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Infinite Loop? What Is Behind the Ongoing Turmoil in the Banking Sector?

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The war in Ukraine is unfortunately not over, to add insult to injury, Silicon Valley Bank collapses and Credit Suisse acquired by UBS under the Swiss emergency legislation. The merger of Credit Suisse with UBS, Switzerland's biggest bank, has also raised concerns about the proliferation of more institutions deemed "too big to fail". Through the study of four financial crises in the past 100 years, this paper believes that behind this potential financial crisis is still the real estate bubble, but the significant problems in the United States are the most worrying. Post-financial crisis recessions are costlier and last longer than normal recessions. When credit booms are superimposed with asset price bubbles, financial crises are highly likely and economic recovery will be slower. In this paper, relative data and regression model are used to analyze the causes of the crisis; further this paper discusses the reasons behind the financial crisis and related conjectures and gives relevant development speculations.

Keywords: financial crisis, real estate, regression analysis

Introduction

First the past two years is depressed and dark for the world economic, with the impact of Covid-19 on the economy and life gradually weakens, but several banks seem got into troubles, first in USA. This starred a number of minor banks in the United States, with the exception of the failure of Silicon Valley Bank (SVB), the 16th biggest bank, which momentarily worsened financial market tensions. After that, on May 1st, the first First Republic was sold to JP Morgan Chase Bank which would be the second-largest bank to fail in U.S. history after Washington Mutual collapsed in 2008. Credit Suisse, one of Switzerland's largest banks, will be bought over by competitor UBS in one of the century's greatest financial transactions. Indeed, banking is very much built on trust. Deutsche Bank tumbled as jittery and decided to redeem its fixed rate subordinated noted to revive the market confidence.

In the post-epidemic era, the banking industry has been deeply turbulent. In this article, we will take the US market as an example to explain the reasons behind the bank shocks.

According to Goy, Strobel, and Boehl (2020), The Federal Reserve and quantitative easing (QE) are a boost

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for investment, but a burden on inflation. Nonetheless, despite QE is significant role in operations, the macroeconomic implications of QE, particularly its influence on production, inflation, and aggregate investment, are still being debated (Boehl, Goy, & Strobel, 2022) estimated large-scale dynamic general equilibrium model with several financial frictions to measure quantitative easing in the US.

From the beginning of this round of interest rate adjustment of Fed, from 2020 to the end of 2022, the Fed interest rate decreased from 2.25% to 0.25%, the whole deposit in commercial banks increased from 13.3 trillion to 17.6 trillion, due to the loan demand weak, only small part of deposit is used in loan drawdown, and the others are in US Securities, bonds, Mortgage-Backed Security (MBS), and Commercial Mortgage-Backed Security (CMBS) which is the main reason lead to (the bankruptcy of SVB).

From March 2022 to March 2023, The Federal Reserve hike rates eight times in 12 months, the interest rate from 0.25% to 5% to curb inflation; it leads to the securities and MBS has about 20% loss in the banking book. The whole industry in the US bank sector has about more than 600 billion losses for this; it makes a lack of liquidity (see the Bank for International Settlements, 2011). Crockett (2001; 2013) pointed the inflation is often one source of financial instability, but the converse is not necessarily true, and now seems got caught into competing narrative of resource of crisis.

For the US debt market, before the epidemic, the volume was 23.7 trillion, and until now is about 31.5 trillion; the three years increased eight trillion for total. The MBS market also has a great increase; the volume of the MBS market increased 2.5 trillion in these three years.

If we consider the debt and MBS market, when the interest rate increased so fast, it has huge liquidity gap for the banking sector, also Fed is very quick reaction after the SVB bankruptcy, the BTFP (Bank Term Funding Program) program is created to support American businesses and households by making additional funding available to eligible depository institutions to help assure banks have the ability to meet the needs of all their depositors.

Look at the balance sheet changes of Fed, to support the BTFP, The Fed increased 400 billion in the sheet. In the next chapter, data are selected and analyzed by regression model; the reasons behind shock are described in detail.

The aim of this paper is to raise and prove the probable cause of the turmoil in banking sector in 2023 based on the regression model, mainly using the SVB and Fed data.

Regression Model

Multiple regression analysis (MR) examines the relationship between independent variables and a dependent variable. It focuses on ordinary least-squares regression with a continuous dependent variable, including testing theoretical predictions and addressing challenges in model specification and data issues (Aiken, West, & Pitts, 2003); the MR model is as following that trying to identify the variables issues.

$$y_i = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_k x_{ik} + \varepsilon_i, for\ i = 1, \cdots, n$$

Legends: y_i is the dependent variable, which is observed in data and often denoted.

