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A THEORETICAL MONETARIST ASYMMETRIC INFORMATION THEORY AND BANKING CRISIS IN NIGERIA

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ABSTRACT

The lack of a direct theory and an adequate theoretical framework to facilitate robust analysis of the behavior of money demand and inflation during banking crisis has necessitated this study. Under this setting, analysis carried out might be subjective; and results as well as conclusions arrived at may not be valid. Policies would likely be ineffective. To this end, the study quantitatively extends the asymmetric information theory to cover the effect of banking crisis on money demand and inflation. This was made possible with the aid of assumptions, schematic articulations and reductions of qualitative expressions to mathematical functions. The outcome of this study, therefore, is the robust theoretical basis for investigating the behavior of money demand and inflation in the era of banking crisis in Nigeria that has been built. Its use would provide valid and adequate results that could assist to formulate robust policy.

Key Words: ***Asymmetric Information; Money demand; Inflation; Banking Crisis; Nigeria. JEL Classification: B41, C51, D82, G01, E41, E31***

INTRODUCTION

The asymmetric information theory was brought to limelight by Akerlof (1970) as well as Rothschild and Stiglitz (1976). The theory, since Akerlof introduced it in 1970, has become an invaluable and ready tool for giving meaning, understanding, effect, purpose and direction to diverse phenomena especially in the field of economics.

However, Mishkin (1996, 2007) applied it to the financial market with financial crisis as the thrust. According to Mishkinlikened it is known as a situation whereby a party to a financial contract possesses much less actual information than the other party. In addition, it creates adverse selection and moral hazard problems that impact significantly on the structure of the financial system. With the asymmetric information, the financial market is rendered incapable in efficiently channeling funds to productive projects. Thus, investment is reduced and economic activity declines. Mishkin (1996, 2007) succinctly showed how the asymmetric information leads to an increase in interest rates, increase in uncertainty, and asset market effects on balance sheets which makes crisis to occur. Further, Mishkin (1996, 2007) extended the asymmetric information theory qualitatively to cover the impact of financial crisis on money supply for developed and developing countries and the price level for developed countries only.

It stands to reason that the theory, as originally presented, has no direct bearing on the behavior of money demand and inflation during banking crisis. The subsequent adaptation by Mishkin (1996,2007), as a theoretical basis, did not focus on the behavior of money demand during banking crisis, however, it touched on the price level for developed countries only. Further, it uses qualitative approach with the aid of diagrams. The thrust of the analysis was financial crisis. Hence, in this paper, an extension of Mishkin's (1996, 2007) work through the use of quantitative approach was carried out to provide an adequate theoretical basis for the behavior of money demand and inflation during banking crisis in Nigeria. By this, the study has not only provided a robust platform but also a compass to suitably guide the conduct of investigation into different aspects of money demand and inflation in the era of banking crisis. In addition, it assists to establish what variables to be selected and measured as well as the relationship between the dependent and independent variables.

The rest parts of the paper are organized into five sections. In section 2, the Asymmetric Information theory is discussed. Section 3 presents the review of previous studies on Asymmetric Information theory. The extension of Mishkin's (1996, 2007) work to cover money demand and inflation in the era of banking crisis is given in section 4. Section 5 considers the extension of Mishkin's (1996, 2007) work to cover money demand and inflation in the era of banking crisis while Section 6 contains the conclusions of the study.

THE ASYMMETRIC INFORMATION THEORY

The Asymmetric Information Theory is attributed to the seminal work of Akerlof (1970), as well as Rothschild and Stiglitz (1976). The authors enunciated the suitability of asymmetric information to competitive market and also showed that the market could experience absolute breakdown amidst asymmetric information.

Akerlof (1970), for example, developed the asymmetric information theory with the aid of used car market and demonstrated how asymmetric information theory could result in market failure. According to Akerlof, in the used car market, information is asymmetric. This is because the car seller has more knowledge of the quality of each car while the buyer has no such information. The buyer, in an attempt to mitigate the likelihood of too much payment for the "lemon" considers all cars based on some market statistic that is used to determine the value of goods. Thus, while the buyer has information only on the average of the entire market, the seller possesses a better knowledge of the good offered for sale. The buyer will therefore, only be prepared to pay for any car based on the average car price. With this, the seller will take all cars whose qualities are above the average quality out of the market. The adverse selection effect may make the market breakdown. Akerlof concluded that this asymmetric information makes the seller to sell goods whose qualities are less than the average market quality.

