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Master Thesis

Comparative analysis between the Panic of 1907 and the Financial Crisis of 2007

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Abstract

The financial crisis of 2007 is widely believed to have been triggered by a decline in the US housing market and irresponsible lending in the subprime mortgage market. On the other hand, the best-known point of another panic occurred one hundred years ago—the panic of 1907, is that it directly led to the establishment of the Federal Reserve System. Few people link these two events. However, there are striking parallels we have observed before, during, and after the two crises. By comparison, we can find the similarities of the financial crises and uniqueness of each one.

This paper first introduces the possible causes, the trigger, and the remedial responses to the panic of 1907 and the financial crisis of 2007. Our study focus on revealing the possible causes, which are grouped into two categories, led to the crises. The first layer of causes emphasizes the technical financial viewpoints, including elements in the fragile banks and imperfect markets. The second layer is the underlying explanation of the first layer to display the conditions that preceded the crises in social, psychological, and ideological perspectives. And then, we briefly describe what happened in and after the crises. What were the triggers of the panic? How did different parties rescue the market? Moreover, we also explain the political and legislative aftermath of what went wrong.

Based on the description of two crises, the similarities between the panic of 1907 and the crisis occurred one hundred years later unfolded. The financial crises were both centered in the shadow banking system: 1907 in trust companies, 2007 in the investment banking system, which was lack of regulation and undertaking risky investment activities. Both markets preceding the crises fell into the fever of speculation (1907 in stock and industrial production, 2007 in real estate and relevant credit derivatives such as structured products and credit default swap) and over-exploiting credit. Human behavior associated with greed and fear look very similar before, during, and after each crisis. Additionally, in both cases, the crisis caused some banks bankruptcy; liquidity dried up; people demanded cash rather than other assets. Furthermore, both governments increased regulation on the financial markets after the crises.

On the other hand, there are also some differences between both periods. The blurred boundaries between investment banks, insurance companies, and commercial banks made current banks more concentrated and larger. The innovative financial tools made financial products more complicated; people ignored the risk, moral hazard induced banks to undertake excessive risk before 2007. The most notable difference is the establishment of the Fed Reserve, which played a vital role in banking system oversight, interest rate control, and money supply management. By comparing, we can get a deeper understanding of the two financial crises.

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CHAPTER 1

Introduction

1.1 The Panic of 1907

From the end of the 19th century to the beginning of the 20th century, while the US industrial economy developed rapidly, economic and financial crises occurred frequently. The panic of 1907 financial crisis was the last severe financial crisis experienced by the United States during the National Bank period (1864-1913). The trigger of this crisis was a speculative event of copper stocks by Augustus Heinze and Charles Morse.

In general, stock market speculation and failure are regular. It will only have a slight impact on the stock market and will not cause panic. However, August Heinze and Charles Morse took control of many banks, trusts, and stock brokerage companies. They used these banks to provide financial support for copper stock manipulation, which caused these institutions to suffer heavy losses. After knowing the news, depositors rushed to these banks to withdraw their money. Among the financial institutions run by depositors, New York 's third-largest trust company, the Knickerbocker Trust Company, was the first one to be collapsed. The run quickly spread to other trust institutions, and everyone withdrew funds from New York, making the cash supply in the New York money market tight. It is like the domino effect; one and one trust was under attack and forced to suspend. Additionally, the stock market fell a lot, thousands of stock speculators went bankrupt.

J.P. Morgan, the 70-year-old New York private banker, led the rescue actions to the panic. He summoned the presidents of large banks and trusts in New York, organized the rescue committee to check the accounts of the trust companies, fundraised for the New York stock exchange, sent favorable signals to the public. Ron Chernow wrote in his book *The House of Morgan: An American Banking Dynasty and the Rise of Modern Finance* that the role of J.P. Morgan in this crisis was equivalent to that of the US Central Bank.[1]

As for the causes of this panic, there are countless pieces of literature to discuss from different angles. Monetary theorists usually take the 1907 financial crisis as an example of analyzing the rigid structure of the US banking system. However, they only focus on technical analysis but ignore the social and historical background. Financial historians prefer objective descriptions of historical events but not dig deeper into the underlying causes. Sprague (1910) attributed this financial crisis to the UK tightening monetary policy, the inelastic currency of the banking system, the rapid expansion of American economic, and unreasonably over-speculation in the stock market.[2] Piatt Andrew

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[1] Ron Chernow, *The House of Morgan: An American Banking Dynasty and the Rise of Modern Finance,* New York: Simon & Schuster, 1991

[2] Oliver M. Sprague, *History of Crises Under the National Banking System,*

(1908) argued competitive hoarding of money by individuals, depleting banks reserves, was the most significant cause.[3] Additionally, he criticized the US Secretary of the Treasury, Lyman L. Gage and Leslie M. Shaw, arbitrarily intervened in the money market and announced the improper fiscal policy, which was the main reason for the 1907 financial crisis.[4]

These scholars highlighted one of the causes, the fragile banking system. The drawbacks of the national bank system were the common reason for this panic and several preceding financial crises. However, we cannot ignore the particularity of the panic of 1907. Some researchers emphasized the ungoverned trust was the root cause of this panic. Jon Moen and Ellis Tallman published a large number of papers to explain the imperfect trust companies attributed to this crisis. They mentioned that trust companies were subject to fewer restrictions and regulations than National Bank, so they had higher risks in terms of debt ratio[5]. Also, New York trusts were not members of the New York Clearing House, and therefore they did not get timely rescues from the Clearing House during the crisis.[6] Eugene White (1983) also argued several years before 1907, the national bank's monopoly was threatened by state banks and trust companies. He concluded this is the reason why New York Clearing House (most members are National banks) was unwilling to offer help for the trusts.[7]

Except for the different types of problems rooted in unsound American banking practices, the untypical financial market condition was also a critical cause of this crisis. Kerry Odell and Marc Weidenmier (2004) pointed out that the 1906 San Francisco Earthquake caused a large amount of gold inflow to the United States. The outflow of gold from other countries prompted the central banks in Europe to set restrictions for American bills and raise the domestic interest rate. These policies worsened money market tightness in New York and set the stage for the panic of 1907.[8] The financial

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Washington: Government Printing Office, 1910

[3] Piatt A. Andrew, *Hoarding in the panic of 1907*, The Quarterly Journal of Economics, Vol. 22, No. 2, 1908, pp. 290-299

[4] Piatt A. Andrew, *The United States Treasury and Money Market: The Partial Responsibility of Secretaries Gage and Shaw for the Crisis of 1907*, American Economic Association Quarterly, Vol. 9, No. 1, Papers and Discussion of the Twentieth Annual Meeting: 218-31, 1908

[5] Ellis W. Tallman and Jon R. Moen, *The bank panic of 1907: The role of trust companies*, The Journal of Economic History, Vol. 52, No. 3, September 1992, pp. 611-630

[6] Jon R. Moen and Ellis W. Tallman, *Private Sector Responses to the Panic of 1907: A Comparison of New York and Chicago,* Economic Review of Federal Reserve Bank of Atlanta, 1995

[7] Eugene N. White, *A History of Banking in Arizona by Larry Schweikart,* The Journal of Economic History. Vol. 43, No. 2, 1983, pp. 543-545

[8] Kerry A. Odell and Marc D. Weidenmier, *Real shock, monetary aftershock: The 1906*

historian, Alexander Noyes (1909) underlined the uncontrolled credit expansion, due to the technology revolution, affected the equivalence of the credit market. The unreasonable credit boom is always followed by a credit crunch and financial crisis. He said the real cause of the crisis of 1907 was not "an imperfect American currency, nor 'President Roosevelt'…but the extravagant over-exploiting of capital and credit throughout the industrial world."[9]

When backtracking the historical backgrounds for this panic, we find that at the turn of the 20th century, it was the peak of the wave of the first globalization, the global trade prospered, the global economy was booming. Additionally, the fruits of the first industrial revolution in Europe laid the foundation for the development of science and technology in the United States. Enormous sums of immigrants came to America, enriching the labor force, and speeding up the industrialization process. However, the rapid development brought some social problems such as inequality, government corruption, crime. To fight against the social problems, reformers of progressive movement stood on the stage, calling for the elimination of all inequalities. President Roosevelt was one of the representatives for progressivism. He put his eyes on the financial and industry oligarchs. Some bills he enacted discriminated the energy and railway industry, which indirectly affected the financial market.

The Federal Reserve was established in 1913. West Craig (1978) pointed out that the Federal Reserve Act of 1913 was the response to panic and instability in the banking system.[10] The control and abuse of substantial financial rights by private bankers had been generally dissatisfied and questioned by the public. This crisis has made all sectors of society generally aware of the shortcomings of the banking system and reached a consensus to revolutionize the banking industry. To make up for deficiencies in the banking system, the United States started a series of large-scale bank reformation. The government passed the Aldrich-Vreeland Act to increase money supply elasticity in 1908 and established the National Monetary Commission. In 1912, the US federal government launched a currency trust investigation to US bankers. In 1913, former Virginia Congressman, the chairman of Banking and Currency Committee, based on the Aldrich Act, redrafted the bank reform plan and formulated *The Federal Reserve Act* in 1913.

1.2 The great financial crisis of 2007

It is known widely that the financial crisis of 2007 was a severe worldwide financial

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San Francisco earthquake and the panic of 1907, The Journal of Economic History, Vol. 64, No. 4, 2004, pp. 1002-1027

[9] Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, Vol. 23, No. 2, 1909, pp. 185-212

[10] Robert Craig West, *Banking Reform and the Federal Reserve: 1863-1923*, Ithaca and London: Cornell University Press, 1978

crisis, originated from the price bubble burst in the American real estate market, and quickly brought about global impact. As the housing market turned down in the second quarter of 2006, a large number of subprime mortgages designed for customers with low credit rating and low income depreciated. The source of their repayment was not originally from their disposable income but based on the expectation of continued rising housing prices. The borrower could quickly refinance to maintain the monthly payment by mortgaged property. However, when the house prices fell, they were not able to pay back the monthly payment. Thus a wave of defaults came. Also, massive securities through subprime mortgage securitization like MBS (Mortgage Backed Securities), ABS (Asset-Backed Securities), CDO (Collateralized Debt Obligation) became risky; price plunged. Most investors of these securities were hedge funds, insurance companies, and investment banks, who utilized the products as collateral to increase their leverage. The subprime mortgage crisis made investors suffer a lot. The panic rapidly spread to the financial market. The entire US currency market was stuck in a liquidity shortage.

March 12th, 2007, the second-largest subprime lender, New Century Financial, applied for bankruptcy protection. It was clear that the subprime crisis started. Subsequently, a large number of subprime loan companies fell into financial crisis, loan prices fell, and the market was full of pessimism and panic. They massively sold subprime loans and asset-backed securities, resulting in a substantial decline in the prices of subprime-related products and their company's stocks. Companies with high leverage were forced to sell assets to pay off debts, which caused the asset price crash. A large number of financial institutions collapsed in the crisis. For example, Bear Stearns, the fifth-largest investment bank in the United States lost over 90% of their value[11], eventually acquired by JP Morgan. The Lehman Brothers filed for bankruptcy in September 2009.

To prevent further collapse of global financial markets, the Federal Reserve and the US Treasury employed bailouts to save some financial institutions, especially the rescue of Fannie Mae and Freddie Mac. Meanwhile, a series of monetary and fiscal policies were used to fight the credit crunch. The Fed began to lower the federal funds rate and provide liquidity to stabilize the credit market.

There is a large number of research works of literature discussing the root cause of the subprime mortgage crisis. First, some scholars agreed that loose monetary policy was one of the sources for this crisis. The mistake made by the Federal Reserve was a contributing factor. Taylor (2009) showed that the long-time low interest rate pushed up the house booming and subsequent bust.[12] In order to avoid economic recession due

[11] Viral Acharya, Thomas Philippon, Matthew Richardson and Nouriel Roubini, *The Financial Crisis of 2007-2009: Causes and Remedies,* New York University Salmon Center and Wiley Periodical, Inc, 2009

[12] John B. Taylor, *Economic policy and the financial crisis: An empirical analysis of what went wrong,* Critical Review: A Journal of Politics and Society, Vol. 21, No. 2, 2009, pp. 341-364

to the dot com bubble in 2001, the Federal Reserve kept the interest rate low for several years before the financial crisis of 2007. Home prices kept appreciating at a rate above the interest rate, which motivated more households to purchase houses, thus further accelerated the house price. However, when the government raised the interest rate, many households could not afford the refinancing cost and the monthly payment, and thereby default rate spiked up. Maddaloni and Paydro (2011) argued that low interest rates also decreased the lending standards for households and businesses.[13] Even individuals with no assets or no income were given credit to buy a house.

On the other hand, Thakor (2012) developed an innovation-based financial crisis to show that financial institutions were incentives to pursue higher profit by new products while ignoring the tail-risk.[14] Due to the excessive innovation of financial institutions, a large number of financial derivatives had been created. When the crisis broke out in the real estate market, the direct or indirect effects of these financial instruments caused the subprime crisis to spread into the whole capital market. Robert Order (2007) conducted an economic analysis of the securitization process on the US subprime mortgage loans. He pointed out that there was information asymmetry in securitization.[15] Piskorski, Seru, and Witkin (2014) represented evidence that mortgages buyers cannot recognize the risks of the securities because they received false information about the real quality of assets in contractual disclosures.[16]

From another viewpoint in the market, Jagannathan, Kapoor, and Schaumburg (2013) pointed out the imbalanced developments in the global economy must be partially responsible.[17] The rapid development in the emerging-market countries, especially in China, help them accumulate a large number of savings, which flow in the United States and some European countries for better and safer assets investment. Hot money wave led to liquidity surplus in the United States and thereby pushed up the house price.

Except for some defects of the financial markets, the fragile banking system also played a role in this crisis. The government lacked efficient supervision of non-bank

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[13] Angela Maddaloni and Jose-Luis Peydro, *Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the Euro-Area and the US lending standards*, Review of Financial Studies, Vol. 24, No. 6, 2011, pp. 2121-2165

[14] Anjan V. Thakor, *Incentives to innovate and financial crises,* Journal of Financial Economics, Vol. 103, No. 1, 2012, pp. 130-148

[15] Robert Van Oder, *On the Economics of Securitization: A framework and some lessons from US experience,* Ross School of Business Paper, No.182, 2007

[16] Tomasz Piskorski, Amit Seru and James Witkin, *Asset Quality misrepresentation by financial intermediaries: Evidence from RMBS Market,* Journal of Finance, Vol. 70, No. 6, 2015, pp. 2635-2678

[17] Ravi Jagannathan, Mudit Kapoor and Ernst Schaumburg, *Causes of the great recession of 2007–09: The financial crisis was the symptom not the disease,* Journal of Financial Intermediation, Vol. 22, No. 1, 2013, pp. 4-29

institutions and shadow banking. Masera (2011) argued that the root cause of the financial crisis was the imperfection of the supervision system.[18] Adrew Lo (2008) showed the direct relationship between the loose regulations and this financial crisis. [19]Some financial institutions neglected risk management, heavily purchased subprime loans, and held an ultra-high leverage ratio. In the absence of supervision and information symmetry, the financial institution may have a moral hazard. Bebchuk and Fried (2010) noted that some banks viewed themselves too big to fail and invested in high risky assets since the government would protect them from collapsing.[20]

The causes mentioned above explained the direct causes of this crisis. The market and the banking system are not isolated from human, culture, politics, and society. To better understand it, some researches proposed more possible causes in other fields beyond traditional finance. In the analysis of Adrew Lo (2008), the long-term prosperity induced investors to underestimate the risk and become more risk tolerance. When the market collapsed, the greed turned into fear. The greed of profit and the fear of the unknown accelerated the crisis.[19] Ralph Nader pointed out that the financial crisis was caused by "pure greed."[21] Ashcraft and Schuermann (2007) argued that participants in each chain of securitization had conflicts of interest.[22] Wall Street took over regulators, employing policies for the benefit of the financial industry.

1.3 Motivation

This thesis intents to reveal the remarkable parallels and distinctions between the financial crisis of 2007 and the panic that happened one hundred years ago. There are both countless pieces of literature to study the great financial crisis of 2008 and the panic of 1907. It is known that the panic of 1907 originated from the failure of the Copper stock corner, which eventually led to the run on trust companies in New York. The financial crisis of 2007 started from the house price bubble burst and thereby led to a wave of subprime mortgage defaults. Even one hundred years passed by, some conditions preceding the financial crisis are unchanged. For example, the unregulated shadow banking systems grew brutally and rapidly. Massive credit demand expanded

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[18] Rainer Mesera, *Taking the moral hazard out of banking: the next fundamental step in financial reform,* PSL Quarterly Review, Vol. 64, No. 257, 2011, pp. 105-142

[19] Andrew W. Lo, *Hedge Funds, Systemic Risk, and the Financial Crisis of 2007–2008: Written Testimony for the House Oversight Committee Hearing on Hedge Funds,* 2008, pp. 9-12

[20] Lucian A. Bebchuk and Jesse M. Fried, *Paying for long-term performance*, University of Pennsylvania Law Review, Vol, 158, 2010, pp. 1915-1959

[21] Ralph Nader, *Financial Crisis "Pure Greed*," September 2008 https://www.upi.com/Top_News/2008/09/16/Nader-Financial-crisis-pure-greed/43731221599036/?ur3=1

[22] Adam B. Ashcraft and Til Schuermann, *Understand the securitization of subprime mortgage crisis*, Wharton Financial Institution Center Working Paper No. 07-43, 2007

due to economic prosperity. The government lacked oversight in the banking industry. However, few researchers connect these two crises and compare their differences and similarities. Therefore, research in this area must be strengthened.

The comparison of these two crises helps us to re-examine the financial crisis under different historical backgrounds, and we can also appreciate the century-old historical picture of the United States from a new perspective. Under the backgrounds of different times, we can observe what are the similarities and differences, and accumulate experience from history. By comparing the direct and profound causes of the two crises, we can find the commonality of the economic cycle and the problems that have always existed in the financial market. For example, the conflict between government regulation and the financial market, the contradiction between economic efficiency and social equity, the personal and public interest collisions, the irrational economic prosperity and the credit boom, and the impact of human behavior on the crisis. On the other hand, we can also see the reform and development of the banking and financial system. For example, the monetary policy now is more flexible since the gold standard was abolished. The Federal Reserve injected millions of funds into the market to increase liquidity during the panic.

By comparing and summarizing historical experience and lessons, this thesis not only helps us to comprehend better the backgrounds of the panic of 1907 and the financial crisis of 2007, but also deepens our understanding of financial crises. We know some similar conditions before the crisis. It may provide early warning and preparedness measures for the next crisis.

1.4 Thesis Structure

The main body of this thesis is constructed as follows:

- Chapter 2 discusses the causes, the trigger, and the remediation of the panic of 1907. The most important part is the root causes. We explain it from the technical financial, social, economic, psychological and ideological perspectives
- Chapter 3 describes the great financial crisis of 2008. We briefly summarize the points from the working document"*The Illusion of the perpetual Money Machine and the Fool's Gold Age"* written by Prof. Didier Sornette and Dr. Peter Cauwels. This book is an essential reference for our analysis
- Chapter 4 states the parallels between the panic of 1907 and the financial crisis of 2008.
- Chapter 5 includes the difference between the two periods

CHAPTER 2

The Causes, the trigger, and the remediation of the Panic of 1907

In this chapter, we will study the panic of 1907, describe and explain it from different angles, painting a broad picture with abundant elements. Theses can be financial, economic, social, and ideological causes, the seemingly inconspicuous trigger, and the significant remediation. This crisis has always been a research topic in academia. The related papers and published books are uncountable. Different writers bring distinct viewpoints of the causes and the consequences of the panic.

In the first part of this chapter, we group these opinions into two main categories, unveiling the underlying vulnerable financial and social situations preceding this panic. The first one mainly describes the direct causes of the crisis from the perspective of technical finance. It shows the reasons why the banking system and the markets were fragile and why the imperfect trust system in New York attributed a lot to this panic. This category is called "dry forest " explanation,[23] which indicates that the financial system looks like the forest with a pile of dry woods where a fire spark, a trivial disturbance, can lead to a prescribed forest fire.

However, these technical analyses just stay in the first layer. Few works of literature go to the deeper layer, studying the fundamental reasons to cause the fragile banking system and the markets. It is not enough to just describe the surface of the panic. More elements are needed to show a border picture. Questions must be answered like: Why did banks ignore risk? Why did vulnerable trusts proliferate? Why was there no central bank in the long American history? And therefore, we will extend our discussion in economic, social, ideological and psychological areas in the second category "climate change"[24] referring to the idea that the change in climate is the reason behind the "dry forest."

