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Thesis on

Financial Markets and Institutions

Pyramid Schemes: Will Ponzi Always Succeed Against Regulators?

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Introduction

Nowadays, the economic system is increasingly interconnected with the financial system. In order to have an efficient and well-functioning economy, solid, secure and constantly growing and evolving finance is needed. Likely shortcomings in the financial system can have disastrous effects on the economy. This is why it is necessary to pay particular attention to the possible pitfalls of finance, with an eye on fraud. In particular, this study concerns one particular type of fraud, highly diffused among investments funds and, more generally, among every kind of investment: the so-called Ponzi scheme. This scam firstly came out in 1929 in the U.S. and take its name by the Italian immigrant Carlo Ponzi, the first perpetrator. The Italian swindler has been followed by other con men, who have innovated and enforced the scam in different financial contexts, leading investors and financial system as a whole to blame the blow. Striking case is the one of Bernard Madoff, former president of NASDAQ, who gave a loss of nearly $70 billion to the system in 2008, worsening the already awful financial condition of the crisis.

This paper, therefore, has the objective to analyse which are the effects of such widespread Ponzi Schemes on financial markets and understand how financial regulators cope and act against this problem, and their efficiency in contrasting Ponzi. The work wants, in addition, to study if different approaches could exist to handle the fraud more efficiently and with the aim of preventing Ponzi crooks' activities.

Of special regard about Ponzi scheme is its versatility. It can be applied in many different ways and in many different subjects. Indeed, many variants exists, depending on the field taken into account. Even if the thesis is focused on financial arguments, the fraud is not exclusive of this matter. Moreover, it changes even inside a unique area. Hence, this feature is the one that gives hurdles to market regulators in the detection and in the application of effective actions.

However, versatility is not the sole characteristic that do not allow authorities in good actions. Of high interest, is the fact that this scam in order to be applied use as first thing psychological action, and only after that technical aspects come out. Fraudsters use to target specific kinds of investors, aiming at their weaknesses and their needs, exploiting thereafter the irrationality coming from their weak points. Here is another main concern for financial regulators: their actions cannot be concentrated solely on the technical structure, even if this last is quite trivial. They

have to give relevance to psychological analysis of consumers. The analysis of the mental attitudes is not limited to those who are scammed, but to scammers too. This because Ponzi scheme has the peculiarity to fail certainly, and con men knows this at inception. Curious is therefore to understand why even if the scheme will collapse, there are so many individuals perpetuating them, being aware to be discovered at the end of everything.

Therefore, the thesis studies in the first chapter the main characteristics of the Ponzi frauds, common in every case, and the failure that they give to the entire financial system. This is made through the analysis of some striking cases happened in the past. A general picture of the fraud functioning is described, going to see which actions are taken by fraudsters and the characteristics of the preferred victims. Features of investors cheated are studied through two econometric analysis. It is important, in order to understand entirely how frauds work and their consequences on financial system, the contextualization on a financial crisis environment.

After reaching an idea of fraud behaviour, in the second chapter the aim is to see how regulators act to defend consumers and the system against the fraud. A brief description about the evolution of normative and regulations on this topic is given in the first paragraph. Followed by the explanation of actual normative describing ways of action and measures taken. Analysing this, main weaknesses in the financial regulatory system are detected, and whys for a continuous success of Ponzi scheme against regulations find answers.

As aftermath, in chapter 3 the will is to give proposals to a more efficient and effective regulation system. Proposals are of two types. The first is technical, in which tips on possible technical analysis are given. In fact, statistical analysis model and mathematical model to detect as soon as possible the fraud are presented. The second type of proposals are organizational: rethinking of the system and which should be the objectives of regulations. Then, the chapter concludes in the analysis of such proposals and possible difficulties that may be faced in their implementation.

Chapter 1

1. Pyramid Schemes: Threats to Financial Markets

1.1. Origins and Most Striking Cases

One of the most frequent financial scams is the so-called Pyramid Scheme, also known as Ponzi Scheme. The name derives from the Italian swindler Charles Ponzi, who, in the 20s, migrated from Romagna to North America, and, here, he began one of the frauds that will prove to be among the most profitable and most difficult to eradicate in the financial world.

This scheme, has not a precise definition, given it is applied in a wide variety of configurations. Black's Law Dictionary defines a Ponzi scheme as "a fraudulent investment scheme in which money contributed by later investors generates artificially high dividends or returns for the original investors, whose example attracts even larger investments. Money from the new investors is used directly to repay or pay interest to earlier investors, [usually] without any operation or revenue-producing activity other than the continual [deposit] of new funds"[1].

Therefore, what we understand from this definition is that more money is needed in each set of transaction in order to satisfy the investors of the previous participants. Let assume, for instance, a Ponzi crook promises to an investor a return of 20% on an investment of $100,000 in a one-year period. At the end of the first year the crook should approach another investor promising the same results but demanding an initial investment of $120,000 (= first investor principal plus the return promised). If investor number 2 accepts the proposal the scheme perpetrator takes the money and pays the first investor. So, another investor must be found asking for an investment of $144,000 (= second investor principal plus the return promised). The procedure has the possibility of running infinitely until the crook is able to find new investors from which raising funds needed to pay earlier investor. However, the scheme reaches a point at which is difficult to find other investments, or investors suddenly wants to withdraw all their investments, causing the fraud to fail[2].

1: Eisenberg, D.T., Quesenberry N.Q., 2014. "Ponzi Schemes in Bankruptcy". *Touro L. Rev.*, Volume 30, page 502.
2: Eisenberg, D.T., Quesenberry N.Q., 2014. "Ponzi Schemes in Bankruptcy". *Touro L. Rev.*, Volume 30, page504.

With this kind of scam Charles Ponzi, in a two-year period of time (1919-1920), defrauded investors of over $4 million, which are, more or less, $120 million in 2015 dollars

Despite the Italian swindler gives the name to the fraud, he is not the first implementer of it. The New Yorker William Miller, in 1899, is credited with the creation of the cheat, stealing $29 million of actual dollars persuading the investors that he had found a method to evaluate companies' earnings that offered a huge return.

The fraud has perpetuated until our days, with many fraudsters that has taken out billions of dollars. In fact, from Table1 we can see which are the main "History's infamous Ponzi Schemes"; and these are just some of the hundreds of such frauds that still today verifies.[3]

Table 1: "History's infamous Ponzi Schemes"

Schemer	Year	Amount Scammed (in 2015 dollars)	Prison Sentence
William Miller	1889	$29 Million	10 years
Norman Hsu	1992	$93 Million	24 years
Charles Ponzi	1920	$120 Million	5 years
Lou Pearlman	2008	$360 Million	25 years
Gerald Payne	1996	$614 Million	27 years
Scott Rothstein	2010	$1 Billion	50 years
Tom Petters	2009	$4 Billion	50 years
Allen Stanford	2012	$8 Billion	110 years
Bernie Madoff	2008	$73 Billion	150 years

Source: (Hussein, 2016, revised by David C. Williams)

Among all, stands out the name of Bernard Madoff, former non-executive chairman of NASDAQ stock market. Other than playing out the biggest Ponzi scheme in history, he had executed also the longest one. In fact, even if he admitted to the court the fraud began in the early 1990s, according to the trustee Irving Picard, everything began by 1980s.

3: Williams, David C. 2017. "A timeline and fraud triangle analysis of the sec's Madoff Ponzi scheme investigation". *International Journal of Business & Public Administration*, Volume 14, pages 98-105.

Madoff, after suffering huge losses with a European bank in 1990s, rather than admitting this loss to its clients, began playing out false return. Investor funds were placed into a single Madoff Investment Securities bank account. While Madoff told investors that the funds were closed and no more investors could be accepted, he continued to raise funds. Here starts the scheme in which longer term investors were paid off with the funds of new investors. In addition, Madoff personnel, when people wanted to withdraw funds, used to fabricate investment transactions to cover-up the fraud.

NASDAQ president was able to keep the scheme functioning for so long given many factors. His reputation was one of the main and starting point that gave him the possibility of implementing such scam since his firm was one of the largest market-maker of Wall Street. Moreover, the returns he offered were quite high, but not so unlikely. He promised returns of 10-13% per annum in good and bad markets, involving also the purchase and sale of panoply of financial instruments as derivatives or stocks. Another factor, one of the most important, is the affinity factor, defined by the SEC (Security Exchange Commission) as follows: "Affinity fraud refers to investment scams that prey upon members of identifiable groups, such as religious or ethnic communities, the elderly, or professional groups". Since Madoff belonged to the upper crust of Jewish society, he focused on luring many important people of his community. Last factor is the usage of two separated business activities: financial adviser and accountant. Indeed, Madoff, operated as a broker-dealer with an asset management division, avoiding the need of an independent custodian whose job is to make sure that the assets are actually there; and he gave the auditing task of financial statements to a three-person accounting firm.

All these factors are the most relevant of Madoff case since they can be considered at the base of the usual Ponzi scheme run nowadays. There are, in fact other similar cases, not so striking as Madoff one, but still significant which has been conducted with such affinities.

For instance, Kenneth Wayne McLeod, a broker and investment adviser from Jacksonville, spent years targeting, as investors in a Ponzi scheme masquerade as a bond fund, federal agents, agents of the FBI, of the Drug Enforcement Administration (DEA) and other government employees. He was able to convince this group of people, because for twenty years he had held seminars to government agencies to help employees to understand better the intricacies of the US federal retirement system. Thus, also in this case we can see the affinity group fraud. Other

than this and the confidence his person gave to investors, he also promised returns on the investment of high but not unbelievable estimates (8-13%), so investors were attracted, but not scared since the investments were secured, according to McLeod, by government bonds. Therefore, in such a manner he was able to cheat nearly $35 Million used not in the investments he said he was doing, but for personal and lavish purposes.

Another case is the one of the Australian accountant Allan McFarlane, who has robbed, over 80 people an amount between $30 and $40 Million. McFarlane hit its own township in South Australia, where almost all people had from few thousand dollars to millions invested in the scam. He made people trust him advising them on their financial status and business plan, offering to manage their superannuation and by paying small, stage-managed returns of investments over time. However, statements were issued showing interest paid and balances but short in detail and difficult to reconcile. And this because the money was actually used for its luxurious lifestyle and to create his image of trustworthy person. Also, in this case two business activities were involved, that is accountant and finical adviser.

Many other examples of Ponzi schemes can be done, and all of them would be different in the application, but almost all have the factor described above in common. [4]

1.2. Actions, Targets and Victims of Pyramid Schemes

Action of Ponzi and Pyramid scheme

Ponzi scheme is a scam where victims are coerced into investing in entities that does not exists. The main strategy used in order to keep the scam running is the rollover of investments and the re-investment of paper earnings. The ability of Ponzi's crooks is the capability of convincing investors in the rollover into a new investment cycle of the "profit" already made. In such a manner, investors will never have their earnings in hands, but they will always see them on a statement. This helps scammer to have more time to find new people to insert in the scheme. Moreover, the enthusiasm given by the profit registered on the statements leads people to share the "success" of

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4: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.

their investments with family and friends which may be tempted to make investments. "Portfolio managers" are facilitated, then, in finding new investors thanks to the help of their client and on the psychological effect given to them. It is for this that schemers focus on a particular group: they do not need to modify particularly their way of attracting customers and they are supported by their clients which easily convince other of the same groups.

Therefore, the fraud relies on the ability of the fraudster to raise new funds in order to being able to repay the investors arrived earlier. In case the number of investment increases, while it becomes harder to find new investors that put capital in the hand of the scammer, the entire system collapses. In other words, the claims of capital from investors in the scheme (schemer's liabilities) are higher than inflow of flows from new investors. This is the reason for which a Ponzi scheme is always considered insolvent ex ante. The number of investors needed to run the scheme should be enormous

However, a Ponzi scheme, even if there are no added investors, may, anyway, last long if who is already a client reinvest and add other money without withdrawing.

This is the main distinction from a pyramidal scheme. This second fraud, in fact, is based on the concept that the compensation of clients is for searching out and introducing new participants into the venture. So, the success is dependent on luring in new members. Failing in this means no income into the system and collapse of the scam. Here the need of an astronomical number of new investors is the supporting point of the structure in order to work and last as much as possible.

