Market Performance and Review System Informativeness

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Feedback and review systems

- FRSs are crucial for functioning of online markets. (e.g. Resnick et al., 2000; Dellarocas, 2003; Tadelis, 2016)
- The problem: Long-lived sellers vs. short-lived buyers (Fudenberg & Levine 1989, 1992)
- Establishing reputation can help restore trust.

(**Theory**: e.g. Kreps, 1990, **Observational:** McDonald & Slawson, 2002; Livingston, 2005; Jin & Kato, 2006; Cabral & Hortaçsu, 2010; Cai et al., 2014; Klein et al., 2016 **Experiments**: Ba & Pavlou, 2004; Chen et al., 2004; Duffy & Feltovich, 2002, 2006; Keser, 2002; Bolton et al., 2004; Bohnet & Huck, 2004; Bohnet et al, 2005, Grosskopf & Sarin, 2010; Huck et al., 2012, 2016; Abraham et al., 2016; Keser & Späth, 2021)

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- A review system conveys information to buyers about a seller's past behavior. But this information is not perfect:
  - reviewers' biases, (self-)selection & "silent reviews" (e.g. Dellarocas & Wood, 2008; Nosko & Tadelis, 2015)
  - social interactions & inflation (Bolton et al. 2013; Fradkin et al. 2015; Horton & Golden, 2015; Zervas et al. 2015)
  - system design and interpretability (Tadelis, 2016)
  - and…

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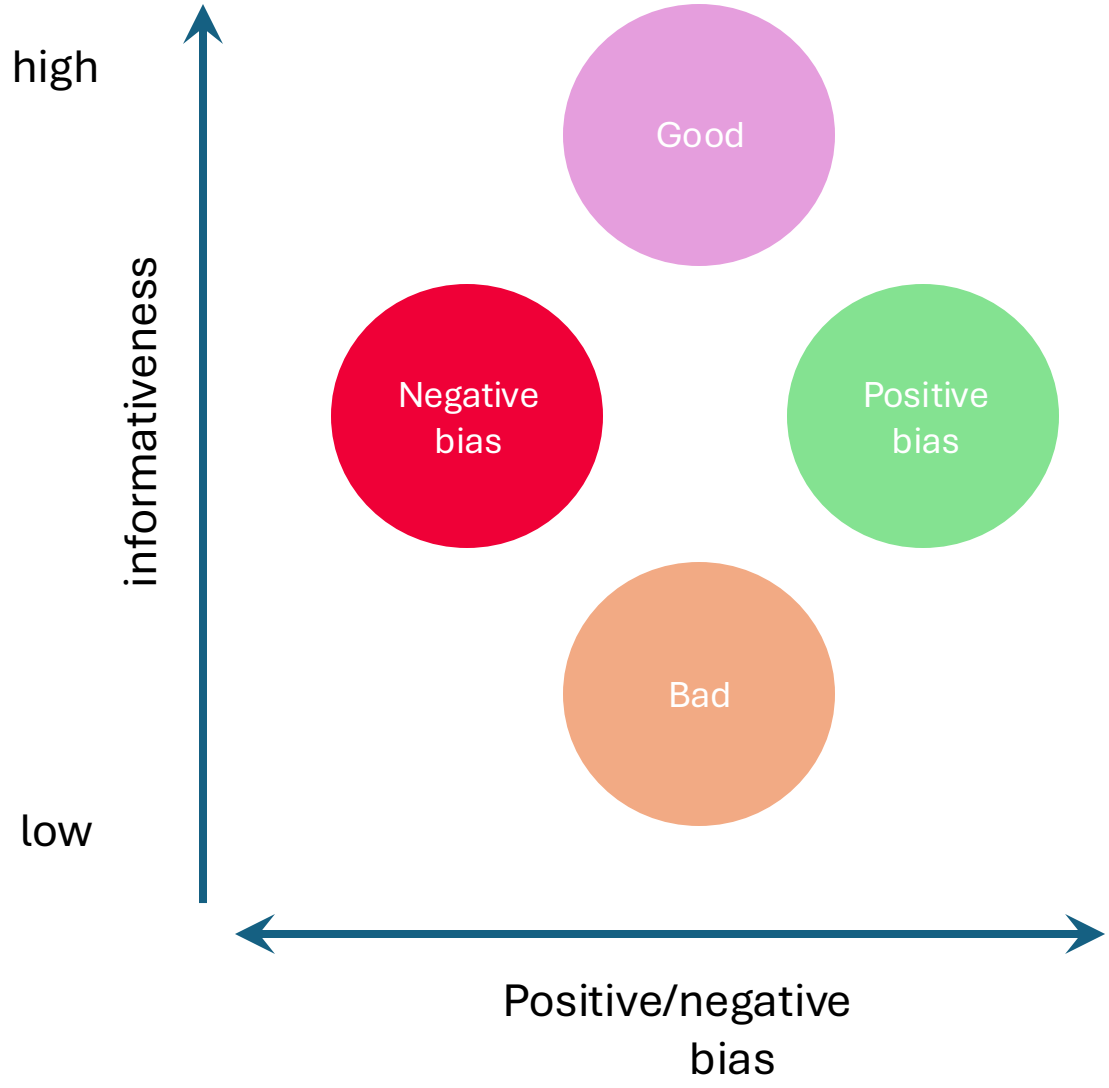
  - system design and interpretability (Tadelis, 2016)
  - and…
- Fake reviews are pervasive (and not illegal until very recently!) and are becoming hard(er) to identify because of genAI.

(Lappas et al. 2016; Reimer & Benkenstein, 2016; Karabas et al., 2016; Maslowska et al., 2017; Pooja & Upadhyaya, 2022; Kim et al., 2023; Song et al., 2023)

From informativeness to market performance

- Noise in the review system, either from fake reviews or other sources affects how informative and/or biased the system is about **past** behavior.
- In turn, this may affect both sides' **current** market behavior.
- We try to experimentally establish a link between the two.



Research questions

What role does the informativeness of a feedback and review system have on the functioning and performance of the market?

Does “bias” in a review system hinder trust formation?

What is the potential of mis-trust contagion?

Opportunities and Challenges

- Experiments can be a great complement to other empirical approaches aiming to study these questions.
  - One can perfectly observe fundamentals
  - One can control the review system's informativeness

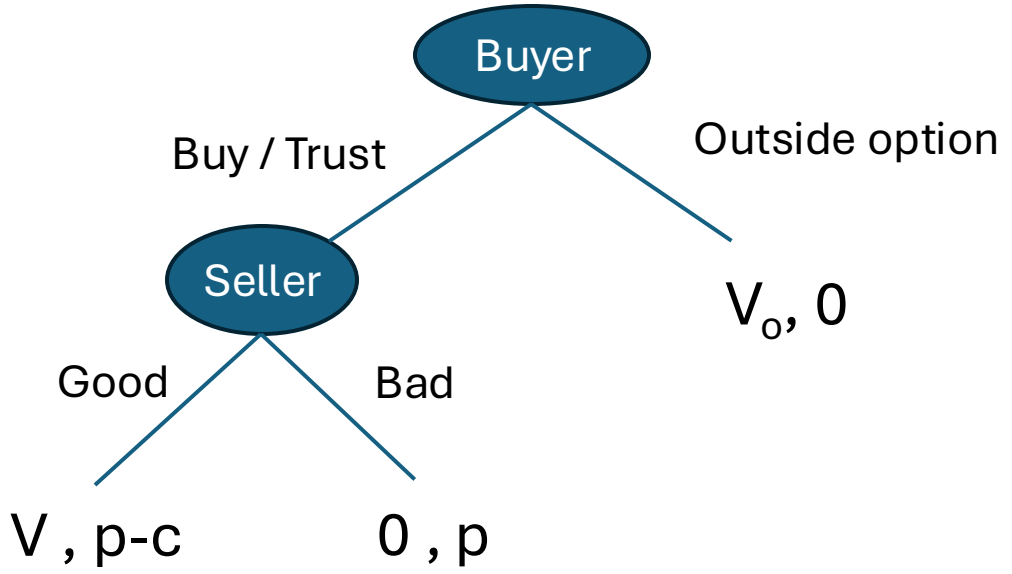
- Difficult to re-create the one-shot nature of the interaction beween buyers and sellers

Experimental Design

Modified Trust game

- **Price:** Seller chooses a price that is visible to buyers.
- **Competition**: multiple sellers that buyers can choose from.
- **Review system:** provides information on sellers' past choice of quality.

- Interaction is repeated but anonymous.



