

A Survey of Studies on Money Demand and Inflation Amidst Banking Crisis

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Abstract

The paper is borne out of the necessity to create a repository of information on monetary effects of banking crisis with a focus on money demand and inflation. To this end, the paper selectively reviews some empirical studies on money demand and inflation in the face of banking crisis. Overwhelming evidence reveals that money demand does not only increase during banking crisis but is also largely stable. The studies also suggest that long-run cointegrating relationship exists between money demand and its determining variables during banking crisis. However, evidence indicates that banking crisis makes inflation to decline or increase. These pattern of results were evident in developed and developing countries and from different methodologies applied. One policy implication from the survey is that during banking crisis monetary policy would be ineffective. The policy recommendation that can make monetary policy effective is to expand money supply and reduce interest rate for the productive sectors, particularly agricultural and manufacturing sectors.

Keywords:

Money demand
Inflation
Banking Crisis.

JEL Classification:

E41, E31, G01

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Publisher:

Scientific Publishing Institute

1. Introduction

The banking industry of developed and developing countries experiences crisis and this makes their banking systems inefficient and the actualisation of their monetary policy goals arduous. It is observable that financial disintermediation, inefficient payment system and ineffective monetary policy frustrate investment and leads to reduced economic activity. Moreover, banking crisis negatively affects money demand and inflation. This alters the nexus that usually exists among monetary policy instruments, and makes monetary policy implementation difficult. The goals of monetary policy as noted in literature which include achievement of domestic price and exchange rate stability, maintenance of healthy balance of payments position, development of a sound financial system, and promotion of rapid and sustainable rate of economic growth are compromised. Yet, adequate empirical attention has not been paid to the behaviour of money demand and inflation during banking crisis. In fact, researchers like Martinez-Peria (2002) noted that empirical studies in this area are scanty. It is the contention of this study that this observation made well over a decade ago is still valid today.

It could therefore be said that, a well developed and tested literature in this area has not evolved. Hence, this survey attempts to create a repository of some selected empirical studies that examined the behaviour of money demand and inflation during banking crisis with a view to act as a veritable source of literature for future studies as well as lessons for policy formulation.

The rest of this paper is made up of four sections of which section 2 concerns studies on behaviour of money demand during banking crisis while section 3 focuses on studies of behaviour of inflation during banking crisis. Section 4 consider studies that combined behaviour of money demand, inflation and selected monetary-based aggregates during banking crisis and finally section 5 hosts the summary, conclusions and recommendations. In addition, the tabular format summary is as presented in Appendices 1, 2 and 3.

2. Studies on Behaviour of Money Demand during Banking Crisis

Khamis and Leone (2001) investigated the long run determinants of real currency demand, estimated its dynamics and the stability of the dynamic model during and after the Mexican banking crisis. The sample period covered 1983:1 to 1997:4 and monthly data were utilised. The variables considered were real currency balances, real private consumption expenditure, consumer price index, inflation rate, interest rate on 60-day-time deposit and a dummy. Johansen and Juselius's (1990) cointegration technique and recursive Chow test were used to analyse the data and test for parameter constancy respectively. The findings proved that the real currency demand was stable throughout and after financial crisis. In addition, a strong evidence of cointegration relationship between real currency balances, real private consumption expenditure and inflation was established. The statistical test also revealed that after the financial crisis, the dynamic model for real currency demand exhibited significant parameter constancy. One conclusion drawn from this study was that the remarkable decline in real currency demand during the financial crisis could be suitably justified by the change in the variables that historically explained the demand for real cash balances in Mexico.

Amidst the result reported above, Atkins (2005) assessed the money demand function for Jamaica during financial crisis for the period, 1962-2000. The study used annual data of nominal broad money, real gross domestic product (RGDP), exchange rate index (J\$/US\$), nominal interest rate, treasury bill rate and consumer price index. The study employed structural cointegrating vector auto-regressive (VAR) model. The investigation confirmed that two cointegrating relations existed which are compatible to a domestic and external monetary equilibrium. The money demand equation is given by the domestic equilibrium. However, estimation of the structural relation was in a vector error correction model (VECM) and the study found strong but apparently perverse long run effects of interest rates. Despite the financial crisis, structural stability of money demand was established using cumulative sum of recursive residuals tests (CUSUM).

In addition, for Venezuela, the demand for money was estimated between 1985Q1 and 1995Q1 in which financial crisis occurred by Bjornlard (2005) using quarterly data. The variables considered were broad money, real gross domestic product (RGDP), consumer prices, the exchange rate (Bolivares per unit of US dollar), interest rate spread between the 90 days deposit rate for Venezuela and the US treasury bill rate (Bond equivalent). The study used a VAR model and the analytical techniques were cointegration and chow test. Like the Jamaica case, Bjornlard's result indicated structural stability of money demand throughout the period of the crisis. In fact, Bjornlard found a significant relationship between real money, real income, inflation, the interest rate differential and the exchange rate that remained stable over the crisis period. The long-run properties stressed that inflation and exchange rate depreciation had negative effects on real money demand while a higher interest rate differential had positive effects. Unlike Atkins (2005) who developed the structural system built on two cointegrating vectors, Bjornlard identified two cointegrating vectors for money and gross domestic product (GDP) but paid attention on the single money cointegrating vectors.

Another study was that of Anglingkusumo (2005) which used quarterly data for Indonesia over the period, 1981-2002 to conduct investigation into the stability of the demand for real narrow money demand (M1) in Indonesia. The author used cointegrated Vector Auto Regression (VAR) framework that took into account the possibility of structural breaks using Johansen-Mosconi-Nielson approach. The variables used for the analysis included consumer price index, private household consumption spending and one month nominal interest rate of time deposits in commercial banks as well as nominal narrow money demand. The result suggested that nominal narrow money demand function was in the long-run homogenous in the price level and the price level was endogenous in the equation for nominal M1. It was established that the demand function for real money demand balance did not experience an intercept break, but real M1 and real consumption in the long run relationship co-break during the Asian crisis. Also, there was evidence of a co-breaking relationship between the real M1 balances and the real private household consumption spending in Indonesia during the crisis.

Effort was also made by Komeil, Moslem and Fattaneh (n.d.) to analyse the effect of financial crisis on money demand in Australia from 1973 to 2007 applying quarterly data. The authors applied Auto-Regressive Distributed Lag (ARDL) and Error Correction Method in dynamic analysis. The variables used were real income, inflation rate, exchange rate and interest rate. The findings of the study revealed that, during financial crisis, the money demand increased. In addition, in the short-run, the effect was negligible while it was evident in the long-run. The calculated sign is positive which confirms the *a priori* sign. However, the result showed reverse relation between money demand and exchange rate variable. This attested to the substitution effect of exchange rate in economic literature. It means that, if an increase in exchange rate is expected, people would increase the demand for foreign money for prevention of decrease in purchasing power of money which would lead to decline in domestic money.

May be in the same consideration and using a VECM with cointegration procedure, Miyagawa and Morita (2009) investigated the effect of financial crisis on Finland and Japan from 1980 to 2007. The study used quarterly data. The result indicated a cointegrating relationship between money demand, interest rate, GDP and "financial anxiety" variables that held through the financial crises. The financial anxiety variable derived from business survey data accounted for a strong rise in money demand, which the authors attributed to a rise in precautionary balances in those countries during the crises. The result, no doubt, is partially in line

with the precautionary motive of cash holdings during the financial crisis. In addition, the later findings of the study of Song and Lee (2012) were not too different from that of Miyagawa and Morita.

