Regulation of Banks' capital and Macroeconomic Stability – a theoretical appraisal

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1. Introduction

The stability of banking sector is central to the stability of the overall financial sector in country and after the advent of the globalization and in wake of its resultant spill-over implication of any economic disturbance or turmoil; the concern over financial stability has got further intensified. In recognition of this matter, Bank for International Settlement ramped up the global standard on supervision of banking institutions in the name of Basel norms. A key element of this global benchmark is the regulation of capital reserve of a banking institution which mandate threshold extent capital reserve to be kept in proportion with bank's total risk weighted assets in terms as minimum capital requirement. Although, this norm was intended for enhancing the resilience of banks to any adverse economic shock or financial predicament, which is arguably propitious for ensuring stability, the international experience indicates a serious downside of this capital norm which makes it some-what self defeating in nature. In the wake of this minimum capital requirement, banks might turn more vulnerable to economic shocks in the way that an outbreak of recession worsens the capital adequacy ratio and thereby makes it difficult for banks to cope with the Basel mandate. Now this perhaps has jeopardizing outcome for banks in terms of hampered credit mobilization on account of cut in loan making as consequent upon the banks' failure in complying with the capital norm. Now an unequivocal implication of this dispensation is that a cut in credit flow in the economy is likely to magnify ongoing recession and thereby make the economy leap into more heightened crisis. Once this happens, the propensity of defaulting on loan will rise, leading to an amplification risk on banks' sustainability and subjecting banks to a bigger quandary. Thus attempt to fix hidden fault line might serve to aggravate it further. At this juncture, the current is intended at highlighting on how regulation of banks' capital base in terms of minimum capital requirement may not go down well with the stability of banking sector and thereby is likely to push the financial sector out of gears.

Since 2011-12 non-performing assets of public sector banks have begun to rise. Both Government of India and RBI have taken alarm and have adopted a number of measures to arrest the growth of non-performing assets. The government is planning to infuse new capital into the banks to maintain capital adequacy ratio. Some of the public sector banks have been put under the category that requires "Prompt Corrective Action" (PCA). All the banks in general and the public sector banks in particular have been put on high alert. Most alarmingly, the GOI has proposed to introduce the Financial regulation and deposit insurance (FRDI) bill, which empowers the government to forfeit the deposits of the depositors to rescue banks that have become insolvent. Clearly, this measure will destroy people's faith in banks. They will be disinclined to hold their savings with the banks bringing about a collapse of the banking system and, thereby, that of the economy as a whole. We shall examine the implications of all these measures here. However, to adopt appropriate measures, one has to identify the reasons for the increase in the stock of non-performing assets. From the data of growth rate and non-performing assets, it is clear that the non-performing assets as a percentage of total advances started rising since the onset of recession in 2011-12 (see Tables 1 and 2). The period from 2003-04 to 2010-11 was one of unprecedented boom during which

GDP grew at an average annual rate of around 8.5 percent. The growth rate dropped to 6.5 percent in 2011-12 and further to 4.5 percent and 4.8 percent respectively in 2012-13 and 2013-14. Even going by the new data derived using new methodology and a new base year 2011-12, which has substantially raised the growth rates of 2012-13 and 2013-14, the average annual growth rate during 2012-13 – 2015-16 is around 6.5 percent. If we had applied the same methodology and the base year to estimate the growth rates of the boom period (2003-04 to 2010-11), the average annual growth rate of the boom period would have been much higher than what we have shown in Table 1. During the boom period spanning eight years, investors' morale was high. Driven by their enthusiasm to invest, advances grew at a high rate. However, the expectation of a high growth of demand that drove investment during the boom period turned awry since 2011-12. Large expensive capacities created during the boom period turned idle saddling the investors' with large losses. Investors' morale went for a toss. This led to two changes: default rate rose sharply raising the growth rate of non-performing assets, while growth rate of advances fell. These two factors together brought about an increase in the stock of non-performing assets as a fraction of total advances. Obviously, neither the investors nor the banks are at a fault as capitalist economies are subject to trade cycles and both upswings and downturns are unpredictable. The best way of tackling recessions and the attendant problem of non-performing assets is to undertake appropriate expansionary fiscal policy to put the economy on an upswing, provide debt relief to ailing firms until the economy revives and provide adequate capital to the banks to fully compensate for their losses until the economy begins to boom again and the firms begin to make profit and start paying back the loans along with the interest. (In fact, some of these policies were adopted by the US government and Fed to rescue the banks and the economy following the financial meltdown since 2007 (see Mishkin (2011) and Blinder and Zandi (2010[a], 2010[b]).) If instead of adopting intelligent, well-informed anti-recessionary policies, the government takes the banks to task, it will have the confidence of banks', savers' and investors' badly shaken, credit disbursement will dip sharply and the economy will slip into a deep recession. In what follows, we shall illustrate these points.

2. Literature Review

Blinder (1985) develops two macroeconomic models in which central bank policy has real effects on the supply side of the economy due to credit rationing. In each model, there are two possible regimes, depending on whether credit is or is not rationed. Starting from an un-rationed equilibrium, either a large enough contraction of bank reserves or a large enough rise in aggregate demand can lead to rationing. Monetary (fiscal) policy is shown to be more (less) powerful when there is rationing than when there is not. In the first model, credit rationing reduces working capital. There is a failure of effective supply in that credit—starved firms reducing the production below national supply. The resulting excess demand in the goods market may trigger a rise in prices and reduce the real supply of credit further, leading to further reductions in supply and a stagflationary spiral. In the second model, credit rationing reduces investment, which cuts into both .aggregate demand and Supply. Despite the effect on demand, stagflationary instability is still. possible. Besides, it has been illustrated herein that a rise in government spending crowds out investment in the rationed regime but crowds in investment in the un-rationed regime.

Bernanke et al (1994) indicates that adverse shocks to the economy may be amplified by worsening credit-market conditions yielding the phenomena of financial accelerator. Theoretically, the paper interprets the financial accelerator as resulting (endogenous changes over the business cycle in the agency costs of lending. An implication of the theory is that, at the onset of a recession borrowers facing high agency costs should receive a relatively lower share of credit extended (the flight to quality) and hence should account for a proportionally greater part of the decline in economic activity. The paper also entails the review of evidence for these predictions and present new evidence drawn from a panel of large and small manufacturing firms.

Shajahan (1998) sought to examine the warranty behind the RBI 's claim regarding the decline in the non-performing assets in the bank as on the March 1997 from the previous year to the tune of more than 50 per cent and in connection to this the relation between the magnitude of non-performing assets of the banks and their exposure to priority sector credit. This apart the paper questions the sudden shift of RBI's stance on public disclosure of NPA status from gross sense to the net sense in 1997 which sparked off controversy over whether NPA had indeed declined over the said period.

Gorter et al (2001) suggested that a more or less predictable level of non-performing loans, though it may vary slightly from year to year, is caused by an inevitable number of 'wrong economic decisions by individuals and plain bad luck (inclement weather, unexpected price changes for certain products, *etc.*). Under such circumstances, the holders of loans can make an allowance for a normal share of non-performance in the form of bad loan provisions, or they may spread the risk by taking out insurance. Enterprises may well be able to pass a large portion of these costs to customers in the form of higher prices. For instance, the interest margin applied by financial institutions will include a premium for the risk of non-performance on granted loans. At this time, banks' non-performing loans increase, profits decline and substantial losses to capital may become apparent. Eventually, the economy reaches a trough and turns towards a new expansionary phase, as a result the risk of future losses reaches a low point, even though banks may still appear relatively unhealthy at this stage in the cycle.

A host of literature have found the credit –rating being pro-cyclical based on which the risk weights for various categories of assets held by the banks are evaluated (Ferri et al(1999), Monfor and Mulder, (2000) and Ferri et al (2001)).It has been discovered that the credit rating agencies upgrade sovereigns in times of sound market conditions and downgrade in turbulent times.

Betrand (2000) highlights on whether and how Swiss banks react to regulation over capital adequacy. The approach of this paper is essentially developing as simultaneous equation model to examine the adjustment in capital and risk at Swiss banks. The study ends with envisaging that the regulation prompts the banks to heighten the capital reserve and has to nothing to do with the level of risk exposure.

Dianmond et al (2002) presents a theory of bank capital which asserts that the asset side of the bank is intertwined with liability side. This study essentially involves determining at least three effects of capital – on bank safety, on bank's ability to refinance at low cost and on the bank's ability of recovery or its willingness to liquidate, from borrowers.

Nachane et al (2001) explores some crucial issues relation capital adequacy regulation in terms of – optimality of targeting capital as meaning regulating banks, best standard of evaluation of capital adequacy; to put it in other way, the determinants of capital adequacy, and responsiveness of banks to capital adequacy norms. The findings are reassuring in the sense that capital requirements do seem to affect bank behaviour over and above the influence of the banks' own internally generated capital targets , implying higher levels of capital can be useful in preventing systemic distress, which is an important lever in the hands of policy-makers. Moreover, it has been envisaged hereby that for the banks to respond to capital regulation in a variety of ways, regulators need to figure out the kind of response they want to elicit when formulating new regulations.

Rajaraman et al (2002) attempts a panel data regression analysis based on 27 PSU banks covering a period of five years ending in 1999-2000 to illuminate on the variation of the nonperforming loans within class of banks. The finding of this exercise enables to the group the banks with more than average NPA into those are explained by the operational efficiency as measured by operating profit as the percentage of working funds and those with below average NPA are grouped into those explained by high operating efficiency and those where operational efficiency leaves an unexplained negative residual. Comparing the regional concentration of these with high-NPA banks, there is clear scope for pair-wise comparative studies of banks in the same region of operation so as to identify bank-specific factors accounting for their very different outcomes in terms of NPAs.

Krishnan (2002) focused on the problem of swelling non- performing assets in banks and financial institution of the country posing serious threat to the financial sector. She found that securitization can be used for the liquidating the illiquid and long terms debt like loan receivables of the financial institutions or bank by issuing marketable securities against them. She concluded that the SARFAESI act is definitely a big leap forward not only in the filled of NPA management but also promoting the securitizing market in India. The act may be required to fine tuned to bring in 'natural justice'.