Design overview

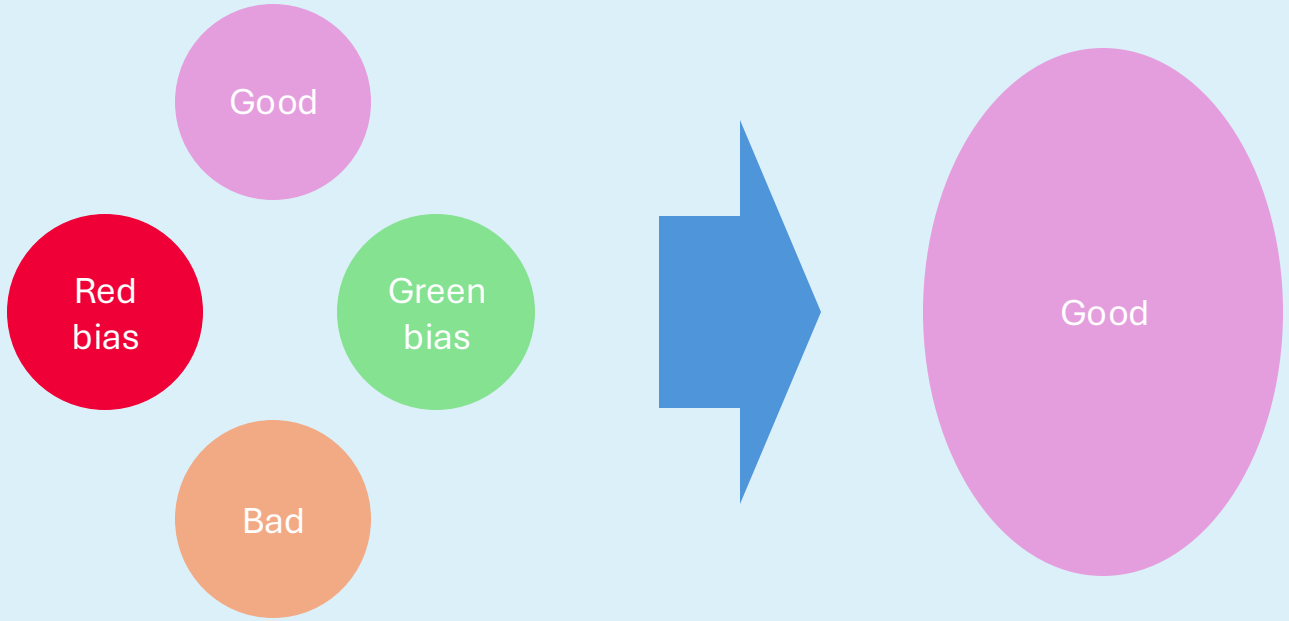
Experimental Task

Phase I
Review System specification

Phase II
Review System specification

market for fictitious good

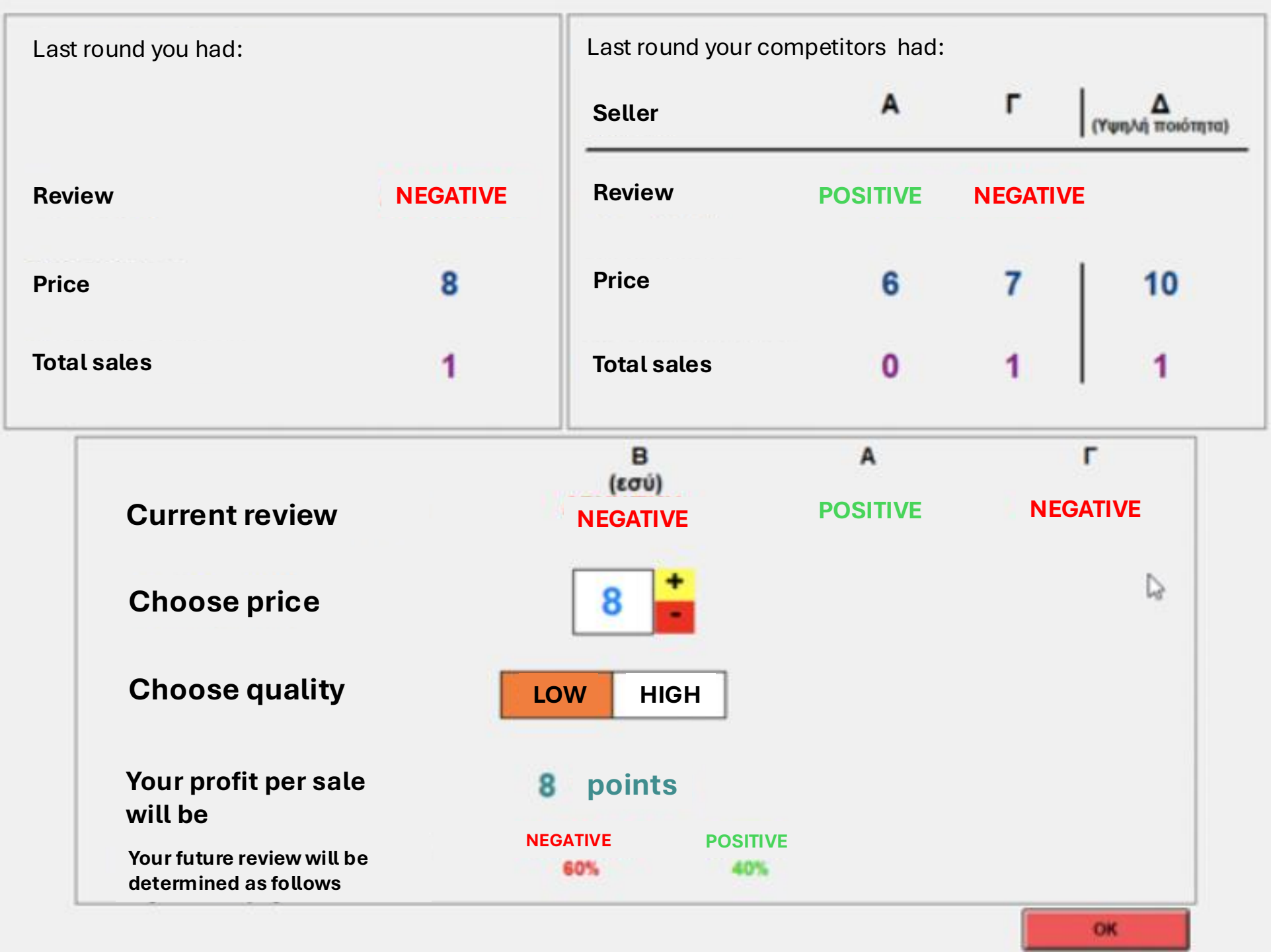
(i.e. repeated trust game with competition)



The market

- 3 buyers – 3 sellers
- Sellers
  - Set price: integer between 6 and 12 points
  - Set quality: **HIGH** (cost = 3 points) or **LOW** (cost = 0 points)
- Buyers
  - Observe price, NOT quality
  - Value only **HIGH** quality (12 points)
  - Observe review
  - Choose between offers and outside option (price 10, quality **HIGH**)
- Review
  - **POSITIVE** or **NEGATIVE**
  - Depends *stochastically* on previous round quality only.

Sellers' feedback & decision screen



Buyers' decision screen

Buyers' feedback screen

Provided every 3 rounds

In the last 3 rounds you had:

	Offers with review	Stable offer
Your choices	2	1
Quality		
HIGH	1	1
LOW	1	
Payoff per unit	0 points	2 points

OK

Review system specifications

		review in t	
		negative	positive
quality in $t-1$	low	.9333	.0667
	high	.0667	.9333

		review in t	
		negative	positive
quality in $t-1$	low	.60	.40
	high	.40	.60

Review system specifications

		review in t: negative	review in t: positive
quality in $t-1$	low	.9333	.0667
	high	.0667	.9333

$\kappa = 14$ $\lambda = 14$

NF: No fake reviews

		review in t: negative	review in t: positive
quality in $t-1$	low	.60	.40
	high	.40	.60

$\kappa = 1.5$ $\lambda = 1.5$

BF: Both fake reviews

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quality in $t-1$	low	.35	.65
	high	.025	.975

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GF: Fake green (positive) reviews

		review in t: negative	review in t: positive
quality in $t-1$	low	.975	.025
	high	.65	.35

$\kappa = 1.5$ $\lambda = 14$

RF: Fake red (negative) reviews

		review in t: negative	review in t: positive
quality in $t-1$	low	.60	.40
	high	.40	.60

$\kappa = 1.5$ $\lambda = 1.5$

BF: Both fake reviews

Treatments

- Two phases of 45 rounds each
  - Phase 1: one of the four review system specifications
  - Phase 2: NF specification for all treatments

Treatment	Phase I 45 rounds	Phase II 45 rounds	Markets	# of partcps
Baseline	NF	NF	6	36
All Fake	BF	NF	6	36
Fake Positives	GF	NF	6	36
Fake Negatives	RF	NF	6	36

Hypotheses

Hypothesis 1

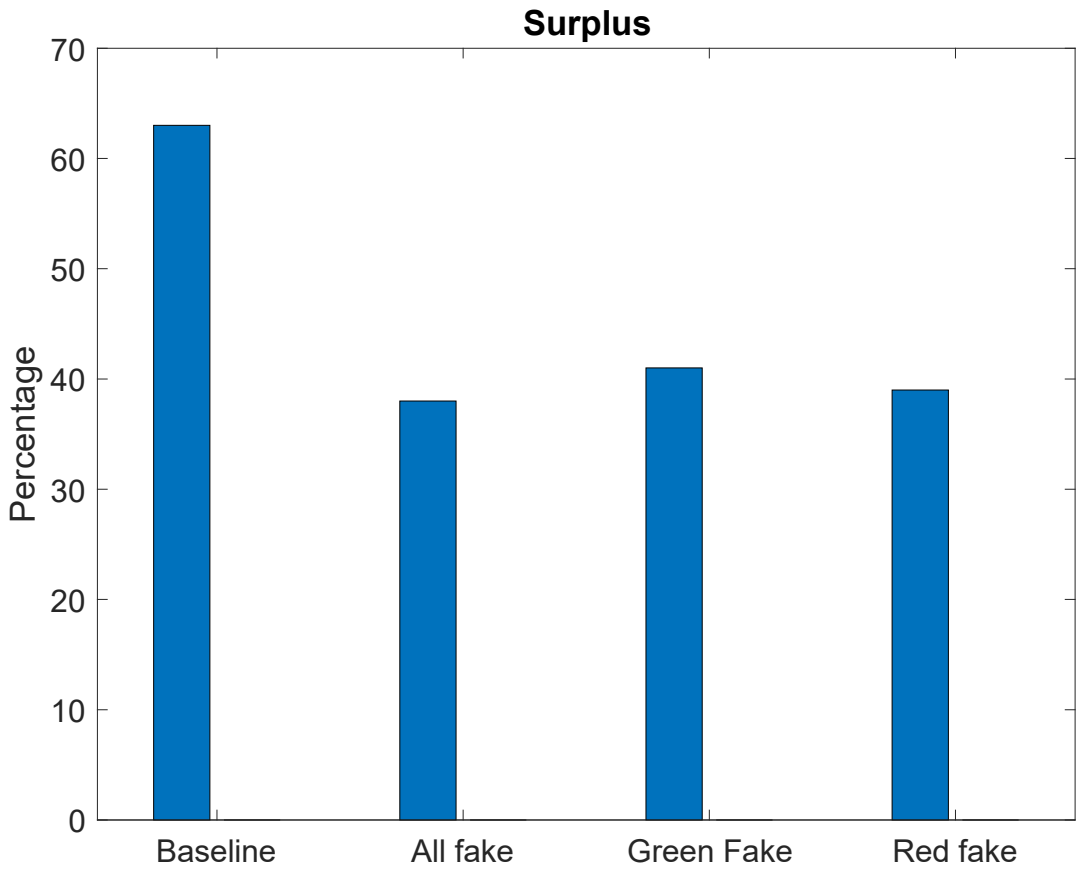
$$surplus_{AF} < surplus_{RF} < surplus_{GF} < surplus_{NF}$$

