

Research on the Operation Mechanism and Coping Strategies of Social Networks in the Ponzi Scheme

Xingchen He*

Shenzhen College International Education, Shenzhen, Guangdong, China

*Corresponding author: s23283.He@stu.scie.com.cn

Abstract. Social network marketing is one of the most mainstream scams today. This kind of fraud deceives many investors, generates negative effects on society, and decreases people's trust and confidence in the investment. That is the main reason for and importance of tracing the origin of this kind of scam and talking about the Ponzi Scheme. The Ponzi Scheme is a fraud that happened a century ago, and the core method was to promise investors a high-interest rate in a short period of time and use the money of new payers' money to afford the interests of previous investors. The mechanism sounds simple and not rigorous; however, this fraud received a successful consequence and became the origin of today's form of fraud. This form of fraud with high profits is still very popular based on the nature of people's greed. This passage aims to introduce the relationship between social networks and the conducting of the Ponzi scheme. Also, a discussion about how people reveal and prevent the traps of that kind of fraud is included. This study shows that the model of social networks in the Ponzi Scheme is a star network, and there is a hierarchy in this model. Also, the passage concludes with suggestions for the government, firms, and individuals.

Keywords: Operation Mechanism; Coping Strategies; Social Networks; Ponzi Scheme.

1. Introduction

This passage aims to introduce the relationship between social networks and the conducting of the Ponzi scheme and how this study can reveal and prevent the traps of that kind of fraud.

1.1. Research background

The origin of the Ponzi scheme can be traced back to Charles Ponzi, an Italian speculator in the early 20th century. Ponzi began to plot this conspiracy in 1919. He promised investors that he could get high returns in a short period of time (such as 45 days or three months). In fact, the reward that is paid to the previous borrowers comes from the principal of later investors instead of the actual profits. This kind of high repayment rate appeals to a large number of investors. Also, they fulfilled their promise in the early stage and won the trust of investors. However, due to the Great Depression in America at that period of time, people lost their trust in the banks and the products they invested in, and this kind of model couldn't be maintained anymore. It led to the disclosure of Ponz's bankruptcy and fraud, and the Ponzi scheme was notorious [1].

The main feature of Ponzi schemes is the promise of high repayment rates to the investors. The principle can be concluded as principal from new investors used to repay the reward of the previous investors. This model is known as the "Ponzi scheme" in the financial field and has derived many other forms of fraud. It is also considered as the greatest fraud in the financial history. It makes a large amount of loss to many investors.

1.2. Literature Review

After several papers have been found, this part has concluded the main arguments they made. Firstly, the general reason that caused people to participate in this scam due to those papers is people's desire for high-return and low-risk investment opportunities attract people to participate in this kind of scheme. It utilizes people's greed and blindness to attract investment through false promises and publicity and by paying rewards to previous investors to create credit that can appeal to more people involved in this business. The effect can also be divided into several points. Firstly, the number of

investors will lose the capital that they invested; many people stock most of their money into this fictional but promising whirlpool that, unsurprisingly, sucks all their shares into a drain of no return. Subsequently, The Ponzi scheme will damage the credibility and stability of the investment market, resulting in a decrease in investors' trust in the investment market. Thirdly, Ponzi schemes bring negative impacts and external costs into the local market while also affecting the confidence levels of investors in the long term. All in all, this negatively affects the entire economy while also slumping economic growth.

As for further research, almost all the papers introduce its status from the economic aspect by discussing the novelty of this kind of fraud and how it becomes the basis of other kinds of scams. And how can it become a problem for investors? However, few of them explained the true reasons why this kind of fraud system works based on the social network behavior of people and how the investors can invest their money in different periods of time just because the information gap can directly lead to the conducting of the system. From the author's perspective, knowing the working principle of these kinds of scams can help people have a more comprehensive cognition of this kind of fraudulent means and a better understanding of the essence of that, and only this way after people has a clear sense of the working mechanism, they can prevent them more efficiently.

1.3. Research Framework

This passage is going to introduce how social networks participate in the Ponzi scheme and strategies to cope with scams like that. Firstly, there will be a case study of the Ponzi scheme, aiming to introduce the phenomenon and features of this type of scheme and paraphrase the specific steps of its developing processes. Secondly, the passage will explain how social networks can lead to the cycle and system by collecting more and more clients and investors to maintain their funding chain and fill the funding gap with a constant population and investment input. For the last part of the content, the passage is going to discuss the main characteristics of those kinds of frauds and how they are presented in a completely new way now. It will also talk about possible solutions to prevent falling into a trap like that.

