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抵押貸款、金融中介、與金融危機的關係研究

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計畫編號：NSC 89－2416－H－004－006－
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計畫主持人：胡聯國教授
共同主持人：

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ABSTRACT

My study basically extends the works of Mankiw (1986), Bernanke & Gertler (1990) and Holmstrom & Tirole (1997) in examining the macroeconomic consequences of financial imperfection. By taking into account of the collateral used by a bank to mitigate the problem of information asymmetry, this paper shows that our financial system has built in an intrinsic mechanism that will magnify the impact of government's monetary policy, fiscal policy as well as exogenous shock on the economy. Moreover, although this magnification effect will gradually subside as the economy expands, it will be enhanced in response to economic contraction and may eventually trigger the death spiral or so-called financial crisis. This study also identifies the countries that are most likely to suffer from a financial crisis. It is shown that those countries with lower income or lower investment return tend to require a higher proportion of collateral to secure their bank loans and are thus more vulnerable to financial crises. If a country has less propensity to save or its saving is phlegmatic to an interest rate raise, it will have relatively low buffer to defend its credit drain resulting from any adverse economic shock and will be vulnerable to financial crisis as well. To forestall the emergence of financial crisis, the government should be functioned as a last resort to prevent the free fall of collateral's value. For example, it may set up a trust fund to guarantee a bank's collateral to exceed a minimum value, reverse its conservative lending strategy and revive the enervating economy.

I. INTRODUCTION

After the 1960s, and following Modigliani and Miller's (1958) contribution, the view that ``finance is a veil'' became widely accepted. If the financial structure of firms is irrelevant, and if financial intermediaries are redundant, then monetary policy can have only a transitory impact on real variables through unanticipated changes in the money supply. In all the real business cycle models that were developed subsequently, finance does not play any role. The comeback of financial aspects in macro models started in the early 1980s. Following an earlier study by Mishkin (1978), Bernanke (1983) analyzed the relative importance of monetary versus financial factors in the Great Depression. He concluded that monetary forces alone were ``quantitatively insufficient'' to explain the Depression's depth and persistence, and that the collapse of the financial system (half of the U.S. banks failed between 1930 and 1933, and the financial markets crashed worldwide) was an important factor. This piece of empirical evidence gave support to the credit view, which argued that financial markets appeared to be imperfect, so the Modigliani-Miller assumptions did not hold and finance did matter.

As a result of the recent setback in the global stock market, many investors were panicking and worried that big stock market drops would depress consumer confidence and spending through the so-called wealth effect and herald recessions. The persistent global stock market decline can also hurt the economy by making banks more cautious about credit extension when companies and investors need these credits more urgently than before. In addition, the recent Asian financial crisis exacerbated by the failure of banking system in the region (particularly Japan) raises the serious concern of the imminent global depression. Can financial history remind us of any clue?

A stock market crash does not mean that a recession or depression must follow. A similar crash in October 1987 did not lead to depression. In 1929 a complex interaction of many factors caused the decline of the economy. Many investors had bought stock on a margin of ten percent, meaning that they had borrowed ninety percent of the purchase through a broker's loan, and put up the stock as collateral. Broker's loans totaled $8.5 billion in 1929, compared with $3.5 billion in 1926. When the price of a stock fell more than ten percent, the lender sold the stock for whatever it would bring and thus further depressed prices. The forced sales brought great losses to the banks and businesses which had financed the broker's loans, as well as to the investors. With the decline in the economy, Americans had less money for foreign loans and bought fewer imported products. That meant that foreign governments and individuals were not able to pay their debts in the United States. The whole reparations and war debts structure collapsed. American exports dropped, further hurting the domestic economy. The depression eventually spread throughout the world.