Hypothesis 2

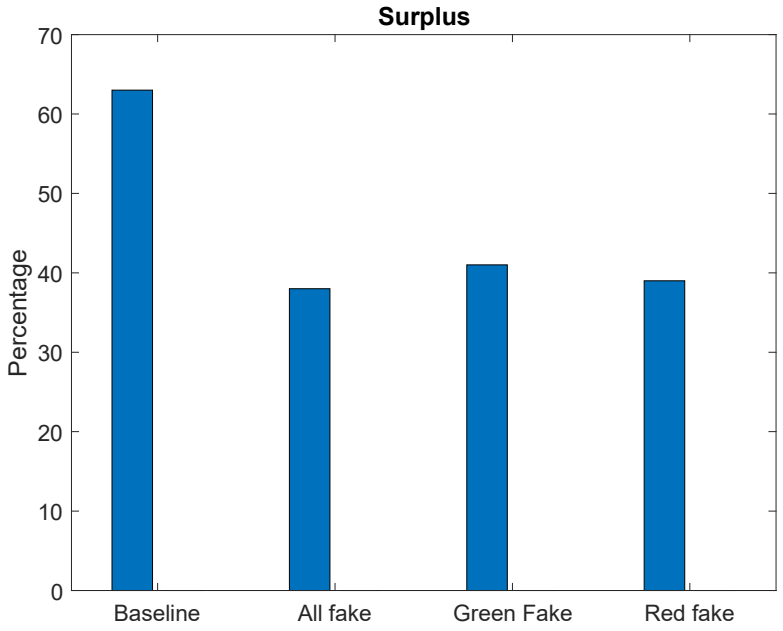
$$surplus_L^1 < surplus_K^1 \Rightarrow surplus_L^2 < surplus_K^2$$

Phase I

Surplus


Surplus
Percentage
70
60
50
40
30
20
10
0
Baseline
All fake
Green Fake
Red fake

Surplus


Surplus
Percentage
70
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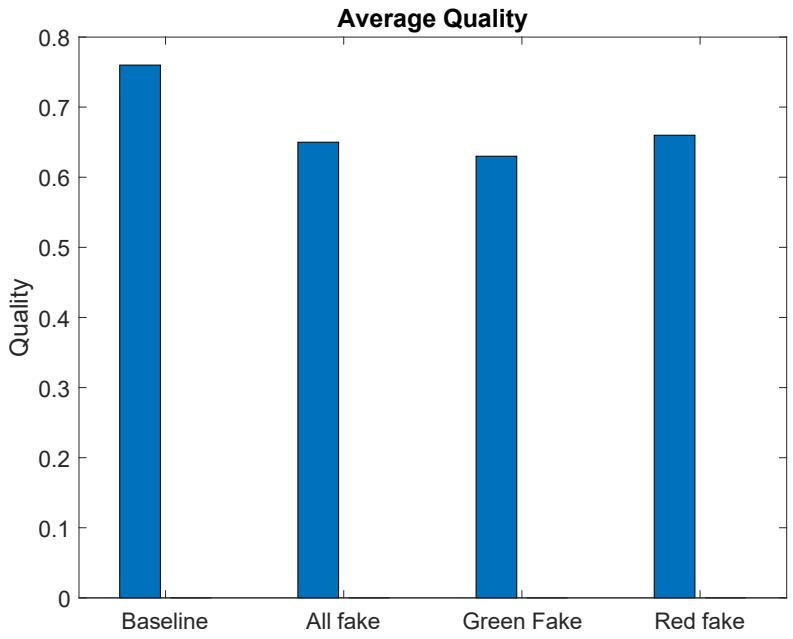
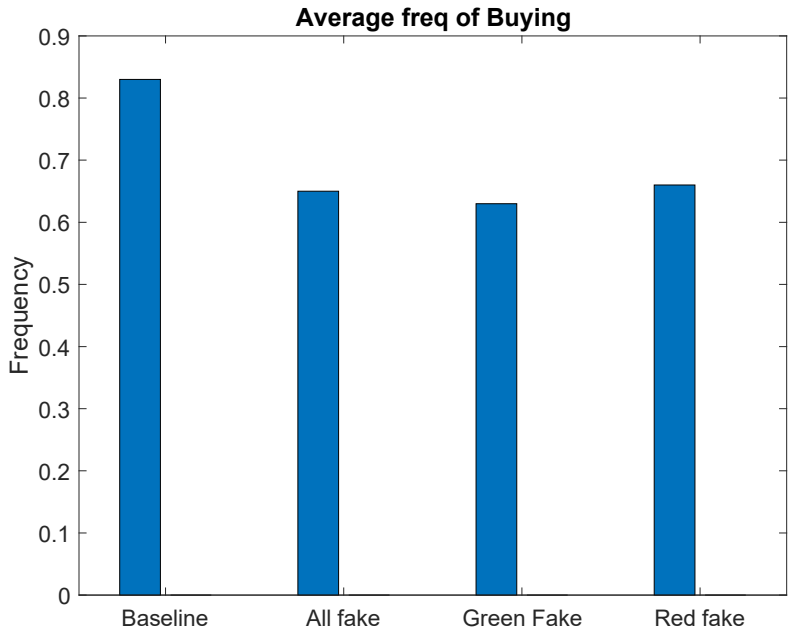
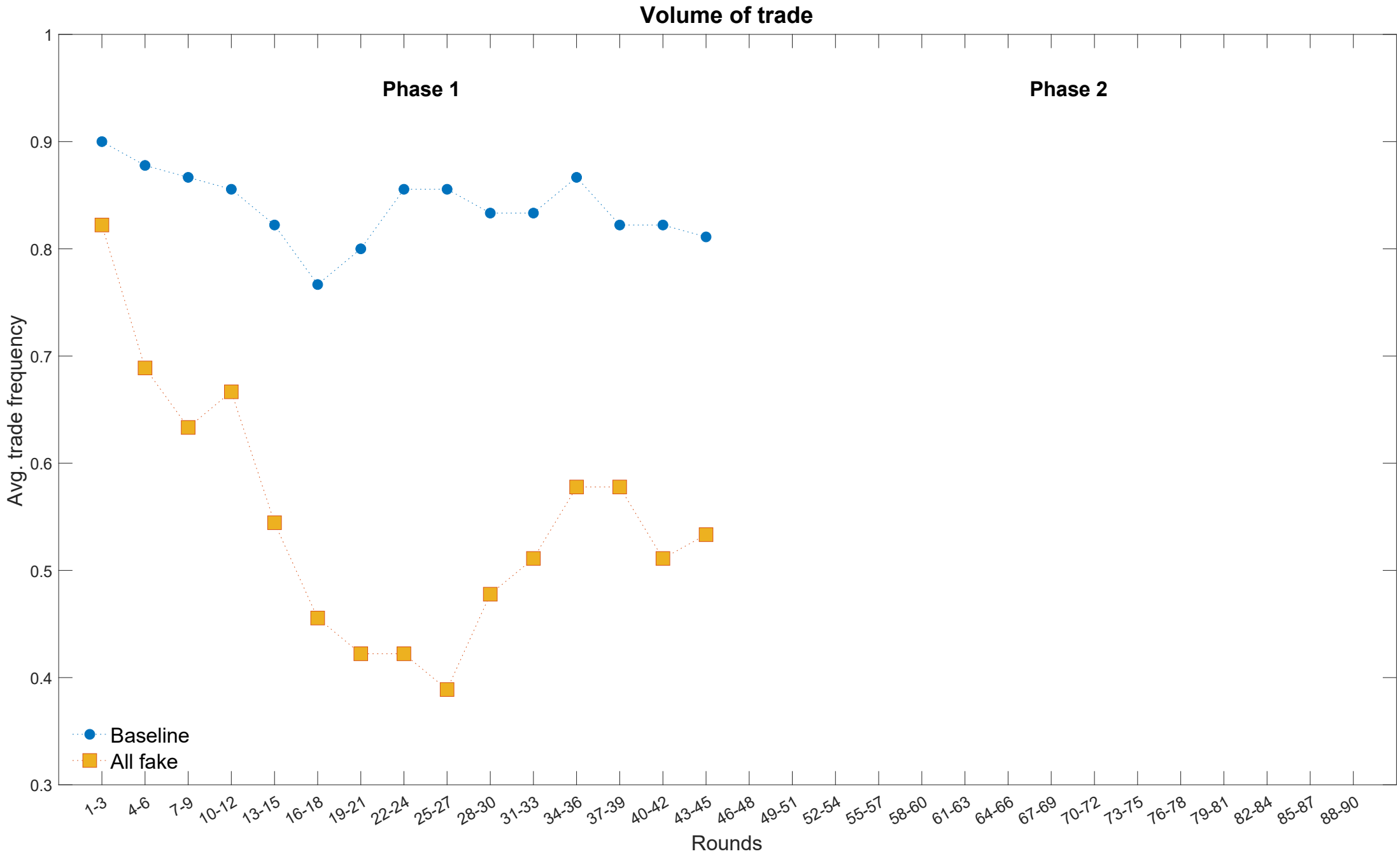
Baseline
All fake
Green Fake
Red fake

