

Systematic Risk Assessment in the Banking Industry

Yifeng Bai^{1,a,*}

¹*College of Engineering and Computer Science, Syracuse University, Syracuse 13210, USA*

a. ybai02@syr.edu

**corresponding author*

Abstract: The article delves into the intricate realm of systematic risk, a formidable peril that casts its shadow upon the entirety of the market or vast segments thereof. It traverses the annals of history, unearths the weighty import, origins, and reverberations of systematic risk, while shedding light on the intricate models and methodologies employed for its quantification and prudent handling. The article channels its focus towards three cardinal manifestations of systematic risk, namely liquidity risk, credit risk, and market risk. Moreover, it scrutinizes the perilous path these risks tread, culminating in cataclysmic systemic disasters that ruthlessly disrupt the harmonious functioning and unwavering stability of financial systems. To accentuate the gravity of the subject matter, the article cites poignant examples of such calamities, with the 2008 financial crisis standing as a haunting epitome. Furthermore, the article imparts sagacious guidelines and best practices, serving as a beacon for assuaging the ever-looming specter of systematic risk. Ultimately, the article culminates with an emphatic crescendo, underscoring the paramount significance of systematic risk management for discerning investors and astute policymakers alike.

Keywords: systematic risk, liquidity risk, credit risk, market risk

1. Introduction

Systematic risk is a type of risk that permeates the entire market or a substantial segment of it. Unlike unsystematic risk, which is specific to a particular company or industry, systematic risk cannot be mitigated through diversification. Systematic risk encompasses the influence of economic, geopolitical, and financial factors that lie beyond the control of individual investors or firms. Systematic risk is also commonly referred to as market risk, volatility risk, or undiversifiable risk.

The notion of systematic risk emerged during the development of modern portfolio theory (MPT) in the 1950s and 1960s. MPT provides a framework for constructing optimal portfolios that maximize the expected return for a given level of risk. MPT delineates between two categories of risk: systematic and unsystematic. Systematic risk denotes the portion of total risk that is inherent in all securities within the market and cannot be diversified away. Unsystematic risk denotes the portion of total risk that is unique to each security and can be mitigated through diversification. MPT posits that investors should only be rewarded for bearing systematic risk, as unsystematic risk can be eliminated without incurring any cost.

Systematic risk holds significant importance in financial theory as it underlies various other forms of investment risks, including liquidity risk, credit risk, and market risk. Moreover, systematic risk bears substantial implications for financial markets and investors, as it can instigate widespread losses

and instability during times of crisis. This article endeavors to explore the definition, historical context, and significance of systematic risk, along with its primary sources and consequences [1]. The capital asset pricing model (CAPM), formulated by William Sharpe in 1964, stands as one of the most widely employed models for estimating systematic risk. CAPM elucidates the relationship between the expected return and the systematic risk of an asset or portfolio. CAPM assumes that investors are rational, risk-averse individuals who hold well-diversified portfolios. Furthermore, it assumes the existence of a risk-free asset that guarantees a certain return and identifies a singular factor that drives the returns of all risky assets, namely the market portfolio. CAPM posits that the expected return of an asset or portfolio equals the risk-free rate plus a risk premium contingent upon the asset's or portfolio's beta, which measures its sensitivity to the market factor. According to CAPM, investors should exclusively invest in assets or portfolios that offer returns surpassing the risk-free rate for a given level of systematic risk, or alternatively, exhibit lower systematic risk for a given level of expected return.

2. Liquidity Risk

Liquidity risk refers to the danger arising from the insufficient marketability of an investment, which hinders its ability to be swiftly bought or sold to prevent or minimize losses. Particularly in times of market stress, liquidity risk can pose a significant threat, becoming a primary source of systematic risk [2]. When liquidity risk affects multiple businesses or financial institutions simultaneously, it can trigger a liquidity crisis, disrupting the essential flow of credit and amplifying market volatility and contagion [3]. The impact of liquidity risk extends to businesses, investors, and markets. The inability to quickly convert assets into cash can result in substantial losses, especially during periods of rapidly declining markets. Furthermore, liquidity risk can create a detrimental feedback loop that intensifies market shocks, as investors are compelled to sell other assets to raise cash or fulfill margin calls [4]. Liquidity risk can also impair the functioning of financial intermediaries like banks, which rely on short-term funding to finance long-term assets [5]. When funding sources diminish or become more expensive, banks may face solvency issues or need to reduce lending, thereby causing adverse spillover effects on the real economy [6].