A pyramid scheme involves an initial investor that receive money by recruiting others in exchange of high return.[5] New members, recruiting other people, receives money with the same promise and so on so forth until the system self-collapse. Assuming the process last long, the collapse occurs because at a certain point, at the base of the pyramid, people ends: as shown in Figure 1, at the base of the pyramid there is the need of more people than the world population.
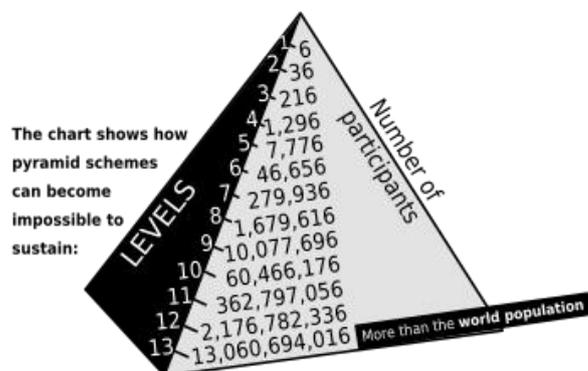
What stands out is that schemers of the two models are similar in the way of acting. Both require a continuous stream of investments and rely on trying to convince people, giving good earning prospective, trying to delay as much as possible the

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5: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.

withdrawal of the fictitious profits and creating a sort of chain and interdependence among members.

Figure 1: "Pyramid scheme collapse"

The chart shows how pyramid schemes can become impossible to sustain:

LEVELS / Number of participants

1 - 6
2 - 36
3 - 216
4 - 1,296
5 - 7,776
6 - 46,656
7 - 279,936
8 - 1,679,616
9 - 10,077,696
10 - 60,466,176
11 - 362,797,056
12 - 2,176,782,336
13 - 13,060,694,016 More than the world population

Source: https://en.wikipedia.org/wiki/Pyramid_scheme

Objectives of the fraud

The aim of fraudsters has not a rational foundation. Many scholars have tried to understand which are, other than a sporadic greed, the main reasons pushing crooks to play out such scams. Psychologists have studied different cases of Ponzi schemes dwelling on the figure and on the way of action of schemers in order to examine possible objectives. What psychologists have concluded, in most cases, is that motivation is only the will to live with a certain standard of life. It is a high standard, playing the role of generous philanthropists, sponsoring community events, charming social networkers and living the grand life, yet at the same time seen as skilled financial and investment advisers. Other than this desire of luxury and fame, no other reasons can be seen to justify the implementation of pyramid schemes.

Nonetheless, scholars have analysed that schemers set what can be called intermediate goals. These have the only purposes to reach the final result of gathering as much money as possible for a personal use. Hence, goals are solely operational.

What con men want to leverage is trust. Trust is a focal point in our everyday life, and with the growing, development and enhancing of financial system has become a crucial point, too important, for the life and the functioning of financial activities. Each of us tries to put money aside during life for different purposes, among which there is the sustaining of our main needs. That is why most of our investments are in pension funds and in contribution schemes, which essentially is putting our money in portfolio managers' hands, given most of us have no knowledge of how properly manage our wealth. Here comes the trust, and here come crooks, who wants to exploit this aspect. Mock portfolio managers, therefore, aim to present themselves as

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the "nice guy", magnifying in his caring, ability to love and kindness. This helps them in the process of convincing people.

Another image scammer wants to give is the one of an entrepreneur, always optimistic, confident and assured.

Ponzi implementer gives the idea of safety, respectability and professionalism, carefully selecting clients, talking about safe investments, secured by bonds or other securities; talking about partnerships and collaborations with big and important banks and financial institutions.

Another aim to run the fraud is to transform first investors in "songbirds". With the illusion given of huge and quick returns on principal, clients become unconsciously missionaries, making advertising campaign.

Thanks to the analysis of this modus operandi scholars have identified what are the social factors leading to gullibility crooks aim for: situation, cognition, personality and emotion.

➢ Situation: in financial decision, consists in the investor wealth condition that could influence more or less the decision of a profitable offer but with high risk profile. If social and other situational pressures are strong a gullible behaviour is more likely to occur.

➢ Cognition: essentially is the lack of knowledge and of clear and rational thinking. This does not mean no intelligence, but just gullibility.

➢ Personality: high-level personality gives, as said before, the illusion of safety. As in Madoff case, moreover, people were, in some sense, privileged in entrust money in NASDAQ president hands.

➢ Emotion: the excitement of making quick profits lead to a greed behaviour of enhancing and protect wealth. In such a manner rational thinking slides away, replaced by gullibility.[6]

Victims

Therefore, for what said just above, we have partially identified a kind of people scammers want to cheat:gullible and easy to convince people. However, these are only characteristics obtained by con men skills. In fact, some econometric analysis,

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6: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.

based on an empirical approach, have been conducted identifying other characteristics and conditions that help us in understanding who more easily may fell prey.

In particular, I would like to highlight two econometric analysis which end up with very similar results. The first has been conducted by professor Benjamin Amoah, lecturer in Banking and Finance at Central University of Accra (Ghana) and researcher, among others, in interest of financial fraud. The second has been elaborated by Professor David Tennant of the University of West Indies (Jamaica).

Both Ghana and Jamaica from 2002 to 2008 experienced an increase in unregulated investment schemes, so their condition as far the presence and characteristics of pyramid schemes became remarkably similar to Ponzis all over the world, and so similar to USA, where between 2000 and 2012 have been detected more than 300 pyramid schemes[7].

An interesting point in the two studies is that both Ghana and Jamaica inhabitants tend to group according to socio-economic conditions: easy, therefore, for scammers to exploit the affinity factor.

On the other hand, the analysis of Professor Amoah differ from the one of his colleague in that he takes as sample people both victims and non-victims of Ponzi schemes using logistic probability model; professor Tennant adopt an ordinary least square (OLS) methodology analysing also victims of the scheme and their risk exposure.[8]

Professor Amoah econometric analysis:

Questionnaires have been submitted to a sample of 800 people, with a purposive technique in the sense that everyone had to be educated and have some form of investment; but with a random technique too, meaning that whoever have the previous characteristics, the chance to be selected were random.

The victimization relationship is represented by Figure 2[9] which represents the variable used.

7: Williams, David C. 2017. "A timeline and fraud triangle analysis of the sec's Madoff Ponzi scheme investigation". *International Journal of Business & Public Administration*, Volume 14, pages 98-105.
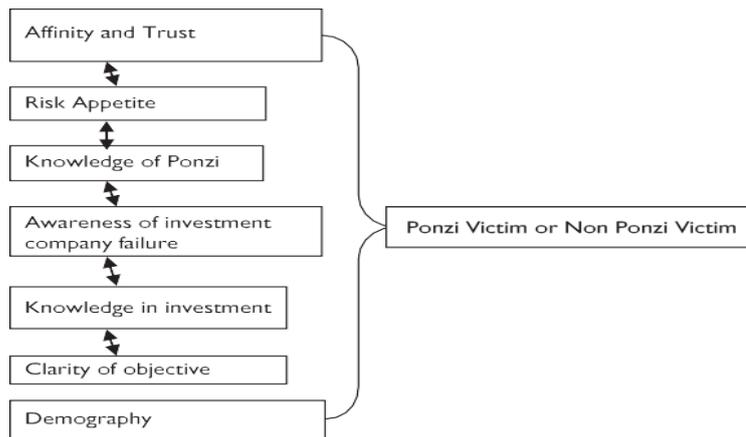8: Amoah, B. 2018. "Mr Ponzi with fraud scheme is knocking: investors who may open". SAGE journals, Volume 19, pages 1115-1128.

9: Affinity and trust: represent the investor gullibility concept→Affi (+)
Risk appetite: likelihood of changing current investment if promised a return higher than the current one. →Riskapp (+)
Knowledge of Ponzi: respondents' understanding of Ponzi scheme, where respondents are scored depending on items such as registration of a company, provision of audited accounts, lack of qualified personnel, friends and close relations referral, consistently reported high performance, promised high

Figure 2: "Investor's Ponzi victimization model"

Source: "Amoah, B. 2018. "Mr Ponzi with fraud scheme is knocking: investors who may open". SAGE journals, Volume 19, pages 1115-1128."

The dependent variable is a binary measure which takes the value of 1 if the respondent is a victim, and 0 otherwise.

The logistic function is given by:

$$prob(y_i = 1) = \frac{1}{1 + exp^{-xi\beta}}$$

The result is given by the model:

$$vicponzi = f(Affi, Invknown, Riskapp, InvFail, UndPonzi, UnInvPdt, Demo, \varepsilon).$$

Professor Tennant econometric analysis:

Professor took 402 victims among 17 Ponzi schemes as sample of his analysis. The sample in this case, is not selected randomly, but using convenience sampling technique.[10]

Firstly, Tennant theorized some relationship to identify the independent variables. Among the most relevant variables there are gullibility and risk tolerance, each of which depends on other factors (*EXPOSURE = f (GULL, RISKTOL)*):

➢ Gullibility (*GULL = f (IRAEXUB, COGN, PERS, EMO)*) is highly influenced by irrational exuberance, cognition, personalities and emotion. The first one is in

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return, and so on. High scores of respondents mean high understanding of Ponzi schemes. →UndPonzi (-)

Awareness of investment company failure: measure of the awareness of the national financial market. →InvFailn(-)

Knowledge in investment and investment products: respondents' basic investment knowledge. →Invknow (-), UnInvPdt (-)

Demography: includes educational level (-), income (+), marital status (-,+), gender (-,+) and age (-). →Demo

ε: error term

Y is a binary variable assuming the value of 0 or 1,

x is the column vector with a p+1 dimension,

p is the number of independent variables,

β is the unknown own parametric vector to be estimated.

10: The model is simplified with respect the one in the article from which it is extrapolated.

turn related to the number of investors known which are participating in a Ponzi scheme and to the number of friends participating in such scheme (*IRAEXUB = ƒ (NUMPONZI, FRIENDPONZI)*). Cognition is related to finance knowledge and/or lapses in clear thinking due to self-deception (*COGN = ƒ (FINKNOW, SELFDECP)*). Personalities is influenced by individual trusting nature and tendencies towards impulsiveness and risk taking (*PERS = ƒ (TRUST, IRA)*). Emotion depends on the amount gained or lost by investing in Ponzi, which can in some sense define the level of greed of an investor (*EMO = ƒ (AMTGAINLOSS)*).

➢ The willingness, of an individual, to take financial risks is influenced by certain characteristics such as demography, socioeconomical condition and attitude (*RISKTOL = ƒ (DEMO, SOCIOECON, ATTITUDE)*). Demography has many variables which alters its value as sex, age, marital state, occupation (*DEMO = ƒ (SEX, AGE, MARSTAT, PROF, BANKER, CLERICAL, MANAGER)*). Socioeconomical condition depends mainly on income levels and educational attainment (*SOCIOECON = ƒ (INCOME, EDUC)*). Then, there is attitude, which has variables as economic expectations, tendencies to impulsiveness and risk attitudes and financial knowledge (*ATTITUDE = ƒ (ECONEXP, IRA, FINKNOW)*)

Thus, the regression model used to obtain the level of exposure is the following[11]:

$$\ln Exposure_i = \alpha + \beta_1 IRAEXUB_i + \beta_2 COGN_i + \beta_3 PERS_i + \beta_4 EMO_i + \beta_5 DEMO_i + \beta_6 SOCIOECON_i + \beta_7 ATTITUDE_1 + \varepsilon$$ [12]

With the results obtained by the two studies, conclusions reached very similar results. The analysis, first of all, confirm the positive relationship between affinity and trust with Ponzi victimization, hypothesized by scholars. On the contrary, the negative relationship among educational level and Ponzi victimization (higher educational level, lower is the chance to fell prey) has been contradicted. From results, both Amoah and Tennant get to the conclusion that is not sure that a more intelligent and best educated individual is more careful in being victimized. Ponzi scheme, in fact, used to lure in people with a low level of understanding of Ponzi and its red flags, independently whether the investor reached academic level of study or not. However, competences in financial world is necessary for individual to understand better which the promised investment condition are.