=


Average Quality
Quality
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Baseline
All fake
Green Fake
Red fake

X


Average freq of Buying
Frequency
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Baseline
All fake
Green Fake
Red fake


Volume of trade
Phase 1
Phase 2
Avg. trade frequency
Rounds
Baseline
All fake
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1-3
4-6
7-9
10-12
13-15
16-18
19-21
22-24
25-27
28-30
31-33
34-36
37-39
40-42
43-45
46-48
49-51
52-54
55-57
58-60
61-63
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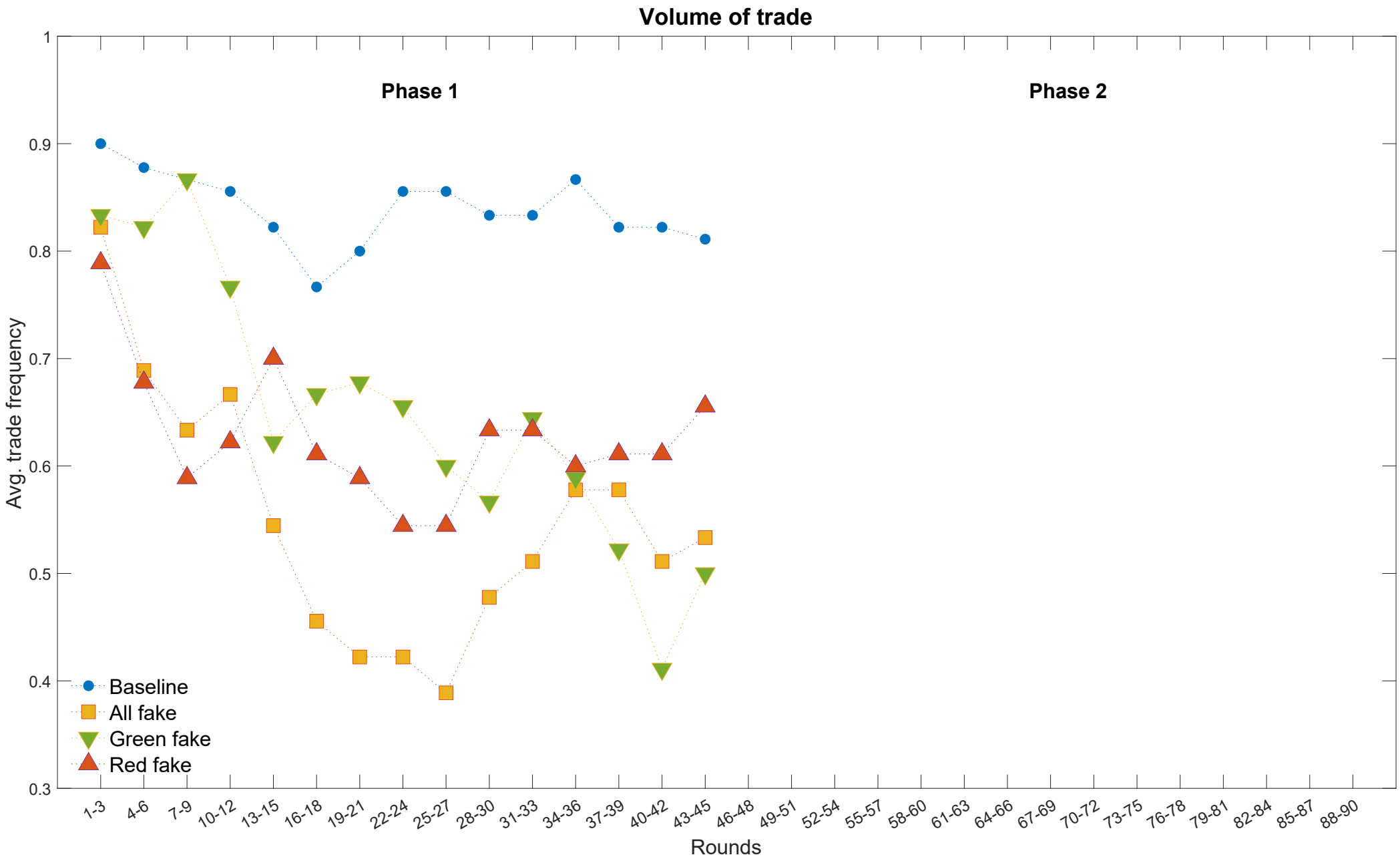
Volume of trade
Phase 1
Phase 2
Avg. trade frequency
Rounds
Baseline
All fake
Green fake
Red fake
1
0.9
0.8
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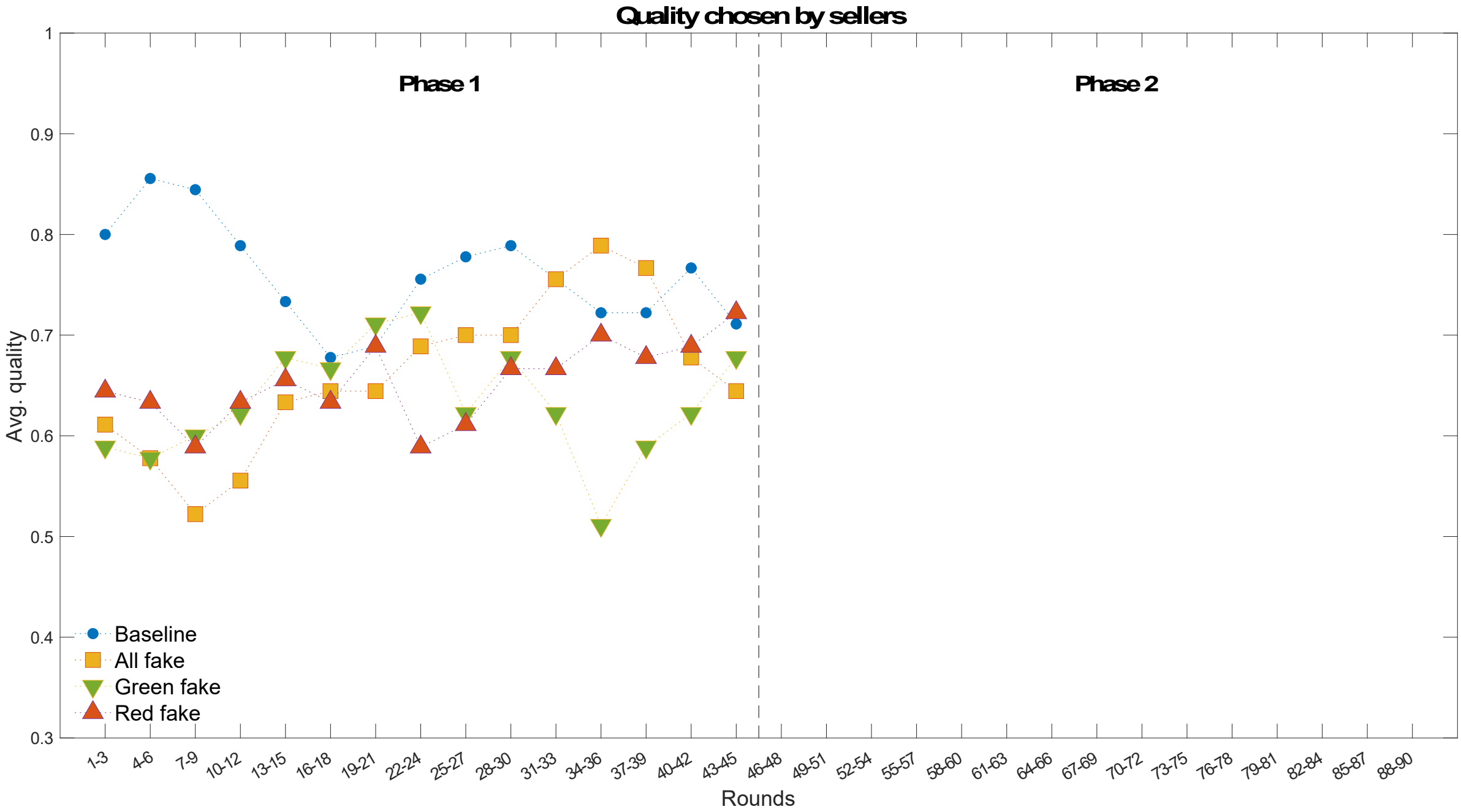
Quality chosen by sellers
Phase 1
Phase 2
Avg. quality
Rounds
Baseline
All fake
Green fake
Red fake
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1-3
4-6
7-9
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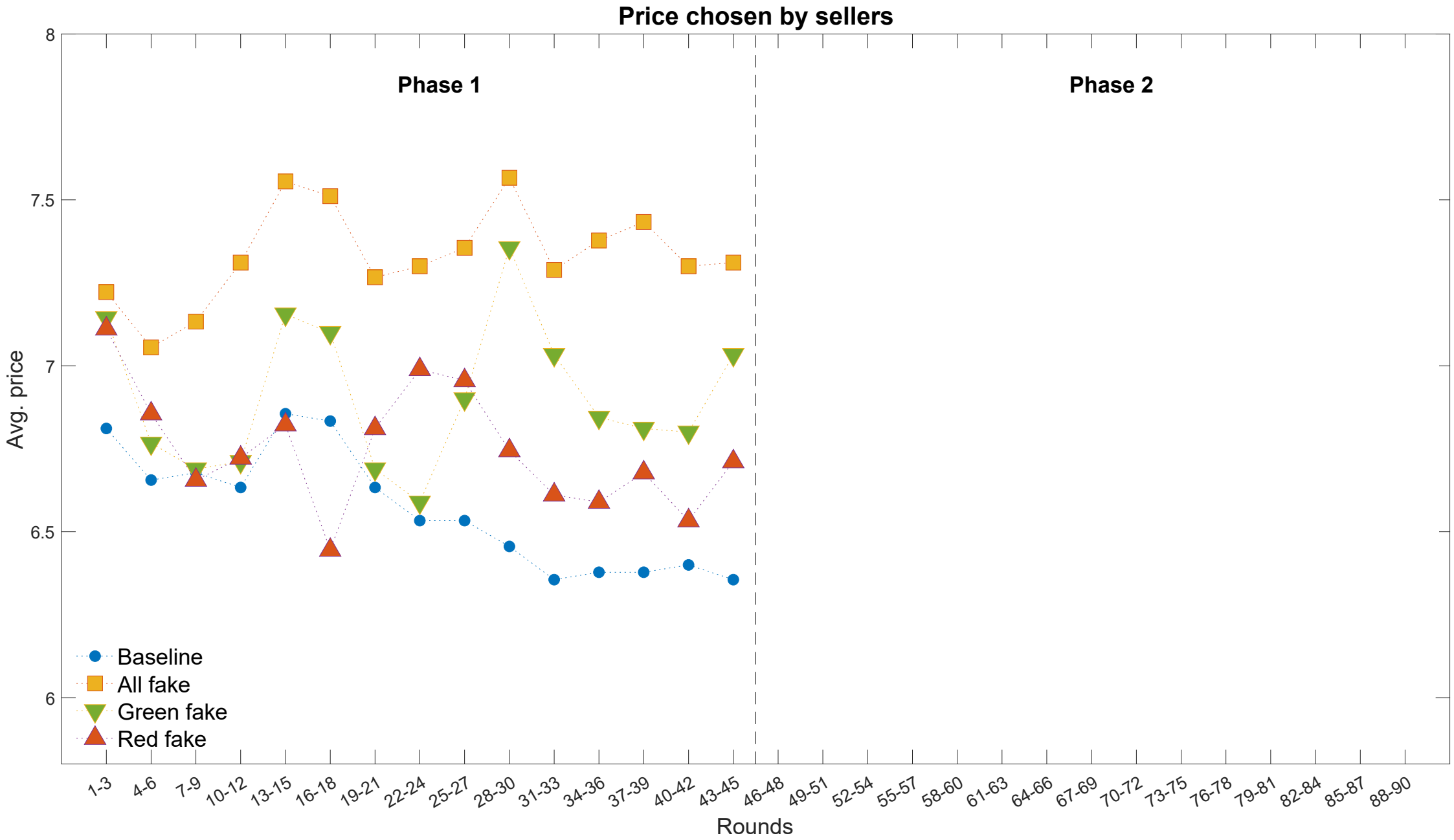
Price chosen by sellers
Phase 1
Phase 2
Avg. price
Rounds
8
7.5
7
6.5
6
Baseline
All fake
Green fake
Red fake
1-3
4-6
7-9
10-12
13-15
16-18
19-21
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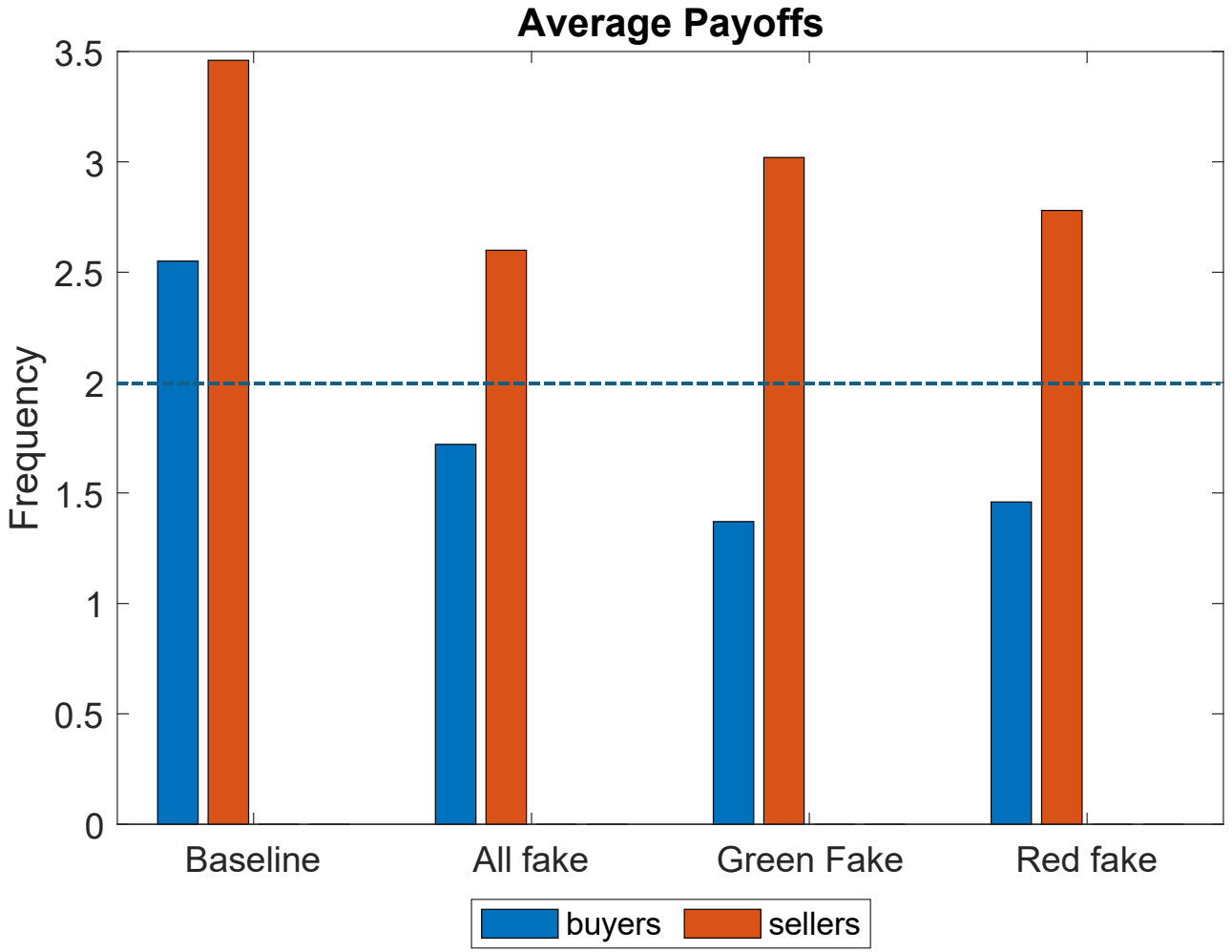
Payoffs


