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Market Valuation and Risk Assessment of Indian Banks using Black-Scholes-Merton Model

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Abstract

The global financial crisis has compelled regulators to focus on the necessity of resilience of banks towards risks and sudden financial shocks. Market Valuation of banks require risk to be evaluated using bank assets and equity which can be incorporated only through Black-Scholes Merton Model. This paper develops an algorithm in Matlab to evaluate two non-linear equations used in Black-Scholes-Merton option valuation approach for calculation of the market value and volatility of bank's assets for a random sample of 13 Public and 8 Private sector banks in India over the period from March 2003 to March 2012.Further, it calculates yearly Z-score for each bank, allowing for capital adequacy as per the Basel II and III norms, for the periods before and after 2008 financial crisis. Findings indicate a resilient Indian banking system with differential in risk observed in assets and equity between public and private sector banks.

I. Introduction

BANKING SECTOR HAS set the pace for itself ever since the liberalisation and globalisation reforms of the 1990s. After the reforms of 1990s the focus of banking sector shifted towards a more market oriented one and thus meant more focus on efficiency and stability for banks. India has the fourth largest economy in the world and the role of banking industry cannot be ignored. According to an IBA-FICCI-BCG (2011) report "India's gross domestic product (GDP) growth will make the Indian banking industry the third largest in the world by 2025".

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Annexure

Annexure I

The following Matlab code uses Fminsearch function for finding out the values of V_0 and s_V that minimizes equation (4) . The code uses Fminsearch function which is given in the optimization toolbox of Matlab.

```
function [value] = min_fn(x)

global e0 d sig_e t rf

v0=x(1);
sig_v=x(2);

d1=(log(v0/d)+(rf+0.5*sig_v*sig_v)*t)/(sig_v*sqrt(t));
d2=d1-sig_v*sqrt(t);
temp1=e0-v0*normcdf(d1)+d*exp(-rf*t)*normcdf(d2);
temp2=sig_e*e0-normcdf(d1)*sig_v*v0;
value=temp1^2+temp2^2;
end
```