Building Vulnerability Predictive Indicator for the Banking Sector: Perspective of Bangladesh

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Abstract

For risk and capital measurement, banks and other financial institutions need to meet approaching regulatory requirements. It is a major issue to meet the regulatory requirements is a sole or even the foremost important reason for the establishment of a scientific risk management system. To direct capital towards activities with best reward/risk ratios, managers need reliable risk measures. They need mechanisms in order to monitor positions and create incentives for prudent risk-taking by divisions and individuals. This research focuses on the economic vulnerability faced by the banks in financial sector in terms of the crises issues and economic distress. Here, the methodology followed is based on the CAMELS framework variables. CAMELS is an abbreviation for: capital adequacy (C), asset (A), management (M), earnings (E), liquidity (L) and sensitivity to market risk (S). Based on these terminologies, a couple of variables should be selected, such as capital asset ratio, non-performing loan, cost income ratio, non-interest income as component series and return on equity (RoE) as reference series to identify the detecting turning points as identification of economic vulnerability in banking sector of Bangladesh. Thus, by forecasting the directional changes it could make policymakers aware of changes in financial markets and banking economy and allow them to undertake preventive steps for remedial purposes. The constructed MPI should have a remarkable lead time of about an average of 6 months in case of prediction against the leading for reference Series.

Keywords: Macro-prudential Indicator; Return on Equity; Banking sector; Financial Crises

JEL Classifications: C53; G01; G17

Introduction

The incidence of the financial crises worldwide over past two decades has raised concerns about all the interdependence with other sectors of the economy and stability of financial system of an economy. Earlier all the central banks and banking supervisors put emphasis on liquidity of the individual banks rather than considering banking system as a whole and the risk of solvency. Over the years stream of focus has shifted from the micro-prudential to the macro-prudential dimensions in regard of financial stability - generally characterized by stress or crises in the financial system and the absence of excessive volatility. Specifically following the worldwide financial crises during 2008-09, ensuring and monitoring financial system in accordance to stability has become the overarching goal of central banks around the world.

According to European Central Bank (2007) financial stability is a condition in which all the financial system consisting of markets, financial intermediaries and market infrastructure is capable of withstanding shocks and the sorting out of financial imbalances, thereby mitigating all the likelihood of disruptions as overall the financial intermediary process which are extreme enough to significantly impair all the allocation of savings towards profitable investment opportunities. The purpose of the study is to construct a unique index which is the MPI for the Bangladesh financial market. MPI consists of CAMELS (capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk) frameworks. CAMELS frameworks that will be used in MPI enable prediction for crisis detection of financial markets specifically banks.

Generally, based on their financial and economic conditions for constructing their own financial stability indexes, central banks adopt diverse methodologies. The purpose of this study is to construct an unique index which is a macro-prudential indicator (MPI) for the Bangladeshi financial market. This MPI consists of the CAMELS (capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk) framework. Based on these terminologies, a couple of variables should be selected, such as capital asset ratio, non-performing loan, cost income ratio, non-interest income as component series and return on equity (RoE) as reference series to identify the detecting turning points as identification of economic volatility in banking sector of Bangladesh. The CAMELS framework that will be used in the MPI enables the prediction of systemic risk which may lead a bank to collapse or to bankruptcy. The assessment will enable the MPI to have the ability to detect future financial crises in the banking economy in Bangladesh by measuring profitability performance. In conjunction with crisis detection ability, the MPI will also act as an Early Warning System (EWS). Moreover, the MPI will serve as a suitable benchmark for the well-being of the Bangladeshi banking economy as well as offering better supervision of Bangladesh's financial stability. Therefore, the construction of the MPI is essential in order to measure financial health and stability to take precautionary measures by policymakers and regulatory bodies for safeguard purpose in Bangladeshi financial market sector.

Literature Review

Previous research outcome elaborates that an overall tightening in macroprudential policies is associated with a reduction in the overall credit growth (Revelo, Lucotte & Jobet, 2020). Their study shows that a impermanent monetary policy stimulates the impact of the macroprudential tightening on the overall credit growth. Possible solutions were concluded that monetary strategy works as stimuli to reduce transmission impediments in accordance to the macroprudential policy actions. A study to determine financial market disruptions was conducted by Chao, Kou, Peng and Alsaadi (2019). The study provided a model where tick-size frictions were central to understanding exchange fragmentation and competition in financial markets, to measure vulnerability or distress. The key point of the study was that to enable trading firms, exchanges could use differential fee structures to provide liquidity at slightly different net-of-fee prices across exchanges, by focusing on the financial market and by giving exchanges market power.

