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## Analysing the Return on Asset to Construct Foretelling Indicator for Bangladeshi Banking Sector

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### Abstract

Financial institutions and banks are required to follow mechanisms to monitor the positions and create stimulus for sensible risk-taking by divisions as well as individuals. Risk measurement comprises of the quantification of risk exposures, whereas risk management demonstrates to the overall procedures by which managers fulfill these needs to identify the risks and recognise the category of the risks it faces. This research targets on the economic instability faced by banks in financial arena in terms of the crises affairs in regard of economic distress. Here, the methodology followed is based on the CAMELS framework variables. CAMELS is a short form stands for: capital adequacy (C), asset (A), management (M), earnings (E), liquidity (L) and sensitivity to market risk (S). Based on these nomenclature, a couple of variables should be selected, such as capital asset ratio, cost income ratio, non-performing loan, non-interest income as component series and return on asset (ROA) as the reference series to identify turning points of economic volatility in banking sector of Bangladesh. Thus, by forecasting the directional deviations it could make financial policymakers aware of the changes at early stage in financial markets and banking industry and privilege them to undertake precautionary steps for preventive purposes. The constructed MPI should have a incredible lead time of about 5 to 7 months on an average in case of prediction against leading for the reference series. By renovating financial efficacy of venture banks, Bangladesh also should recover their subsequent banking system to execute these suggestions.

**Keywords:** Financial Cycle; Return on Asset; Financial Market; Economic Distress

**JEL Classifications:** C53; G01; G17

## **Introduction**

The incidence of financial crises worldwide over the past two decades has raised concerns about the interdependence with other sectors of the economy and stability of the financial system of an economy. Earlier the central banks and banking supervisors put emphasis on liquidity of individual banks rather than banking system as a whole and the risk of solvency. Over the years the focus has shifted from micro-prudential to macro-prudential dimensions 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 stability has become an overarching goal of the central banks around the world.

According to European Central Bank (2007) financial stability is a condition in which the financial system, consisting of financial intermediaries, markets and market infrastructure is capable of withstanding shocks and the unraveling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediary process which are extreme enough to significantly impair the allocation of savings to profitable investment opportunities. The purpose of this 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.

Over the last few years, the economy of Bangladesh continued to register a growth rate at around 6% despite political unrest, natural disasters and external shocks. This growth rate is expected to be sustained in the current fiscal year despite the current financial crisis which may affect Bangladesh's economy mainly in the areas of remittances, exports and foreign investment. The question is then when and by how much it would be affected. There is hardly any existence of foreign capital stock as portfolio investment in the capital markets of Bangladesh and as such the possibility of drain-out of capital through this channel is less likely. However, due to ongoing world financial crisis, there is an apprehension that FDI inflow may decline which may adversely affect the economy. The macroeconomic fundamentals in Bangladesh have been stable for the last few years with sustainable budget deficit and public debt. In this context, if the crisis affects the economy of Bangladesh, government may have to resort to expansionary fiscal policy and consider alternate measures of options to recover country economy (Ministry of Finance, Bangladesh, 2017). Thus the policymakers should undertake preventive approaches to overcome instability.

The outcome of this study is a composite index known as an MPI. It will be constructed from a set of subset indicators by using the CAMELS framework. The study constructed MPI will have full coverage of every aspect of the financial sector. However, the CAMELS framework's variables that will be selected in the construction of the MPI will be specialised to Bangladesh's conditions. In-depth, understanding of the financial sector in Bangladesh will be accessed. By selecting couple of variables such as, capital asset ratio, non-performing loan, cost income ratio, non-interest income, this MPI is constructed for the timeline of 1998 to 2018. The robustness of the constructed MPI has been intensively tested with different compositions of the component series, filtering procedures and predictive power based on the leading profile and directional accuracy.

Thus, financial institutions and non-financial institutions will be able to have alternative guidelines for their organisation's operations. This study will construct the 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 is able to signal any possible economic shock at early stages 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 minimised in the Bangladeshi banking economy.

## **Literature Review**

In previous research, examinations conducted by different authors, macroeconomic effects as well as net benefits of two alternative policies in regard of macroprudential perspective were examined and there were shown the outcome of significant policy relevance given extensive untested initiation of such policies (Davis, Liadze & Piggott, 2019). Research study by Zulkhibri (2019) provides a crucial review of empirical and

theoretical research on literature on the Islamic finance that examines macroprudential policy and its effect, specifically the theoretical and empirical literature as the consequences of macroprudential policy because it relates to risk taking and financial stability in regard of the conventional and Islamic financial systems.