By discussing the two main categories of causes, we explain how vulnerable the situation is in the American financial market from different viewpoints. In the following part of this chapter, we will show how the fire spark (the trigger of the panic) set on the forest fire (the spread of the panic), describing the whole process of the financial crisis in chronological order. Meanwhile, we will introduce how the government, the bank association and the private bankers rescue the market during this panic, revealing the drawbacks of the current banking system.

In the final part of this chapter, we will discuss the remediation to see how the

[23] The "dry forest" concept quoted from the working paper "The Illusion of the perpetual Money Machine and the Fool's Gold Age" written by Prof. Didier Sornette and Dr. Peter Cauwels, Chair of Entrepreneurial Risks, ETH Zurich, 2019

[24] The "climate change" concept quoted from the working paper "The Illusion of the perpetual Money Machine and the Fool's Gold Age" written by Prof. Didier Sornette and Dr. Peter Cauwels, Chair of Entrepreneurial Risks, ETH Zurich, 2019

policymakers reflected in this panic. It is an essential trigger of a big step in the banking industry reformation, promoting the establishment of the American Federal Reserve and eliminating the public's negative sentiment to the central bank.

2.1 "The dry forest": fragile banks, trusts, and markets

As mentioned before, "the dry forest" explanation include all possible technical financial causes of the panic of 1907. The financial crisis often stems from the nature of the financial system and the development characteristics of the cycle, usually caused by a combination of various factors and events. The old financial system was like a pile of dry wood in the jungle. Any spark would cause disaster and even obliterate it. Figure 2.1 elaborates possible reasons in more detail. In the highest hierarchical levels of the mind map, the "dry forest" is divided into three elements: banks, trusts, and markets. It is non-consensus on which of these factors is the most significant, and we will discuss each in turn. In the following part, we will start from the vulnerable banking system to investigate each of the three-level.

Figure2.1: The "dry forest" view of the panic of 1907 includes all the possible technical financial reasons that made the banking system, trusts, and the market fragile. The mind map is organized in a hierarchical mind-map structure.

2.1.1 Fragile banking system

Like many financial crises that occurred during the earlier period of the National Bank

period, the root cause of the financial crisis in 1907 was due to problems with US bank supervision and systems. As schematized in Figure 2.1, there were three factors for the fragile banking sytem in the turn of 20th century: 1) lack of central bank to supervise and support the banking system; 2) inelasticity money supply associated with the gold standard and bank note issuing restrictions; and 3) the interconnected relationship between different financial institutions that caused the panic spread rapidly.

2.1.1.1 No central bank

Without the central bank's centralized supervision or regulation of the banking system, it is impossible to unite different financial institutions, increase the supply of money in a short period, and ensure the stability of the financial market. Without a central regulator to manage and monitor the financial system, if one brick fell, the building will potentially collapse. There is some evidence to show the problems of the lack of a central bank.

First, to strengthen cooperation and the ability to resist risks, some financial institutions voluntarily self-organized into financial associations, the Clearing Houses. However, the regulations and practices of the Clearinghouses were not standardized but customized in different regions in the United States. Not all banks were its membership; even there was no clearinghouse in some states. Furthermore, it was only useful locally in some cities. For example, in New York and other large cities, many banks voluntarily formed local associations such as the New York Clearing House. Through cooperation and coordination, members of the association would maintain internal stability and development. During the panic, the clearinghouses only cared about their members, left those outside this association unaided. Before 1907, most bank crises started from commercial banks, the clearinghouse members. The association played a significant role in taking anti-crisis actions to help its members. However, the panic of 1907 started form trusts, institutions outside the Clearing House monitoring system. The local self-organized association was ineffective.

In fact, unlike the clearinghouse association organized by national and state banks, the trusts were not closely connected internally. There was no trust coalition in New York to save themselves during the panic. The presidents of each trust had no consciousness to build such a united association that helped each other. As evidence shown below, they were reluctant to cooperate. After taking over the anti-crisis matters, it was J. P. Morgan who convened the presidents of the New York trust companies and urged them to form a rescue team.[25] However, the presidents of trust companies had to introduce themselves first in the meeting. The cooperation between trust companies was unsuccessful in the beginning. In the first meeting of raising money to rescue the trust company of America, the ten trusts failed to reach the agreement that each of these trusts provided $300 thousand after fierce debate. In their views, it was not their responsibility to intervene.

[25] Wikipedia, Panic of 1907, https://en.wikipedia.org/wiki/Panic_of_1907

On the other hand, different regulatory standards for national and state banks induced the state-charted financial institutions to take some risky operation since they were taking advantage of loose regulations. National Bank and State Bank operated under two various measures of federal and state governments. National banks were chartered by national legislations and authorized to receive the federal deposit. State banks were chartered by state laws so that different state banks may follow various regulations. The regulation was much stricter to National Bank than state bank in capital ratio and notes issuing. For example, national banks were not allowed to set up branches and had to hold a minimum 25% reserve against deposits[26]. Except for state banks, other state-chartered financial institutions were also less regulated, especially trusts, which enjoyed more liberal policies than both National and State banks. The inconsistent regulatory standards in the banking system led to less coordinated mechanisms among banks during the panic.

In the end, the federal government was unable to stabilize the banking system during the panic in the absence of the central bank. Before the establishment of the federal reserve in 1913, no federal or state government institution had rights or abilities to intervene in financial markets and carry out rescue work in the crisis. Even though the US Treasury had adopted an indirect control method of Treasury's surplus currency to adjust the money supply in the currency market, the Federal Treasury Department was not a central bank. It did not have the right to issue currency, and it could not mobilize the reserves of banks. In periods of the bank crisis, the US Treasury often took simple actions to shift the gold and currency to the regions and deposited federal funds in national banks to increase liquidity.[27] However, the Treasury could only deposit in the banks who provide federal bonds as collateral.[28] On the other hand, the Treasury did not have enough funds to meet the bank's urgent requirement. It recorded that in the middle of November 1907, there was only $5 Million left in the Treasury Department after it injected $37.6 Million to New York National Banks.[29] The indirect regulations adopted by the Federal Treasury was insufficient to deal with sudden financial crises.

2.1.1.2 Inelasticity of money supply associated with gold standard and notes issuing backed by government bonds

As the National bank act regulated, National bank notes issuing was backed on federal government bonds[30]. The necessity of being able to hold enough government bonds

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[26] Ellis W. Tallman, *The Panic of 1907*, Working Papers (Old Series)1228, Federal Reserve Bank of Cleveland, 2012

[27] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p.58

[28] Martin S. Fridson, *It Was a Very Good Year: Extraordinary Moments in Stock Market History,* John Wiley & Sons Inc, 2000, p.7

[29] Richard H. Timberlake Jr, *The Origins of Central Banking in the United States*, Harvard University Press, 1978

[30] National banks must purchase federal government bonds in fiat currency and deposit

deposited in the Treasury limited the currency supply. This policy made the money supply lack the necessary elasticity. It cannot expand or contract in response to the needs of the economic cycle. The amount of currency had nothing to do with the actual needs of the economy. However, it was related to the government's financial situation, the price of bonds, and other factors, which caused the money supply in the long-term downturn trend.[31]

Besides, between 1870 and 1914, many countries used the gold standard. Under this standard, the currency issue of a nation linked to gold. Because the issued banknotes must be convertible into gold, there were strict restrictions on the number of notes in circulation, and they must be within a certain multiple of the central bank's gold reserves.[32] Therefore, the gold reserve had directly affected the country's money supply, limiting the fiat money in circulation, increasing the currency inelasticity, and further preventing interest rate from flexibly adjusting. For example, during the panic of 1907, the gold standard caused the constraints on the financial interventions of the US Treasury to manage money and credit supply.[33] The gold standard and currency-issuing restrictions resulted in unreasonable responses of the money supply to the economic cycle, and the elasticity was not available in a short period. Therefore, the national banks were unable to cope with seasonal money shortage and financial panic.

2.1.1.3 The interconnected relationship of different financial institutions caused panic to spread in the banking system quickly.

Although there was no unified management of financial institutions by the central bank, there were other factors linking banks together: the inter-bank inverted pyramids structure of reserve, the private social network of the bank 's president, and the commercial cooperation. The relationship between banks allowed the panic to spread and travel to the institutions seemingly unrelated. Besides, the inverted pyramid structure of reserve made the banking sector and stock market interconnected with each other, forming a channel to transfer and spread the financial crisis.

First, banking reserve structure[34]made reserve concentrated in large national banks

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in the Treasury before releasing national banknotes. Once the issuing bank went bankrupt, the federal government could sell the bonds as guarantees and pay off the bank debts. See: E.W.Kemmer, *The ABC of the Federal Reserve System*, Princeton University Press, 1936, p.12

[31] Edwin W. Kemmerer, *Seasonal Variations in Relative Demand for Money and Capital in the United States: A Statistical Study,* Washington: Government Printing Office, 1910

[32] The Classic Gold Standard, https://www.gold.org/about-gold/history-of-gold/the-gold-standard

[33] Ellis W. Tallman, *The Panic of 1907*, Working Papers (Old Series)1228, Federal Reserve Bank of Cleveland, 2012

[34] According to the National Banking Act, there are three levels of national banks:

while most rural banks held insufficient reserves. However, large banks used the reserves to get involved in the stock market. In the United States, to gain interest return, the rural banks saved noncash reserve in "reserve city" banks. These city banks were required to hold higher percentage deposits as reserves, and they could put a percentage of the reserves in financial institutions in central reserve cities. Therefore, national banks in big cities were holding reserves of a large number of interior banks (rural banks and city banks in small towns). The reserve structure of the "inverted pyramid" was automatically formatted. This structure strengthens the sensitive linkage between interior banks and large national banks.[35]

Due to the inverted pyramid structure, a large number of interior only held small percentage reserves. In 1907, the US held 16,000 financial institutions (compared to 7,500 in 2007).[36] It regulated the rural banks had to hold reserves as equal to 15% deposit, 60% among which could save in city banks. It means that rural banks usually held only 6% deposits as a cash reserve in hand, and the remaining were depositing in the up hierarchy city banks. For city banks, they were required to hold 25% deposit as reserves, 50% of the reserves holding in cash.[37] The holding reserves of the interior banks were sufficient for the daily operation.

However, when panic came, it was a catastrophe. Without the help of the central bank as a last resort, each national bank could only use its reserves, which was incapable of tackling depositors' run before accepting reserves successfully from reserve city banks. Therefore, at the start of the panic, they rushed to city banks urgently to pull their money back.[38] Their reaction brought tremendous pressure to the banks on the upper layer pyramid who faced double shock from running by rural banks and local deposits. It was very slow to transfer deposits from New York and Chicago back to interior banks in Western and Southern US.[39] The delayed response upgraded the anxiety of the public.

On the other hand, it was true that the inverted pyramid structure of the bank reserve mechanism led to a concentration of reserves in New York City in the large, Clearinghouse member national banks.[40] According to R. Glen Donaldson, the largest

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"central reserve city" bank is New York national banks; "reserve city bank" is national banks in 18 cities; the rural bank is the national banks except that in the 19 cities.

[35] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p. 154

[36] Joseph French Johnson, *The crisis and panic of 1907*, The Academy of Political Science, Political Science Quarterly, Vol. 23, No. 3, 1908, pp. 454-467

[37] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p.58

[38] Milton Friedman and Anna Jacobson Schwartz*, A Monetary History of the United States*, 1867-1960, Princeton University Press, 1963, p. 109

[39] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p. 136

[40] Ellis W. Tallman, *The Panic of 1907*, Working Papers (Old Series)1228, Federal

six national banks controlled almost 40% of the economy's total vault cash.[41] Until August 1907, the cash reserves in New York six national banks was $1.4 Billion, 70% of total bank deposits absorbed by all New York banks.[42] Beckhart has argued that "one of the most serious of defects in the American banking system was the rigidity and immobility of reserves. The proportion of reserves to be held in national banks against their deposits was definitely fixed by status." Table 2.1 indicates a large number of bank reserves were concentrated layer by layer, and finally collected in the central reserve city bank.[43]

	Number of banks	Deposits ($Millions)	Cash Reserves ($Millions)	Deposited Reserves ($Millions)
Central Reserve Cities	60	1,205.5	315.5	-
Reserve Cities	306	1,423.4	196.6	165.7
Others	6,178	2,627.2	216.8	226.7
Total	6,544	5,256.1	728.9	392.4

Table 2.1 shows that central reserve city banks kept a large number of cash reserves. On average, the cash reserve held by central reserve cities was more than 100 times than that of interior banks.

To make a profit, these large national banks actively got involved in the call loan market, lending money to stock investors on the New York Exchange and got securities as collateral. The reserves should have been invested in safer assets in case of any market shocks. However, the turbulence of the money market and the capital market caused short-term loans to fluctuate significantly, affecting the stability of the domestic financial market and the asset value of the central reserve banks.[44] The fluctuation of securities price would potentially spread anxiety to the depositors, then led bank run.

Secondly, financial institutions had more than the reserve relationship. The complicated relationship between trusts and national banks showed more connections of each participant in the banking system. Even though trusts took advantage of being less regulated and engaging in high-return activities, trusts and national banks were more

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Reserve Bank of Cleveland, 2012

[41] Glen Donaldson, *Panic Liquidity and the Lender of Last Resort: A strategic Analysis*, International Finance Discussion papers, No. 332, 1988

[42] Ellis W. Tallman and Jon R. Moen, *Liquidity Creation Without a Lender of Last Resort: Clearinghouse Loan Certificates in Banking Panic of 1907,* Federal Reserve Bank of Atlanta, 2006

[43] B. H. Beckhart, *Outline of Banking History from the First Bank of the United States: Through the Panic of 1907,* The ANNALS of the American Academy of Political and Social Science, Vol. 99, No. 1, 1922

[44] Paul M. Warburg, *The Federal Reserve System: Its Origin and Growth,* New York: The Macmillan Company, 1930, p. 13

than just competitors in deposit business. National banks were not allowed to conduct trust business, but they could own trust. Therefore, some national banks established or bought trust companies[45], and some national banks acted as clear banks for trusts, which formed the complicated interest linkage between different banks. For example, The National Bank of Commerce in New York cleared for the Knickerbocker Trust. J.P. Morgan held a controlling interest to the Banker Trust. When the crisis comes, all banks, like dominoes, fell. If one of them failed to meet the needs of depositors, then the market would lose confidence in the entire banking industry. Without intense interventions, the run was going to spread to banks in the country inevitably.

Finally, there was another exciting connection of banks, the social network of the president of different banks. It was a trend in New York that more and more small size banks were owned by individuals or a group of associated individuals. They participated in the speculation activities in the stock market. As we knew, national banks were not allowed to open the branch office, and therefore there were numerous banks in the US with small size. Their business was highly localized, serving for small enterprises. According to Gorton and Huang, the banking system with small and undiversified banks is more likely to experience panic than the one with a few large diversified banks.[46] Few banks were large enough to provide high profit for their owners on traditional bank business. Thus, during the beginning of the 20th century, to make more money, an individual or a group of associated individuals started to gain control of banks for their private business and industrial speculation. For example, Charles W. Morse, a Wall Street Banker, purchased a group of banks in the way that he first purchased controlling interest of one bank and used shares of the bank along with other collaterals to get a loan for buying shares of the second bank and so on. Morse and his association repeatedly used such techniques and therefore created interlocking banking relationships.[47] Morse actively financed enterprises by these banks. New York journal had criticized Morse's risky activities. Sprague argued that it was hazardous if such banks controlled by a group of associated individuals located in New York or other money centers; since they were deeply involved in industries and owned by individuals who only sought private undertakings. The failure of these banks would have a significant influence on public confidence.[48]

To sum up the above problems, the main problem of the US banking system at that time was first that the central bank was not established. There was no unified supervisor and

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[45] Vincent Carosso, *Investment Banking in America*: A History, Harvard University Press, 1970, p. 97

[46] Gary Gorton and Lixin Huang, *Banking Panics and the Origin of Central Banking*, NBER Working Papers 9137, National Bureau of Economic Research, 2002

[47] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p. 40

[48] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, pp. 248-250

regulator. As a result, different financial institutions could only form distinct associations spontaneously. The gold standard and banknote issuing backed by federal bonds from national banks aggravated inelasticity of money supply,[49] which prevented banks from increasing the money supply in the short term. On the other hand, the interconnected relationship between national banks, trusts, and other small banks in the banking industry created a network to transfer and spread the financial crisis. Through this channel, the instability of few banks in a specific region may evolve into the national economic crisis.

2.1.2 Fragile trust companies

From 1897 to 1907, state laws boosted the growth of state-charted banking institutions rapidly. Many trust institutions appeared in the financial market. In New York, the growth rate of trust companies was more rapid than that of national banks. The trust company assets in New York State had grown from $396.7 million to $1.364 billion in comparison to those of national banks from $915.2 million to $1.8 billion.[50] In January 1898, the loans of the trust companies in New York were about $180 million less than half those of the national banks. In August 1907, their loans had increased to $610 million, compared with $712 million for the national banks at the same date.[51]

However, the problems rooted in the trust system were not solved when this group was expanding. For the development of the regional economy, state governments lowered the requirements on the reserve ratio of trust institutions. They set a few restrictions on their investment, which induced trust to operate risky businesses that were forbidden by National banks. Finally, trusts were not forced to join the clearinghouse association, which reduced their ability to resist liquidity risk. All the factors made them vulnerable to any market shock.

2.1.2.1 Inadequate trusts reserves

Before 1906, New York City trusts were not mandatory to hold the minimum deposit reserve, while national banks had to keep 25 percent reserve against deposits. In 1906, New York State announced trusts must hold 15 percent reserve on deposits, among which only one third needed to be saved as currency, the remaining proportion could be held by noncash reserves like specified bonds.[52]In contrast, before the crisis, to

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[49] Since the establishment of Federal Reserve in 1913, Federal Reserve replaced the National banks and the Treasury to issue American currency banknotes. Federal Reserve notes were backed by the asset of Federal Reserve Banks

[50] George Barnett, *State Banks and trust companies since the passage of the National-bank act*, Washington: Government Printing Office, 1911, p. 227

[51] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, p. 227

[52] Ellis W. Tallman and Jon R. Moen, *The bank panic of 1907: The role of trust companies*, The Journal of Economic History, Vol. 52, No.3, 1992, pp. 611-630

maintain surplus reserve as well as the public confidence, national banks reduced the deposits liabilities intendedly. The low reserve ratio resulted from the fact that deposits mainly came from the extra funds of private or institutions, which were not often removed. Trusts holding a larger share of interest-bearing assets became very competitive to national banks. For example, trusts in 1901 were able to pay 2%-5% interest on deposit accounts, while most banks paid none[53].

2.1.2.2 High-risk investment and operations of trusts

Trust companies performed higher-risk operations compared to national banks. First, trusts could make uncollateralized loans which were prohibited to national banks. Trusts lent a large sum of credits to New York Exchange brokers, which provided liquidity to the equity market. Brokers could first borrow from trusts without collateral, then purchased equities by these loans. After that, they used these stocks as collateral to get a call loan from national banks, which were eventually paid for the initial loan from trust companies.[54] Figure 2.2 illustrated the process of how a stock investor got a call loan from the trusts and national banks.

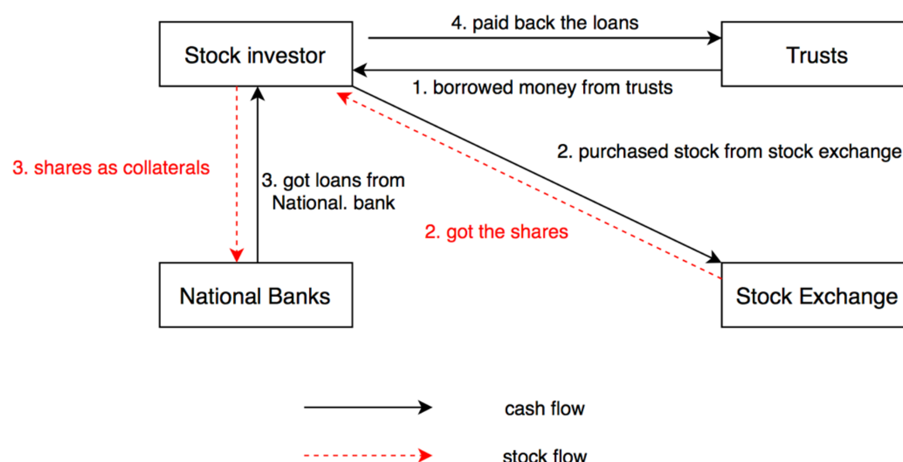

Figure 2.2 shows the money flow and stock-flow of stock investors, trust companies, Stock Exchange, and National banks. It seems like the trusts are the initial liquidity providers in the stock market.