2. Case Description: Brief Introduction and Effect

For example, Ponzi (an Italian immigrant) set up an import business in Boston in 1919. He found a business that he could profit from trading international reply coupons (a voucher that could be exchanged in multiple countries for local postage stamps). During this trading, he made a profit from differing local exchange rates. Ponzi was able to buy vouchers in one country and then exchange them for a small profit in another.

Ponzi created a new company and sold the bonds to investors at an extremely high rate of repayment (50% interest after just 90 days). He focuses on credit creation and repaying the interest at the start of the period of time to create an illusion that persuades investors to believe that their repayment is from the profit their company gained. However, the truth is that new investors have funded the interest. In the first eight months of 1920, Ponzi collected US\$15 million – equivalent to about US\$260 million today – from approximately 30,000 investors [2].

However, this fraud he created was not the world's largest one, but it became one of the most imitated and famous over the following decades.

2.1. Initial step: The Foundation of the Scheme

It promises a high-interest rate and a short period of time for stoking. Let people feel safe and profitable so that more people are likely to invest money in their stocks by creating a façade of legitimate and lucrative business opportunities (50% interest rate in 90 days, as mentioned above).

2.2. Second step: Credit creation

Create credit by repaying interest during the first step of the consumer's investing to appeal to more investors. Initial investors are recruited, and when it is time to pay back the repayment, the fraudster (Ponzi) uses part of the money of new participants to pay off the initial investors. This successfully creates a mistaken impression of a profitable and low-risk investment, primarily due to the profit received [3].

2.3. Third step: Improvement

More investors are appealed to due to the extremely high-interest rate and low-risk investment opportunities provided by the Ponzi, which are more likely to encourage investors to reinvest their money [4]. It also spreads through the social networks of investors at each level, which allows this investment product to enjoy a high reputation among various investors. The number of new consumers provided a larger amount of money supply, which strengthened the funding chain of their 'company'.

2.4. Fourth step: Collapse

The essence of the Ponzi scheme is to use the funds of later investors to pay the return of early investors to attract more investors. During the later period of this fraud, due to the lack of embracement of real industry, they are to pay back the high interest they have promised before [5]. When the money supply is not steady enough to cover the payment, their funding chain will be affected, and they are hardly going to pay back the interest, which also leads to the credit loss of their stocks. People lost their confidence in this project and will not invest anymore, but they are asking to pay back the money, which stuck this scheme in a vicious cycle in which all investors are asking for their money. No one will invest in it anymore, the supply chain collapses, and Ponzi can no longer pay back the high interest, which leads to the failure of this fraud.

3. Analysis of the Problem: Role of Trust Level in the Social Networks in Ponzi Schemes

3.1. Introduction of Trust Level in Social Networks

Trust plays an important role in financial decisions of any kind [6]. Trust is an important phenomenon in social networks. The trust level here is based on the relationship between different people. People will be weighted in a different proportion on different people based on their relationships. For the general phenomenon, when making financial decisions, people often rely on trusted social ties such as family members and friends or on others through which their family and friends recommend [6]. However, trust also has levels or degrees. Burt has mentioned that levels of trust are based on strong and weak relationships within an individual's network structure; closed networks consisting of strong ties, including third-party ties, embody a better environment to trust the individuals around users. However, the condition that formed the trust is that people are in a risky and uncertain environment. Normally, the trustee is in a vulnerable position, and trust becomes a necessary factor in supporting the transactions.

This study generally divided the formation of trust into three types.

The first type, Process-based trust, is trust in the past or expected exchange or reputation [7]. This kind of trust is basically built up during the process of people connecting. Building up this kind of trust takes a lot of time, and it is hard for people to feel confident about a person or firm that they are not familiar with. This is generally the initial step for building relationships with nodes on the first floor and building up loyalty with each other. In social networks, it takes a long period of time for nodes to strengthen their links or paths with other nodes that are connected.

