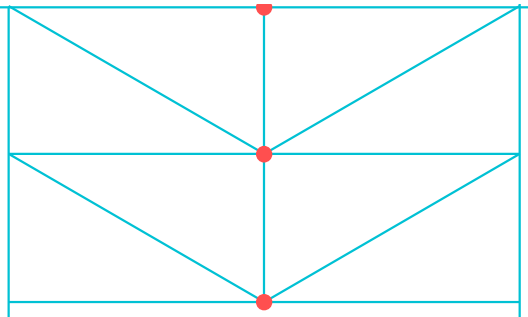
Fraud Dynamics and Controls in Organizations

–

A Replication and Social-Norm-Theory Extension

TUHH
Hamburg University of Technology



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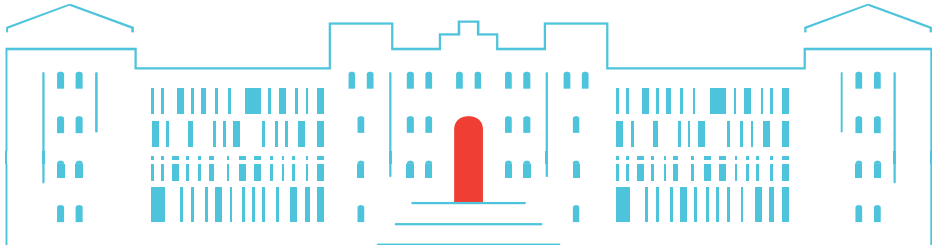
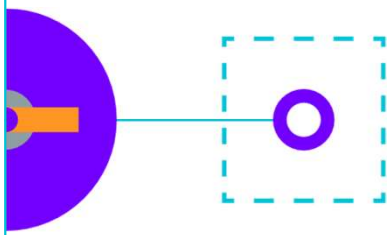


Alexandra Eckert and **Matthias Meyer**

European Accounting Association 46th Annual Congress May 15-17, 2024

Overview

1. Purpose and Motivation
2. Research Questions and Methodology
3. Results
4. Contribution



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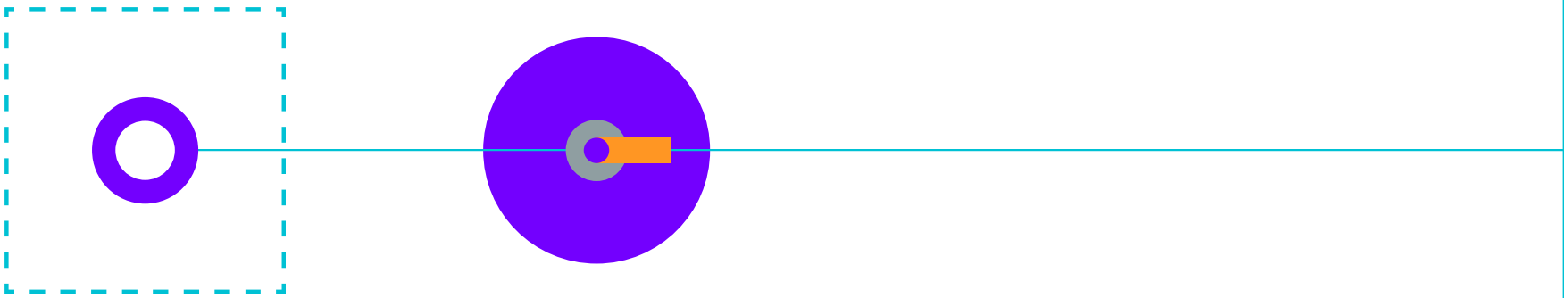
1. Purpose and Motivation



Why Doing Research on Fraud Control?