PREVIOUS STUDIES ON ASYMMETRIC INFORMATION THEORY

Stiglitz and Weiss (1981) demonstrated that asymmetric information occurs in the loan market by showing that, at equilibrium, the loan market may have credit rationing as its main features. With interest rate as the thrust of the market and residual imperfect information at play in the sieving of loan applicants by the banks, one finds that the nature of the transaction is affected and it may become impossible for the market to be cleared. In most cases, the adverse selection dimension of interest rate stems from the possibility of different borrowers to liquidate their loan. Therefore, the banks attempt to identify borrowers who can redeem their loans which is always difficult. Most often, this is done using interest rate as the yard stick, and on the average, borrowers that are prepared to pay high interest rate turn out to be worse risks. This undermines the returns to the banks.

However, Chari, and Jagannathan (1988), used signal extraction problem to explain asymmetric information theory. The authors mentioned that there is a mixture of aims for deposit withdrawals which could either be for consumption or based on information that the bank is failing. Under this situation, there are depositors that would not be able to interpret the reasons behind the growing withdrawals that might as well follow suit. It was further revealed by Chari and Jagannathan that crises are not confined to the period of poor outlook. It also happens during periods of high liquidity needs even when information on future returns is not available or forthcoming to any individual.

Interesting contributions of Mishkin (1996, 2007) to the asymmetric information theory as it relates to the influence of financial crisis is Mishkin's extension of the theory to cover money supply for developed and

developing countries as well as inflation for only developed countries. This was done qualitatively with the support of diagrams.

Still on asymmetric information theory, Morrison and White (2005) developed a general equilibrium model in which banks are faced with Asymmetric Information which regulators have the tools to address. Depending on the reputation of the regulator, if there is crisis in the banking system that has brought about crisis of confidence, the suitable response would be tightening of capital requirements. This is a better way of enhancing the quality of banks that have survived. It is the claim of this study, that, as crisis of confidence arises and regulatory body tightens capital requirements to improve the quality of services of banks, the demand for money will increase, there will be flight to currency and quality as well as movement of cash from weak and perceived weak banks to strong and perceived strong banks.

Also, Kama (2010) showed that during banking crisis, the quality of available information worsens and that exacerbates the adverse selection pressure. Given that several firms witness decreases in credit worthiness because of the inability to repay loans, there is a high degree of chance that funds would be directed to inefficient firms because such firms are willing to pay higher interest rates. The resultant effect is that the quality of investment is likely to suffer after a banking crisis has occurred.

In another dimension Acharya, Gromb, and Yorulmazaer (2012) came up with a model to show that during banking crisis, the inter-bank market experiences Asymmetric Information. The framework revealed that a bank with surplus liquidity has higher bargaining power than a bank in need of liquidity that will enable it continue in business. It is interesting to note that banks which possess surplus liquidity will deliberately short supply funds in the interbank market, so that banks which need liquidity will be made to sell bank-specific assets inefficiently. This will result in inefficient resource allocation. Consequently, central bank will take to its duty of lender of last resort and lend to the needy banks.

Frexias and Jorge (2008) studied the effect of asymmetric information in interbank market as well as how financial imperfections in the interbank market influence the monetary policy transmission mechanism. The author revealed that asymmetric information in the interbank market produces equilibrium with credit rationing. This is because the interbank market could not efficiently channel liquidity to liquidity stricken banks. Therefore, the occurrence of asymmetric information in the interbank market destabilizes the efficient allocation of liquidity to illiquid banks that are solvent. As such, as there is monetary shortage of liquidity, the banks are compelled to reduce lending. It is the belief of this study, that when this happens money supply reduces and interest rate

increases. Heider, Hoerova, and Holthausen (2009) studied the functioning of the interbank market and its possible impairment as a result of counterparty risk during banking risk.

The authors posited that, the interbank market fails because of its inability to re-distribute liquidity. The argument is that the risk of banks' long-term assets makes liquidity to dry up in the market and therefore cannot address the liquidity shocks faced by banks. However, banks with surplus liquidity have to contend with counterparty risk which arises from the risk of borrowing bank's assets. Meanwhile, every bank is aware of how the risk in the banking system is distributed as well as the risk of its assets but not the risk of their counterparties. Thus, an interbank loan would likely not be liquidated as a result of risky long-term investment. This result in counterparty risk and its associated asymmetric information can raise the interbank market spreads as well as total breakdown of the interbank market.