There have been several previous studies which have discussed models where exchanges have been meaningfully differentiated regarding the determination of the volatility of financial markets. These studies include; Pagnotta and Philippon (2018), where exchanges in financial markets were vertically differentiated,

as well as Baldauf and Mollner (2019), where exchanges appeared to be horizontally differentiated. Baldauf and Mollner (2019) considered a model in which exchanges were in a location on a Salop circle (to capture horizontal differentiation), with the number of exchanges enhancing the size of the latency arbitrage pie, and the social planner trading off the benefits of enhanced competition from additional exchanges (lower trading fees) against that cost, through an increased amount of latency arbitrage. Such differentiation allowed exchanges to charge super competitive trading fees. Such models recommend the segmentation of financial market participants and securities which is against the regulatory environment of US securities. Previous research by Brogaard, Jonathan, Dan and Ying (2017) employed an instrumental variable approach regarding the determinants of financial market stability in the case of HFTs (high-frequency traders) exploiting the differences in the ban's cross-sectional outcome between HFTs and non-HFTs. Short-selling by non-HFT simply proved liquidity, as measured by bid-ask spreads.

In previous research, several authors have examined various aspects of the US equity markets, especially concerning the measurement of volatility in the financial sector, which has changed over the last decade. The study by Haslag, Ringgenberg and Matthew (2016), found that if the average trade size fell, it led to price delays decreasing, and, as a result, the volatility in financial markets was increased. Focusing on country-specific objectives, the areas of; foreign direct investment, remittances and exports may affect the Bangladeshi economy, since the growth rate was likely to be maintained during the current fiscal year, despite the existing financial crisis (Yousfi, 2016). An important question is, by how much, and when would the Bangladeshi economy be affected. As there is rarely any occurrence in the capital markets of Bangladesh, this channel is less likely to be drained of capital. However, there is apprehension that, based on the state of the country's economy, that FDI inflows may lessen, which may undesirably impact the financial system, due to the ongoing global fiscal crisis. In Bangladesh, the macroeconomic fundamentals have been consistent for the last few years, with significant but sustainable budget deficits, as well as public debt. In this context, if the economy of Bangladesh was affected by a crisis, the government may have to consider remedial measures by employing expansionary fiscal policies (Ministry of Finance Bangladesh, 2016).

According to Ahlem, Mohamed and Imen (2015), in case of European banking sector, the application of Artificial Neural Network (ANN) method emphasises that the most specific variables in predicting distress (one year ahead the distress) are loan loss provisions to the gross loans ratio (LLPGL), loan loss reserves to the non-performing loans (LLRNPL) and return on average equity (ROEA), respectively, with an importance rate 100%, 57% and 27%. Research findings of Ouhibi and Hammami (2015) on determinants of financial soundness indicators (non-performing loans) of the banking system of the countries of Southern Mediterranean (Tunisia, Jordan, Morocco, Lebanon, Egypt and Turkey) concludes that there are several factors that direct to the growth or turn down of non-performing loans, such as macroeconomic variables. In the context of Bangladesh, Lata (2015) conducted a research on non-performing loan and its effect on profitability of commercial banks which is state owned. NPL as percentage of total loans, which is represented by the empirical results in cases of SCBs, is very high and they hold greater than 50% of the total NPLs of the banking & financial industry during the last 8 years. Study was conducted by Akinlo and Emmanuel (2014) on the determinants of non-performing loan with a macroeconomic model in the banking system of Nigeria. It has been found that economic growth is adversely integrated with the non-performing loan. Paul, Yan and Claire (2013) estimated loan growth, between liquidity controls and macro-prudential capital. They found funding costs and monitoring intensity of bank authority supervision to be the most important determinants of loan growth followed by bank profitability and loan performance of loan portfolio.

Shin & Song (2012) discussed the loan risk premium in regard of global banking glut for the financial sector. These portrays the risk measurement options to be identified and taking precautionary steps. Peter (2013) showed in regard of emerging Asia concept, capital inflows & asset prices relationship. This study discussed preventive measures to be undertaken based on capital and pricing of assets concept perspective for the financial markets. Boris and Dumicic (2016) discussed the Croatian economy by elaborate discussion on systemic risk to make it identifiable to the policy makers for undertaking regulatory options to overcome volatility or crises in regard of financial institutions and markets.