Average Payoffs
Frequency
3.5
3
2.5
2
1.5
1
0.5
0
Baseline
All fake
Green Fake
Red fake
buyers
sellers

Trade and reviews

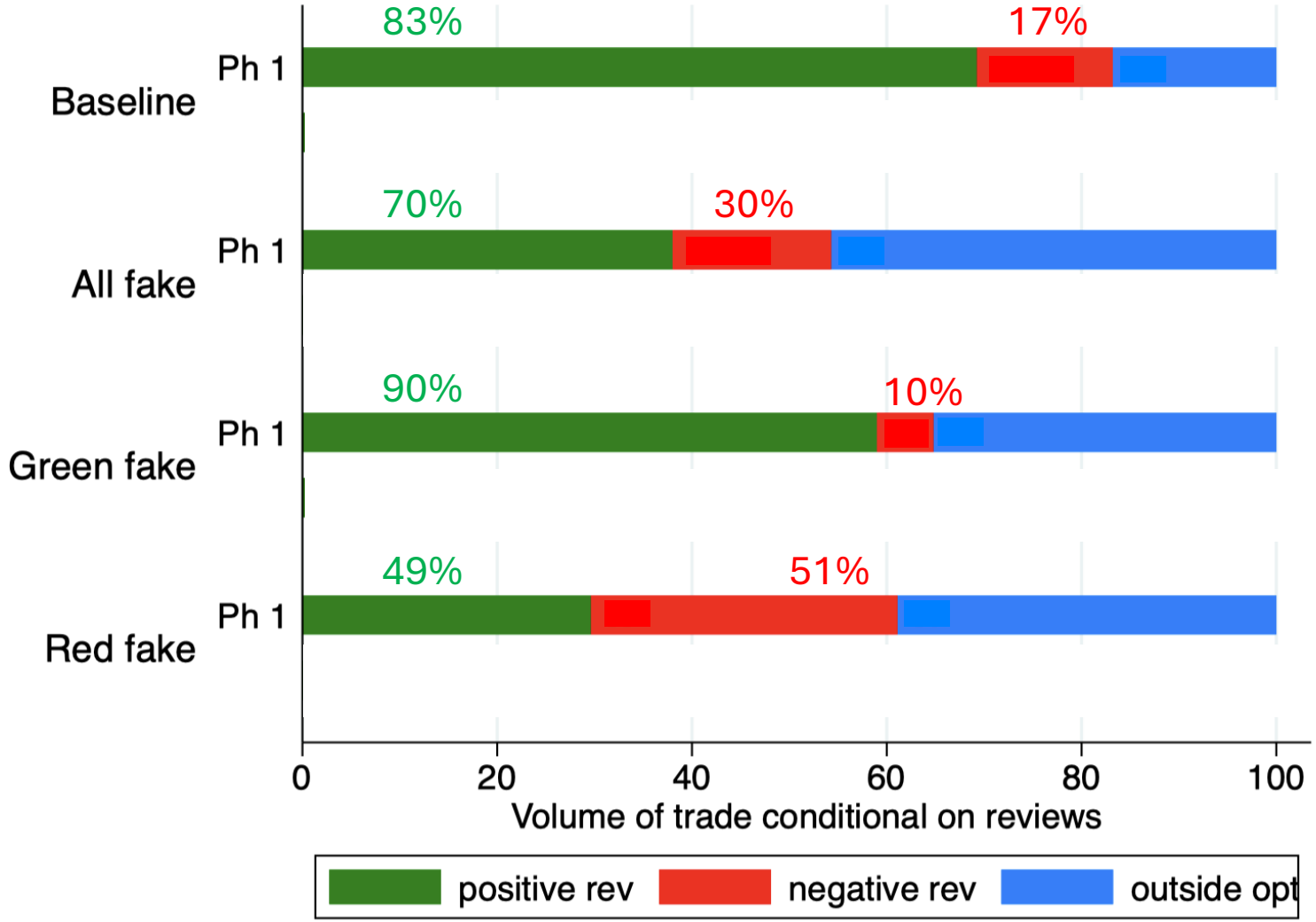
Out of all reviews:

50% positive

72% positive

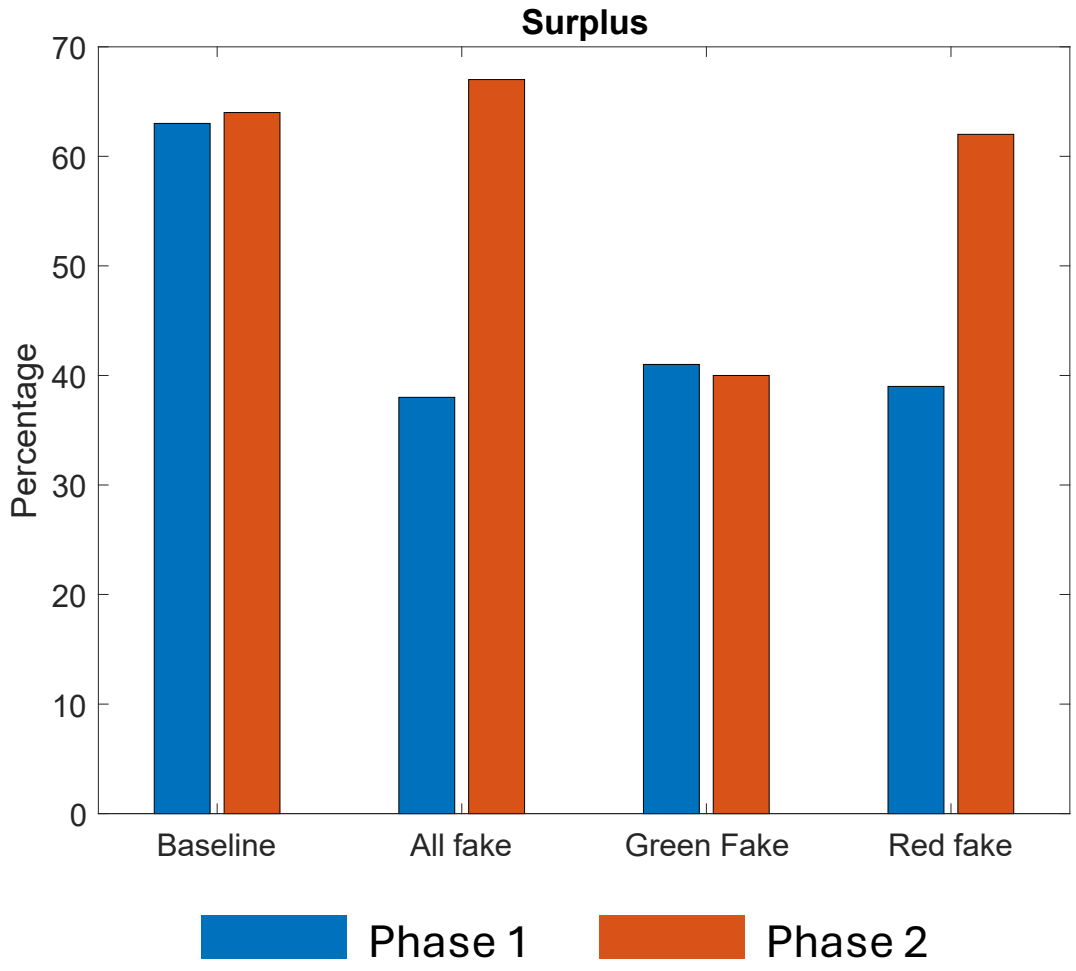
82% positive

24% positive



Phase II

Surplus


Surplus
70
60
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30
20
10
0
Percentage
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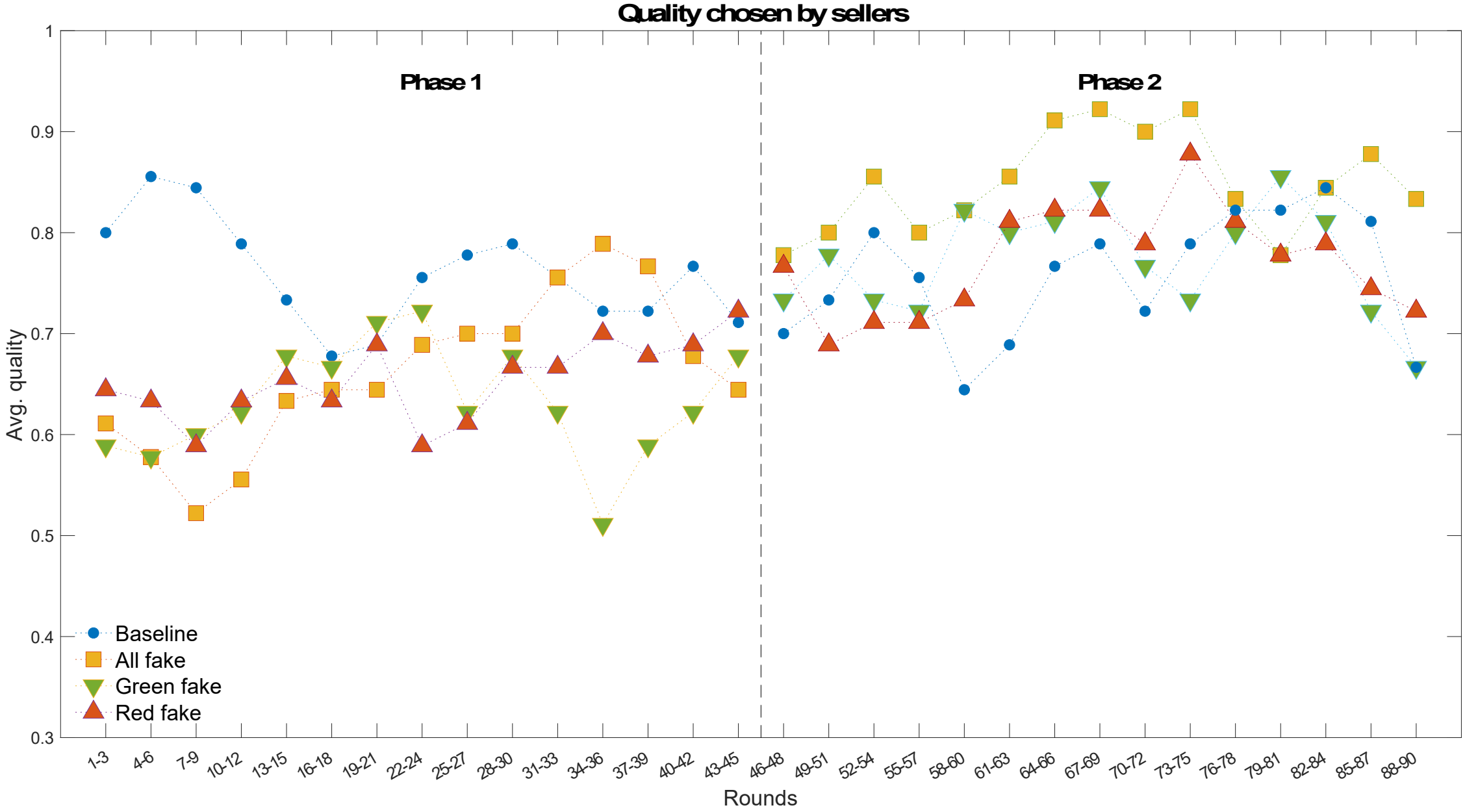
Red fake
Phase 1
