to private sector with easy condition to invest in real estate with political motive to show gross domestic product (GDP) higher than the past years. Remittance was another crucial source of investment.

The major contribution of this study is the construction of spillover indices for two major asset markets of the country which would provide early indications regarding asset bubbles and thereby providing inputs for making strategies to manage them. Secondly, the study used data from the year of 2003 to 2013 within which both the stock market and the real estate sector experienced high growth taking credit disbursed to the private sector and remittance as inflows. Between these two markets, the stock market crashed at the end of 2010 and it provides signals about the real estate as well. Finally, this study can provide valued insights to the policy makers of these two markets and also guidelines for the upcoming research works.

The rest of the paper is structured as; section two contains the literatures review which is followed by the subsequent section containing analytical portion of the study. Section three summarizes the methodology and the next section explains the data and variables used in the study. The final section elaborates the major findings of this study and concludes with some guidelines.

2. LITERATURE REVIEW

There is a diverse amount of literature on the stock market integration and information spillover (both in terms of return and volatility) across the markets. Some studies have considered only the return spillover across the markets, while some other studies examine cross border spillover. Linear aggregation is used to establish spillover index and in this paper the same methodology has been followed to demonstrate the contagion effect among various asset classes. Janakiraman and Lamba (1998), Elyasiani and Mansur (1998), Gilmore (2002), Nath (2003), Greenberg et al. (2003), Bessler and Yang (2003), Alexandr (2008), etc. are some

of the important studies where the examination of return spillover across the markets has been the only consideration.

By applying the vector auto regression model, Janakiraman and Lamba (1998) and Hsiao (2003) have revealed the possible interrelation between the stock markets in the Pacific-Basin. Diebold and Yilmaz wrote a number of papers on spillover index. Starting from the equity market spillover in US, they focused on how to measure financial asset return and volatility application to global equity market (2009) and then it was extended by their next paper which stresses on asymmetry volatility spillover (2013).

Neither US stock market nor central European market is co-integrated in the long run (Gilmore 2002). Steven et al. (2005) found out the spillover effect among various asset classes through gold, stock and bond. This paper focuses on measurement of spillover in equity and real estate returns and equity and real estate return volatilities.

Longin and Solnik (1995) found that international equity returns increased in correlation from 1960 to 1990. According to Bekaert and Harvey (2000; 2003), international diversification is resultantly becoming ever more elusive.

Financial contagion is evident during any major financial and economic crisis (King and Wadhvani 1990, Lee and Kim 1993, and Calvo and Reinhart 1996). By examining contagion effect in light of the Mexican crisis in December 1994 Calvo and Reinhart (1996) enriched the set of theoretical sources of contagion.

Eichholtz et al. (2009) explain that real estate service providers have gone multinational and new financial instruments give foreign investors nearly the same footing as local investors. Further explanations of Eichholtz et al. (2009) point to the internationalization of real estate providers, greater market transparency, deconstruct political barriers, and financial liberation to contribute to foreign direct investment. This lends support to the argument that markets should display co-movements.

In the current environment, for example, spillover from credit markets to stock markets are of obvious interest. In all cases, moreover, one could also attempt to assess the direction of spillovers as in Diebold and Yilmaz (2009,2011).

3. DATA, INPUTS AND VARIABLES

This paper includes information about remittance flow to Bangladesh, credit granted to private sector, stock market capitalization and contribution of real estate sector to GDP.

3.1. Market Capitalization (DSE)

The latest value for Market capitalization of listed companies (current US\$) in Bangladesh was \$17,479,190,000 as of 2012. Over the previous 24 years, the value for this indicator fluctuated between \$269,000,000 in 1991 and \$23,546,000,000 in 2011. Market capitalization of listed companies (% of GDP) in Bangladesh was 21.05 in 2011. Its highest value over the past 23 years was 21.05 in 2011, while its lowest value was 0.87 in 1991. Market capitalization is the share price times the number of shares

outstanding. Listed domestic companies are the domestically incorporated companies listed on the country’s stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Data are in current U.S. dollars.

3.2. Private Sector Credit Disbursement

A significant amount of credit was granted to private sector. But the credit was used in elsewhere than those were granted for. The number of actual borrower was less. Figure 3 shows a quick glance of the data. The credit bubble triggered the asset price bubble in the country.