All the macro-economic instability leads to financial market crisis. This research proposes remedial measures to forecast crisis moments as mentioning about prediction of indicators (composition of a couple of

component series variables) by leading to reference series stated as return on equity (RoE) based on CAMELS framework concept. This proposed indicator can forecast the vulnerable moments in case of financial markets and lead to preventive measures. Precautions could be undertaken to tackle banking crisis and thus protecting economic constraints of Bangladesh and focusing to development and growth.

Up until the beginning of 2007, the global economy had experienced a boom by the recording an approximately average Gross Domestic Product (GDP) growth rate of approximately 5%. However, in the US, the subprime mortgage issue in the middle of 2007 caused a global financial crisis. It could be seen that the leading economies of the world grew by only 1% on average during the period. In Bangladesh, the growth rate was 2.5% lower between the fourth quarter of 2007 through to the second quarter of 2009 (Ministry of Finance Bangladesh, 2009).

From historical evidence, it has been observed that developing and emerging economies suffered lower growth rates. The biggest economy of the India, South Asian region faced huge negative consequences from the crisis. India's growth rate in the services, industrial, and export sectors is expected to reduce. Similarly, the demand for bank credit has reduced. A depreciation of the Indian Rupee was also notable. This crisis was also undergoing at a critical juncture in the case of the Pakistani economy. In relation to the US dollar, the value of the Pakistan Rupee dropped significantly and inflation doubled within a couple of months (Innocent, Enekwe, Mary & Ordu, 2013). In accordance to overcome this distress, governments from all over the world started to provide support to recapitalise the affected financial institutions, they introduced various procedures such as increasing public spending and also the central banks injected liquidity as well as easing the lending norms. The spreading and deepening of social protection drivers such as targeted subsidies, cash transfers, and concessional credit were commonly considered programs to safeguard deprived poor people from the adverse negative effects of the global financial meltdown (Dell'Ariccia, Igan, Laeven & Tong, 2012).

Over the preceding few years, the economy of Bangladesh sustained to register a growth rate at approximately 6% despite all natural disaster, political unrest and external shocks. This growth rate is likely to be sustained in the recent fiscal year despite the current financial crisis which may have an effect on Bangladesh's economy mainly in the areas of exports, remittances and foreign investment. The question is then how much and when it would be affected. There is hardly any existence in accordance with foreign capital stock as portfolio investment considering the capital markets of Bangladesh and as such the possibility of drain-out of the capital all the way through this channel is less likely to happen. However, due to the ongoing world financial crisis, there is an trepidation that FDI inflow may reduce which may adversely have an effect on the economy. The macroeconomic fundamentals in Bangladesh have been steady for the last few years with remarkable public debt and budget deficit. In this context, if the crisis affects the overall economy of Bangladesh, government may have to way out to the expansionary fiscal policy, (Ministry of Finance, Bangladesh, 2009).

There are conflicting views among economists on the authentic impact of the current global financial catastrophe on garment exports of Bangladesh. One view is that as the consequence of the recession, the middle and lower middle income class in US and EU will be harmfully affected and this might dampen down our RMG export prospective. The other view is that the RMG exports could ascend because there could be a swing of demand from high-end garment segment to the low-end segment. Most of the Bangladeshi workers are unskilled/semi-skilled and are in employment with the construction sector. The current distress may affect them in the context of a descend trend in oil revenues, promoting a slowdown in the construction sector. The skilled Bangladeshi workers in the USA may face job losses. Due to the economic crisis, overseas aid flow to Bangladesh may decrease. However, this may not prompt a significant problem since most of the overseas aid of Bangladesh come by means of multilateral agencies. Bangladesh mostly depends on import in fulfilling the demands for the food and non-food items. In the world market, commodity prices together with wheat, rice, edible oils, fertilizers, have declined substantially predominantly after the financial crisis. The price of crude oil has also declined substantially. The overall situation would then consent to Bangladesh to import these merchandise at lower prices which will expand the balance of payment (BOP) situation of the country, (Ministry of Finance, Bangladesh, 2009).

Methodology

Predicting turning points in the financial market cycle involves several major procedures. First, we selected an appropriate indicator of economic activity related to the financial market sector, which is also called the reference series. The selected combination of the component series was utilized to construct a macro-prudential indicator based on the step-wise indicator construction methodology proposed by the Conference Board (2000). In order to establish an empirically sound macro-prudential indicator (MPI), we adopted the non-parametric index aggregation procedure outlined by Conference Board (2000), and the detailed step-based procedure was as follows:

i. Compute the month-to-month changes, each component, where $i = 1, \dots, n$ for as a symmetric percentage change formula based on the symmetric percentage change formula below:

$$r_{i,t} = \frac{X_{i,t} - X_{i,t-1}}{X_{i,t} + X_{i,t-1}} * 200$$

Note that if the composite involves a series in percentage form, then it will be applied the simple arithmetic difference.