11: Tennant, D. 2011. "Why do people risk exposure to Ponzi schemes? Econometric evidence from Jamaica". *Journal of International Financial Markets, Institutions and Money,* Volume 21, pages 328-341

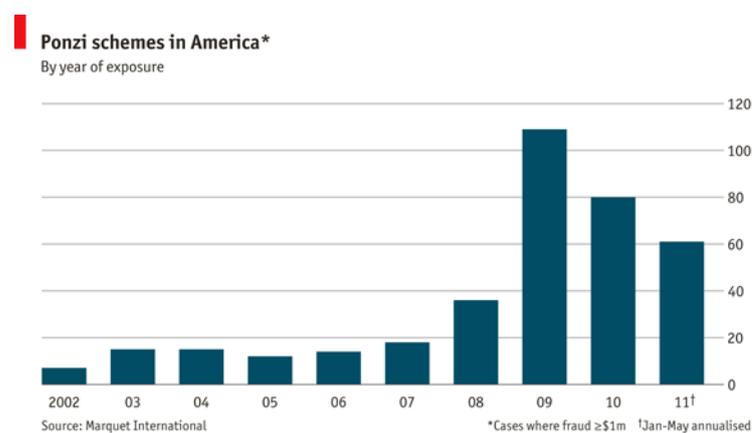12: i=each surveyed investor; βs= regression coefficient; ε= residual.

Moreover, the two professors, have concluded that risk appetite, although it has a positive relation with victimization is not highly relevant. What really matters in being more easily attracted by Ponzi scam is the socio economical condition as income level. High pressure on individuals of these conditions bring into the trap those who may be less affected from a psychological and character point of view.[13]

1.3. Ponzi and Financial Crisis

Ponzi schemes cannot be considered one of the causes that leads to financial crisis, at least for the past experiences. However, once there is an outbreak of financial markets crisis, pyramid scams are really dangerous, since they have an impact that worsens further the system conditions.

This impact is given by the fact that, in very bad times, people stop trusting markets' performances, and so they tend to ask for the withdrawal of all the investments made. Here the insolvency feature (liabilities > assets) of Ponzi scams comes out, and crooks are not able to cover all the money asked. Ponzi frauds emerge. Government supervision commissions begin more detailed investigation discovering also those frauds which were able to sustain the crisis effects until that moment.

Figure 3:"Growing number of exposed and investigated Ponzi and fraud schemes in the U.S from 2002 to 2011"

Ponzi schemes in America*
By year of exposure

Source: Marquet International   *Cases where fraud ≥$1m   †Jan-May annualised

Source: "http://teachingwithdata.blogspot.com/2012/01/economic-desperation-breeding-more.html"

For instance, in <u>Figure 3</u> is shown the growing number of exposed and investigated Ponzi and fraud schemes in the U.S from 2002 to 2011. From 2007 the number of

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13: Amoah, B. 2018. "Mr Ponzi with fraud scheme is knocking: investors who may open". *SAGE journals*, Volume 19, pages 1115-1128.

scams detected increased sharply, with a peak in 2009, the period of the burst of the subprime mortgage's financial crisis.[14]

This increase turned out not only in the U.S, but also in many other countries around the world, given the global impact of the crisis. Another example confirming the fact that Ponzi schemes to collapse need turbulent economic times is the Eastern Europe case in 1990s, in which countries such as Russia, Serbia, Albania and many others saw a huge number of Ponzi schemes coming out following the intense hard times. In addition, the great depression of 1930s, precipitated the downfall of Sweden's Ivar Kreuger, financier that ran an enormous Ponzi scheme. The global collapse of that time, revealed the balance sheet weaknesses of the investments of more than 200 companies acquired by the businessman and of the many other type of investors Kreuger lured in.[15]

1.4. Inefficiency and Losses Given to the Market

The effects of these scams in crisis period are, most of the time, masked by the heaviest effect of the financial and economic consequences. In addition, most of the schemes have faint monetary losses, except some as Madoff or Stanford's ones, which causes losses of $73 billion and $8 billion respectively[16].

However, the direct loss of money has not an important meaning in the inefficiency given to the markets. The loss for which it is worth dwelling is trust. Unearthing of many Pyramid frauds lead to a strong lack of trust in the financial system, which includes not just markets, but also banks and non-bank financial institutions. This problem is relevant, since our modern economy is based on giving to complete strangers' sums of money to be managed properly. Therefore, the failure in reliance on institutions that manages money and funds is added to the already present scepticism of market performance, leading to probable failures of large financial institutions, such as insurer, banks and securities broker-dealers.

14: http://teachingwithdata.blogspot.com/2012/01/economic-desperation-breeding-more.html
15: Tennant, D. 2011. "Why do people risk exposure to Ponzi schemes? Econometric evidence from Jamaica". *Journal of International Financial Markets, Institutions and Money*, Volume 21, pages 328-341
16: Williams, David C. 2017. "A timeline and fraud triangle analysis of the sec's Madoff Ponzi scheme investigation". *International Journal of Business & Public Administration*, Volume 14, pages 98-105.

A decrease in confidence on the ability of financial institutions to carry out their liabilities, dropped the Dow Jones Industrial Average from 12,474.52 on January 2007 to 8,776.39 on December 2008.

Furthermore, trust and confidence lost pour reward over governmental authorities, which should guarantee a strict control and monitoring over every institution and non that invest money on behalf of others. Indeed, many investors after the Madoff case came out, sued also the SEC, for the incapability of monitoring one of the biggest financial institution if the U.S.[17]

Public authorities have also the difficulty of taking care of bankruptcy process of all companies running Ponzi schemes. The main problem is that, once the bankruptcy is assigned to a trustee, the latter has to liquidate all the assets and repay the creditor of the company. As, well known, assets will never be sufficient to cover all debts. The trustee, then, should choose which are the first creditor in right of receiving the debt, making a list of creditor importance. In this manner, some investors in the Ponzi schemes will not have nothing paid back, losing every possibility of seeing back either the principal invested.

Hence, losing trust in institutions and authorities, make the financial system coping with relevant issues that, if handled in period of financial crisis, could worsen conditions, influence some of the strongest companies and institutions and enlarging time of recovering for the system.

17: Background: impairment of investor confidence in regulators. Smith, F. 2010. "Madoff Ponzi scheme exposes the myth of the sophisticated investors". *University of Baltimore Law Review*, volume 40, pages 215-284.

Chapter 2

2. Market Regulators Vs Pyramid Schemes

2.1. History of Regulations applied to Ponzi Scheme

Normative and regulations for investors protections find their origins in the period immediately after the outbreak of the Great Depression in 1930s. Speculators, during this period, borrowed money to invest in a stock market in which prices were often manipulated, and used pyramid schemes to increase gains. The switch from an analytical approach to a pseudo-analysis of facts and figures to support the delusion of the period, contributed to the widespread of fraudulent, dishonest and non-ethical activities, leading to huge losses sustained by the public.[18]

To counteract these abuses for the first time the "Securities Act of 1933" was enacted.[19] As stated in the act the purpose is "[…] *to provide full and fair disclosure of the character of securities sold in interstate and foreign commerce and through the mails, and to prevent frauds in the sale thereof, and for other purposes*."[20] The main content, therefore, requires registration of public offerings with the commission and imposes liabilitie and criminal sanctions on issuers, directors and officers of issuers, underwriters and accountants for prospectus of oral communications that include omissions or misstatements of material information. So, the aim is to verify if information disclosure in the registration is complete and accurate. Authorities try to prevent the distribution of securities in case the standard required are not fulfilled. This since regulators want to protect investors from possible false or misleading given by investment firms.

Hence, from now on, it begins the so-called "Disclosure-oriented registration regime for public offering". The information disclosed enables investors to make the best choice of investment. Generally, the registration of the security sold required by the Securities Exchange Commission is complete when in the file there are four main information:

➢ Description if the company's business;

➢ Description of the security offered;

➢ Description of management of the company;

18: Smith, F. 2010. "Madoff Ponzi scheme exposes The myth of the sophisticated investors". *University of Baltimore Law Review*, volume 40, pages 215-284

19: Smith, F. 2010. "Madoff Ponzi scheme exposes The myth of the sophisticated investors". *University of Baltimore Law Review*, volume 40, pages 215-284

20: U.S., 1933. "Securities Act of 1933"-Enacted May 24, 2018

➢ Certified financial statement.

The commission, however, do not require the registration of any kind of securities; intrastate offerings, offering of limited size and government securities are exempted.

The year after the securities act was enacted, another act was published: the "Securities Exchange Act of 1934". This state the birth of the SEC and its authority over the securities industry. It has the power to register, regulate and oversees brokerage firms, transfer agents and clearing agencies. Moreover, in the act are described which are the prohibit conducts and the actions and sanctions SEC may apply in case of breach of right conducts. Commission, furthermore, asks for disclosure in materials used to solicits shareholders' vote in annual or special meetings held for the approval of important corporate action. So, any possible behaviour not complying with regulations may be anticipated.

In 1940 came up the "Investment Company Act of 1940" which regulates the organization of companies, their behaviour, liabilities and way of acting with clients. In the same year was promulgated also the "Investment Adviser Act of 1940", which defines the normative and regulations about financial advisers: those compensated for advising others about securities investments. As financial investment firms they must be registered with the SEC and conformed to regulations designed.

These acts, with the evolution of financial system as a whole and with its most affecting international outlet, have been amended to enhance the protection of investors and to keep the path of an efficient market hypothesis, trying to avoid the too dangerous lack of trust by small and big investors. The rectification of acts follows hard times, as the last one in the period immediately after the Financial crisis of 2007-2009. This due to the easiness of coming out of fraudulent behaviour in economic downwards period. In 2010, indeed, president of the United States Barack Obama, signed "The Dodd-Frank Wall Street Reform and Consumer Protection Act", with which was reshaped the U.S. regulatory system in a number of areas including consumer protection, trading restrictions, credit ratings, regulation of financial products, corporate governance and transparency.[21]

The law enforcement to fight pyramid schemes in the U.S is the guideline for most of worldwide legislation. Since in U.S.A. Ponzi schemes came out earlier than in other countries, and since the financial system is based much more on investment banking,

21: https://www.sec.gov/answers/about-lawsshtml.html#secact1933- consulted on May 12, 2019.

legislators have been always active in modifying normative to fit at most the need of eradication of fraudulent scams. Then, regulations in other markets, such as European one, has been always followed the U.S. acts, enacting very similar normative as the ones contained in the MiFID II (Markets in Financial Instruments Directive; 2014/65/EU) and in the MiFIR (Markets in Financial Instruments Regulation; EU regulation n. 600/2014). Each single EU country applies its own laws as stated for instance in the Italian TUF ("Testo unico della finanza") which aims to set the intermediary finance, based on the European directive. What is relevant from the EU normative is that it is coincident to the U.S. one even in the history patterns from the birth of the Union until now.

2.2. How Regulators Act: Detection and Taken Measures

The identification by regulators of scams such as Ponzi schemes are complex process, which may be conducted in different ways. One of the main and principal action taken by SEC, ESMA (European Securities and Markets Authorities) and similars is the registration process.

Registration is the starting point to ensure an adequate supervision of good behaviour and compliance with financial regulations. The first step, for financial firms and banks in order to operate, is to file a demand in which they present all the characteristics required to be activated the business, as stated by the Title II, Chapter 1, Article 5 of the MiFID II. The aim, from the point of view of regulators, is to have trusted, competent and financially solid investment firms.

Other than specific capital requirements and corporate organization, market regulators ask for a complete documentation describing the kind of activities all types of investments intended to run, in addition to the employee's profiles. This, in order to verify the professionalism and the capabilities of the firm to operate in the market, and so to ensure that investors could be advised and assisted in the investment process.

Moreover, institutions with this procedure are able to monitor constantly the activities and behaviour of registered companies, looking for a continuous compliance over time of requirements. If the conduct is not in line with regulations or there is a change in some aspect of the firm which does not reflect a requisite directed by the law, or the change is in requirements which cannot be complied,

regulators may decide to deny some specific activities or even to undo the permission to operate in the market.[22]

In addition to registration of enterprises, authorities want registration of issued securities. This is one of the most significant point in order to ensure an efficient market and to protect investors. This main fundamental principle is asserted by the Securities Act of 1933, section 7, 77g (August 6, 2018). Here are described in general the required information, about securities and issuers, to collect in the registration statements. Each document required varies depending on the class of issuer, and if the specific information provided are not applicable to that class, but it is necessary to ensure consumer protections, the documents must be filed mandatorily. In addition, the Commission requires to present in the registration statement the consensus of the accountant, engineer, or appraiser, or any person whose profession gives authority to a statement made by him. The specific required documents are described by the Section 28, Schedule A (77AA) of the securities Act of 1933. Important to be highlighted is the point 4 where the act reads: "the names and addresses of the directors or persons performing similar functions, and the chief executive, financial and accounting officers, […]; of all partners, if the issuer be a partnership; and of the issuer, if the issuer be an individual; and of the promoters in the case of a business to be formed, or formed within two years prior to the filing of the registration statement". This intends to monitor, in first place, the capabilities, reliability, professionalism of the main figures of the companies operating the market. In addition, to ensure some safeness guarantees to the underwriters of a security, authorities ask issuer general characters of the business transacted (SCHEDULE A, point 8); a statement of the capitalization of the issuer (SCHEDULE A, point 9); a statement of all securities covered by options outstanding (SCHEDULE A, point10); "the net proceeds derived from any security sold by the issuer during the two years preceding the filing of the registration statement" (SCHEDULE A, point 19); the balance sheet of at most 90 days before the filing date, and the profit and losses of the latest fiscal year (Schedule A, point 25-26). From these requirements stands out the willingness of authorities to verify

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22: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065&from=IT#d1e7573-349-1. Consulted on May 16, 2019.

not only the professional credibility, but even the financial stability of the issuer, to be sure that everything is going to be as safer as possible for the clients.[23]

Although many financial enterprises are monitored and certified by government authorities, many cases of pyramid schemes run anyway. Companies in this situation, indeed, try to misrepresent or omit important information about securities, selling unregistered securities and stealing costumers' fund.[24] Authorities sometimes detect this behaviour thanks to the control on registered firms, but many other times the scam is either carried out in a non-detectable way or is performed by non-registered financial firms.