In another study it has been posited that the sheltering of weak institutions while liberalizing operational rules of the game is making implementation of operational changes difficult and ineffective (Reddy, 2002). Moreover, it has been argued that changes required to tackle the NPA problem would have to span the entire gamut of judiciary, polity and the bureaucracy to be truly effective. This paper has also touched upon the experiences of other Asian countries in handling of NPAs. It further looks into the effect of the reforms on the level of NPAs and suggests mechanisms to handle the problem by drawing on experiences from other countries.

Joshi (2003) conducted a survey on has found that Profitability and Viability of Development Financial Institutions are directly affected by quality and performance of advances. The basic element of Sound NPA Management System is quick identification of Nonperforming advances, their containment at minimum levels and ensuring that their impingement on the financials is at low level. Excessive reliance on Collaterals has led Institutions to long drawn litigations and hence it should not be sole criteria for sanction. Banks should manage their exposure limit to few borrower(s) and linkage should be placed with net owned funds for developing control over high leverages of borrower level. Study also revealed that exchange of credit information among banks would be immense help to them to avoid possible NPAs. Management Information system and Market intelligence should be utilized to their full potential.

Jones et al (2004) has pointed out that Basel II may significantly overestimate the risk of international lending to developing economies. It has also pointed out hereby, in particular, that linking of the sovereign rating to the regulatory capital the sovereign ratings could have an unfavourable effect on the credit flows to the emerging market economies as the credit rating of the developing and emerging countries are not as high as the high income countries.

Chaudhuri (2005) examined the resolution strategies for maximizing value of non-performing assets (NPAs). The article indicates that declining capital adequacy adversely affects shareholder value and restricts the ability of the bank/institution to access the capital market for additional equity to enhance capital adequacy. So, if a resolution strategy for recovery of dues from NPAs is not put in place quickly and efficiently, these assets would deteriorate in value over time and little value would be realized at the end, except may be its scrap value. The purpose of this paper is to indicate the various considerations that one has to bear in mind before zeroing on a resolution strategy and provides a State - Resolution - Mapping (SRM) framework. However, the paper has not specifically discussed about the various resolution strategies that could be put in place for recovery from NPAs, and in particular, in which situation which type of strategy should be adopted.

Netsure (2005) has strongly highlighted some basic problem concerned with Basel II Accord that was framed to the make the minimum capital requirements more risk sensitive. First of all, given that this new accord had been flouted out to affect essentially the bank of international presence which were compliant with Basel 1 Accord and Core Basel Principles. Hence it could not be of immediate priority for the banks of developing nations as its implementation would require a through up-gradation of the technology and human resources leading to shift in regulator's attention from supervision to implementation. It has been pointed out that Basel 2 accord makes discrimination against the banks with less sophisticated risk management system, particularly the small banks, by making them embrace the 'Standardized Approach' to the assessment of credit risk; whereby these are to be dependent external rating agencies and this in-turn renders them less risk sensitive. Moreover, when a business downturn is in space, a bank's capital base is likely to be eroded by loan losses. As a result of this, its existing non-defaulted borrowers will also be downgraded by the relevant credit risk models, forcing the bank to hold more capital against its current loan portfolio. To the extent that it is difficult for the bank to raise fresh external capital in bad times, it will be forced to curtail its lending activity, thereby contributing to the worsening of the initial downturn. Thus, Basel II is likely to accentuate cyclical fluctuations – a price too high for emerging economies to bear once they adopt the advanced IRB system. There is also a fear that too much regulation under Basel II will adversely affect the risk appetite of Indian banks and their lending to credit-starved sectors posing a major challenge for the RBI in maintaining a healthy credit momentum amid this tighter risk-sensitive framework.

Hakenes et al (2006) contemplates the relationship between bank size and risk exposure under the capital accord of Basel II regime. Employing a model with imperfect competition and moral hazard, the study indicates that the introduction of internal rating based(IRB) approach to measuring risk apropos Basel II norms improves upon flat capital requirements if the approach is applied is uniformly across the banks. Moreover, the study suggests the choice between the standardized approach and IRB would benefit the large at the disadvantage of the small banks because fierce competition.

Vallabh et al (2007) presents an empirical approach to the analysis of Non-Performing Assets (NPAs) of public, private, and foreign sector banks in India. The NPAs are considered as an important parameter to judge the performance and financial health of banks. The level of NPAs is one of the drivers of financial stability and growth of the banking sector. This paper aims to find the fundamental factors which impact NPAs of banks. A model consisting of two types of factors, viz., macroeconomic factors and bank-specific parameters, is developed and the behaviour of NPAs of the three categories of banks is observed.

Ghosh (2008) examines the degree of monetary policy transmission through banking sector which is subject capital adequacy regulation. The theoretical model developed herein, depicts the impacts of monetary policy shocks on bank deposit and lending in the short run, when equity capital is fixed, as well as in the long run, when equity is variable. The study, inter alia, presents empirical dispensation to indicate that banks being constrained by capital adequacy norm tend to lend risky borrowers in face monetary contraction.

Ahmad et al (2008) investigates into the determinants of bank capital ratios based on the unbalance panel data analysis covering the time span of eight year 1997-1998.The results obtained leave a strong testimony to the positive linkage between regulatory capital and risk behaviour of banks. Moreover, the study indicates that bank capital decisions are not governed by profitability consideration in contrast with the corresponding literature on developed countries that has put emphasis on bank's earning as the driver of capital ratio.

Pandey et al (2013) has come across an attenuation in the non-performing asset as the percentage of gross advanced for the scheduled commercial banks during the post reform period from 15.7 % in 1997 to 2.25% in 2008; which has been attributed to the adopted of prudential norms regarding income and asset classification as per recommendations of Committee on Financial System headed by M.Narasimham (1991). However the study shows a surge in the non-performing asset in the recent years which has been considered as the aftermath of the global recession coupled with slowdown of the domestic economy fetching adverse impact on small and medium enterprises adversely affecting the credit quality. Moreover deterioration of situation in terms NPA has been found particularly for the PSBs which the aforesaid study claims to be due to the large exposure to the big worth corporate loans and the shift to the system based recognition of non-performing asset from the previously prevailing manual set-up eliminating managerial discretion in reporting. This apart the study provides a strong evidence for the pro-cyclical nature of non-performing asset in the sense that a rise in same is reflection of the domestic economic meltdown. However, in regard to the debt recovery the study points to some improvement in cases of public and private sector banks in 2011-12 in terms of the rise in recovery ratio with the foreign banks lagging behind. Moreover, the major volume of the total debt recovered has been found to be coming up through SARFAESI route over the years from 2007-08 up to 2011-12.

Arora et al (2018) examines the connection between the loan market and the housing market routed through mortgage loans. Repayment of such mortgage loans depends on the future earning potential of the borrowers, which in turn depends on the overall macroeconomic scenario. Under buoyant macroeconomic conditions, all borrowers pay back their loans and both the loan market and the housing market function well. However, a temporary income shock in the economy, which undermines the repayment ability of the borrowers, may result in imprudent lending by banks thereby leading to a crisis. This calls for stringent monitoring of mortgage loans by regulatory authorities.

3. Objective of Research

Following the adoption of the New Economic Policy (NEP) by India in July 1991, Government of India (GoI) has started viewing banks as commercially organized profit driven financial institutions whose viability depends upon their ability to make profit. Like all capitalist economies, India is also subject to trade cycles and onset of a recession leads to a drop in banks' profit levels and an increase in their stock non-performing assets. This prompts the government to ask banks to tighten lending norms and maintaining adequate capital buffer as mandated by minimum capital requirement norm.

The objective of this research is primordially about developing a simple baseline model to examine the implications of this kind of a policy. It shows that the policy noted above deepens recession, increases inequality and exacerbates the problem of non-performing assets and lowers profit. It also shows that, instead of taking the banks and the defaulting firms to task for a factor that is completely beyond their control, the best way of tackling this problem is to adopt appropriate stabilization programmes to counter the recession.

4. A Baseline Model on Banks' Capital Adequacy

We first develop a simple baseline model to examine the implications of the recent banking sector reforms in India. We consider a small open economy divided into two sectors: a real sector and a financial sector. We focus on the real sector first.

Real Sector

In the real sector, aggregate output or GDP is demand determined. The equilibrium condition of the real sector is given by

$$Y = cY + I(r) + G + X\left(\frac{P^*e}{P}; Y^*\right) - \frac{P^*e}{P} M\left(\frac{P^*e}{P}, Y\right) \tag{1}$$

We assume that government expenditure is financed by borrowing from the central bank so that

$$G = \frac{dH}{P} \tag{2}$$

In (2), *dH* denotes increase in the stock of high-powered money. For the time being, we ignore cross-border capital flows and consider the flexible exchange rate regime. The BOP equilibrium condition is, therefore, given by

$$X\left(\frac{P^*e}{P}, Y^*\right) - \frac{P^*e}{P} M\left(\frac{P^*e}{P}, Y\right) = 0 \tag{3}$$

Financial Sector

We assume for simplicity that the only kind of financial institutions that exist in the financial sector are banks. Banks raise their funds by inviting deposits and also by selling equities. We ignore here the secondary market in equities. Banks sell new equities in the market at a fixed price. At the fixed price, either they are able to sell as many equities as they want or they face demand constraint. We consider both the cases here. We postulate for simplicity that only banks issue equities.

We assume that savers hold their saving in the form of equity, bank deposits and currency. They hold q and q_1 fractions of their saving in the form of equity and currency respectively and the rest in the form of bank deposits. We also assume here that banks do not hold any excess reserve and they sell equities only to meet the capital adequacy requirement. Given these assumptions, the amount of new equities the banks want to sell is given by

$$E^s = \frac{1}{\theta} L^s = \frac{1}{\theta}(1-\rho)dD \tag{4}$$

In (4), $E^S \equiv$ planned supply of new equity by the banks, $L^S \equiv$ planned supply of new bank loans, $\dfrac{1}{\theta} \equiv$ capital adequacy ratio, $\rho \equiv CRR$, and $dD \equiv$ new deposit received by the banks.