ii. Calculate the standardization factor (w_i) by inverting the standard deviation in regard of the month-to-month changes for each component series (r_i, t) and perform an adjustment by multiplying r_i, t and w_i to yield the monthly contribution of each component series (c_i, t).

iii. Across the component, adding the adjusted symmetric changes for each month to obtain the sum of the adjusted monthly contribution,

$$S_t = \sum_{i=1}^n c_{i,t}$$

iv. Then, based on the symmetric percentage change formula, derive the preliminary index recursively by letting the initial index value equal 100.

The index value of the subsequent month will be:

$$I_2 = \frac{200 + S_2}{200 - S_1} * I_1$$

Given the constructed MPIs, transformation into the growth cycle takes place as the present study seeks to examine the Bangladeshi Financial market cycle in a growth cycle setting rather than the classical cycle. Thus, the transformation involves the following procedure:

i. Detrending the MPIs to obtain the cyclical component using the CF filter developed by Christiano and Fitzgerald (2003) and

ii. Smoothing to remove the irregular component through a simple centered moving average. Zhang and Zhuang (2002) proposed to be seven months the moving average length.

The present study also employs the non-parametric Bry and Boschan dating algorithm (Bry and Boschan, 1971) to detect the turning points in the extracted cyclical movements of the MPI and the RoE. Following Greer (2011), the constructed MPI will be tested with a directional accuracy test to reflect the accuracy of the constructed MPI against mere chance. Thus, the directional accuracy rate (DAR) is calculated based on the formula below:

$$DAR = \frac{C_s}{N_s} * 100$$

Taking the probability of obtaining an accurate forecast as 0.5 within a fixed number of tests, the probability of getting an accurate forecast by chance could be calculated based on a binomial distribution. To conduct the binomial testing, the null hypothesis can be specified as "If the forecasting model is 50% in case of the probability of correct prediction of the direction of change". Depending on the outcome of direction accuracy testing (DAR), rejection of the null hypothesis will focus towards two distinct conclusions. If the DAR is greater than 50%, then the forecasting model is independent of wild guesses. On the other hand, if the DAR is below 50%, we can expect that wild guesses could obtain the correct predictions (Greer, 2011).

Based on the indicator construction technique implemented in the present study and the growth cycle approach, the cyclical movement of MPI and the reference cycle of RoE are established by using the filtering approach created by Christiano and Fitzgerald. A finite approximate band-pass filter was proposed by Christiano and Fitzgerald, optimal for each time series. In this paper, we present the construction under the assumption of this optimal approximation that by a pure economic background analysis, the data is generated in regard of Bangladesh banking economy perspective.

Return on equity estimates a firm's efficacy at generating profits from every unit of shareholders' equity. Return on assets is, on the other hand, a significant module of return on equity, being an indicator of how beneficial a company is before leverage is considered. In terms of expansion rates, we use the value well known as return on assets to determine a company's inner growth rate. This is the highest growth rate a firm can accomplish without resorting to peripheral financing. We use the value for return on equity, however, in shaping a company's sustainable growth rate, which is the maximum growth rate a firm can achieve without changing its debt-to-equity ratio or issuing new equity.

After implementing the course of action of the indicator procedure from the Conference Board (2000), we extracted the cyclical component of MPI and the reference cycle. Both cycles were assessed via a de-trending chronological method known as CF filtering. Numerous combinations of feasible component series were tested to obtain the MPI that best matches the cyclical movement of the MPI, tracing every turning point ahead of the RoE.

Construction of MPI

Based on the indicator construction technique and the growth cycle approach implemented in the present study, the cyclical movement of MPI and the reference cycle of RoE are established by using the Christiano Fitzgerald (2003) filtering approach. After multiple simulations of various combinations of all possible component series, component series with a combination of four variables were as a final point selected to construct the MPI for Bangladesh. The following figure demonstrates the graphical representation of the best selected alternative of MPI that traced the movement of RoE with moderately good timing. As shown in figure, the movement of MPI is consistent in advance of RoE suggesting that MPI has a moderately significant amount of signaling attributes against the RoE. Moreover, by scrutinizing the major transition of MPI and RoE from one phase to another, one can see MPI has signaled the approaching phase shift before the RoE diffuses into the upcoming phases. This evidence again suggests that the constructed MPI in this study can trace the general movement of the financial market focusing banks correctly in an absolute manner. In this research, MPI can forecast 6 months earlier the crises moments by leading to reference series (RoE) which is demonstrated in the graph below.