The unknown parameters are often denoted as a scalar or vector β_0.

The dependent variables are observed in data and are often denoted as x_{ik}.

The error terms are not directly observed in data and often denoted using the scalar ε_i.

Variable Selection

Given the influence of MBS, securities, and loan volumes on the capital structure of SVB and their main contribution to bankruptcy, we have selected these variables for the analysis of US commercial banks.

Table 1

The Definition of Dependent and Independent Variables. Source: Economic Research Federal Reserve Bank of ST. Louis

Dependent variables	Definition
Deposit	Deposits, all commercial banks, billions of USD, quarterly, seasonally adjusted
Assets	Balance sheet: Total assets, billions of USD, quarterly, not seasonally adjusted
Independent variables	
MBS-balance sheet perspective	Balance sheet: Total assets: Securities: Mortgage-backed securities, billions of USD, quarterly, not seasonally adjusted
MBS-commercial banks perspective	Treasury and agency securities: Mortgage-backed securities, all commercial banks, billions of USD, quarterly, seasonally adjusted
Debt	Federal debt: Total public debt, billions of USD, quarterly, not seasonally adjusted
PCE	Personal consumption expenditures, billions of USD, quarterly, seasonally adjusted annual rate
Loans	Loans and leases in bank credit, all commercial banks, billions of USD, quarterly, seasonally adjusted
Securities	Securities in bank credit, all commercial banks, billions of USD, seasonally adjusted

Empirical Results

The data are collected from the Economic Research Federal Reserve Bank of ST. Louis. Besides, for data processing and model development, our primary tools are RStudio and Excel. We have two parts of the data. The initial part of the analysis aims to assess the overall US market covering the data period from 2008 to 2022 with a seasonal frequency. This period comprises a total of 60 observations for each variable under consideration. The subsequent part of the analysis focuses specifically on the US commercial bank sector. The data for this section span from 2009 to 2022, based on the available data, resulting in a total of 56 observations for each variable considered.

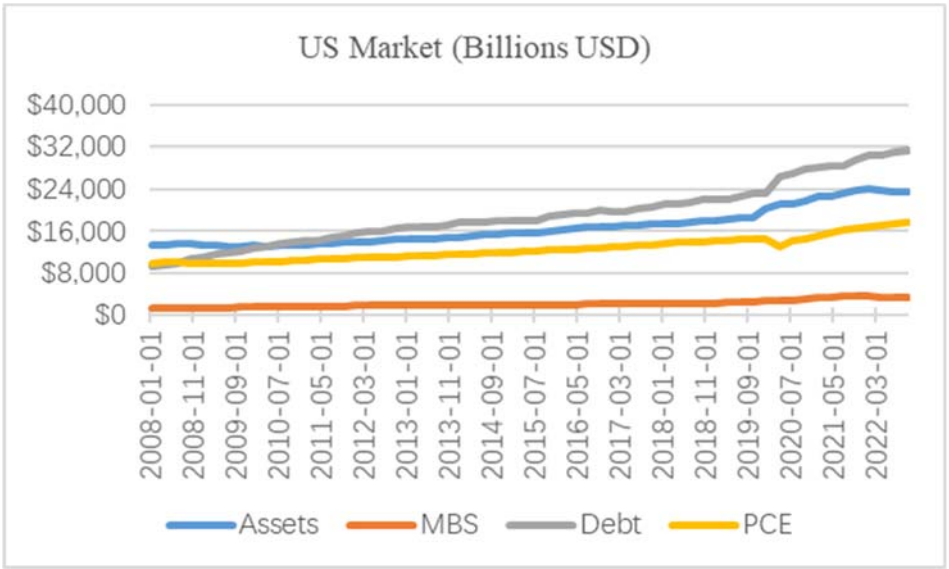

Figure 1. Different categories of assets in US. US market (2008-2022). Source: Economic Research Federal Reserve Bank of ST. Louis.

