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**Keywords**
Agent-Based Model, Ponzi Schemes, NetLogo

**JEL Codes**
C63, C88, D83, K42, G11

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# Rephrasing Illusions: an Agent-based model of Madoff's Ponzi scheme

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(*You may also look at the Appendix at this stage).*

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## 1 Introduction

Ponzi schemes are notorious frauds in which, in theory, the proceeds from newly registered investors are used to pay returns to previous investors. Perhaps one of the most notable aspects of Charles Ponzi's initial plan in the 1920s is captured by this term, which has gained some traction.

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To the best of our knowledge, however, there isn't a precise and widely accepted definition of similar scams in the literature or the popular press, where the term "Ponzi scheme" is frequently used as a catch-all for financial scams, such as Madoff's massive fraud, which we will contend has a different structure.

In this essay, the phrase "Ponzi scheme" refers to a prevalent financial scam in which

1. investors' money is actually not invested at all;
2. investors feel their money is expanding continuously at ridiculous rates with little to no risk. They are essentially believers;
3. the scammer uses the (residual) real flows for both his personal expenses and, to the extent that it is feasible, to reimburse the investors who liquidate their position.

Most people agree that Bernie Madoff operated the biggest Ponzi scheme ever, scamming clients out of roughly 65 billion USD. He could, however, reimburse all of the investors who recovered their capital and interests for several years, according to all the evidence. This was accomplished by diminishing a pool of accumulated income that was mostly raised in the early years of his business, rather than necessarily requiring new inflows.

Our exposition and agent-based modeling experiment will be guided by Madoff's fraud. In 1960, he started his financial career by managing a brokerage firm that eventually became Bernard L. Madoff Investment Securities [1]. It's unclear exactly when the scam started, although it most likely started in the early 1990s. The falsehood didn't come to light until December 10, 2008. Madoff admitted turning his wealth management business into a massive Ponzi scheme in a guilty plea to eleven federal counts on March 12, 2009[1]. [2] is a recent review of the subject, and [6] is our favorite book on the subject. [4], [3], and [8] are more excellent accounts. The websites of the Department of Justice's asset forfeiture distribution program, the Madoff Victim Fund (`https://madoffvictimfund.com/`), the U.S. Securities and Exchange Commission (`https://www.sec.gov/`), and the Madoff Recovery Initiative (`https://www.madofftrustee.com/`), which is well-known for the work of trustee

[1] Madoff was sentenced to 150 years in jail and passed away in 2021 at the age of 82.

Irving Picard, contain an overwhelming amount of information and documents about the fraud.

It is generally accepted that Madoff's scam fell apart during the 2008 global financial crisis. Many investors withdrew from any risky position due to a crisis of confidence in financial institutions' ability to meet their obligations, which was brought on by the failures of significant actors, such as commercial banks, securities broker-dealers, and insurance. In summary, the scheme was exposed when Madoff was unable to withstand the influx of requests from his clients, [8].

We emphasize that early accusations of Madoff's misconduct were made, yet there were no repercussions. We pay particular attention to the work of Harry Markopolos, who alleged that his hedge fund was a scam since 1999 when he identified 29 *red flags* or reasons to assume that the profits were faked in a complaint to the SEC. When it was too late, the claims were painfully unearthed after being essentially disregarded and buried in the archives.

Motivated by the above explanation, we model the situation using three key presumptions. First of all, agents initially have a favorable inclination to invest money with the belief that there is little to no danger and that their return will be, say, 1% per month. Many of the individuals or organizations implicated in Madoff's carnage remained invested for years, if not decades, and investors are not going to cash in their investment in a month or two. Since they think the money will continue to grow at the exaggerated rate, it appears to be a really good bargain to leave it invested in the assets controlled by the scammer. Put another way, their mental image of riches is expanding due to either fictitious official documents, phony unofficial reports, or simply indolence and laziness.

Second, we suppose that bad news and a negative mood spread gradually in the market, with varying intensity, and are absorbed by agents, simulating the overall loss of confidence that took place in 2008. This attitude pushes agents to eventually disinvest and lessens their initial inclination to invest.