Previous study (Kaur, Nathani & Chopra, 2019) appreciates the importance of macro-prudential policy involvement for bringing in fiscal stability into the monetary system. By visualizing and synthesizing information based on past accomplishment (using panel regression), it can be demonstrated that this paper may be utilised to facilitate prudent decision-making in particular at the government and policy level of emerging economies and assure building up of the financial solidity framework. Jan & Rongrong (2019) demonstrated in their research that macroprudential policy can be utilised to retain economic stability without stimulating the macro-economic slowdown, or as the complement towards monetary policy to offset buildup of the financial vulnerabilities emerging from the monetary easing.

Previous study by Baker (2018) focused on systemic outcomes as a consequence of macro-prudential policy implication. These led to collective social expectations, such an ontology creating the basis for the so-called macro-moralities which provide ethical justifications in regard of public forms of the systemic stabilisation. Dumcic (2017) emphasised in his study the main stages of the macroprudential cycle, the relationship between the macroprudential policy as well as other economic policies, and costs and well-being of macroprudential regulations. Previous researcher demonstrates in their outcome reviews regarding those issues related to the public dissemination of MPis, in recognition of their crucial role in the strengthening of financial sector surveillance and the oversight of the global financial system (Evans, Leone, Gills & Hilbers, 2016). Lombardi & Siklos (2016) constructed an index of macroprudential capacity, which is developed by means of credit growth and that indicator were robustly associated with each other.

According to Ahlem, Mohamed and Imen (2015), in case of European banking sector, the application of Artificial Neural Network (ANN) method demonstrates that the most significant variables in predicting instability (one year before the distress) are loan loss provisions to the gross loans ratio (LLPGL), loan loss reserves to non-performing loans (LLRNPL) as well as return on equity average (ROEA), respectively, with the importance rate 100%, 57% and 27%. Research findings of Ouhibi and Hammami (2015) on determinants of the financial soundness indicators (non-performing loans) of banking system of the countries of Southern Mediterranean (Tunisia, Jordan, Morocco, Lebanon, Egypt and Turkey) concludes that there are several factors that lead to the growth or decline 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 the 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 industry during last 8 years. Study was conducted by another researchers such as, 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 negatively related to 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) demonstrated the loan hazard premium in regard of global banking overabundance for financial sector. These portrays the risk assessment options to be identified and undertaking the precautionary steps. Peter (2013) showed in regard of rising Asia perspective the overall capital inflows and asset prices relationship. This study suggested preventive measures to be undertaken on basis of capital and pricing with assets concept perspective in regard of financial markets. Boris and Dumcic (2016) discussed the Croatian economy by elaborative discussion on the systemic risk to make it particular to the policy makers for undertaking regulatory measure of options to overcome crises or volatility with respect of financial institutions as well as markets.

The Bank of England (2011) when studying the credit portfolio, might have included the loan to income (LTI) lending and the loan to value (LTV) ratios for measuring the performance of bank operations. A compression in lending spreads to secured financing transactions and an easing of covenant restrictions or a fall in the quality of collateral is required for secured lending. Weakening real-economy lending standards leave financial institutions more open to any losses that occur and subsequently increase the likelihood of excessive borrowing. Falling margins or haircuts may also increase systemic liquidity risks that might trigger asset fire-sales or liquidity hoarding. Prior to the current crisis with the onset of distress, lending spreads in the United Kingdom appeared to fall below their equilibrium levels in the banking sector and in both the corporate sector as well as the household sector before rising sharply. Pre-crisis exuberance was also

obvious in the increase in the share of new term mortgages at both high LTV and LTI ratios and there was a rising prevalence of interest-only and self-certified mortgages.

In the case of bank supervisors, there prevails a conflict between micro- and macro-prudential purposes and goals. If we focus on financial matters in 1999–2002, the licensing policy of the Central Bank of Russia (CBR) consistently modified its regulatory policy (Sophie & Koen, 2007). To analyse this potential conflict, the CBR combined a broad swathe of functions and authorities as it was a newly created central bank. The onset of many bank failures, as well as its own micro-prudential bank standards, allowed enforcement by the CBR. The finding showed that most liquidity and capital standards experienced some level of enforcement, as improvement was witnessed, in spite of the enforcement of liquidity regulations. These had the necessary effects on credit growth. It was not regarded as good news. It is noted that instead of predicting future trouble, the CBR mainly de-licensed banks which were illiquid.