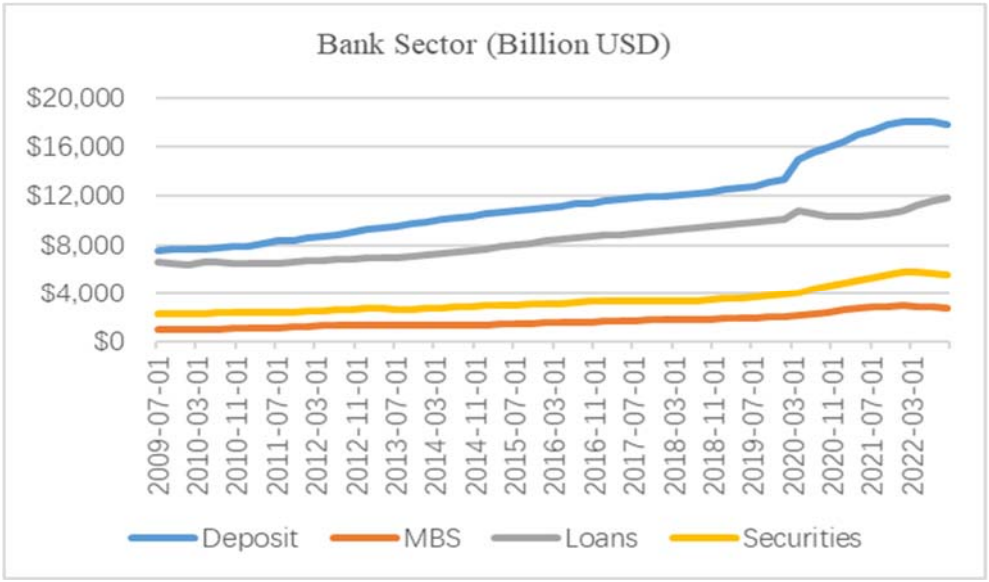

Figure 2. Different categories of deposits in all US commercial banks. US bank sector (2009-2022). Source: Economic Research Federal Reserve Bank of ST. Louis.

As the Figures 1 and 2 show above, all the variables are increasing significantly after 2020; therefore, before the modeling, we are going to test the correlation between the variables and the results are shown below.

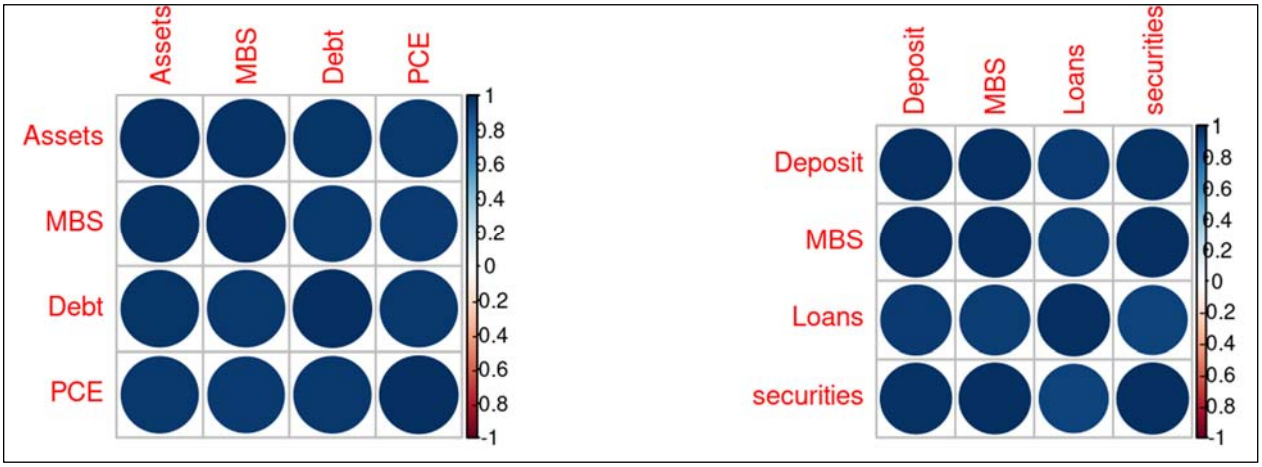

Figure 3. Correlation plot between variables. Source: Economic Research Federal Reserve Bank of ST. Louis.

Table 2

The Correlation Between the Variables. Source: Economic Research Federal Reserve Bank of ST. Louis

	Assets
MBS-balance sheet perspective	0.9864
Debt	0.9725

As the correlation plot on the left side, representing the entire US market sector, a strong correlation is observed between assets and MBS. Additionally, a high correlation is found between assets and debt. These findings further highlight the robust correlation between assets and the US debt market, underscoring their strong relationship.

On the right side, as depicted in the correlation plot, similar results emerge, indicating a strong correlation

among the variables within the bank sector. Based on these observations and correlations, we assume that the model can be built using the MR perspective. The data in Model A specifically focus on the commercial bank sector, with all measurements expressed in billions of USD.

Model A: $Deposit = \beta_0 + \beta_1 * MBS + \beta_2 * Loans + \beta_3 * Securities + \varepsilon$

Due to the presence of a strong correlation between the variables, we carefully select the most appropriate variable in our model. To assess multicollinearity, we conducted a test using the variance inflation factor (VIF). The results revealed significantly high VIF values for both MBS and securities variables. Consequently, we are exploring the option of dividing these variables to enhance the models and mitigate the impact of multicollinearity.