Phase 2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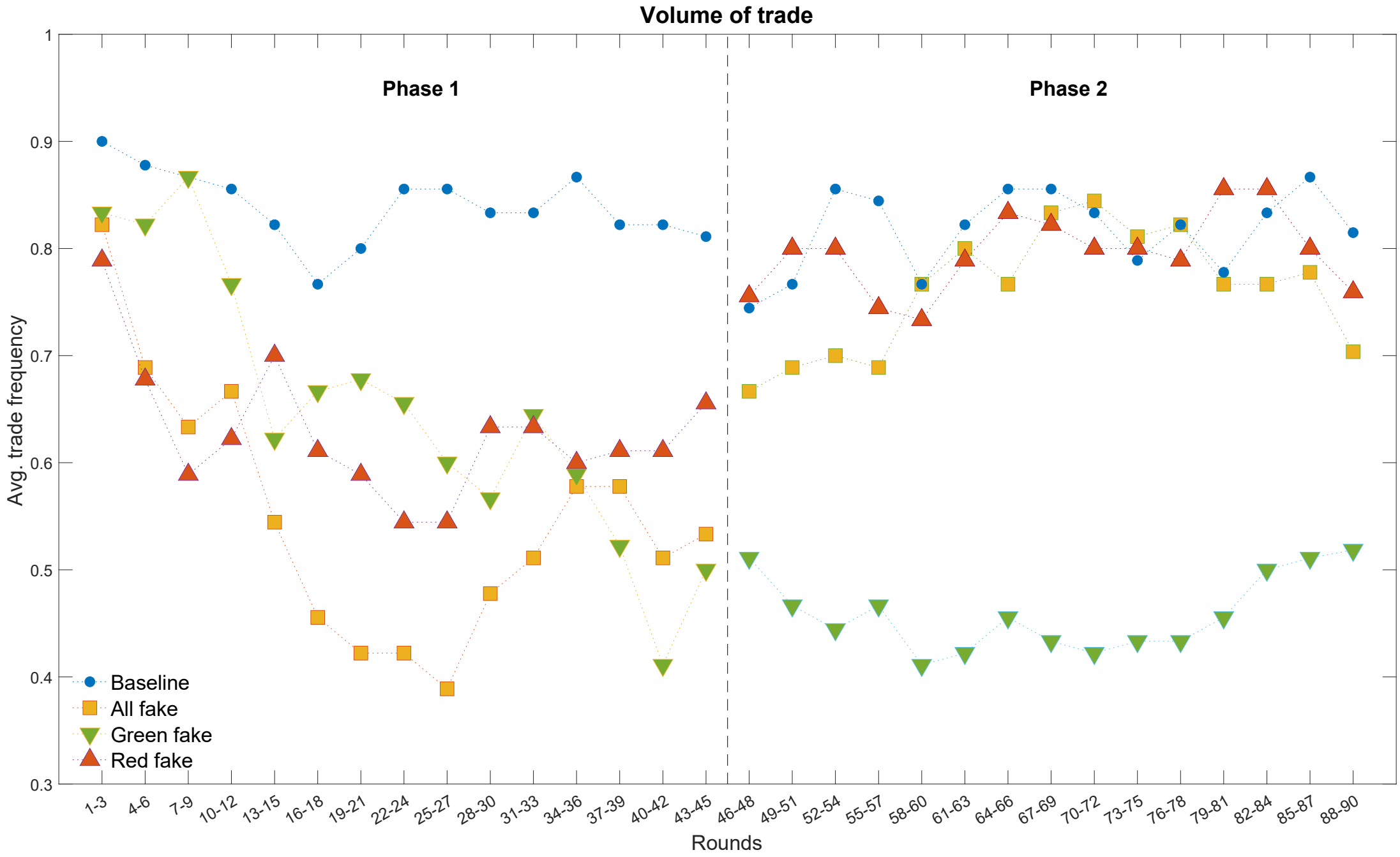
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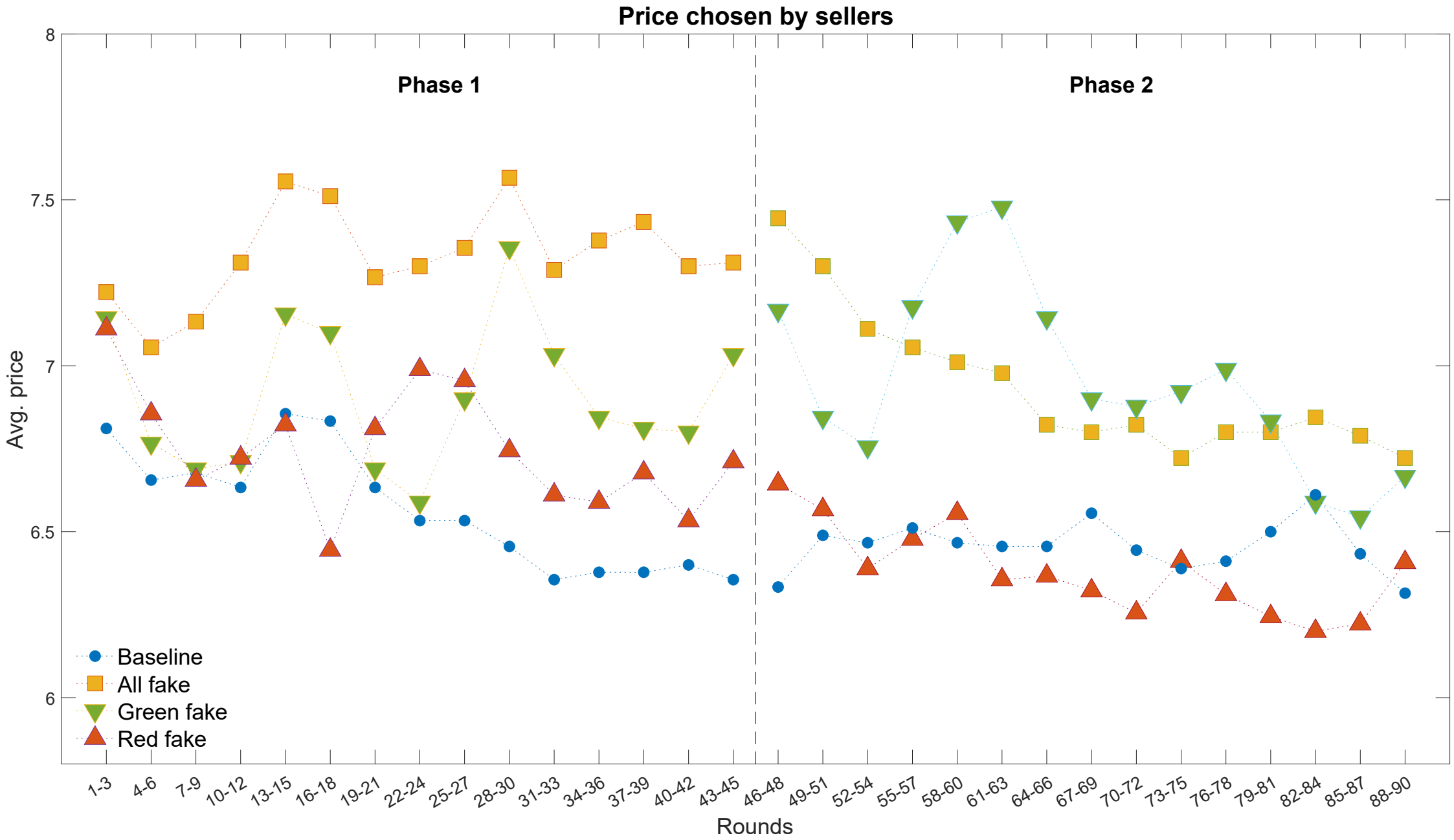
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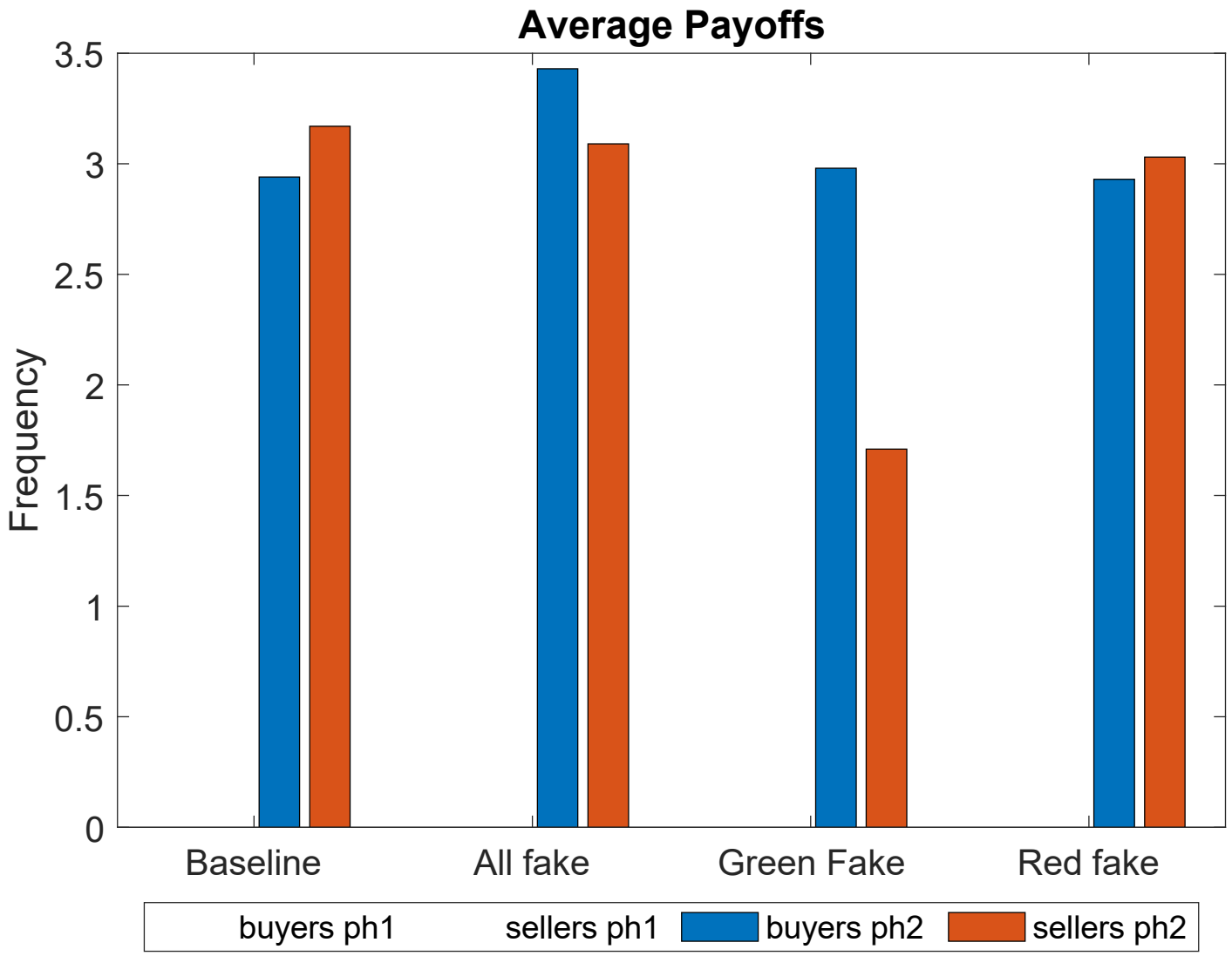
Payoffs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Green Fake
Red fake
buyers ph1
sellers ph1
buyers ph2
sellers ph2