Regarding monitoring as a determinant of bank loan supply, a number of studies have focused on the intensity of the supervision of banks (Schoors & Claves, 2007). The criteria that were used by bank supervisors and assigned as either high or low quality to qualify an institution (from a safety and the soundness perspective). The key finding was that over the credit cycle the criteria varied.

Banks generally generate profits in a cyclical manner. When profits are high and the nonperforming assets are comparatively low, supervisors allegedly lower the standards needed to attain a favourable soundness and safety regulatory grading. Banks respond by weakening in perspective of their underwriting standards as well as increasing their loan growth. In contrast, when bank profits are noticeably weak as well as nonperforming assets are higher, banking authorities need to strengthen their criteria comprehensively (Gilbert & Wheelock, 2007).

Finally, as a whole, when there is a violation of standards in the banking sector, the CBR is lenient regarding the withdrawal of the licenses of individual banks. There is a developed hypothesis which corroborates the theory of “too many to fail” that has been proposed by researchers in the past. The potential for fire-sale losses is an externality that individual banks do not recognise when they set their own funding mix. Many advocates of macro-prudential policy suggest using minimum liquidity requirements to limit banks’ use of short-term debt to control for this externality.

The Bank of Spain was one of the first bank regulators to modify its micro-prudential regulations to limit the pro-cyclical effects of bank capital regulations (Paul, Yan & Claire, 2013). The Spanish regulator executed rules that required banks in good times to build up special loans that were not counted as regulatory capital. To augment their regulatory capital, banks are allowed to draw down these accounts during bad times. This scheme (Paul, Yan & Claire, 2013) has been in effect in Spain since 2000. It created a system similar to Basel III where the effective regulatory capital requirement varied over the business cycle. These rules had a significant stabilising effect on bank growth in Spain, which was difficult to argue, given the depth of Spain’s financial crisis.

Hong Kong employed minimum LTV ratio requirements on mortgages (Paul, Yan & Claire, 2013). There was no widely-accepted benchmark estimation for the elasticity of bank loan growth to minimum regulatory capital or liquidity requirements (Paul, Yan & Claire, 2013). Much of the macro-prudential literature is theoretical and focused on explaining the externalities that support the use of macro-prudential policies. A number of studies have examined bank behaviour during the recent financial crisis but none established a link between binding minimum capital regulations and bank lending. The above study focused on bank performance in Hong Kong based on the impact of the deregulation of the interest rate. The evidence uncovered by the study was that interest rate deregulation in bank market values led to a significant decline.

According to the examination of Bordo and Landon-Lane (2010), a discrete financial stress index comprising of a time series on business failures, the real interest rate, banking conditions and a quality spread described the situation of the US financial sector. By aggregating balance sheets and sets of the variables from the financial banking sector, other researchers built a real continuous indicator, with replication ability, for the case of financial crisis chronologies in the US banking system which examined the influence of different weighting schemes. It appropriately signalled the future crises from 2007 onward.

All the macro-economic instability leads to financial market crisis. This research proposes remedial measures to early forecast the 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 asset (RoA) 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.

## Methodology

Predicting turning or deviating points in the financial market cycle involves several major procedures. First, we sorted out an appropriate indicator of the economic activity related to financial market industry, which is also demonstrated as the reference series. The selected combinations of the component series was utilised for the construction of a macro-prudential indicator on the basis of step-wise indicator construction methodology significantly proposed by the Conference Board (2000). In order to establish an empirically sufficient and sound macro-prudential indicator (MPI), we adopted the non-parametric index aggregation process outlined by the Conference Board (2000), and the detailed step by step 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.

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 RoA 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.