Generally, to meet liquidity needs, trust companies could quickly call short-term loans. However, when trusts faced run, to collect capital, they had to call back short-term loans from the market, which made it difficult for stockbrokers to find new loans available in

[53] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017, p. 85

[54] Jon R. Moen and Ellis W. Tallman, *The Panic of 1907*, Federal Reserve History, 2019

a credit crunch, and therefore they had to sell stocks. The Large selloff caused stock price plunge, which made stockbrokers bankrupt and unable to repay the loans. The selling of stocks (equity assets) exacerbated the stock market. The average stock market decreased by 35% during one month on October.[55]

Second, trust companies were allowed to engage in activities that were prohibited to other intermediaries. They were relatively flexible in their investment portfolio. For example, trusts were able to invest in real estate and securities directly, which were limited to national banks.[56] Trusts could also act like both a commercial bank and investment bank simultaneously. As Carosso said, trusts took the functions on accepting loans, making loans while they were active in short-term financing, underwriting and distributing new securities. The Comptroller of the Currency in 1902 assisted the entry of trusts to the securities market by restrictions on national banks.[57] Trusts participated extensively in the underwriting of railroad securities and provided loans for consolidating industrial corporations.[58] In some projects, the issued securities were illiquid in the open market. Therefore, the freedom to underwrite bond and stock issuance led to additional risk as the trust company would often hold illiquid securities they had underwritten in their portfolio.

2.1.2.3 Trusts were not members in New York Clearing House Association: Lack of explicit liquidity providers and less transparency led to the untimely rescue

The United States, during the National Bank era (1863-1913), had no central bank. This absence resulted in the dramatic expansion of the Clearinghouses at the end of the period.[59] The Clearinghouses took many tasks such as holding reserves, examining banks, and issuing temporary emergency currency.[60] However, it was a private self-regulating institution that was voluntarily formed by several private commercial banks in the city. New York trusts used to be members of this association but terminated their membership since 1904. Even though the New York Clearing House played an important role during the panic, it cannot ensure success. Moen and Tallman proposed

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[55] Glen Donaldson, *Panic Liquidity and the Lender of Last Resort: A strategic Analysis*, International Finance Discussion papers, No. 332, 1988, p. 3

[56] Ellis W. Tallman, *The Panic of 1907*, Working Papers (Old Series)1228, Federal Reserve Bank of Cleveland, 2012

[57] Vincent Carosso, *Investment Banking in America*: A History, Harvard University Press, 1970

[58] Ellis W. Tallman and Jon R. Moen, *The bank panic of 1907: The role of trust companies*, The Journal of Economic History, Vol. 52, No.3, 1992, pp. 611-630

[59] Dowd Kevin, *Competitive banking, Banker's club, and Bank Regulation*, Journal of Money, Credit and Banking, Vol. 26, No. 2, 1994, pp. 289-308

[60] Jon R. Moen and Ellis W. Tallman, *Private Sector Responses to the Panic of 1907: A Comparison of New York and Chicago,* Economic Review of Federal Reserve Bank of Atlanta, 1995

that the experience of the Panic of 1907 changed how New York Clearing House bankers perceived the value of a central bank because trust companies, the primary role in this panic, were outside their membership.[61]

During the panic, to satisfy the liquidity demands of individual banks, the Clearinghouse employed clearing house loan certificates that were exchangeable between the clearinghouse members. The largest national banks in New York City collectively and intentionally engaged in the lender of the resort activities, borrowing clearing house loan certificates in the amount that has exceeded their own needs, providing liquidity during the financial crisis.[62] This measure could have artificially increased the money supply and free up the currency for the member banks during the panic. Table 2.2 shows that clearing house loan certificates were issued extensively during each financial crisis. It was a standard practice to provide liquidity support.

Year	Date of First Issue	Aggregate Issue ($million)	Maximum Outstanding ($million)
1863	6-Nov	11.5	9.61
1864	7-Mar	17.7	16.4
1873	22-Sep	26.6	22.4
1884	15-May	24.9	21.9
1890	12-Nov	16.6	15.2
1893	21-Jun	41.5	38.3
1907	26-Oct	101	88.4

Table 2.2 presents the loan certificate issued on a specific date.[63] It indicates that the aggregate issue amount in the year of 1873, 1884, 1893, 1907 increased when the financial crisis occurred in the United States[64]. The loan certificate was an effective debt contract to provide liquidity to the financial markets.

However, the loan certificate just increased the credit available to the clearinghouse

[61] Ellis W. Tallman and Jon R. Moen, *Why Didn't the United States Establish a Central Bank until after the panic of 1907, Federal Reserve Bank of Atlanta, Working Paper 99-16,*1999

[62] Ellis W. Tallman and Jon R. Moen, *Liquidity creation without a central bank: Clearinghouse loan certificates in the banking panic of 1907*, Journal of Financial Stability, Vol. 8, Issue 4, 2012

[63] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, pp. 432-433 and United States Comptroller of Currency in 1893 and 1907

[64] Clement Juglar and De Courcy, *A Brief History of Panics and Their Periodical Occurrence in the United States,* G. P. Putnam's Sons, 1917

members but ignored the financial intermediaries outside the membership. Trust companies refused to be a member since the cost of this association was too high. The Clearinghouse required at least a 10% cash reserve after June 1, 1904.[65] It was comparably low. Nevertheless, the core business of trust was investment, not the payment; its clear service was even minimal. The trust had only 7 percent of the clearings of national banks, so they were not like commercial banks to provide transaction services.[66] Thus, there was no reason for trust to join an organization that protected the traditional banking business. Being outside the protection of Clearinghouse laid hidden dangers for trusts. This kind of financial institution, out of last resort mechanism, could not obtain the loan assistance from the Clearing House.

Besides, the New York Clearinghouse required its members regularly to submit financial statements and asset-liability information. As a consequence of the independence of the New York Clearing House, the balance sheet of trust was not under effective control and monitoring. To get a higher return, trusts preferred to keep risky assets. Without supervision and management, the trust company's accounts had been in a long-term unsoundness. For example, in 1907, to save Knickerbocker Trust, J. P. Morgan and his associates examined its books overnight and refused to offer aid.

In contrast to New York trusts, Chicago trusts were a member of the Chicago Clearing House. Through regular account checks, the Chicago Clearing House knew the financial situation of each trust and was able to react timely to a potential crisis. At the same time, direct access to the liquidity from the Clearinghouse prevented the panic at Chicago Trust.[67] During the panic of 1907, No trust or bank was forced to suspend in Chicago.[68]

From the above analysis, we can see that some shortcomings of trust institutions. First, the reserve ratio of trusts against deposit was relatively low. With insufficient cash in hand, trusts were unable to meet the withdrawing needs of depositors. To profit, they were actively engaged in capital markets and long-term investment projects with high risk. This kind of asset structure was very vulnerable to any financial shock. Last but not least, most of the trust companies in New York were not a member of the New York Clearing House Associations. Independence means they were unable to receive liquidity support during the panic. These problems underlying the trust system implied

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[65] James Gerald Smith, *The Development of Trust Companies in the United States*, American business series, H. Holt and Company, 1928, pp. 347-50

[66] George Barnett, *State Banks and trust companies since the passage of the National-bank act*, Washington: Government Printing Office, 1911, p. 133

[67] Jon R. Moen and Ellis W. Tallman*, Private Sector Responses to the Panic of 1907: A Comparison of New York and Chicago,* Economic Review of Federal Reserve Bank of Atlanta, 1995

[68] Martin S. Fridson, *It Was a Very Good Year: Extraordinary Moments in Stock Market History*, John Wiley & Sons Inc, 2000, p. 6

the occurrence of a financial storm.

2.1.3 Fragile Markets

Except for the vulnerable situation created by the fragile banking system and unsound trusts, there were other factors in the crumbling markets attributed to the panic of 1907. The domestic background of the US financial crisis in 1907 was: the tightening of the New York money market in the summer of 1907, the stock market hit by President Roosevelt 's series of measures, and the long-term opaque market information. All these factors planted the seeds of this panic. Besides, the international background was a global financial crisis. Egypt, the United Kingdom, Japan, and other countries had been hit. The financial markets of various countries were facing a short-term currency shortage. Therefore, increasing interest rate caused international credit crunch.

2.1.3.1 The factors led to the tight and unstable money market in New York

The New York money market always faced capital outflow during each autumn since New York had to transfer money to the interior to finance harvests transportation from the Midwest to the East Coast port, and then to Europe. As a result, New York increased the rate regularly for the liquidity needs during September and October to support the seasonal money shortage. In general, cash demand would be satisfied successfully. However, there were some hidden and specific elements in the New York money market in 1907.

First, abnormal gold outflow created a shortage of gold in the US in 1907. Fabio Canova offered evidence to argue that unusual gold flow was a significant cause of most financial crises before the established Federal Reserve[69]. Under normal circumstances, American commercial banks and trust companies sold some short-term commercial notes in London every summer in exchange for pounds and gold. This seasonal moderate gold inflow lasted until 1905. However, in 1906, Treasury Secretary Leslie Shaw took some actions to subsidize gold imports to the US from abroad. He used government deposits to guide banks to import gold and generated a significant inflow.[70] Also, the San Francisco earthquake intensified the trend. British and some European insurers wrote many city's fire insurance in the United States. To compensate for the loss in the San Francisco earthquake and satisfy the claims, England insurance company began shipping gold to America. Scott noted, “The amount of gold sent to San Francisco to settle earthquake claims was equal to 14 percent of Britain's total stockpile”.[71]

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[69] Canova Fabio, *The Sources of Financial Panics: Pre- and Post-Fed Evidence*, International Economic Review, Vol. 32, No. 3, 1991, pp. 689-713

[70] Ellis W. Tallman and Jon R. Moen, *Lesson from the panic of 1907, Federal Reserve Bank of Atlanta,*1990

[71] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017*,* pp.38-55

As Figure 2.3 shows that in April and May of 1906, nearly $50 million gold flowed into the United States, among which 60% of shares contributed to England. Almost $40 million was shipped to San Francisco, while less than $10 million transferred to New York.[72] At this time, the capital market in New York was becoming scarce despite the small gold inflow from other countries. The earthquake coincided with ordinary fund demand in the American harvesting season, and New York had to ship gold to the west coast while providing credit for the crops, which led to a credit shortage in the winter of 1906.

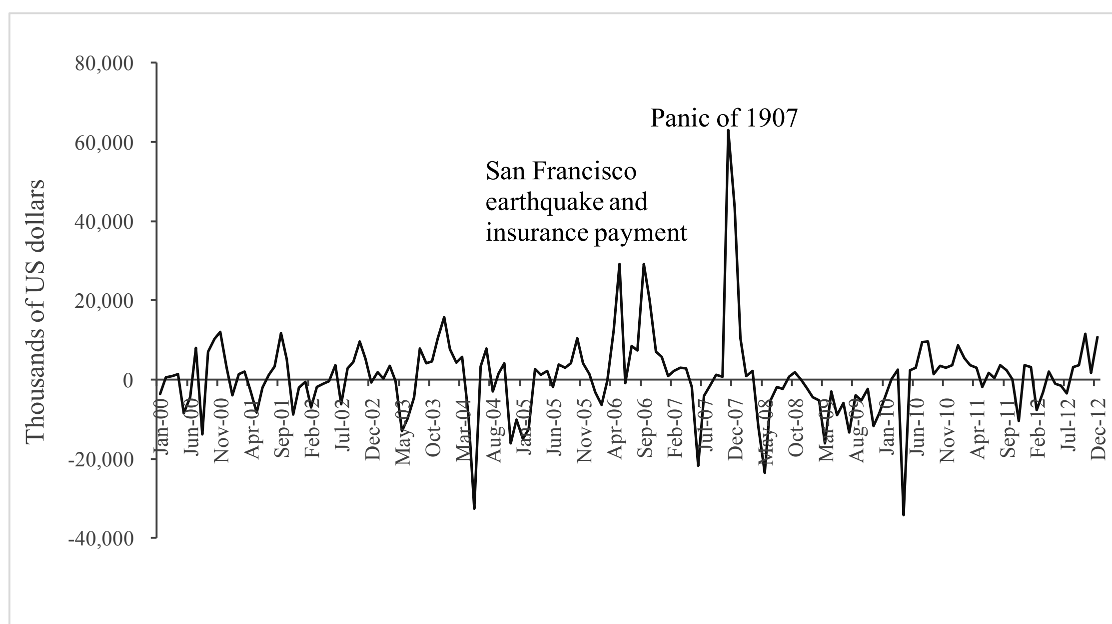

Figure 2.3 illustrates the monthly net gold import in the United States from 1900-1912.[73] It shows that there was a large gold flow reserved from the summer of 1906 to the summer of 1907. In 1906, due to the earthquake in San Francisco, the Insurance companies in Europe shipped gold for claims. From 1907 May to 1907 August, America experienced the gold outflow, because the foreign countries increased interest rate to prevent gold from outflowing and set restrictions on the American finance bill.

However, the trend reversed in the summer of 1907. Gold was shifted from America to London rather than gold flow to New York for trade needs as usual. There are some reasons. The massive outflow of gold from England in 1906 nearly caused internal panic in London. To prevent the drain of gold, the bank of England increased the discount rate from 3.5% in September to 6% in October 1906 to attract capital stay in the UK. Reichsbank also increased the interest rate to stimulate capital flow back to

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[72] Kerry A. Odell and Marc D. Weidenmier, *Real shock, monetary aftershock: The 1906 San Francisco earthquake and the panic of 1907*, The Journal of Economic History, Vol. 64, No. 4, 2004, pp. 1002-1027

[73] NBER Macrohistory Database: https://data.nber.org/databases/jones-obstfeld/
See the "all files" data for the US from 1870 to 1945, updated on 04/04/2020

Europe.[74] Besides, the bank of England restricted the issuance of finance bills in London and stopped discounting US bills. Also, the German and French Central banks worked with the bank of England to resist American finance bills. These measures first reduced the amount of gold flowing into the United States, then reversed the flow of gold and squeezed American financial markets. Sprague considered these restrictions the most important economic factor in the panic of 1907.[75]

In 1907, the United States exported $30 million in gold to London during the summer. [76]The flow of gold to the US suddenly reversed as gold was transported to London to settle the payment of the finance bill. The gold stock increase trend in the US stopped. Figure 2.4 indicated the US gold stock reduced almost 10 percent between May and August of 1907.[77] And therefore, the low volume of gold reserve in 1907 seemed to attribute for the extreme seasonal tightness in New York City's money markets in the fall.

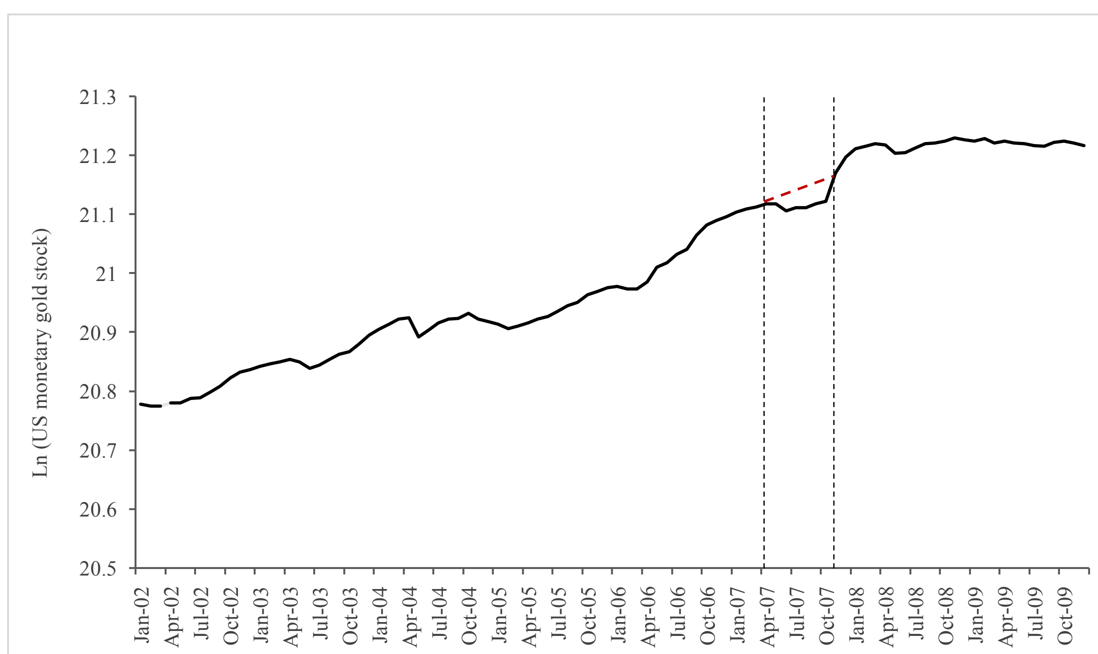

Figure 2.4 is the natural logarithms of American monthly monetary gold stock from 1902 to 1909. From 1907 may to 1907 August (the summertime), the money supply in the US decreased around 10%.[78]

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[74] Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States*, 1867-1960, Princeton University Press, 1963, p. 104

[75] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, p. 241

[76] Ellis W. Tallman and Jon R. Moen, *Lesson from the panic of 1907, Federal Reserve Bank of Atlanta,* 1990

[77] Kerry A. Odell and Marc D. Weidenmier, *Real shock, monetary aftershock: The 1906 San Francisco earthquake and the panic of 1907*, The Journal of Economic History, Vol. 64, No. 4, 2004, pp. 1002-1027

[78] NBER Macrohistory Database: https://data.nber.org/databases/jones-obstfeld/

The second factor is that the loans from foreign capital in New York City were uncertain. All kinds of financial transactions centralized in New York. This trend motivated foreign banks to increasingly provide loans for the business activities in New York. The credit from foreign banks was an essential component in the New York loan market. It was estimated no less than $300 million[79] (compared to $610 million loans in Trusts and $712 million in national banks in 1907 in New York City). However, the foreign banks were susceptible to the disturbance of the interest rate, and their loans might liquidate when affairs at home required more of their funds or when they no longer felt confident in the US money market.[80]

The last and the most crucial factor is over-exploiting credit in each field related to industrial production and foreign trade. Unfortunately, enormous credit need is an early warning signal of the financial crisis. As a result, excessive credit expansion led to overheating speculation in the stock market and exhausted lending power in the bank.

Since the start of the 20th century, the need for money was far beyond what was able to supply. It recorded that the annual capital available for investment was $2.4 Billion while the demand was $3.25 Billion in 1906. The increasing money demand reflected the booming credit market, which approached the exhaustion point. In the US, there were $872 Million new bonds within two years of 1905 and 1906 in contrast to $367 Million from 1900 to 1901. Noyes pointed out that there are three invisible phenomena in the world before the panic of 1907 to show a strain on the credit supply: increasing price for all commodities, unprecedented expansion of capital demand, and extremely high money rate on both American and European markets.[81]

To explore the reasons why the capital demand increased so fast in the early 1900s, we find first at that time, American industrial production was in full swing, the United States became the world's factory. Railways and industrial companies acquired a large number of notes with high rates of interest. In order to reduce competition, some companies were merged into one large company, becoming an industry leader. Besides the prosperity of private business, the government invested a lot to build infrastructures such as highways, power stations, and thereby the government had to issue bonds for raising capital. French economist M. Leroy-Beaulieu attributed the global credit exhaustion partly to the development of the US. He pointed out America should

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See the data for the US from 1870 to 1945, updated on 04/04/2020

[79] Alexander D. Noyes, *Forty Years of American Finance: A Short Financial History of the Government and People of the United States Since the Civil War, 1865-1907*, 2009, University of Michigan Library, p. 356

[80] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, pp. 229-230

[81] Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, February 1909, pp.186-212

postpone at least one half of the massive project, since the whole world could not provide sufficient capital it needed. In return, to raise funds, American corporations had to pay a higher interest rate, which further increased their burden and put the global money market in tension as well.[82]

The second reason is that as the first wave of globalization started in 1870, foreign trade for crops, gold, and manufacturing products reached a peak. To expand the credit and enhance the efficiency of international trade, the finance bill, a kind of bond borrowing overseas, was most frequently-issued in the summer. It was a way for firms in the US to get financing in Europe. Import and export activities were extensive, secured by different kinds of finance bills. During summer, US firms issued a finance bill to refinance their obligations. When it came to the harvest season, European purchased agricultural goods in US dollars. After that, US firms had to settle the payment of the finance bill. In 1906, it was generally believed that finance bills to the amount of $400 million or $500 million had been drawn in the US. [83]However, due to the restriction of the US finance bill by England, the volume of finance bill in London slashed to $30 million in 1907 summer. Sprague noted that even if the amount of bill in 1907 was relatively small, its expansionary in earlier years indicated the tendency that New York Money Market exhausted the credit resource in every source of credit, both domestic and foreign.