Considering the first option, regulators with their internal office of accountancy, or in collaboration with national accountant boards, begin an in-depth analysis of suspected firm's financial statements, of the activities and of all files which a possible track of infringement could be contained in.

Together with auditing boards, it occurs also a legal support coming either from a legal department of the same market regulators or from an external office. As stated in Title VI, Chapter 1, Article 68 of the MiFID II, collaborations among different authorities is possible if necessary and essential for the best compliance of the regulator supervision duties. This interconnectedness among different boards helps to exploit at most different subjects and analyse better financial companies' actions that are subjected to inquiries[25]. Highly evident is the case of the SEC, in the United States, which is sustained by the FBI investigation activities, and, in addition to its Enforcement Division's Financial Reporting and Audit (FRAud) Group, always referees to the National accountant board[26].

In the second case, where the regulator authorities are not able in detecting possible signal of breach of requirements and regulations, it becomes much harder the investigation process. As we can see from experience, evidences of existence of Ponzi schemes or other kind of market abuses come into light just when there is a self-collapse of the fraud, and so when the damage on consumers and markets has already occurred. Anyway, third parties often come in help of regulators to report possible bad behaviour of investment companies. A striking example is Harry Markopolos, an accounting and financial fraud independent investigator, who, in a

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23: U.S., 1933. "Securities Act of 1933"-Enacted May 24, 2018

24: https://www.sec.gov/enforce/how-investigations-work.html. Consulted on May 16, 2019.

25: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065&from=IT#d1e7573-349-1. Consulted on May 16, 2019

26: https://www.sec.gov/spotlight/financial-reporting-and-audit-task-force.shtml. Consulted on May 16, 2019

nine-year period, presented to SEC documents testifying the existence of a Ponzi scheme operated by Bernard Madoff. The investigator was not alone, as, from the birth of the scheme, outsiders contacted the SEC to complain Madoff 's operation. Regulators, therefore, are the first to spur who is doubting the work of financial enterprises to alert and file proof of the uncertain conduct. In this way, they receive many inputs to start accurate investigation and financial, legal analysis that may result in an infringement.[27]

A typical input received comes from the so-called whistle-blowers. It is defined whistleblowing the activity of disclosing wrongdoings by employers, partners, shareholders or stakeholders, who come to know the unlawful inside the working environment. Particular attention is given to this action, because may give rise to an easier investigation. It is known the immediate direction to take in order to verify the integrity of the tip received. Despite the importance, this practice is not so common, since many insiders of firms are worried in being a "spy", because of likely retaliation of the firm[28]. Hence, regulators take action to protect and remunerate such informers. In the regulation of the European Parliament and Council of 16 April 2014 n.596/2014, in the point 76 of the premise is stated that "[…] whistleblowing may be deterred for fear of retaliation, or for lack of incentives[…]Measures regarding whistleblowing are necessary to facilitate detection of market abuse and to ensure the protection and the respect of the rights of the whistle-blower and the accused person[…]".[29] This highlights the importance given to this way of detection and the necessity of it, ensuring any kind of protection and safeness of the mole. After the notification, in fact, the competent authority enters in the investigation process, addressing to the first suspected offices and figures, and to apply a more detailed investigation in case the whistle has been verified true.

Once the scam is surely detected the proceeding is brought under civil, administrative or penal action depending on the kind of violation and grade of impact on customers and clients. Still according to the type of breach, different sanctions are decided, based on the kind of procedure and on how the scam has evolved and how crooks acted until the detection and after[30]. As a line guide for the sanction can be

27: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.
28: https://www.sec.gov/spotlight/financial-reporting-and-audit-task-force.shtml. Consulted on
29:   https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R0596&from=it#d1e40-1-1.
30: https://www.sec.gov/enforce/how-investigations-work.html- consulted for 16 May, 2019

considered the TUF, Italian legislative decree n. 58 of 24 February 1998, modified with the update of the legislative decree n. 34 of 30 April 2019. The paper, following the MiFID II, has Part V dedicated to sanctions; classified in Penal sanctions, and Administrative sanctions. The first varies depending upon penal sanctions and market abuse, considering the kind of unlawful act and the company or person perpetuating it. The latter instead is based just on the kind of abuse conducted.[31]

Moreover, as the MiFID II and the Securities Act of 1933 both state, sanctions and penalties vary according to the state law, in line with the main directives, but always based on the singular law of the state (Member state in Europe and Federal state in USA). High relevance is given to willful violation and circumvention of stay of discovery, for which sanctions to apply should be more severe.

Sanctions may go from simple fees payment, to imprisonment, as in Madoff case. Most of the time they include payments of a share or total quantity of money stolen to consumers, and to other companies. In case the discovery of the fraud leads the company in bankruptcy, the process needs to take in consideration of the asset liquidation, thanks to which is possible to raise the remaining wealth in order to redistribute to creditors of the failed firm.[32]

2.3. Strength and Weaknesses: are regulations preventive or curative?

Despite the fact regulators and governments take particular attention to protect market efficiency, and investors, Pyramid and Ponzi schemes are still widespread threating markets and regulators. This means different things, among which the ineffective and insufficient protection by authorities.

Notable is that normative or regulations concerning directly Pyramid and Ponzi schemes do not exist. Regulators aim to give line guide to single actors, focusing especially on the behaviour of financial companies and the way of acting of vigilantes. Therefore, there are no directives on specific scam cases. Prevention (if included), investigation, and curative process are mainly in the hands of the single national law, following the national procedure. For instance, in Italy, the law 17/08/2005, n 173, in the article 5 paragraph 2 states that "*It is prohibited the*

31: "Testo Unico della Finanza", updated with the changes made by D.L. n.34 del 30/04/2019.
32: Smith, F. 2010. "Madoff Ponzi scheme exposes The myth of the sophisticated investors". *University of Baltimore Law Review*, volume 40, pages 215-284.

organisation and promotion [...] of the so-called "Sant'Antonio" chain, that configure the possibility of an earn through the mere recruitment of other persons and in which the right to recruit moves infinitely subject to payment of a fee".[33] Similar law can be found in the law of singular federal states in US, where each express the prohibition in a different way[34]. The diversity, even if thin, of state laws may result in a more complex coordination with the market regulator and among regulators, who may find difficulties in the implementation of right sanctions, and in particular in modelling a unique prevention method.

Another weakness, correlated in some sense with the previous one, is the vigilant investigation process. The evidence of this is strong in the already mentioned Madoff case. The investigation, over the course of 16 years, encompassed several divisions and regional offices of the SEC. In spite of the high quantities of outsiders' notifications, neither division was able to open a more in-depth analysis based on these files. Every documents presented to the Commission seem to be either ignored or studied superficially, rejecting all the notification thereafter. A review of the investigations by the Inspector General H. David Kotz (2009) revealed the whys for this way of acting of the investigators. Kotz said that the fail was due to the incompetence and inexperience of the investigation team, containing auditors that were either new, or untrained or the team did not include proper accounting professionals. In addition, second important point highlighted by the Inspector General is a breakdown in communication across SEC department and regional offices, which played a significant role in the persistence of Madoff Ponzi scheme. Here comes out the lack of a training, consisting not only in the subject of the individual, but also in the multidisciplinary of accountants, analysts, attorneys and whoever is included in the investigation team; other than a lack in collaborations among different departments[35].

However, it is not possible to generalize that each regulator world-wide has not well linked offices and untrained employers. It is too simplistic, and it does not represent the reality of the fact. There exists indeed, many market vigilantes who have a strong and well-functioning collaboration within its departments and also with other authorities. The Madoff case fits in order to highlight the extreme difficulty in

33: Legge - 17/08/2005, n.173-Gazzetta Ufficiale: 02/09/2005, n. 204

34: https://criminal.findlaw.com/criminal-charges/pyramid-schemes.html

35: Williams, David C. 2017. "A timeline and fraud triangle analysis of the sec's Madoff Ponzi scheme investigation". *International Journal of Business & Public Administration*, Volume 14, pages 98-105.

creating a smooth working vigilant system, and the tough task to search and train the best professionals in particular fields.

A hurdle for regulators offices' capacities, particularly the legal one, is most due to the nature of finance. Finance, as asserted by Minsky in his analysis of financial system fragility, is in continuous innovation. This unstoppable process of innovation of new financial products, practices and institutions make the task of government regulators extremely complicated.

Legislation should, in some sense, anticipate innovation and take everything under control, without leaving the system with gaps that may lead to fail or negative results. However, in this case, given the birth of new financial products and techniques day after day, it is extremely difficult, that policy makers can regulate something that does not still exist in the practice. It is not possible to understand which the best way is to limit the possible negative implication, since characteristics and impacts of the new practice are not known. Laws, indeed, often come out because of the necessity to regulate something new, and it is rare that, in finance, it can anticipate the new procedures. Finance innovation, moreover, tend to create optimism and are created, in theory, to enhance the efficiency and the condition of the users, decreasing possible risks. On the other hand, many of these new products come into life because the need to find new ways of finding funds for firms that have to repay debts. So, in some other sense, innovation just redistribute and worse the risks involved, but this aspect is hidden by the positivity that innovation creates in the system. That is why regulators are not able to prevent this to happen. Their willingness to set rules in advance, even if they already know every aspect of the innovation, may be stalled by the good presentiments created within the system. This behaviour of the entire system produces, usually, the "Ponzi Finance": it consists in a finance which is accustomed in asking debts to repay debts, creating a sort of chain which may collapse entirely creating substantial losses in the system. The presence of this kind of finance creates, in addition, conditions for an easier spread of unregular activities and con men creating fraudulent schemes to raise funds.

Furthermore, what creates Ponzi finance and the diffusion of pyramid schemes is also the idea of liberalisation and of deregulation. Many policymakers believe that markets must be left free at most. This leads to high preference for trading financial products in unregulated markets such as the Over the Counter (OTC) markets, where prices and volumes of trades are not disclosed. Thus, these markets are left completely with no transparency, also because trades occur in offshore centres,

making impossible the detection of complex financial pyramids, where they can reach critical proportions much easier.

Additionally, offshore exchange of financial products creates more and more interconnected financial systems between countries with different rules and different organization in the entire process of vigilance. The scandal of the Northern Rock Bank in 2007 shows how dangerous is the interconnection of unregulated financial markets. The collapse of the bank revealed how deregulated systems push companies to come up with new sophisticated ways to originate, value, manage and trade risk, encouraging fraudulent financial practices. In this regard, an investigation of the Rock's ownership structure by Richard Murphy, an independent tax expert, exposed an artificial scheme employed by the British bank to hide £50 billion through the use of an offshore trust company. This firm financed the bank, and an unsuspecting charity in the North-Est of the country, whose name was used for financial gains and without its knowledge. For Murphy, this dodgy financing scheme were used to finance the activities of the offshore company rather than Northern Rock. This affair raises concerns about how many other companies might be benefiting from similar schemes through the use of structured finance and complex investment pyramids, other than how many companies are intertwined in the complex pyramids. The main conclusion is that interconnected markets, with independent and liberalised policy regime, has facilitated the privatisation of financial risks at costs of socialising its losses. In other words, the regime made Ponzi principle legitimate.