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Aurubis

This is what we know

Loss due to metal theft: **10 million €***	**1 employee *** sentenced

Image source: AI generated using Microsoft Copilot on 22 April 2024 (left)
Figures taken from: * Aurubis press release of 23 February 2024 (retrieved from https://www.aurubis.com on 28 February 2024)

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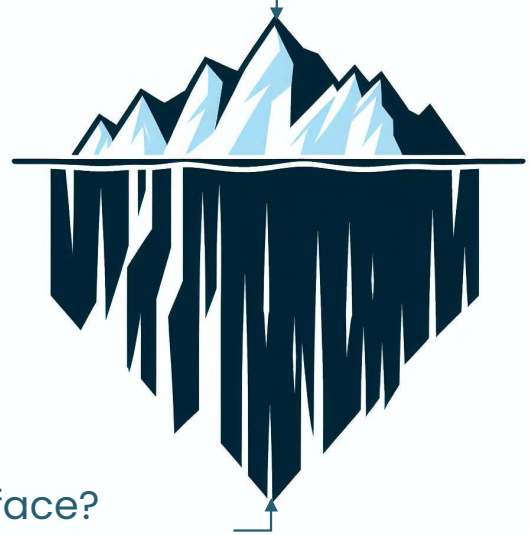

But what is going on beneath the surface?
Does it matter for fraud controls to be effective?

Image source: AI generated using Microsoft Copilot on 22 April 2024 (left) and on 10 May 2024 (right)
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Fraud Dynamics and Controls Model (Davis & Pesch, 2013)

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Assumptions:

- individuals are **indifferent** between alternative attitudes
- individual attitudes change due to **social influence**
- individuals differ in their **likelihood to emulate** others' attitudes

Question: Which anti-fraud intervention is more effective?

(a) tighter controls (b) tone at the top

(c) ethical training (d) detection and termination

Davis, J. S., and H. L. Pesch. 2013. "Fraud Dynamics and Controls in Organizations." *Accounting, Organizations and Society* 38 (6-7): 469–83.

Fraud Dynamics and Controls Model (Davis & Pesch, 2013)

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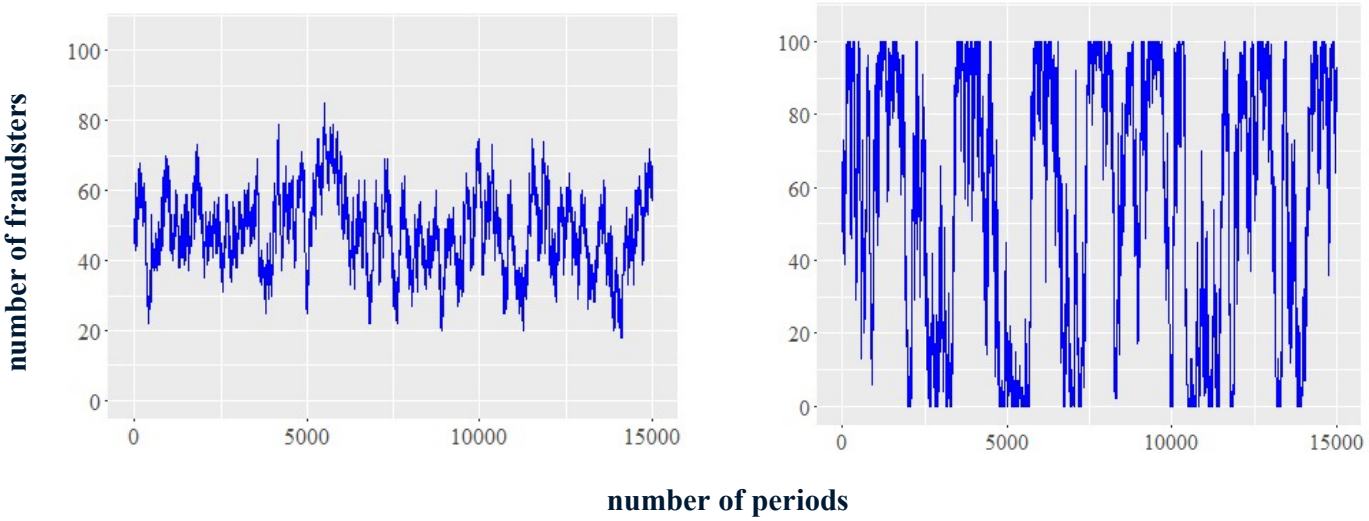
Method: computer simulation experiments with agent-based model (ABM)