Thirdly, we investigate the consequences of a Markopolos-type agent under the assumption that one trader is able to disseminate information about the existence of a scam in one parametrization. By doing this, agent Markopolos is able to significantly deteriorate the sentiment of the agents he encountered. As a result, Markopolos successfully—though not always—persuades others to withdraw their investments from Madoff's company right away.

The structure of the paper is as follows. The ODD protocol, which gives an overview of the concept, demonstrates its design, and gives the specifics, is used to describe it in the next section. A representative run of the model and simulation results are shown in Section 3.2, which also analyzes the effects of changing important parameter values. The work wraops up in the final section, which also addresses the consequences for policy and the economy.

## 2 The model (ODD description)

We describe in the following the model using the Overview, Design, (ODD) protocol, described in [5].

### 2.1 Purpose

The model seeks to demonstrate how Ponzi schemes can be created by a process in which investors see an apparent increase in wealth while the impostor's actual capital under management is decreasing. The majority of fraudulent schemes, if not all of them, are mostly motivated by this methodical double accounting process.

### 2.2 Entities, state variables and scales

*State variables are in italics in what follows.* Investors, a particular impersonator, and, in one variation, a special agent (called Markopolos) who can expose the fraud are all part of the plan. Markopolos and investors travel on a toroidal grid of patches with varying degrees of negative mood. The "doesn't move" impostor might be viewed as an abstract mastermind that receives money from investors and uses some of it for its own purposes at all times.

*cash* and *perceived.wealth* are owned by investors. The perceived value is maintained while the cash is retained.It is the investor's fictional wealth that is in the hands of the impostor and is thought to grow at a favorable rate. The degree to which investors are prepared to give the impostor money in the hopes of becoming wealthy ultimately depends on their *sentiment*. The likelihood of transferring (recovering) money to (from) the impostor is positively connected with a positive (negative) *sentiment*.

The impostor owns all of the actual money that is in his possession at any given time. This *total* is determined by the outflows of investors who redeemed all or a portion of their investment and the inflows of investors who believed their wealth would increase at a monthly constant rate $r > 0$. Furthermore, the impostor's secret expenses or withdrawals cause *total* to decrease at a monthly rate of $r$.

To put it simply, Markopolos is a unique agent who never invests but has the power to convince investors to return all or a portion of their fictitious wealth. In other words, Markopolos has the power to negatively affect people and persuade them to give up investing.

A variable of the spatial cells, the *mood* is determined by subtracting the *sentiment* of the investors in that cell. This is discussed in more detail in the section that follows. Therefore, *mood* lowers the likelihood that someone will invest in the plan and may result in reclaims if it causes *sentiment* to become negative.

One month might be considered the model's tick.

### 2.3 Process overview and scheduling

Agents calculate the likelihood of giving the impostor a portion of their *cash* or withholding some of their *perceived.wealth* at the start of each tick.riches from him. This likelihood depends on the *sentiment*. A uniform random variable dispersed over the range between zero and *perceived.wealth* can be used to characterize the quantity involved, either between 0 and *cash* if it's an investment, or *perceived.wealth* if it's a redemption. As a result, investors typically return half of their perceived riches or contribute half of their cash.

If this is feasible, that is, if `total` plus all the cash received less the reclaimed amounts is positive, the impostor collects the *cash* and pays the reclaims; if not, there is a bankruptcy, the hoax is exposed to everyone, and the simulation ends.

A random cell receives a quantity *diff* of *mood* each tick. Additionally, each cell shares 50% of its mood with its eight neighbors. This simulates the market's introduction of negative news and its gradual spread throughout the industry.

When an agent meets another agent at random when Markopolos is active in the model, the other agent's *sentiment* changes to an extremely negative value. This information can be taken as an admission that the investment is fraudulent, and the investor will therefore get back what they thought they had.The future ticks for prosperity.

At the conclusion of every tick, *total* reduces to $total(1-r)$, and the *perceived.wealth* rises to $perceived.wealth(1+r)$ for all investors. Even though the impostor typically makes false claims to the contrary, let's note once more that this is sham money, in the eyes of investors but no longer possessed by the impostor. Every investor modifies their "sentiment" by removing the "mood" of the cell in which they are situated.