Thus, with such a multitude of financial instruments and the creation of an interconnected markets, despite the promotion of a greater transparency and information glut by financial regulators, markets became opaquer, while regulator tools, aiming to mitigate non transparency growth, remained steady. [36]

On the other hand, with a specific attention to financial intermediaries, regulators aim to hedge consumers setting strong limitations and obligations. They limit marketplace to those with sufficient resource and qualification; apply prudential standards, protecting companies against sudden financial failures; set internal controls and risk management standards, reducing, so, possibility of default or appropriate of client assets; impose business control rules, ensuring proper handling of client accounts.

36: Nesvatelovia, A., 2008. "Ponzi Finance and Global Liquidity Meltdown: Lessons from Minsky". London UK: Departement of International Politics, City University London. Unspecified version

Secondly, they tried to enforce the transparency, and the information communication by setting restrictive rules. For instance, in case of new financial products emission, there are standard set for these innovations. Though, as said before, not everything can be assessed in advance.

All these measures are applied strongly by most of the regulators, and they can seem to have a preventive purpose: to avoid certain behaviour from financial companies and from the market. Prevention is one of the main goal regulators aim at, but it is made much more complex given all the financial condition presented above. Therefore, it is easier finding the regulators more active in an ex-post procedure: sanctions and liquidation process coming from the bankruptcy of the institutions that organised the fraudulent activity. The why for this is given by the insufficient capability of vigilant in the preventive and investigation process. Hence, they started relying on criminal authorities for enforcement purposes and for the modelling of more severe sanctions. So, market regulators gained a power in the administrative sanction process. However, this led to an impairment in the vigilant reliability and soundness.

In conclusion we can say that, even if the aim of regulators is preventive, the complexity of the entire financial system creates obstacles to a market that can always protect investors from the first moment they enter the financial system. The difficulty in finding a good trade-off between liberalised and hence efficient markets and secure markets for costumers has still to be found since the modifying system is always one step forward the regulation system.

2.4. Why Ponzi Schemes use to succeed

Ponzi swindle, more than other types of frauds, are therefore much harder to identify. Not only because of the weaknesses of regulatory authorities, but even because of the specific features of the scheme. Market regulators do not have regulations referring directly to Ponzi schemes because of the nature, characteristics and versatility of the scam.

One of the main aspects leading Ponzi to take advantage on vigilantes is its misrepresentation and breach of trust involved. From an accounting point of view, the detection of such schemes is made difficult due to the apparent legitimacy in investments reported on financial statements. Actually, Ponzi schemes are insolvent at inception, as said in the first chapter, so they are in default from the begin, and the

leverage can be virtually infinite. All of this is not reported by the swindler's accountants, but, instead, is hidden. Accounting firms, sustaining activities of con men, carry out this task of masking exploiting secrecy via offshore centres, with feeder funds domiciliated in foreign sites, complex operation of corporate shells, holding companies, offshore trusts and private partnerships. Taking advantage on foreign markets activities swindlers are able to push on market vigilantes' non-collaboration and on differences among financial markets.

Second relevant point for the success of Ponzi on authorities is limitations found by the last in applying and carrying on tasks.

One of the limits is the inapplicability of some increased and more stringent regulations. It is recognized that the regime of enhanced transparency and disclosure has not worked, because disclosure get buried in fine print. Fine print is strongly supported by regulators, but investors never ever read it, investing almost blindly. Even more radical solutions were found impractical, such as licensing of investors or narrow finance, consisting in constraining the range of approved investments.

What's more is the lack of active collaboration with other market participants. Feeder funds, auditors, accountants and others behaving responsibly reporting questionable behaviour that cannot be ignored even by authorities, may facilitate surveillance and a prompt investigation.

To be highlighted is the need of more effort devoted to adapting profiling techniques to study and identify the behaviour and characteristics of the preparators of Ponzi frauds. The necessity for regulators is, then, to enhance training and preparation of their team and align and overpass their capability with respect the swindler's one. Since many regulators are still far from this, there is an obvious predominance of scammers.

Furthermore, incapacity of abatement of this swindle is given by the psychological aspects. Ponzi is not solely a technical fraud which can be detected exclusively by the analysis of financial statements and business techniques applied. The most important thing that keeps pyramid alive is the effect on people. Crooks aim to exploit situational and social pressures of people, focus on specific groups well known to them and that can be deceived easily using their weaknesses. In first place, fraudsters look for financial illiterates in need of some financial products or instruments, luring in with stellar returns promises, making them ignore evidence of possible warning signs that would change their beliefs. The creation of illusion, and the annulment of any possible rational thinking summed to the prevalence of

emotions on mind lead to affect the kind of trust the financial system is based on. Here comes the obstacle for authorities. Financial markets are based on trust and veracity of financial advice, without which savers would have their investment options limited. Regulators should ensure this system feature and, at the same time, safeguard investors from trusting wrong people which seem, thanks to their character, reliable and reputable, giving the impression of high knowledge and careful to investors' needs.

Authorities should also consider the aspect of versality and dynamism when facing Ponzi schemes. The habit of schemers to change according to investors conditions, and to use psychology in different manners, make the scheme highly flexible and variable. Giving then drawbacks to regulators in the detection and prevention process. There is a problem in finding a constant in this fraud that might be useful in creating a prudential methodology able to counteract ex ante the fraud.

Psychological side is not the only aspect giving the flexibility of the deceit. It is, in addition, due to the possibility of applying the scheme in different scale, different location and, most of all, in disparate fields. It is probable because the continuous birth of new financial products, new financial markets, new trade and commerce. At the moment widespread is the presence of fraudulent schemes in the virtual currency world, or in the online selling of goods and services. Ponzi schemes do not limit to the finance environment, but also in different systems, where goods or services are traded. Pyramids follow innovation in any field and change with the change of technologies, other than change in people way of thinking.

Consequently, versatility of the frauds gives added weaknesses of regulators which find themselves having to deal with something in constant evolution. They should keep pace of it, paying high attention to new possible pitfalls for consumers and their change in the approach to financial system, trying to educate them as most as possible. At the same time, they should study ways to predict movements of possible con men and their way of surfing the wave of innovation in order to predict every move. However, all this is highly complex and need many resources and competence which are hard to reach added to all the previous limitation exposed, giving to Ponzi a way to always succeed.[37]

37: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309

Chapter 3

3. Rethinking Contrast Method to Ponzi

3.1. Detect properly the schemes at the roots: anomalies as red flags

As we have seen so far, regulators are in need of a constant rethinking of methodologies used to detect Ponzi fraud. There is the necessity to improve what already is in their capabilities, find new ways to detect, minimise and avoid at inception the scam. The challenge is to find a set of tools that can be applied systematically to fraud detection. In this order, regulators should pay attention in what are the indicators which permits to maximise the investigation process and the analysis of wrong behaviours. Such indicators are known as "Red Flags" and point out the likelihood that a fraudulent behaviour is occurring in financial companies.

The fact that a fraud occurs when opportunity for fraudulent activity exists and the perceived likelihood of detection is low, is linked to the indispensability of tailoring the detection system to specific contexts. Considering the financial system, this need is highly important since we are examining an environment where fraudulent activity is particularly attractive for two reasons. Firstly, fraud perpetuated in this context entails important financial rewards. Second point is that individuals within financial organisations can take the opportunities available to them as a function of their legitimate control over the organisational financial asset pool to perpetuate fraud and protect themselves from detection.

Thus, is absolutely a must to have a robust fraud-detection system able to identify the particular types of red flag and anomalies.

Red Flags can be categorised in three macro areas: behavioural, statistical and organisational. Table 1, adapted from a study of Peter Grabosky and Grace Duffield for the Australian Institute of Criminology, indicates how these three anomalies are defined.[38]

38: Extraced from: Drew, J., & Drew, M. 2010. "The Identification of Ponzi Schemes: Can a Picture Tell a Thousand Frauds?" *Griffith Law Review: Law Theory Society*, Volume 19(1), pages 51–70

Table 2: "Anomalies as Red Flags"

Behavioural	Statistical	Organisational
Unusual patterns of behaviour such as living beyond one's means or, more generally, sudden changes in one's activity.	Statistical incongruities, measures that begin to stand out. These irregularities may be entirely legitimate, but they may indicate something to the contrary.	Characteristic of an organisation that differ markedly form those generally regarded as best practice and departures from conventional standards.

The classic example of behavioural anomaly is the individual who begins to lead an extravagant lifestyle, no represented by its declared income. Obviously, this example does not represent a certain presence of fraudulent conduct, but it cast doubts on the likelihood, that must be taken in analysis.

Statistical anomalies may consist in tax deductions for work-related travel expenses exceeding certain proportion of one's gross income. Other statistical discrepancy may be represented by unexplained variations in share prices or by exceptionally high merchant's ratio of loss to turnover.

Lastly, organisational anomalies are characterised by poor leadership, inadequate systems of communication within the organisation, lack of transparency to outside observers. The absence of financial control systems, or a board of directors handpicked by the chief executive officer and lacking in independent members, similarly to unrealistic organisational goals or sales targets and incentive structures based on commissions, may be a prerequisite for fraud.[39]

Despite all three anomalies need high consideration, statistical one is the one more analytical in approaching the detection process, and maybe the one requiring better specialised analysts. In such kind of analysis, specific tools chosen due to their particular relevance to the context being analysed may lead to earlier and more compelling discoveries of red flags.

As example for this kind of analysis Madoff case can be taken into consideration, to demonstrate which are possible statistical and quantitative techniques for the

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39: Grabosky P, Duffield G., 2001. "Red Flags of Fraud". *Trends & issues in crime and criminal justice*, n. 200. Canberra: Australian Institute of Criminology.

evaluation of Ponzi fraud performance characteristics and to include in a more tailored fraud detection system.

Using Madoff Ponzi schemes, statistical irregularity consists in incongruity between the equity-like returns achieved over nearly two decades of investing, with an apparent absence of risk.

To show how the analysis should be conducted and possible results we consider data from the Fairfield Sentry Fund, Madoff's key feeder fund. The fund followed a market neutral strategy, meaning a portfolio manager seeks to profit from both increasing and decreasing prices in one or more markets, while attempting to completely avoid some specific form of market risk[40].A portfolio that appears market-neutral may exhibit unexpected correlations as market conditions change[41].

First step for analyst, in order to evaluate discrepant statistic values, is to select an appropriate reference rate that provides insights into the risk and reward characteristics of the investment scheme. Since the reference rate has to be contextualized, in this example it should be a proxy relating to the performance of peers from the equity market neutral universe hedge funds. So, in this case the Hedge Fund Research, Inc. (HFRI) might be used; an equity market neutral index, which is constructed on equally weighted performance results methodology. This fits at best, since Fairfield Sentry was one of the largest equity market neutral funds influencing heavily peers' indices that used the same methodology. In addition, another index should be considered when analysing hedge fund, which is the S&P500 total return index, since it provides common return comparisons.

Table 3: "Correlation Matrix"

	Fairfield Sentry	HFRI	S&P500
Fairfield Sentry	1		
HFRI	0.11	1	
S&P500	0.32	0.23	1

Source: Drew, J., & Drew, M. 2010. "The Identification of Ponzi Schemes: Can a Picture Tell a Thousand Frauds?" Griffith Law Review: Law Theory Society, Volume 19(1), pages 51–70

The correlation of the replicated strategy with S&P500 was calculated around 0.95 (nearly 1), meaning a high correlation. The Fairfield Sentry's correlation, on the contrary was estimated at 0.32 (low correlation), as shown in Table3. Here is one of the first anomalies

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40: https://www.investopedia.com/terms/m/marketneutral.asp.
41: https://en.wikipedia.org/wiki/Market_neutral.

Second useful technique may be a visual inspection of Track records. For instance, the track record of Fairfield Sentry fund's monthly return registered a total of 16 negative returns over almost 18 years of operation (December 1990- October 2008). Table 4 shows these returns, which constitute just the 7% of all months.