In fact, a sample of 32,174 firm-years representing 5,059 unique East Asian firms over the period, 1990-2006 were employed by Song and Lee (2012) to investigate the long-term effect of the Asian financial crisis on corporate cash holdings in eight East Asian countries, namely, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan and Thailand. The variables put to use included cash holdings, cash ratio, investment/assets ratio, and market to book rate, firm size, dividend/assets ratio, equity issuance/assets ratio, earnings before interest and taxes (EBIT)/assets ratio and standard deviation (Std) of EBIT. A multivariate equation model, descriptive statistics and panel data analysis were used to analyse the annual data. The result revealed that the financial crisis did alter the cash holding policies of the firms. The Asian firms were found to have piled up cash holdings by reducing investment activities.

Perhaps, in an attempt to extend the frontiers of studies of effect of banking crisis on money demand, Beyer (2009) used preliminary data for wealth and GDP and M3 to determine the impact of the global financial crisis that started in 2007 on the stability properties of M3 money demand for Euro Area. Other variables used included prices and interest rate. Quarterly data were used and the study covered 1980 to 2007. The study was conducted within a vector error correction model applying cointegration technique and Chow test. A stable cointegrating relationship was found. Also, the parameter constancy of the money demand model was not affected.

In the same vein, Cusbert and Rohling (2013) assessed the Australian economy vis-à-vis the 2008 global financial crisis with an attempt to detect what propelled the surge in currency demand and whether high-frequency currency demand data contained useful real-time information during crises. The study covered 1992Q1 to 2012Q4. The authors captured the impact of the global financial crisis on currency demand using three approaches. First, the authors added dummy variables for the three quarters from December (sic: October) 2008 to June 2009 to the baseline model. Second, the authors introduced confidence, financial market and wealth variables to the model. Other variables included currency holdings, GDP, interest rate and broad money. Finally, they examined whether the variables retained any explanatory power in the presence of dummy variables. The variables were all found to be affected in a highly correlated fashion during the global financial crisis, but none would be considered to directly measure households' confidence in the banking system. Around 80% of the rise in currency holdings during the global financial crisis could not be explained by the standard explanatory variables. This could be attributed to the unusual increase in precautionary demand for currency during banking crisis. It should be noted that the study modelled currency demand in an error correction framework to exploit the possible cointegration between currency holdings, GDP and interest rates.

In the case of Nigeria, Doguwa, Olowofeso, Uyaabo, Adamu and Bada (2014) estimated the money demand function in the context of the 2008/2009 global financial crisis and sought to establish whether its underlying properties changed over the study period that covered 1990Q1 to 2013Q4. The study investigated the issues of existence of stable long-run demand for money function and structural breaks. The variables used were real monetary policy rate, RGDP, movements in Bureau de Change, exchange rates, exchange rate premium and real money demand. Cointegration and error correction models were the framework used to estimate the model while CUSUMQ stability test was employed to determine parameter stability. The study did not use any variable or proxy to capture the global financial crisis. However, the result revealed that real money demand was cointegrated with the independent variables namely, monetary policy rate, exchange rate premium and exchange rate movements. It however established 2007Q1 as break point. The CUSUM and cumulative sum of squares of recursive residuals (CUSUMQ) tests showed a stable demand function for pre- and post global financial crisis while it indicated instability during the crisis.

3. Studies on Behaviour of Inflation during Banking Crisis

In the contribution of Taskin (2009) to the literature of the effect of banking crisis on inflation, the aftermath of banking crisis in emerging economies, using Turkey as a key study, was examined. The period covered by the study was 1994-2001. The variables utilised were GDP, inflation and exchange rates. The author, using descriptive statistics, reported that the banking crisis made the Turkish GDP decline by 6%, inflation to hit three digit level, and Lira which is the Turkish currency, depreciated against currency of foreign countries by over 100% as at December 31, 2004.

Daminian (2012) used a multifactorial regression model to evaluate the impact of financial crisis on inflation rate in Romania from 2007 to 2011. The variables used included crisis dummy, CPI, gross average salary, external inflation rate, real net average salary and broad money and monthly data were employed. The estimation technique applied was least square method. The study did not conduct any diagnostic tests. However, the study established that financial crisis had positive influence on inflation because the result revealed that, it decreased commodity prices and contracted economic activity. On the other hand, the study reported that it had negative influence on inflation because the result showed that the Romania currency depreciated.

A further examination was carried out by Bermingham, Coates, Larkin, O' Brien and O' Reilly (2012) to show the status of inflation during financial crisis. Specifically, the authors estimated a Phillip's curve for Ireland and carried out a conditional forecasting to determine whether economic conditions had a place in the explanation of inflation over the crisis period. The sample period covered was 1980Q1 to 2011Q4. The authors used annual data of the following variables: output gap, unemployment, lag of inflation rate, CPI, oil prices and the nominal effective exchange rate. To put the Irish inflation during the crisis in context, it conducted a preliminary assessment to determine whether inflation declined. This was done by examining the historical evolution of inflation over a long time period (January 1932 to June 2012). In addition, Phillips curve and threshold models as well as ordinary least squares (OLS) estimation technique were applied. The results from the study indicated that the financial crisis was associated with a decline in inflation. In addition, the forecasting result supported the Phillips curve.

An attempt to bridge the gap between the prevailing lack of systematic and in-depth study of the effect of banking crisis on inflation as noted by Kaehler (2010), perhaps made the author utilise a sample of 54 countries which included Nigeria. The sample period used for each of the countries varied from one to twelve years and the study covered 1971 to 2008. Several of the countries witnessed more than one crisis and the total of all crises considered was 76. Kaehler utilised descriptive statistics as well as multivariate panel data analysis and the frequency of data engaged was annual. Inflation rate was the only variable used as the study applied descriptive statistics. The mean and median of the data were employed to compare inflation rates in the pre and post-crisis eras. The variables used in the multivariate panel data estimates were inflation rate, real growth rate of output, that is, GDP, change in the exchange rate, growth rate of money (M1) and banking crisis dummy. The result from the descriptive statistics showed that banking crisis led to a decline of inflation save for few countries like Argentina. Moreover, the multivariate panel data model, that included selected essential determinants of inflation, confirmed that banking crisis increased inflation. It was evident, therefore, that the findings of this study were contradictory.

Also, Naghdi, Kaghazian, & Kakoei (2012) like Kaehler (2010) used panel data analysis and annual data in an attempt to capture the consequences of global financial crisis on inflation among OPEC members between 2000 and 2010. The study utilised three models. Variables considered were inflation rate, GDP growth rate, oil prices and stock price index. The first model was estimated with the aid of fixed effect method while panel data and pool method were employed to estimate the second model. The third model estimation was carried out using random effect method. The results revealed that financial crisis changes inflation through its influence on economic growth, oil price and stock price index. It was also found that the oil price which increased as a result of the financial crisis positively and significantly affected the inflation of the OPEC members, while economic growth and stock price index were found to have had negative and statistically insignificant impact on inflation. In essence, the result of the study was not far from the findings of Kaehler.

Similarly, using a dynamic panel model, Adeleke and Ogebe (2013) analysed the impact of banking crisis on inflationary process as well as on the relationship between monetary variables and prices in West African Monetary Zone member countries (Gambia, Ghana, Nigeria and Sierra Leone) from 1980 to 2011 using annual data. The variables considered included nominal broad money stock, real income, consumer price index (CPI), interest rate measured as own interest rate on demand deposit, alternative interest rate (treasury or saving rate) and banking crisis dummy. A one-step dynamic panel estimation technique was employed. The result revealed that banking crisis increased the rate of inflation of WAMZ member countries. The result of this study supported Kaehler (2010) and Naghdi, et al (2012) who equally used panel data analysis and found that inflation increased during the crisis period studied.

Galati, Poelhekke and Zhou's (2011) study provided a refreshingly different picture when it sought to figure out the behaviour of long-run inflation expectation in the United States of America, the Euro Area and the United Kingdom during the crisis that erupted in the mid-2007. The period covered by the study was from June 2004 to March 2009 and quarterly data were used. This period included almost two crisis years. The variables used included news, harmonized index of consumer prices (HICP), and GDP growth, business confidence indicators, and industrial production, RGDP, CPI, producer price index (PPI) and unemployment rate. The authors tested for structural breaks applying Chow test. The results proved that in the United States of America, the Euro Area and the United Kingdom, long-run inflation expectations had become less firmly anchored during the crisis.