From the brief review above, it is obvious that literature seems to be saying that amidst banking crisis, asymmetric information affects interbank market and credit rationing. However, it is only Mishkin (1996,2007) that attempts to qualitatively extend the asymmetric information theory to touch effects of financial crisis on money supply for developed and developing countries and price level for developed countries. However, it ignored extending it to money demand and inflation (for developing countries) in the context of banking crisis and using mathematical approach.

MISHKIN'S (1996, 2007) ADAPTATION OF THE ASYMMETRIC INFORMATION THEORY

Mishkin (1996, 2007) used the Asymmetric Information Theory to explain events in the financial market and built an asymmetric information theory of financial crisis. To Mishkin (1996, 2007), as stated earlier, sees it as a situation whereby in a financial contract between two parties one of them possesses less accurate information than the other party. The borrower, for example, who obtains a loan, has more information on the possible returns and risk associated with the investment projects for which the funds are intended than the lender does. The asymmetric information creates adverse selection and moral hazard problems in the banking system.

According to Mishkin (1996, 2007), adverse selection happens before the transaction takes place. He held that, prospective bad credit risks are the ones that most vigorously seek to obtain a loan. In other words, that parties which are most possibly capable of producing an undesirable outcome are the ones that most likely strive to go into the loan transaction. Mishkin exemplifies this by stating that, it is those borrowers that intend to take big risks that are more likely to be very anxious to obtain a loan because this group of borrowers knows that they

might not repay such loan if granted. Knowing full well that there is the possibility of giving out loan to bad credit risk due to adverse selection, the lender (bank) has the option of not granting any loan even though there abound good credit risk in the market place. Mishkin posited that this outcome is a feature of classical lemon problem. Mishkin (2007), held that a lemon problem occurs in the debt and equity markets. This is attributable to the lender's difficulty to establish whether a borrower is a good risk, that is, has good investment opportunities with low risk. Alternatively, it is a bad risk, that is, the borrower has poor investment projects with high risks. Faced with this situation, a lender accepting a security would consider the average quality of the firm issuing the security, which is, a price that is situated between the values of securities from bad and good firms respectively.

Therefore, for high quality firms, the lender would be prepared to accept a price that is less than the fair market value and more than the fair market value for low-quality firms. The high quality firms that know the quality of their security will also be aware that the securities are underpriced. As such there will be no willingness to sell. However, low quality firms are aware that their securities are overvalued and will therefore be willing to sell. Mishkin (1996, 2007) concluded that asymmetric information deprives investors from knowing that the market is of the mixture of both high and low quality firms. As a result fewer than adequate securities are supplied to the credit markets. This is because many projects with positive net present value will not be undertaken.

Unlike adverse selection, moral hazard in the submission of Mishkin (1996, 2007) happens after the transaction has taken place. This results from the borrower engagement in activities that make it less possible for the loan to be paid back. In other words, moral hazard occurs because it is incentives that attract the borrower to invest in projects with high risk. In addition, if the project is successful, it will be to the benefit of the borrower but if otherwise the lender bears most cost of the loss. In conclusion, Mishkin posited that the conflict of interest that occurs between the borrower and lender stems from moral hazard (the agency problem). This implies that many lenders will decide not to grant loans, so that lending and investment will be at sub-optimal levels.