Table 4: "Fairfield Sentry Fund (December 1990 through October 2008, n=215)"

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	0.63	0.06	0.18	0.93	0.81	-0.06	0.72	0.71	0.50	-0.06		
2007	0.29	-0.11	1.64	0.98	0.81	0.34	0.17	0.31	0.97	0.46	1.04	0.23
2006	0.70	0.20	1.31	0.94	0.70	0.51	1.06	0.77	0.68	0.42	0.86	0.86
2005	0.51	0.37	0.85	0.14	0.63	0.46	0.13	0.16	0.89	1.61	0.75	0.54
2004	0.88	0.44	-0.01	0.37	0.59	1.21	0.02	1.26	0.46	0.03	0.79	0.24
2003	-0.35	-0.05	1.85	0.03	0.90	0.93	1.37	0.16	0.86	1.26	-0.14	0.25
2002	-0.04	0.53	0.39	1.09	2.05	0.19	3.29	-0.14	0.06	0.66	0.10	0.00
2001	2.14	0.08	1.07	1.26	0.26	0.17	0.38	0.94	0.66	1.22	1.14	0.12
2000	2.14	0.13	1.77	0.27	1.30	0.73	0.58	1.26	0.18	0.86	0.62	0.36
1999	1.99	0.11	2.22	0.29	1.45	1.70	0.36	0.87	0.66	1.05	1.54	0.32
1998	0.85	1.23	1.68	0.36	1.69	1.22	0.76	0.21	0.98	1.86	0.78	0.26
1997	2.38	0.67	0.80	1.10	0.57	1.28	0.68	0.28	2.32	0.49	1.49	0.36
1996	1.42	0.66	1.16	0.57	1.34	0.15	1.86	0.20	1.16	1.03	1.51	0.41
1995	0.85	0.69	0.78	1.62	1.65	0.43	1.02	-0.24	1.63	1.53	0.44	1.03
1994	2.11	-0.44	1.45	1.75	0.44	0.23	1.71	0.35	0.75	1.81	-0.64	0.60
1993	-0.09	1.86	1.79	-0.01	1.65	0.79	0.02	1.71	0.28	1.71	0.19	0.39
1992	0.42	2.72	0.94	2.79	-0.27	1.22	-0.09	0.86	0.33	1.33	1.36	1.36
1991	3.01	1.40	0.52	1.32	1.82	0.30	1.98	1.00	0.73	2.75	0.01	1.56
1990												2.77

Source: "Drew, J., & Drew, M. 2010. "The Identification of Ponzi Schemes: Can a Picture Tell a Thousand Frauds?" Griffith Law Review: Law Theory Society, Volume 19(1), pages 51–70

Relevant from the track record is the resultant volatility considered. At the end of 2008, from Fairfield Sentry fact sheet the annualised returns were at 10.11%, against the ones of S&P500 (9.24%) and HFRI (7.69%). If we consider volatility of annualised returns, measured by the standard deviation, it has been calculated that Fairfield Sentry fund recorded returns with a standard deviation of 2.45% lower than HFRI and S&P500, which were respectively estimated at 3.23% and 14.25%. The risk differential between Madoff feeder fund and S&P500 is shown by Figure 4.

Figure 4:"Time series of monthly returns"
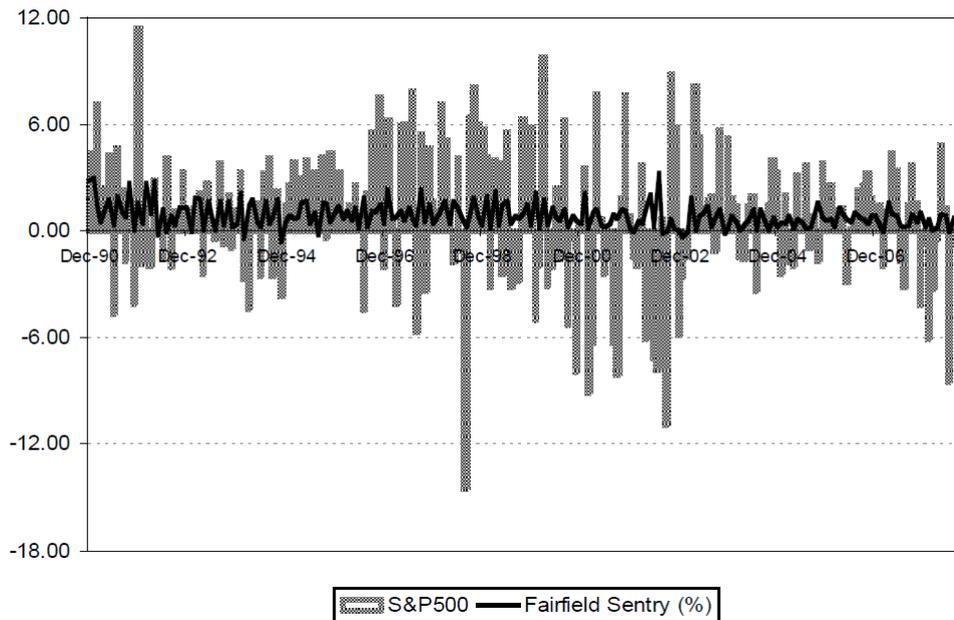
Highlighting differences are also in the dispersion of monthly returns among the three series. The range monthly return (maximum monthly return minus minimum monthly return) for Fairfield was around 4%, not so far from HFRI (6.46%), but really distant form the 30% of S&P500, as shown in Table 5

## Table 5: "Dispersion of returns"

Monthly returns	Fairfield Sentry	HFRI	S&P500
Q1	1.27	1.14	3.40
Min	−0.64	−2.87	−16.79
Median	0.73	0.58	1.28
Max	3.29	3.59	11.44
Q3	0.30	0.11	-1.67
Mean	0.84	0.64	0.77
St Dev	0.71	0.93	4.11

If we observe Figure 5 too, the result of inter-quartile range of monthly returns for Fairfield Sentry is close to HFRI, while there is a high volatility with S&P500. One more time the analysis states out the equity market neutral-like risk incurred by Madoff Feeder Fund in producing equity-like returns.

Figure 5: "Box-and-Whisker diagram"
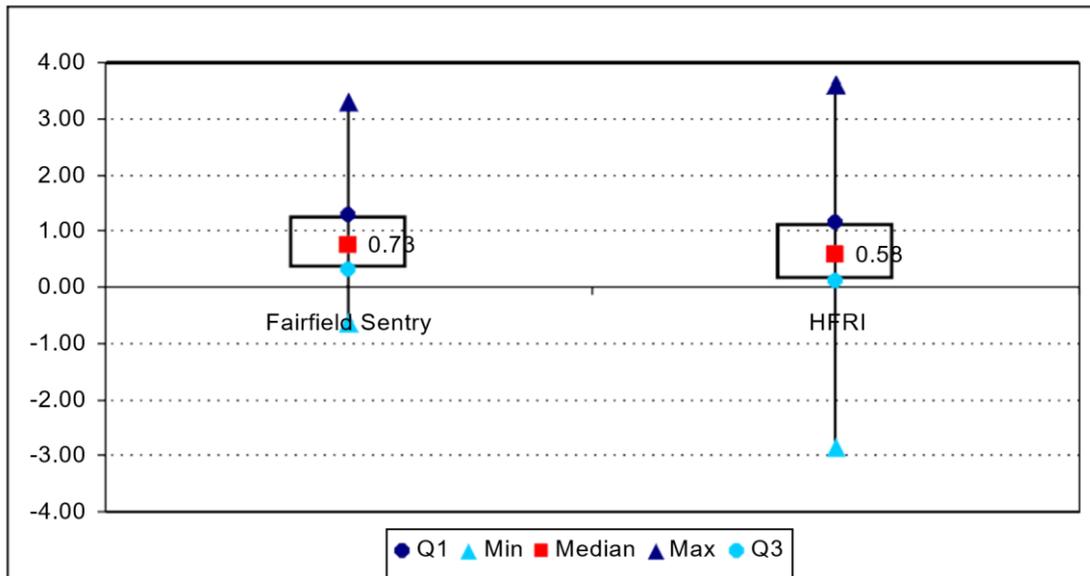
Keeping going with the analysis of different statistical instruments, of high importance is the shape of the monthly return distribution, described by the skewness (measure of the asymmetry of the probability distribution of a real-valued random variable), and by kurtosis (representing a removal from normal distribution). Tracing an histogram of the three series of monthly returns, as in Figure 6 , it is evident a visual representation of a rejection of all three return series of normal distribution, as in the vast majority of times series return in finance. However, the most important thing to highlight is the positive skewedness (right tail of the distribution longer and flatter) in the Fairfield Sentry track record against the negative skewedness of the other two series.

Figure 6: "Histogram of monthly returns for Fairfield Sentry"
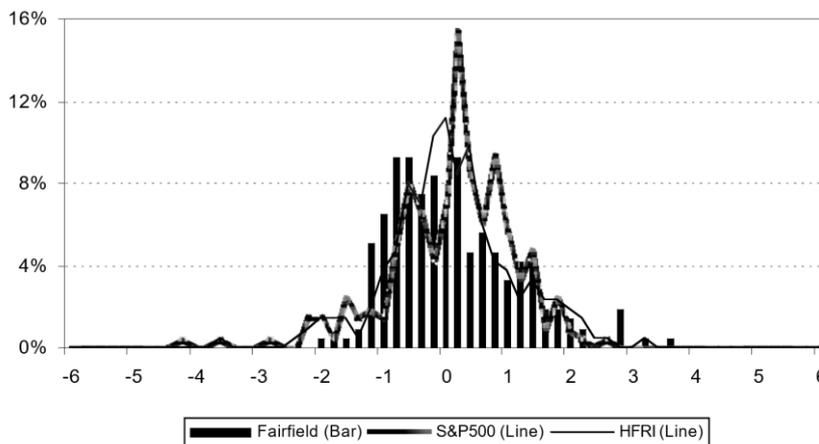
Further anomalies are shown by the percentage of wining months against losing month of the three series. Fairfield registered a number of 93% of winning month over 18 years, much higher than the 79% of HFRI and 65% of S&P500. This means that for one month of negative return in Fairfield fund corresponded twelve months of positive earnings for their investors, while the other two had a ratio of negative returns over positive returns of respectively 1:4 and 1:2. [42]

Therefore, all these discordant trends among market estimates and Fairfield Sentry fund remarkably challenge laws of finance, giving clues for possible anomalies in the conduct of the fund. Thus, different red flags come out from statistical analysis, identifying fraudulent activities. This technique should be applied in a more specialised detection system with a particular attention, by regulators' analysts, in the benchmark selection and search of reasonable proxy, such as HFRI in the Madoff case, to be used to compare performance characteristics of the financial investment activities considered. On the other hand, it is also important to link data with peer-based and more traditional reference rates which can yield positive insights into performance characteristics.

Hence, regulators able to correctly select the best proxy to confront, may apply a statistical analysis leading to a more truthful representation of the mismatching and of the conduct of the specific financial company, leading to the discovery of a running financial fraud.

3.2. Mathematic as Regulator Supporter

As in the previous paragraph we presented possible statistical analysis helpful to financial regulators, here the aim is to show a mathematical model useful in the understanding of the main parameters driving the dynamics of Ponzi frauds. The model was developed by Marc Artzrouni, professor at the Department of Mathematics of the University of Pau[43]. Artzrouni tried to shed lights on the main features of Ponzi schemes. He looked for a mathematical analysis that, considering different variables and specific characteristics, understand if a fund is legal or not and, in the latter case, its solvency and life span.

42: Extraced from: Drew, J., & Drew, M. 2010. "The Identification of Ponzi Schemes: Can a Picture Tell a Thousand Frauds?" *Griffith Law Review: Law Theory Society*, Volume 19(1), pages 51–70
43: Artzrouni, Marc 2009. "The mathematics of Ponzi schemes". *Mathematical Social Sciences*, volume 58, pages 190-201

The model

Firstly, it is necessary to highlights the variables and the main assumptions. The model is assumed to:

- ➢ Start in time $t=0$;
- ➢ Initial deposit $K \geq 0$;
- ➢ Following inflows of cash called $s(t)$;

- ➢ Promised rate of return or "Ponzi rate" r_p, and nominal interest rate r_n at which the money is actually invested: if $r_n \geq r_p$ the fund is legal (profit rate r_n-r_p); if $r_n < r_p$ the fund is promising more than it can deliver;
- ➢ Constant withdrawal rate r_w, corresponding to withdrawal of some money during the life of the investments.