Demand for new equities comes from the savers who hold q fraction of their saving in the form of new equities. Thus,

$$E^d = q.(1-c)Y \qquad (5)$$

New deposits received by the banks are given by

$$dD = (1-q-q_1)(1-c)Y \qquad (6)$$

Substituting (6) into (4), we get

$$E^s = \frac{1}{\theta}(1-\rho)(1-q-q_1)(1-c)Y \qquad (7)$$

There are clearly two possibilities, $E^s > E^d$, $E^s \leq E^d$. In the first case, banks are rationed in the equity market. Hence, their planned supply of new loan will be given by

$$L^s = \theta E^d = \theta q(1-c)Y \qquad (8)$$

In the second case, banks are able to sell as much new equity as they plan to. Hence, their supply of new loans is given by

$$L^s = \theta E^s = (1-\rho)(1-q-q_1)(1-c)Y \qquad (9)$$

We also assume that the banking sector is oligopolistic and the interest rate charged by banks on loans is rigid and depends only upon the repo rate. Denoting the lending rate of banks and the repo rate by r and r_p respectively, we have

$$r = r\left(\underset{+}{r_p}\right) \qquad (10)$$

Demand for loans comes from the investors, who finance their entire investment with bank loans. In this connection, we divide aggregate investment into two parts. One part of investment is undertaken by the quality borrowers whom banks never ration, and the other part is undertaken by those investors whom banks ration. We denote the former by I_0 and the latter by I_1 and write the investment function as

$$I = I_0\big(r(r_p, \varepsilon_0)\big) + I_1\big(r(r_p, \varepsilon_1)\big) \qquad (11)$$

In (11), ε_0 and ε_1 denote expectations of the two types of borrowers. We assume here that at the given interest rate, non-quality investors are rationed in the credit market and investment

of the non-quality borrowers is determined by the supply of loans. Banks, however, ration credit. They give loans only to those whom they consider creditworthy. Normally, they cannot disburse as much credit as they want to. Taking this into account, we modify the loan supply equations (8) and (9) as follows:

Eq.(8),which gives the loan supply equation in the first case, is given by

$$L^s = I_0\left(r(r_p), \varepsilon_0\right) + \beta\left(\underset{-}{N}, \underset{-}{R}\right)\left[\left(\theta q(1-c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right]\right] \quad 0 < \beta \leq 1 \tag{12}$$

In the second case, eq.(9) is written as

$$L^s = I_0\left(r(r_p), \varepsilon_0\right) + \beta\left(\underset{-}{N}, \underset{-}{R}\right)\left[(1-\rho)(1-q-q_1)(1-c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right] \quad 0 < \beta \leq 1 \tag{13}$$

In (12) and (13), β denotes the fraction of the banks' potential supply of loans that banks are able to disburse to their non-quality borrowers. β is made a decreasing function of both N, which denote the stock of non-performing assets of the banks, and R, which denotes bank regulations that make banks more cautious regarding their lending behavior. Since, by assumption, banks ration credit, aggregate investment is determined by supply of bank credit. Hence investments in case 1 and case 2 are given by (14) and (15) respectively.

$$I = I_0\left(r(r_p), \varepsilon_0\right) + \beta\left(\underset{-}{N}, \underset{-}{R}\right)\left(\theta q(1-c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right) \tag{14}$$

$$I = I_0\left(r(r_p), \varepsilon_0\right) + \beta\left(\underset{-}{N}, \underset{-}{R}\right)\left[(1-\rho)(1-q-q_1)(1-c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right] \tag{15}$$

We first focus on the second case where capital adequacy norm does not act as a constraint.

4.1. The Case where Capital Adequacy Ratio Does Not Act as a Constraint on Loan Supply

Substituting (2), (3) and (15) into (1), we rewrite it as

$$Y = c.Y + I_0\left(r(r_p), \varepsilon_0\right) + \beta(N, R)\left[(1-\rho)(1-q-q_1)(1-c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right] + \frac{dH}{P} \tag{16}$$

The model is now given by two key equations (3) and (16) in two endogenous variables: Y and e. We can solve (16) for the equilibrium value of Y. Putting this equilibrium value of Y into (3), we can solve it for the equilibrium value of e.

We now carry out a comparative static exercise to explain the working of the model. Suppose the government raises its expenditure by dG and finances it by borrowing from the central bank so that $dG = d\left(\dfrac{dH}{P}\right)$. Taking total differential of (16) and solving for dY, we get

$$dY = \frac{d\left(\frac{dH}{P}\right)}{1 - \left[c + \beta.(1-\rho)(1-q-q_1)(1-c)\right]} \qquad (17)$$

Again, taking total differential of (3), using the fact that $X = pM$, where $p \equiv \frac{P^* e}{P}$, holds in the initial equilibrium, we get

$$de = \frac{pM_Y}{\frac{P^*}{P}M(\eta_X + \eta_M - 1)}dY = \left(\frac{pM_Y}{\frac{P^*}{P}M(\eta_X + \eta_M - 1)}\right).\left(\frac{d\left(\frac{dH}{P}\right)}{1 - \left[c + \beta.(1-\rho)(1-q-q_1)(1-c)\right]}\right)$$

$$(18)$$

In (18), $\eta_X \equiv \frac{p}{X}\frac{\partial X}{\partial p} \equiv$ price elasticity of export and $\eta_M \equiv -\frac{p}{M}\frac{\partial M}{\partial p} \equiv$ price elasticity of import.

Again, from (6) we get

$$d(dD) = (1-q-q_1)(1-c)\frac{Pd\left(\frac{dH}{P}\right)}{1 - \left[c + \beta.(1-\rho)(1-q-q_1)(1-c)\right]} \qquad (19)$$

Note that if $q = q_1 = \beta = 0$, we get our standard money supply formula:

$$d(dD) = \frac{1}{\rho}Pd\left(\frac{dH}{P}\right) \qquad (20)$$

(20) gives us the usual money supply formula. Again, when $q_1 > 0$, but $q = \beta = 0$, we get

$$d(dD) + dCU = dM^s = \frac{\frac{1}{1-q_1}}{\frac{q_1}{1-q_1} + \rho}Pd\left(\frac{dH}{P}\right) = \frac{1+\lambda}{\rho+\lambda}Pd\left(\frac{dH}{P}\right) \qquad (21)$$

In (21), $CU \equiv$ currency in circulation, $M^s \equiv$ money supply and $\lambda \equiv$ the ratio in which people hold their saving in currency and deposit. Thus, (21) also gives the standard money supply formula.

Let us now explain the adjustment process. Following an increase in G by dG financed by borrowing from the central bank, the multiplier process operates and Y increases by $\frac{dG}{1-c}$. During the multiplier process, transactions may be carried out with currency or bank deposits

or both. Let us explain the multiplier process a little. Per unit increase in Y, demand for domestic goods rises by $c - pM_y$. However, the increase in import demand raises the exchange rate by $\frac{pM_y}{b}$, where $b \equiv \frac{P^*}{P}M(\eta_x + \eta_m - 1)$ so that net export goes up by pM_y restoring BOP equilibrium. Therefore, in the net, demand for domestic goods rises by c per unit increase in Y. This explains the multiplier. Out of this additional income, people will save $(1-c).\frac{dG}{1-c} = dG$, which they will allocate over bank deposit, equities and currency. Out of this additional saving, banks will receive new deposits of $(1-q-q_1).dG.P$ and people will hold additional currency of $q_1.P.dG$. Out of this new deposits, banks will be able to extend new loans in real terms of $\beta.(1-q-q_1).dG$, which will raise planned investment by the same amount. At this point, the first round of transactions is complete. The first round increases in Y, e, dD, CU, L and I are denoted by $dY_1, de_1, dS_1, d(dD)_1, dCU_1, dL_1$ and dI_1 respectively and they are given by

$$dY_1 = \frac{dG}{1-c}, de_1 = \frac{pM_y}{b}dY_1, dS_1 = dG, d(dD)_1 = (1-q-q_1).P.dG, dCU_1 = q_1.P.dG,$$
$$dL_1 = \beta.(1-\rho).(1-q-q_1).P.dG \text{ and } dI_1 = \beta.(1-\rho).(1-q-q_1).dG$$

The increase in investment demand in the first round will set off the multiplier process and raise Y in the second round by $dY_2 = \frac{\beta.(1-\rho).(1-q-q_1).dG}{1-c}$, e in the second round will go

up by $de_2 = \frac{pM_y}{b}dY_2$. Similarly,

$$dS_2 = (1-c)dY_2, d(dD)_2 = (1-q-q_1)(1-c)PdY_2, dCU_2 = q_1(1-c)PdY_2,$$
$$dL_2 = \beta.(1-\rho).(1-q-q_1)(1-c)PdY_2 \text{ and } dI_2 = \beta.(1-\rho).(1-q-q_1)(1-c)dY_2$$

In the same way, third round changes are given by

$$dY_3 = \frac{[\beta.(1-\rho).(1-q-q_1)]^2}{1-c}.dG \quad , \quad de_3 = \frac{pM_y}{b}dY_3 \quad ,$$
$$dS_3 = (1-c)dY_3, d(dD)_3 = (1-q-q_1)(1-c)PdY_3, dCU_3 = q_1(1-c)PdY_3,$$
$$dL_3 = \beta.(1-\rho).(1-q-q_1)(1-c)PdY_3 \text{ and } dI_3 = \beta.(1-\rho).(1-q-q_1)(1-c)dY_3$$

This process of expansion will continue until the increase in Y that takes place in each successive round eventually falls to zero. Total changes in Y, e, dD and CU are given respectively by

$$dY = \frac{1}{1-c}.dG + \frac{[\beta.(1-\rho).(1-q-q_1)]}{1-c}.dG + \frac{[\beta.(1-\rho).(1-q-q_1)]^2}{1-c}.dG + \ldots\ldots =$$
$$= \frac{1}{(1-c)[1-\beta.(1-\rho).(1-q-q_1)]}.dG = \frac{1}{(1-c)[1-\beta.(1-\rho).(1-q-q_1)]}.d\left(\frac{dH}{P}\right)$$

(22)

$$de = \frac{pM_y}{b}dY \tag{23}$$

$$d(dD) = (1 - q - q_1)(1 - c)PdY, dCU = q_1(1 - c)PdY,$$
$$dM^s = dM^d = d(dD) + dCU = (1 - q - q_1)(1 - c)PdY \tag{24}$$

In (24), M^d denotes money demand. One can easily check that (22), (23) and (24) tally with (17), (18) and (19) respectively.