Trehan and Zorrilla's (2012) study on inflation expectations unlike Galati, Poelhekke and Zhou's (2011) was a comparative one. Trehan and Zorrilla conducted an empirical investigation to determine the behaviour of long-term and short-term inflation expectations in the USA and United Kingdom (UK) during financial crisis as well as to compare the pattern in the two countries. The study covered 1999 to 2010 but the authors used the 2008-2009 financial crises as the test to anchor the expectations. It employed household survey data and measures of central tendency in the study. The results indicated that financial crisis made inflation expectations largely temporary in the USA while it lasted longer in the UK. In addition, it was established that in the USA, the long-term inflation expectations behaved better than short-term inflation expectations during the crisis, while in the UK, short-term inflation expectation and long-term inflation were increased. Long-term inflation expectation was pushed higher by the financial crisis in the UK. The indicators of long-

term expected inflation were found to be closer to the short-term measures in UK than what prevailed in the USA.

4. Studies that Combined Behaviour of Money Demand, Inflation and Selected

4.1. Monetary-Based Aggregates during Banking Crisis

Johnston (1991) estimated a simple regression money demand equation on Thailand annual data, 1971 to 1986 in the light of financial crisis among finance companies. The study employed GDP, nominal GDP in agricultural sector, savings deposit rate at commercial banks, deposit rate at finance companies and crisis dummy. A multivariate equation model and ordinary least squares estimation technique were used. The study indicated that following the movement of deposits out of finance companies into commercial banks, the behaviour of monetary aggregates (M2, M3 and reserve money) were altered. In addition, there was remarkable demand for M2 currency and demand deposits of commercial banks. Besides, the study concluded that it was very difficult to measure the impact of financial crisis on real economic activity, inflation and balance of payments. This means the study could not ascertain whether financial crisis positively or negatively influenced inflation.

Garcia-Herrero (1997) study that explored the monetary impact of banking crisis and the conduct of monetary policy, also looked into the long run money demand stability in seven countries namely: Argentina, Estonia, Latvia, Lithuania, Paraguay, Philippines and Venezuela. The study looked at narrow and broad money demands. The variables used included real narrow money demand, real broad money demand, RGDP and inflation. The study covered 1983 to 1996. Gracia-Herrero used multivariate single equation model and Johansen type cointegration technique to analyse the monthly data. Cointegrating vectors were found for narrow and broad money in all cases, indicating that the long-run stability of the demand for money might exist for all countries reviewed. In essence, the study established that banking crisis destabilises money demand. The author ended with a caveat based on short sample period for which data was available, significant measurement inaccuracies of monetary aggregates and autocorrelation that could not be avoided because of sample size problems as well as weak exogeneity and price homogeneity tests that were not conducted. Garcia-Herrero (1997) declared unequivocally that the analysis was incomplete. All these, are pointer to the fact that the conduct of this study was not in a systematic empirical manner and appropriate methodology was not applied as noted by Martinez-Peria (2002). Therefore, the findings and conclusions made might not be suitable.

Odusola (2001) utilised Vector Error Correction Model (VECM) and sequential two-stage least squares (2SLS) estimation technique to look into the dynamic interaction between banking crisis and macroeconomic performance with concentration on real money balances and general price level in Nigeria from 1980:I to 1998:IV with the aid of quarterly data. The author relied on stochastic neo-classical framework and in using this theory the study had recourse to asymmetric information theory. However, in its application, it could not go beyond the shock on financial intermediation and its impact on investment that had negative effects on aggregate demand and supply. The inflation models developed by Odusola assumed that the economy contained four sectors (goods, government, money and external) with two basic markets, namely goods and money markets. For inflation, the variables considered were the growth rate of RGDP and real money balances, while for real money balances the variables were M2, fiscal deficit, real exchange rate and banking crisis with the ratio of non-performing loan to total banking system assets as proxy. The findings of the study showed that the contemporaneous and dynamic models indicated negative effects of banking crisis on macroeconomic conditions. Specifically, in the absence of banking crisis, developments in the goods and money market were able to significantly explain the conduct of inflation. When banking crisis variable was included, it significantly reduced the importance of the goods market and the performance of the whole model. It was established that banking crisis raised the demand for real money balances in Nigeria but it was not statistically established. The inability of the study to statistically establish the results calls for a second look at the study.

In a similar study, Martinez-Peria (2002) looked into the monetary effects of banking crisis in each of the following countries: Chile (1981-1987), Colombia (1982-1988), Denmark (1987-1992), Japan (1992-1998), Kenya (1985-1989, 1992-1995), Malaysia (1985-1988) and Uruguay (1981-1985) using monthly data. The study estimated dynamic money demand and inflation equations in order to: first, establish if money demand became unstable during banking crisis and second, analyse the relation between monetary indicators and prices as well as test for whether crisis precipitated structural breaks.

Though different variables were used by Martinez-Peria (2002), it was clear that for the scale variable, industrial production was employed for all countries except Kenya whose GDP was utilised. The monetary aggregate considered for all the sample countries was M2. Expected inflation rate, foreign exchange rate, foreign prices, CPI, wage index, share index, interest rate, USA bond rate and crisis dummy were also used. Cointegration analysis and error correction modelling which did not concede VAR were employed to obtain appropriate dynamic specification for money and prices. Parameter constancy involved the usage of recursive, t-test, Hansen's 1992 variance, and joint error variance, coefficient of stability and Chow test. The domestic

prices in each of the sample countries were modelled as a function of monetary, external and cost-push (labour market) driven factors.

Further, Martinez-Peria (2002) revealed that, with the exception of Uruguay, banking crisis did not jeopardise broad money demand stability. In essence, banking crisis did not systematically threaten the short-run or long-run broad money demand function. With respect to the indicators of price behaviour, money, exchange rates, foreign prices and domestic interest rates proved to be significant in explaining prices in most countries. Nevertheless, stock prices had been established not to be valuable indicators of price behaviour.

In general, Martinez-Peria (2002) did not find change in the individual coefficient of the price equations with the occurrence of banking crisis. In essence, the relation between prices and individual monetary indicators was found to be stable. The results did not persistently agree with the conception that the relationship between monetary indicators and prices witnesses structural breaks in the era of banking crisis, but in three out of the seven sampled countries, ample evidence of variance instability in the price/inflation equations was found. However, Martinez-Peria concluded that, policymakers in countries experiencing crisis should not have anxiety about the structural stability of money demand function. Moreover, the sample periods were too short and the possibility of getting meaningful result from such a sample were likely to be remote. Besides, the results are mixed with respect to inflation when compared to money demand.

Dreger and Wolters (2011) introduced an interesting direction as the study provided empirical evidence on the stability of the relation between money demand and inflation in the Euro Area by including the recent financial crisis. VAR model and cointegration analysis in which inflation and asset price (nominal house prices) were allowed to enter the long-run relationship were used. Other variables used were nominal balances for M3, short and long-term interest rate, RGDP, GDP deflator, real financial wealth and real money balances. The study covered 1983Q1 to 2010Q4 and applied quarterly data. The result indicated that the evolution of M3 was in tandem with money demand. In the long run, inflation was influenced by asset price and detrended output. It was also established that excess liquidity played a vital role in inflation dynamics. However, the hypothesis of weak exogeneity was rejected for real money balances and inflation, real income, real asset prices and the term structure were found not responding to deviations from the long-run equilibrium.