Now we can specify the density of withdrawals at time t, $W(t)$, which is composed by those who deposit the initial amount summed with those who add to the fund between time *0* and *t*. The former has a density given by $r_w K e^{t(r_p - r_w)}$, where $K e^{t(r_p - r_w)}$ represents investors expected accumulated capital at time *t*. It is an exponential function assuming r_w is lower or greater than r_p, so that there is an exponential increase or decrease, respectively. The latter density is given by those who invested at time *u* and summing for *u* between *0* and *t*. the quantity invested $s(u)$ has an expected growth rate r_p-r_w for the duration *t-u*. So, the density is given by $r_w \int_0^t s(u) \, e^{(r_p - r_w)(t-u)} \, du,$ where the integral represents the sum of withdrawals of all those who invested between time *0* and *t*. Summing the two density withdrawals we get the total one $W(t)$, which does not depend on r_n but only on r_p:

Equation 1

$$W(t) \stackrel{\text{def.}}{=} r_w \left(K e^{t(r_p - r_w)} + \int_0^t s(u) e^{(r_p - r_w)(t-u)} du \right)$$

Once the density of withdrawal is defined, it is possible to define the differential equation on which the model is based on. Adding to $S(t)$, the amount in the fund, the nominal interest $r_n S(t) dt$ and the inflow of new money $s(t) dt$ and subtracting the density withdrawals stated above $W(t)$ we obtain:

Equation 2

$$S(t + dt) = S(t) + dt [r_n S(t) + s(t) - W(t)].$$

For $dt \to 0$ the amount $S(t)$ is the first order linear differential equation:

Equation 3

$$\frac{dS(t)}{dt} = r_n S(t) + s(t) - W(t).$$

Now it is important to state some new assumption in order to restate the expression for the particular case of Ponzi scheme. We consider $C=S(0)$ the initial deposit made by fund clients, which may differ from K. (In a Ponzi fraud, there could be also the possibility that fund managers make initial "in-house" deposit $K_0 \geq 0$, invested at r_n. So, the initial deposit is $C= K_0+K > K$). If, instead C is lower than K for some reason, a fraction of the initial deposit is not available. An important assumption to make is that the cash inflow $s(t)$ has an exponential growth, giving $s(t) = s_0 e^{r_i t}$,

where r_i is the investment rate (assumed to be equal 0 or 0.001). After restating $W(t)$[44], the solution $S(t)$ to the differential Equation 3 has a closed-form expression formulated. Now the solution $S(t)$ is given by:

Equation 4[45]

$$S(t) = g(t, a, b, c, d, \alpha)e^{r_n t} = ae^{(b+r_n)t} + ce^{(d+r_n)t} + \alpha e^{r_n t}$$

The solution to this expression is a linear combination of three elements not solvable with elementary methods. The core of this model, thus, stand in the zeros of the $S(t)$ function and on its derivatives, which let us understand the behaviour of the function. Understanding the zeros, indeed, we can reach evidence of solvency of the fund and on the collapse possibility of it. The solution of $S(t)$ have 0,1 and 2 positive zeros[46] depending on the parameters. In the first case $S(t)$ remains a positive function, meaning the fund is solvent. With one positive zero the function changes, becoming

---

44: $W(t) = r_w e^{t(r_p - r_w)}(K + s_0 \frac{e^{t(r_w+r_i-r_p)}-1}{r_w+r_i-r_p})$

45: $a = \frac{r_w[s_0-(r_i-r_p+r_w)K]}{(r_p-r_n-r_w)(r_i-r_p+r_w)}$, $\quad b = r_p - r_n - r_w$, $\quad c = \frac{s_0(r_i-r_p)}{(r_i-r_n)(r_i-r_p+r_w)}$, $\quad d = r_i - r_p$,

$\alpha = C - \frac{s_0(r_n-r_p)+Kr_w(r_i-r_n)}{(r_i-r_n)(r_i-r_p+r_w)}$.

46: Zeros of a function indicates the number of times the function changes sign.

negative, indicating a collapsing fund. In the third case, with two positive zeros the function becomes first negative and, then, back positive. In this case the fund collapses but may be recovered with a bailout equal to the absolute value of the negative minimum reached in the first change.

Through the demonstration of how the parameters of Expression 4 change, the introduction of the value $\rho \stackrel{\text{def.}}{=} r_i - r_p$, $\sigma_k \stackrel{\text{def.}}{=} \frac{Kr_w}{s_0} - 1$, and the introduction of the quantity $C_1(k)$[47] and $C_2(k)$[48] , professor Artzrouni stated the following final theorem of the model.

> *Theorem*: We consider the solution $S(t)$ of Equation 4 defined by the nonnegative parameters K, C, s_0, r_i, r_w, r_p and r_n. The number of positive zeros of $S(t)$ is given as a function of the sign of ρ:
>
> ➢ Case B1: $\rho > 0$, $(r_i > r_p)$.
>
> o Sub-case B1,1: $\sigma_K < 0$ $(K < s_0/r_w)$. $S(t)$ has no positive zero.
>
> o Sub-case B1,2: $\sigma_K > 0$ $(K > s_0/r_w)$. We first consider the case $r_n > r_i$. If $C > C_2(K)$ (which includes the case $C=K$) then $S(t)$ has no positive zero for $t > 0$ and therefore remains positive for all $t > 0$. For $C1(K) < C < C2(K)$ the function $S(t)$ has one positive zero on each side of t_c. For $C < C1(K)$ the function $S(t)$ has one positive zero. When $r_p < r_n < r_i$ the function $S(t)$ has one positive zero for $C < C_2(K)$ (which includes the case $C=K$) and none if $C > C_2(K)$. When $r_n < r_p$ the function $S(t)$ has one positive zero for $C < C_2(K)$ (which includes the case $C=K$ if K is larger than the fixed point $K^*=C_2(K^*)$ of $C_2(K)$) and none if $C > C_2(K)$ (which includes the case $C=K$ if K is smaller than the fixed point K^*)
>
> ➢ Case B2: $\rho < 0$, $(r_i < r_p)$.
>
> o Sub-case B2,1: $r_w < r_p - r_n$ or $r_n < r_i$. The function $S(t)$ has one positive zero.

47: $C_1(K) = \frac{s_0(r_n - r_p) + Kr_w(r_i - r_n)}{(r_i - r_n)(r_i - r_p + r_w)}$: defined as the critical value of C above which α is positive.

48: $C_2(K) = C_1(K) + s_0 \frac{(r_p - r_i)Z(K)^{\frac{r_n - r_i}{r_p - r_i - r_w}}}{(r_i - r_n)(r_i - r_p + r_w)}$ if K≥ s0/rw and $C_2(K) = 0$ if K < s0/rw : defined as the critical value of C above which the extremum m is positive

o Sub-case B2,2: $r_w > r_p$-r_n and $r_n > r_i$. For $C > C_1(K)$ (which includes the case $C=K$ if $r_n > r_p$) the function $S(t)$ has no positive zero. For $C < C_1(K)$ (which includes the case $C=K$ if $r_n < r_p$) then $S(t)$ has one positive zero.

Such theorem, at a first glance may seem trivial, but it gives a prediction of the zeros of $S(t)$ function, and hence on the behaviour of the fund. The theorem, in practice shows that results depends on whether the rate r_i of new investments is larger or smaller than the Ponzi rate.

As the theorem is split in two main case (B1 and B2), also the interpretation should be divided in two. The following figures distinguishes them, and the subcases.

### Figure 7: "Graphical representation of theorem: case B1"[49]
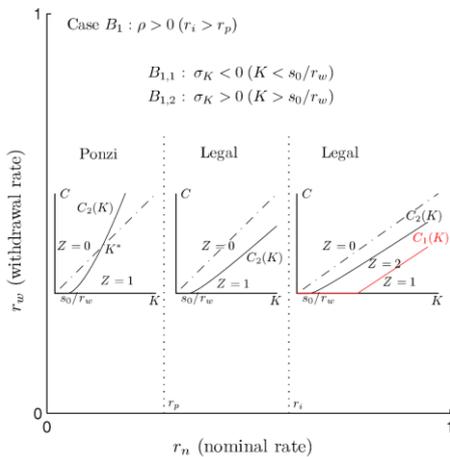
Important in the analysis is which is the case of presence of Ponzi schemes.

In the first case of the theorem (B1) there is a Ponzi scheme where $r_n < r_p$. The fund is solvent for $C=K$ only if K is not too large, that is $K < K^*$. $C=K$ and is larger than K^* the combined withdrawals by the initial and subsequent investors cause the collapse of the fund. This situation is described by the leftmost graph in the Figure 7.

49: Number Z of zeros of the function S(t) in the cases B1 ($\rho > 0$) and B2 ($\rho < 0$); Z is given in the phase space (rn, rw). In the sub-case B2,1 the number Z of zeros is 1 regardless of the values of C and K. In the two sub-cases of B2,2 and in the three regions of B1, the number Z is given in the phase space (K, C).

Figure 8:'' Graphical representation of the theorem: Case B2''[50]
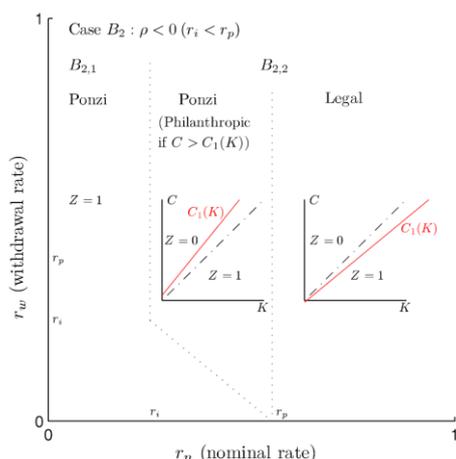
In case B2 of the theorem, Ponzi frauds come out in two different situations. The first one is subcase B2.2 where $r_i < r_n < r_p$ and $r_w > r_p - r_n$. Here, the fund does not grow too fast and is solvent if $C > C_1(K)$ (where $C_1(K) > K$). Despite r_i and r_n are smaller than r_p, the scheme is solvent only in case the fund manager adds to initial K an "inhouse" investment K_0 at least equal to $C_1(K)-K$. Here, by some numerical examples, is possible to estimate that $C_1(K)-K$ is large, and the scheme is unprofitable for the fund manager. Moreover, if the manager does not invest enough, the fund is going to fail. This type is called "philanthropic Ponzi scheme"[51], represented in the middle graph in <u>Figure 8</u>.

In subcase B2.1, where $r_n < r_i$, $r_w < r_p - r_n$ and $r_i < r_n < r_p$, the fund grows so fast to collapse. The leftmost side of <u>Figure 8</u> represents this case, where the number of positive zeros is Z=1.

Applications

The model just presented is much simplified and only the most relevant steps are presented. Difficulties stand, not only on the derivation of parameters and formulas, but in the understanding and application of correct parameters that should be contextualized and adapted. The model, hence, varies at the change of parameter values.

However, the theorem before stated finds proof in the application with real numbers. Professor Artzrouni, applied his model to the real case of Ponzi scheme operated by Charles Ponzi in 1920, using the data available, getting to expected results. The

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50: See note 49.
51: Philantropic in sense that its efficacy is highly dependent on managers in-house investment and on high growth of number of investors.

model, after this application seems reliable, and quite specific. Most notable is that assumptions as setting r_i equal 0 or 0.001 or as the exponential growth of cash inflows in the fund show realistically how Ponzi fraudsters use money in the fund.

To be highlighted is even the importance given to the investment rate r_i and the withdrawal rate r_w. A fund is always solvent with $C=K$ in case of a legal fund characterized by $r_n > r_p$. In the opposite case, $r_n < r_p$, the fund keeps being solvent depending on the values of r_i and r_w. If r_i is large enough or r_w small enough the fund grows quickly and risk to collapse in case withdrawals increase. If, instead, r_i is too small or r_w too large, the fund may enhance at an increase in withdrawals.

To conclude, this model describes different behaviour of investment funds, considering individual characteristics of each fund. Its usage means analysing fund technical characteristics, and reaching conclusion based on mathematical evidences, highly improbable to disprove. Therefore, the model is able to forecast the behaviour of a fund: if solvent and legal, solvent but illegal or next to collapsing. This would give the ability, to financial market regulators, to detect Ponzi frauds before the collapse. Furthermore, applying the model in real cases, there might be the probability to find common technical characteristics of Ponzi common to each fraud. In case this happens, regulators could construct a proper at inception detection system, faster and more efficient.[52]

3.3. Possible normative theories fitting a better regulation system

In the previous chapter are highlighted which are hurdles financial regulators have to cope with in order to rethink a stronger financial surveillance on Ponzi schemes. The disconnection between how regulators think and how investors behave is highly evident, and highly evident is the hardness in understanding the way of acting of Ponzi perpetrators, both from a psychological and technical point of view. Hereupon, is a must for financial vigilant institutions to rethink and remodelling the system.