### 2.4 Design

Basic principles:

- The fraud is created and maintained due as agents engage in "double" accounting, believing that their investments are increasing while the impostor's wealth is decreasing;
- there is a positive or negative probability of investing in the scam or disinvesting based on the sign of sentiment.
- if the agents pass through cells that are in a foul *mood*, their *sentiment* drops.

Emergence: one of the most intriguing features produced by the model is the existence of a *sentiment* threshold at which losses abruptly change, as bankruptcy is anticipated due to the general decline in *sentiment* fueling disinvestments that will ultimately lead the impostor's balance to 0. Furthermore, even if subtle impacts only influence a small collection of agents, the contribution of Markopolos first seems to have minimal aggregate impact.
Adaptation: Agents encounter the special agent Markopolos or subtract the mood to update their initial good *sentiment*.
Objectives: In general, agents have a favorable inclination to invest and generate significant returns since they seek to maximize their profit.
Learning: when agents met Markopolos, they were forced to disinvest after "revealing" the scam. Additionally, the stygmergic process of

deducting *mood* from the *sentiment* is comparable to the gradual absorption of negative news regarding the scheme's reliability or the economy as a whole.
Prediction: not relevant in the model.
Sensing: agents sense the *mood* in their location and use it to reduce their *sentiment*.
Interaction:

- agents interact with the space absorbing the *mood* (in this sense, the patches are places where news are stored, diffused, found and digested);
- the encounter with Markopolos affects the *sentiment* and can spur immediate disinvestment.

Stochasticity: there are various random elements in the model.

- the probability (or, more colloquially, the propensity) of investing/disinvesting is a function of the *sentiment*:

$$Prob(invest) = \sigma(sentiment), \quad \text{if } sentiment > 0;$$
$$Prob(disinvest) = \sigma(sentiment), \quad \text{if } sentiment \leq 0,$$

  where
$$\sigma(x) = 1/(1 + \exp(-2|x|)),$$
  (the function is depicted in Figure 1).
- The sums that are either disinvested, $\tilde{U} \cdot perceived.wealth$, or invested, $\tilde{U} \cdot cash$, which are arbitrary sums based on the draw from a standard uniform variable $\tilde{U}[0, 1]$;
- Agents travel randomly around the space, so they gather *mood* to be subtracted from *sentiment*;
- the special agent Markopolos moves and encounters other agents during random movements.

Collectives: not relevant in this paper.
Observables: in this work we focus on

- the number of ticks needed, with various instantiations of the parameters, to reach bankruptcy (this is the time needed to reveal the scam);
- the total loss generated by the scam;
- the effects of the Markopolos agent;
- the distribution of the losses/gains among the population of agents.

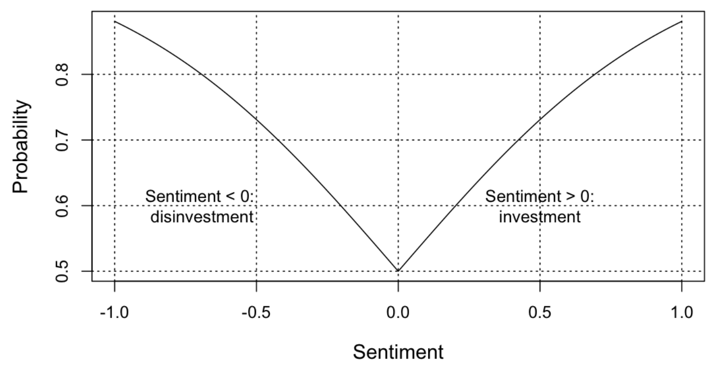


**Fig. 1.** The probability of acting as a function of the *propensity*. If the *propensity* is positive (negative), the agent invest (disinvest) a random fraction of his *cash* (*perceived.wealth*).

### 2.5 Initialization

We initialize $N = 150$ agents, setting *cash*= 1 at the beginning of the simulation. The propensity is initially set at $\tilde{U}$. We assume that $r = 0.01$, i.e., the scammer consumes 1% of his wealth per period while agents trust their "savings" grow at 1% per period.

### 2.6 Input data

The model does not use external data.