Assets are the firm's aggregate total assets, everything the company owns. Return on assets (ROA) for the overall business is calculated by dividing net operating income after tax (but before other income or expenses like interest expense) by the total assets. Return on assets is considered as the total return on all assets on an adjusted debt free basis, regardless of how much quantity of debt is actually used. The RoA is a financial ratio which indicates the percentage of the profit that a corporation produces in relation to its total assets or overall resources. The RoA is a key profitability measuring ratio which calculates the quantity amount of profit made by means of a company per dollar of its assets. It shows the company's ability to generate profits before they leverage, rather than only utilising leverage (Murshid, Zohir, Ahmed & Zabid, 2009). Unlike other profitability measuring ratios, such as the RoE, the RoA particularly measurements all of the company's assets together with those ratios that arise from the liabilities to creditors and those which arise from

contributions made by the investors as well. So, the RoA provides knowledge as to how competently management utilise company assets to the generation of profit. However, compared to some other financial ratios such as the RoE, it is usually of less interest to shareholders. The RoA gives a sign of the capital concentration of the company which depends on the industry (Wanke, Peter, Azad & Barros, 2016). Capital-intensive industries (such as thermal power plants and railroads) produce a low RoA since they essentially possess such significant assets for doing business.

This research establishes a reference chronological sequence for the Bangladeshi economic cycle from 1998 to late 2018, against the significant backdrop of the late 2000s worldwide recession and the most recent domestic socio-economic developments, which once again emphasises the significance of dating financial market cycle turning points. The derivation of the accurate dates of switches between the expansions and recessions allows the detection of the point in the time at which the Bangladeshi banking economy set foot in the recent recessionary economic cycle regime in the late 2000s and the verification of the affirmation that, up to the end of 2015, it had not yet exited the recession. We rely on both the non-parametric and parametric procedures in order to prove the coherence among the attained turning points and examine the establishment of a reference chronology by the significant implementation of BB dating Algorithm (Bry, G. and Boschan, C., 1971). This research focuses particularly suggesting that the Bangladesh banking economy entered the recessionary financial market cycle regime in 2008 which was all-over continued throughout 2012. Also, what could be the potential remedies that could predict the Bangladeshi banking economy well-being, and provide precautionary measures in this context.

To conduct the directional accuracy testing, the cyclical changes were broken into three trichotomy scenarios which were: a large predicted increase with no significant changes, a large predicted decrease and a cut off of the small predicted changes with a threshold point of 50% (Greer, 2011). Thus, the directional accuracy rate could be calculated based on the formula below:

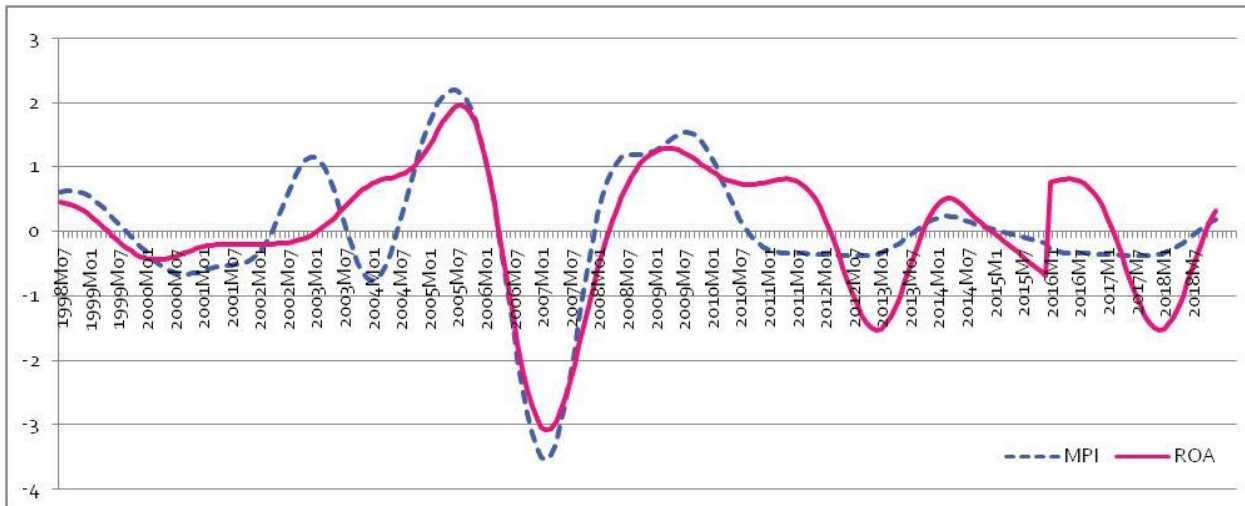
$$\text{Directional Accuracy Rate (DAR)} = \frac{C_s}{N_s} \times 100$$

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 result of direction accuracy testing (DAR), rejection of the null hypothesis will focus towards two significant 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%, particularly we can expect that wild guesses could obtain the precise and correct predictions (Greer 2011).