The third factor is the bull stock market from 1904 until the San Francisco earthquake in 1906 induced people to borrow money and invest heavily in the stock market. Under the prevailing speculative sentiment, speculators bought stocks by loans. The rising demand pulled up stock prices, and thereby speculators were driven by optimistic speculation psychology, believing that the rise would continue. There was huge capital demand in the stock market, which accelerated money scarcity in the year of 1906. A large number of people were dissatisfied with small returns but willing to take the risk in high return investment[84]. Meanwhile, the railway and the industrial companies announced their massive demand for the money market. Henry Clew said in 1906, the abnormal need for money in Wall Street and Corporations led to monetary distress.[85]

2.1.3.2 Vulnerable stock market

In the year of 1905, one observer described a "mammoth bull market" running in the New York Stock Exchange. This trend stopped when the unprecedented natural disaster

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[82] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*, John Wiley & Sons Inc, p. 30

[83] Oliver M. Sprague, *History of Crises Under the National Banking System,* Washington: Government Printing Office, 1910, pp. 229-230

[84] Joseph French Johnson, *The crisis and panic of 1907*, The Academy of Political Science, Political Science Quarterly, Vol. 23, No. 3, 1908, pp. 454-467

[85] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*, John Wiley & Sons Inc, p. 16

occurred in San Francisco. Even though the stock market experienced two-year prosperity, its nature was still vulnerable and fragile. Except for the earthquake, a series of events hit the stock market since 1906. The most crucial factor was the government intervention by President Theodore Roosevelt regime.

Theodore Roosevelt was elected to be the new president in the US since 1901 September. He was known as a troublemaker and reformer in the eyes of people in the business. President Theodore Roosevelt accepted large corporations, and he said these companies were indispensable elements of civilization and industrialization. However, he disliked the dangerous mergers and suggested the government set regulations and enhance examination to corporates behaviors. His tirades against market manipulation and monopoly launched attacks on business, threatened the investors. For example, North Securities, associated with J.P. Morgan, was sued in March 1902 due to the "illegal" acquisition of the Northern Pacific and Great Northern railroads. In the following years, President Theodore Roosevelt's government had filed an antitrust action against some smaller concerns—including the Terminal Railroad Association, Otis Elevator, and Virginia-Carolina Chemical. In 1906, he started to attack Standard Oil, which had the largest corporate trust. This company was accused of benefiting from secret rate deals with railroads securities and disadvantaging all America to pay more for kerosene and transportation service.[86]

Theodore Roosevelt's actions raised the alarm widely in this country. The public has shown more concern about the future development of large companies and government policies. Market and investors were susceptible to government policies. The effect chain would be operated like that if the large company was accused of, its stock value would decline. The public lost confidence in the stock market, and no one was going to purchase. As a result, the company faced financing difficulty, all sorts of business involved were suffering. In the end, the economy was depressed.

One specific example of how the Theodore Roosevelt regime threatened the market was the equity crash in March 1907, caused by an investor's fear of Theodore Roosevelt's aggressive actions to railways. During the period of industrial growth, the most apparent characteristic was the rapid increase in coal output and railway transportation capacity. Due to the expansion requirement, the railway companies issued new bonds, and stocks to get public capital. However, one of Theodore Roosevelt's major policy goal was to regulate railroad industry. His regime passed the Hepburn Act in 1906, which gave the Interstate Commerce Commission(ICC) the power to maximize the railroad rate. The act depreciated the value of railroad securities. Except for the aggressive policies, by early 1907, there was the steady progressive tightening of money in New York. To overcome the liquidity shortage, American firms started to sell railroad securities in early 1907. As a result, the phenomenal liquidation

[86] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017, p. 38-47

of railway stock caused equity prices declined sharply, and then led to “Rich Man’s Panic” in March.

Besides the political reasons, a series of shocks hit the stock market in 1907: the stock of Union Pacific fell 50 points; Theodore Roosevelt's government attacked Standard Oil Company drove down the 14.9% stock market within ten days of the trail[87]; in July, the copper market collapsed; in August, the Standard Oil Company was fined $29 million for an antitrust violation. The stock market was fragile due to stock price large decline, money market (gold) shortage and varies aggressive policies by President Theodore Roosevelt by early 1907, the investor were not so confident to the market, and small ripple might cause a significant disturbance. It, in return, added much uncertainty to the bank system, especially these banks that held a large share of assets on collateral-stock loans or directly held stock through call loans.

2.1.3.3 Information Asymmetry

It was evident that information asymmetry played a vital role in the panic of 1907. Information asymmetry between individuals would cause the problem of adverse selection. A better-informed person took advantage of the poor-informed one. The first ones knew negative information, then took action to get their money from banks when reserves were adequate. Some people noticed and feared to be the last one in the queue. Thus they rushed to the banks and followed the wave of withdrawals. On the other hand, the bank information was not transparent. For example, J.P. Morgan knew nothing about the balance sheet performance of other banks. Before providing liquidity support, he had to organize a committee to audit the bank's financial statement. If the bank's performance was known ahead, Morgan might have deployed the rescue actions earlier, stopping the panic contagion.

However, Robert Bruner argued that what matters was not the information asymmetry between banks and Morgan but between banks and the public. Depositors cannot know the asset value of banks and will re-evaluate the risk if they receive incomplete market information. For individuals, it was very costly to examine whether their deposit banks were solvent. A bank run is a straightforward method to examine a bank's solvency, forcing banks to disclose balance sheet performance. Since they did not know which individual bank was unsound, they would withdraw deposits from all banks. As a result, the run spread to the entire banking industry. Charles Calomiris and Gary Gorton said that “The availability of reserves through central bank action would not, in this view, prevent panics.”[88]

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[87] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017, p. 53

[88] Charles W. Calomiris, Gary Gorton, *The Origins of Banking Panics: Models, Facts, and Bank Regulation,* NBER Chapters, in: Financial Markets and Financial Crises, 1991, pp. 109-174

2.1.3.4 The global vulnerable banking system

It was true that the US was not the first market to be threatened by the financial crisis in 1907. The whole financial and economic world faced unusual financial panic. The instability of the global economic environment transmitted the crisis by the flow of foreign trade and gold transport. Several banks runs occurred outside the US in Europe, in Asia, in Africa, in the year of 1907. As Robert Bruner mentioned, the financial distress occurred "in Egypt from January to May; in Hamburg and Chile in early October; in Holland and Genoa in September; in Copenhagen in winter."

There some other abnormal conditions to indicate many countries were suffering the collapse of credit. First, the amount of bond issuing reached a peak in both London and New York, far beyond historical record. Second, most of the countries increased their interest rate to prevent capital from outflowing during the two years preceding the panic of 1907.[89] Table 2.3 illustrates the change in the interest rate in the money market in large European countries or cities.

Country/City	1907 bank interest (Percent)	1906 bank interest (Percent)	1905 bank interest (Percent)	1904 bank interest (Percent)
Berlin	7.5	7	6	5
London	7	6	4	3
Paris	4	3	3	3
Switzerland	5.5	5.5	5	4.5
Denmark	8	6	5	4.5
Vienna	6	4.5	4.5	3.5

Table 2.3 [90]means that different central banks in Europe experienced severe credit strain. For example, the interest rate in the Bank of England increased to 6 percent in 1906. The rate had not reached such high for sixteen years except for the Boer War of 1899 and London panic in 1890. While foreign countries were raising interest rates, without a central bank, the United States could not manage the money supply and prevent capital outflows.

The entire financial world stuck in a mess at the beginning of 1907. In Egypt, piles of shares were unable to sell, and depositors rushed to banks. In Japan, the crisis was four

[89] The reason to cause a global financial crisis: the growth of gold production was unable to catch up with the growth rate of the industry, over-exploiting of credit throughout the industrial world, and the war consumed cash reserve. Related papers: Alexander D. Noyes, *A Year After the Panic of 1907*. The Quarterly Journal of Economics, February 1909, Canadian banks, gold, and the crisis of 1907, etc.

[90] Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, Vol. 23, No. 2, 1909, pp. 185-212

months ahead of the panic in New York. Some banks were forced to suspend in May and June. In Hamburg, the failure of Haller Soehle & Company caused the ripple effect of suspensions of commercial and industrial firms in Germany. In Chile, companies recklessly borrowed loans, the accumulation debt impaired the exchange rate of the peso. The following bank run disrupted the business order. Most of the monetary and financial crisis were induced by the crazy pursue of money and overconfident to the business. Lord Rathmore had said, “People were mad; they seemed to think that every company that came out was worth double its value before it had even started the business.” The crisis indicated the “hoarding panic” for the banking system in the year.[91]

2.2 “The climate change”: deeper cause in economic, social, psychological and ideological perspectives

The possible explanations in "dry forest" are the most direct reasons to cause the panic of 1907 in technical finance perspectives. However, to dig out the more in-depth and thorough roots of this financial disaster, the underlying logic of which elements in "climate change" resulted in the "dry forest" needs to be discussed. Figure 2.5 elaborates backgrounds from economic, social, psychological, and ideological perspectives in the turn of the 20th century, to unveil the underlying truth and provide a more comprehensive answer to this panic.

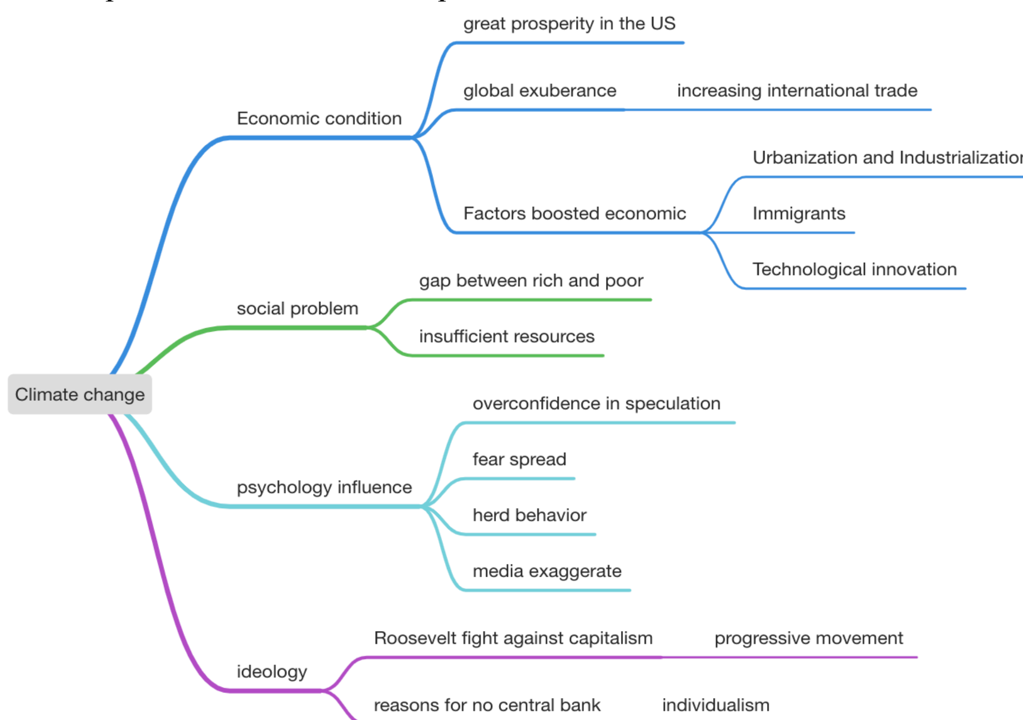

Figure 2.5 shows the "climate change" view of the panic of 1907. From economic perspective, there was a global exuberance. In the United States, urbanization and industrialization facilitated production and transportation. The immigrants from

[91] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*, John Wiley & Sons Inc, p. 142

Europe expanded the labor force in America, and the technological innovation accelerated the manufacturing efficiency. Additionally, the problem of inequality came to the surface. A proportionality of wealth was control by a small group of financiers and businessmen. All these factors explained the over-exploited credit situation discussed in Section 2.1.3.2 and the growth of trust companies. The irrational exuberance made companies, individuals, and banks unwisely borrowed money, neglected the risk management, participated in the speculation. It also created a living space for trusts to provide loans and make a higher profit for the clients. Together with the psychological influence of fear and herd behaviors, the stock market suffered, and the bank run spread to every trust. From the ideological perspective, the long history of no central bank in the United States was associated with individualism, the opposition to the central power. Additionally, through the progressive movement, the recall for equality explained why the Theodore Roosevelt government set restrictions on large companies. The more in-depth explanation of most of the possible causes in "dry forest" could be found in the "climate change." They are interconnected. Their complicated relationship composed the intricate causes for the panic of 1907.

2.2.1 Global economical exuberance

During the beginning of the 1900s, the global world was experiencing a period of rapid economic development. Not only commodity prices and wages rose, but the international foreign trade expanded, and the global cooperation accelerated. In the US domestic market, the GNP grew very fast. The country was transforming into an advanced industrial production center, supported by technological innovation and abundant labor force. However, the recession always follows the overheating prosperity. It is like the nature of the business cycle. Excessive credit expansion eventually led to the economic collapse.

2.2.1.1 Global financial and economic prosperity

The extraordinary prosperity lasted several years before the panic in the whole world. All nations pursued commerce enhancement. They endeavored to build railways and harbors to enhance infrastructure networks, to retrofit factories to expand manufacturing capability, to hire experienced workers to speed up efficiency. It was industrialization and foreign trade age. As a result of trade and commerce increased, the price of raw material and wages also rose. It was evident that the cost of all sorts of commodities increased at a fast growth rate before the panic of 1907. The index of periodically average commodity price throughout the world was 1885 in 1897, and it reached 2136 at the end of 1904 with 2% annual growth rate of preceding seven years As a result of striking enhancement, the index came to 2601in June 1907 with 8% annual growth rate in two hand a half years from 1904 to 1907.[92] With the global economic exuberance, nations strengthened commodity trade based on each

[92] Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, Vol. 23, No. 2, 1909, pp. 185-212

comparative advantage. The global trade volume increased yearly. Table 2.4 indicated the scope and scale of international foreign trade activities

Country/City	Imports 1906 (£ Millions)	Imports 1907 (£ Millions)	increase/decrease (percent)	Exports 1906 (£ Millions)	Exports 1907 (£ Millions)	increase/decrease (percent)
Great Britain	608	651	7.1%	375.7	421.5	12.2%
Germany	417	462	10.8%	312.2	332.2	6.4%
France	209.2	217.2	3.8%	201.7	208.8	3.5%
Austria-Hungary	85.4	80.9	-5.3%	87.5	84.7	-3.2%
Belgium	123	129.6	5.4%	97.6	107.5	10.1%
Italy	97	111.4	14.8%	73.4	75.6	3.0%
Russia	63	69.1	9.7%	106.1	96.2	-9.3%
United States	264.2	292.5	10.7%	359.6	393.8	9.5%

Table 2.4[93] *illustrates the foreign trade import and export data in European countries and the United States. Great Britain was the top 1 import and export country, while the United States took advantage of exports due to a large number of agriculture goods and progressive industrial products.*

2.2.1.1 Great Prosperity in the US until one year before the panic

Return to the home market in the US, the nation's annual growth rate of GNP was 7.3 percent between 1895 to 1906. The size of industrial production also had doubled in this period. At this time, America surpassed Britain and became the top 1 industrial country.[93] Figure 2.6 elaborates how fast GNP increased from 1890 to 1907. It rose from $13 billion to $30 billion in less than twenty years.

[93] Paul Kennedy, *The Rise and Fall of the Great Powers: Economic Changes and Military Conflict from 1500 to 2000*, Vintage Books, 1989

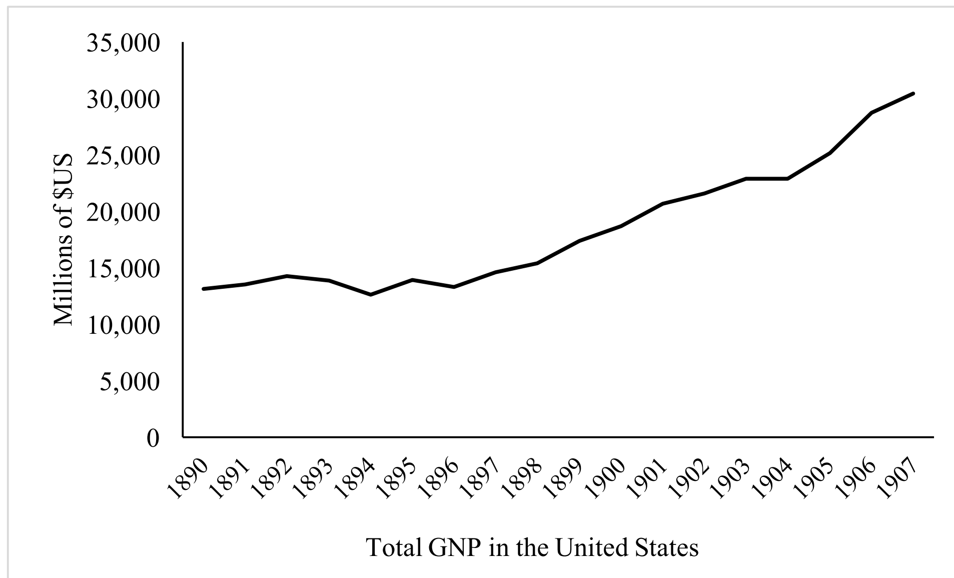

Figure 2.6 shows the total nominal GNP based on the current price from 1890 to 1907[94]

Furthermore, its economic structure was undergoing a considerable transformation, shifting from agriculture to manufacturing. To support factories and infrastructure, capital for fixed plant and inventories in America increased from $2.5 billion in 1895 to $5 billion in 1906. The agriculture price had risen for ten years, which helped farmers to accumulate wealth and payback to their debt. The railways were also expanding constantly.[95] The industrialization in the US boosted business consolidation. A large number of small companies consolidated to super large ones. A few well-known banks financed many of the securities issued by these companies in New York[96]. The rapid economic growth created a high demand for capital.

The rapid economic development of the United States in this period was inseparable from the three factors: industrialization, immigration, and scientific and technological progress. The industrial revolution made the American industry develop from the textile industry to the machine manufacturing industry. The application of energy and machinery significantly promoted the development of social productivity. A series of major inventions in electrical technology have made the United States the premier industrial power. In turn, reliable economic power attracted a large number of immigrants and injected new impetus into industrial production, creating a self-reinforcing upward spiral. In the following part, we describe the more details of the three factors promoting the economy.

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[94] Historical National Accounts, North America data, used the GNP with the current price, https://www.rug.nl/ggdc/historicaldevelopment/na/, updated on 12/03/2020

[95] Oliver M. Sprague, *The American Crisis of 1907*, The Economic Journal, Vol.18, No.71, 1908, pp. 353-372

[96] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, pp. 7-9

In the late 19th century, the United States entered a historical period of transition from an agricultural country to an industrial nation, and its social activities gradually shifted from rural to urban. The industrialization has promoted the development of cities and provided material and technical support for the transformation of city appearance. In turn, large cities where most labor forces lived offered the human capital for industrial production. Arthur Meier Schlesinger, the most influential historian in the twentieth century, underlines that urbanization is vital to American industrialization in his book *"The Rise of the City,*1878-1898."[97]

In 1894, the American industrial output was equal to that of European countries.[98] By 1900, the total industrial production of the United States accounted for about half of the world's industrial output. Cities and factories started from the northeast along the Atlantic coast, such as New York and Boston. Due to railway development of the west, the continued industrialization created cities in the central and western regions. Most cities became centers of modern industry. As Table 2.5 shows, the urban population increased rapidly since the late 19th century.[99] In 1890, one in three people in the US lived in a city. Until 1920, the number of urban population was the same as that in the rural area. [100]

Table 2.5A Rural and Urban Population in the United States,1860-1910

Year	Rural Population	Urban Population	Urban Population as a percentage of the U.S. Population
1860	25,226,803	6,216,518	19.8%
1870	28,656,010	9,902,361	25.7%
1880	36,059,747	14,129,735	28.2%
1890	40,873,501	22,106,295	35.1%
1900	45,997,336	30,214,832	39.6%
1910	50,164,495	42,064,001	45.6%
1920	51,768,255	54,253,282	51.2%

Table 2.5B Population of Major Cities in the United States,1860-1900

[97] Arthur Meier Schlesinger, *The Rise of the City, 1879-1898 (Urban Life and Urban Landscape),* Ohio State University Press, 1999

[98] Michael George Mulhall, *Industries and Wealth of Nations*, Longmans, Green, and Company, 1896

[99] Urbanization and its Challenges, https://courses.lumenlearning.com/atd-hostos-ushistory/chapter/urbanization-and-its-challenges/ Original Data Source: Bureau of the Census

[100] In 1900, the population in New York surpassed three million, which made it become the second-largest city in the world when the first largest one was London.