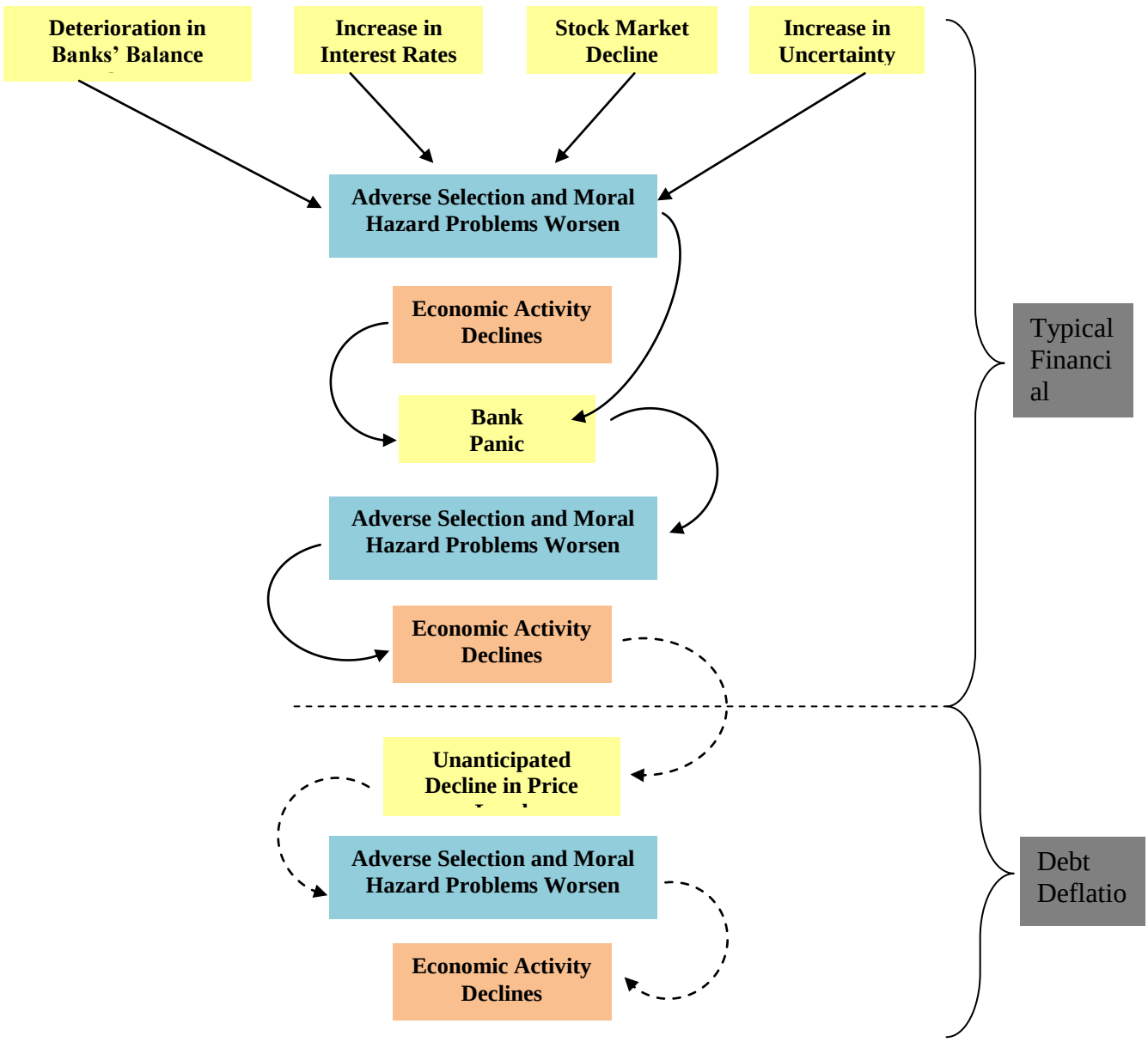
By way of emphasis the Asymmetric Information theory of banking crisis could be seen in Mishkin's (1996, 2007) view of crisis as being a non-linear disruption to financial markets, that is, adverse selection and moral hazard problems become worse such that financial markets are incapable of efficiently channeling funds to economic agents that have the most productive investment opportunities. Therefore, the occurrence of panic becomes inevitable. This panic is due to lack of good information about asset portfolio values at the disposal of depositors. In addition, the depositors are incapable of evaluating the banks and the management of the banks and this breeds asymmetric information problems. The inability of depositors to identify banks that have problems

when there is adverse news about the banking system stems from the inadequacy of the depositors to decipher the true situation of the banks. This, therefore, sparks a panic and there is flight to safety evident in withdrawals made by depositors from all the banks.

Mishkin (1996, 2007) in his analysis, used the asymmetric information theory and made a schematic exegesis of the sequence of events that breed bank run and outcomes for developed and developing countries as could be seen in Figures 1 and 2, respectively. Mishkin maintained that weakened banks' balance sheet which unavoidably arise from such risks taken and/or adverse shocks that retrograde balance sheet of non-financial institutions possibly make it less likely for loans to be repaid and produce bank run. In addition, most often the worsening health of the bank could also lead to crisis. This comes from the nature of developing countries like Nigeria, where debt contracts have short duration and are often denominated in foreign currencies and once there is devaluation, it gives birth to depreciation of domestic currency. This increases the debt burden of domestic firms. Added to this are other shocks, such as, increase in interest rates and their spread, stock market failure and unanticipated decline in inflation.