Findings:

organization with no intervention

low fraud dynamics **high**



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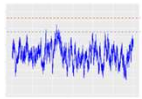
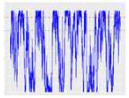


low

fraud dynamics



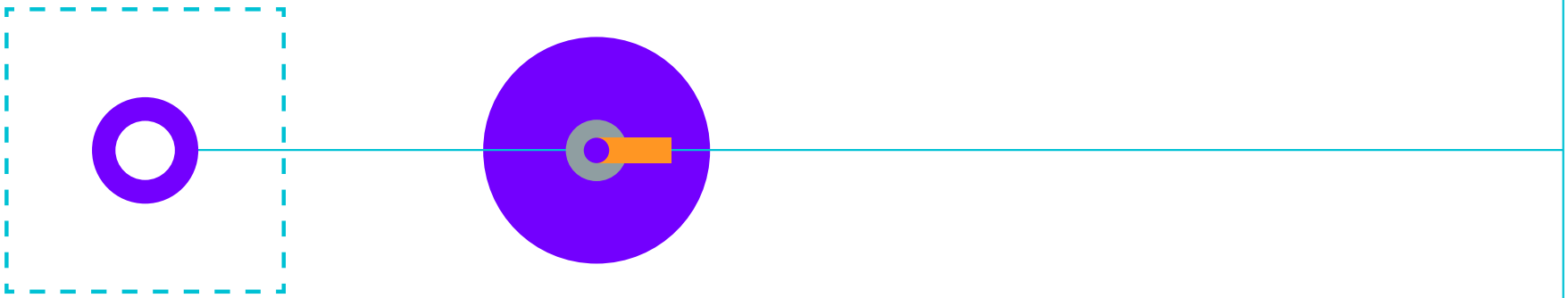
high

Findings:

Experiment (10 organizations)	**m (sd)**		**m (sd)**
No intervention	50.4 (13.5)		51.0 (35.3)
(a) tighter controls	25.1 (7.6)		25.5 (18.0)
(b) tone at the top	27.1 (9.4)		3.4 (5.2)
(c) ethical training	24.6 (8.9)		**0.8 (1.7)**
(d) detection	**1.7 (1.9)**		2.7 (4.4)

on average: (d) **detection** is highly effective (c) **ethical training** is highly effective

2. Research Questions and Methodology



Our Research Questions and Methodology

Research question	Method
1. **Are the results by Davis & Pesch (2013) internally valid?** • Descriptive statistics • Qualitative findings	**Close replication** ✓ Re-implement conceptual model ✓ Re-run computer experiments ✓ Compare results
2. **Can external validity be increased?** • Robustness to a change in the social influence mechanism	**Extension** ✓ Modify social influence mechanism ✓ Re-run computer experiments ✓ Analyze results

Why We Implement a Social Norm Mechanism?

attitude *honest* *pro-fraud*

Fraud as infectious disease
(implementation by Davis & Pesch, 2013)

Why We Implement a Social Norm Mechanism*?

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Fraud as infectious disease
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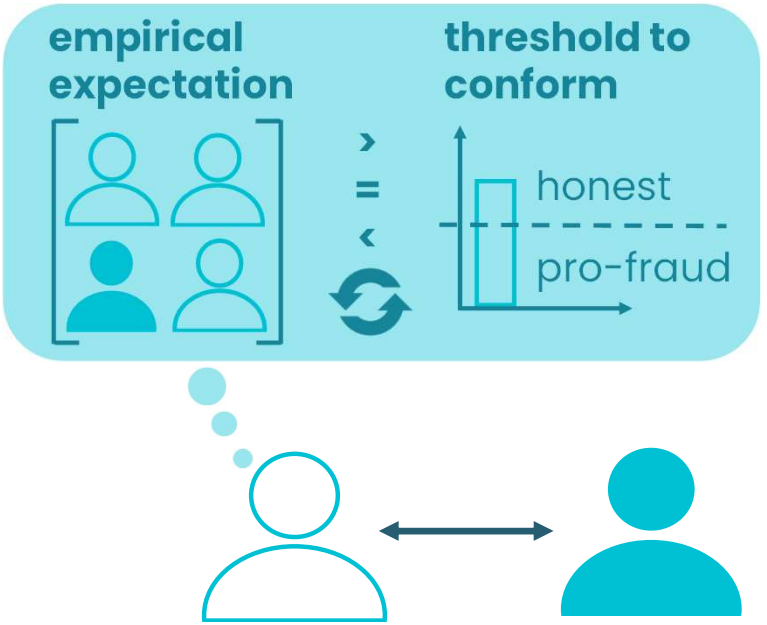
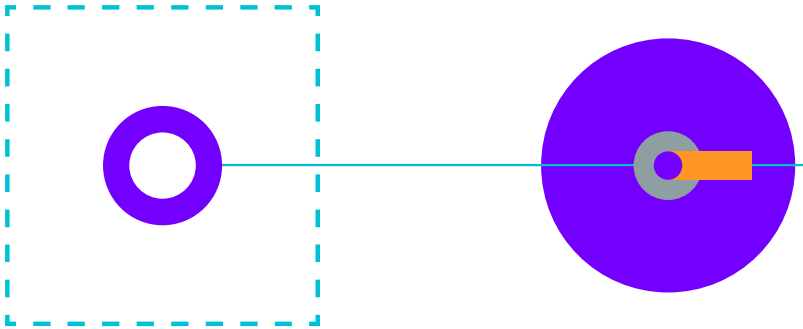