The second type is characteristic-based trust, which is based on the social characteristics of individuals and groups [6]. This kind of trust refers to the understanding of the features and

characteristics of other people or institutions. In this kind of social network, the main paths or connections are not communication. Those nodes may be connected indirectly. They know each other by their directly connected nodes on the first floor, and especially evaluation from those strongly connected nodes can be more persuasive.

The third type is institutional-based trust, where individuals trust formal institutions to avoid the risk and uncertainty inherent in making investment decisions [6]. The generally accepted trust for some large institutions is based on their background. The country that supports them supports them or a really great number of participants and positive evaluations from other people. This is the final step for the first point that has been mentioned above, after a really long period of time to accumulate consumers and credit creation. They are widely known and trusted by people on social networks.

In the case of the Ponzi scheme, they promised an extremely high rate of interest, which accelerated the appeal of consumers because everyone wanted to earn more. By paying this kind of high-interest rate, people would be more confident, and this confidence can cover their fear of losing money. This ensured that a basic population of participants was invested in this project. When they truly gain the profit, they will completely trust this fraud. Meanwhile, according to the spreading information in the social networks, more people who do not connect with this project will also become participants in the project. After this process is repeated several time, people become more inelastic to this project; also, it will gain popularity that it can generate a way larger social networks to ensure adequate supply to the funding chain.

3.2. Definition of the Star Network

A star network is a local area network (LAN) topology in which all nodes -- personal computers (PCs), workstations, or other devices are directly connected to a common central computer that is often referred to as a hub [8]. However, when it is used to describe the relationship between different nodes in the social networks, it means that one main node in this social network radiates to the surroundings, providing information and communication.

As the Ponzi scheme becomes a focus of different nodes, the information will spread immediately through the star networks to the second, third, or even more floors as it can be communicating and behavior studying. The strategy of marketing a product by targeting a small number of individuals, which triggers brand awareness among all the members of the network through self-replicating viral diffusion of messages, is known as viral marketing, and this spreading method is more efficient compared with traditional one [9,10].

As the Ponzi scheme take high profit as bait, the process even accelerated in this way. For the communication aspect, when people know about this high-profit project, they will introduce them to their families and friends (secondary participants) by talking to them. Based on the trust between those strongly connected nodes, people will be more likely to choose to trust. When they gain the benefits themselves, they will also introduce it to their strongly connected networks, and this process will repeat and repeat again to spread to a large number of people. The principal can be explained as nodes transferring the information to their strongly related networks. The process repeated from the first floor to the second floor, then to the third floor, until it became a consensus in this huge network. As people at first didn't realize the problem and kept their confidence in this project, the followers will also choose to keep investing. In this way, misinformation can be spread to a large number of people and will lead to the mistaken confidence of investors in this project.

From the behavior learning aspect, people will learn behaviors from others, especially those people who are in the higher class. As soon as they find that many people are investing in this project, they will likely study their behaviors and follow them. However, due to the information gap between low-income people and high-income people, they will get this piece of information much slower than those of higher-class people. However, this also directly leads to the tragedy that those middle-class or lower-class people are the biggest victims. People in the higher class have speedy information and can react immediately when they find some problem or when they start to make losses. And poor people had no information, so they kept their mistaken confidence in the Ponzi scheme project and

even borrowed money to invest. Undoubtedly, the consequence is sad that most of them are making a huge loss and even lose the ability to repay their debts.

4. Suggestions: Problems Solving and Optimizing Strategies

4.1. Countries Perspective

Firstly, governments should introduce a comprehensive regulatory system to restrict fraud. After learning about the experiences of Ponzi schemes, the government already realized some loopholes in the economic systems. Based on the characteristics of this type of scheme, this study's suggestions to governments for regulation-making include: 1. Strictly check the authenticity of the company's products and pay more attention to companies that launch virtual products. Basically, all MALI scheme organizations start by launching a fictitious investment product to make their company more persuasive and reliable for those investors. The government should set a strict supervision mechanism for such companies. Also, a personal survey of the operator and a clear form of the company's financial expenditure can be necessary. On the one hand, by understanding the background information of the operators, credit and risk assessment agencies can generally infer the risk level of this person. If he is a long-term borrower and his credit level is not enough, or he has participated in fraud before or has some related experiences, then they should be the target of focus of the government. However, during this process, governments should conduct a detailed investigation to ensure that who is the real controller of the company, or the government may be cheated by those fraud organizations that they find an innocent person to bear the responsibility that they promised someone with low education level really high salary level to bear the responsibility for them. A clear financial outcome form can illustrate the trend of investment funds. However, Central financial institutions should also ensure the accuracy and credibility of those forms.