Liquidity risk played a pivotal role in the 2008 financial crisis. As the subprime mortgage market collapsed, the liquidity of mortgage-backed securities rapidly deteriorated, exacerbating the crisis. Numerous financial institutions holding these securities as collateral encountered severe funding problems as they were unable to sell them or utilize them for securing short-term loans. Institutions such as Bear Stearns and Lehman Brothers failed or were acquired at drastically reduced prices. Others, including AIG and Citigroup, required government bailouts [7]. The crisis, in addition to revealing vulnerabilities in the global corporate sector, laid bare the precarious state of affairs characterized by unprecedented levels of debt and leverage in the pre-crisis low-interest environment. The predicament faced by numerous highly leveraged firms was the arduous task of refinancing their debt and meeting their obligations, resulting in defaults and bankruptcies [8].

To effectively address these challenges, it is imperative to establish a comprehensive framework that encompasses the following elements. Firstly, a precise definition of liquidity risk and its underlying causes should be set forth. Secondly, a robust methodology should be employed to identify, quantify, monitor, and report liquidity risk exposures and gaps. Thirdly, it is essential to develop a set of policies and limits to manage liquidity risk in both normal and stressed conditions. Furthermore, the establishment of a contingency funding plan outlining the sources and utilization of funds in the event of liquidity shortages is of utmost importance. Additionally, the implementation of a stress testing program to assess the impact of various scenarios on liquidity positions and ratios is crucial. Lastly, the establishment of a governance structure is necessary to ensure accountability, oversight, and effective communication in liquidity risk management.

One of the primary challenges in measuring and managing liquidity risk is the lack of standardization and comparability across institutions and jurisdictions. There is no universally accepted definition or measure of liquidity risk, and regulatory bodies and market participants may possess different perspectives and expectations concerning liquidity risk management. Moreover, liquidity risk is a dynamic and intricate phenomenon, contingent upon factors such as market conditions, investor behavior, asset characteristics, and funding sources. Therefore, financial institutions must adopt a flexible and holistic approach to measure and manage liquidity risk, taking into consideration their unique business models, risk profiles, and market environments. It is also imperative for them to remain abreast of the latest developments and best practices in liquidity risk management, as well as evolving regulatory requirements and expectations. Venkat et al. have identified several best practices for liquidity risk management [9]. These practices encompass the early identification of liquidity risks through regular gap analysis, scenario analysis, and sensitivity analysis. Furthermore, they emphasize the significance of continuous monitoring and control of liquidity, which can be achieved by establishing liquidity metrics, limits, triggers, and reporting systems. The authors also recommend conducting scheduled stress tests to simulate adverse scenarios, such as market shocks, funding disruptions, or rating downgrades. Finally, they suggest developing backup or contingency plans by identifying alternative funding sources, liquidating assets, or reducing exposures. By adhering to these best practices, financial institutions can fortify their resilience and preparedness to withstand potential liquidity shocks, thus averting liquidity problems that could undermine their operations or reputation.

3. Credit Risk

Credit risk encompasses the potential for loss that arises when a borrower or counterparty fails to meet their contractual obligations, playing a pivotal role in influencing lenders, borrowers, and overall financial system stability [10]. Moreover, credit risk contributes to systemic risk, which refers to the potential for significant harm or failure within a country's or region's financial system. Credit risk can be classified into two primary types: default risk and migration risk. Default risk involves the possibility of a borrower or counterparty being unable to repay their debt or fulfill their contractual commitments. Conversely, migration risk pertains to the likelihood of a borrower or counterparty experiencing a decline in credit quality, leading to a lower credit rating or an increased chance of default.

Several factors contribute to the emergence of credit risk. These factors include borrower-specific elements such as income, assets, liabilities, cash flow, business performance, management quality, and reputation. Market-specific factors, such as interest rates, exchange rates, commodity prices, inflation, and economic conditions, also play a role. Additionally, event-specific factors like natural disasters, political instability, regulatory changes, fraud, and litigation can contribute to credit risk. The concept of credit risk holds significant importance for lenders, borrowers, and financial systems alike. Credit risk directly influences lenders' profitability, solvency, and liquidity. Lenders must assess the creditworthiness of their borrowers or counterparties, establish appropriate interest rates and fees that reflect the level of credit risk, monitor the performance and behavior of borrowers or counterparties, and provision for potential losses. For borrowers, credit risk affects their access to funding, borrowing costs, and financial flexibility. They must maintain a good credit history and rating, manage their debt levels and repayment obligations, and hedge against adverse market movements. In the case of financial systems, credit risk impacts stability and efficiency. It is crucial to ensure the efficient and prudent allocation of credit among different sectors and entities, facilitate the smooth and transparent functioning of credit markets, and diversify and mitigate credit risk across the system.

The consequences of credit risk can have far-reaching effects, leading to systemic disasters within financial markets. Systemic disasters encompass events that cause widespread losses, failures, or disruptions in the financial system, impairing its ability to intermediate funds, provide liquidity, and facilitate payments.