4.1.1. Recession, Banks and Bank Regulation

We shall now use the model developed above to examine how recessions affect banks and what the government's policy intervention should be in such a scenario. This is of considerable importance as, following the onset of recession in India since 2011-12, banks got into trouble as its stock of non-performing assets increased and became subject to close official scrutiny and concern (see Tables 1 and 2). To accomplish this task, we have to incorporate in our model the fact that N depends upon the state of the economy indicated by Y and on such factors as degree of supervision and monitoring, norms specified by the central bank for identifying non-performing assets etc. We denote these latter factors, which are exogenously given here, by ϕ. An increase in ϕ indicates an increase in the degree of strictness in supervision, monitoring etc. We, therefore, make N a decreasing function of Y and an increasing function of ϕ. Incorporating this in (16), we rewrite it as

$$Y = c.Y + I_0\left(r(r_p), \varepsilon_0\right) + \beta\left(N\left(\underset{-}{Y}, \underset{+}{\phi}\right) - \frac{d\overline{H}}{P}\right).\left[(1 - \rho)(1 - q - q_1)(1 - c)Y - I_0\left(r(r_p), \varepsilon_0\right)\right] + \frac{dH}{P} \tag{25}$$

In (25), $\dfrac{d\overline{H}}{P}$ denotes the stock of real balance created by the central bank to buy up the non-performing assets.

Using (25), we shall now examine how the effect of an adverse exogenous shock to the economy gets magnified manifold on account of the government's obsession with the non-performing assets of the banks. We assume here that on account of exogenous reasons, there takes place a fall in ε_0, which indicates a deterioration in the expectations regarding the future of the quality investors. We derive its impact here by taking total differential of (25) treating all exogenous variables other than ε_0 as fixed and, then solving for dY. This yields the following:

$$dY = c.dY + I_{0\varepsilon_0}d\varepsilon_0 + \beta_N N_Y.(1 - \rho)(1 - q - q_1)(1 - c)YdY +$$
$$\beta(1 - \rho)(1 - q - q_1)(1 - c)Y - \beta I_{0\varepsilon_0}d\varepsilon_0 \Rightarrow$$

$$dY = \frac{(1-\beta)I_{0\varepsilon}d\varepsilon_0}{1-[c+\beta_N N_Y.\{(1-\rho)(1-q-q_1)(1-c)Y-I_0\}+\beta(1-\rho)(1-q-q_1)(1-c)]} < 0 \quad , \quad \text{when}$$

$d\varepsilon_0 < 0$

....................(26)

From (26) it is clear that the extra caution that the banks have to adopt with the increase in their non-performing assets on account of government regulations makes the multiplier much larger than $\frac{1}{1-[c+\beta(1-\rho)(1-q-q_1)(1-c)]}$, the value that it otherwise would have assumed. This will be clear, if we explain the expression on the RHS of (26). The numerator gives that fall in aggregate investment at the initial equilibrium Y following the deterioration in the investors' sentiments. Thus, there emerges an excess supply given by the absolute value of the numerator at the initial equilibrium Y. To remove this, producers reduce Y. Per unit fall in Y, excess supply falls by unity. However, the unit fall in Y also reduces demand raising excess supply thereby. A unit fall in Y reduces consumption demand by c. It reduces saving and, thereby, potential supply of bank loan by $(1-c)$ and $\frac{(1-\rho)(1-q-q_1)(1-c)}{\beta}$ respectively. The unit fall in Y also raises N and lowers . Hence aggregate loan disbursement of banks and aggregate investment go down by $\beta(1-\rho)(1-q-q_1)(1-c)$. Hence, in the net, per unit decline in Y, excess supply falls by $1-[c+\beta(1-\rho)(1-q-q_1)(1-c)]$. However, governments' efforts at arresting the growth of non-performing assets forces banks to be extra cautious and reduces loan disbursement and investment further by $\beta_N N_y(1-\rho)(1-q-q_1)(1-c)Y$. Therefore, per unit decline in Y, excess supply instead of falling by $1-[c+\beta(1-\rho)(1-q-q_1)(1-c)]$ falls by a smaller quantity given by $1-[c+\beta(1-\rho)(1-q-q_1)(1-c)+\beta_N N_y\{(1-\rho)(1-q-q_1)(1-c)Y-I_0\}]$. Hence, the multiplier becomes much larger. This explains (26).

Similar outcome is observed following the outbreak investment pessimism under the regime of fixed exchange rate system as shown by (27). However the degree of magnification is this case will be relatively lower owing to the counter balancing fall in the import due to contraction of real income.

$$dY = \frac{(1-\beta)I_{0\varepsilon}d\varepsilon_0}{1-[c+\beta_N N_Y.\{(1-\rho)(1-q-q_1)(1-c)Y-I_0\}+\beta(1-\rho)(1-q-q_1)(1-c)+pM_Y]} < 0 \quad ,$$

$d\varepsilon_0 < 0$

since

Thus we have the following proposition:

Proposition 1: On account of the kind of regulations and pressures banks are subject to in the post-reform period in India, the effect of an exogenous decline in aggregate demand gets magnified manifold bringing about a deep recession.

4.1.2. Appropriate Counter – Recessionary Policy of the Government

The government can tackle the situation by raising G by a suitable amount and financing it by creating money. We can show the impact of this policy by taking total differential of (25), and setting $-(1-\beta)I_{0\varepsilon}d\varepsilon_0 = d\left(\dfrac{dH}{P}\right)$. This yields

$$dY = c.dY + (1-\beta)I_{0\varepsilon}d\varepsilon_0 + \beta_{\bar{N}}N_Y I_0 dY + \beta_{\bar{N}}N_Y.\left[(1-\rho)(1-q-q_1)(1-c)Y\right]dY +$$

$$\beta\left[(1-\rho)(1-q-q_1)(1-c)dY\right] + d\left(\dfrac{dH}{P}\right) \Rightarrow dY = 0$$

From the above it follows that if the government raises G by the amount of the autonomous decline in investment demand and finances it by money creation, Y will be restored to its initial level and the economy, banks and investors will again become healthy. Otherwise, the economy will slip into a deep recession and the banks and the investors will plunge into deep trouble. This gives us the following proposition:

Proposition 2:

If there takes place au autonomous decline in aggregate demand for exogenous reasons plunging the economy into a recession, the best way of tackling it is to raise government expenditure by the same amount as the autonomous fall in aggregate demand and finance it by money creation. It will restore the economy, banks and the firms back to health.

From the above it follows that a recession should be tackled by an appropriate stabilization policy at the macro level. If instead, firms and banks are taken to task for the losses they make on account of factors, which are completely beyond their control and which stem from the very nature of a capitalist economy, the recession and plight of the forms and banks will deepen instead of the other way round.

Illustration in a Dynamic Set-Up

To illustrate the impact that the government's regulations produce on banks as their stock of non-performing assets increases with the onset of recession, we dynamize the model presented above. We make the stock of non-performing assets of period t a decreasing function of Y_{t-1} and $\dfrac{d\bar{H}}{P}$ and an increasing function of ϕ. Thus,

$$N_t = n.\left(\overline{Y} - Y_{t-1}\right) + \phi - \frac{d\overline{H}}{P} \qquad n > 0, \phi > 0 \tag{27}$$

In (27), $\overline{Y}$ is a constant and it denotes the full employment level of output. Using (27), we rewrite (14) (making some simplifications for algebraic convenience) as

$$Y_t = cY_t + \overline{I} + \beta.\left[(1-\rho).(1-q-q_1).(1-c)Y_t - \overline{I}\right] - \varphi.\left[n.\left(\overline{Y} - Y_{t-1}\right) + \phi - \frac{d\overline{H}}{P}\right] + \frac{dH}{P} \tag{28}$$
$$n > 0, \varphi > 0$$

In (28), we have assumed that the quality investors' investment is exogenously given and denoted it by $\overline{I}$, regarded β as fixed and captured the deleterious impact of an increase in the stock of non-performing assets on credit supply and investment due to government regulations by means of the term $\varphi.\left[n.\left(\overline{Y} - Y_{t-1}\right) + \phi - \frac{d\overline{H}}{P}\right]$. All this has been done for simplicity.