Figure 1: MPI versus RoE (1998-2018)

Table 1: Results of the Turning Points Analysis of the MPI and RoE (1998-2018)

Cycle	Reference Series (ROE)	Component Series (MPI)	Gap/ Month	Economic Episodes
Peak	June-01	July-00	11	Food price hike /
Trough	October-02	November-02	-1	Investment reduced
Peak	July-06	December-05	7	Rise in remittance /
Trough	December-07	March-07	9	Capital flow down
Peak	July-09	August-08	11	Improved macro-economic balance /
Trough	August-10	May-09	15	Natural disaster occurred & food price hike
Peak	April-11	July-11	-3	Inflow of remittance /
Trough	September-12	February-12	7	Slowdown in growth
Peak	April-14	October-13	6	Structural reforms occurred /
Trough	March-17	November-16	4	Way to achieve middle Income country status
Average Prediction (Months)			6	

Table 2: Results of the Directional Accuracy Test and the Binomial Test

Lag	1	2	3	4	5	6
Directional Accuracy Rate	36%	42%	50%	56%	61%	66%
P(Binomial)	0.000655	0.000874	0.001158	0.001526	0.001054	0.001397

Based on the directional accuracy and binomial test proposed by Greer (2011), the directional accuracy test results for the constructed MPI for the Bangladeshi banking financial market are presented in Table 2. The tabulated results demonstrate that the constructed MPI can predict Bangladesh's major banking financial market's cycle turning points with up to 66% accuracy. Moreover, the binomial test results called for a

rejection of the null hypothesis at the 10% significance level for the MPI, indicating that the constructed MPI performs better than a wild guess.

Findings

In the perspective of Bangladesh, the economic seasonal episodes in accordance with timeline could be described as follows: food price hike and investment reduced from 2000 to 2002, rise in remittance and capital flow down from 2005 to 2007, improved macro-economic balance and natural disaster occurred as well as food price hike from 2008 to 2010, inflow of remittance and slowdown in growth from 2011 to 2012, structural reforms occurred and achieved middle income country status from 2014 to 2018 onwards. In predicting the movement of the financial market cycle in Bangladesh with a prominent lead time and reliability as an early signalling tool, the constructed MPI demonstrated a strong ability to work as a predictor for the financial market economy roadmap in Bangladesh. In the case of the RoE at the end of 2006, the RoE value dropped because of the stock market crash at that time. This is because the earnings per share (EPS) downturned. EPS is also a calculation that shows how profitable a company is on a shareholder basis. A higher EPS is always better than a lower ratio because this means that a company is more profitable and the company has more profits to distribute to its shareholders. In 2011, the EPS rose because of the improved stock market portfolio. In the year 2013, the EPS dropped again, as a result of the country's economic downturn and the EPS reduced as a consequence of stock market volatility. At the end of 2014, it again showed a negative tendency, which affected the RoE. The MPI movements with the RoE, as a leading indicator, show the prediction period in the chronology of events from the perspective of the Bangladeshi financial market.

All of these financial market vulnerabilities are the consequences of significant economic events in Bangladesh. The dated turning points from the MPI corresponded well with the historical financial market cycle profile in Bangladesh. The outcome of the turning point analysis is presented in Table 1. The result of the turning point analysis shows that the MPI marked ten major turning points that corresponded to two significant episodes (peak and trough) in the Bangladeshi financial market cycle or macro-prudential cycle.

The troughs are the consequence of the occurrence of natural calamities such as floods, cyclones, food price hikes, political unrest, a lack of infrastructural development which lead to a volatility in the growth rate. This leads people who live in the countryside to take credit from banks to survive and to sustain a living allowance. Overall this affects the banking economy in Bangladesh by becoming volatile in terms of capital, credit, industry productivity, an imbalanced expenditure-income ratio, the central bank reserve, rising commodity prices, deteriorating interest income, contingency period inventory as a cushion and many other reasons as well. All of these variables affect infrastructure development, thus affecting the banking economy in Bangladesh. According to Table 2, this suggests that the source of success or correct prediction produced by the MPI is owed to the predictive power of the indicator itself. Given the strong evidence from the directional accuracy assessment, the robustness of the MPI in forecasting the Bangladeshi banking financial market cycle is supported.