Credit risk can contribute to systemic disasters through various channels. One such channel is contagion, where the failure or distress of one entity can spread to other entities through direct or indirect linkages, such as interbank lending, derivatives contracts, or shared exposures. Another channel is fire sales, where distressed entities are compelled to liquidate assets, causing a sharp decline in asset prices and market liquidity. This, in turn, affects the value and solvency of other entities holding similar assets. Information asymmetry is another significant channel, as the lack of transparency or disclosure regarding credit risk exposures and losses can create uncertainty and panic among market participants. This loss of confidence can lead to a withdrawal of funding. Additionally, feedback loops arise when the interaction between credit risk and other risk factors, such as market risk, liquidity risk, or operational risk, generates a destructive cycle of deterioration and amplification of shocks.

The global financial crisis of 2008 serves as a notorious example of credit risk leading to a systemic disaster. The crisis originated from the subprime mortgage market in the United States, involving loans granted to borrowers with low credit scores or income levels, making them highly susceptible to default. These loans were securitized and sold to investors as mortgage-backed securities (MBS) with investment-grade ratings assigned by credit rating agencies. However, these ratings were based on unrealistic assumptions and models that underestimated the correlation and interdependence of default rates across different borrowers and regions. Moreover, these MBS were further repackaged and sold as collateralized debt obligations (CDOs), which complicated and obscured the credit risk transfer process. When the housing market collapsed in 2007-2008, numerous subprime borrowers defaulted on their mortgages, resulting in losses for MBS and CDO holders. These losses triggered a chain reaction involving contagion, fire sales, information asymmetry, and feedback loops that impacted various segments and participants of the financial system, such as banks, hedge funds, insurance companies, money market funds, and pension funds. The crisis quickly spread to other countries and regions through global financial linkages and spillovers. Its repercussions included a severe reduction in credit availability and economic activity, a surge in unemployment and poverty, and extensive government and central bank interventions.

4. Market Risk

Market risk encompasses the potential for losses arising from market factors that impact the value or price of an investment or portfolio [11]. It is commonly referred to as systematic risk, given its influence on the overall market or a significant segment of it. While diversification techniques cannot entirely eliminate market risk, alternative means can be employed to hedge or mitigate it. Market risk arises from a wide range of factors that necessitate consideration. Firstly, economic factors, including changes in gross domestic product (GDP), inflation, unemployment, interest rates, exchange rates, as well as monetary and fiscal policies, play a significant role in market risk. Geopolitical factors also contribute, encompassing conflicts, wars, elections, trade disputes, sanctions, and pandemics. Moreover, social factors come into play, involving shifts in consumer preferences, demographics, lifestyles, and behaviors. Technological factors should also be taken into account, such as innovations, disruptions, cyberattacks, and data breaches, as they can contribute to market risk as well [12].

Market risk can have distinct effects on various types of investments or portfolios, depending on their exposure to different market factors. Several primary types of market risks warrant consideration. One such type is interest rate risk, which involves the potential impact of interest rate fluctuations on the value or price of fixed-income securities like bonds, mortgages, and loans. Additionally, interest

rate risk can indirectly affect other securities by influencing the cost of capital and the discount rate. Equity risk is another type, referring to the possibility of stock price fluctuations affecting the value or price of equity securities such as stocks, mutual funds, and exchange-traded funds (ETFs). Equity risk can also have an indirect influence on other securities through its effect on a company's earnings and dividends. Currency risk represents another important type, relating to the risk of exchange rate changes impacting the value or price of foreign currency-denominated securities like foreign stocks, bonds, and commodities. Furthermore, currency risk can indirectly affect domestic securities by influencing the competitiveness and profitability of internationally operating or trading companies. Lastly, commodity risk entails the possibility of changes in commodity prices affecting the value or price of commodity-related securities like futures, options, and ETFs. Commodity risk can also indirectly impact other securities by influencing the production and consumption costs of companies involved in the utilization or production of commodities.

Market risk holds significant importance for both investors and markets, as it affects the expected return and volatility of investments or portfolios. For investors, market risk influences their investment decisions, risk preferences, and portfolio allocation. Evaluating exposure to market risk, measuring and monitoring market risk exposures, and managing or hedging market risk in line with risk tolerance and objectives are crucial for investors. For markets, market risk affects the efficiency and stability of financial markets. Ensuring accurate and transparent pricing of market risk, providing sufficient information and liquidity to market participants, and diversifying and mitigating market risk across the system are imperative for markets. Market risk can have substantial implications for investments or portfolios, potentially leading to losses or fluctuations in value or price. Moreover, it can trigger or amplify market shocks or crises that affect the entire market or a significant segment, thereby causing systemic disasters in financial markets.