We rewrite (28) as

$$Y_t = \frac{(1-\beta)\overline{I} + \dfrac{dH}{P} - \varphi\left(n\overline{Y} + \phi - \dfrac{d\overline{H}}{P}\right)}{1 - \left[c + \beta.(1-\rho).(1-q-q_1)\right]} + \frac{\varphi n}{1 - \left[c + \beta.(1-\rho).(1-q-q_1)\right]} Y_{t-1} \tag{29}$$

We assume that the first term on the RHS of (29) is positive. We also assume for the sake of existence and stability of the steady state that the coefficient of Y_{t-1} lies between 0 and 1. The line YY in Figure 1 represents (29). The steady state value of Y corresponds to the point of intersection of YY and the 45^0 line. Suppose there takes place a deterioration in the quality investors' morale for exogenous reasons and this brings about a fall in $\overline{I}$ by $d\overline{I}$. Following this, the YY shifts downward bringing about a cumulative decline in Y and, therefore,

4.1.3. Effect of an Autonomous Fall in Investment Demand

Figure 1
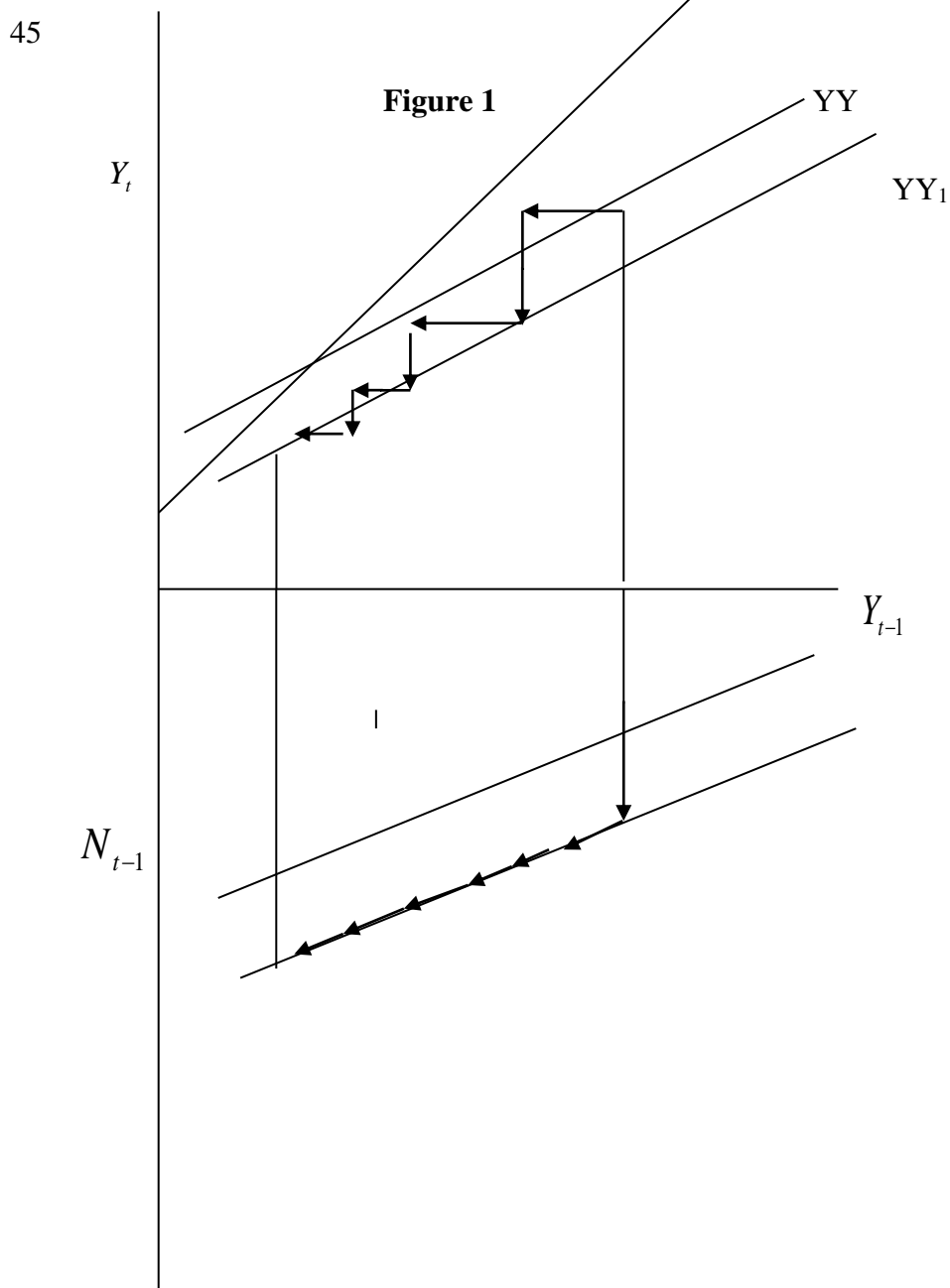
a cumulative increase in the stock of non-performing assets. These cumulative changes have been indicated by arrows. The process may be briefly explained as follows. Following an exogenous decline in quality investors' investment in period 0 by $d\bar{I}$, the multiplier process operates and in period 0, Y goes down by $\dfrac{(1-\beta)d\bar{I}}{1-c+\beta.(1-\rho).(1-q-q_1)(1-c)}$. Let us explain this expression. Following the fall in output by $(1-\beta)d\bar{I}$, aggregate consumption falls by

$c.(1-\beta)d\bar{I}$. On the other hand, aggregate saving and bank deposits decline by $(1-c)(1-\beta)d\bar{I}$ and $(1-q-q_1)(1-c)(1-\beta)d\bar{I}$ respectively. Hence, disbursement of bank loans and, therefore, investment fall by $\beta(1-q-q_1)(1-c)(1-\beta)d\bar{I}$. Accordingly, aggregate demand and, therefore, aggregate output go down by $[c+\beta(1-q-q_1)(1-c)](1-\beta)d\bar{I}$. This multiplier process of contraction will continue and at the end of the process, aggregate output will fall by $\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]}$. In the absence of government's obsessive concern with non-performing assets of banks and the efforts it makes to arrest the growth of non-performing assets by forcing banks to follow stricter norms of bank lending, the contraction in GDP would have stopped here. But the latter factors lead to further rounds of contraction in GDP. In the next period, period 1, because of the contraction in GDP in period 0, banks' stock of non-performing assets rises by $n.\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]}$. It forces banks to adhere to stricter lending norms stipulated by the central bank and, as a result, bank lending falls further by $\varphi n\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]}$, which, through the multiplier process described above, reduces GDP in period 1 by $\varphi n\dfrac{(1-\beta)d\bar{I}}{\{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]\}^2}$. This leads to further increase in the stock of non-performing assets by $\varphi n^2\dfrac{(1-\beta)d\bar{I}}{\{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]\}^2}$ in period 2 and reduces GDP by $(\varphi n)^2\dfrac{(1-\beta)d\bar{I}}{\{1-[c+\beta.(1-\rho).(1-q-q_1)(1-c)]\}^3}$. This process of contraction will continue until the new steady state is reached. The contraction in Y that takes place from period 1 is quite substantial and is entirely due to government's policies towards banks' non-performing assets. Since non-quality borrowers comprising the small and medium borrowers are rationed, when lending norms are tightened, concentration and inequality increase along with the deepening of recession. The above analysis yields the following proposition:

Proposition 3: Stricter lending norms imposed on banks following an onset of recession and the consequent increase in the stock of non-performing assets of banks to arrest the growth of their non-performing assets substantially deepen recession and exacerbate the problem of non-performing assets. They also significantly increase degree of concentration and inequality.

Clearly, the situation calls for suitable policy intervention on the part of the central bank to avert the crisis. It is quite clear from (29) that, if the government raises $\dfrac{dH}{P}$ by the same amount as the fall in $(1-\beta)\bar{I}$, the YY schedule in Figure 1 will remain unaffected and the fall in Y and the increase in non-performing assets can be averted. Thus, instead of taking to task

the victims of recession, the government should adopt appropriate, well-informed anti-recessionary policies to keeps banks and other economic agents healthy. Otherwise, recession and inequality and along with them economic woes of banks and other economic agents will deepen.

4.2. Case of Capital Adequacy norm being binding constraint

In this case the supply of equity issued by the banks is greater than the demand for the equity. i.e $E_S \geq E_D$. Thus as what follows from the expression of E_D and the equation showing the relation between CRAR (θ) and supply new of loans (L_S):

$$L_S = \theta q(1 - c)Y \text{.......(30)}$$

Given , banks ration the non-quality borrowers and investments made by the quality borrowers depends on the rigid interest rate($\bar{r}$) and future profit expectation (ε_0), the amount aggregate private investment is $I(\bar{r}, \varepsilon_0) + \beta[\theta q(1 - c)Y - I(\bar{r}, \varepsilon_0)]$. Thus, the restated product market equilibrium condition is :

$$Y = cY + I(\bar{r}, \varepsilon_0) + \beta[\theta q(1 - c)Y - I(\bar{r}, \varepsilon_0)] + G + X\left(\frac{eP*}{P}, Y^*\right) - \frac{eP*}{P}M\left(\frac{eP*}{P}, Y\right)$$

However given , that the exchange is flexible in nature and therefore an disequilibrium in the foreign exchange is eliminated by the commensurate adjustment in foreign exchange rate , $X\left(\frac{eP*}{P}, Y^*\right) - \frac{eP*}{P}M\left(\frac{eP*}{P}, Y\right)$ is effectively a vanishing term in the product market equilibrium condition which henceforth can restated as :

$$Y = cY + I(\bar{r}, \varepsilon_0) + \beta[\theta q(1 - c)Y - I(\bar{r}, \varepsilon_0)] + G \dots \dots (31)$$

Now we shall look at the multiplier effect of increase in G on Y.

This can be determined by totally differentiating (2) holding everything other than G constant and this yields :

$$dY = \frac{dG}{1 - [c + \beta\theta q(1 - c)Y]} \dots \dots \dots \dots (32)$$

Now the impact of rise in G on exchange rate e can be determined from the following equation

$$de = \frac{pM_Y}{\frac{P*}{P}[\eta_X + \eta_M - 1]} dY$$

as

$$de = \frac{pM_Y}{\frac{P*}{P}[\eta_X + \eta_M - 1]}\left[\frac{dG}{1 - [c + \beta\theta q(1 - c)Y]}\right] \dots \dots \dots (33)$$

The multiplier effects stated above can be explained intuitively. Following an increase in G by dG , *ceteris paribus* , leads an increase in aggregate demand for goods and services and

thereby an excess demand in the product market. Now to make the product revert to the equilibrium real aggregate output Y needs to rise. No following an unitary rise in Y , excess demand falls by $1 - [c + \beta\theta q(1 - c)Y$. This is so because an unitary increase in Y raises the consumption by c units and savings by (1-c)units. Now out of this increased saving the demand for equity issued by the banks rise by $q(1 - c)$ units. Given, that the amount the banks can raise by issuing equity is constrained by the its demand and supply of new is in turn contingent upon the amount of equity that the banks can sell, the supply of loans goes up by $\beta\theta q(1 - c)$.The increase in the supply of new loans results in the rise in investment by $\beta\theta q(1 - c)$. Moreover, import will increase consequent upon the unitary increase in Y to the tune of pM_Y; but the exchange rate being flexible will rise to raise net export by pM_Y so that the trade balance rebounds to zero balance. Thus , after Y rises by one unit , excess demand falls by $1 - [c + \beta\theta q(1 - c)Y]$ and hence to offset the excess demand coming up against the rise in dG , Y has to rise increase by value of the multiplier effect.