City	Population in 1860 (thousand)	Population in 1880 (thousand)	Population in 1900 (thousand)
New York	1,175	1,912	3,437
Philadelphia	566	847	1,294
Boston	178	363	561
Baltimore	212	332	509
Cincinnati	161	255	326
St.Louis	161	350	575
Chicago	109	503	1,698

Table 2.5A[99] lists the rural and urban populations in the United States. In 1860, only 20 percent of citizens lived in cities while the ratio increased to 50 percent in 1920. There are two reasons for urban population growth. One is domestic population transfer from rural areas. Another is immigration from foreign countries. Table 2.5B shows in most large cities in the United States, the population in 1900 was two or three times that of 40 years ago.

The second important factor is the fast growth of immigration. Immigration was an essential reason for the growth of the US population. From 1840 to 1914, 24 million immigrants came to the United States. Most of the immigrants stayed in the cities in the Northeast and mid-west regions, where there were many employment opportunities and immigrants composed of more than 70% of the total number of the city population. [101]From 1898 to 1907, except for a slight reduction in 1903-1904. The number of immigrants increased every year, reaching 1 million for the first time in 1905. In the following two years, the number of immigrants received kept constant. Figure 2.7 shows the growth of immigrants numbers flowing into the United States every ten years from 1850 to 1910.[102]

[101] Herbert G. Gutman, *Work, Culture and Society in Industrializing America*, Basil Blackwell, 1976, p. 40

[102] US Immigrant Population and Share over Time, 1850-Present https://www.migrationpolicy.org/programs/data-hub/charts/immigrant-population-over-time Source: Migration Policy Institute (MPI) tabulation of data from US Census Bureau, updated on 20/04/2020

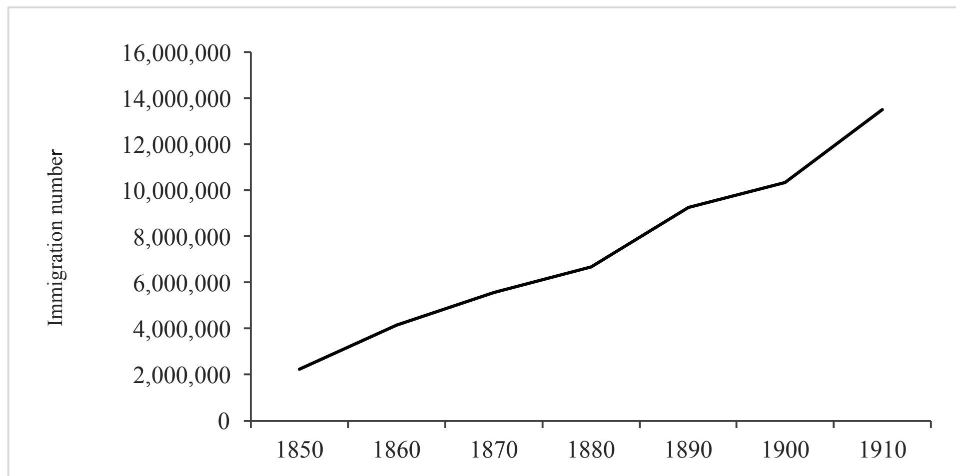

Figure 2.7 [102]*llustrates how many immigrants went to American in the late 19th century. Since 1860, more than 10 percent of the US population came from immigrants. This percentage reached a peak from 1890 to 1910 when it was the hot wave to immigrate from Europe to the United States.*

As of 1910, half of the American population were descendants of European immigrants who entered the United States in 1790. Since most of the immigrants were young adults, large-scale immigration caused the growth of the American labor force to increase rapidly. We could say that immigrants were inseparable from the American industrialization process.

The third contributing factor to the economy is technological innovation. In the 1900s, technological progress not only enhanced residents' living standards but boosted business development. By the end of the 19th century, the United States had developed new processes and products that were more advanced than those in the UK in most industries[103], especially in steel, coal, machinery, and electrics sectors. Robert Shiller had quoted articles in Boston Post that "trains [will be] running at 150 miles per hour, . . . newspaper publishers will press the buttons, and automotive machinery will do the rest, . . . phonographs as salesmen will sell goods in the big stores while automatic hands will make the change".[104]

The rise of American industrialization highly depended on railway expansion and the massive demand for energy in the form of electricity. Jeremy Rifkin, an American economist, explained that every great economic success must include the three elements: communication media, energy, and transportation.[105] These three elements converged

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[103] Chris Freeman and Francisco Louca, *As Time Goes By: From the Industrial Revolutions to the Information Revolution*, Oxford University Press, 2002

[104] Robert J. Shiller, *Irrational Exuberance, Chapter 5 "New Era Economic Thinking*," Princeton University Press, 2000, pp. 100-102

[105] Jeremy Rifkin, *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism,* St. Martin's Publishing Group,

in the nation in the late 19th century. The rapid growth of railway mileage and transportation capacity not only provided a broader market, but also the railway itself was a sector with very rapid technological changes. The replacement of steel rails, more robust locomotives, and more efficient freight cars, as well as new products and technologies such as automatic couplers, were widely adopted in the railway sector. The extensive use of telegraph and telephone accelerated information spread, which played an essential role in enhancing railway transportation efficiency, reporting business intelligence, and transmitting weather forecasts. Thanks to the development of technology, multiplex, the two-way telegraph system eventually established.

Also, it was a golden age for independent inventors at the beginning of the 20th century. American entrepreneurs were good at developing efficient technologies, expanding industrial processes, and innovating machines and production systems. Companies began to establish their own experiment laboratories. The patent system had further promoted innovation.[106] A large number of products such as airplanes, telegraph machines, and fax machines were first invented and then commercialized in the United States. Figure 2.8 summaries the number of utility patents (inventions) from 1853 to 1915 in America.

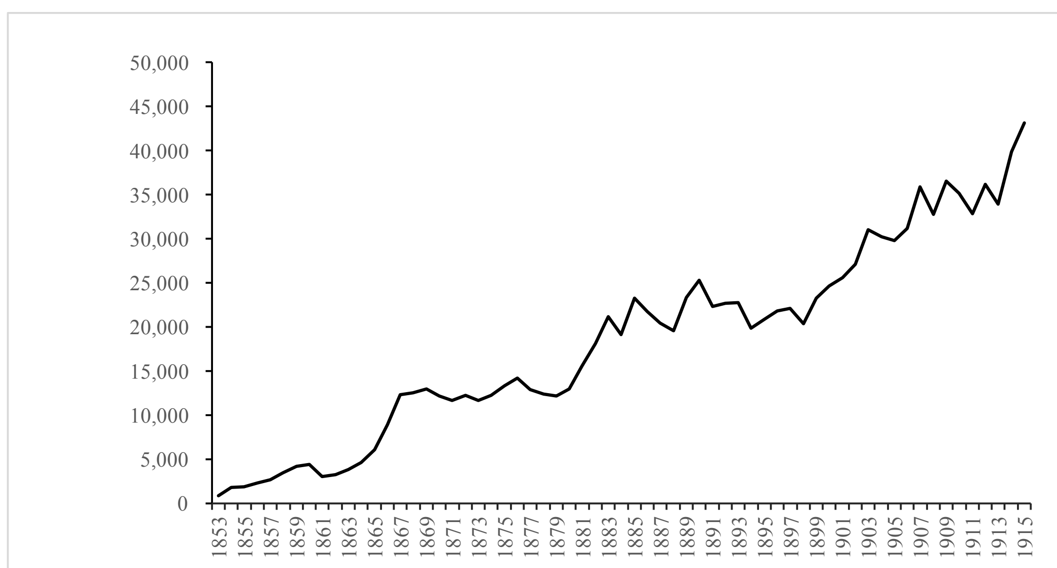

Figure 2.8 shows the explosive growth in the name of US utility patents started from the mid of the 1850s. In 1853, the number granted US utility patents was 846, while it came to 21,160 in 1883 and 33,915 in 1913.[107]

2014

[106] Stanley Engerman and Kenneth Sokoloff, *Technology and Industrialization, 1790-1914*, Cambridge University Press, 2000

[107] US Patent Activity Calendar Years 1790 to the Present, https://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.htm Data updated on 04/20/2020

However, the fast growth in the economy is not always good news. Countries that experienced financial panic have more rapid economic growth than the countries grow steadily.[108] The economists, John Keynes and Joseph Peter also propose that the recession followed the economic booms and bubbles.[109] The expansion and contraction of the credit cycle for companies and individuals is a trigger for an economic recession after an overheat business period. During the economic booming time, companies, eager to make a profit, and satisfy customer's needs, undertake excessive-high leverage ratio. Some banks unwisely lend to less creditable companies without careful due diligence process. The expansion of risky loans threatens banks that lack available reserves when unpredictable external shocks come. To reduce further loss, they contract loans to businesses, which leads to capital chain break, factories shut down, and consumption slump.

As Hyman Minsky observed, “Stability is destabilizing”.[110] The nature of instability is linked to the the relation between asset and investment in the business cycle. It seems the inevitable cycle. Economic prosperity and development triggered credit expansion, and excessive credit expansion caused people to be irrational, speculatively overheated, and formed asset bubbles. Once the debt exceeded the debtor’s income or there was any market shock, the credit market became exhausted, banks and lenders tightened the credit, and a large number of assets were sold due to liquidity shortage, which triggered the financial crisis

2.2.2 The social problem existed in the United States

Changes brought prosperity to American society, but a series of social issues as well. It is the dilemma that many countries in transition have to face. There were two main problems in American society. One was the uneven distribution of wealth. Although many millionaires had been created in this era, wealth still concentrated in the hands of a few people. The story of changing from a civilian to a rich person inspired many poor people to speculate, causing a frenzy in the capital market. The other was a lack of resources. Excessive urbanization made public resources unable to meet the needs of the urban population.

First, in the late 19th century, various stories about wealth staged in the United States. Many financial oligarchs and industrial giants accumulated enormous wealth; however, the ordinary faced high pressure in survival. There were billionaires like Carnegie and Morgan, while others were struggling in slums. This polarization was the real portrayal

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[108] Frank Westermann, Romain Ranciere and Aaron Tornell*, Systemic Crises and Growth*, The Quarterly Journal of Economics, Vol. 123, No. 1, February 2008, pp. 359-406

[109] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p. 158

[110] Randall L. Wray, *Why Minsky Matters, An Introduction to the work of a Maverick Economist*, Princeton University, 2016

of America in the early 20th century. With the acceleration of monopoly, the gap between the rich and the poor became more extensive. The number of poor people per million people in 1880 was 66,203, and it increased to 73,045 by 1890.[111] Also, due to high-speed and large-scale industrial production, the urban population's income had significantly increased compared to farmers.

As a result of a flood of immigrants and explosive population growth, urban housing shortages, inadequate public facilities, and lack of education and medical resources were the main problems in American cities. These situations accompanied by an increase in the crime rate of people. According to statistics, in 1890, areas with more new immigrants and more developed industries, had higher crime rates.[112] Moreover, due to the rapid expansion of industrialization but the lack of educational resources, workers in many factories were unable to receive training, and their acquired skills could not meet the job requirements so that many incompetent could hold places.[113]

These problems arising from rapid industrialization and urbanization seem to be inevitable. It is described here only to show the background of the times, as a supplementary explanation. In the following section, more details of those periods will be exposed.

2.2.3 Psychology influence to the panic of 1907

The previous analysis tried to explain this crisis from all perspectives, but did not consider the most critical factor, people. In the assumptions of various economic models, people will always make rational choices. However, this is not the case. It is inaccurate to use traditional financial theory to explain this crisis. We must take into account behavioral economics and explain from a psychological perspective of how human behavior caused this crisis to occur and spread. Why did people fanatically speculate? Why did they rush to the bank for withdrawals? How did the two emotions of greed and fear game in different scenarios?

Robert Shiller, the Nobel Prize in Economics winner in 2013, a Sterling Professor of Economics at Yale University, had written “the first decade of the twentieth century came to be called the Age of Optimism, the Age of Confidence, or the Cocksure Era.” in the book “*Irrational Exuberance*.”[114] He pointed out that new centuries would bring new people extraordinary hopes and expectations, which inspire them to be very optimistic about everything. People always read stories of "the ordinary became a

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[111] *Census of Population and Housing*, 1890 Census, Washington DC, 1896, p. 267

[112] *Report on Crime, Pauperism and Benevolence in the United States*, Census of Population and Housing, 1890 Census, Washington DC, 1896

[113] George Barnett, *State Banks and trust companies since the passage of the National-bank act*, Washington: Government Printing Office, 1911, p. 239

[114] Robert J. Shiller, *Irrational Exuberance, Chapter 5 “New Era Economic Thinking*," Princeton University Press, 2000

millionaire" in the newspaper. The public immersed in the wealth dreams blindly believes the continuous economic booms. Daniel, Hirshleifer, and Subrahmanyam argued that the overconfidence came from that people overestimated the precision of their private information but underestimated the forecast errors and ignored the public signals.[115] If people find favorable information on their analysis, their overconfidence would lead them to push up asset prices and participate in speculation activities.

At the turn of the 20th century, individuals actively participated in the speculation in the stock market, heavily purchasing stocks instead of saving. Business people no longer evaluated the nature of business objectively, but focused overly on the annual enhanced profit and revenue, making every effort to expand production. Besides, the speculative excitement in the stock market inspired them to borrow more money since there was a belief that the experience in the 20th century proved that economic growth would not turn downward. Charles Kindleberger argued more confidence expectation to the prosperity seduces investors to purchase risky stocks, and banks provide risky loans based on optimism environment. The fever of speculation gradually evolves into uncontrolled mania.[116]

This overconfidence sentiment was not only confined to the only community, the US, but spread fairly worldwide. Excessively rapid growth made people irrational. Due to the rapid growth rate in the US, Europe, investors were overly confident. They kept transferring money to support American corporations, even though political policies were in less satisfactory nature. For example, after the Hepburn Act[117] was initiated to restrict the railway industries, instead of drawing out capital from the US, European funds were shipping money to railway operators in Wall Street because of the excess of confidence in American economics. They did not realize the potential detriment through President Theodore Roosevelt's activities. During the summer of 1906, the American market borrowed unprecedented quantity to speculate for the rise of railway shares. It seems that the whole world fell into the irrational pursuit of wealth without rational thinking.

When the panic occurred, fear beat greed. G. C. Selden wrote in *The Psychology of the Stock Market*: “The memory of the events of 1907 undoubtedly operated greatly to lessen the volume of speculative trade from that time to the present…During the ensuing decline, more and more people feel uneasy over business or financial condition, and they liquidate their holdings. This caution of fearfulness gradually spreads,

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[115] Kent Daniel, David Hirshleifer, and Avanidhar Subrahmanyam, *Investor Psychology and Security Market Under- and Overreactions*, The Journal of Finance, Vol. 53, No. 6, 1998, pp. 1839-1885

[116] Charles P. Kindleberger and Robert Z. Aliber, *Manias, Panics, and Crashes: A History of Financial Crisis (Fifth Edition),* John Wiley & Sons, 2005, pp. 40-43

[117] The Hepburn Act was a federal law gave Interstate Commerce Commission the power to set maximum railroad rates, canceled free riders for privileged persons, railway companies were not allowed to operate other businesses

increasing and decreasing in waves…"[118] The effect of the panic of 1907 was not limited to a temporary bank run but even more critical in a continuous economic downturn. The individuals worried that their asset value would collapse, and therefore sold their holdings. Banks feared the borrower's default, and then contracted credit and refused to lend. Individuals lowered their expectations to future economic growth, preferred to save rather than consume.

During the panic of 1907, anxious depositors crowded in the front doors of trust companies and lined up even to the sidewalk, looking forward to getting their money back. However, some of them did not know what happened. They just took the opinions or behaviors of others as a reference for their practice, which is called herding in social psychology when people desire to get the right information. If there is no objective authority standard for comparison, they often follow the majority, which is a sub-optimal method to reduce the risk of personal decision-making.[119]

The herding behavior not just appeared between the crowded depositors but also other areas. First, due to the low reserve ratio requirement and fewer restrictions, trusts gained attractive profits in providing short-term financing, which stimulated the explosive growth of the number of trusts. On the other hand, National banks also developed this market, actively bought trusts, or established subsidiary trusts to involved in the securities business. In this process, the financial industry completely ignored the basic principles, but all for profit pursue. Second, for individuals or corporations, they read stories about fortune won by speculation from the ordinary people. To mimic this success, they mostly borrowed from banks or trusts to speculate in the stock market or expand production but significantly underestimate their credit tolerance. Every investor chased high returns but ignored the characteristics of high risk. During this booming period of the market, ordinary investors continued to herd, and the bubble in this market also grew more substantial. We can say that herd behavior played an essential role in the formation of this century's great crisis.

Besides, media was also a contributing factor to influence people's psychology. Newspaper overly described the bank run in the past. Two years before the panic, the public had little knowledge about a bank run. In 1905, the media started to pay attention to how currency was created and managed in the banking system. The journalist showed how many times loans were exceeding the cash holding in banks and how helpless the public is in a bank run[120]. Thus, during the fear, if the public read the horrible situation described in the newspaper, when the crisis occurred, they would be very panicked.

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[118] G. C. Selden, *The Psychology of the Stock Market*, Ticker Publishing Company, 1912, pp. 87-89
[119] Andrea Devenow and Ivo Welch, *Rational Herding in Financial Economics*, European Economic Review, Vol. 40, No. 3-5, 1996, pp. 603-615
[120] Joseph French Johnson, *The crisis and panic of 1907*, The Academy of Political Science, Political Science Quarterly, Vol. 23, No. 3, 1908, pp. 454-467

The above analysis explains how human emotions changed with the environment. When the economy was overheated, people were overconfident in economic development, and greed ultimately overcame fear. When the crisis just happened, people acted like living on a razor's edge, selling many stocks, running a bank, terrified of losing money.

2.2.4 Ideology: progressive movement and individualism

The following description focuses on explaining from an ideological point of view, on digging out deeper of the possible causes mentioned in "dry forest." This section talks about the reasons why Theodore Roosevelt regime was so unsatisfied with oligarchs and issued a series of policies to restrict its development, and why other countries in Europe had established a central bank. In contrast, the United States had a long history without the central bank.

Progressives were active in the turn of the 20th century in the US. It began in the 1890s and lasted until 1920, which started from reflection on the issues brought by the rapid growth in industrialized American society. It was also the first movement that widespread in the nation, reached to every town and every city. The core principle of the progressive movement was to create "a more morally perfect society." McCormick wrote in his book:

"Angry farmers demand better prices for their products, regulation of the railroads, and the destruction of what they thought was the evil power of banks, middleman, and corrupt politicians. Urban residents crusaded for better city services, more efficient municipal government, and sometimes the control of social groups whose habits they hated and feared. Members of various professions, such as social workers and doctors, tried to improve the dangerous and unhealthy conditions in which people worked and lived. Businessmen, too, lobbied incessantly for goals which they defined as reform".[121]

A diverse group of reformers called for protection from the government to resist those who obtain self-interest at the expense of common benefit. Just as political corruption was particularly rampant in the Gilded Age.[122] In the 1900s, a series of political-business crimes were revealed publicly by media. Businessmen bribed governors; in turn, legislators enacted bills in favor of business and used the "dirty money" to strengthen their political position. For example, in New York, the truth was uncovered that a life insurance company had a long-term improper relationship with Republic

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[121] Richard L. McCormick, *The Party Period and Public Policy American Politics from the Age of Jackson to the Progressive Era*, Oxford University Press, 1989, pp. 263-280

[122] The Gild Age, named by American writer Mark Twain's novel, The Gilded Age: A Tale of Today. The author mocked political corruption in Washington DC at that time and exposed unscrupulous capture of wealth by monopoly giants.

politicians. In San Francisco, several politicians were accused of selling privileges to public utility corporations. Moreover, the election campaigns in Alabama and Georgia were suspicious of being controlled by the railroad corporations.