One of the main proposals presented by psychologist Gregg Henriques, professor at James Madison University (State of Virginia), is the concept of "Narrow Banking"[53]. This concept sheds light on the idea of perfectly safe banks, which activities are

52: Extract from: Artzrouni, Marc 2009. "The mathematics of Ponzi schemes". *Mathematical Social Sciences*, volume 58, pages 190-201.
53: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.

narrowly permitted. Regulators should in a certain sense take the control of the business allowing depositors to entrust their funds. Investing in other institutions would be caveat emptor: costumer alone is responsible in checking quality and suitability of products and of sellers. This theory includes a roster of approved investments that are the only ones the public can buy being officially ensured of safety. The financial products on which is possible the investments would be designated by regulators, selecting those for which it is much harder for con artist to insert in[54].

Second proposal rises from the competence of investors. As seen in previous chapters, most of the clients lured in a Ponzi scheme are not competent in financial subjects, highly convincible with false promises targeting people fragile psychological aspects. A solution for this is the so called "licensing of investors". As the name suggests, regulators should curtail entering financial markets to those who show a strong knowledge of the risk in investments and on the world of finance as a whole. Obtaining license for investors would, thus, be a process that requires passing through the analysis of competences by regulators.

In addition, authorities have to conduct financial education programmes, match to specific type of investors, specific financial areas. So, giving a targeted education is going to be easier and more efficient[55].

New normative theories should encompass also the financial approach to the system. As seen, the concept of Ponzi finance, creates an environment in which frauds could readily come out and spread in the system, provoking high losses. Minsky studied Ponzi finance asserting that a system who wants to accelerate, as in this case, provides just an enhancement of increasing borrowing and increasing prices. For Minsky, a system based on real growth, supported by employment, would support cash flows that validate assets through actual sales. This kind of finance is supported by wages and not by borrowings, leading to a system in which large and numerous interests are avoidable and a sounder capital structure diminishes necessity of borrowing. More solid finance, less dependent on debts, will not permit con men to act and exploit the weak situation.[56]

54: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309.
55: Lewis, Mervyn K. 2012. "New dogs, old tricks. Why do Ponzi schemes succeed?". *Accounting forum*, volume 36, Pages 294-309
56: Kregel, J.A. 2010. "Minsky Moments and Minsky's Proposals for Regulation of an Unstable Financial System." Paper presented at the 19th Annual Hyman P. Minsky Conference on the State of

In view of this, regulations must be set up so that the system finds difficult to reach a level in which finance has chiefly speculative purposes.

What helps this environment to develop is the interrelation among foreign financial markets. Financial institutions perpetuating pyramid schemes most of the time have the help of offshore markets and companies. Thus, regulation should try a way to find a control over foreign markets. This is possible just with a strong, homogeneous international finance regulatory system. To achieve it, collaboration among different systems regulators is the crucial point, in order to create authorities as a unique body which supervises the different financial markets that as they are developing will increasingly interact as a single market.

Afterwards, evidence in difficulties of detection system creates the need of a revolution in this field. Normative and directives, given to regulators by the legislative power, should focus in boosting the effectiveness and competence of investigation offices. As seen from Madoff case, not appropriate measures in the detection and investigation process give opportunity to conduct scams easier for longer period. The necessity is to enhance competences and education of analysts and inquirer. Training of personal skills is the first step to take in order to reach this objective. The enhancement of capabilities has to form professionals which are able to promptly understand new financial products and techniques. Consequently, possible shortcomings these innovations may bring into the system are swiftly gathered by regulators before becoming of speculative purposes.

As a second step, authorities have to pay particular attention to modalities used. Reaching Ponzi schemes ex-ante is crucial to minimize losses and to deter them. In order to obtain this, regulators have to proceed using models such the ones presented in the first two paragraphs of this chapter. Statistical analysis of financial behaviour, as said, permits to detect discrepancies with ordinary and legal behaviour, and grant an immediate understanding of "Red Flags". Once these indicators are tracked down, deeper investigation will be set on time. The second model, presented, the mathematic one, can be used, also to have more evidence on the possible outlet of investments funds using determined data. The analysis on how the fund is managed, looking to interest rates and return rates, withdrawals and capital invested and the change of these and other parameters, with the model of professor Arztrouni, bring to recognize a Ponzi scheme as soon as it starts, before its collapse.

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the U.S. and World Economies, "After the Crisis: Planning a New Financial Structure," *Levy Economics Institute of Bard College*, New York, April 14-16

From the importance of these methods, normative should oblige regulators to the study investment funds from the beginning of their activities, and monitoring during the entire life.

Market regulators system may, in addition have a strong usage of specialists dedicating exclusively on the study of psychology of Ponzi schemes. Two sides of psychology are of high importance: schemers and preys' sides. This subject will help in make conjectures and hypothesis on what are the mental settings of fraudsters and match this with the ones of consumers. Matching specific con men with specific individuals will ease vigilantes in the defence, a priori, of the particular investor identified, modelling different techniques for each category.

Therefore, trying to create new departments dedicated only on analysing the presence or not of frauds, creates more attention and specialization in the detection, limiting the proliferation of them and minimizing the losses, before the collapse of pyramids. Focusing, moreover, on the study of thousands of varieties that Ponzi may have, give rise to possible theory fitting the real world. Knowing probability of happening of frauds, regulators gives a more careful look in each specific field of action of fraud and may impose more restrictive measures, hindering crooks at the root.

3.4. Do these theories insert new or different pitfalls in financial markets?

A first insight of reforms of financial market regulator system may lead to positive outcome as concern the clash against Ponzi schemes. Yet, many proposals may have not only good results. Taking action against frauds requires to give up other aspects of financial system.

For instance, the concept of narrow banking possibly falls in abandonment of the financial liberalisation and deregulation. Higher presence of the State in financial industry, would lower competition, hence efficiency. Moreover, asserting that the responsibility of investing in non-regulated firms belongs only to the consumers, gives complete free action of these businesses, which may act only with speculative purposes, since they have no burden of liability. Regulators with this method, risk either to increase number of fraudsters or to shift trust only in the regulated side of the market (few banks), and not in the other part, restricting possibility of investments and the match of consumers needs with the right financial activity to enforce.

Another limited proposal regards licensing of investors. Such procedure does not permit to everyone to have a free entry in the system. There are as many competent investors as non-competent ones. Denying the possibility to those who are in the dark of financial market functioning to invest their wealth gives lower capital to the market. It follows a deceleration of market growth and the productivity of the entire system and, as a consequence, of the economic system (which efficiency is guaranteed by a good performant financial system). Many, indeed, have high savings, who if not invested properly are more subject to devaluation. A restriction to access financial markets means even an imbalance in the opportunity given to those who wants to save for future projects and future lives.

Critical is the creation of an international financial regulation system too. Collaboration must struggle with diversity in interpretation of the issues, in policy preferences and in the legal framework of each State[57]. Accordingly, a unique regulator system has the need to overhaul, from the beginning, the legal system of each country. This seems impossible.

On the contrary, collaboration have to be stuck to its prime meaning. The revolution streams from the introduction of a unique coordinated detection system. Normative, in this sense, needs to be added and not substituted, to conduct to the birth of unified and homogeneous model of action against Ponzi.

The homogeneity concern also the practical methods applied by regulators. Statistical and mathematical approach presented above requires substantial expenditure of resources. Monitoring on infinite financial companies and funds is tough for each single regulator. A possible solution to a smooth collaboration of offshore regulators investigation may be the split and integration of tasks. For instance, if in one country there is a high specialization in a determined office, resources of that authorities should be devoted mainly on that particular tasks, operating on behalf of all other authorities which, in that tasks, are relatively scarce. On the other hand, to compensate the nonperforming of another analysis, another regulator should employ its specialization in this new activity for itself and for the entire unique system.

Government normative about Ponzi and pyramid schemes are difficult to set, since if one has a likely positive outcome, for sure it has also a shortcoming on the other

57: Dorn, N. 2010. "Ponzi finance and state capture. The crisis of financial market regulation". Extracts from CROSS-BORDER CRIME INROADS ON INTEGRITY, P. Van Duyne, G. Antolopoulos, J. Harvey, A. Maljevic, T. Vander Beken, K. von Lampe, eds., Oisterwijk: Wolf Legal Publishers, 2010

side. To cease the practice of this fraud are necessary reforms that cast other pitfalls in the system. So, a weighted trade-off for regulations has to be evaluated carefully, studying which are the consequences on the financial system as whole, and assessing if the efficiency gained from one side is higher than the one given up.

Conclusions

The thesis has conducted an analysis on Ponzi schemes, directed to the understanding of prevalence that the scam has on financial market regulators. This study wants to emphasize which are the main difficulties that regulators face in counteract the fraud. Pitfalls in the regulation process has been described through the presentation of main actual weaknesses that impede a good surveillance and preventive measures by regulators. Suggestions in the rethinking of some methodologies applied by authorities against Ponzi fraudsters were presented along with other possible shortcomings likely to meet in the enforcement of them.

What stands out from this paper is that actual market regulation system framework and modus operandi, even if with sound base, are not enough in preventing Ponzi schemes to threat the system. Gathering most important normative and regulations, it has been possible to have a whole idea of how Ponzi is regulated, and it has been found that a direct regulation on it is not present. Accordingly, what is regulated is just financial intermediary way of entering and conducting business. Very few is said by government laws to regulators about measures on the scam. This due to the idea of liberalisation and deregulation authorities wants to give to obtain more competitive financial markets. To this is added the features of Ponzi fraud as the interconnection with offshore system, the versatility and the psychological aspect. But even the aspect that in some environment such the ones in which Ponzi finance is widespread let frauds take an advantage. These are peculiarities on which regulators do not dwell enough.

If we also consider the non-smooth collaboration among single regulator offices and among regulators around the world, is evident the prevarication of Ponzi and the need to revisit normative and actions. After thinking of a possible "Narrow Banking", licensing of investors, new ways of seeing the financial system following Minsky view and proposing technical models and reorganizations inside regulators, new drawbacks came out. So here it is highlighted the caution with which authorities have to move to find ways of total prevention and eradication of the fraud.

What is notable is the need for detectors to give high importance to the psychological study of fraud's preys and perpetrators. Therefore, the starting point to prevent and not only cure fraud effects, is the creation of new teams. These must focus on the whys some investors are lured in the fraud so easily, and the whys con men run the fraud with the awareness of being discovered and of facing future strong punishments. New competent offices dedicated to analysing, more in depth, each

singular characteristic of the fraud, from the motivations of scammer to the technical application in different fields, should lead to understand the multitude of varieties Ponzi fraud has. This is the best way to start a process with the objective of stopping the development of new ways of innovation of the scam, limiting it and the consequent losses. Hence, the main difficulties that must be handled have an organisation aspect.

Being able to apply new techniques for detection process, following the pace of financial innovation in products and techniques, is due to competences of supervisors. A highly competent system of investigation and detection is such if it has extremely skilled professionals which in first instance study the fraud. Only after they decide to take proper preventive measures.

What made inefficient the methodologies used until now is the fact that financial authorities have lost the objective of which kind of finance is preferred. Lot of space is given to liberalisation and deregulation, but, on the other hand, tips on how the fraud could be fought are oriented in a stringent and very controlled market. This orientation would lead to a less competitive and efficient market; would lower opportunity for investors and slow down the growth of the system, diminishing the trust on which finance is constructed.

What is apparent is the difficulty in the detection process organization. Adaptability to different contexts of the fraud can be easily defeated, but it is not since the necessity is to assert once again the main objectives of finance: efficacy, trust and giving opportunity to everyone. Whereupon reorganize a system of regulation in which is described how detection offices can operate in collaboration with foreign regulators' offices.

To conclude, the thesis gives the idea of a possible regulation system which put in first place the financial market setting and the more powerful detection system against Ponzi. An international regulatory system can be made only if the scope is to create a unique detection system, and all the rest keeps being independent. In this way there is no need to change the own law. The focal point is the integration of new directives describing how investigators and detectors may collaborate properly with foreign ones. The paper suggests a sort of Heckscher-Ohlin theorem applied for financial fraud detection system. Indeed, the aim of the proposed new system is to let those regulators much more skilled in a certain phase of the detection process to operate on behalf of those who are not capable in it. While this, other regulators more talented in a different phase exchange the "favour" operating on behalf for the first. In this manner, it is likely to let each market supervisors to enhance more and more

in a certain topic. The control is on a higher number of financial companies and financial markets. So, it is possible to prevent and do not let Ponzi exploit its adaptability feature.

In brief, the study of Ponzi scam, together with regulations concerning it, reached the point to start thinking that is time to have tries in a high collaboration among countries financial market regulators.

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