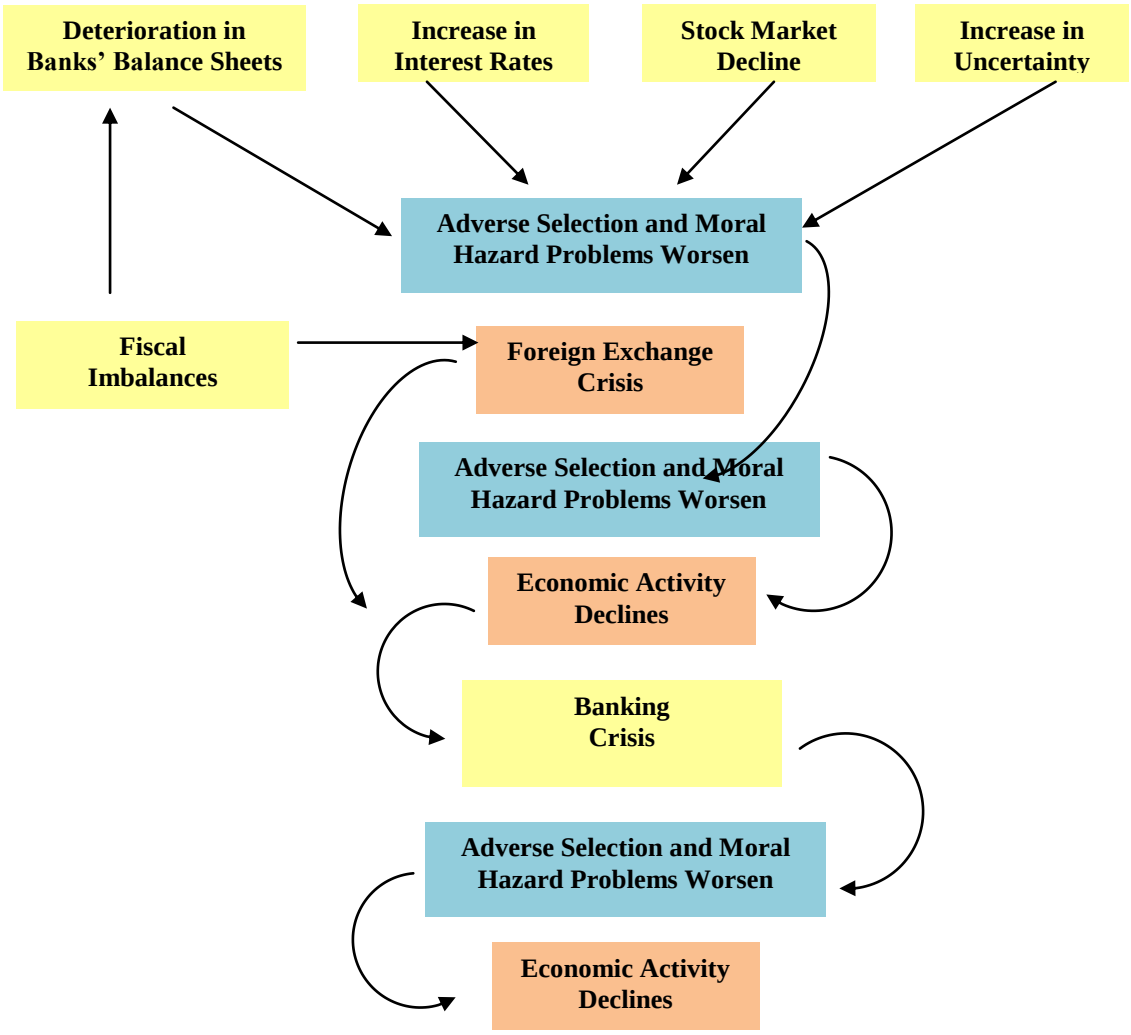
Further, as applied by Mishkin (1996, 2007) to developing countries, the sequence of events shows that with the commencement of recession and major bank and non-bank business failure, what is witnessed is acute increase in interest rate, stock market collapse and rise in uncertainty. This brings about deterioration and uncertainty in business activities and health of banks. A follow up is funds withdrawals by depositors. Therefore, bank panic is precipitated. The shortage of liquidity it creates does not only lead to a sharp rise in interest rates but also instability in unanticipated depreciation as well as decline in stock market. It is no surprise that Mishkin (1990) had previously remarked that the Asymmetric Information theory does not rule out significant effects on aggregate economic activity because of the decrease in money supply that banking panic produces. In addition, it just suggests that there is more to the theory of banking crisis than its consequences on money supply.