5. Conclusion

Systematic risk, encompassing liquidity risk, credit risk, market risk, and systemic risk, poses a formidable threat to the financial system. Diversification alone cannot fully eradicate systematic risk; instead, strategic asset allocation and hedging are necessary. Managing systematic risk plays a crucial role in enhancing financial performance, resilience, and sustainability in decision-making processes. Liquidity risk arises when assets cannot be swiftly bought or sold at favorable prices. Market inefficiencies, information asymmetry, transaction costs, and regulatory constraints contribute to this risk. Its impact extends beyond profitability and solvency, affecting the liquidity of businesses, investors, and the overall efficiency of financial systems. Credit risk emerges from borrowers or counterparties failing to fulfill contractual obligations. Factors contributing to credit risk include borrower-specific, market-specific, or event-specific elements. Credit risk affects the profitability, solvency, and liquidity of lenders and borrowers, as well as the stability and efficiency of financial systems.

Market risk entails losses resulting from changes in market factors impacting the value or price of investments or portfolios. Economic, geopolitical, social, and technological factors contribute to market risk. It directly influences the expected return, volatility of investments, and the stability and efficiency of financial markets. Systemic risk refers to the potential damage or failure of the financial system within a country or region. It can be triggered or amplified by liquidity risk, credit risk, market risk, or other contagion sources. Factors like fire sales, information asymmetry, and feedback loops contribute to systemic risk, affecting the intermediation, liquidity, and payment functions of financial systems, as well as the economic activity and welfare of nations or regions. Effective systematic risk management involves identifying, measuring, monitoring, and mitigating the sources and effects of systematic risk. It plays a crucial role in financial planning, investment strategy, and policymaking, enhancing the performance, resilience, and sustainability of financial decisions. Systematic risk

management is applicable at various levels and involves different entities, such as individuals, businesses, regulators, and governments.

To manage systematic risk, various tools and techniques are utilized. Asset allocation involves distributing funds among different asset classes based on risk-return characteristics and investor objectives and constraints. Hedging aims to reduce exposure to specific risks by taking offsetting positions in negatively correlated assets or instruments. Diversification spreads investments across securities, industries, countries, or asset classes with low or negative correlation to minimize overall portfolio risk. Stress testing assesses the impact of adverse scenarios on investments, portfolios, or financial systems, enabling the understanding of potential vulnerabilities and risks under different market conditions. Contingency planning involves preparing for potential liquidity shortages or systemic shocks, identifying alternative sources and uses of funds, reducing exposures, liquidating assets, or suspending operations as necessary. Regulation plays a crucial role in risk management by establishing and enforcing rules and standards to ensure the safety, soundness, transparency, and accountability of financial institutions and markets. Effective regulations aim to mitigate risks and promote stability in the financial system. Embracing systematic risk management principles and practices empowers investors and policymakers to make informed financial decisions and achieve better outcomes amidst uncertainty and market volatility.

References

- [1] Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2017). *Fundamentals of Corporate Finance*. McGraw-Hill Education.
- [2] Strahan, P. E. (2012). *Liquidity risk and credit in the financial crisis*. FRBSF Economic Letter, 15, 14.
- [3] What is a liquidity crisis? (2023). Capital.com. Retrieved from <https://capital.com/liquidity-crisis-definition>
- [4] Brunnermeier, M. K., & Pedersen, L. H. (2009). Market liquidity and funding liquidity. *The review of financial studies*, 22(6), 2201-2238.
- [5] Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy*, 91(3), 401-419.
- [6] Acharya, V. V., & Mora, N. (2015). A crisis of banks as liquidity providers. *The journal of Finance*, 70(1), 1-43.
- [7] Reinhart, C. M., & Rogoff, K. S. (2009). *This time is different*. In *This Time Is Different*. Princeton University Press.
- [8] Harmon, M., & Ivashina, V. (2020). Managing the liquidity crisis. *Harvard Business Review*. <https://hbr.org/2020/04/managing-the-liquidity-crisis>
- [9] Venkat, S., & Baird, S. (2010). *Liquidity Risk Management: A Practitioner's Perspective*. John Wiley & Sons.
- [10] Credit Risk. (2023). Investopedia. <https://www.investopedia.com/terms/c/creditrisk.asp>
- [11] Hayes, A. (2023). Market Risk Definition: How to Deal with Systematic Risk. <https://www.investopedia.com/terms/m/marketrisk.asp>
- [12] The Business Professor, LLC. (2022). Market Risk - Explained. <https://thebusinessprofessor.com/investments-trading-financial-markets/market-risk-definition>