Reynard (2012) analysed the behaviour of money and inflation during the crisis in Argentina (early 2000s), Japan (1990s and early 2000s), the US (1930s) and Switzerland (early 1990s) with an attempt to determine the dynamic relationship between money and price levels, accounting for equilibrium changes and non-linearity issues. The variables of interest were money, CPI, RGDP, interest rate and M2. The methodology applied centred on the multivariate equation model and ordinary least squares (OLS) estimation technique. Specifically, the empirical strategy first imposed the long-run adjustments required by the quantity theory of money which was followed by analysis of the dynamics between the adjusted money and price levels. The results revealed that the relationship between money and inflation was stable and the same in all countries during normal and financial crisis periods. The results also pointed out that financial crisis in Argentina in the early 2000s led to increasing inflation while that of Japan in the 1990s and 2000s brought in deflation and disinflation. One striking conclusion that could be made from the study of Dreger and Wolters (2011), Kaehler (2010) as well as Reynard was that financial crisis could negatively or positively affect inflation. In addition, the relationship between inflation and money during financial crisis could be stable.

Nevertheless, it is instructive to note that Mishkin (1996, 2007) examined banking crisis with the aid of descriptive statistics in an asymmetric information model and showed the sequence of events that had occurred during banking crisis in the 19th and 20th centuries for developed countries typified by United States of America and developing countries as represented by Mexico. The variables that were involved included interest rate, deposits, stock price, price level and money supply. Mishkin concluded that, crisis led to worsening business conditions, uncertainty in the health of the banks, withdrawal of funds by depositors, decline in stock prices, increase in interest rate and increase in prices. Interesting contributions of the work as it touched on monetary effects of banking crisis were that, Mishkin was able to extend the theory to cover money supply and interest rate for developed and developing countries but inflation for only developed countries. In addition, Mishkin noted that if an expansionary monetary policy was pursued during banking crisis in developing countries, it would accentuate inflation and induce further depreciation of the domestic currency.

Goldstein and Xle (2009) like Taskin (2009) used VAR model, descriptive statistics and OLS technique to analyse the effect of the global financial crisis that began in the summer of 2007 on nine emerging Asian countries. The study spanned 1983Q1 to 2010Q4. Goldstein and Xle used annual data of RGDP, headline and core inflation rates, foreign trade, terms of trade, current account, exchange rate, interest rate, credit flow, sovereign bond spread, equity price as well as international reserve and came to the conclusion that, in emerging Asia, the inflation rates during crisis revealed a pattern similar to those of other emerging markets, rising from mid-2007 to early or mid-2008 and then falling. Goldstein and Xle also showed that the Asian inflation rates fell faster and further than their emerging market counterparts.

Also, with descriptive statistics, Aigbokhan (2010) made effort to identify the effects of global financial crisis in Nigeria. The study used annual data, covered 2007 to 2009, and the variables engaged were RGDP growth, inflation rate, international oil price, all share index, broad money growth, prime lending rate and

monetary policy rate. Mean analysis model and descriptive statistics technique were used. The author found that, global financial crisis made inflation rate rise from 5.5 % in 2007 to 11.2 % in 2008, to 14.2 % in the first quarter of 2008 and made share index decline.

The seminal work of Friedman and Schwartz (1963) on the American Monetary History covered 1867-1960 and used multivariate equation model. Annual data were used while the analysis involved the use of OLS estimation technique. Money stock, nominal income, real income, price level, interest rate, money growth and real income growth were the variables considered. The authors came to the conclusion that banking panics produced monetary and economic instability. In addition, it was emphasised by the authors that banking crisis impacted on money supply and that the waves of crisis which started in October 1930 and came to an end in March 1933, to a large proportion, reduced the money stock and money multiplier. It also led to a decline in economic activities. The study also revealed that call loan fell to the tune of \$120 million within two weeks.

Bernanke (1983) had a contrary view to that of Friedman and Schwartz (1963) as evidenced in the empirical study in which Bernanke used Barro-lucas type regression equation as against OLS estimation technique used by Friedman and Schwartz. Bernanke set out to test the hypothesis that banking panics of 1930 to 1935 in the United States had raised the cost of financial intermediation, decreased output over and above the effects as a result of monetary contraction. The variables Bernanke employed included deposits and liabilities of failing banks, spread between the Baa and treasury bond rate, rate of growth of industrial production, rate of growth of M1 and rate of growth of wholesale price index. The result that was statistically significant showed increase in the cost of credit, output changed above unexpected money growth, unexpected price level changes and lagged output. On the other hand, Gorton (1988) used annual data, multivariate single equation model, Granger-causality test, OLS, Tobit procedure and Spearman's correlation coefficients to study seven banking panics in the United States from 1873 to 1914 which is usually addressed as National banking era. Gorton stated that because of bleak business activity, depositors sought to withdraw deposits from banks and this precipitated bank panic. Under this circumstances, there was a bank run, increase in interest rates, decline in stock market and worsened agency and adverse selection problems.

Examining the causes and effects of banking crisis, Sundararajan and Balino (1991) used seven countries including the Southern Cone countries with different sample periods. The countries were Argentina (1980-1982), Chile (1981-1983), Malaysia (1985-1986), Philippines (1983-1986), Spain (1978-1983), Thailand (1984-1986) and Uruguay (1982-1985). Banking crisis dummy, non-performing loan, stock prices and GDP growth, inflation rate, M2, interest rate and currency were the variables of interest. Sundararajan and Balino applied Granger-causality and a reduced form model. They found that non-performing loans sharply increased in each of the crises. In addition, asset prices, that is, stock prices, changed adversely. There was also a sharp change from deposits to currency and decrease in the interest elasticity of demand due to the crisis in all the samples of the study. As a result, money multipliers drastically declined in Argentina, the Philippines, Spain and Uruguay but this was not the case in Thailand and Chile. Also, the crisis led to sharp reductions in GDP growth and initial falling of inflation before rising again. In addition, central bank credits to the banks and other financial institutions had a sharp rise while its share in reserve money increased. Again, the authors established that there were changes in broad money demand intercepts and interest rate elasticity in the face of banking crisis. In essence, portfolio and parameter shift occurred due to banking crisis. However, the analysis compromised cointegration technique and error correction modelling. Therefore, it cannot be said that the equations were well specified.

The findings of Sundararajan and Balino (1991) however, converged with the later result from Kaminsky and Reinhart (1999) who investigated banking crisis in 20 countries from 1970 to 1995 and found that exchange rates and interest rates adjusted sharply. Kaminsky and Reinhart established that M2 multiplier decreased, deposits decreased, domestic-credit-to-GDP ratio increased, output became smaller and lending-to-deposit interest rates ratio increased because of banking crisis. Kaminsky and Reinhart got the results using monthly data of real exchange rate, real interest rate, M2 multiplier, lending-deposit rates ratio, excess M1 deposits, exports, terms of trade, imports, industrial production, real interest rate differential, stock returns and public sector deficit as share of deficit. In Uruguay and Philippines, the crisis led to sharp declines in money multipliers whereas in Argentina it was mild but associated with greater volatility. The findings of Sundararajan and Balino were similar to the earlier findings of Nascimento (1990) which revealed that the crisis significantly altered the money multiplier behaviour and monetary base stability in the Philippines. Nascimento analysed the causes, manifestation, and transmission mechanism of the Philippines's financial sector crisis as well as the reaction of the authorities to the crisis from 1970 to 1986 using descriptive statistics and OLS. The variables used for the analysis included demand for money (real M3), deposit rate, dummy, real money balances and actual inflation rate.