3.3. Real Estate Sector Contribution in GDP

The contribution of real estate sector to the country’s GDP has also shown a upsurge just like the stock market. This unproductive sector had a price bubble and now is on the way to burst.

3.4. Remittance

For about two decades remittance has been contributing around 35% of export earnings. Moreover, it is greater than foreign aid and thus helps in lessening dependence on foreign aid.

4. METHODOLOGY AND MODEL SPECIFICATION

This research is a secondary research since the research has been done on secondary data mainly collected from different publication of Bangladesh Bank, the central bank of Bangladesh. Major four variables have been selected to conduct the research. Market capitalization of stock market, contribution of real estate to country’s GDP were the outputs while remittance and credit granted to private sector were considered as input variables.

4.1. Vector Auto Regression

VAR model describes the endogenous variables as a linear function over the same sample. The variables are set in a $k \times 1$ vector y_t , containing i th element, y_{it} , the time t observation of the i th variable.

Let,

$$X_1 = \frac{\text{Real Estate}}{\text{Equity Market Capitalization}}$$

$$X_2 = \frac{\text{Remittance}}{\text{Credit to Private Sector}}$$

For each asset I (real estate, equity market capitalization), the shares of its forecast error variance coming from shocks are added to variables j (remittance, credit to private sector), for all $I \neq j$, and then we add across all $i = 1, \dots, N$.

4.2. Variance Decomposition (Cholesky Factorization)

By using variance decompositions it is easy to find the portion of the 1-step-ahead error variance in forecasting X_1 occurred due to shocks to X_1 and shocks to X_2 . And similarly, the portion of the 1-step-ahead error variance in forecasting X_2 due to shocks to X_1 and shocks to X_2 has also been found.

We use variance decompositions to detail how each of these two economic parameters contributed to the return and volatility of over the time horizon. In case of return spillover calculation, contribution of both private sector credit and remittance continuously increased. Increasing rate of private sector credit was a lot more than the rate of remittance (Diebold and Yilmaz, 2009).

In the initial years, contribution from private sector credit increased a lot and within the same time horizon, private sector credit disbursement grew most. Later on it slowed down. In the last part of the time horizon, when the stock market is already crashed and contractionary monetary policy measures are taken, the influence from private sector credit disbursement became flat. On the other hand remittance kept its contribution to real estate sector in a steady rate. Even stock market crash didn’t influence it much. But again, its influence in the stock market spillover was more intensive. Initially it slowly grew and then flattened with time.

In case of volatility spillover, the contribution scenario was somewhat different. Contribution from remittance started growing and kept its increasing intact even after the stock market crash. But the contribution was more in real estate sector. On the other hand contribution from private sector credit started falling although the falling rate wasn’t that high. In fact it became completely flat in the second half of the time horizon. To sum up, from the tables of variance decomposition we find important similarities between returns and volatility spillover of housing markets and stock market that have not been previously recognized.

4.3. Index Calculation

There are two possible spillover for our simple variable example: x_{1t} shocks that effect the forecast error variance of x_{2t} (with contribution to $a_{0,21}^2$) and x_{2t} shocks that effect the forecast error variance of x_{1t} (with contribution to $a_{0,12}^2$). Hence the total spillover is $a_{0,12}^2 + a_{0,21}^2$. The total spillover can be converted to an easily interpreted index by expressing it relative to total forecast error variation which is $a_{0,11}^2 + a_{0,12}^2 + a_{0,21}^2 + a_{0,22}^2 = \text{trace}(A_0 A_0')$ and expressing the ratio as a percent as Spillover index (Diebold and Yilmaz, 2009).

$$S = \frac{a_{0,12}^2 + a_{0,21}^2}{\text{trace}(A_0 A_0')} \times 100$$

The ij th entry in the table is the estimated contribution to the forecast error variance of variable i (Tables 1-4) coming from innovations to variable j (Table 1-4). Hence the off-diagonal column sums (labelled contributions to others) or row sums (labelled contributions from others), when totalled across variables, give the numerator of the spillover index.

Similarly, the column sums or row sums (including diagonals), when totalled across variables, give the denominator of the spillover index. Spillover table provides the input-output decomposition of the spillover index. Now it is estimated that the model uses 120 months of rolling samples, and it is assessed the extent and nature of spillover fluctuation over the period via series of spillover indices.