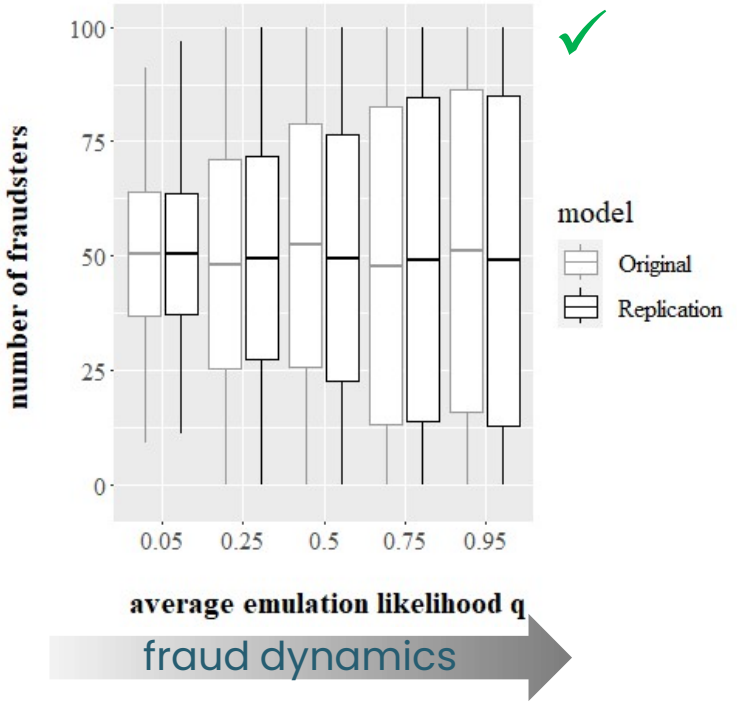
Fraud as non-conformity to the norm
(our alternative implementation)

Bicchieri, C. 2006. *The Grammar of Society: The Nature and Dynamics of Social Norms*: Cambridge University Press.