Model B: $Deposit = \beta_0 + \beta_1 * MBS + \beta_2 * Loans + \varepsilon$

Model C: $Deposit = \beta_0 + \beta_1 * Securities + \beta_2 * Loans + \varepsilon$

While processing the model, we discovered that the variable "Loans" did not exhibit statistical significance in both Model B and Model C. As a result, we excluded "Loans" from further model construction. Additionally, during subsequent analysis, we observed a quadratic trend in both models based on residual plots. Consequently, we are considering the utilization of polynomial regression, which is another form of MR to capture and express this trend in the model.

Model of quadratic regression: $y_i = \beta_0 + \beta_1 x_i + \beta_2 x_i^2 + \varepsilon_i, for\ i = 1, \cdots, n$

After careful consideration, the final variable is chosen for the Model D with variable "Securities", which exhibits a non-linear relationship with "Deposit". The equation representing this relationship is as follows:

Model D: $Deposit = -5420 + 6.67 * Securities - 0.00045 * Securities^2 + \varepsilon$

R squared: 0.9948, adjusted R squared: 0.9946. The residuals of all the variables consistently hover around the conditional mean of 0, indicating that when the value of "Securities" reaches 7,144 billion USD (as of the end of 2022, it reached 5,544 billion USD), the "Deposits" are projected to reach their highest values at 19,296 billion USD. This finding suggests that as "Securities" surpass this threshold, there is an expectation of an exponential increase in "Deposits". Based on the Model D, it is estimated that an additional around USD 150 billion is required for securities in order to achieve parity with deposits.

The final variable chosen for the Model E with variable "MBS" has a non-linear relationship with "Deposit". The equation representing this relationship is as follows:

Model E: $Deposit = 1082 + 6.701 * MBS - 0.0003142 * MBS^2 + \varepsilon$

R squared: 0.9874, adjusted R squared: 0.9869. The residuals are also falling around 0, indicating that when the value of "MBS" reaches 10,663 billion USD, the "Deposits" will reach 36,810 billion USD as the highest value. Considering the MBS threshold, it is projected to take a longer period of time for this variable to reach equilibrium with deposits at the current level.

In summary, the data analysis highlights the general challenges in the US debt market, characterized by the limited impact of loans and the statistically significant impact of MBS and securities on them. The model results substantiate this phenomenon. It is important to note the growth rate of securities, as it is projected to approach the threshold in less than two years at the current pace. Furthermore, the strong correlation of 0.9913 between MBS and securities indicates their interdependence. Analyzing the data suggests that a hyperinflationary environment could lead to relief through rising interest rates, potentially triggering higher default rates in the real estate sector and impacting the MBS market. This interplay could contribute to increased market volatility and potentially serve as a key factor in triggering the next financial crisis, as observed in the case of the Blackstone

Group crisis.

Conclusion

The 2023 crisis fermentation directions are in different for banking sectors; the experience from 2008 crisis told us risk spreads from a single point of exposure to a single asset class and then to more asset classes, and finally to markets which is no problems and makes many innocent players involved in the low-risk market.

The Fed has two aims as many central banks in other countries; first is the inflation rate in band they set, and second is the unemployment rate under 5%. From the before figures we could know, when the Covid is epidemic, the enormous QE leads to enlarge the MBS and debt into the market and sows the hidden dangers of today's Silicon Valley Bank crisis; in the 2022, the Fed was shrinking its balance sheet; however, with the side effects of interest rate hikes, banks began to expose the crisis, and the entire balance sheet reduction process was interrupted; mid-sized banks were struggling, in part, from higher interest rates, as the Fed carried out its most aggressive tightening campaign since the 1980s.

Authors think US fiscal problem is the significant behind the bank turmoil; the three trillion U.S. debt will pay more than 20 billion U.S. dollars interest in the fourth quarter of 2022; Fed fund futures prices show that the Fed could raise rates by another 25 basis points next month, but continuing to raise rates will cause fiscal problems, how to solve the problem now? Tax or issue new debt? Biden budget tax increases destroy jobs and reduce the economic increased, but if reducing the tax, the debt is still the problem.

This problem is an infinite loop, the inflation of the US is under 5% in March, and for stable the market and debt, the government needs to issue new debt for all of this, and then the inflation will increase again which is a high probability event. Anti-globalization and the Russo-Ukraine war have increased global financial uncertainty; no matter where the financial crisis starts, the risk of currency crisis is the biggest risk.

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