Table 1: Return and volatility

Return (%)	Market volatility (%)	Return of remittance (%)	Volatility of remittance (%)	% change of private credit	Volatility of private credit (%)	Real estate return (%)	Real estate volatility (%)
26.87	8.32	11.32	6.54	7.32	2.98	21.45	26.32
60.87	24.04	-0.53	8.38	40.60	23.53	32.98	8.15
19.60	29.18	22.77	16.48	10.88	21.01	13.89	13.50
2.72	11.94	9.28	9.54	6.81	2.88	-36.90	35.91
-2.03	3.36	26.62	12.26	9.46	1.87	69.17	75.00
30.44	22.97	9.58	12.05	8.21	0.88	-27.77	68.55
45.18	10.42	8.94	0.45	7.57	0.45	12.23	28.29
58.61	9.50	9.72	0.55	8.12	0.38	27.02	10.46
30.17	20.11	29.89	14.27	12.01	2.75	-18.4	32.12
17.07	9.26	0.78	20.58	12.44	0.30	42.88	43.33
6.70	7.33	15.68	10.53	6.24	4.38	3.96	27.52
43.91	26.31	6.87	6.23	8.82	1.82	-25.6	20.92
57.62	9.69	-1.15	5.67	11.18	1.67	51.59	54.60
34.81	16.13	3.15	3.04	13.90	1.92	-32.3	59.38
-13.13	33.90	13.25	7.14	12.33	1.11	23.70	39.66
-1.54	8.19	4.47	6.20	9.12	2.27	18.02	4.02
-10.14	6.08	20.32	11.21	9.10	0.01	-0.14	12.84
-1.71	5.96	8.56	8.32	7.90	0.85	22.74	16.18
-4.24	1.79	-7.99	11.70	4.46	2.43	11.74	7.78
10.24%	10.24%	-4.97	2.13	6.24%	1.26%	-21.1	23.23

Table 2: Equity market return spillover

Spillover	Market return	Return of Pvt. credit	Return of remittance	Contribution from
Market return	82.41	2.51	15.08	17.59
Return of Pvt. Credit	50.10	16.61	33.29	83.39
Return of remittance	28.12	3.11	68.78	31.22
Contribution to	78.21	5.61	48.37	132.19
Total	160.63	22.23	117.15	300.00
				44.06%

Table 3: Real estate return spillover

Spillover	Return of real estate	Return of Pvt., credit	Return of remittance	Contribution from
Return of real estate	69.82	7.76	22.42	30.18
Return of Pvt., credit	28.12	25.32	46.56	74.68
Return of remittance	11.13	6.38	82.49	17.51
Contribution to	39.25	14.14	68.98	122.37
Total	109.07	39.46	151.47	300.00
				40.79%

Table 4: Equity market volatility spillover

Spillover	Market volatility	Volatility of Pvt., credit	Volatility of remittance	Contribution from
Market volatility	95.25	2.45	2.30	4.75
Volatility of Pvt., credit	10.51	54.21	35.28	45.79
Volatility of remittance	4.77	17.04	78.19	21.81
Contribution to	15.28	19.49	37.58	72.35
Total	110.53	73.70	115.77	300.00
				24.12%

5. EMPIRICAL EVIDENCE: BANGLADESH CONTEXT

In capital market of Bangladesh the stocks were overpriced which gave birth of a bubble in 2010. Investors found that stocks can be a better investment as it brings profit quicker than any other asset classes. This asymmetric information led the stocks to become abnormally over-priced. This increase in demand of stocks took its price to the skyline (even 1000% more than the underlying value) and at that time bubble matured.

Investing in capital market by borrowing from banks, taking margin loans and even investing remittance made this bubble fluffier. Then the price level went beyond the purchasing power of the investors. There was no circuit breaker to control the fluctuation of price. As a result price increased abnormally because of excess demand in the market. The market was manipulated to a great extent and there was not enough regulation to control it.

Bubble in real estate sector was the result of various facts. Firstly, real estate development was concentrated on some specific areas and

products. Some false attractive advertisement like “last flat for sale” once created an artificial demand. Both demand and supply shifted rightward. But by the end of the day, this development grew to the extent where the supply crossed the demand in many times. Flats’ price and house rent touched the skyline. The sector became overrated. Remittance and easy bank loans boosted up this bubble even bigger.