Here in this study, RoA is selected as reference series. On the other hand, combination of four variables such as non-performing loan, capital asset ratio, cost income ratio, non-interest income are selected as component series which constructs the MPI. This MPI moves ahead the reference series and detects the turning points of economic episodes of Bangladeshi financial market cycle. Thus MPI helps to guide the Government and policymakers to take preventive measures for safeguard purpose in regard of Bangladeshi economic sector volatility in contingency moments.

## Results

The cyclical movement of MPI and RoA is shown in Figure 1, where, MPI moves ahead to RoA (reference series) showing leading trend of conducting prediction approach. In the perspective of Bangladesh, according to the Table 1, 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, inflow of remittance and slowdown in growth from 2008 to 2010, improved macro-economic balance and natural disaster occurred as well as food price hike 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.



**Figure 1:** MPI versus RoA (1998-2018)

Source: Constructed by author's data analysis

In this research, it suggests that the constructed MPI in this study can trace the general movement of the financial market focusing banks in an absolute moderate manner. In this research, MPI can forecast 5 months earlier the crises moments by leading to reference series (RoA) which is demonstrated in the graph in Figure 1.

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

Cycle Condition	RoA	MPI	Difference (Months)	Important Events
Peak	2001M02	2000M05	9	Overall GDP growth increased
Trough	2002M10	2002M12	(2)	Rise in fuel and food prices
Peak	2006M05	2005M11	6	Rise in remittances, Low inflation, GDP increase
Trough	2007M08	2007M01	7	Revenue and capital flows lowered, less exports
Peak	2009M01	2008M04	9	Liquidity reduced inflation and improved macro-economic balance
Trough	2010M02	2009M03	11	Significant slowdown in growth
Peak	2011M01	2011M04	(3)	Agricultural wages and remittance inflows increased
Trough	2012M12	2012M06	6	Natural disaster occurred and food price hike
Peak	2014M02	2013M09	5	Structural and institutional reforms occurred
Trough	2017M03	2016M12	3	Led to middle income country status
Total Difference (Months)			51	
Average Prediction (Months)			5	

Source: Author's calculation

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 61% 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. 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.

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

Lag	1	2	3	4	5	6
Directional Accuracy Rate	34%	38%	41%	48%	59%	61%
P(Binomial)	0.02	0.00	0.01	0.00	0.01	0.00

Source: Author's calculation

## Discussions

The typical relation between risk and capital or between profitability and capital shows an identical direction that there is a positive relationship between capital and profitability and a negative one with regard to capital as well as risk in the Bangladesh banking sector. Nevertheless, it will increase (decrease) the positive persistence in cases of profitability (risk) by taking regulatory variables into attention. As shown, countries with higher creditor protection or superior capital stringency or higher legal efficacy will increase the risk and decrease the profitability of banks. In particular, in Bangladesh, with higher regulatory constraints and higher shareholder value, such protection stimulates the profitability of banks in parallel with a reduction of probable risks. According to the types of banks, the main results appear to differ, comprehensively across regions in relation to each countries' economic development.

It has the highest positive capital effect on the ROE in terms of banks in the upper-middle-income countries. However, for those in high-income countries, it has the lowermost positive value of capital effect on non-interest revenue. Hence in low-income countries in regard to banks, it has a greater capital result effect on profitability, as a result, it demonstrates the ROA effect in the company. Also, it has the greatest reverse in the perspective of the capital effect on risk for banks in lower-middle income countries like Bangladesh. For banks in high-income countries, it has the minimum values. This provides evidence that with sounder technology and financial supervision which are probably associated with banks in high-income countries. Thus, comparing them to emerging markets and developing countries, their risk may seem minor (Claessens, 2009). Hence the effects of risk and profitability in the case of capital income levels do incur diverse impacts.