3. Results

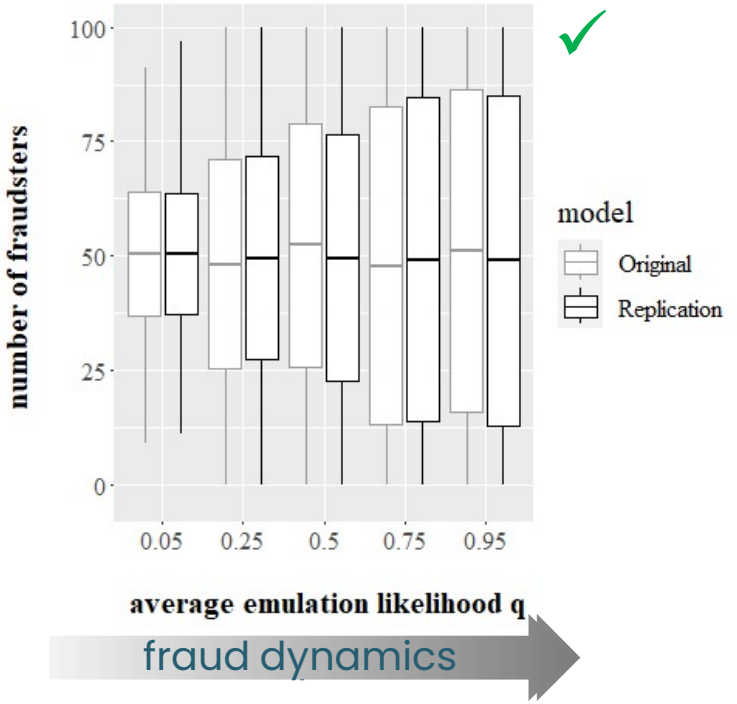


Testing for distributional equivalence*



* Replication standard proposed in Axtell, R., R. Axelrod, J. M. Epstein, and M. D. Cohen. 1996. "Aligning Simulation Models: A Case Study and Results." *Computational and Mathematical Organization Theory* 1 (2): 123–41. doi:10.1007/BF01299065