### 2.7 Submodels

We provide the description of two modules, namely the very simple one in charge to move the turtles and the one managing the the encounters with the special agent Markopolos. The model was coded using Netlogo, [10].

```
to wander-move
  ;; Turn left or right by a small, random angle
  ;; up to 'turn-variance'
  rt random-float turn-variance
  lt random-float turn-variance
```

```
  forward d
end
```

In the simulations, `turn-variance` is 20. It remains to be investigated whether changes in `turn-variance` alter the results.

```
to Markopolos
  ;; Look for other turtles on the same patch
  ;; (excluding itself)
  ask turtle 0 [
    let companions other turtles-here
    if any? companions [
      let s [sentiment] of turtle 0
      ask target [set sentiment s]
    ]
  ]
end
```

Markopolos (turtle 0) is asked by the prior code to choose one target agent from among any companions that share its position (patch). The target then replicates Markopolos' extremely unfavorable attitude (the method uses a sentiment of -5, which results in a probability of 0.999955 for disinvestment).

### 2.8 Discussion

We use the ODD procedure to further explain a few of the model's salient aspects.

The agents are first inclined to invest in the unidentified fraud because they are born with a positive predisposition. As soon as their inclination turns negative over time, they will alter their behavior and switch from investing to disinvesting. This can occur for two reasons: either they encounter the special agent Markopolos (who will be given the honor of being turtle 0!) who abruptly shifts their inclination to extremely negative values that cause rapid-fire disinvestments, or news that conveys a (bad) mood appears in the world, spreads, and is slowly absorbed.

The scammer, the second character in the story, takes money from agents, doesn't actually invest it on their behalf, wastes 1% of it for personal gain each period, and leads everyone else to believe that the money is growing at the same rate (for simplicity's sake).

It might be helpful to highlight some of the arbitrary and subjective decisions we made when creating the model. However, advertised refunds may have been of the same order in a number of scams, so there is no good reason to presume. Madoff frequently asserted that the returns were around or barely above 10% every year. that $r = 0.01$ and we heavily rely on conventional uniform random values for the absence of obviously superior alternatives. As a result, agents often invest or disinvest 50% of their actual cash or perceived wealth. Additionally, they have beginning propensities in $[0, 1]$, which means that their average initial investment likelihood ranges from 50 to nearly 90% (per period). They go from being (skeptical) investors with probability 50% to (equally skeptical) dis-investors with the same chance when their propensities change from a small $\epsilon > 0$ to $-\epsilon$.

Examining the module *Markopolos* reveals that little adjustments can exacerbate significant outcomes. By changing the line `ask turtle 0 []` to `ask turtles with [sentiment <= -5][`, the agents that Markopolos "converted" would be able to convert others in later periods, starting a cascade that would probably hasten the scheme's demise. Furthermore, altering `ask target [set sentiment s]` to `ask companions [set sentiment s]` allows multiple sentiment revision in a single tick, contrary to our assumption that Markopolos could only alert one `target` at a time.

## 3 Results

The parameters used in the model are summarized in Table 1.

**Table 1.** Parameters of the simulations

| | |
|---|---|
| Number of agents | 150 for each run |
| Coefficient of diffusion `diff` | from 0.05 to 1 by 0.05 |
| Markopolos effect | true/false |
| collective effect | true/false |
| replications for each combination of parameters | 10 |

We primarily concentrate on the following: the time required to disclose the bankruptcy (i.e., the number of ticks required to reduce the amount in the scammer's hands to zero); the total loss suffered by agents; the role of Markopolos; and the distribution of agent gains and losses at the end-titles (prior to the start of criminal investigations). To give an overview of the model, we describe a representative simulation in the next subsection.

### 3.1 A representative run

In the benchmark scenario, there is a moderate amount of news (*diff* = 0.15) reaching the market, which causes the *sentiment* to decline gradually. The sum of *perceived.wealth* (in black) and the actual amount (*total*, in red) in the scheme are displayed as a function of time in Figure 2.