The lesson of 1929 depression crystallizes the destructive role played by the financial intermediary which triggered the multiplier effect from the plummeting collateral's value. We are wondering (1) why we need a financial intermediary like banks? and (2) why a financial intermediary needs collateral in its loan contract? The Arrow-Debreu paradigm leads to a world in which banks are redundant institutions and does not account for the complexities of the banking industry. There are basically two complementary ways out of this disappointing result: The first is to draw upon the incomplete information paradigm which explains why financial intermediaries exist. The examples are Leland and Pyle (1979), Diamond (1984, 1991), Boyd and Prescott (1986), etc. The second adopts the industrial organization approach which considers that banks essentially offer services to their customers, and that financial transactions are only the visible counterpart to these services. As a consequence, the cost of providing these services such as risk management and information processing has to be introduced (e.g., Klein (1971), Mester (1991, 1992)). This paper basically follows the second approach.

The study of collateral required by the bank has something to do with the design of self-selection mechanisms to improve credit allocation in an asymmetric information setting. Because of the existence of different categories of borrowers characterized by their risk parameters that can not be observed by the lender (bank), the lender will usually offer different loan contracts with variable collateral requirement (as in Bester 1985), the interest rate being a decreasing function of collateral. Another way for the bank to obtain a self-selection of heterogenous borrowers is to offer different loans of variable sizes (as in Freixas and Laffont (1990)), the interest rate being now an increasing function of the size of the loan. My study below will accommodate both collateral and loan size in the determination of lending rate to borrowers.

There are a few literatures that examine the macroeconomic consequences of financial imperfection. Mankiw (1986) shows that, because of adverse selection, the credit market may collapse after a small increase in the money market rate. In the study of Bernanke and Gertler (1990), they show that the general financial conditions (credit worthiness of borrowers, or banks' solvency) can affect macroeconomic performance because of the moral hazard problem. Farmer (1984) offers a new theory of the business cycle that combines two ingredients: imperfection of credit markets due to asymmetric information and nonexistence of a complete system of futures markets due to overlapping generations. Once asymmetric information and limited liability are introduced, he shows that today's productivity shocks will affect tomorrow's interest rates. My study basically follows the framework of Klein (1971), and Bernanke and Blinder (1988) with special consideration of borrower's productive assets as collateral. The latter will be shown to be essential to amplify or contract the impact of any monetary or exogenous shock on the economy.

Section II sets up a model in which a bank can optimally determine its lending and deposit rates. The feedback of collateral on the lending rate will be specified explicitly. The partial differential equations that conform with the optimal conditions for bank's behavior in section II will then be solved in section III. From the derivation of bank's lending and deposit rates, we can measure the magnitude of collateral effect by taking the partial derivative of lending rate with respect to the size of collateral and find out the factors that contribute to this collateral effect. The macroeconomic consequences of collateral will be analyzed in section IV with special attention to the issues of how a financial crisis may be formed and what policy recommendations can be made for the government. Empirical study based on the model is conducted in section V. Some concluding remarks are made in section VI.

II. MODEL

We model banking activity as the production of deposit and loan services, and banking technology is represented by a cost function c(D, L), interpreted as the cost of managing a volume D of deposits and a volume L of loans. For expository reasons, we consider a representative (monopolistic) bank confronted with a downward sloping demand for loans and an upward sloping supply of deposit. It can easily be extended to the model of imperfect (Cournot) competition among a finite number N of banks. The difference between the volume of deposit D that the bank has collected and the volume of loan L that the bank has granted is divided into two terms: the cash reserve R transferred by the bank on its account at the Central Bank and the bank's (net) position on the interbank market. The difference between these two terms is that the former typically bears no interest while the latter does (assume to be equal to r). The cash reserve R equals a proportion α of deposits, i.e., $R = \alpha D$. The coefficient α of compulsory reserves may be used as a policy instrument through which the Central Bank will try to influence the quantity of money in circulation in the economy.

To complete the picture, a description of the real sector is needed, which consists of three types of agents: the government (which includes the Central Bank), the firms, and the households. The role of the commercial bank is to collect the savings S of households so as to finance the investment needs I of firms. Finally, the government finances its deficit G by issuing securities B (Treasury bills) and high-powered money M (the monetary base) used by the commercial bank to finance their compulsory reserves at the Central Bank. Since this model ignores currency (the cash holdings of households and the relation with foreign countries), money consists only of the deposits collected by the bank, i.e., M = R.