Testing for distributional equivalence*



✓

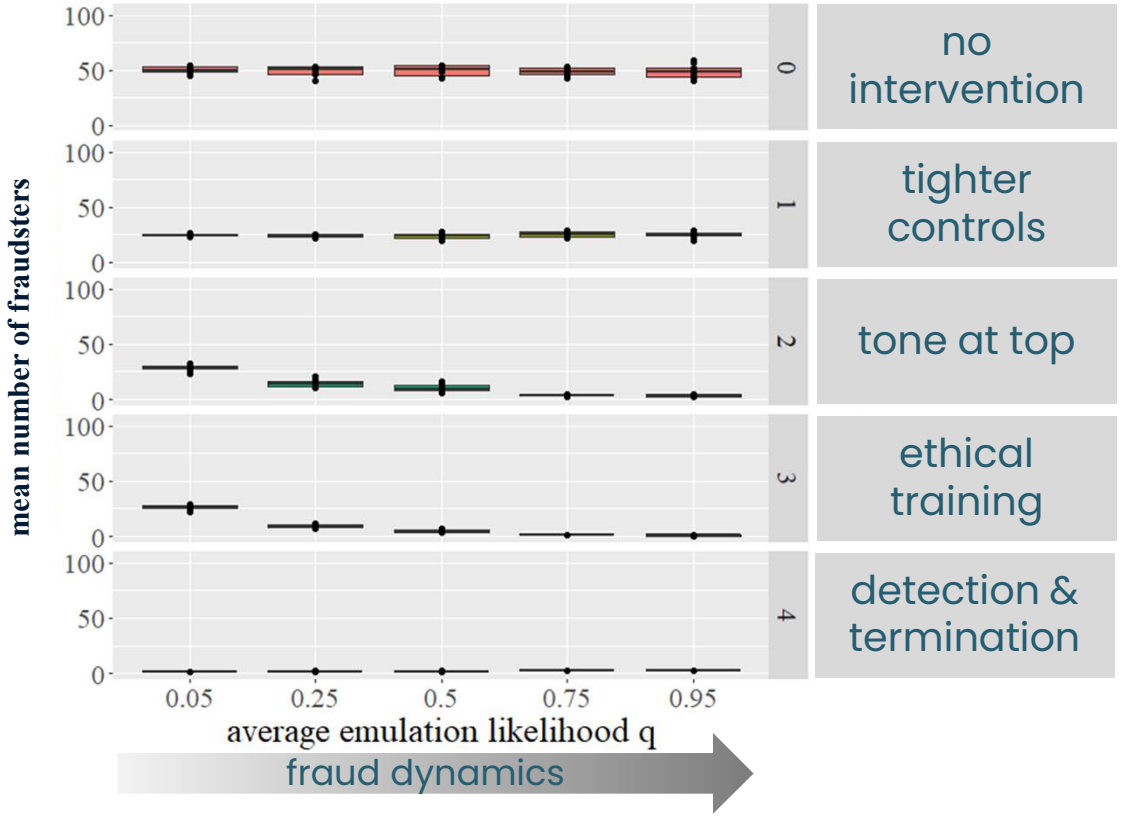
$H0 : m_{Original} = m_{Replication}$ ✓

$H1 : m_{Original} \neq m_{Replication}$

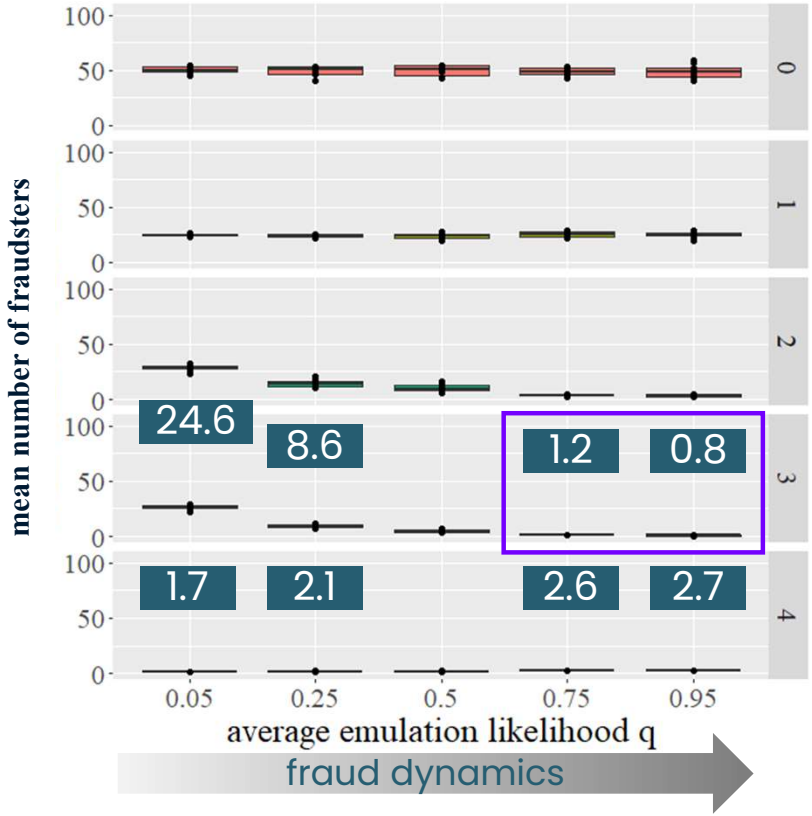
Results of Unpaired Two-Samples Welch's t-Test

	Original		*Replication*					
avg_q	*m*	*sd*	*m*	*sd*	*Δ mean*	*se*	*t (18)*	*p*
0.05	50.4	13.5	50.4	13.1	0.0	1.6	.000	1.000
0.25	48.1	22.9	49.5	22.3	1.4	2.1	.659	.519
0.50	52.4	26.6	49.5	27.0	-2.9	2.3	-1.253	.227
0.75	47.8	34.8	49.2	35.5	1.4	2.7	.528	.604
0.95	51.0	35.3	49.0	31.6	-2.0	2.6	-0.773	.450

* Replication standard proposed in Axtell, R., R. Axelrod, J. M. Epstein, and M. D. Cohen. 1996. "Aligning Simulation Models: A Case Study and Results." *Computational and Mathematical Organization Theory* 1 (2): 123–41. doi:10.1007/BF01299065


mean number of fraudsters
100
50
0
0
1
2
3
4
no intervention
tighter controls
tone at top
ethical training
detection & termination
0.05
0.25
0.5
0.75
0.95
average emulation likelihood q
fraud dynamics