Figure 1: The Sequence of Events in U.S. Financial Crisis of the 19th and Early 20th Centuries



Source: Mishkin (2007)

Figure 2: The Sequence of Events in the Mexican Financial Crisis of 1994-1995

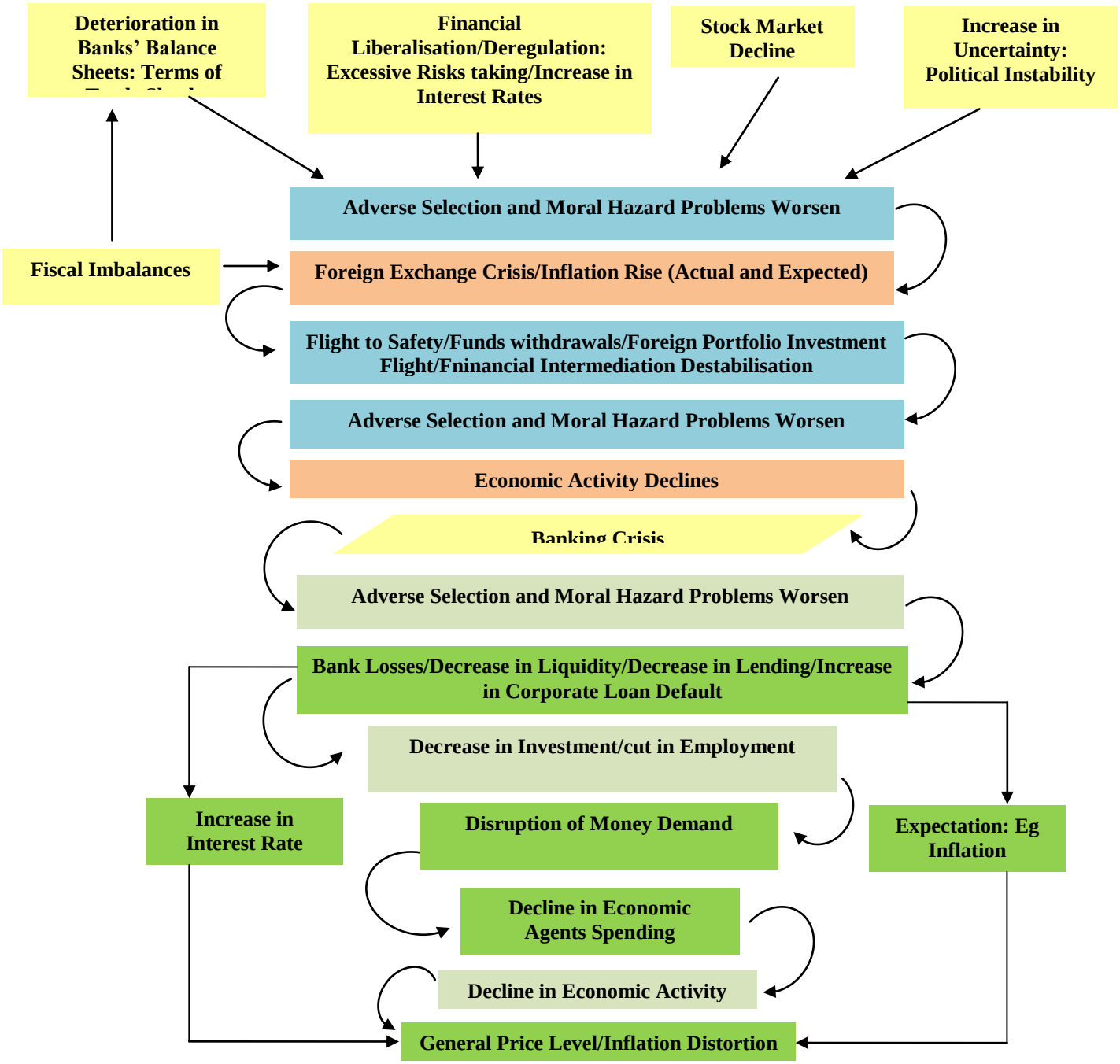


Source: Mishkin (2007

5. The extension of Mishkin's (1996, 2007) work to cover money demand and Inflation in the era of banking crisis

Mishkin's (1996, 2007) sequence of events as shown in Figures 1 and 2, and discussed above, were modified to produce Figure 3.