In the imperfect market, the loan rate $r_L(L)$ and deposit rate $r_D(D)$ faced by the bank will no longer be fixed. Instead, they will be the function of the volumes of loan L and deposit D, respectively. In addition, as a result of information asymmetry between the loan borrower and the bank, the latter will usually ask the former to provide some collateral whose value should exceed certain fraction of the loan granted. The collateral can be in the form of equipment, building, account receivable from the output sales, etc. In general it should be some function of the firm's production capability. Here we assume that the loan rate $r_L(L, y)$ be the negative function of firm's production y. The greater output the firm can produce, the more likely the firm can set aside the collateral sufficient for the loan, and therefore be able to qualify for the lower loan rate. Taking into account the management costs, the profit of the bank will be

$$\pi = r_L(L,y) * L + r * \Delta M - r_D(D) * D - c(D,L)$$

where ΔM, the net position of the bank on the inter-bank market, is given by

$\Delta M = (1-\alpha)D - L$ (note that $\Delta M = 0$ in equilibrium). π can be rewritten as

$$\pi(L,D) = (r_L(L,y) - r)L + (r(1-\alpha) - r_D(D))D - c(D,L)$$

Assume that π is concave. The first conditions for the maximization of the bank's profit are

(1)
$$\frac{\partial \pi}{\partial L} = [\frac{\partial r_L(L,y)}{\partial L} + \frac{\partial r_L(L,y)}{\partial y}\frac{\partial y}{\partial L}]L + r_L(L,y) - r - c_L'(D,L) = 0$$

(2)
$$\frac{\partial \pi}{\partial D} = -\frac{\partial r_D(D)}{\partial D} * D + r(1-\alpha) - r_D(D) - c'_D(D,L) = 0.$$

These two equations together with the following equilibrium conditions for the commodity and credit market (i.e., the so-called CC curve) and money market (i.e., the so-called LM curve) will be used to solve four variables y, r, r_L, and r_D:

(3) $S(y,r) = I(r_L) + G + \varepsilon$ (equilibrium in the commodity and credit market), and

(4) $M = \alpha * D^s(r, y)$ (equilibrium in the money market).

G stands for government's expenditure, and ε for exogenous shock in the system. The market clearing condition for government's bond can be ignored as a result of Walras' law. In equilibrium the demand for loan $I(r_L)(\equiv L^d(r_L))$ should be equal to loan supply $L^s(r_L, y)$. Note that the following budget conditions for households, government and banks always hold by definition:

$$S(y,r) = B^d(r_B) + D^s(r_B, y),.$$

$$G = M + B^s(r_B), L^s(r_L, y) + M = D^d(r_D, r)$$

The superscripts d and s stand for demand and supply with respect to loan (L), deposit (D) and bond (B) respectively. The household's saving behavior S(y, r) is positively related with income level y and negatively related with the interest rate in general which is represented by interbank overnight rate r. From the household's viewpoint, the government bond B is treated as a risk-free investment whose return should be close to the interbank's overnight rate. Hereby we assume that r_B = r. As we expect, the partial derivative of $D^s(r, y)$ with respect to r is negative and positive with respect to y. As for the functions of loan supply $L^s(r_L, y)$ and deposit demand $D^d(r_D, r)$ for banks, they are determined based on equations (1) and (2), and will be solved below.

III. SOLUTION

The requirement of collateral in the determination of lending rate is essential for this model. Owing to lacking reliable information about the credibility of a borrower, the bank will usually utilize collateral to protect it from default. The higher the value of collateral to secure its loan, the lower lending rate will be provided. Normally the value of collateral provided by the borrower is highly correlated with its production capability that in turn determines the size of loan demand. By granting the loan, the bank can affect the firm's production capability and thus the value of collateral to secure its loan. The latter further influences the lending rate and the size of loan demand. Nowadays this reflexivity effect is too ubiquitous to be ignored by any bank that seeks a long-term relationship with its clients and has been particularly pinpointed by George Soros in designing his speculative investment strategy.