Banks grant housing loan to the developers and buyers of the flats. On the other hand, credit that are granted to private sector are often invested in capital market or real estate both of which are unproductive sector. So when these two asset classes started facing crisis, all the money invested got stuck. Some corrective measures were taken by the government in the monetary policy statement (MPS) 2011, 2012, 2013, 2014; where it is noticed that lending rate were increased to discourage private sector borrowing. Some other contractionary measures were taken as well.

The surge in the asset bubble was made possible by the fact that there were misplaced incentives on all sides both from government to individual level. Perhaps these were not the only factors of this crisis but worked as strong catalysts for asset bubble. This paper brings some of those issues into focus:

- There was information asymmetry among the general individual investors that equity market is the place to multiply their investment. As a result those who are totally uneducated about the market were also encouraged to participate pulling all their savings as investment in this wholly unproductive sector.
- The next area where misplaced incentives were evident was in the appraisal process. The stock and real estate property were presented as high priced assets which were actually over-priced.
- Bangladesh government urged the bank to provide credit on simple conditions to private sector to show a higher GDP. But the borrowers invested that borrowed amount in capital market, sometime in real estate as well though the purpose of those loans were mentioned in otherwise in the credit documents.
- Some well known asset management companies attracted the foreigners and NRBs with false information about the quick return that can be earned from real estate and equity market. So huge amount of foreign currency and remittance were two

of the most potential sources of investment in real estate and equity market.

The bubble began to unravel after house prices peaked and began to turn down after 2011. The bigger the bubble becomes the less the purchasing power is. There will be excess supply than demand. Then some large institutional investors speculated the market to lower the price. Panic is created among individual investors which result in negative demand. Abnormal sell pressure is made which is synthesized. Then the bubble burst. Though market made some corrections the stock price happened to fall to underlying value even below the underlying value as there were no circuit breaker to limit the price fluctuations.

6. RESULTS AND INTERPRETATION

6.1. Descriptive Statistics

From Tables 5 and 6, the value of the mean reports the arithmetical average of the variables which are included in the study. The minimum and maximum values indicate the lower and the highest value of the variable. The median indicate numerical value separating the higher half of a data sample. The standard deviation (SD) exhibits how much variation or dispersion exists from the mean. A low SD indicates that the data points are inclined to be extremely close to the mean; while high values of SD indicates that the data set is broaden out over a large range of values. The variance represents how the random variable is distributed near the mean value. Low variance indicates that the random variable is distributed near the mean value. High variance indicates that the random variable is distributed far from the mean value.

6.2. Data Consistency Analysis

For the analysis of consistency of data, correlation matrix among the variables is shown. As we know correlation is the measure of determining any statistical dependency of involving. Correlation coefficient is sensitive to only linear relation between the variables. It measures the degree of correlation. But correlation does not imply causation that means correlation does not show any causal relation between the variables.

Table 5: Real estate volatility spillover

Spillover	Real state volatility	Volatility of Pvt., credit	Volatility of remittance	Contribution from
Real estate volatility	92.98	0.17	6.86	7.02
Volatility of Pvt., credit	2.01	63.52	34.47	36.48
Volatility of remittance	28.17	11.65	60.17	39.83
Contribution to	30.18	11.82	41.33	83.32
Total	123.16	75.34	101.50	300.00
				27.77%

Table 6: Descriptive statistics of half yearly return

Statistical parameter	Market cap (%)	Real estate (%)	Remittance (%)	Credit to Pvt., sector (%)
Mean	20.60	9.45	9.33	10.63
Median	18.33	13.06	9.11	8.96
SD	23.89	29.29	10.09	7.46
Skewness	33.23	7.58	38.30	371.12
Kurtosis	-114.93	-57.26	-21.43	1531.94

SD: Standard deviation

Table 7: Descriptive statistics of half yearly volatility

Statistical parameter	Market cap (%)	Real estate (%)	Remittance (%)	Credit to Pvt., sector (%)
Mean	12.26	28.13	8.43	1.64
Median	9.26	23.23	7.14	1.67
SD	9.64	18.68	5.08	1.19
Skewness	151.40	48.48	131.05	102.14
Kurtosis	166.68	-100.04	257.01	205.93

SD: Standard deviation

Table 8: Correlation matrix with market capitalization

	Market cap	Remittance	Credit to Pvt. sector
Market cap	1		
Remittance	0.868071593	1	
Credit Pvt.	0.735876987	0.779469083	1

In Tables 7 and 8 we can observe that remittance inflow to Bangladesh, credit provided to private sector and equity market capitalization are positively and highly correlated. Correlation between market capitalization and remittance is 0.86807, market capitalization and private credit is 0.7358 and remittance and private credit is 0.779469, which are indication of the highly positive correlation.