Secondly, strengthening the control of the Internet is also an efficient method. Nowadays, the Internet has already become the main communication channel of information. Social networks on the Internet are really various and include different levels. For most people, the Internet is their main way to obtain information. Undoubtedly, this kind of method is extremely convenient for people, but the quality of network information is uneven. This can bring some opportunities for those fraud institutions to spread their fake information, as the spreading speed of information is extremely fast on social media networks. This can mislead many people, especially those who have a low education level. Under the temptation of high profits, they might invest without considering, which directly leads to making a loss.

Thirdly, the government should propagandize fraud to the public to enhance their awareness of prevention. People usually lack the cognition of the accuracy of online information, and they usually lack judgment of that information, especially for those people in the social networks who lack updated information. They will think they are really lucky, but in fact, this group of people mostly make a loss in this fraud. That's the reason why the government should make some universal education to decrease the possibility of being stuck in those frauds.

4.2. Industries and Firms' Perspective

Various firms should prevent falling into those frauds by observing and communicating with other nodes in the social networks and deducing their investment decision carefully under the premise of ensuring that they abide by the rules themselves. Companies should have a long-term follow-up of the company before determining whether to cooperate with it or buy stock of it. Through a long period of observation, they can generally deduce what this company is like and whether it is valuable to invest in. However, the most essential part is that this is a risk aversion phenomenon. Companies can reduce their risk level in this way. However, the disadvantage of this method is that it has an extremely high time cost. This enhanced the opportunity cost of the firm to invest, which can lead to loss of profit caused by missing the chance to invest at the lowest price level to some extent. Due to this reason, this study would be more likely to suggest a method, which is the combination of

communication and observation, which are also the main methods of nodes in a social network to study each other. On the one hand, the user can get others' opinions of the firm that the user targeted. By asking other investors, users can know how this company treats their investors, whether their profit rate is high or low, or what the credit level of this firm. Users can not only determine whether it's valuable to invest, but they can also have a general impression of how reliable this firm is. This can reduce the investment risk when making the decision. By asking consumers, users can know how much they trust the firm and their demand change tendency, which can also be useful. That information can enhance user efficiency significantly when determining investing behaviors. However, this condition is based on the user not really trusting those people the user asks for advice and suggestions. It's better to find some closely connected nodes in social networks.

4.3. Individual Perspective

Individual investors are the most vulnerable to the financial investing market. Most of them lack a high education background or clear cognition of the conducting mechanism of the stock market. Most of them look at the profit rate of the investing products to decide which bonds to buy. This led to the tragedy that they are so strengthless, facing some professional investing institutions and fraud institutions. In the Ponzi Scheme, individuals have the most serious losses due to their greed, which is why they want to earn more. Also, a lack of information can become a determining factor. Based on this kind of situation, this study's suggestions are as follows: Firstly, individuals should enhance their cognition level by learning more and doing more study and research on a specific firm or stock instead of looking at the profit rate. More research can help people make decisions that are more rational and reasonable. Some people regard buying bonds as the more efficient way to earn money compared with earning a fixed salary every month. To gain a high return, they usually invest a high percentage of their deposit in the bond market. High returns are. Accompanied by high return is high risk. Most of them invest a lot and make a big loss. So, the second suggestion is to control the proportion of users who invest. Unless users are super confident in a specific bond or really confident in the general tendency of growth, the user should control their amount of investment and not be too greedy. Thirdly, people should make their decisions about investment after they learn about the timely news. In this way, the user can have a preliminary deduction of the tendency of growth of the world economy, and the user can determine whether this is a good chance to invest and which industries are worth to invest.