Secondly, at a minimum, the following factors should be documented and considered in approving credit: (i) the clearly stated purpose of the credit and the source(s) of repayment; (ii) the current risk profile of the borrower; (iii) the integrity as well as the reputation of the borrower; (iv) the borrower's repayment history record and their sensitivity to economic and market deterioration, also the current capacity to repay, based on historical financial movements analysis and cash flow projections; (v) a forward-looking analysis in terms of their capacity to repay should be conducted based on different scenarios; (vi) the legal status and capability of the borrower to execute documents and meet their liability; (vii) the status of the borrower's probable economic sector and the borrower's expertise as well as their position under that sector; (viii) the proposed terms and conditions of the credit, comprising credit covenants in case of default; and (ix) the adequacy and enforceability of the collateral or guarantees. Finally, we need to understand to whom we are granting credit. Therefore, prior to entering into any new prospective credit relationship, we should be acquainted with the borrower or the organisation that we are dealing with and that they are of sound repute as well as being creditworthy.

Third, a separate Credit Administration Unit or Cell with specific responsibilities such as monitoring the terms and conditions of the facility agreement which requires the thorough checking of documents before disbursement in addition to other forms of compliance should be operational in all banks. The on-going administration of credit facilities with due diligence and governance must be assured. We should develop and apply internal risk rating systems in addition to the central bank's guidelines for managing credit risk. The rating system should be customised in such a way that it will be consistent with the nature and size of any proposals.

Ensuring adequate control over credit is another important aspect of the sound management of credit risk. Based on the financial and operational performance of the borrower, a system for the completion of documentation, supervision, valuation, follow-up, monitoring, early alert processes, etc., should be established to ensure adequate control over the credit facility. The results of the on-going reviews, monitoring, follow-up, etc., should be communicated to top management on a regular basis. However, there



should be internal controls and practices to ensure that the information on review, monitored, followed-up, etc., are reported in a timely manner to the appropriate level of management.

Fourth, maintaining an adequate MIS (Management Information System) and obtaining a complete KYC (know your customer) process regarding the borrower and his/her business is a crucial issue for managing credit risk effectively. Bankers should take into consideration any potential upcoming changes in economically sustainable conditions while assessing credit proposals and maintaining an MIS for the same purpose. Moreover, the credit risk exposures for borrowers who are undergoing stressful conditions should be assessed and should be kept within the MIS. It should be kept in mind that changes in the economy, regulations, competition, technology and other developments may adversely affect a client's business. The unsophisticated 'five Cs' model (which includes character, capacity, condition, collateral and cash flow) should be applied to the know your customer (KYC) process. Credit Risk Grading (CRG) should be conducted based on realistic and audited data related to the borrower and his/her industry. All of these results should be kept and used within the MIS for further decision making. A good MIS will also include an occasional check of public records and a daily perusal of newspapers, magazines and trade publications.

Fifth, it is important to develop a system for monitoring the complete composition and quality of the credit portfolio for effective credit risk management. Traditionally, bankers have given more focus on the oversight of individual credit facilities and managing that risk. While this focus is important, bankers should also have a system for monitoring the overall composition and quality of their credit portfolio. Credit concentration risk can affect the overall quality of a bank's credit portfolio. Such credit concentration can occur when a bank's credit portfolio contains a high level of credits to (i) a single borrower; (ii) a group of connected concerns; (iii) a particular industry or economic sector; (iv) a particular geographic region; (v) a type of credit facility; or (vi) a type of security. Credit concentration can also occur if credits have the same maturity. A high concentration of credits can expose the bank to adverse changes in the area in which the credits are concentrated. Thus, to avoid or reduce the credit concentration risk banks should diversify the trade area, geographic location, try to get access to more financially diverse borrowers and possibly initiate financial inclusion programs under their investment portfolio.

Sixth, establishing a system for managing non-performing credit and a workout situation is also an essential step in risk management. In designing the strategy for managing non-performing credit at least four aspects should be measured. Firstly, the proper screening of the credit proposal which includes objectively conducting credit risk grading, obtaining a CIB report, a report from trade checking and other connected parties, etc., secondly, a monitoring mechanism which includes the practice of an early alert process, off-site supervision, etc., thirdly, transparency, including proper credit filing, documentation, loan classification and provisioning, etc., fourthly, the lender's recourse which includes using legal provisions under the Artha Rin Adalat Ain, NI Act, Limitations Act, Bankruptcy Act etc., as well as non-legal measures.

This will promote sustainable growth for the Government which can be implemented with regard to sustainable macroeconomic policies, offering a conducive and business-friendly environment which will enhance the capability utilisation of industries. It will permit a high level of absorption in the economy and credit demand. The banks should strive to enhance their operational efficacy internally as well as their productivity in managing and generating a well-diversified risk asset portfolio by deploying both financial and human capital as this will ensure that equally interest sensitive risk liabilities and assets are utilised on the way to maximise returns.