When we analysed the correlation between real estate, remittance and private credit it showed the following result which close enough to 1. Correlation between real estate and remittance is 0.9674, real estate and private credit is 0.9799 and remittance and private credit is 0.944591143, which are indication of the highly positive correlation.

As the correlation coefficients are almost close to one with a positive notion, so the data set is consistent and the chosen variables are appropriate to run the spillover index.

6.3. Return and Volatility Calculation

Return is calculated based on simple percentage change in values. The best measure of volatility is the SD. SD is a statistical term that measures the amount of variability or dispersion around an average. SD is also a measure of volatility. Generally speaking, dispersion is the difference between the actual value and the average value. The larger this dispersion or variability is, the higher the SD. The smaller this dispersion or variability is, the lower the SD. Chartists can use the SD to measure expected risk and determine the significance of certain price movements. Volatility is calculated with the SD. But it could be also done with natural log if the high and low value of every month was available (Table 9).

From the index values listed in Table 1, we can see the similarities between the return spillover indices among the stock market and real estate market. Same is seen in case of volatility spillover index. The indices implies that the economic parameters that are used in this research have influenced the change and dynamics of the two observed markets more or less in a similar way. Variance shares are the fractions of the 1-step ahead error variance in forecasting x_i due to shocks to x_j , for $i = 1, 2$ and cross variance shares, or spills over to be the fractions of the 1-step ahead error variances in forecasting x_i due to shocks to x_j , for $j = 1, 2; i \neq j$.

Here it is noticeable in Table 1, that credit to private sector has a contribution of 2.51% to return of stock market, where remittance is responsible for 15.08% and 82.41% shocks are coming from the equity market itself. 50.10% return of equity market is coming from return of private sector credit, 28.12% for return on remittance. At the same time credit to private sectors has a contribution of 3.11% to return on remittance. Remittance is contributing 33.29% to private sector credit and 15.08% to equity market. The contribution from the particular sector itself are 82.41% for equity market return, 16.16% for credit to private sector and 68.78% for return on remittance.

From Table 2, Real estate sector has 28.12% contribution to private credit, 11.13 to remittance return. Return from the credit to private sector is responsible for 7.76% return of real estate and 6.38% for return on remittance. Remittance is contributing 22.42% to real estate return and 46.56% to private credit sector return. Now let's see the extent of contribution to return to a specific sector coming from the sector itself. For real estate it is 69.82%, credit to private sector is 25.32% and return on remittance is 82.49%.

From Table 3, capital market has 10.41% contribution to volatility of private credit, 4.77% to remittance volatility. Volatility of the credit to private sector is responsible for 2.45% volatility of capital market and 17.04% for volatility of remittance. Volatile effect of remittance is contributing 2.30% to equity market volatility and 35.28% to private credit sector's volatility. Then it was tested that what is the extent of volatility effect to a specific sector coming from the sector itself. For capital market it is 95.25%, credit to private sector is 54.21% and return on remittance is 78.19%.

From Table 4, real estate sector has 2.01% contribution to volatility of private credit, 28.17% to remittance volatility. Volatility of the credit to private sector is responsible for 0.17% volatility of real estate and 11.65% for volatility of remittance. Volatile effect of remittance is contributing 6.86% to real estate volatility and 34.47% to private credit sector's volatility. Now let's see the extent of volatility effect to a specific sector coming from the sector itself. For real estate it is 92.98%, credit to private sector is 63.52% and return on remittance is 60.17%.