Discussion

The economy of Bangladesh is a rapidly developing market-based economy. Its per capita income in 2010 was US\$1,700 (adjusted for purchasing power parity). According to the IMF, Bangladesh ranked as the 47th largest economy in the world in 2010 in purchasing power parity (PPP) terms and the 57th largest in nominal terms. The economy has grown at the rate of 6-7% per annum annually over the past few years. More than half of the GDP belongs to the service sector. A large number, nearly half, of Bangladeshis are employed in the agriculture sector with ready-made garments (RMG), textiles, leather, jute, fish, vegetables, leather and leather goods, ceramics and fruits as other important products. Remittances from Bangladeshi foreign workers mainly come via Middle Eastern countries which are a major source of foreign exchange earnings. Exports of garments and textiles are another major source of foreign exchange earnings. Shipbuilding and cane cultivation have become major growth areas. The GDP's rapid growth is due to sound financial controls and regulations which have also contributed to economic growth. However, foreign direct investment has yet to rise significantly. Bangladesh has also made major strides in its human development index (Ministry of Finance Bangladesh, 2018).

In the case of a country's financial sector, economic ideas and all the ideologies set the agenda for the action and change. Monetary policy might seem as trivial in the wider context of the economy, polity and society. But economic result of outcomes which are path dependent do have political result of consequences at

election time and the social consequences for well-being of the people (Wanke, Peter, Azad & Barros, 2016). It would be considering both prudent as well as wise for the overall government not to put all of its eggs in one basket. Instead, it should be unbiased in considering different views before making the critical economic guiding principle decisions. Thus, a variety of segments should be considered reflecting the various variables leading to finding a forecasting measurement tool. In previous sections, the cause and effect relationship between different variables resemble the initiative to redeem financial market volatility by forecasting ability. In such matters, in Bangladesh, there is always a need for institutional checks and balances so that the Ministry of Finance takes initiatives in an unfettered unilateral manner.

With regard to the Bangladeshi banking economy, after analysis and observations, the results also proved that monetary controls and prudential terms of instruments contributed to higher stability and thus to general financial stability. Specifically, this affects the banking sector by monetary controls and prudential instruments and also by reducing the credit growth rate, and by a moderately lower level of NPLs in regard to total loans. This is identified as improved liquidity and higher profitability. Furthermore, despite the imposed measures, our results show that beside deposits, banks continue to keep the rate using alternative sources of funding in cases of credit growth (Michiru, 2013). Other regulatory variables that are affecting our financial stability indicators are economic development, the M2 to reserves ratio, economic growth and the inflation rate. This is proved partially significant by the real interest rates, domestic credit growth and external debt while these are important in the case of the budget deficit and capital liberalisation. Underlying the significance of prudential measures, we propose certain changes in the central bank's structural instruments and in the bank's strategies which may become significant factors. Namely, in providing a stable banking sector, prudential instruments and monetary controls are demonstrated as significant which is a prerequisite for sustainable economic growth and global macroeconomic stability in Bangladesh.

The former finance minister of Bangladesh, M Syeduzzaman, in an interactive speech organised by the Financial Express Bangladesh on 3rd November 2015, provided his analysis of the country's banking sector. "In my view, too many banks have been permitted, mostly in political consideration. The state of governance in some of the private banks, as well as of the state-owned commercial banks (SOCB) and specialised banks need serious review," he added.

This chronologically leads to the drainage of a huge sector of publicly acclaimed resources, as the capital adequacy ratios (CARs) of various SOCBs continue to be inadequate. The common perception is that politically-appointed boards appear to be politically-influenced determinants. Enquiries into the SOCBs' scams are slow or inadequate, as a consequence of the lacking of efficacy.

M Syeduzzaman also opined that the banks were exposed to the share market beyond desirable levels which was highly inappropriate. In addition, giving almost all commercial banks the permission to have brokerage houses and merchant banks as subsidiary banks were observed. "We, no doubt, have a stable macroeconomic situation, but at the cost of higher growth in employment and investment," he said. "The list of weaknesses, if we go into the details, is quite long. To start with, local currency public debt is growing, with growing interest payments, denting into domestic resources for investment. Other weaknesses are noted in the below figure; however, they are not necessarily stated in the correct order. Inadequate collection of revenue and the drainage of public resources were witnessed through state-owned enterprises (banking and non-banking). Too many projects prevail in the ADP, including many that are unauthorised and there were inadequate monitoring and supervision of their implementation by the ministries. Institutional weaknesses are contributing in a vital and reasonable manner into this. According to him, "Not enough FDI inflow, and inadequate disbursement of foreign aid, as mentioned earlier, both of which are considered important for increasing investments." The law and order situation raises concerns over the investment climate. "Similarly, perception and data collected by some think tanks on corruption and graft are not contributing to improving the investment climate," he added. "Slow physical infrastructure expansion, including the supply of power and gas, does not help foreign or domestic investment. The available power generation capability is lower in quantity than the installed generation capacity. These are not stimulating FDI inflow in the case of the slow development of the designated Special Economic Zones (SEZs) according to the Ministry of Finance Bangladesh. (2016). Unplanned urban transportation systems and unplanned urbanisation are raising the expense of doing business and decreasing productivity, and it urgently requires a moderate term plan for refining the situation. He expressed high concern that inadequate employment generation prevails below the level of the target because of decreased GDP growth. "The Social Safety Net programs are not adequate to guarantee nutritional security and reduce poverty. The quality of education, especially technical education, is a drag on skill improvement, and results on improved quality jobs," he continued.