The public's concern about the influence of monopolies and oligopolies might be abused for politics end surged. They were reluctant to see the existence of large corporations as they worried these companies would sacrifice the consumers' benefits for investors' gains. President Theodore Roosevelt, one of the progressive politicians in this movement, stood out and spoke for reformers. He applied his power to oppose monopoly and mediate the conflict.

On the other hand, public distrust sentiment of central political control of the banking system could be traced back to 1791 when the first national bank in the US, First Bank of United States, was established and closed within only 20 years. In a multi-interest society, the difficulty in unifying the interest of each stakeholder manifested the failure of central bank establishment. Besides, one of the American cultural traditions is individualism, which emphasizes individuals and strongly opposed state and government intervention. Individualism has the characteristics of anti-control and oppression. Moreover, therefore, the public vehemently opposed to the central bank. In 1816, America, eager to tackle the war debt,[123] created the Second National Bank of the United States. However, the bank was suspicious to only serve in developed regions, and the wealth, and thereby was forced to shut down in 1836. In later 70 years, any central bank reformation plan, as long as it involved the establishment of the central bank, was opposed by the American public and failed.

2.3 Trigger of this panic and what happened

America's obsolete banking system, unreasonable global credit expansion, and fragile financial markets had long been like the dry forest. The financial crisis originated from systemic vulnerability. It is the result of complicated abnormal economic, social, or also psychological and ideological factors as described above. In the following, we will look at the spark to ignite the dry forest to describe what happened in October 1907. The trigger was a copper stock speculation failure.

On October 16, 1907, two speculators, Augustus Heinze and Charles W. Morse, failed in the attempt of cornering[124] the stock of United Copper, a mining company. As a result, banks and stockbrokers who involved in and financed this speculation suffered a lot. Augustus Heinze, a copper magnate, and Charles W. Morse[125], a Wall Street

[123] The War of 1812, the Second war of independence, was between the United States and Great Britain, the first foreign war after the American independence

[124] Someone attempts to manipulate the market price, since he has significant control of the stock, the commodity or the asset

[125] Charles Morse was actively engaged in industrial and banking sectors and had long been regarded as a distrusting person due to his speculation and manipulation activities.

banker, were responsible for this failure. The two men together gained control of some financial institutions that included at least six national banks, ten or twelve state banks, and five trust companies, and four insurance companies.

This idea origniated from Otto Heinze, the brother of Augustus Heinze. He monitored extraordinary outstanding shares of United Copper Company were trading in the market, and guessed that securities brokers were secretly loaning out their shares to traders, who expected the stock price would fall.[126] And Otto Heinze believed his family took control of the majority shares of United Copper. As long as they purchased a large number of remaining shares in the market, the price of the stock would be driven up, and thereby attracting more short sellers. When they called back their shares, speculators had no option but to purchase the shares from the Heinze brothers to return the borrowed shares. Figure 2.9 and Figure 10 illustrates the relationship among the Heinze brothers, brokers and short sellers.

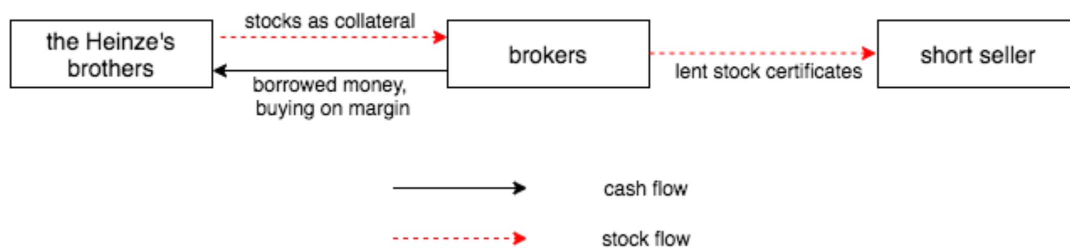

Figure 2.9 [126]shows that the Heinze brothers purchased the stock by money borrowed from brokers (buying on margin), and used the shares as collateral for loans. Since the broker had the certificates of the stock, they could lend the shares to the short seller.

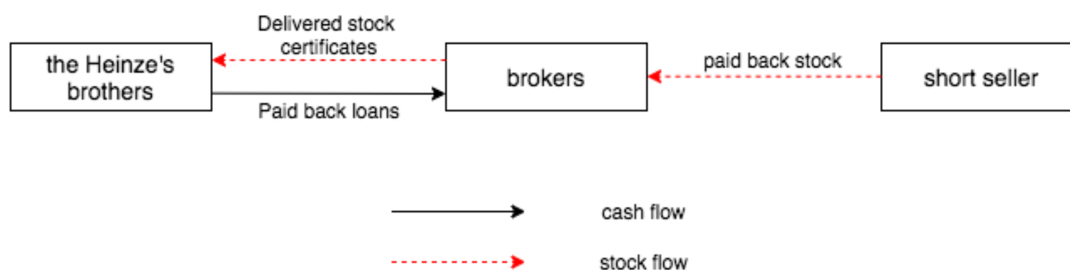

Figure 2.10 explains when the Heinze brothers issued the call for their shares, they got the certificates of the stocks from brokers and the brokers had to be paid for the loan. If the shares lent to short sellers were not able to return back timely to the brokers. The brokers would default in their deliveries to the Heinze brothers.

The New York Clearinghouse had investigated him as early as 1902 for his misconduct.

[126] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, p. 43

In the following days, Otto Heinze bought significant shares. On October 14, the stock of United Copper rose to $60 in the morning, nearly $23 higher than the previous close price. On the next day, the Heinze brothers issued the call, asking the brokers to return their stocks. However, there were plentiful shares available in the market. The brokers successfully responded to the call. And they were producing so much stock that the Heinzes refused the deliveries. Thus, the brokers, unable to transfer stock to Heinzes, had to sell the shares on the market, which drove down the share price to $10. The corner failed.

The corner failure first caused some financial institutions, directly associated with Augustus Heinze, to suspend all businesses . For example, Gross & Kleeberg[127], Otto Heinze & Co., and the Butte State Savings Bank closed. On October 18, the New York Clearing House agreed to support Mercantile National Bank, whose president was Augustus Heinze. During the copper corner, Mercantile National Bank had helped to clear the checks written against the Otto Heinze & Company's account. However, the prerequisite to offer help was the resignation of the entire board of Mercantile National Bank. On the next day, Morse's banks faced significant withdrawals. The New York Clearing House agreed to aid at the price of the resignation of Morse from any bank he served.[128] Meanwhile, other banks unrelated to the Heinzes, showed increased reserves, indicating depositors were shifting their money to relatively solvent banks.

The run on the Knickerbocker Trust accelerated on October 21. Charles T. Barney, the president, was forced to leave the Knickerbocker Trust due to his "association" with Morse. In fact, the Heinze brothers and Charles Morse asked for help from Charles T. Barney before the corner to raise fund. However, Charles Barney refused their request, because the amount they needed was too huge to support. The run on the Knickerbocker Trust was because Charles Barney and Charles Morse were closely connected. Barney served as director of Morse's National Bank of North America and the New Amsterdam National Bank. He also was a board member of Morse's American Ice Company. Even, the Knickerbocker Trust held sizable shares of Morse's Company. Besides, a series of bad news came. The National Bank of Commerce ended the clear service for the Knickerbocker Trust. The New York Clearing House and J.P. Morgan also refused to support the Knickerbocker Trust.[129] These actions made depositors ultimately lose confidence. The Wall Street Journal reported that "The worst and most dangerous feature in the view of Wall Street was the alarm among the public." [130]

[127] Gross & Kleeberg was a brokerage house who represented the Heinzes to purchase United Copper stock in the corner

[128] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017, p. 83

[129] Carola Frydman, Eric Hilt and Lily Zhou, *Economic effects of runs on early "shadow banks": Trust companies and the impact of the panic of 1907,* Journal of Political Economy, University of Chicago Press, Vol. 123, No.4, 2015, pp. 902-940

[130] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the*

On October 22, the terror spread among the public. Hundreds of depositors were anxious to withdraw their deposits in the Knickerbocker Trust. It recorded that $8 million in cash, a large fraction of their reserves, was taken away in three hours. The Knickerbocker Trust was unable to stand a large number of withdrawals and was forced to close doors. [131]Due to the suspension of the Knickerbocker Trust, other trusts also experienced a run. Among them, Trust Company of America and Lincoln Trust Company suffered the most. Also, the panic spread to other cities, many interior institutions and depositors came to New York to withdraw their deposits, which made the money market in New York further worse. In the evening, J.P. Morgan conferred with George Baker, the president of First National Bank, James Stillman of the National City Bank of New York, and the United States Secretary of the Treasury, George Cortelyou, to decided how to raise fund to support trust companies.

On October 23, J.P. Morgan offered a loan to the Trust Company of America after examining its balance sheet for solvency and receiving securities as collateral. Even though, $12 million was paid to depositors on this day[132]. Meanwhile, J.P. Morgan coordinated the presidents of trust companies in New York. And then a trust committee was established to make the account examination of the trusts which faced run. Under the help of J.P. Morgan and temporary trust committee, a large amount of cash was raised. The Trust Company of America was survival in the run. The next day, to increase the money supply, George Cortelyou, the United States Secretary of the Treasury, deposited around $25 million into New York Clearing House national banks. In comparison, John D. Rockefeller deposited $10 million in Stillman's National City Bank and promised an additional $40 million.

On the other hand, the bank run further weakened the stock market. Investors and speculators were urgently selling their shares due to the expectation of continuing collapse in the stock market. However, there were not enough buyers of the shares sold. Also, to meet withdrawal needs from depositors, trusts called loans from brokers, which further rose the loan interest. As a result, many stockbrokers and investors became bankrupt. Call loan interest spiked to 100 percent as the trust was pulling their money out of the market. To prevent the New York Exchange close and restore the public confidence, J.P. Morgan organized the presidents of banks to raise at least $25 million, increasing liquidity and maintaining the call money loan in the stock market.

On October 25, a money pool of $10 million formed on the same purpose. J. P. Morgan realized that the endless fundraising was not the way to stop the panic since the accumulated cash was not enough to solve the money shortage. And therefore, he arranged media to disseminate the information, restoring public confidence that the

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Market's Perfect Storm, John Wiley & Sons Inc, p. 79

[131] Ellis W. Tallman, *The Panic of 1907*, Working Papers (Old Series)1228, Federal Reserve Bank of Cleveland, 2012

[132] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017*,* p. 99

financiers were trying effort to save the market. He also asked clergy to calm down the anxious public, encouraging them to put cash in the bank instead of withdrawing.[133]

To provide more liquidity in the market, on October 26, the New York Clearing House Committee agreed to establish a Clearing House Loan Committee, issuing $100 million certificates to increase the money supply. Initially, J.P. Morgan disagreed with the idea, since he believed the action was a signal representing the situation was extremely disastrous. However, the state of affairs suddenly deteriorated, J.P. Morgan had to persuade banks in New York to accept the clearinghouse loan certificates as urgent currency for clearing. Sprague criticized that the delayed loan certificate was the most severe error during the panic. It could have been issued two or three days earlier, as the earlier issue certificate was able to calm down the public and provide support for more banks. Two days later, George McClellan, New York City Mayor, asked for Morgan's help, saying the panic caused European investors to withdraw money from America, and the city was unable to meet its all obligations. J. P. Morgan, George Baker, and Jamnes Stillman agreed to raise the $30 million the mayor needed.

On November 2, Saturday, the crisis of Moore & Schley, one of the largest brokerage firms in New York, threatened the financial systems. It borrowed money from plenty of banks and trusts, using stocks of Tennessee Coal, Iron & Railroad Company (TC&I) as collateral. Under the current circumstance, creditors were urgent to call their loans to increase available cash and liquidate the shares in the stock market. The stock of TC&I was not liquid; large number of shares sold would lead to the price crash. To prevent another wave of panic, J.P. Morgan coordinated the rescue of TC&I and Moore & Schley. He contacted US Steel, the largest steel producer, and proposed the acquisition plan to take control of TC&I. With the consent by Present Theodore Roosevelt of this acquisition, the board of US steel approved the deal that it would exchange its gold bond for the shares of TC&I. Eventually, the stock market was rescued; the price of shares went upward on the next Monday.[134]

Withdrawals abated from November 6 when the committee of trusts presidents announced they had controlled most shares of the Trust Company of North America and another trust company.[135] On the day, $7 million gold shifted from London arrived in New York.[136] In the process of panic rescue, to raise money, J.P. Morgan and his colleagues persuaded, ordered, even threatened the presidents of trusts and banks. A batch of bankers worked overnight to gather information, check banks' balance sheets, and release signals to restore public confidence. Thanks to their efforts, the New York

[133] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, pp. 104-107

[134] Robert F. Bruner and Sean D. Carr, *The Panic of 1907: Lessons Learned from the Market's Perfect Storm,* John Wiley & Sons Inc, pp. 115-135

[135] Oliver M. Sprague, *The American Crisis of 1907*, The Economic Journal, Vol.18, No.71, 1908, p. 352

[136] Martin S Fridson, *It was a Very Good Year: Extraordinary Moments in Stock Market History*, John Wiley & Sons Inc, 2000, p. 8

financial market successfully prevented the large-scale spread of bank run.

However, this panic still brought some adverse effects on economic development. From 1907 to 1908, the nominal gross national product fell more than 11% ; commodity prices slashed 5%.[137]All kinds of indicators showed that this was one of the most severe economic contractions in American history since 1879. Plenty of corporations closed doors; many workers lost jobs. The manufacturing sector suffered the most. Cleveland indicated in the event of a financial crisis, even for reputable companies, if they failed to get the support of bank credit for their due debts, they were in trouble. However, in the crisis, the vast majority of banks would encounter the loss of deposits, making it impossible to expand the loan for companies.[138] *Economist's* index number of Commodity prices[139] decreased from 2,601 in the middle of 1907 to 2,168 at the end of August 1908, nearly 21% decline.

Consumption declined for months, which led to the falling price of raw materials. The foreign trade shrank 25% in one or two months after the panic. The Commercial and Financial Chronicle wrote that "It is probably no exaggeration to say that the industrial paralysis and the prostration were the very worst ever experienced in the country's history."[140] Within one year, from the end of 1906 to the end of 1907, the Dow Jones Index decreased by 38%. Stocks in the railway sector lost 32%.[141]

2.4 Remediation measures after the panic

The emergence of this crisis made all sectors of American society aware of the shortcomings of the banking industry and called for thorough banking reform. The federal government also began to investigate and deal with the problems exposed during the crisis. The most striking reforms were the enactment of The Aldrich-Vreeland Act, the establishment of National Monetary Committees, and the establishment of the Federal Reserve.

The panic of 1907 was an essential and unprecedented event to stimulate the establishment of the Central bank system in America. Before that, bank reformation focused on authorizing each bank to issue currency backed by its general assets, solving

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[137] Milton Friedman and Anna Jacobson Schwartz*, A Monetary History of the United States*, 1867-1960, Princeton University Press, 1963, p. 107

[138] Harold B. Cleveland and Thomas F. Huertas, *Citibank: 1912-1970*, Cambridge, Harvard University Press, 1985, p. 48

[139] Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, Vol. 23, No. 2, 1909, pp. 185-212

[140] Kevin J. Cahill, *The US Bank Panic of 1907 and The Mexican Depression of 1908-1909,* The Historian, Vol. 60, No. 4, 1998, pp. 795-812

[141] Martin S. Fridson, *It Was a Very Good Year: Extraordinary Moments in Stock Market History,* John Wiley & Sons Inc, 2000, p.3

the problem of currency inelasticity.[142] The panic of 1907 directly promoted the establishment of the National Monetary Commission, triggered an investigation of currency trusts, and ultimately helped the establishment of the Federal Reserve System.[143]

There are some underlying reasons explaining the special historical meaning of this panic. First, before 1907, the financial crisis was caused by national banks, which could be solved by the cooperation of bank members in the Clearing House Association at the very beginning of the crisis. However, the panic of 1907 was initiated by trust companies in New York. Clearing House had no responsibility and experience to save non-membership financial intermediaries. Private bankers in the city of New York had to organize and take joint action to save the banking system. Second, the reformation of the banking system was more than the topic within bankers, economists but the focus of the public. The public started to mistrust the rationality and safety of existing mechanisms in banks which resulted in this panic. Therefore, people called for strengthening the authority of the financial supervision of the federal government. The reformation was the only way to maintain financial stability. Lastly, New York bankers altered their opinion to the central bank that they used to resist since New York was the financial center, and they preferred to operate under the long-existing regulations of the Clearing House Association. The panic caused by the trust company made them feel the risk of the absence of a central supervision of the banking industry. Few large banks were capable of playing the role of lender of last resort. Only by the national legislation of the creation of the central reserve system, the fundamental problem would be solved by incorporating state banks and trusts into a unified regulatory regime.

On May 30, 1908, the government passed the Aldrich–Vreeland Act in response to the Panic of 1907. As an emergency measure for the panic, the Act required banks to establish a reserve alliance to guarantee the supply of funds in an emergency temporarily. The US also established the National Monetary Commission, chaired by Nelson Aldrich, who played an essential role in the creation of Federal Reserve to study banking and currency reformation. Nelson Aldrich led the study of the American monetary system and central-banking system in some European countries.[144]

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[142] Elmus Wicker, *The Great Debate on Banking Reform*, Ohio State University Press, 2005, p.1

[143] Jean Strouse, *Morgan: American Financier*, Random House Publishing Group, 2014

[144] Wikipedia, history of the Federal Reserve System
https://en.wikipedia.org/wiki/History_of_the_Federal_Reserve_System#The_National_Monetary_Commission,_1907-1913

During the 1912 election, Woodrow Wilson, newly elected president, was committed to banking and currency reform, and he believed Aldrich Plan was 60-70% correct.[145] Based on the Aldrich Plan, Carter Glass, chairman of the House Committee on Banking and Currency and Robert Owen, drafted the Glass-Owen bill and presented it to President Wilson. After repeated reversion and discussion, on December 23, 1913, the Federal Reserve Act was successfully signed. The US central bank system officially established.

The story of the panic of 1907 ended. We described from its preceding conditions in different perspectives, and then how did it happen, and eventually the remediation for its recovery, ultimately showing the course of this event. In the following chapter, we will summarize the main message from Prof. Dr. Didier Sornette and Dr. Peter Cauwels[146] to describe the great financial crisis of 2007.

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[145] Michael A. Whitehouse, *Paul Warburg's Crusade to Establish a Central Bank in the United States*, May 1989 https://web.archive.org/web/20080516102112/http://minneapolisfed.org/pubs/region/89-05/reg895d.cfm

[146] Peter Cauwels and Didier Sornette, *The Illusion of the perpetual Money Machine and the Fool's Gold Age,* working document, Chair of Entrepreneurial Risks, ETH Zurich, 2019

CHAPTER 3

The Causes, the trigger and the remedial steps of the financial crisis of 2007

In this chapter, we will summarize the key points following the same structure of the previous chapter, to describe the great financial crisis of 2008 from the causes, the trigger to the remediation. In the first part of this chapter, we quoted the explanations of the GFC causes in the working document *"The Illusion of the perpetual Money Machine and the Fool's Gold Age"* written by Peter Cauwels and Didier Sornette. In the second part, we will show how this financial crisis was triggered and how the authorities rescued the market during the panic. The final part is the remediation taken by the Fed and the government to help the market recovery.

The analysis of the great financial crisis of 2007 started from the paper *"The Illusion of Perpetual Money Machine"*[147] published in 2014 by Didier Sornette and Peter Cauwels. In this paper, Didier Sornette and Peter Cauwels argued since the early 1980s, the regime of "illusion of the perpetual money machine" started, consumption came from appreciated house prices, financial profits and increasing debt but not the real economy growth fueled by productivity improvement. The financial market entered into a new era. The succession of crashes and bubbles occurred since the great stock crash of October 1987. Before the GFC of 2007, there was the "globalization bubble" in real estate, global stock, commodities and other assets.