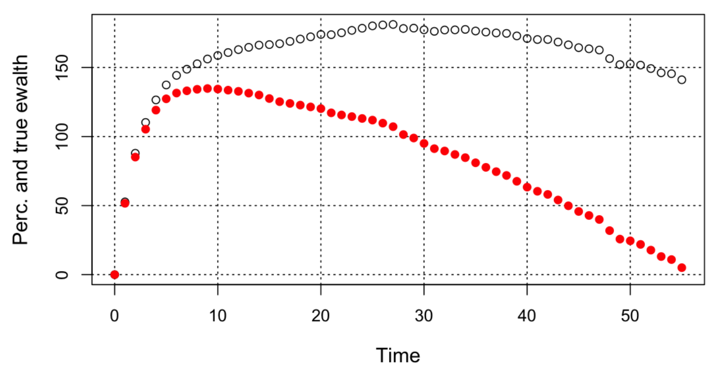


**Fig. 2.** Perceived wealth and the amount in the scheme.

As you can see by the red points, bankruptcy is attained in 55 periods (months) in this scenario. The plan receives a lot of inflows at first, and the scammer's available funds peak after ten periods. When agents are simultaneously investing and disinvesting, the *perceived.wealth* stabilizes after growing until period 25. At $t = 10$, the scheme's structural insolvency is already apparent (the potential claims significantly outweigh the remaining money), but the discrepancy between what the scammer believes to be true and what the agents believe to be true continues to grow. Note that after the bankruptcy occurs, agents still think they have 141.11 in total, even though many of them become aware of the situation and disinvest.

The time-series of inflows (outflows) into and out of the scheme is shown in Figure 3. After period 10, the sharp increase in investments is followed by a dearth of additional inflows (that the fraudster, who already has complete control over a sizable portion of money, does not "need").

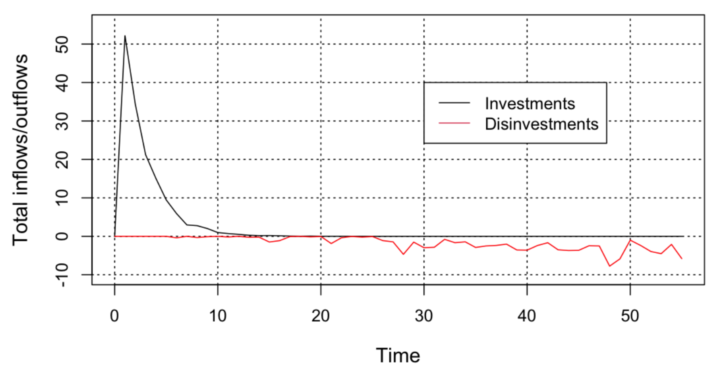


**Fig. 3.** Inflows / Outflows

A growing proportion of agents decide to disinvest starting in period 20, sometimes in significant amounts (as shown by the red line). This, along with the 1% decline in the fraudster's holdings each period, will exhaust his reserves, which are used to compensate the agents who want to disinvest.

The wealth of the 150 agents at the end of the simulation (precisely *cash*) is shown as a function of the starting *sentiment* in the left panel of Figure 4, which offers an alternative viewpoint on the result. On the one hand, because more (negative) sentiment was needed to dampen their initial exuberance, the agents with a high *sentiment* invested earlier and did not disinvest prior to the collapse.

It should come as no surprise that they had no time to retreat, and their ultimate wealth was zero (there were 71 such agents).

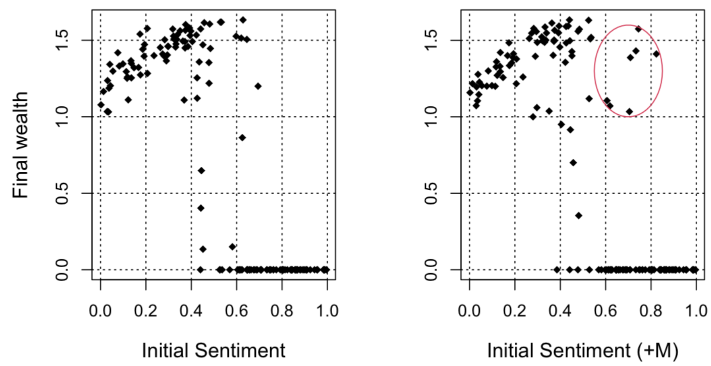


**Fig. 4.** Final wealth (at bankruptcy) of agents as a function of their initial sentiment in the absence (left panel) and in the presence (right panel) of Markopolos.