We capture the reflexivity of loan on the lending rate (via collateral) by the term $\partial y / \partial L$, which should equal $\partial y / \partial I$ in equilibrium. Let $\partial y / \partial L = \mu$. Reflecting the bank's conjecture about the marginal effect of its loan granting on the expansion of its client's production, μ measures the return for investment project. Given μ, the partial differential equation (1) above can be solved as

$$r_L = e^{-\ln L^s + a(L^s - y'\mu)} + r + c'_L,$$

where parameter a can be determined by some boundary condition. Let g(L) stand for the lending rate without any collateral, i.e., $g(L) = r_L(L,0)$. We can solve the parameter a as follows:

$$a = \frac{\ln[g(L^s) - r - c'_L] + \ln L^s}{L^s}.$$

And the lending rate can be written as

$$(5)\ r_L = e^{\ln[g(L^s) - r - c'_L][1 - y/(\mu L^s)] - (y \ln L^s)/(\mu L^s)} + r + c'_L$$

$$= \frac{[g(L^s) - r - c'_L]^{[1 - y/(\mu L^s)]}}{L^{y/(\mu L^s)}} + r + c'_L.$$

By definition, the function $g(L^s)$ should satisfy the following differential equation

$$\frac{\partial r_L(L)}{\partial L} L + r_L(L) - r - C'_L(D,L) = 0,$$

which is the equation (1) by ignoring the impact of y on r_L and replacing c(D,L) with C(D,L). C(D,L) stands for bank's serving cost in absence of collateral. Without the collateral to secure bank loan, the bank has to spend more (monitoring) cost to obtain the information about its borrower's credit. It is the information asymmetry between borrower and bank that causes higher bank's service cost than before, i.e., C(D,L) > c((D,L).

$g(L^s)$ can be solved as

$g(L^s) = (r + C'_L)/[1 - 1/\eta_L(L^s)]$, where

$\eta_L(L)(= -\dfrac{r_L L'(r_L)}{L(r_L)} > 0)$ is the elasticity of the demand for loans. Assume that η_L be fixed for the simplicity. We can rewrite equation (5) in terms of loan supply as

$$r_L = \left[\frac{r + c'_L + \eta_L(C'_L - c'_L)}{\eta_L - 1}\right]^{1 - y/(\mu L^s)} \left[L^s\right]^{-y/(\mu L^s)} + r + c'_L.$$

By equating $L^s(r_L, y)$ to the investment $I(r_L)$, we can solve r_L as a function of r and y:

$$(5') \quad r_L = k(r,y).$$

Taking total differential of equation (5') yields

$A \bullet dk = B \bullet dy + C \bullet dr$, where

$$A = \frac{1}{r_L - r - c'_L} + \frac{y * I'}{\mu * I^2}\left[1 - \ln I - \ln \frac{r + c'_L + \eta_L(C'_L - c'_L)}{\eta_L - 1}\right]$$

$$B = -\frac{1}{\mu * I}\left[\ln \frac{r + c'_L + \eta_L(C'_L - c'_L)}{\eta_L - 1} + \ln I\right]$$

$$C = \frac{1}{r_L - r - c'_L} + (1 - \frac{y}{\mu * I}) * \frac{1}{r + c'_L + \eta_L(C'_L - c'_L)}$$

.

In general, $A > 0, B < 0$ Therefore, $k'_y = \dfrac{dk}{dy} < 0$. From the relationship between A and B, we can easily derive the following results:

LEMMA I: *The larger y,* $\mu (= \frac{\partial y}{\partial L})$ *or* $|I'(r_L)|$, *the less impact of collateral will have on the lending rate, i.e.,* $\left|\frac{dk}{dy}\right|$ *will become smaller. When the demand for loan is either very elastic* ($\eta_L > \max(1, \frac{\mu * I * r_L}{y(r_L - r - c'_L)})$) *or very inelastic* ($\eta_L < \min(1, \frac{\mu * I * r_L}{y(r_L - r - c'_L)})$), *a greater degree of information asymmetry measured by* $(C'_L - c'_L)$ *will result in a smaller*

$\left|\frac{dk}{dy}\right|$. *Otherwise, a larger* $(C'_L - c'_L)$ *will lead to a larger* $\left|\frac{dk}{dy}\right|$.