From macroeconomic perspective, Lindgren, Garcia and Saal (1996) analysed the effects of banking crisis in three countries, namely, Argentina, Paraguay and Venezuela from 1980 to 1996. The variables used were output growth, interest rate, exchange rate, fiscal policies, interest rate spread, international reserves and cash to GDP ratio. Mean-analysis model and descriptive statistics approach of five years pre-crisis and five years post-crisis were employed to analyse the data. The study established that output and money multiplier declined, international reserves decreased, depreciated exchange rate fell, increase in interest rate, interest rate

spreads and financial intermediation were adversely disrupted. These led to credit crunch, decreased growth and increase in deposit to GDP ratio. It would suffice to add, that there was Cash to GDP ratio increase contrary to the findings of Gorton (1988).

Demirguc-Kunt and Detragiache (1998) investigated the macroeconomic determinants of banking crisis in 65 developing and developed countries from 1980 to 1994. Annual data was used and the variables utilised were GDP growth, terms of trade, real interest rate, inflation rate, banking crisis dummy, rate of depreciation of exchange rate, ratio of credit to private sector to GDP, ratio of M2 to foreign exchange reserves and government surplus as a percentage of GDP. The study used a multinomial logit model, panel data analysis and OLS estimation technique. The result revealed that slow domestic GDP growth, poor performance of the country's terms of trade, high real interest rates and inflation characterised banking crisis. In a related vein, Hutchison and McDill (1999), using a large sample of 132 countries, added to their statistical study of determinants of banking crisis, an examination of the conventional time series behaviour of macroeconomic variables and financial variables in crisis countries. The study covered 1975 to 1997 and annual data were used. The variables used were RGDP growth, exchange rate depreciation, inflation rate, credit growth, real interest rate, ratio of M2 to reserve ratio, stock prices change and budget surplus. The study applied multivariate probit model and analytical technique. One of Hutchison and McDill findings for countries experiencing crisis as compared to the others, was that, pre-crisis period was associated with a faster rate of currency depreciation, a higher rate of inflation and a higher ratio of M2 to foreign exchange reserves while the crisis period paraded decline in output growth, contraction in credit growth, significant increase in exchange rate depreciation and sharp decline in stock prices. The findings pointed to the fact that the monetary consequences of banking crisis for the countries studied were adverse in nature.

5. Summary, Conclusions and Recommendations

In this paper, efforts have been made to review some chosen studies on money demand and inflation amidst banking crisis in developing and developed countries alike. In the review salient features of the studies were reported. The objectives of the studies in most cases were to investigate the long-run and short-run dynamics of money demand and inflation, structural break as well as its stability during banking crisis using either narrow or broad money. The available studies did not use any theory to examine the effect of banking crisis on money demand and inflation except Odusola (2001) and Mishkin (1996, 2007) that used the stochastic neo-classical theory and asymmetric information theory, respectively. The uses of these theories were fraught with problems. The studies used different countries as subject, sample periods and data frequency as well as different variables except composite index. Also, different models such as multivariate equation model, autoregressive distributed lag model, VAR, VECM and error correction model other than computable general equilibrium as well as macro-econometric model were employed. Various estimation techniques were utilized except three-stage least squares (3SLS). Chow and CUSUM tests for parameter constancy were used. The studies that set out to establish structural breaks were concerned with one point structural break. The results gotten from the studies were conflicting. Some of the results like Atkins (2005) had long-run and short-run cointegrating and stability of money demand while others did not. While studies like Martinez-Peria (2002) revealed that, save for one country, there was no awesome evidence that banking crisis jeopardised broad money demand stability or threaten short-run or long-run broad money demand. For inflation studies, such as Kaehler's (2010) and Damirian (2012) the conclusion is that financial crisis could positively or negatively influence inflation.

An interesting conclusion from the review is that, the results gotten from studies for developed and developing countries are alike. Another conclusion is that, the conflicting results produced by most of the studies may be due to the failure to use economic theories as the basis for their studies. One policy conclusion from the survey is that, during banking crisis, monetary policy would be ineffective. In addition, a handful of empirical studies that looked at the effects of banking crisis on inflation did not control for interest rate spread, output gap and macroeconomic policy, which might have adversely affected the efficiency of the parameter estimates. More so, the use of computable general equilibrium and macro-econometric models were disregarded. Simulation for ex-ante prediction was not conducted by any of the studies reviewed. Moreover, despite that composite index is more adequate than a single variable in capturing banking crisis, the studies used the latter. Besides, no thought was given to the non-homogeneity of banking crisis effect and the possibility of an optimal threshold level for banking crisis beyond which it becomes inimical to the economy. These concluding observations that are lacuna constitutes possible areas of future research.

A number of policy recommendations falls out of this review. The first is that to make monetary policy effective during banking crisis especially in Nigeria, there is the need to expand money supply and reduce interest rate for the productive sectors particularly agricultural and manufacturing sectors. Next, there should be appropriate harmonization of macroeconomic policies and banking crisis policy responses. Also, there should be adequate coordination of banking crisis related policies among inter-monetary institutions. The programmes and measures adopted should engender stable macroeconomic environment and confidence in the banking system.

References

- Adeleke, A.I. and Ogebe, J.O. (2013) Banking crisis and inflation dynamics in the West African Monetary Zone (WAMZ). *Journal of Economics and International Finance*, 5(6): 225- 231.
- Aigbokhan, B.E. (2010) The global financial crisis: impact on Nigeria and policy responses of government. *The Nigeria Journal of Economic and Social Studies*, 52(1): 65-79.
- Anglingkusumo, R. (2005) Stability of the demand for real narrow money in Indonesia: Evidence from the pre and post-Asian crisis era. (Tinbergen Institute Discussion Paper TP 2005 – 051/4). Rotterdam, Netherlands: Erasmus Universiteit.
- Atkins, F. (2005) Financial crisis and money demand in Jamaica (Birkbeck Working Papers in Economics BWPEF 0512). London, United Kingdom: Birkbeck, University of London.
- Bernanke, B.S. (1983) Non-monetary effects of the financial crisis in the propagation of the great depression. *The American Economic Review*, 73(3): 257-276.
- Beyer, A. (2009) A stable model for Euro area money demand: Revisiting the role of wealth (European Central Bank Working Paper 1111). Frankfurt am Main, Germany: European Central Bank
- Bermingham, C., Coates D., Larkin J., O'Brien, D. and O'Reilly, G. (2012) Explaining Irish inflation during the financial crisis (Research Technical Paper 9/RT/12). Ireland, United Kingdom: Central bank of Ireland.
- Bjornlard, H. (2005) A stable demand for money despite financial crisis: The case of Venezuela. *Applied Economics*, 37(4): 375-386.
- Cusbert, T. and Rohling, T. (2013) Currency Demand during the global financial crisis: Evidence from Australia (Research Discussion Paper 2013-01). Australia: Reserve Bank of Australia.
- Daminian, M. (2012) The impact of financial crisis upon the inflationary process in Romania. *Intermediate Journal of Business and Social Sciences*, 3(10): 267-274.
- Demirguc-Kunt, A. and Detragiache, E. (1998) The determinants of banking crises in developing and developed countries. *IMF Staff Papers*, 45(1): 81-109.
- Doguwa, S.I., Olowofeso, O.E., Uyaabo, S.O.U., Adamu, I., and Bada, A.S. (2014) Structural breaks, cointegration and demand for money in Nigeria. *CBN Journal of Applied Statistics*, 5(1):15-33.
- Dreger, C. and Wolters, J. (2011) Money and inflation in the euro area during the financial crisis (DIW Berlin Discussion Papers 1131). Mohrenstr, Berlin: German Institute for Economic Research.
- Friedman, M. and Schwartz, A. (1963) *A Monetary History of the United States*. Princeton, NJ: Princeton University Press.
- Galati, A. Poelhekke, S. and Zhou, C. (2011) Did the crisis affect inflation expectations? *International Journal of Central Banking*, 7(1): 167-209.
- Garcia-Herrero, A. (1997) Monetary impact of a banking crisis and the conduct of monetary policy (IMF Working Paper WP/97/124). Washington, DC: International Monetary Fund.
- Goldstein, M. and Xle, C. (2009) The impact of the financial crisis on emerging Asia (Peterson Institute for International Economics Working Paper No 09-11). Washington, DC: Peterson Institute for International Economics
- Gorton, G. (1988) Banking panics and business cycles. *Oxford Economic Papers*, 40(4):751-781.
- Hutchison, M.M and McDill, K. (1999 July) Are all banking crisis alike? The Japanese's experience in international comparison (NBER Research Working Paper 7253). Cambridge, MA: National Bureau of Economic Research.
- Johansen, S. and Juselius, K. (1990) Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52 (2):169-210.
- Johnston, R. B. C. (1991). Distressed financial Institutions in Thailand: Structural weaknesses, support operations, and economic consequences. In V.Sundararajan & T.J.T. Balino (eds), *Banking crisis: Cases and issues*. Washington, DC: International Monetary Fund.
- Johansen. S., Mosconi, R., & Nielson, B. (2000) Cointegration analysis in the presence of structural breaks in the deterministic trend. *The Econometrics Journal*, 3(2):216 – 249.
- Kaehler, J. (2010) Inflation in the aftermath of banking crisis: A panel-data analysis. Retrieved from <http://www.economics.phil.uni-erlangen.de/institut/mitarbeiter/mantus>.
- Kaminsky, G.L. and Reinhart, C.M. (1999) The twin crisis: The causes of banking and balance-of-payments problems. *American Economic Review*, 89(3): 473-500.
- Khamis, M. and Leone, A.M. (2001) Can currency demand be stable under a financial crisis? The case of Mexico. *IMF Staff Papers*, 48(2):344-366.
- Komeil, T., Moslem, A. and Fattaneh, S. (n.d) International financial crisis and money demand in Australia: ARDL approach. Retrieved from: komeil@econ.ui.ac.ir.
- Lindgren, C.J., Garcia, G. and Saal, M.I. (1996) *Bank Soundness And Macroeconomic Policy*. Washington, DC: International Monetary Fund.
- Martinez-Peria, M.S.M. (2002) The impact of banking crises on money demand and price stability. *Imf staff papers*, 49 (3):267-312.