Through the policy implications of this study, banks should explore strategies to reduce their lending rates in order to attract deposits through lower operational costs; they should also seek to diversify their sources of deposits. When lending, a borrowers' ability to collect credit decreases with higher interest rates. Policymakers should seek a low rate of inflation by means of the effective application of expansionary and contractionary monetary policy which will promote a lower lending or monetary policy rate (MPR). Also, in terms of growth, the results should be executed as this will invariably lead to increased profitability for the commercial banks, together with an increase in credit expansion which will have a positive impact on the economy.

Although credit risks cannot always be avoided, a number of safeguard strategies can control their incidence and minimise a bank's losses. Thus, managing credit risk effectively may allow banks not only to avoid unexpected losses from their credit portfolio but also help them to increase their sustainability, safeguard them from forced provisioning, securing them against capital erosion and declining profitability, etc. Thus, the credit risk management guidelines, credit appraisal format, approval and disbursement process, valuation of collateral and security, early awareness process, monitoring and follow-up process, the due diligence process, documentation checklist, governance etc. should be well-structured and adapted as per the nature

and size of the borrower. Rigorous training and motivational programs for the bank's employees, extended use of information technology in the credit management procedure, the establishment of a credit counselling unit or cell for borrowers, organising talk-shows in the media between borrowers and bankers, all of these items may assist in managing credit risks.

It is generally said that credit rarely becomes problem-credit overnight. Usually, a gradual deterioration in the quality of credit occurs and this is accompanied by numerous warnings or early alert signals. If these signals are detected in time, banks can act to prevent problem credit from developing or they can at least move to minimise their losses in the event of difficulty. For example, a borrower's company has failed to invest enough in product research and development over a number of years. As a result, its products have become obsolete. This will likely reflect on the company's financial statements as declining sales and a slowdown in inventory turnover. The company heads towards bankruptcy with potentially sizeable losses for the banks or creditors. Here, the obvious symptom of this problem is the reduction in the company's financial commitment to product research and development. So, the key is to minimise the risks and to observe the telltale symptoms when they occur, rather than waiting for a major breakdown in repayments. Early recognition of the problems of borrowers gives the bank an opportunity to work with the borrower and take remedial initiatives before a credit workout or loss becomes inevitable.

The reduction of non-performing loans requires the investigation of the borrower's authenticity to ensure the security of the bank's money. Before granting loans, banks should know their customers, in fact, it is modern banking practice to adhere strictly to the 5C's of credit. A diversified portfolio of loans with proper inspection may reduce non-performing loans. The proper valuation of loan collateral is essential. Loan disbursement based upon personal undertakings should be reduced.

## Conclusion

We will propose to assemble a MPI which could be used to predict the trend of movement of the Bangladeshi financial system. In other words, this MPI would be able to predict the Bangladeshi financial market's economic welfare. Within the Bangladeshi financial system, this constructed MPI will be able to indicate any possible economic shock that might generate an impact. The Government and policymakers will be able to take precaution for early preparations to cushion any impending crises with the help of the MPI. Thus, the impact of any distress could be lessened for the Bangladeshi banking economy.

Based on this research, we propose a macro-prudential indicator, which would be obtained for the forecasting of Bangladeshi financial market welfare. The probable combination of variables to be undertaken as permutation of component series are such as capital asset ratio, inflation, industry production index, non-performing loan, cost income ratio, non-interest income, stock turnover ratio, reserve of gold and real interest rate. To lead the banking measurement of performance efficiency as return on equity (RoE), in regard of component series, MPI would be constructed for identifying the turning points in regard of predicting vulnerability in the banking sector of Bangladesh.

Bangladesh should obtain macro-prudential measures on the basis of time horizon encompassed the pre-crisis period (2004–2007), the crisis period (2008–2009) and the post-crisis time period (2010). Within this period it should be undertaken four steps of a macro-prudential nature and should aim to (i) at decreasing the systemic risk arising from the growth of the balance sheets and risk-taking by banks and (ii) enabling the stable supply of banking services to the real economy (iii) regulations on foreign exchange lending (iv) amendments to the capital adequacy framework (v) prevention of high credit growth risk (vi) introduction of liquidity ratios. By adopting above mentioned measures, Bangladesh undergoing profitability crises in banks and financial institutions could be taken under control and minimised.

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