Again, the increase in Y leads to an increase in import at the rate of pM_Y for every one unit rise . This in turn leads to deficit in balance of trade , given that it was in zero balance initially and hence excess demand in the foreign exchange market by pM_Y in terms of the domestic goods. Now since exchange rate is flexible , this excess demand will prompt an increase in the exchange rate which in turn will clear the foreign exchange market ; thereby restoring balance of trade in balance . Now if foreign exchange rate rise by one unit ,excess demand in the foreign exchange market declines by $\frac{P*}{P}[\eta_X + \eta_M - 1]$ and therefore following an unitary increase in Y , foreign exchange rate has to rise by $\frac{pM_Y}{\frac{P*}{P}[\eta_X + \eta_M - 1]}$. Thus, we have the result that the rise in exchange rate following an increase in G by dG as what is illustrated in (33).

4.2.1. Impact of adverse invest sentiments on Y

Now we shall look at the consequence of the worsening of the investment sentiment on real aggregate output as illustrated by a fall in ε_0 indicating a deterioration of expectation of the quality borrowers about future profit. At, we shall examine the impact of this adverse shock on Y mathematically by the totally differentiating (31) holding everything else other than ε_0 constant. Thus we have what follows below.

$$dY = \frac{(1 - \beta)I_{\varepsilon_0}d\varepsilon_0}{1 - [c + \beta\theta q(1 - c)Y]} \ldots\ldots.(34)$$

The above can be explained intuitively . The worsening of future profit expectation would result in the contraction of private investment by $(1 - \beta)I_{\varepsilon_0}d\varepsilon_0$. Now the excess supply that would arise as a result of this contraction would require a fall in Y to make the product market rebound to equilibrium. Now for every unitary fall in Y , excess supply in the product market declines by $1 - [c + \beta\theta q(1 - c)Y]$ and this shows that the required fall in Y is what is illustrated in (5). Now it is emergent that the degree of multiplier effect depends on θ which stands for the regulated capital adequacy ratio and so is that a higher is θ greater is the intensity of impact of the adverse investment sentiment. Thus we have following proposition

Proposition 4:   The presence of regulatory on norm on capital adequacy deepens the deleterious consequence of any adverse investment shock. Moreover, higher the capital adequacy ratio more exorbitant is the contraction of aggregate output resulting in from such investment pessimism.

Let us now make the analysis a bit deeper by the introducing a linkage between the stock of non-performing assets(N) and the fraction of total supply of new loan extended to the non-quality borrowers. It is in this way that rise in N makes the banks more skeptical in lending to the non –quality borrowers. Thus we have :

$N = N(\bar{Y} - Y), N_y > 0$ and $y = \bar{Y} - Y$ ....(35)

$\beta = \beta(N)$, $\beta_N < 0$.........(36)

Revising the product market equilibrium condition incorporating (6) and (7) and carrying out the comparative exercise with respect to G on Y and e gives us the following.

$$dY = \frac{dG}{1 - [c + \beta\theta q(1 - c) - \beta_N N_y \{\theta q(1 - c)Y_0 - I_0\}]} \dots \dots \dots \dots (37)$$

and

$$de = \frac{pM_Y}{\frac{P}{P} * [\eta_X + \eta_M - 1]} \left[\frac{dG}{1 - [c + \beta\theta q(1 - c) - \beta_N N_y \{\theta q(1 - c)Y_0 - I_0\}]} \right] \dots \dots \dots (38)$$

The third term in $(3)'$ reflects the rise in the credit disbursement to the non-quality borrowers following the fall in the non-performing with the improvement in the aggregate demand condition brought about by the rise in G and resultant contraction in the output gap . This makes the multiplier effect more intense than it was in the previous situation as evident from the difference of $(3)'$ from (3) as $\beta_N(-N_y)$ is positive.

Similar consequence will be witnessed when quality borrowers turns pessimistic about the prospect . This has been illustrated below where (6) and (7) have been incorporated in (5).

$$dY = \frac{(1 - \beta)I_{\varepsilon_0} d\varepsilon_0}{1 - [c + \beta\theta q(1 - c) - \beta_N N_y \{\theta q(1 - c)Y_0 - I_0\}]} \dots \dots \dots (39)$$

Thus the contraction of Y will be much more cogent as result of the bearish outlook of the quality borrowers.

There can be another variant of this analysis where the willingness of the non-bank public to hold shares issued by the banks is affected by the rise in non-performing asset. This is because , an increase in non-performing assets in the banks will attenuate their net worth and thereby the market value of the banks ; so is their share price .Thus, it is worth relating the

fraction of savings held in bank shares with the stock of non-performing ; where a rise in the stock of non-performing asset associated with the fall in q. Therefore , we have the following:

$$q = q(N) , \qquad q' < 0 \dots\dots\dots\dots (40)$$

Now incorporating the responsiveness of propensity to save in form banks' shares in (3) and (4) we get following.

$$dY = \frac{dG}{1 - [c + \beta\theta q(1-c)Y + \{\beta_N q + q'\}(-N_y)\theta(1-c)Y]} \dots\dots\dots\dots (41)$$

and

$$de = \frac{pM_Y}{\frac{P*}{P}[\eta_X + \eta_M - 1]}\left[\frac{dG}{1 - [c + \beta\theta q(1-c)Y + \{\beta_N q + q'\}(-N_y)\theta q(1-c)Y]}\right] (42)$$

The revelation of $(3)''$ suggest that the multiplier effect of increase in government expenditure will be stronger to the extent to which an improvement in the state of aggregate demand emanating from the expansionary fiscal policy escalates the net worth of the banks and raises the fraction of the increased savings invested in banks' shares by $q'(-N_y)\theta q(1 - c)$ for every unitary increase in Y. The reason being that the availability of more funds in form of equity will result in the expansion in the supply of new loans given that the capital adequacy norm is binding.

The impact of the bearish investment sentiments can be also recast in the light of the afore mentioned as shown below.

$$dY = \frac{(1 - \beta)I_{\varepsilon_0}d\varepsilon_0}{1 - [c + \beta\theta q(1-c)Y + \{\beta_N q + q'\}(-N_y)\theta(1-c)Y]} \dots\dots\dots (43)$$

The reason behind the adverse impact of the worsening expectation of future profit being more intense is that the aggregate demand shock arising therein leads to the accumulation of non-performing asset which in turn makes people unwilling to invest in the shares in anticipation of the deterioration of share price following the decline in the banks' net worth. This contraction in Y in turn leads to the furtherance of the non-performing assets. Thus we have the following proposition .

Proposition 4: Introduction of net worth effect of non-performing assets exacerbates the recession arising out of investment pessimism and in turn makes the problem more acute.

Dynamic Illustration of the malignant effect of CRAR

To trace out the counterproductive nature of CRAR we consider a linear functional expression of the non-performing asset as

$$N_t = n(\bar{Y} - Y_{t-1}) + \emptyset - \frac{d\bar{H}}{P}; n, \emptyset > 0 \dots \dots (1)$$

$$q_t = \delta N_t, \delta < 0 \dots \dots (2)$$

Substituting (1) and (2) in the product market equilibrium condition (as shown below)

$Y_t = cY_t + \bar{I} + \beta[\theta q(1-c)Y_t - \bar{I}] + G$, we have:

$$Y_t = cY_t + \bar{I} + \beta\left[\theta\delta\{n(\bar{Y} - Y_{t-1}) + \emptyset - \frac{d\bar{H}}{P}\}(1-c)Y_t - \bar{I}\right] + G \dots \dots \dots \dots (3)$$

Now solving (3) for Y_t we find the equilibrium level of output in period t as

$$Y_t = \frac{(1-\beta)\bar{I} + G}{1 - [c + \{\beta\theta\delta n(\bar{Y} - Y_{t-1}) + \emptyset - \frac{d\bar{H}}{P}\}(1-c)]} \dots \dots (4)$$

The above equation depicts that the equilibrium level of output in period t i.e.Y_t depends on the equilibrium level of output in period t i.e. Y_{t-1}.Moreover, it is revealed hereby that a higher Y_{t-1} is associated with Y_t .The reason being that a higher output in the previous period leads to a lower gap with respect to $\bar{Y}$ so that the stock of non-performing asset in period t is lower , resulting in the improvement in the net worth , given everything else remaining unchanged . This henceforth will prompt a greater holding of the banks' equity and thereby results in the increased demand for equity. Now given the binding nature of capital adequacy norm , greater is the demand for equity larger is the room available to the banks in extending loans. As a result, the supply of new loans gets increase which translates in to higher private investments and thereby higher Y_t.

Mathematically, the positive relation between Y_t and Y_{t-1} can traced out by differentiating (4) with respect to Y_{t-1} as what follows.

$$\frac{dY_t}{dY_{t-1}} = -\gamma\beta\theta\delta n > 0 \dots \dots (5)$$

where

$$\gamma = \frac{(1-\beta)\bar{I} + G}{[1 - [c + \{\beta\theta\delta n(\bar{Y} - Y_{t-1}) + \emptyset - \frac{d\bar{H}}{P}\}(1-c)]]^2}$$

Now one can attempt to ramify the current exercise into two basic possibilities as :

Possibility I: $\quad 0 < \dfrac{dY_t}{dY_{t-1}} < 1$

Possibility II: $\quad \dfrac{dY_t}{dY_{t-1}} > 1$

The implication of each possibility for the impact of investment pessimism can be depicted in the light of the phase diagrams illustrating the difference equation (3) denoted by YY schedule , the slope of which is as defined by (5).