In developing countries like Bangladesh, where monetary and fiscal policies allow a greater return on investment (RoI) in Government savings instruments which are meant for financing public expenditure, investors diligently divert their investments from stocks where the RoI is less certain and is risk-bearing. A deposit holder of a commercial bank that lends money to businesses and industries to create employment opportunities and to increase the productivity of goods and services for the economy at present gets interest of approx. 7.75% per annum (pa). The same deposit holder gets approx. 11.50% pa if he/she invests in government savings instruments. In this scenario, there is less possibility of growth in the investment in the stock and real estate markets and in the productive sector. Media reports say that the government of Bangladesh plans to discuss with stakeholders to determine the causes of the reduction of exports in terms of volume and value.

In the case of external factors, the central bank data shows that the gross inflow of FDI into Bangladesh stood at \$2.06 billion in 2014. Gross inflows are the total inward direct investment provided by non-resident investors into the country while net inflows are the gross inflows minus disinvestment. Disinvestment comprises of reverse investments, capital repatriation, loans given to parent firms and repayments of intra-company loans to parent firms in a certain duration of time. The FDI and monetary measures are not considered in indicator construction as these do not contribute any significant effect. The variables that are undertaken maintain a strong effect in predicting the early signals of banking volatility. A United Nations (UN) agency report also shows earlier that greenfield investment in Bangladesh has improved. "FDI inflows to Bangladesh remained relatively high at \$1.5 billion, thanks to large greenfield investments in a range of industries," said the report (Anshuman, 2011).

Thus, Bangladesh is becoming an investment destination for foreign investors according to BPI ratings (credit ratings). While the US is at 50th position and China is at 65th position, India was at the top of the list for investment in the year 2015. Baseline profitability based on an index assumes that the ultimate success of a foreign investment is stimulated by three factors (Lata, 2015). These are the growth of the assets, the ease of repatriation in terms of proceeds by means of selling the asset while the asset is owned, and the preservation of that value. For each of these factors for investment, it provides a country's basic stimuli and the index combines contributions into a summary statistic.

In the case of financial market study, based on Dr Altman's analysis, an article was published about the index and the latest annual ranking in a Foreign Policy magazine, "The Finance Professionals Post", (2012). It claimed that the index is a guide for investors to put in their money and make good returns. "Economic growth alone doesn't determine the returns to investing abroad," was stated. "You have to worry about things like financial stability, physical security and corruption, expropriation by the government, exploitation by local partners, capital controls, and exchange rates as well." Putting all of these factors together gives a better idea of how big the return will be and when it will finally reach an investor's pocket.

Compiled by the World Bank, the BPI calculations also use an index of investor protection. The rankings were published in the same week that the United Nations Conference based on Trade and Development (UNCTAD) released its world investment report 2014. The UNCTAD report showed that the net inflow of foreign direct investment (FDI) into Bangladesh declined by 4.5% in 2014. The inflow of FDI stood at \$1.5 billion in that year against \$1.6 billion in 2013 (Bangladesh Bank, 2014). The UNCTAD estimation was based on data furnished by Bangladesh Bank. The central bank data, however, showed that the gross inflow of FDI to Bangladesh stood at \$2.06 billion in 2014.

In the context of Bangladesh, the circulation and enforcement of the 'Green banking policy framework' in 2011 by the Bangladesh Bank was a remarkable step towards attaining environmental sustainability in the country. The central bank also prepared and circulated a standard guide on environmental risk management in the same year to restructure solutions for managing the environmental risks in the financial sector and prescribed a set of sector-specific 'Environmental Due-diligence Checklists' for sponsoring environmentally delicate segments by banks. The Bangladesh Bank's initiatives have already brought notable changes in several areas of green banking. Regarding environmental risk management in financing, banks have principally undertaken initiatives to manage ecological risks at the transaction level. To ensure financial sector stability, it would be required to identify and manage the environmental risks of banks both at the broader portfolio level and at the transaction specific level.