Trade and reviews

Out of all reviews:

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80% positive

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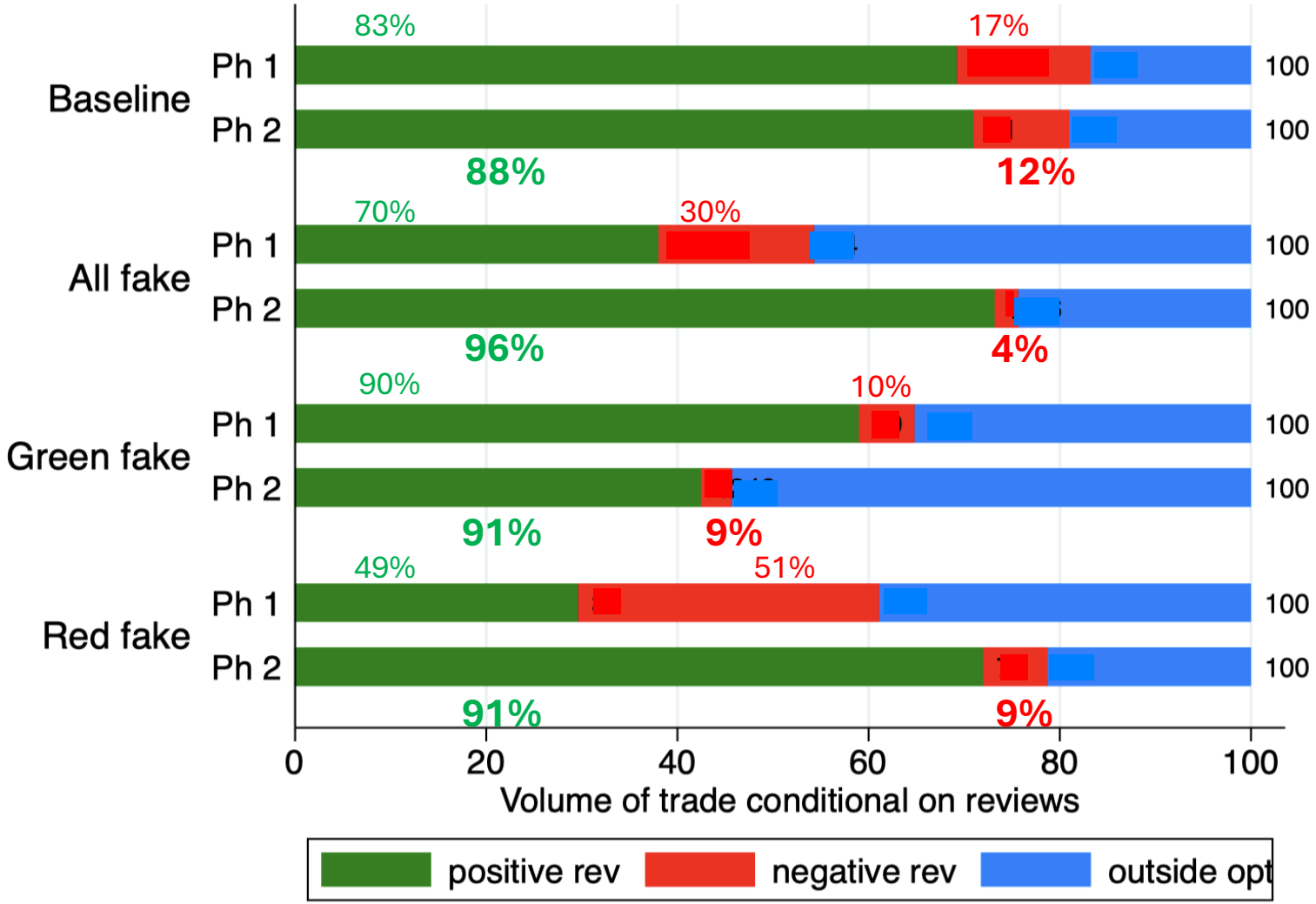

What is going on? (preliminary)

We think:

- Buyers learn about the market from past experience.
- Bad quality always hurts trust…
  - …but, bad quality from ‘Good’ review hurts more(?)
- Sellers’ react to review informativeness.
- Buyers coming from markets with many fakes observe the change in the frequency of revviews, experiment and trust is restored.
- In the GF market, the change in sellers’ behavior is not coming through to buyers.

To validate our intuition, we fit a Heteregoeneous Markov Model (HMM) to the data of Phase I and then simulate buyers behavior in both phases.

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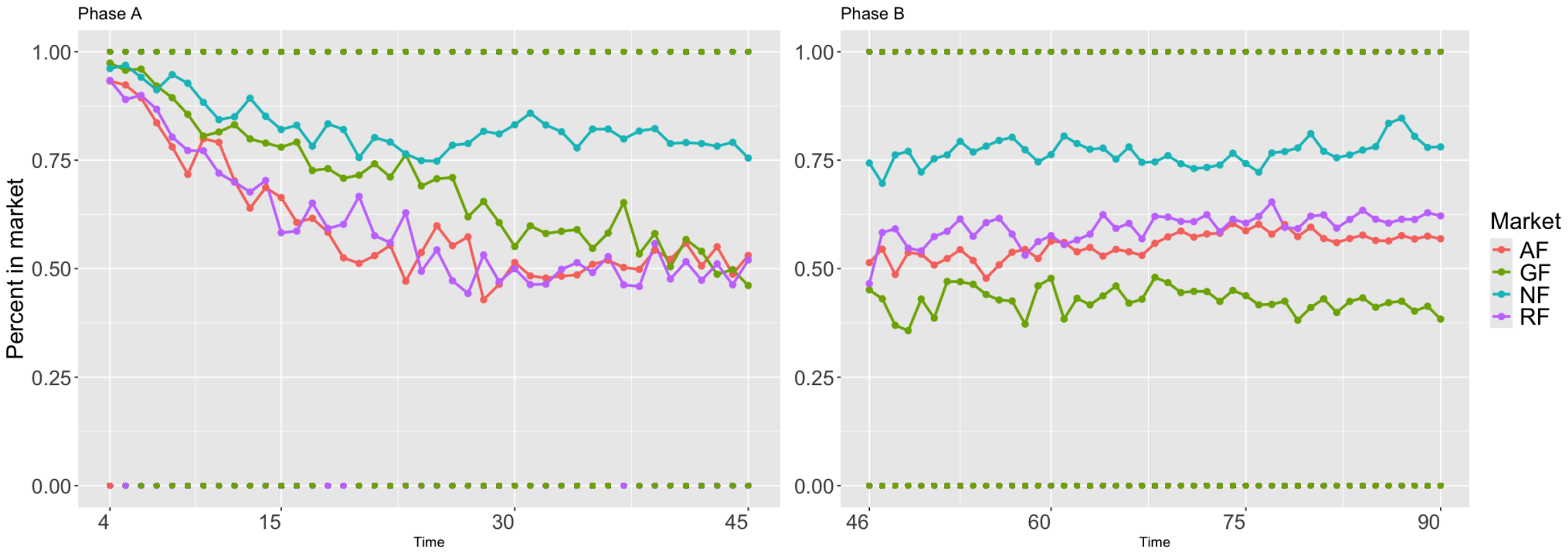

Conclusions

- For the market to function the review system must be informative about past behavior.

- Fake reviews or ‘noise’ in the system errodes trust
- But the specifics matter:
  - A system producing excessive positive reviews can lead to a total breakdown of trust.

- Work in progress: understand the underlying mechanism explaining the asymmetries.

Thank you!

Image: Michael Crider/Foundry