5. Conclusion

5.1. Main Findings

This passage mainly researched the conducting mechanism of the Ponzi scheme and the role of social networks in this passage. This research concludes that the Ponzi Scheme is a typical representative of a star network, which is the main type of model in social networks. The main methods included in information exchange in this type of social network are observing and communicating. There is a hierarchy in the information exchange process, which leads to an information gap between nodes in the first stage, second stage, etc. People at the bottom of the hierarchy of information exchanges are most likely to make a loss in this fraud, and suggestions include making strict laws and strengthening supervision of firms, strengthening the control of the Internet, propagandizing useful information, and enhancing people's awareness of prevention for the government. Long-term observation and more communication with other nodes in social networks are pieces of advice for firms, and it's better to reach a combination of these two methods. For individuals, the suggestions include, firstly, doing some research on scholar-targeted firms and bonds. Secondly, the proportion of the investment and quantity should be controlled. Thirdly, learn some timely news and analyze them.

5.2. Conducting Mechanism

The conducting mechanism can be generally concluded as a fraud institution producing a hypocritical investment product with the promise of an extremely high-interest rate in a short period of time. Information spreads through the social networks at each stage of the hierarchy to appeal to a higher amount of the population. During this process, high interest and low periods of time have accelerated the processes of credit built between the gateway node (Ponzi's firm) and sensor nodes (investors), which means that those nodes are sensitive to this investment. Information spreads through social networks in the form of radioactivity, and it spreads speedily. By paying back the interest that has been promised before, people build trust in it and start to invest more. Meanwhile, the reputation of the firm became better in the social networks, and people regarded it as a reliable source of investment, so more of the population appealed to this project. At last, when the funding chain can't afford the large amount of interest that they have to pay, the fraud fails.

5.3. Limitations

The limitation of these frauds (Ponzi Scheme) can be concluded as follows: 1. Uncertainty of the future tendency of economic growth. One of the main reasons that the Ponzi Scheme fails is the economy is facing depression, and people lose their confidence in investing, and they want to get their money back. This leads to the failure of the funding chain of the fraud organization. 2. People's cognition level and awareness of this kind of fraud. People at that time had a low education level, and their awareness of fraud was weak. Also, the Internet was not developed at that time, and people lacked information and awareness of these frauds, which led to their misbelief. Nowadays, people have a higher education level than in the past century, and the Internet is more advanced now that people can get some information from the Internet. However, with the development of society, their scams have also had a large improvement especially through the Internet

References

- [1] Baesens, Bart, Veronique Van Vlasselaer, and Wouter Verbeke. *Fraud analytics using descriptive, predictive, and social network techniques: a guide to data science for fraud detection*. John Wiley & Sons, 2015.
- [2] Baker, Wayne E., and Robert R. Faulkner. Social networks and loss of capital. *Social Networks*, 2004, 26 (2): 91-111.
- [3] Zhang, Zhiyong, and Brij B. Gupta. Social media security and trustworthiness: overview and new direction. *Future Generation Computer Systems*, 2018, 86: 914-925.
- [4] Cortés, Darwin, Julieth Santamaría, and Juan F. Vargas. Economic shocks and crime: Evidence from the crash of Ponzi schemes. *Journal of Economic Behavior & Organization*, 2016, 131: 263-275.
- [5] Bonchi, Francesco, Carlos Castillo, Aristides Gionis, and Alejandro Jaimes. Social network analysis and mining for business applications. *ACM Transactions on Intelligent Systems and Technology (TIST)*, 2011, 2 (3): 1-37.
- [6] Rathore, Shailendra, Pradip Kumar Sharma, Vincenzo Loia, Young-Sik Jeong, and Jong Hyuk Park. Social network security: Issues, challenges, threats, and solutions. *Information sciences*, 2017, 421: 43-69.
- [7] Colladon, Andrea Fronzetti, and Elisa Remondi. Using social network analysis to prevent money laundering. *Expert Systems with Applications*, 2017, 67: 49-58.
- [8] Thieme, Susan. *Social networks and migration: Far West Nepalese labour migrants in Delhi*. Vol. 7. LIT Verlag Münster, 2006.
- [9] Onu, Ifeyinwa Jacinta, Abiodun Esther Omolara, Moatsum Alawida, Oludare Isaac Abiodun, and Abdulatif Alabdultif. Detection of Ponzi scheme on Ethereum using machine learning algorithms. *Scientific Reports*, 2023, 13 (1): 18403.

- [10] Chen, Weili, Zibin Zheng, Jiahui Cui, Edith Ngai, Peilin Zheng, and Yuren Zhou. Detecting ponzi schemes on ethereum: Towards healthier blockchain technology. In Proceedings of the 2018 world wide web conference, 2018, 1409-1418.