Figure 3: Modified Sequence of Events in Developing Countries' Banking Crisis typified by Nigeria



Source: Author's Adaptation from Mishkin (2007)

In addition, assumptions were made to be able to extend the Asymmetric Information theory to monetary effects of banking crisis with concentration on money demand and inflation as Mishkin (1996, 2007) had already extended it to cover money supply for both developing and developed countries and to price level for only developed countries.

The following assumptions took the peculiarities of the Nigerian economy into account:

1. Banking system performs financial intermediation by mobilizing deposits (resources) from surplus units to deficit units for productive investment.
2. Banking crisis impairs financial intermediation and leads to a collapse in lending and thus to a decrease in economic activity.
3. Financial intermediation is impaired due to liquidity squeeze as the crisis makes consumers abandon deposit for cash because of increased advantages of holding cash. Observably, there are increases in interest rate, decline in demand for credit as well as contraction in output and decline in consumption. The increase in demand for cash is always less than the decrease in the demand for deposit and the demand for broad money as well as money multiplier. For the fact that depositors cannot distinguish between good and bad banks as the news of the crisis comes to limelight, the depositors become concerned about potential deposit losses and proceed to withdraw such funds from the banking system. This leads to loan and deposit contraction as well as currency depreciation. The crisis makes the banks attempt to forestall possible deposit outflow by increasing reserves in relation to deposit. This also leads to loan and deposit reduction in the number of banks. These events hamper lending, increase the cost of intermediation and increases interest rate.
4. The decline in economic activity and poor business condition leads to expectation of loss on deposits that are still with the bank, therefore, depositors sought to withdraw such funds. This propels interest rate to further rise and stock market price to decline.
5. Decline in economic activity suggests that firms and households are not in a position to liquidate debts, and this leads to substantial loan losses for the banks and thus affects the lending strength of the banks.
6. Once the crisis has commenced, the fundamental issues or imbalances imbroglio that brought about the crisis are reinforced and the flow of credit, stock market prices, household consumption, employment, investment and output face significant disturbance. In fact, there would be expectation of further contraction in the economy.

7. Increased interest rate payments make households and firms cash flow to reduce. This leads to deterioration of balance sheets which increases adverse selection and moral hazard problem and makes lending by lenders undesirable.
8. Bank crisis leads to liquidity squeeze which compels interest rate to rise further and stock market to decline. It can also lead to a decrease in the value of household and firms net worth.
9. The lending contraction arising from banking crisis reduces the role of the banking system in addressing adverse selection and agency problem which is evident in high interest rate.
10. Debt contracts either with citizens or foreigners are of short duration. This creates cash flow and liquidity pressures for non-bank firms and banks, as interest rate rises or domestic currency depreciates.
11. From the preceding assumptions, this study analyses the effect of banking crisis on money demand. It is observable that during the crisis, deterioration in banks' balance sheets, increased interest rate, stock market decline and increased uncertainty compound adverse selection and moral hazard problem which affect lending and make investment and economic activity decline. The worsening business environment and withdrawal of funds from banks by depositors and the weakened position of banks in terms of lending make interest rates rise. This disrupts money demand as could be seen in Figure3 and in turn makes economic activity decline. In essence, banking crisis affects money demand but not directly, it does so through interest rate and output.

In summary, with the occurrence of banking crisis, it is not only money supply, interest rate, stock market and depreciation of currency that are affected as shown in the Asymmetric Information theory, but also money demand through the following channels.

Income channel: With the increase in cost of borrowing and fall in credit availability, aggregate production will fall. This will lead to a fall in corporate profits and household income. Once there is a change in income, there is bound to be change in money demand and credit. In other words, based on the decline in investment and economic activity, the level of income will be low. Since the demand for money varies directly with the level of income, it implies that the low level of income would lead to low demand for money and vice versa.

Interest rate channel: It is sufficient to observe that banking crisis reduces the supply of money as well as credit and so leads to an increase in the interest rate. The higher interest rate in turn leads to a reduction in borrowing and investment. The reduction in investment activity leads to a reduction in aggregate production and output and hence to a reduction in income. Reduced income would naturally lead to a reduction in the money demanded. In essence, banking crisis affects money demand indirectly through interest rate.

Price level channel: Following the decline in investment and economic activity and the attendant decrease in output as well as income, the saving and spending behavior of economic agents are affected. This affects inflation which in turn influences money demand.