Comparing qualitative findings



no intervention

tighter controls

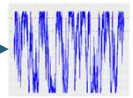
tone at top

ethical training

detection & termination

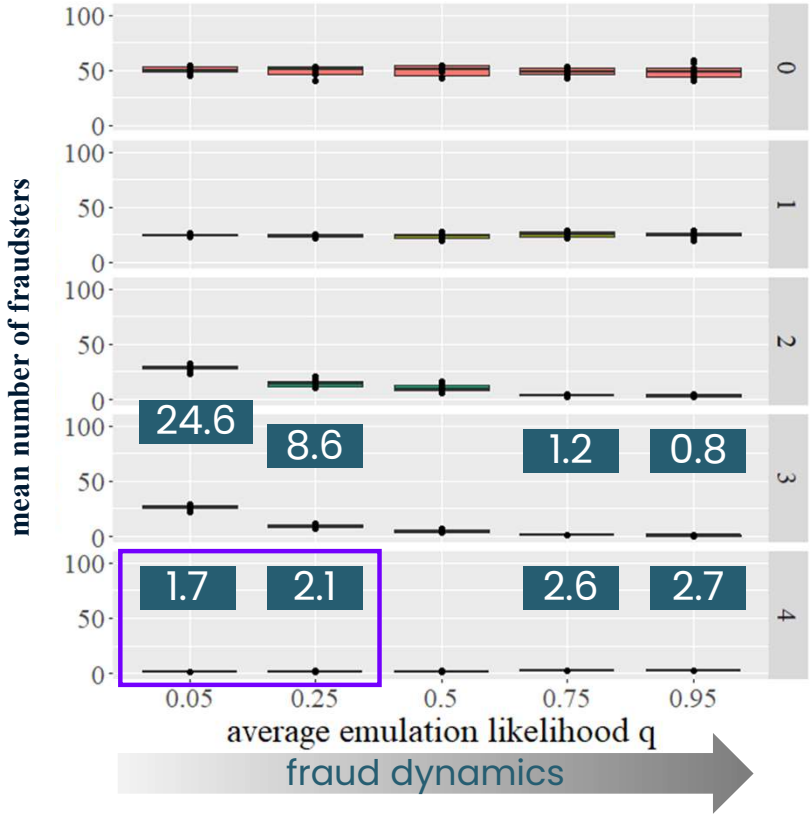
Legend

24.6 original results



works best when dynamics are **high**

Comparing qualitative findings



no intervention

tighter controls

tone at top

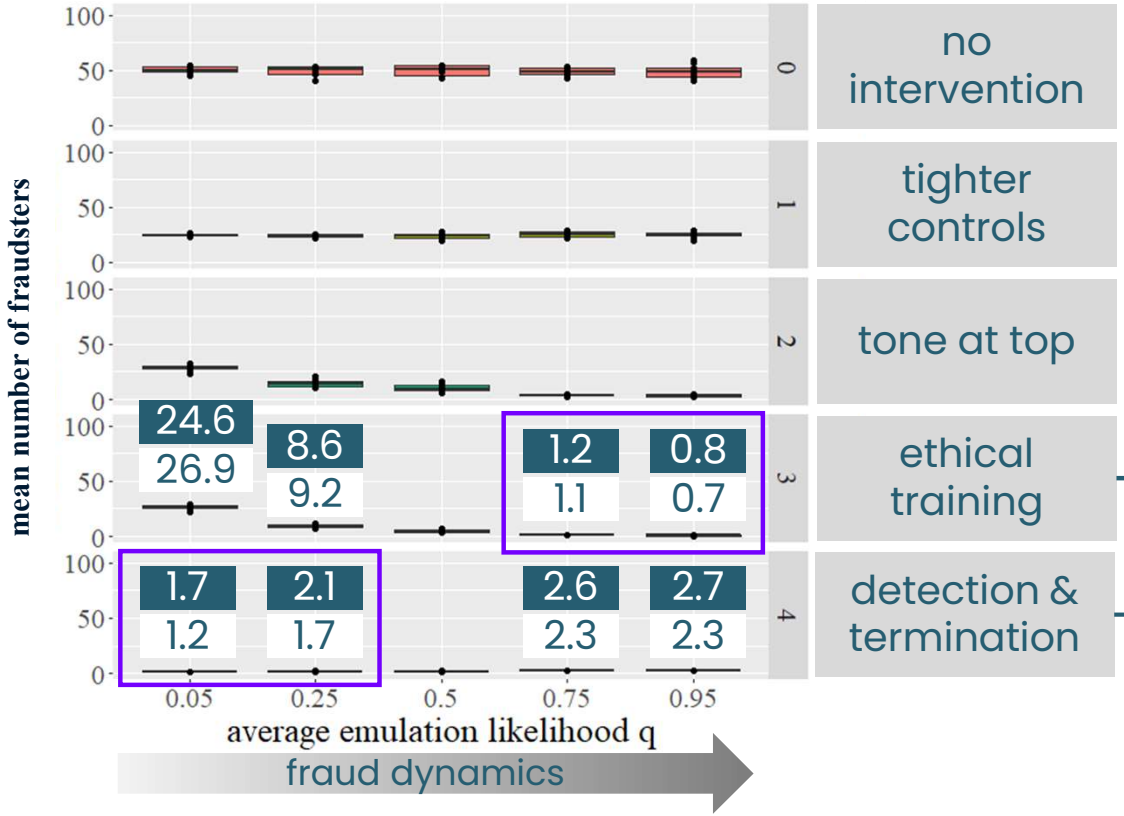
ethical training → works best when dynamics are **high**