- Mishkin, F.S. (1996) Understanding financial crisis: A developing country perspective (National Bureau of Economic Research Working Paper 5600). Cambridge, United Kingdom: National Bureau of Economic Research.
- Mishkin, F.S. (2007) *The Economics of Money, Banking and Financial Markets*. London: Pearson, Addison Wesley.
- Miyagawa, S. and Morita, Y. (2009) Financial crisis of Finland, Sweden, Norway and Japan. *Journal of the Faculty of Economics, Kyoto Gakuen University, and Kyoto, Japan* 19(1): 45-77.
- Naghdi, Y. Kaghazian, S. and Kakoei, N. (2012) Global financial crisis and inflation: Evidence from OPEC. *Middle-East Journal of Scientific Research*, 11(4): 525-530.
- Nascimento, J.C. (1990) The crisis in the financial sector and authorities' reaction: The case of the Philippines (IMF Working Paper WP/90/26). Washington DC: International Monetary Fund.
- Odusola, A.F. (2001) *Banking Crisis and macroeconomic performance in Nigeria* (Unpublished Doctoral dissertation). University of Ibadan, Ibadan, Nigeria.
- Reynard, S. (2012) Assessing potential inflation consequences of QE after financial crises (Working Paper WP 12-22). Washington, DC: Peterson Institute for International.
- Song, K. R. and Lee, Y. (2012) Long-term effects of a financial crisis: Evidence from cash holdings of East Asian firms. *Journal of Financial and Quantitative analysis*. Retrieved from <http://ssrn.com>.
- Sundararajan, V. and Balino, T.J.T. (1991) Issues in recent banking crisis. In V. Sundararajan and T.J.T. Balino (eds). *Banking crisis: cases and issues*. Washington DC: International Monetary Fund.
- Taskin, F.D. (2009) The aftermath of banking crisis in an emerging economy: Evidence from the 1994 and 2001 banking crisis of Turkey. *Journal of Money, Investment and Banking*. Issue 12. Retrieved from <http://www.eurojournal.com/JMIB.htm>.
- Trehan, B. and Zorrilla, O. (2012) The financial crisis and inflation expectations (Economic Letters 2012-29). Federal Reserve Bank of San Francisco.

APPENDIX-1

Summary of Empirical Studies on Impact of Banking Crisis on Money Demand.

| Authors Name | Objective(s) | Data Frequency | Country(ies) | Sample Period | Variables | Model | Estimation Technique | Findings |
|--------------------------|--|-----------------------|---------------------|---|---|--------------------------------|---|---|
| Khamis and Leone (2001). | To investigate the long run determinants of currency demand and its dynamics during and after financial crisis. | Monthly. | Mexico. | 1983 Q ₁ - 1997 Q ₄ . | Real currency balances, real private consumption expenditure, CPI, inflation rate, interest rate, and banking crisis dummy. | Multivariate equation and ECM. | Johansen and Juselius (1990) cointegration recursive and chow test. | Real currency demand was stable during and after the crisis. The dynamic model exhibited significant parameter constancy after the crisis. |
| Atkins (2005). | To find out whether there was a stable long run money demand relationship during the financial crisis of the 1990's. | Annual. | Jamaica. | 1962 – 2000. | Nominal broad money, RGDP, exchange rate index(J\$/US\$, nominal interest rate, treasury bill rate and CPI. | VAR. | Cointegration OLS, CUSUM and CUSUMQ. | A long run structural stability of broad money demand as well as the existence of two cointegrating relation was found. |
| Bjornlard (2005). | To estimate the demand for money during financial crisis. | Quarterly. | Venezuela. | 1985:1 - 1995:1. | Crisis dummy, broad money, RGDP, CPI, exchange rate and interest rate spread. | VAR. | Johansen (1991) cointegration, OLS and how test. | There exists a long run relationship between real broad money demand and its explanatory variables. Broad money demand was stable despite the financial crisis. |
| Anglingkusumo (2005). | To examine the stability of the demand for real M ₁ during financial crisis. | Quarterly. | Indonesia. | 1981 – 2002. | CPI, real private household consumption spending, nominal interest rate of time deposits and nominal narrow demand. | VAR . | Johansen - Mosconi - Nielson (2000) cointegration. | Demand function for real narrow money demand balance did not experience an intercept break. |

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|------------------------------------|--|------------|--|--------------|--|------------------------|---|---|
| Komeil, Moslem and Fattaneh (n.d). | To analyse the effect of financial crisis on money demand. | Annual. | Australia. | 1973 – 2007. | Real income, inflation, exchange rate and interest rate. | ARDL. | ARDL cointegration procedure. | During financial crisis, money demand increased. The effect was negligible in the short run but pronounced in the long run. |
| Miyagawa & Morita (2009). | To examine whether during financial crisis there exists a long run relationship between monetary and economic activity with focus on precautionary money demand. | Quarterly. | Finland, Sweden, Norway and Japan. | 1980 – 2007. | Money demand, interest rate, business survey, RGDP and interest rate spread. | VECM. | Cointegration. | A cointegrating relationship between money demand, interest rates, GDP and financial anxiety was established throughout the financial crisis period in Finland and Japan. |
| Beyer (2009). | To determine the impact of the global financial crisis on the stability properties of M3 money demand. | Quarterly. | Euro Area. | 1980 – 2007. | Wealth, RGDP, nominal money stock M3, Inflation, 3 months money Market interest rate, nominal housing wealth, and GDP deflator, real money stock M3, own Rate M3, growth of housing wealth and crisis dummy. | VECM VAR. | Cointegration and chow test. | The parameter constancy of the money demand model was not affected by the financial crisis. |
| Song & Lee (2012). | To estimate the long term effect of the Asian financial crisis on corporate cash holdings of firms before and | Annual. | Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, | 1990 – 2006. | Cash ratio, investment/ assets, market to book rate, firm size, dividend /assets, equity issuance/ | Multivariate equation. | Descriptive statistics and panel data analysis. | Financial crisis increased cash holdings of the firms and reduced investment activities. |