As for inflation, this study made the following assumptions based on the context of the Nigerian economy:

1. During banking crisis, a good proportion of money is reasonably kept outside the banking system where the central bank has no control. This makes money supply increase, thus fueling inflationary pressure.
2. The institutional characteristics of the financial system particularly how much of the debts are denominated in foreign currency, are such that high and variable inflation results in debt contracts of very short duration. These, with expansionary monetary policy are likely to cause expected inflation rate to rise and domestic currency to depreciate.
3. Depositors (Local or foreign) look outside the shores of the banking crisis ridden country for safety.
4. Once investment activity and aggregate economic activity decrease, because of increase in adverse selection and agency problems, expectation of further decline in economic activity and increase in business failure will occur.

Similarly, we analyze the effects of banking crisis on inflation by using the following channels to do so.

Monetary channel: When interest rate increases, cost of inputs used by firms for production increases. This higher production costs are passed to the consumers in the form of higher commodities prices thus exacerbating inflation. In addition, debt contracts of short duration and contraction of money supply as a result of depositors shifting from deposits to currency and banks shifting from loans into reserve also results to increase in inflation rate. Inflation expectation would lead to higher interest rates and exchange rate depreciation, cash flow and balance sheet will deteriorate and this will create inflationary pressure. The size and direction of the effect of banking crisis on inflation could be altered as a result of changes in expectations. For example, an expected devaluation of the local currency will precipitate inflationary pressure.

Output channel: The effect and expectation of banking crisis make producers reduce production and output and thus, affect economic activity. A reduction in the level of economic activity through the quantity of credit that is available and input prices directly influences the production of goods and services. The reduced economic activity ultimately has upward pressure on inflation.

From the above, the theoretical underpinning of the effects of banking crisis on money demand and inflation, indirectly through interest rate and output has been shown. Below is the specification of the function.

Mishkin's (1996, 2007) assertion that financial crisis (F^c) affects money supply (M^s) and inflation (π) among other variables (θ) can be functionally expressed as follows:

$$M^s = f(F^C, \theta) \quad \text{.....1}$$

The impact of financial crisis on money supply as given in equation 1 above is indirect through changes in interest rate. Thus, interest rate has implicit impact on financial crisis.

Similarly, the impact of financial crisis on inflation as expressed in equation 2 below is indirect through changes in interest rate and output. Hence, interest rate and output have implicit impact on financial crisis.

$$\pi = f(F^C, \theta) \quad \text{.....2}$$

Recalling Calomiris (2009) claim that banking crisis (B^c) is a distinct subset of financial crisis and the fact that banking crisis is the heart of financial crisis makes the study, assume their equality which gives

$$F^C = B^C \quad \text{.....3}$$

Substituting equation 3 into equations1 and 2 respectively yields equations 4 and 5 respectively.

$$M^s = f(B^C, \theta) \quad \text{.....4}$$

$$\pi = f(B^C, \theta) \quad \text{.....5}$$

In equilibrium, money supply is always equal to money demand

Hence:

$$M^s = M^d \quad \text{.....6}$$

Substituting equation 6 into equation 4 produces

$$M^d = f(B^C, \theta) \quad \text{.....7}$$

The implicit functions which constitute equations 1, 2, 4, 5 and 7 arose from the liquidity squeeze and reduced lending resulting from banking crisis effects on interest rates (r) which is represented as

$$r_t = f(B^C, \theta) \quad \text{.....8}$$

Further, the implicit functions which constitute equations 2 and 5 arose from increased interest rate, announcement effect and expectation which make banking crisis affect output (Y) and is as given below.

$$Y_t = f(B^C, \theta) \quad \text{.....9}$$

From equations 5, 7, 8 and9 the estimable equations that constitute model specifications for the effects of banking crisis on inflation, money demand, interest rate and output respectively could be drawn.

DISCUSSIONS AND CONCLUSIONS

The Asymmetric information theory a seminal work of Akerlof (1970) was unfortunately not developed to address the issue of behavior of money demand and inflation during banking crisis in Nigeria. However, Mishkin (1996, 2007) made attempt to extend it to cover the financial market with focus on money supply for developed and developing countries and price level for developed countries within the context of financial crisis. This he did qualitatively and with the use of diagrams. The contribution of this paper, therefore, is a modest extension of Mishkin's (1996, 2007) work which gives the theoretical foundation capable of addressing the question of behavior of money demand and inflation during banking crisis in Nigeria. The use of this established theoretical foundation would facilitate analyses of behavior of money demand and inflation during banking crisis which would likely produce valid and adequate results. And, such results could assist to formulate robust policy that would make monetary policy to attain their goals during banking crisis.

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CONFLICT OF INTEREST

We share no conflict of interest in this study.

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