Conversely, agents with low initial sentiment did take part in the scam, but they were rather quick to absorb enough negative sentiment to disinvest prior to the bankruptcy. An sudden shift around (initial) $sentiment = 0.45$ is visible on the graph. A threshold's existence conveys the idea that a narrow margin separated the fortunate, who disinvested just before Armageddon, from the unfortunate, who did so a little later[2], even though it is difficult to interpret the exact value. In other words, agents with almost the same *sentiment* might have lost everything or gained up to 0.70 (beyond their starting endowment of 1).

The effects of having Markopolos in action are shown, ceteris paribus, in the right panel of Figure 4 (the agents on the right have exactly the same sentiment as the ones on the left, and the same seed was used to "align" the two cases; the simulation on the right lasted 55 periods and, once more, exactly 71 agents have zero wealth at the end). The two scenarios are strikingly similar: agents with high (little) *sentiment* find themselves in opposing circumstances where they

[2] Actually, they didn't do anything because the game was over!

are likely to make a lot of money (lose everything). The Markopolos agent's function and importance will be covered later, but an intriguing feature is that a small number of agents—highlighted by a red circle on the right panel—have significant gains, despite their large *sentiment*. They are the (lucky and rare) people that met Markopolos and quickly fled after learning about the swindle (technically, this is obtained setting *sentiment* to very negative values and causing a chain of disinvestments). This is a simple interpretation.

The following Subsection explores systematically how results are affected by variations in key parameters.

### 3.2 Simulations

Examining the relationship between the time required to file for bankruptcy and the *diff*, a stand-in for the severity of the news flow that erodes sentiment, is intriguing. The typical number of *ticks* (periods) required to achieve bankruptcy is represented by points in Figure 5. The standard deviations (10 simulations per point) are represented by the vertical segments, and we show three scenarios:

- no absorption of news[3], Markopolos is present (yellow);
- news are absorbed, no Markopolos (gray);
- news are absorbed and Markopolos is present (blue).

As you can see by the yellow marks, the existence of Markopolos causes the strategy to fail in roughly 135 times when no news is absorbed. This period of time is quite long, prone to considerable random variability, and independent of *diff*. The findings suggest that Markopolos alone has a negligible impact on the scheme's demise.

Instead, bankruptcy happens much more quickly as the amount of news that reaches the market grows if the news is digested and causes the sentiment to decline. For example, low values of *diff* cause the collapse in 60–80 periods, but big values cause bankruptcy in as little as 20 periods (gray curve). The first scenario is consistent with a very gradual build-up of negative sentiment in the agent populations. An increase in *diff* is similar to situations where traders have

[3] In other words, whatever the *diff*, agents' sentiment is changed only by an encounter with Markopolos.

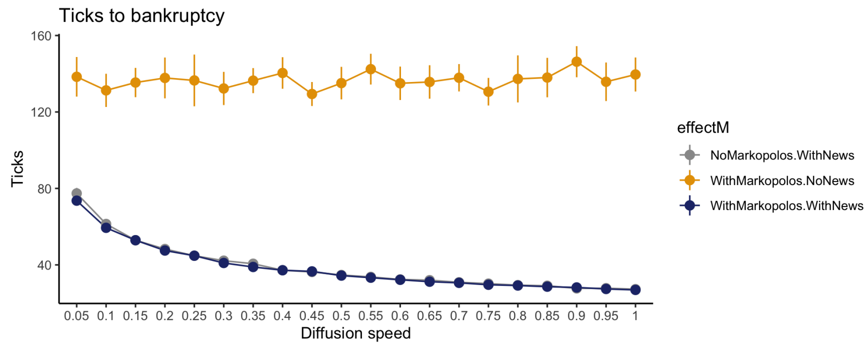


**Fig. 5.** Time to bankruptcy when Markopolos is present but no news is absorbed (yellow); news is absorbed but Markopolos is absent (gray); and news is absorbed and Markopols is present (blue). One standard deviation is represented by vertical segments, and we utilized ten simulations per point.

several opportunities to assess their emotions downward due to increased media pressure, increasing the likelihood and frequency of withdrawals.