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|---|---|------------|----------------------|---|--|--------------------------------------|---|---|
| | after the Asian financial crisis. | | Taiwan and Thailand. | | assets, EBIT/ assets and Std of EBIT. | | | |
| Cusbert and Rohling (2013). | To find out what propelled the surge in currency demand and whether high - frequency currency demand data contain useful real-time information as a result of the 2008 global financial crisis. | Quarterly. | Australia. | 1992 Q ₁ - 2012 Q ₄ . | Banking crisis dummy, business confidence, nominal household wealth, currency holdings, GDP, interest rate, consumer confidence, stock market index and broad money. | Multivariate equation, VAR and VECM. | Descriptive statistics, co integration and chow test. | An unusual increase in demand for currency was experienced during the crisis but was not sufficient to cause financial instability. |
| Doguwa, Olowofeso, Uyaabo, Adamu & Bada (2014). | To estimate the money demand function in the context of the 2008 / 2009 global financial crisis and whether the underlying properties changed. | Quarterly. | Nigeria. | 1991 Q ₁ - 2013Q ₄ . | Real monetary policy rate, RGDP, bureau de change, exchange rate, exchange rate premium and real money demand. | Multivariate equation and ECM. | Gregory - Hansen cointegration and CUSUMQ. | Real money demand cointegrated with the independent variables and the money demand function was stable before and after the crisis. |

APPENDIX-2.

Summary of Empirical Studies on Impact of Banking Crisis on Inflation.

| Author's Name | Objective(s) | Data Frequency | Country(ies) | Sample Period | Variables | Model | Estimation Technique | Finding(s) |
|----------------|--|----------------|--------------|---------------|-----------------------------------|-------|-------------------------|--|
| Taskin (2009). | To examine the effect of banking crisis with focus on inflation. | | Turkey. | 1994 - 2001. | GDP, inflation and exchange rate. | | Descriptive statistics. | Banking crisis made inflation to increase. |

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|--|--|----------|---|---|--|-------------------------------------|---|---|
| Daminian (2012). | To evaluate the effect of financial crises on inflation rate. | Monthly. | Romania. | 2007-2011. | CPI, crisis dummy, gross average salary, broad money, external inflation rate and real net average salary. | Multifactorial regression model. | OLS. | Financial crises increased inflation. |
| Bermingham, Coates, Larkin, O'Brien & O'Reilly (2012). | To establish the status of inflation during financial crisis. | Annual. | Ireland. | 1980 Q1 - 2011Q4. | Output gap, unemployment gap, lag of inflation, CPI oil prices, and nominal effective exchange rate. | Phillips curve and threshold model. | OLS. | Financial crises led to decline in inflation, and forecasted results supported Phillip curve. |
| Kaehler (2010). | To ascertain the effect of banking crisis on inflation. | Annual. | Fifty four countries which include Nigeria and Argentina. | Sample period for each country varies from 1 - 12 years and was between 1971 -2008. | Inflation rate, RGDP, exchange rate, growth rate of M1 and banking crisis dummy. | Multivariate panel data model. | Descriptive statistics and panel data analysis. | Descriptive statistics results revealed decline in inflation with few outliers like Argentina while the panel data analyses indicate increase in inflation during banking crises. |
| Naghdi, Kaghazan, and Kakoei (2012). | To identify the impact of the 2007 global financial crises on inflation. | Annual. | OPEC. | 2000-2010. | Inflation rate, GDP growth rate, oil prices and stock price index. | Multivariate panel data model. | Panel data analysis expunge. | Global financial crises increased inflation. |

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|----------------------------------|--|------------------------|---|------------------------|---|--------------------------------|-------------------------|--|
| Adeleke & Ogebe (2013). | To analyse the impact of banking crises on inflationary process, and determine the relationship between monetary variables and prices. | Annual. | Gambia, Ghana, Nigeria, and Sierra Leone (WAMZ member countries). | 1980-2011. | Nominal broad money stock, real income, CPI, interest rate on demand deposit, exchange rate, treasury bill or saving rate and banking crises dummy. | Multivariate panel data model. | Panel data analysis. | Banking crises increased inflation in the WAMZ countries. |
| Galati, Poelhekke & Zhou (2009). | To estimate the behaviour of long run inflation expectation during the 2007 global financial crises. | Quarterly. | USA, UK and Euro Area. | June 2007- March 2009. | HICP, GDP growth, business, confidence indicators, unemployment rate, industrial production, RGDP, CPI and PPI. | Multivariate equation model. | OLS and chow test. | During the crises, inflation expectation was fairly stable. |
| Trehan & Zorrilla (2012). | To determine the behaviour of long term inflation expectations relative to short term inflation expectation. | Household survey data. | USA and UK. | 1999-2010. | Rate of expected inflation, interest rate, unemployment and CPI. | Median-analysis model. | Descriptive statistics. | During the crises, inflation expectation was largely temporary in USA but lasted longer in UK. Also, long-term inflation expectation behaved better than short term inflation expectation in USA while in UK both increased. |

APPENDIX-3

Summary of studies on Impact of Banking Crisis on Money Demand, inflation and monetary - based aggregates combined.

| Author's Name | Objective(s) | Data Frequency | Country(ies) | Sample Period | Variables | Model | Estimation Technique(s) | Finding(s) |
|--------------------------|---|----------------|---|-------------------|--|------------------------|---|---|
| Johnston (1991). | To estimate a simple regression money demand equation in the light of financial crisis among finance companies. | Annual. | Thailand. | 1971 – 1986. | Nominal GDP, Nominal GDP in agricultural sector, Savings deposit rate at commercial banks, deposit rate at finance companies, and crisis dummy. | Multivariate equation. | OLS. | behaviour of monetary aggregates M2 and M3 and supply of reserve money were distorted. There was significant increase in the demand for M2 – currency and deposit liabilities of commercial bank. |
| Garcia - Herrero (1997). | To investigate monetary impact of banking crisis and the conduct of monetary policy. | Monthly. | Argentina, Estonia, Latvia, Lithuania, Paraguay, Philippines and Venezuela. | 1983 - 1996. | Real narrow money demand, real broad money demand, RGDP and inflation. | Multivariate equation. | Johansen cointegration technique and Chow test. | Monetary and credit aggregate became more unstable during banking crisis .It destabilises money demand and limits the effectiveness and predictability of monetary policy. |
| Odusola (2001). | To examine the dynamic interaction between banking crisis and macroeconomic conditions with focus on real money balances and general price level. | Quarterly. | Nigeria. | 1980: I 1998: IV. | Inflation, RGDP growth rate, real money balances, M2, fiscal deficit, real exchange rate, and ratio of non-performing loan to total banking system assets as crisis proxy. | VECM. | Johansen (1991) cointegration and 2SLS. | Banking crisis increased the demand for real money balances and price level but was not statistically established. |