6.4. Covariance Matrix and Linear Aggregation

Focusing on the contribution of the parameters in return and volatility spillover of two markets we can use the covariance matrix to build our desired index. To do so linear aggregation model was used that gives a standard index score which shows a logical and meaningful interpretation. Linear aggregates enable to determine the relative weights on the individual contribution of the return/volatility of each data segment. In addition to that it becomes quite easier to compare the index values of the two

Table 9: Correlation matrix with real estate

	Real estate	Remittance	Credit to Pvt., sector
Real estate	1		
Remittance	0.967461409	1	
Credit to Pvt., sector	0.979934948	0.944551143	1

Table 10: Covariance matrix

Indices	Index value
Stock market return spillover index	44.06
Stock market volatility spillover index	24.12
Real estate market return spillover index	40.79
Real estate market volatility spillover index	27.77

markets and then deriving strategies about how the spillovers of both of the markets can be managed. Index values that was obtained after linear aggregation are given in Table 10.

The key substantive result comes from the Tables 1-4 of the various cross-variable spillovers into a single Spillover Index for the overall data sample is around 40% for return of both the assets and around 25% for volatility of both the assets (Table 10). Here, the thing that is highly noticeable is that, a similar outcome is found from both asset classes spillover which denotes that economic parameters influenced both of the markets in a similar manner.

In a more general sense, the people in Bangladesh find these two sources as most suitable to their investment preference. As it has been mentioned several times in this report that people in Bangladesh are more short term oriented than being a value investor. They hardly know any proper valuation technique and they are reluctant about it. As the market is pretty much rumour driven, it is quite easy to manipulate demand supply scenario in Bangladesh.

Whatsoever, as a consequence, if people becomes successful to save some money they usually do not go for productive sectors rather their money gets caught in these two markets. So called future safety and short term are the prime reasons behind it. Sometimes these two markets work as substitutes of each other and sometimes they just go hand in hand. As a consequence, the driver economic parameters have same type of impacts on both of them. As the stock market is more dynamic and more volatile, the bubble builds up easily and much earlier to the real estate market. In case of Bangladesh bubble forming and bursting in real estate sector occurs more slowly and often it remain quite unnoticed to the common people unlike the stock market.

7. CONCLUSION AND RECOMMENDATIONS

The lack of any integrated or well-coordinated mechanism to monitor different asset prices, to scrutinize the magnitudes of trends, and circulate meaningful information about those analyses perhaps have been providing individual real estate property owners into a sense of complacency during the formation of the bubble. This is just a mere reflection of what happened in case of stock market. People back then were too confident about the market's

bullish attitude to be concerned about a potential bubble. Same type of denial attitude is prevalent still now for both of the markets.

Not only the general investors but also regulators were too slow to respond to the vulnerabilities of the credit bubble. Government policy didn't work the way it should have worked. In addition to that, irresponsible remarks from some regulatory officials made investors confused and thus drove the market crazy in 2010–11 stock market crash. The same thing is happening in case of real estate market as well.

The newspapers regularly publish the latest stock market index news along with some other data facts. However, the information fails to meet its purpose as the investors in general fails to use the information to scale the consequences. Sophisticated evaluators, at least those with state of the art valuation models and mechanisms, do not need to be inactive observers of market trends.

As a very few do, they could circulate analysis reports on the scenario of various segments of both the real estate and stock market, give an overview with predictions, and give warning of risks. In Bangladesh a good number of institutional investors circulates analysis reports but they rarely serve their purposes. But in case of real estate market, hardly a few real estate developer company publishes such reports. The local dailies provide daily market commentary for stock market but they don't give any insights for the investors. And in case of real estate market, there are no such things except for some random newspaper articles.

So there surely remains a requirement for effective studies based on the results of which steps can be taken to make investors aware of the things they should be aware of. It's definitely going to be a lengthy process but it has to be started immediately to make both of the markets more effective. Consequently investors would be more prudent in building up their portfolios of investments and the markets will finally serve their purposes.