Except for the asset bubble, there are more underlying causes for the recent crisis. With more research has been done, Didier Sornette and Peter Cauwels decided to extend the explanations of the GFC of 2007 based on the previous work of their research group. Like Chapter 2, the explanations are divided into two groups, "dry forest", the technical financial reasons and "climate change", a deeper layer explanation. We will first introduce the technical financial analysis on of the fragile markets and fragile banks, and later the ideological and psychological studies of the possible explanations.

3.1 "The dry forest": fragile banks and fragile markets[148]

As Figure 3.1 shows, there are three main contributing factors to the real estate and credit boom: decreasing lending standards by mortgage lenders, the aggressive home ownership goals, and the global economic imbalances.

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[147] Didier Sornette and Peter Cauwels, 1*980-2008: The Illusion of Perpetual Money Machine and What it bodes for the future,* Risks, ISSN 2227-9091, MDPI, Basel, Vol. 2, Iss. 2, 2014, pp. 103-131

[148] Peter Cauwels and Didier Sornette, *The Illusion of the perpetual Money Machine and the Fool's Gold Age,* working document, Chair of Entrepreneurial Risks, ETH Zurich, 2019

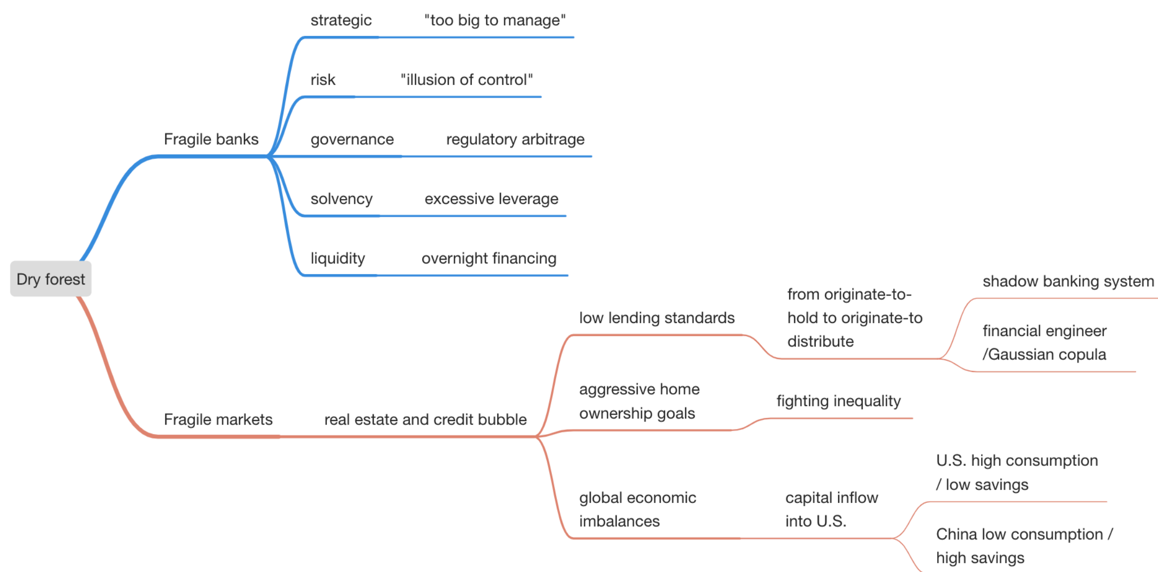

Figure 3.1[148] gives the hierarchical mind map to explain the elements included in the "dry forest" explanation

Firstly, due to the rising house prices, lending institutions lowered the lending standards for mortgages. The mortgage lenders gave credit to the households with low income and low creditworthiness. Because most people believe that the house price can only go up. Even if lenders encounter the default, they can recover the loan value by selling the property as collateral. Besides, to help the lending institutions expand the credit market, investment banks used financial models to repackage subprime loans, amplifying the credit chain. The risk of loans from the originators was eventually sold to the investors all over the world through securitization. The investment banks also held large number of the asset-backed securities. The high leveraged nature of derivatives had further expanded the asset bubble.

The second factor resulted from the inequality in US society. In order to encourage the groups who could not afford a house to purchase their own house, the government continuously pass some policies stimulating commercial banks to provide loans for these low-credit groups. President Bill Clinton and President George Bush announced the plans to increase houseowernship. The Government Sponsored Entities, Fannie May and Freddie Mac, were required to provide mortgage for the poor. Congress allocated funds to support first-time buyers to pay the down payment. A series of government policies further spurred the real estate market.

Lastly, in order to avoid economic recession due to the dot com bubble in 2001, the Fed Reserves kept interest rates low for years. The low interest rate incited more people to purchase house, accelerating the real estate boom. However, when the federal rate increased from 2004 to 2006, the fixed-rate mortgage rate was still low. One explanation is that the global economic imbalanced made the Fed lost control of the monetary policy. The developing countries were saving to increase USD reserves. The

excessive consumption of American people and insufficient savings led to huge trade deficit. The United States had to borrow a lot from the emerging countries to purchase the imported products. In contrast, the emerging countries with high saving rates and low consumption rate shipped their savings to the US. This large amount capital inflow made the Fed lose control of money prices and the real estate bubble.

On the other hand, as Figure 3.1 shows, there are many problems rooted in the US banking system. Firstly, induced by the high-return profit, most of investment banks held extremely high leverage to by different innovative securitization derivatives. The debt was more than ten times of the capital. Any market disturbance would clear their assets to zero. And many investment banks faced liquidity problem. Besides, short-term lending of investment banks largely came from hedge funds. A large amount of their cash had to pay the overnight loan interest rolling on daily basis. Next, the wave of consolidation in the banking sectors made financial institutions “too big to manage”. The management could not consider every investment decision or take care every department equally, which resulted in the mismanagement in corporation strategies, compliance and risk control. Finnally, with the development of financial innovation, banks were too obsessed with all kinds of pricing models but ignored risk diversification and hedging. The supervision of shadowing banks was in a vacuum. Credit rating agencies lost the principles, giving a high rate to subprime loans, which reduced investor’s risk awareness. The total absence of regulation in shadow banking system further impaired the system.

3.2 “The climate change”: ideology and animal spirits[149]

In this section, we will discuss deep fundamentals behind the “dry forest” of the Great Financial Crisis of 2007. Figure 3.2 indicates the “climate change” in two big groups. The first group is the ideology shift to cultural hegemony, that the elites spread the “common sense” benefited for their interest. A wave of deregulation started in the US since the 1980s. Many financial institutions lacked regulation, sometimes they policed themselves. And many people believed the deregulation and financial innovation was the right decisions. On the other hand, one cause rooted in the human nature was that the two market emotions between the greed of profit and the fear of loss take control of human behavior. The Great Moderate together with “illusion of control” made people they were living in a “risky-less society”.

[149] Peter Cauwels and Didier Sornette, *The Illusion of the perpetual Money Machine and the Fool’s Gold Age,* working document, Chair of Entrepreneurial Risks, ETH Zurich, 2019

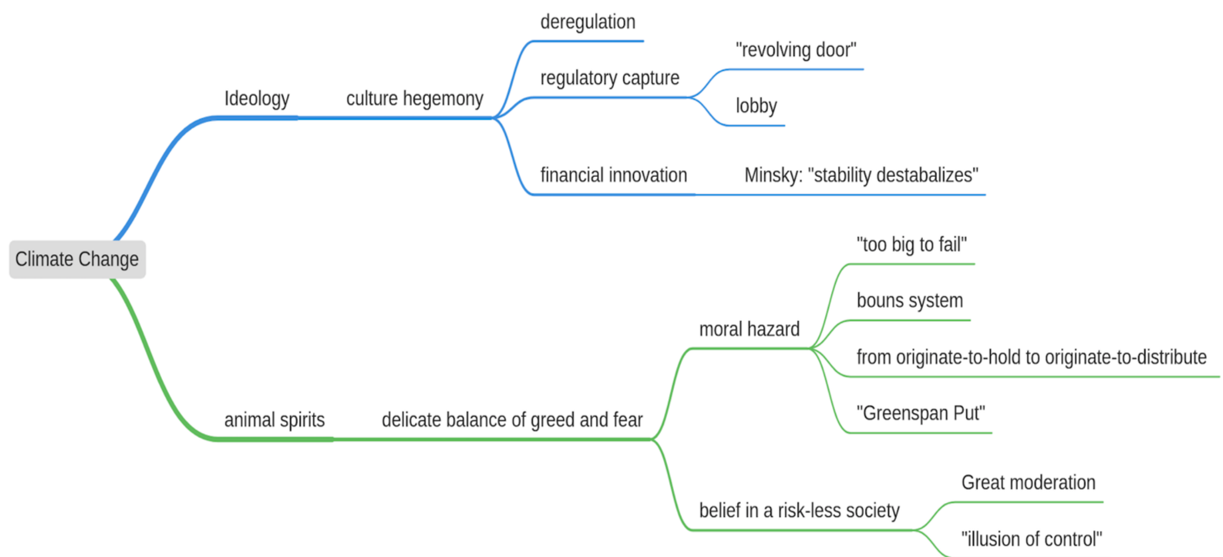

Figure 3.2[149] gives the hierarchical mind map to explain the elements included in the "climate change" explanation

In the first viewpoint from ideological perspectives, the elite class spread the ideology that the conditions in society and economy was not intentionally created for someone's interest, but inevitable. The common sense in the society seemed to be taken into control by a small group of elites. The Wall Street bankers support political campaigns, gaining political power by economic power, and making regulations benefit themselves through "regulatory capture." The cozy relationship between the government and big banks created an inadequate oversight market. Additionally, due to the ideological control, it became the "common sense" that deregulation and financial innovation were suitable for the market and society. However, the deregulation since the 1980s made large financial institutions to obstruct future regulation.[150] The financial innovation undermined the institutional checks and balances, expanding the derivatives market, and accelerating the asset bubble.

The second group is animal spirits, the fundamental drivers behind human actions, endogenously originated from human nature. Financial markets are generally dominated by two emotions: greed and fear. When the market went up, the greed for profit overcame the fear of loss and vice versa. Firstly, people are easily stuck in the sentiment of the "illusion of control." The long term moderate economic prosperity before this crisis made financial specialists believe this economic boom was built on sound fundamentals. On the other hand, moral hazard played a role in this crisis. For example, the Wall Street portfolio managers pursued a high short-term bonus at the expense of taking a high risk. The large financial institutions viewed themselves as too

150 Simon Johnson and John Kwat, *The Wall Street takeover and the next financial meltdown*, New York: Random House, Pantheon Books, 2010

big to fail, taking excessive risk. They believed the Fed would support the market with monetary policies after the collapse of the market. The nature of humans affects the market all the time.

3.3 Trigger of this crisis and what happened

Unlike the panic of 1907, the trigger for the great crisis of 2007 was not a specific event that suddenly led to the collapse of the financial market but a series of signs within more than one year. The crisis had its roots in the US housing market, the irresponsible lending in the subprime mortgage market was the "cigarette butt" that was thrown in the "dry forest" and caused the worldwide financial distress. After the house prices peaked in April 2006, most of the subprime lenders were running out of cash. The first sign of this crisis arrived in early 2007 when the second-largest subprime originators, New Century Financial[151], filed for bankruptcy. And a series of warning came. The ABX index[152] had fallen sharply since February 2007. The rating agencies Standard & Poor and Moody agreed to downgrade hundreds of mortgage-backed securities significantly. In the latter, most people believe the crisis began in August 2007 when large-scale withdrawals from short-term funds were called in the high discount rate.[153] However, until now, the only crash in the subprime mortgages did not cause widespread panic. For example, the stock market was sound with small volatility.

Subsequently, in early 2008, the financial crisis caused by the subprime crisis significantly deteriorated. In March, Bear Stearns ran out of its cash and quickly collapsed. In September, the Federal Housing Finance Agency found the problems in Fannie and Freddie's astonishingly high leverage. The government provided the two GSEs additional $100 billion capital to eliminate the capital shortage.[154] The next shock was when Lehman Brothers, the fourth-largest investment bank in the US, filed for bankruptcy. On the same day, due to the risk of $79 billion in exposing of mortgage derivatives of American International Group(AIG), the Fed reserve bailout it with an $85 billion loan secured by the stock. Until October, three of five investment banks in the US had gone.

The crash of 2008 then spread to the global financial market since the mortgage-backed securities were purchased by institutions globally. The credit crunch further moved the financial crisis to an economic downturn. In October, the world's major central banks announced their globally coordinated interest rate cut and provided unlimited liquidity

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[151] Since 2006, New Century's loan default rate gradually increased. 17% subprime were going to default within the first three months

[152] The ABX index served as a barometer to the mortgage market; it decreases as the risk of mortgage-backed securities increase

[153] G Gortan and Andrew Metric, *Getting up to speed on the financial crisis: A one-weekend reader's guide*, Journal of Economic Literature, Vol. 50 No. 1, 2012, pp. 128-50

[154] Scott Nations, *A History of the United States in Five Crashes: Stock Market Meltdowns That Defined a Nation,* William Morrow, 2017, pp. 405-420

to financial institutions.[155] The GDP growth rate of different countries suffered a decline of varying degrees. The panic was transmitted to the stock market with a sharp decline by more than 50 percent. US housing prices lost 30%. The public lost confidence in the financial system. The US unemployment rate increased to 10 percent by October 2009[156]. Even now, Adam Tooze argues that we are living in the consequences of the financial crisis of 2008.[157]

3.4 Remedial responses to the financial crisis of 2008

The government undertook a variety of policy interventions to stabilize the market. The remediation programs designed by different authorities play a significant role in the financial crisis mitigation. First, the Federal Reserve engaged extensively in open-market activities to support the credit market and lower the long-term interest rate. To increase the money supply, the Fed announced a first round of Quantitative Easing in November 2008, planning to purchase $600 million securities from member banks. Furthermore, the fed funds rate dramatically declined near zero. The Fed also approved the liquidity providing facilities Primary Deal Credit Facility[158] (PDCF) and Term Securities Lending Facility (TSLF)[159], to perform like the lender of last resort. Additionally, the Fed created Commercial Paper Funding Facility (CPFF)[160] and Asset-Backed Commercial Paper Money Market Mutual Funds Liquidity Facility (AMLF)[161] to ensure the commercial market stay liquid. All programs in 2008 and 2009 initiated by the Fed Reserve injected over $2.6 trillion to the market, equivalent to 18 percent of 2008 GDP.[162]

Second, except for the Fed Reserve, the importance of other authorities cannot be ignored. The US treasury initiated four remediation programs to save the market. For example, it provided funds to buy troubled debt and equity of government-sponsored entities like Fannie and Freddie. The Treasury was also committed to supporting $3.2

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[155] Anjan Thakor, *The Financial Crisis of 2007-2009: Why Did It Happen and What Did We Learn?* , The Review of Corporate Finance Studies, Vol. 4, No. 2, 2015, pp. 155-205

[156] Wikipedia, Financial Crisis of 2007-08, https://en.wikipedia.org/wiki/Financial_crisis_of_2007%E2%80%9308

[157] Adam Tooze, *Crashed: How a Decade of Financial Crises Changed the World?* Penguin Publishing Group, 2018

[158] PDCF provided overnight loans to primary dealer in exchange collateral. The primary serves as the trading counterparty for Fed's open market activities. The facility was closed in 2010

[159] TSLF allowed the primary dealer to borrow US Treasury's securities in short-term

[160] CPFF method directly purchased the asset-backed commercial papers for a 3-month period from the issuer by the fund of the Fed

[161] AMLF was in the purpose of providing funding to financial institutions to buy high quality asset-backed commercial paper from money market funds

[162] Barrie A. Wigmore, *A Comparison of Federal Financial Remediation in the Great Depression And 2008-2009,* Research in Economic History, Vol. 27, 2010, pp. 255-303

trillion to money market mutual funds. In September 2008 The Federal Deposit Insurance Corporation (FDIC) increased the deposit insurance coverage, offered a guarantee to unsecured debt, participated Legacy program initialized by Treasury to strip of the troubled asset.

On the other hand, in long terms remedial steps, President Obama issued a series of Acts to regulate the financial markets, protect the consumers and revitalize consumption with American Recovery and Reinvestment Act, Fraud Enforcement and Recovery Act signed by 2009. Besides, the US enacted the Dodd-Frank Wall Street Reform and Consumer Protection Act, the most significant legislative change in financial regulation that affected every part of the nation's financial service industry. There are some critical reforms in the fundamental changes. For example, the Act created the Financial Stability Oversight Council to identify the risks in the firms and market securities. The Volcker Ruler asked the banks to give up the proprietary trading and hedge fund. To comprehensively consolidate and supervise the financial institutions, the Act regulates a variety of fields in bank capital, the activities of credit rating agencies, the executive compensation, and the deposit insurance.[163]

[163] Randall D. Guynn, *The International Bar Association's Task Force on the Financial Crisis: A Survey of Current Regulatory Trends,* United State Chapter, 2010

CHAPTER 4

Parallels between the panic of 1907 and the financial crisis of 2007

In this chapter, we will compare the parallels between the two panics based on the observations in Chapter 2 and Chapter 3. First, we will list the similar preceding conditions between the two periods in the imperfect banks, markets, and human behaviors, then discuss the same points during the crises, and political response in the aftermath of the crises.

4.1 Similarities in preceding conditions of the two periods

4.1.1 Similarities in fragile banks

The trust companies in New York 1907 can be seen as the shadow banks[164]in the financial crisis of 2007. They were engaged extensively in underwriting, distributing securities, and short-term financing. First, the shadowing bank system was outside of standard banking regulations. In both periods, commercial banks were subject to strict supervision, but non-bank financial institutions like shadow banks were exempted from it. For example, in 1907, the National bank was required to keep at least 25 percent reserve against the deposit, while the percentage of trust companies in New York was 15 percent. During the great financial crisis in 2007, there were no disclosure requirements for investment banks and hedge funds, and thereby the shadow banking system thrived on these asset-backed securities. Even banks created various financial derivatives to circumvent the regulation for capital adequacy ratio. Additionally, the investment banks had no direct access to the Federal Reserve system while New York trust companies were outside the New York Clearinghouse Association.[54]

Secondly, both institutions, out of perfect regulation, preferred to take excessive risks for profit. Even though the tools they used to get high returns were different (one used inadequate reserves, another used ultra-high leverage), the purposes were the same. The reason why trusts held low reserve ratio was they wanted to increase their competitiveness to the National banks. To achieve it, they offered more loans to borrowers and higher return to the depositors, and thereby attracted more deposit, creating a positive feedback loop. In 2007, in order to pursue high returns, the investment banks used many credit tools that made a few capital leverage assets that are several times or even tens of times of the principal. The credit chain they used continuously transmitted and amplified risk, resulting in increasing systemic risks.

Furthermore, the liquidity of shadow banks was problematic in both periods. Trusts sometimes underwrote and kept securities for the companies whose assets were not tradable in the open market in 1907. A significant amount of loans they lent flew to the

[164] Shadow banks include entities such as hedge funds, money market funds, investment banks, credit insurance providers, securities broker-dealers, private equity funds, etc.

New York stock market, allowed brokers to purchase stock in an uncollateralized way, and then provided liquidity for the daily new transactions in the New York Stock Exchange. When the market was stable, trusts were able to call and recover the loans at any time. However, during the bearish market, the broker cannot pay back the loan, the credit markets tightened, the call loan interest spiked up, and thereby trust's liquidity was affected. Bank liquidity problems became more prominent in 2007. Short-term lending mostly came from hedge funds and money markets funds to investment banks in the overnight market. This lending supported investment banks purchase asset-backed securities. As a result, the investment banks had to pay higher interests to the loan rolling daily. For example, in 2007, Bear Stearns borrowed $70 billion in the overnight market when it had $12 billion equity and $384 billion liability.[165] Then, the daily due limited the cash flow available for other daily business of the investment bank.