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|----------------------------|---|------------|---|---|--|------------------------|--|--|
| Martinez – Peria (2002). | To estimate dynamic money demand and inflation equations in order to establish if money demand becomes unstable during banking crisis as well as analyse the relation between monetary indicators and prices and tests whether crisis precipitated structural breaks. | Monthly. | Chile, Colombia, Denmark, Japan, Kenya, Malaysia and Uruguay. | Different sample period which ranged from 4 – 8 years and were between 1981 – 1998. | Industrial production, M2, expected inflation rate, foreign exchange rate, foreign prices, CPI, wage index, unemployment rate, Share price index, Interest rate, USA bond rate and crisis dummy. | VAR. ECM. | Cointegration, Recursive t-test, Hansen 1992 variance and joint error variance and coefficient of stability and chow test. | . Except for Uruguay, banking crisis did not jeopardised broad money demand stability while money, exchange rate, foreign prices and domestic interest rate significantly explained prices in most countries studied. And the relationship between prices and individual monetary indicators were found to be stable. |
| Dreger and Wolters (2011). | To examine the stability of the relation between money demand for M3 and inflation during financial crisis. | Quarterly. | Euro Area. | 1983 Q1 - 2010 Q4. | Nominal money balances for M3, short and Long term interest rate, RGDP, GDP, GDP Deflator, real financial wealth, nominal house prices, real money balances and Inflation rate. | VAR. | Cointegration. | The results showed that the evolution of M3 is still in line with money demand and that in the long run inflation changed. However, the hypothesis of weak exogeneity is respected for real money balances and inflation, real income, real asset prices and the term structure do not respond to deviations from the long - run equilibria. The relationship between money and inflation was unstable and the same in all countries during normal and crisis period. The financial crisis led to inflation in Argentina in early 2000's and brought |
| Reynard (2012). | To analyse the behaviour of money and inflation during financial crisis. | Annual. | Argentina, Japan, USA and Switzerland. | 1930s, 1990s, 2001s. | Money, CPI, RGDP, interest rate, and M2. | Multivariate equation. | OLS. | |

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|-----------------------------|--|---------|----------------|--------------------------|--|-------------------------|---------------------------------|--|
| | | | | | | | | in deflation and disinflation to Japan in 1990's and 2000's. |
| Mishkin (1996, 2007). | To show the sequence of events of financial crisis of the 19th and 20th centuries. | - | USA Mexico. | 19th and 20th centuries. | Interest rate, deposits, stock price, price level and money supply. | Asymmetric Information. | Descriptive statistics. | Financial crises increased money supply for developed and developing countries and price level for developed countries only. |
| Goldstein and Xle(2009). | To analyse the effect of the global financial crises. | Annual. | Emerging Asia. | 1997 - 2009. | Real GDP, headline inflation rate, core inflation rate, foreign trade, terms of trade, current account, credit flow exchange rate, interest rate, sovereign bond spread, equity price and international reserve. | Multivariate equation. | Descriptive statistics and OLS. | Decline in economic growth and equity price, and increased inflation during the crises; and the pattern was the same for emerging Asia and other emerging countries and increase in interest rate spread that was not uniform. |
| Aigbokhan (2010). | To identify the effect of global financial crises. | Annual. | Nigeria. | 2007 – 2009 | Real GDP growth, inflation rate, international oil price, all share index, broad money growth, prime lending rate, monetary policy rate. | Mean-analysis model. | Descriptive statistics. | The global financial crises increased inflation while share index decreased. |
| Friedman & Schwartz (1963). | To examine the effects of banking crisis. | Annual. | USA. | 1867 – 1960 | Money stock, nominal income, real income, price level, interest | Multivariate equation | OLS. | Banking crisis produced monetary instability particularly decreased money stock and money |

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|-------------------------------|---|------------|--|---|--|---|--|---|
| | | | | | rate, money growth and real income growth. | | | multiplier and contraction in economic activities. |
| Bernanke (1983). | To estimate the effect of financial crisis on the real costs of credit intermediation and macro - economic variables. | Monthly. | USA. | 1919 – 1991 | Rate of growth of industrial production, rate of growth of M1, rate of growth of wholesale price index, deposits of failing banks and liabilities of failing bank. | Lucas - Barro type regression equation model. | OLS. | An increased cost of credit and decline in output was found. |
| Gorton (1988). | To examine deposit behaviour during bank panic period. | Annual. | USA. | 1873 – 1914 | Deposit currency ratio, interest rate, real rate of return, real capital loss, real income earned, pig iron production and bank panic dummy. | Multivariate single equation | Granger causality test, OLS, Tobit procedure and Spear man's rank correlation coefficient. | The bank panic led to increase in interest rates, increased currency deposit ratio, and worsened agency and adverse selection problems. |
| Sundararajan & Balino (1991). | To examine the effect of banking crises on money demand and credit developments. | Quarterly. | Argentina, Chile, Malaysia, Philippine, Spain, Thailand and Uruguay. | Various sample periods ranged from 2 to 6 years and were between 1978 - 1986. | Banking crisis dummy, non - performing loan, stock prices and GDP growth, inflation M2, interest rate and currency. | Reduced form model. | Granger – Casualty. | The result among other things revealed changes in broad money demand intercepts, and an initial fall in inflation which later rose. |

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|---------------------------------|---|------------|---|-------------|--|------------------------------------|--|---|
| Kaminsky & Reinhart (1999). | To establish the casual patterns among banking crisis and balance - of - payments problems and financial liberalization as well as behaviour of macroeconomic indicators during the crisis. | Monthly. | 20 countries which included Argentina, Israel and Peru. | 1970 – 1995 | Real exchange rate, real interest rate, M2 multiplier, lending-deposit rate ratio, excess M1 deposit, M2 / reserves, bank deposits, exports, terms of trade imports, industrial production, real interest rate differential, stock return and public sector deficit as share of deficit. | Mean analysis and threshold model. | Threshold analysis and descriptive statistics. | No apparent link between banking crisis and balance of payments in the 1970's in the era of highly regulated financial market. Both were closely entwined following financial market liberalization. Economic fundamentals became worse during the crisis. The M2 multiplier grew at above normal rate, real interest rate increased, growth in domestic credit / GDP was above normal, M2 increased and domestic inflation was high. |
| Nascimento (1990). | To analyse the causes, manifestation, and transmission mechanism of the financial sector crisis as well as examined the reaction of the authorities to the crisis. | Quarterly. | Philippines. | 1970-1986. | Demand for Money(real M ₃), Deposit rate, dummy,real GNP, actual inflation, real money balances, reserve money and net domestic credit. | Single equation. | Descriptive statistics and OLS. | Factors which include sharp portfolio shifts in the sector led to the crisis and the transmission mechanism moves from the financial sector to the real sector. Banking crisis altered money multiplier behaviour and monetary base stability. |
| Lindgren, Garcia & Saal (1996). | To analyse the effects of banking crisis on macroeconomic variables. | | Argentina Paraguay, and Venezuela. | 1980 – 1996 | Output growth, interest rate, exchange rate, fiscal policies, interest rate spread, international reserves, and cash to GDP | Mean-analysis model. | Descriptive statistics. | Banking crisis reduced money multiplier, increased interest rate, interest rate spread, and cash to GDP ratio. |

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|---------------------------------------|--|---------|--|-------------|--|----------------------|-------------------------------|---|
| Demirguc - Kunt & Detragiache (1998). | To investigate factors associated with the emergence of systematic banking crisis. | Annual. | 65 developed and developing countries which include Austria, Britain, Kenya and Nigeria. | 1980 – 1994 | ratio. GDP growth, terms of trade, real interest rate, inflation, credit to GDP ratio, crisis dummy, rate of depreciation of exchange rate, ratio of credit to private sector to GDP, ratio of M2 to foreign exchange reserves and government surplus as a % of GDP. | Multivariate logit. | OLS and panel data analysis. | High inflation, high interest rate characterized banking crisis. |
| Hutchison and McDill (1999) | To investigate the causes and effects of banking sector distress and particularly general macro - economic and institutional characteristics associated with it in Japan and whether the episode fits an internationally recognizable pattern. | Annual. | 132 countries including Japan. | 1975 – 1997 | Real GDP growth, exchange rate depreciation, inflation, credit growth, real interest rate, ratio of M2 to reserve ratio, stock prices change and budget surplus. | Multivariate probit. | Multivariate probit analysis. | Banking crisis had adverse effect on the economy. There was sharp decline in stock prices, increase in exchange rate depreciation and contraction in credit growth. |