From our empirical results, important policy implications arise. First and foremost, we must question if a rise in profit or a decrease in risk is the consequence of increasing capital. We have shown evidence that through the whole Asian banking sample, between profitability (risk) and capital, there is a positive (negative)

relationship. Furthermore, between risk and the level of capital, there prevails a negative relationship that advocates that regulators should apply closer monitoring against excessively risky undertakings by prohibiting those banks. Nevertheless, this rough assumption counters some phenomena. For example, although there is a strong capital structure in the banks of some countries, though they risk, their profits are not satisfied. Thus, it is further considered through different profitability as well as risk variables in this study, as well as the circumstances of different conditions. This enables us to resolve the puzzle of extant literature, by conducting these efforts, which relate to the banks' specialisations, discounting critical factors, such as, geographic type, regions and income levels. These influencing factors should be taken into consideration by the government or authorities. Second, different patterns of capital are presented by different profitability (risk) variables. Hence, the authorities should realise that using a single profitability or risk variable may result in a totally wrong policy. Specifically, in the Asian banking industry, investment banks play a significant role, since profit is originated through positive persistence. By mending the financial efficacy of investment banks, Asian countries should also improve the ownership of their corresponding banking system to implement the suggestions which were proposed by Basel III.

Capital adequacy denotes the amount of capital which is adequate to compensate for the risks to be covered. The Basel Committee encourages the banking industry to promote sound practices globally for managing credit risks. Our country has undertaken a number of initiatives by the central bank, regulatory authorities and the Government to manage credit risk in the banking sector. Each of these initiatives has had a positive and significant outcome.

A well-equipped credit risk management environment, where credit risk grading and scoring practices are to be conducted thoroughly and objectively with a highly stringent score sheet or even the financial model referred to by the central bank or even self-established tools should be created. The possibility and propensity of the failure of the borrower or counterparty should be assessed based on time series data as well as projected data correlated to a particular borrower and his/her industry where his/her business belongs. However, to create a credit risk management environment in the banks, it is a prerequisite to have a credit risk management strategy and credit risk policies that are approved by the Board of Directors. The Board of Directors will review these policies periodically and make any required amendments as per the necessities of the economy and the banking sector. The credit policy of the banks should reflect at least the tolerance limit of risk to be undertaken. The segments and allocation of credit under different clusters of industry/sector must be obtained to ensure a credit diversification strategy and to avoid credit concentration. Additionally, credit pricing in terms of risk exposure, risk mitigation factors, segments of duties and responsibilities of approving and sanctioning authorities, etc. must be taken into account. The bank's senior management will adopt and execute the credit risk strategy approved by the Board of Directors and apply procedures for identifying, measuring, controlling and monitoring credit risk rigorously. Management must ensure that the risks of products and activities that are new to the banks are subject to sufficient procedures and controls and are approved in advance by the Board of Directors.

Conclusion

To lead the banking efficiency performance as return on equity (RoE), in regard of component series, MPI is been created in this study for detecting the turning points for predicting vulnerability in banking sector in Bangladesh. There it was faced data availability constraint specifically in collecting primary data for a larger period of timeline considering variables related to banking sector arena. According to the perspective of each country, the understanding of the changing and intrinsic nature of the financial structure/nature in each country will eventually contribute to a better future assessment. One important use of the MPI is to give focused attention to provide warning signals to particular types of issues or consequences to problems as well as whether the prevailing signal is unwarranted. This stems from structural and institutional changes which are witnessed as a predominant reason for concern. Regarding the loan portfolios of banks, it will contribute by influencing the profitability of the corporate segment through the real sector. Additionally, many other combinations of variables could be undertaken for construction of indicator in future for predicting banking crises.

In a nutshell, the initial aim of this study was to construct an unique MPI for the Bangladeshi financial market which was successfully achieved. In particular, the study constructed a four-variable composite leading MPI that can produce early lead times of about 6 months on average. In this study, it is constructed a MPI which

can be used to predict the trend of the Bangladeshi financial system. In other words, this MPI would be able to forecast the Bangladeshi financial market's well-being. Within the Bangladeshi financial system, this MPI will be able to signal any possible economic shock that might create an impact. The Government and policymakers will be able to make early preparations to cushion any potential crises with the help of the MPI. Thus, the impact of any crises could be minimized in the Bangladeshi banking economy.

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