In the fig.2, it has been shown that after the investment pessimism gains ground the economy moves from A to A_1 as the adjustments runs through new YY schedule YY_2 resulting in the cumulative contraction of real aggregate output and rise in non-performing asset from B to B_1
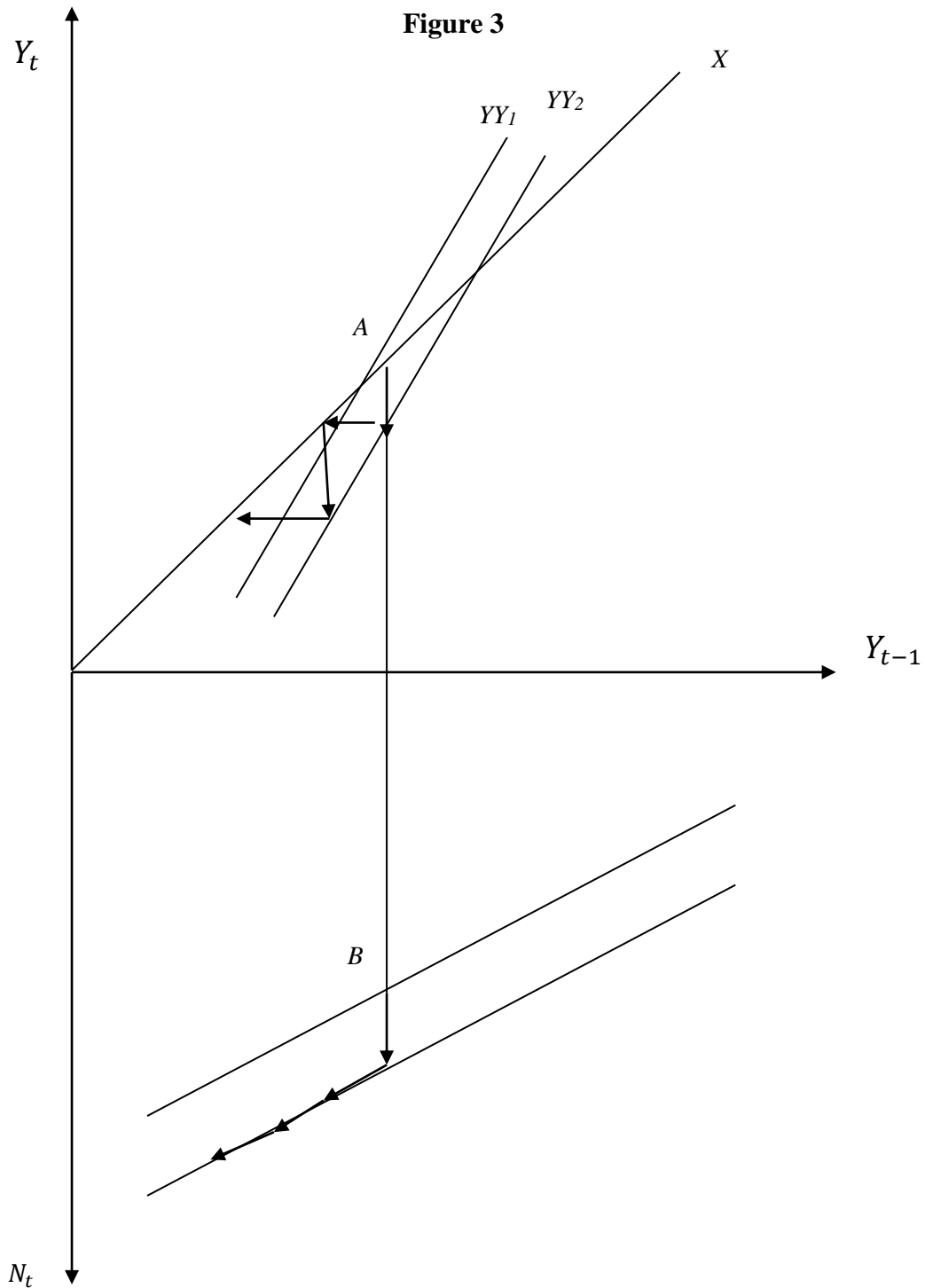

Figure 2

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Figure 3
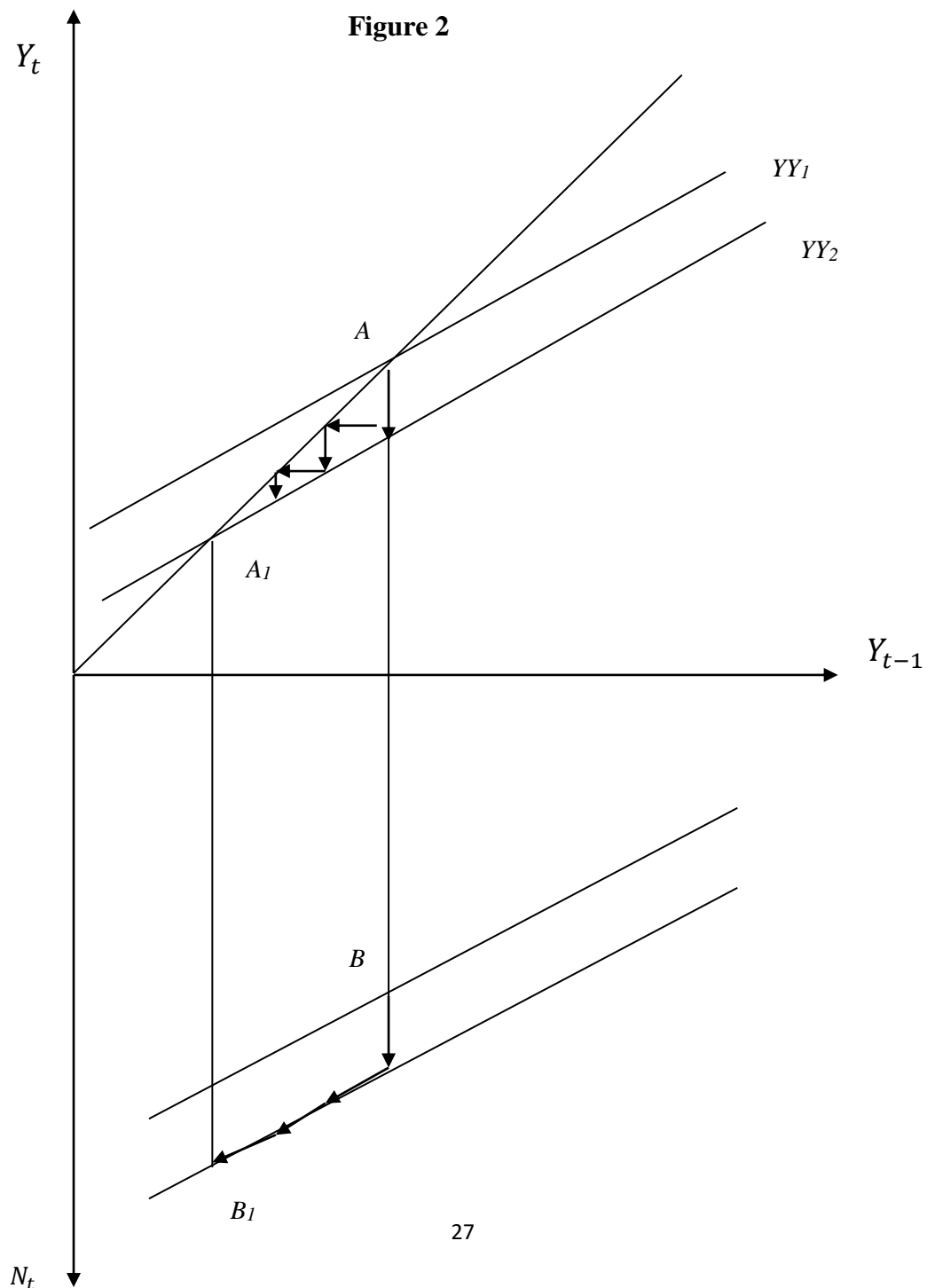
Fig.3 hints at the unstable steady state equilibrium where after the outbreak of investment pessimism gains ground the economy moves from *A* permanently resulting in the perpetual contraction of real aggregate output and rise in non-performing asset from *B*.

Let us now explain the process leading to the contraction of Y in successive time periods following the decline in investment $(\overline{I})$ due to the deterioration of the future profit expectations in period t. Following the contraction of investment by $d\overline{I}$, the negative

multiplier effect sets in leading to the fall in Y by $\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta\{q+n\delta Y\}\theta(1-c)]}$ units. In the next period , there occurs a rise in non-performing asset to the tune of $n\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta\{q+n\delta Y\}\theta(1-c)]}$ and as a result of which the propensity to save in banks' share dips by $\delta n\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta\{q+n\delta Y\}\theta(1-c)]}$. Thus in period t+1, supply of new loans declines setting in the second bout of the negative multiplier effect on Y to the tune of $\delta n\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta\{q+n\delta Y\}\theta(1-c)]^2}$. Now as the effect wades through time, in period t+2 Y falls by $\delta n^2\dfrac{(1-\beta)d\bar{I}}{1-[c+\beta\{q+n\delta Y\}\theta(1-c)]^3}$ and this goes on until the new steady state is arrives at, given that possibility I is true. However, the fall in Y will be perpetual if possible II is true where the economy never rebounds to the new steady state . Now, it is to be noted herein that had there been no such capital adequacy restriction ,the fall in Y would not have been transmitted to the successive time periods and hence the recession would been less prolonged. Thus we have following proposition .

Proposition 5: The attempt to regulate capital adequacy of the banks acts as an in-built distabilizer as it accentuates the macroeconomic crisis ushered in by the investment pessimism and thereby the makes the problem of non-performing assets more rampant.