As for the impact of dr on dk, it hinges on the sign of term C which, in terms, is decided by the relationship between $\mu (= \partial y / \partial I)$ and y/I. Define the elasticity of production with respect to investment as $\eta_I = \mu * I / y$. We can get the following result:

LEMMA II: *Unless* η_I *is extremely small, i.e.,* $\eta_I < \frac{r_L - r - c'_L}{r_L + \eta_L (C'_L - c'_L)}$, *a greater r will result in a greater* r_L. *In other words,* $k'_r = \frac{dk}{dr} > 0$ *usually except when* $\eta_I < \frac{r_L - r - c'_L}{r_L + \eta_L (C'_L - c'_L)}$.

As for the equation (2), it can be easily solved as

(6) $$r_D = r(1-\alpha) - c'_D - \frac{b}{D^d},$$ or equivalently

(6') $$D^d(r_D) = \frac{b}{r(1-\alpha) - r_D - c'_D},$$

where b is a constant to be determined by some boundary condition and has something to do with the elasticity of the supply of deposits, $\eta_D \equiv \frac{r_D D'(r_D)}{D(r_D)}$. More specifically, $b = \frac{r_D * D}{\eta_D}$.

Substituting the equilibrium lending rate in equation (5') for the r_L in equation (3) we can rewrite the equilibrium condition for the commodity and credit market (i.e., the CC curve) as

(3') $$S(y,r) = I(k(r,y)) + G + \varepsilon.$$

From equations (3') and (4) we can solve y and r. By substituting y and r into equation (5') and (6), we can derive the lending and deposit rates for the bank.

IV. MACROECONOMIC CONSEQUENCES

By providing services to borrowers and depositors, the bank channels the funds from the surplus to the need. Against these real services to the economy, the bank introduces some distortion to the market as well. The first kind of distortion results from imperfect competition in the banking industry. The bank exerts some monopoly power to decide its most desirable lending and deposit rates. The second source of distortion occurs because of the information asymmetry between borrower and bank. As a result, some incentive compatible mechanism design like collateral is introduced to protect bank's interest. The first one can be measured by the difference between the equilibrium lending rate r_L and the one in perfect competition, i.e., $r + c'_L$. The second one can be gauged by the impact of y on lending rate.

To begin with, we analyze how y and r would change in response to government's fiscal policy dG, monetary policy dM or exogenous shock $d\varepsilon$. And then we examine how much of these changes in y or r stems from the influence of collateral requirement (which is captured by k'_y, i.e., the partial derivative of lending rate with respect to production capacity). Taking the differential of equations (3') and (4) gets

(7)

$$(S'_y - I'k'_y)dy + (S'_r - I'k'_r)dr = dG + d\varepsilon,$$

and

(8) $$\alpha * D^{s'}{}_y dy + \alpha * D^{s'}{}_r dr = dM.$$

We can solve dy and dr readily from equations (7) and (8) as follows:

(9) $$H * dy = D^{s'}{}_r * dG + D^{s'}{}_r * d\varepsilon - \frac{S'_r - I'k'_r}{\alpha} * dM$$

(10) $$-H * dr = D^{s'}{}_y * dG + D^{s'}{}_y * d\varepsilon - \frac{S'_y - I'k'_y}{\alpha} * dM,$$ where H stands for

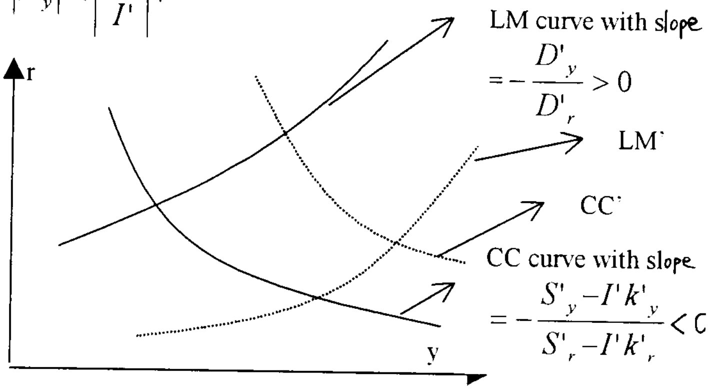
$$H = D^{s'}{}_r(S'_y - I'k'_y) - D^{s'}{}_y(S'_r - I'k'_r).$$