4.1.2 Similarities in fragile markets

Except for the fragile banking system, the two different periods also shared some parallels in the market conditions. However, due to the different eras, the markets were not very similar. First, both experienced the over-exploiting of capital and credit before the crisis, even though the causes to spur credit exhaustion are not alike. Before 1907, The country possessed all elements of prosperity. Due to technological development, the competitiveness and growth rate of the US industry was increasing rapidly. Factories needed capital to expand production; companies leveraged credit to achieve merger and acquisition strategies, and the government issued bonds to build infrastructures. The fever of speculation and unreasonable industrial expansion exhausted the credit available in New York. In parallel, before 2007, in the environment of low interest and low taxes, house prices continued to rise. The mortgage lenders expanded a new market, giving credit to the low-income groups with low credit rating, and thereby generated a large number of subprime mortgages. The subprime share of a home mortgage increased from 8.7% in 1995 to 13.5% in 2005.[166] Speculative impulses and optimism controlled the entire real estate market. The subprime mortgage was issued quickly, mortgage-backed securities appeared in various forms, leading to the expansion of the chain of credit.

Besides, US households at the beginning of the 20th and 21st centuries both intended to consume more. During 1905 and 1906, people live in the cities, as the income grew, their expenditures also increased. In order to pursue a higher living standard, they purchased goods with higher brand premium. Especially for the household living in the cities, they were no longer satisfied the small return of the low-risk assets, but invested

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[165] Peter Cauwels and Didier Sornette, *The Illusion of the perpetual Money Machine and the Fool's Gold Age,* working document, Chair of Entrepreneurial Risks, ETH Zurich, 2019

[166] James Barth, Tong Li and Lu Wenling, *The rise and fall of the US mortgage and credit market: A comprehensive analysis of the meltdown*, Hoboken, NJ: John Wiley & Sons, 2009

in real estate and other enterprises for higher returns. In the environment of speculation, people ignored the disastrous outcomes. Back to the time before the financial crisis of 2007; the US household consumption increased at a striking rate. All macro elements were encouraging American people to consume more. For example, the popularity of credit cards made people feel nothing when spending. The individuals felt rich because of the low taxes policies and cheap goods.The rising house price also induced people to engage in high consumption, since they could use the house as collateral to get financing. The higher consumption was testified by the personal low saving rate in the United States.

The last similarity is the information asymmetry in the capital market existed in the two periods. In 1907, the information asymmetry was between the depositors and the banks. Because of the limited information dissemination channels and the untimely report disclosure by the bank, depositors were not able to make correct decisions. When they heard some negative news about banks, they did not know which banks were insolvent and unsound. Thus, they withdraw their deposits from all the banks to respond to the signal, making the bank suspension. Equivalently, in 2007, information asymmetry was more astonishing in all aspects of the financial market. Because the pricing models for different asset-backed securities were complicated, it is challenging for ordinary investors to understand the risk and benefit of the products. Without professional knowledge, investors cannot judge whether the strategy is in alignment with the investor's interest. Additionally, in order to gain more customers and more income, the rating agencies lose their objectivity, provided the mortgages higher rating than the real level.

The above analyzed the commonalities of the two financial crises in the banking system and market conditions. In the following part, we will discuss a profoundly similar explanation, like the business cycle and human behavior.

4.1.3 Analogies in "Climate Change" explanations

From an economic perspective, each period experienced prosperity before the panic even to a different extent. Each industrial cycle begins with the expansion of production activities. The expansion of production activities may be caused by the discovery of new markets, financial innovation, scientific progress, or population growth. The economy in America achieved continuous growth in a decade before 1907. Similarly, it was two decades before the financial crisis of 2007, characterized by steady GDP growth, low inflation, and unemployment rate due to technological progress and financial innovation. It is common that, at the beginning of the new century, the mood of optimism to the new era induced people to raise their expectations and hope, as they believe this time is different. The innovation created symbolic new beginnings to support continuous prosperity. However, it is like the nature of the business cycle, the contraction always follows the overheating boom.

The human behavior before, during, and after each crisis look very similar. When the economy moved upward, popular perceptions that the future is brighter domain in the market sentiment. The greed of profit overtakes the fear of loss in all levels of society. At the start of the 20th century, people were inspired by the millionaire story, crazily invest in the stock markets with the money borrowed, as they simply believed the fundamentals of the US economy was strong. This speculative mood was perhaps the same to that of a century later when the house price kept rising. Market participants were pursuing higher returns without adequate knowledge of risks. The greedy emotion made people mad. People with low-income preferred to purchase more than one house. The investment banks held a high leverage ratio and massive asset-backed securities.

4.2 Parallels of what happened in the crisis

There are also some remarkable similarities in a sequence of events during the crises. Both financial crises started outside the payment centers like large banks in the financial system. The center of the crisis laid in the shadow bank system. The trusts faced runs by their depositors in 1907, while the investment banks had to withdraw short-term lending to hedge funds and other investors in the crisis of 2000. Some solvent financial institutions were rescued, but the problematic ones failed in both periods. During the panic of 1907, the New York Clearing House agreed to support the Mercantile National Bank as long as Augustus Heinze resigned. It was analogous to the 2008 rescue of Bear Stearns from the Federal Reserve. Before J.P. Morgan Chase bought this investment bank, it received a loan from the Fed. The suspension of the Knickerbocker Trust and the bankruptcy of Lehman Brothers both resulted from their unsound balance sheets and the isolation of their respective lender of last resort. The New York Clearing House refused to offer aid to the Knickerbocker Trust in 1907, while no financial institution and government organization bailed out Lehman Brothers.

Additionally, both periods experienced the liquidity shrinkage of financial institutions as the crisis began, and liquidity support as the crisis exacerbated. In the panic of 1907, the public tried to hoard cash rather than deposits in the bank. Under the pressure of a large number of depositors, trusts had to call undue loans from the stockbrokers to replenish the liquidity. The credit crunch of all intermediaries further sharply drove up the call loan interest rate. The New York Clearing House was forced to issue $100 million loan certificates to inject liquidity into the banking system. Similar to this, with the rising default rate of subprime loans, investors asked investment banks to repurchase overnight lending. However, they were unable to repurchase due to insufficient liquidity and ultra-high leverage and thereby was forced to bring back the property of the default borrowers to the auction. As a result, house prices were getting lower and lower. Additionally, the tightening credit led to the overnight lending rate soared.

4.3 Analogies in the aftermath of the crisis

And finally, the overall result of every crisis is almost the same: once the fire is out, the remedy is increased regulation to prevent the next crisis. Laws and regulations are useful to resolve defects that caused the previous crisis. The panic of 1907 stimulated the US to establish the Federal Reserve in 1913 to regulate and oversight financial institutions uniformly. Since the Federal Reserve Act was enacted, the US baking industry had officially entered a new chapter. Identically, the government regime of the most recent financial crisis issued a series of acts to stabilize the market. The most necessary one is the Dodd-Frank Wall Street Reform and Consumer Protection Act, which changed every single part in the financial service industry legislatively.

CHAPTER 5

Differences between the panic of 1907 and the financial crisis of 2007

We will compare the differences between the two crises. The structure of this chapter is the same as Chapter 4.

5.1 Differences in preceding conditions of the two periods

5.1.1 Differences in fragile banks

There are some differences in the banking system between each period. First of all, since the number and the size of the banks are different in the two cases, mismanagement of banks resulted in unequal aspects. Back in 1907, the US held 16,000 financial institutions, scattered in different states, cities, and towns. The majority of the 16,000 banks were small banks in rural areas, mainly responsible for some simple banking operations such as saving, loans for agricultural production. The unique problem for the small and scattered banking system was that an individual or a group of associated individuals quickly took control of different banks, making these banks closely interrelated. If one of the banks in this network was suspected, the others would be affected too. However, in 2007, the number of financial institutions was only 7,500, less than half of that in 1907. Banks were concentrated and larger. Through the acquisition and merger strategies, some banks became conglomerates such as Citi Group, the largest American financial institution. It faced the problem of "too big to manage." The management cannot pay attention to every aspect of the company, leading to a dramatic failure in corporate governance, risk management, and compliance.

On the other hand, the financial products were more sophisticated in 2007 than in 1907. In the past, the financial products were straightforward, only the stock and bond markets were relatively developed. While the financial innovation experienced an explosion in recent decades, the last three decades of the twentieth century were the golden era for the development of (American) derivatives. Since the 1990s[167], the financial engineers designed sophisticated mathematical models, developed a variety of tradable securities available to clients. They created different derivatives originated from the mortgage, packed and re-packed tranches of the mortgages to sell them as asset-backed securities. Most people believe the risks could be diversified away through elaborate calculations. Because of the advanced IT, information technology, the perfect model, all the factors gave an illusion of control. However, such new products are risky by lacking historical data. The investors also ignored the tail risks. Additionally, driven by interests, rating agencies gave high ratings to subprime loans and derivatives, reducing investors' risk awareness.

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[167] Prior to the recent financial crisis, the financial world witnessed the explosive financial innovation for over two decades. See: Anjan Thakor, *The Financial Crisis of 2007-2009: Why Did It Happen and What Did We Learn?* , The Review of Corporate Finance Studies, Vol. 4, No. 2, 2015, pp. 155-205

The third difference lies in the mechanism of money supply between two periods. In 1907, before the emergence of the Federal Reserve, National banks issued National banknotes as a currency backed by US government debt. The gold standard further limited the national money supply. By contrast, in 2007, the Federal Reserve was responsible for controlling the money supply at any time with monetary tools such as Federal Funds rate, Open Market Operations, and Reserve requirement ratio. Moreover, the US completely abandoned the gold standard many years ago. Through flexible monetary policies, the Fed can maintain and promote the stability of the US financial market. For example, after the subprime mortgage crisis, the Fed began to cut interest rates continuously. When the zero interest rate policy was initiated, the Fed could no longer stimulate the economy by lowering the regular interest rate. In the face of the deterioration of the economic situation, it chose an unconventional method, quantitative easing, to infuse liquidity to the market.

5.1.2 Differences in fragile markets

Except for different banking systems, the market conditions in both periods had lots of variances. The first, the US export surpassed the import in 1907 while it was reverse in 2007. Before 1907, global trade and activities flourished. The United States became the second largest export country in the world. The rapid development of the American industry increased the proportion of the US exports of manufactured products while the proportion of raw materials and agriculture foods declined. Nevertheless, this situation substantially different in 2007. America faced a considerable trade deficit. Large cheap imported goods, alongside with foreign capital, flooded into the domestic market. The emerging Eastern Asian countries, such as China, exported products to developed countries such as America. The developed countries had to borrow from the emerging countries. Compared with excessive consumption and insufficient savings in the United States, the emerging countries had a higher saving rate and lower consumption. This foreign capital flew into the US market to get a higher return, leading to liquidity surplus and continuous rising asset prices.

Another difference is the financial crisis of 2007 originated from the US and then spread to the global market, while the panic of 1907 occurred in the environment of global bank runs in tens of different countries in Europe, Africa, South America, and Asia.[168] At the beginning of 1907, the bank runs started from Egypt, Japan, and Hamburg before the panic in New York. However, before 2007, the financial markets of various countries were relatively stable. Because the United States owned the most important

[168] The financial markets exhausted the credit and capital for industry production in the worldwide not just the United States. The strain on the financial market eventually resulted in the break of the credit chain wherever the link was weakest or the strain was the greatest. For some countries like Egypt and Chile, the link was weakest. The strain was the greatest in the United States. See: Alexander D. Noyes, *A Year After the Panic of 1907*, The Quarterly Journal of Economics, Vol. 23, No. 2, 1909, pp. 185-212

financial markets, the investors from other countries purchased a large number of American mortgage-backed securities. Thus, the impact of the US subprime mortgage crisis quickly spread globally and caused a widespread recession in the developed and developing countries, which harmed the world economy.

The last one embodies in the change of the stock market before the panic. In 1907, before the bank run in October, the US stock market kept declining since the beginning of 1907. In contrast, the Dow Jones Industrial Average (DJIA) peaked in October 2007, even though some subprime originators filed for bankruptcy before that time. In 1907, a series of shocks threatened the stock market before the panic. On the contrary, the stock market was unresponsive to some early warnings in 2007. DJIA rose to exceed 14,000 points. All signs such as ABX decline, massive withdrawals from short-term funds in the high discount rate, downgraded mortgage securities in early 2007, did not attract the attention of the stock market. The pronounced plunge accelerated since 2008, after the start of this crisis.

5.1.3 Different points in "Climate Change" explanations

There is a considerable deviation in the ideological and psychological backgrounds between the two periods. A wave of increasing financial regulation occurred from the civil war to the Great Depression.[169] Since the National Banking Act of 1863 was enacted, the free banking era[170], completely lack of federal control and regulation, ended. The National-chartered banks were regulated strictly on reserves and business practices. (However, trusts, the shadow banking system were not under the same oversight system, since the trust belonged to the state-charted financial institutions.) The office of Comptroller of the Currency was issued to oversee these banks and issue new bank charters. Even though, the United States National Banking Systems was established, the regulation to the market was insufficient. Because it only limited the activities of National banks but not other state-charter banks or institutions like trust. Conversely, in order to increase the innovation and competition of financial institutions, a series of financial deregulation set off in the 1980s. (The regulation in recent decades was absolutely more than that of a hundred ago, there were institutions in place like the FED, FDIC and SEC to regulate the market, but we discuss the trend of regulation prior to each crisis here). A bank could offer commercial banking, securities underwriting, and insurance services under one organization. The complexity of different financial services operated under one roof also planted the seeds of the systematic risk of the banking system.

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[169] Matthew Johnson, A brief of U.S. Banking Regulation, May 7, 2020, https://www.investopedia.com/articles/investing/011916/brief-history-us-banking-regulation.asp

[170] From 1837 to 1862, only state-chartered banks existed in the United States, no National-chartered banks

Next, even though there is some evidence to indicate the strong political-business relationship in both periods, the way politicians and business people connected were distinct. Before 1907, it was an age of political corruption; many connections between American politics and business were based on bribery. [171]Business people bribed the governors in exchange for the regulations that benefited them. They sometimes even manipulated the government election. For example, it was revealed that the railroad corporations probably controlled the elections in Alabama and Georgia. In contrast, the top Wall Street bankers were legally gaining political power by capturing the institutions and propagating the notion of elites benefits as so-call common sense, in decades before the financial crisis of 2007. The financial industry actively donated to support political campaigns and took up senior roles in the government.[172]

Another difference is that the moral hazard was the concern in GFC but not in 1907. Due to the imperfect financial system and weak government power one hundred years ago, there were no government bailouts in the financial crisis. Banks had to bear the consequences of their risky operation. On the other hand, nowadays, most of the financial institutions believe the central bank and other authorities will take action to stabilize a panic in the short run, and therefore they will not bear all costs for excessive risk-taking. Wall Street bankers have witnessed how the Federal Reserve save the market in the past and felt confident that the government would not allow the collapse of their big banks.

5.2 Distinction of what happened in the crisis

When we discuss the distinct situation during the crises, the most notable different points are whether there is a central bank involved in the rescue of the financial crisis. When the US treasury and the New York Clearing House failed to undertake the leadership in the crisis relief work in the panic of 1907, a group of private bankers led by J.P. Morgan rescued the financial market. Without the central bank, J.P. Morgan organized the presidents of trust companies to raise funds, saving the Trust Company of America and Lincoln Trust Company. Even if J.P. Morgan exercised some functions of the central bank, his work was still inefficient due to the limited means to regulate the trust companies. By contrast, the Federal Reserve played a vital role in the financial crisis. After the outbreak of the financial crisis, the Fed lowered the interest rate, spent trillions of dollars to aid a large number of banks, investment banks, and insurance companies, and adopted aggressive Quantitative Easing policies. The series of monetary tools mitigated the crash of the US financial market.

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[171] Richard L. McCormick, *The Party Period and Public Policy American Politics from the Age of Jackson to the Progressive Era*, Oxford University Press, 1989, pp. 263-280

[172] Peter Cauwels and Didier Sornette, *The Illusion of the perpetual Money Machine and the Fool's Gold Age,* working document, Chair of Entrepreneurial Risks, ETH Zurich, 2019

Another thing is even though the authorities refused to offer aid to the Knickerbocker Trust and Lehman Brothers in both periods, their ending had a notable difference. The Knickerbocker Trust was suspended, and Lehman was let to bankruptcy. The trust reopened in next year by the infusion of new capital, while several firms around the world purchased Lehman Brothers.

On the other hand, the duration of the panic in the two periods was different. In 1907, the bank run only last within two months. It is like a blizzard suddenly coming but suddenly stopped, leaving the snow on the ground. Nevertheless, the first warning of the financial crisis of 2007 appeared as early 2007. It gradually developed into an international banking crisis as the collapse of Lehman Brothers in September 2008. The problem related to subprime mortgages popped up once in a while, slowly accumulated, and then burst like an atomic bomb. It was a long-term process.

5.3 Disparity in the policies respond to the crisis

The remedy of the panic of 1907 only reflected in new legislation, the Federal Reserve Act, while different parties undertook a variety of policy interventions to mitigate the financial crisis after the GFC. The Federal Reserve used various monetary tools such as interest rate, Quantitative Easing, and the liquidity providing facilities to stabilize the market. The Treasury also helped to tackle the troubled asset and sponsor Fannie and Freddie.

Conclusion

To study the panic of 1907 and the financial crisis of 2007, we find some remarkable parallels and distinctions between the two periods. Inspired by the way Prof. Didier Sornette and Dr. Peter Cauwels summarized the possible explanations for GFC, we first describe the two-group underlying causes in "the dry forest" and "climate changes" categories resulted to the panic of 1907. And then, we discussed the trigger, and the remedies respond to the panic. Based on these observations, we draw the following conclusion.

First, the parallels between the panic of 1907 and the financial crisis of 2007 are striking. The fragile banks and imperfect markets in two periods were responsible for the crises. Both banking systems were lack of strict regulation to the financial institutions (mainly for the shadow banking system, the trust), shadow banks (Trusts in 1907 and Investment banks in 2007), where both financial crises started. In order to achieve higher returns, these institutions preferred to engage heavily in excessive risk-taking activities, which led to a liquidity shortage of banks.

Additionally, both market conditions between the two periods shared some similarities. The most remarkable one is over-exploiting capital throughout the industrial and real estate world, respectively. Due to the rapid growth in the economy, the American industry demanded massive credit at the start of the 20th century. One hundred years later, the rising house price allowed a large number of households with low income to get credit quickly to purchase the property. The prosperity before the crises seduced people to consume more, save less, and invest in risky assets in both periods. The parallels behind the fragile market and banks are the nature of the business cycle and human behavior. Economy downturn always followed exuberance prosperity. The greed and fear, the two critical ingredients in the financial markets, take control of human behavior as the market fluctuates.

Next, during the panic, the trusts faced run by their depositors were just like the investment banks were required to pay back lending in the short-term credit market. The rescue of Bear Stearns in 2008 with a loan from the Federal Reserve was analogous to the support received by Mercantile National Banks from the New York Clearing House in 1907. The failure of the Knickerbocker Trust, just like the collapse of Lehman Brothers, accelerated the crisis and brought down the financial system. Moreover, in both cases, the financial market experienced a credit crunch. The authorities had to provide liquidity support to stabilize the credit markets. After the crisis, the administrative remedy was very similar as well. Both government regimes issued a variety of acts to increase regulation, preventing the causes of the previous crises.

On the other hand, it is not surprising that the two periods share significant distinctions. In the banking system, due to the ambiguous barriers of commercial banks, investment banks, and insurance companies, the financial institutions in 2007 were

more concentrated, multi-functional than that in 1907. Also, financial products became extremely sophisticated as a result of financial innovation. Financial engineers created delicate mathematical models, designed multiple tranches of derivatives backed by the subprime mortgage, which was unachievable by one hundred years ago. The developed Federal Reserve and the freedom from the gold standard led to the elastic money supply. From the market perspectives, America has shifted from an export nation to import one in one hundred years. Additionally, the GFC originated from the US and then spread to the global financial and economic markets. In contrast, there were several banks run in different countries before and during the panic of 1907. It seems like the bank panic co-occurred all over the world.

There are also many differences in the “climate change” explanation. A wave of financial deregulation set off in the 1980s, while the US experienced increasing regulation one hundred years ago. In the past, merchants made policy-makers enact policies that in their interest through bribery. Nevertheless, now, the Wall Street bankers gained political power by capturing the regulatory institutions and taking senior positions in the government. And finally, the moral hazard was a primary concern in the GFC, but not a topic in 1907.

Furthermore, during the panic, private bankers organized by J.P. Morgan played the role of the central bank, rescued the panic of 1907 due to the absence of a central bank, however, it was the Federal Reserve that led to mitigating financial crisis the one hundred years later. Another difference is that the recovery of the 1907 recession was swift, unlike the aftermath of 2007, whose consequences still affect the whole financial and economic world. As the financial system develops more soundly, more government authorities undertook a variety of policy interventions to help economic recovery.

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