Even if there are some differences in Figure 6, when we zoom in on the pertinent section of Figure 5, the existence of Markopolos does not seem to significantly alter the result because the gray and blue curves nearly overlap.

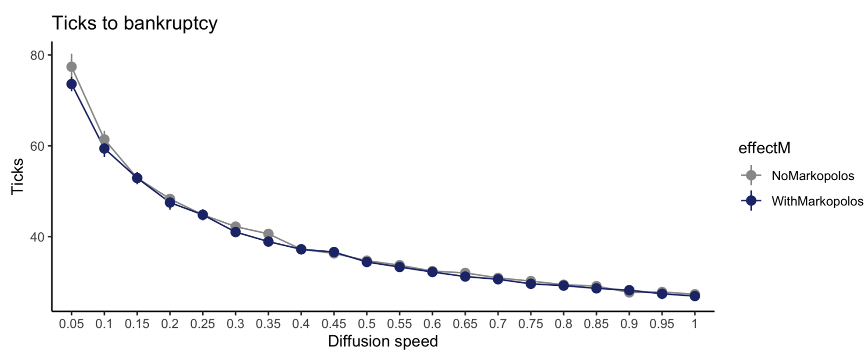


**Fig. 6.** Final ticks: comparisons

We examined the joint distribution of (initial) *sentiment* and (residual) *cash* at the time of bankruptcy to determine how much Markopolos affects the outcomes. In order to do this, we conduct ten simulations with and without Markopolos, using the same random seed and *diff* = 0.05. In order to calculate a non-parametric kernel estimate of the joint distributions of the two variables under the two "treatments" with/without Markopolos, we acquired 1500 pairs ($150 \times 10$) of outcomes (*sentiment,cash*). Figure 7 provides a comparison; the nearly perfect superposition of Figure 6 suggests that the two densities are fairly similar but Markopolos's (bottom panel) effect is evident in the dark "shoulder", extending to values of large (initial) *sentiment* and demonstrating that there is a (some small) chance that those agents will leave the game with positive *cash* and noticeable gains. Remarkably, they are usually those in the circle shown in Figure 4.

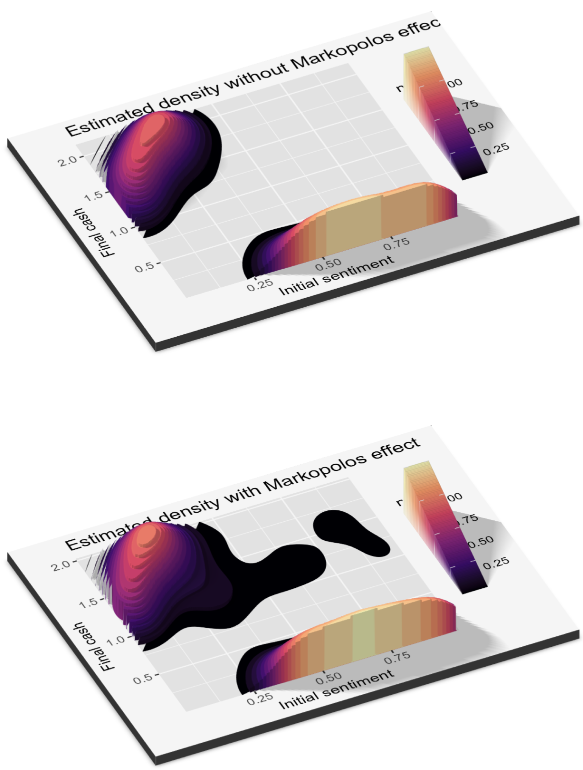


**Fig. 7.** Estimated densities of (sentiment,cahs) at bankruptcy: without Markopolos (top panel), with Markopolos (bottom) panel.

We compare the previously indicated 1500 observations in each case using Pearson's chi-square test of independence to officially determine whether the difference between the two distributions is statistically significant. In the tables 2 and 3, the number of data points in the bins that correspond to the distribution's terciles (without Markopolos) is displayed.