If there were not any collateral effect, i.e., $k'_y = 0$, H would be less than zero. Since $D^{s'}{}_r < 0, D^{s'}{}_y > 0, S'_r > 0, S'_y > 0, I' < 0, k'_r > 0$ usually, we could observe positive impact of dG and $d\varepsilon$ on dy and dr. As for the impact of dM, it would be positive on dy and negative on dr. However, the very existence of collateral effect will reduce the absolute value of H and dramatically enlarge the impact of dG, dM, and $d\varepsilon$ on either dy or dr. If k'_y ever approaches the critical value,

$$V = \frac{D^{s'}{}_r * S'_y - D^{s'}{}_y(S'_r - I'k'_r)}{D^{s'}{}_r * I'},$$ we will come across the breakdown of our economy: a small change in G, M or exogenous shock will lead to an infinite change in y or r.

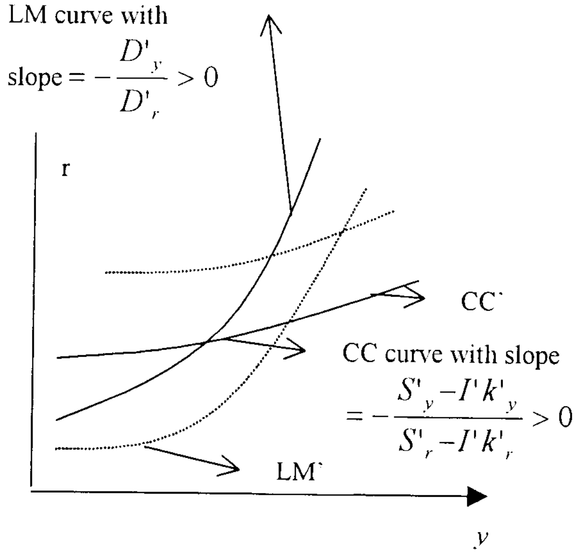
We can describe the impact of collateral on the effectiveness of fiscal policy, monetary policy or other exogenous shock by its effect on CC and LM curves. Depending on the slope of CC curve, we can examine the macroeconomic consequences of monetary policy (dM), fiscal policy (dG) and exogenous shock ($d\varepsilon$) in the following three cases:

(1) When the slope of CC curve is negative, i.e., when the collateral effect is so small that $|k'_y| < \left|\frac{S'_y}{I'}\right|$:



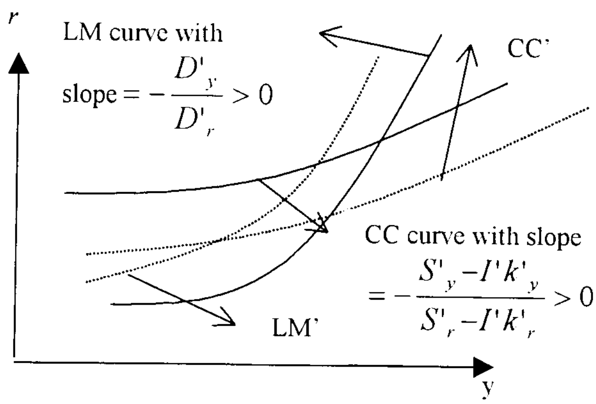
An increase in G or ε will shift CC curve rightward to CC' and lead to an increase in r and y while an increase in M will shift LM curve to LM' so that y increases and r declines.

(2) When the slope of CC curve is positive but is less steep than the slope of LM curve, i.e., when $\left|\frac{S'_y}{I'}\right| < |k'_y| < |V|$:



An increase in G or ε will shift CC curve to CC' and result in an increase in y and r. An expansionary monetary policy will shift LM curve rightward to LM' and bring forth an increase in both y and r.

(3) When the slope of CC curve is positive and more steep than the slope of LM curve, i.e., when $|V| < |k'_y|$:



An increase in G or ε will shift CC curve upward to CC' and result in a decline in y and r. An expansionary monetary policy will shift LM curve rightward to LM' and bring forth a fall in both y and r.