5. Banking Crisis, Macroeconomic Spill and Capital Adequacy Norms

This section highlights a crucial implication of the capital adequacy norms to be adhered by the commercial banks for the spill-over effect of any fault within the banking sector say due to any exogenous rise in NPA owing to the some reason(s) (such as financial malpractice or financial frauds on part of debtors) internal to the banking sector on the economy as a whole. This analysis begins with reshaping the expression of NPA through the incorporation of exogenous component $\bar{N}$ as :

$$N = \bar{N} + N_1(Y,R) \dots\dots.(44)$$

Now in the in the light of the above the goods market equilibrium can be restated under the case of non-binding capital adequacy norm and that of the binding one as (45) and (46) assuming that the exchange rate regime is flexible .

$$Y = cY + I_0 + \beta\big(\bar{N} + N_1(Y,R)\big)[(1-\rho)(1-q-q_1)(1-c)Y - I_0] + G \dots\dots\dots\dots\dots(45)$$

$$Y = cY + I_0 + \beta\big(\bar{N} + N_1(Y,R)\big)[\theta(1-q)(1-c)Y - I_0] + G \dots\dots\dots\dots\dots(46)$$

The mechanism through which the eruption of the crisis within the banking sector due to the exogenous rise in NPA eventually gives shape to an economy-wide crisis , which is what can be regarded as the macroeconomic spill-over, can be illustrated by the differentiating (45) and (46) totally holding everything constant except $\bar{N}$. Thus we have the following results:

$$dY = \frac{\beta_N \, d\overline{N}}{1 - [c + \beta(1-\rho)(1-q-q_1)(1-c) + \beta_N N_1\{(1-\rho)(1-q-q_1)(1-c)Y - I_0\}}$$

$$\dots\dots\dots\dots\dots(47)$$

$$dY = \frac{\beta_N \, d\overline{N}}{1 - [c + \beta\theta(1-q)(1-c) + \beta_N N_1\{\theta(1-q)(1-c)Y - I_0\}}$$

$$\dots\dots\dots\dots\dots(48)$$

Moreover the ultimate effect on the accumulation of NPA of the initial exogenous rise in it can be determined as :

$$dN = \frac{\beta_N \, N_1 d\overline{N}}{1 - [c + \beta(1-\rho)(1-q-q_1)(1-c) + \beta_N N_1\{(1-\rho)(1-q-q_1)(1-c)Y - I_0\}}$$

$$\dots\dots\dots\dots($$

49)

$$dN = \frac{\beta_N \, N_1 d\overline{N}}{1 - [c + \beta\theta(1-q)(1-c) + \beta_N N_1\{\theta(1-q)(1-c)Y - I_0\}}$$

$$\dots\dots\dots\dots.(50)$$

Let us explain the implication of the above results towards the macroeconomic spill-over of the worsened financial health of the banks resulting from an exogenous increase in NPA. It is obvious that an adverse development in the banking sector will disrupt the credit flow in the economy and thereby will hamper the investment which in turn will drive the economy into a crisis. Now this transmission of the crisis within banks into the overall economy will more cogent in presence of the norms restricting the loan making by the banks. This is what is reflected by the term $[\beta_N N_1\{(1-\rho)(1-q-q_1)(1-c)Y - I_0]$, which is essentially the second round effect of an exogenous rise in NPA by $d\overline{N}$ arising out of the contraction of Y due to decline investment to the tune of $[\beta_N \, N_1 d\overline{N}]$ as the first round effect. Now this second round effect in turn takes the contraction in Y in to further step to bring about a more magnified form of economy wide and thereby, a more severe macroeconomic spill-over. Moreover as evident from (48) in case the capital adequacy norm in binding, the degree of the macroeconomic spill-over of an exogenous rise in NPA is sensitive the regulation on capital to–risk weighted asset ratio.

Besides, due to the macroeconomic spill-over the crisis of bad debt in the banking sector becomes accentuated as evinced by the multiplier effect on NPA denoted by dN vide (49) and (50). The binding CRAR norms added more to the multiplication of NPA following an exogenous accretion of the same.

6. Conclusion

Banks perform very important social functions. They mobilize savings of the savers and transfer them to the borrowers. Banks cannot perform these functions effectively if they are commercial organizations, whose objective is to make profit and whose viability depends upon whether they are able to make profit. As enshrined in Indian Constitution and, as should be the responsibility of every civilized society, to provide equal opportunity to everyone, every individual should have access to a safe avenue for holding their savings. Banks cannot achieve this, if they are commercial organizations. If they are commercial organizations, they may not consider it profitable to make themselves accessible to every saver. Moreover, they will be subject to vagaries of capitalist market forces. Hence, their liabilities will not be fully safe. They will, therefore, not be able to fully mobilize all the savings of the savers. In fact, the kind of instabilities that a capitalist economy is usually subject to and given the performance of banks in advanced capitalist economies, banks are unlikely to have any access to the major part of savings of the savers. Thus, for banks to be able to effectively mobilize savings generated in the economy, they have to be social institutions owned by the government and protected by the government fully from the vagaries of market forces. Again, an economy, to perform efficiently and equitably, should meet all the genuine credit needs of people and firms - credit needs that arise out of the necessity of producing and/or consuming essential goods. Again, when banks are commercially organized, they will disburse credit on the basis of profit criteria. Hence, they will ration small and medium producers, even when they are engaged in the production of essential goods, while credit needs of quality borrowers, even when they use the credit to produce luxury goods, are fully met (see in this connection Bernanke, Gertler and Gilchrist(1996)). This may lead to severe macroeconomic instability giving rise to shortages of food and other mass consumption goods and large imports of components required for luxury production. These large non-essential imports may lead to steep increase in exchange rate raising domestic price level and, thereby, worsening trade balance further. Shortages of mass consumption goods coupled with steep increase in the exchange rate generate strong inflationary and recessionary forces. Thus, when banks are commercially organized in a poor and dependent country like India, they fail to meet genuine credit needs of the economy and profit driven bank credit allocation may generate strong destabilizing inflationary and recessionary forces. Banks should be treated as social institutions owned and protected by the government from the vagaries of market forces. They should mobilize saving to the fullest possible extent by providing every individual with a fully safe avenue of saving and utilize the savings to meet all genuine essential credit needs of the economy. Private profit driven banks perpetrate the kind of disasters that we witnessed in 1991 in Japan, in 2007 in the US and in 2008 in Europe.

Commercially organized banks, as pointed out above and as amply evidenced by the disastrous experiences of the advanced capitalist countries, give rise to severe

macroeconomic instability through gross misallocation of bank credit (see in this connection (Blinder and Zandi (2010[a], 2010[b]), Mishkin (2011), Koo (2008) et al.)

Commercially organized banks, public or private, are subject to vagaries of market forces and, as argued in the present paper, government's effort at arresting the growth of their non-performing assets following an onset of recession may deepen the recession significantly.

Government, therefore, should regard banks as social institutions that work not for profit, but for maximizing the welfare of the masses. Such banks will provide stability to the economy and help it realize its full development potential. Commercially organized banks driven by profit motive are a source of instability, inequality and economic disaster.

Commercially organized profit driven financial institutions create an island of immense opulence in the midst of country-wide unemployment and poverty and regularly cause crises, which gravely exacerbate economic woes of the masses.

Table 1: Non-Performing Asset in Absolute Terms and as Percentage of Total Advance in Four Bank-Groups

	GNPA (in billion rupees)				GNPA(as % of total advances)			
Year	Scheduled	Public	Private	Foreign	Scheduled	Public	Private	Foreign
2015	6119.47	5399.56	561.86	158.05	7.5	9.3	2.8	4.2
2014	3233.35	2784.68	341.06	107.61	4.3	5.0	2.1	3.2
2013	2633.72	2272.64	245.42	115.65	3.8	4.4	1.8	3.9
2012	1935.09	1644.61	210.71	79.77	3.2	3.6	1.8	3.1
2011	1423.26	1172.62	187.68	62.97	3.1	3.3	2.2	2.8
2010	979.00	746.00	145.00	50.00	2.5	2.4	2.7	2.5
2009	846.98	599.26	140.17	71.33	2.4	2.2	2.9	4.3
2008	683.28	449.57	138.54	64.44	2.3	2.0	3.1	3.8
2007	563.09	404.52	104.40	28.59	2.3	2.2	2.5	1.8
2006	504.86	389.68	62.87	22.63	2.5	2.7	1.9	1.8
2005	510.97	413.58	40.52	19.28	3.3	3.6	1.7	1.9
2004	593.73	483.99	45.82	21.92	5.2	5.5	3.6	2.8
2003	648.12	515.37	59.83	28.94	7.2	7.8	5.0	4.6
2002	687.17	540.90	72.32	28.45	8.8	9.4	7.6	5.3
2001	708.61	564.73	68.11	27.26	10.4	11.1	8.9	5.4
2000	637.41	546.72	16.17	31.06	11.4	12.4	5.1	6.8
1999	604.08	530.33	9.46	26.14	12.7	14.0	4.1	7.0
1998	587.22	517.10	8.71	23.57	14.7	15.9	6.2	7.6
1997	508.15	456.53	3.92	19.76	14.4	16.0	3.5	6.4
1996	473.00	435.77	2.17	11.81	15.7	17.8	2.6	4.3

Source:Database on Indian Economy, India

Table 2: Annual Growth Rate of GDP at Constant Prices

Year	Growth Rate Of GDP At Factor Prices (Base Year 2004-05)	GVA at Basic Prices Base Year 2011-12 New Series
1990-91	5.3	
1991-92	1.4	
1992-93	5.4	
1993-94	5.7	
1994-95	6.4	
1995-96	7.3	
1996-97	8.0	
1997-98	4.3	
1998-99	6.7	
1999-00	8.0	
2000-01	4.1	
2001-02	5.4	
2002-03	3.9	
2003-04	8.0	
2004-05	7.1	
2005-06	9.5	
2006-07	9.6	
2007-08	9.3	
2008-09	6.7	
2009-10	8.6	
2010-11	8.9	
2011-12	6.7	
2012-13	4.5	5.4
2013-14	4.8	6.1
2014-15		7.2
2015-16		7.9
2016-17		6.6

Source: RBI

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