Table 2: Without Markopolos, *diff* = 0.05

| | *cash* | | |
|---|---|---|---|
| *sentiment* | 0 | (0,1.21] | (1.21,2.16] |
| (0,0.32] | 1 | 37 | 461 |
| (0.32,0.65] | 136 | 325 | 39 |
| (0.65,1] | 362 | 137 | 0 |

Table 3: With Markopolos, *diff* = 0.05

| | *cash* | | |
|---|---|---|---|
| *sentiment* | 0 | (0,1.21] | (1.21,2.16] |
| (0,0.32] | 1 | 77 | 409 |
| (0.32,0.65] | 94 | 352 | 64 |
| (0.65,1] | 271 | 191 | 39 |

The Pearson's chi-square strongly rejects the independence of the two different treatments, with $p$-value close to zero, leading to the conclusion that the presence of Markopolos agent is significant.

## 4 Conclusions

Using the Madoff scam as an example, the article offers a model of a Ponzi scheme. In many similar schemes, investors' money is not invested but is instead retained by the con artist, who (slowly) wastes it for personal use and to reimburse the clients for their capital and earnings. Agents regard themselves as wealthy and think (i.e., incorrectly believe) in gains that are only present in fake paperwork or accounts. We simulate a general loss of trust in the markets, similar to what would have occurred in the Maddoff example, where the initial inclination of agents to invest in the scam is weakened by the assimilation of (negative) economic news. We also looked into the impact of a special agent called Markopolos, who has the ability to persuade agents to leave the scheme quickly, so converting potential investors into "fugitives."

Because of the growing discrepancy between perceptions and the actual amount of money remaining with the fraudster, the NetLogo-developed model clearly illustrates the scheme's structural insolvency. When there is no more money to pay the person who believes they are entitled, bankruptcy is declared. The quantity of negative sentiment that spreads among investors is negatively correlated with the time required to attain flagrant insolvency. Markopolos' effects are likely minimal, indicating that even whistleblowers do not hasten the scam's revelation unless they are able to start a chain reaction of redemptions (which is not depicted here).

Although the Markopolos effect may have little practical significance, we utilize a formal Pearson chi-square test to determine that it is statistically significant (in line with some exploratory and visual evidence derived via simulations and non-parametric density estimation on the generated data).

## Appendix: a bizarre dialogue

**Paolo:** Francesca, have a look! It was a boring afternoon (1 March 2026) and I decided to re-write our working paper on QuillBot (`https://quillbot.com/`...)

**Francesca:** What are you saying? What did you do *precisely*?

**Paolo:** QuillBot is an AI tool that can rephrase texts... I thought it's good and it speaks English better than I do! I'm supervising a couple of students and they suggested me to try. So, I had a shot and rephrased all the text...

**Francesca:** Are you nuts? And did you pay for that?

**Paolo:** Well, actually it's free provided that you only translate small chunks of text up to 250 words. So, I took a couple of hours to copy-paste our article and get the paraphrasis. Overall, I think it's a good attempt and, guess what, I even think we should "publish" it or see how people feel about that. I tend to think that the fluency improved, some sentences look like "real" English, whereas I often fear that our linguistic skills are too basic... You know, we are not native speakers and some idiomatic expressions used by AI are cute!

**Francesca:** C'mon, Paolo! You just waste time! There are lots of blunders scattered around. I've read one "officially" instead of "formally", or still worse, the term "likelihood" which translates "probability": you know that if I have to explain the concept of probability to some young student, I can use the idea of *likely event*, say, but "likelihood" should never (ever!) be used in loose sense in a mathematical-statistical article.

**Paolo:** Uh, I see. The only expression that I really dislike is "more excellent". I may be on a sloppy path... Anyway, would you please allow me to publish the experiment and welcome comments, remarks and suggestions from readers?

**Francesca:** That's looks a bit bizarre... but honestly it is not that harmful either. Ok, let's do this!

**Paolo:** Thanx and ciao.

Please give us your opinion responding to the questionnaire at `https://forms.gle/sPBWT4AqtRtUu2Jz8`
Visit the "Department of Economics - Working Papers" series at `https://www.unive.it/web/en/8034/working-papers` or download the "original" work at `https://papers.ssrn.com/sol3/papers.cfm?abstract_id=6298320` or use the QR code below. Your comments are welcome.

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