The above discussion can be summarized as follows:

PROPOSITION: *(i) When* $|k'_y| < \left|\frac{S'_y}{I'}\right|$, *either expansionary fiscal policy* $(dG > 0)$ *or positive exogenous shock* $(d\varepsilon > 0)$ *will result in an increase in y or r while expansionary monetary policy leads to an increase in y and a reduction in r. Moreover, an increase in the collateral effect, i.e., an increase in* $|k'_y|$, *will enlarge the impact of monetary policy, fiscal policy or exogenous shock on y or r. (ii) When* $\left|\frac{S'_y}{I'}\right| < |k'_y| < |V|$ (V is defined as

$$V = \frac{D^{s'}_r * S'_y - D^{s'}_y (S'_r - I'k'_r)}{D^{s'}_r * I'}$$),

expansionary fiscal policy, monetary policy or positive exogenous shock will all result in an increase in y and r. Moreover, an increase in the collateral effect, i.e., an increase in $|k'_y|$, *will enlarge the impact of monetary policy, fiscal policy or exogenous shock on y or r. (iii) When* $|k'_y| > |V|$, *expansionary fiscal policy, monetary policy or positive exogenous shock will all result in a reduction in y and r. Moreover, a further increase in the collateral effect, i.e., an increase in* $|k'_y|$, *will contract the influence of monetary policy, fiscal policy or exogenous shock on y or r. (iv) When* k'_y *approaches the critical value V, we will come across the breakdown of our economy. A small change in G, M or exogenous shock will lead to an infinite change in y or r.*

So far we have treated the magnitude of collateral effect, k'_y, as exogenously given. However, the Lemma I in session III above tells us that the effect of collateral on lending rate (k'_y) is not fixed at all. For example, assume that there be a positive shock in G, M or ε that results in an increase in y. Though the collateral requirement magnifies the income increase as asserted in Proposition above, the resulting increase in y will gradually reduce the marginal effect of collateral on the lending rate (i.e., $|k'_y|$ becomes smaller) according to the Lemma. The magnification effect of collateral on income expansion will gradually subside. Eventually the expansion in economy will come to a stop. In other words, we will never see an ever-expanding economy.

On the other hand, if there is negative shock of G, M or ε on the economy, the production capacity or income level (y) will be contracted initially. The existence of collateral effect will aggravate the income reduction. The resulting decline in income will raise the marginal effect of collateral on lending rate (i.e., $|k'_y|$ will increase accordingly) and lead the bank to ask for more collateral. This increase in $|k'_y|$ will further worsen the income reduction from the initial negative economic shock. If there were no intervention outside the system, the death spiral or so-called financial crisis would be very likely to happen.

Therefore, the corollary below will immediately follow from the Lemma and Proposition:

COROLLARY I: *Once the financial intermediary (bank) utilizes collateral to alleviate information asymmetry problem, our economic system has built in a mechanism that will magnify the impact of any initial shock (dG, dM or $d\varepsilon$) on income level. This magnification effect will gradually subside as income increases. However, if the initial shock has an adverse impact on income, the magnification effect will be enhanced in response to the income declines, and eventually trigger the death spiral or financial crisis.*

From the definition of H term in equation (9), we know that under the normal condition (i.e., $\eta_I > \frac{r_L - r - c'_L}{r_L + \eta_L (C'_L - c'_L)}$) k'_y is the only factor that counteracts the other three components of H in such a way that H may approach zero and lead to an infinite impact of dG, dM & $d\varepsilon$ on dy or dr. Consequently, we underline the collateral effect as an indispensable ingredient that causes the financial crises. When investment return μ is so bad that $\eta_I = \frac{\mu * I}{y} < \frac{r_L - r - c'_L}{r_L + \eta_L (C'_L - c'_L)}$, k'_r will become negative and collaborate with the collateral effect to make H even closer to zero. According to our model, those countries with large $|k'_y|$ or small threshold $|V|$ are the ones that are most vulnerable to financial crises. From the Lemmas I & II in section III and the definition of