REFERENCES

- Alexandr, C.C.E, Michel, K. (2008), Stock market integration and the speed of information transmission. *Czech Journal of Economics and Finance*, 58(1-2), 2-20.
- Alizadeh, S., Brandt, M.W., Diebold, F.X. (2002), Range-based estimation of stochastic volatility models. *Journal of Finance*, 57, 1047-1092.
- Bekaert, G., Harvey, C.R. (2000), Foreign speculators and emerging equity markets. *The Journal of Finance*, 55(2), 565-613.
- Bekaert, G., Harvey, C.R. (2003), Market Integration and Contagion (No. w9510). National Bureau of Economic Research.
- Bessler, D.A., Yang, J. (2003), The structure of interdependence in international stock markets. *Journal of International Money and Finance*, 22(2), 261-287.
- Calvo, G.A., Leiderman, L., Reinhart, C.M. (1996), Inflows of capital to developing countries in the 1990s. *Journal of Economic Perspectives*, 10(2), 123-139.
- Caporale, G.M., Pittis, N., Spagnolo, N. (2006), Volatility transmission and financial crises. *Journal of Economics and Finance*, 30(3), 376-390.
- De Santis, G. (1997), Stock returns and volatility in emerging financial markets. *Journal of International Money and Finance*, 16(4), 561-579.
- Diebold, F.X., Gunther, T.A., Tay, A.S. (1998), V Evaluating density

- forecasts with applications to financial risk management. *International Economic Review*, 39(4), 863.
- Diebold, F.X., Rudebusch, G.D. (200), Five Questions about Business Cycles. *Economic Review-Federal Reserve Bank of San Francisco*. p1.
- Diebold, F.X., Yilmaz, K. (2009), Measuring financial asset return and volatility spillovers, with application to global equity markets. *The Economic Journal*, 119(534), 158-171.
- Diebold, F.X., Yilmaz, K. (2011), Equity market spillovers in the Americas. *Financial Stability, Monetary Policy, and Central Banking*, 15, 199-214.
- Duncan, A.S., Liu, G. (2009), Modelling South African currency crises as structural changes in the volatility of the rand. *South African Journal of Economics*, 77(3), 363-379.
- Edwards, S. (1998), Interest rate volatility, contagion and convergence: An empirical investigation of the cases of Argentina, Chile and Mexico. *Journal of Applied Economics*, 1(1), 55-86.
- Edwards, S., Rigobon, R. (2002), Currency crises and contagion: An introduction. *Journal of Development Economics*, 69, 307-313.
- Elyasiani, E., Mansur, I. (1998), Sensitivity of the bank stock returns distribution to changes in the level and volatility of interest rate: A GARCH-M model. *Journal of Banking and Finance*, 22(5), 535-563.
- Gilmorea, C.G., McManus, G.M. (2002), International portfolio diversification: US and Central European equity markets. *Emerging Markets Review*, 3, 69-83.
- Greenberg, P.E., Kessler, R.C., Birnbaum, H.G., Leong, S.A., Lowe, S.W., Berglund, P.A., Corey-Lisle, P.K. (2003), The economic burden of depression in the United States: How did it change between 1990 and 2000? *Journal of Clinical Psychiatry*, 64(12), 1465-1475.
- Hsiao, F. S.T., Hsiao, M.W., Yama, A. (2003), The Impact of The US Economy on The Asia-Pacific region: Does it matter? *Journal Asian Economic*, 14, 219-241.
- Janakiraman, S., Lamba, A.S. (1998), An empirical examination of linkages between Pacific-Basin stock markets. *Journal of International Financial Markets, Institutions and Money*, 8(2), 155-173.
- King, M.A., Wadhvani, S. (1990), Transmission of volatility between stock markets. *The Review of Financial Studies*, 3(1), 5-33.
- Lee, S.B., Kim, K.J. (1993), Does the October 1987 crash strengthen the co-movements among national stock markets? *Review of Financial Economics*, 3(1), 89-98.
- Longin, F., Solnik, B. (1995), Is the correlation in international equity returns constant: 1960-1990? *Journal of International Money and Finance*, 14(1), 3-26.
- Nath, G.C., Verma, S. (2003), Study of Common Stochastic Trend and Co-Integration in the Emerging Markets: A Case Study of India, Singapore and Taiwan, NSE Research Paper.
- Pandian, M.P., Jeyanthi, S.Q. (2009), Stock Market Volatility in Indian Stock Exchanges. *Socio Economic Voices*.
- Sok-Gee, C., Karim, M.A., Karim, M.A. (2010), Volatility spillovers of the major stock markets in ASEAN-5 with the US and Japanese stock markets. *International Research Journal of Finance and Economics*, 44, 161-172.
- Steven, S., Robert, J., Luc. (2005), Spillover effects among gold, stocks, and bonds. *Journal of Centrum Cathedra*, 3(2), 106-120.