detection & termination → works best when dynamics are **low**

Legend

24.6 original results

Comparing qualitative findings



no intervention

tighter controls

tone at top

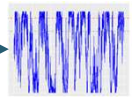
ethical training

detection & termination

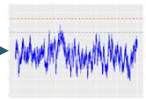
Legend

24.6 original results

26.9 replication results

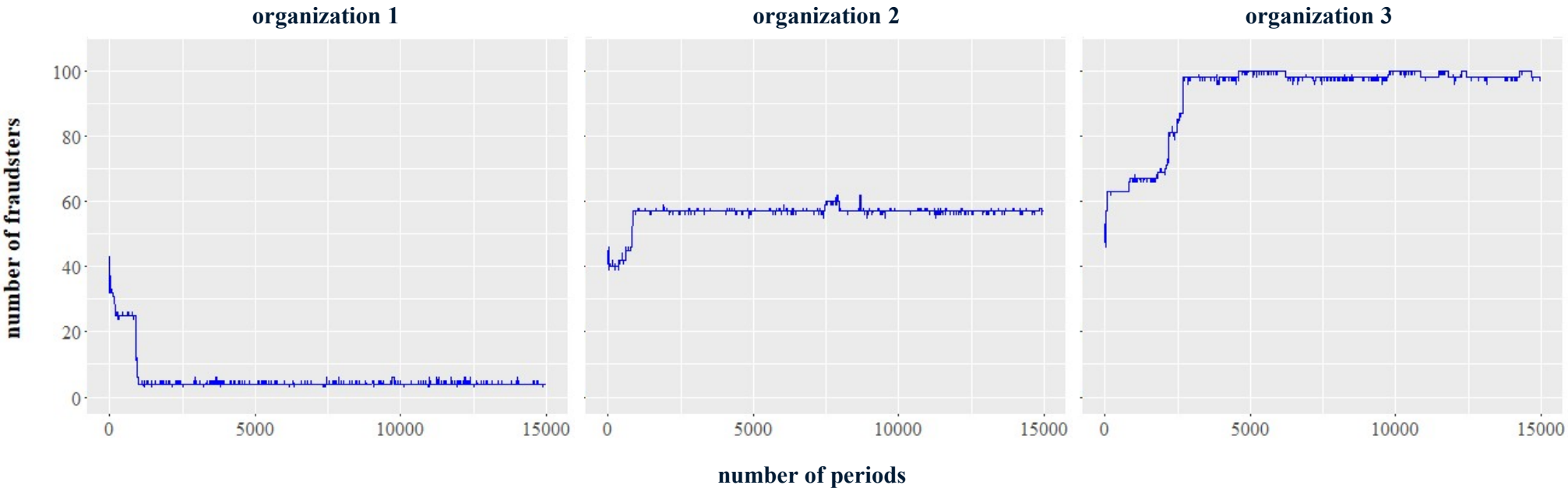


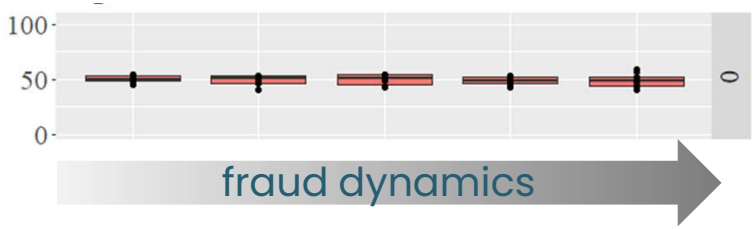
works best when dynamics are **high** ✓

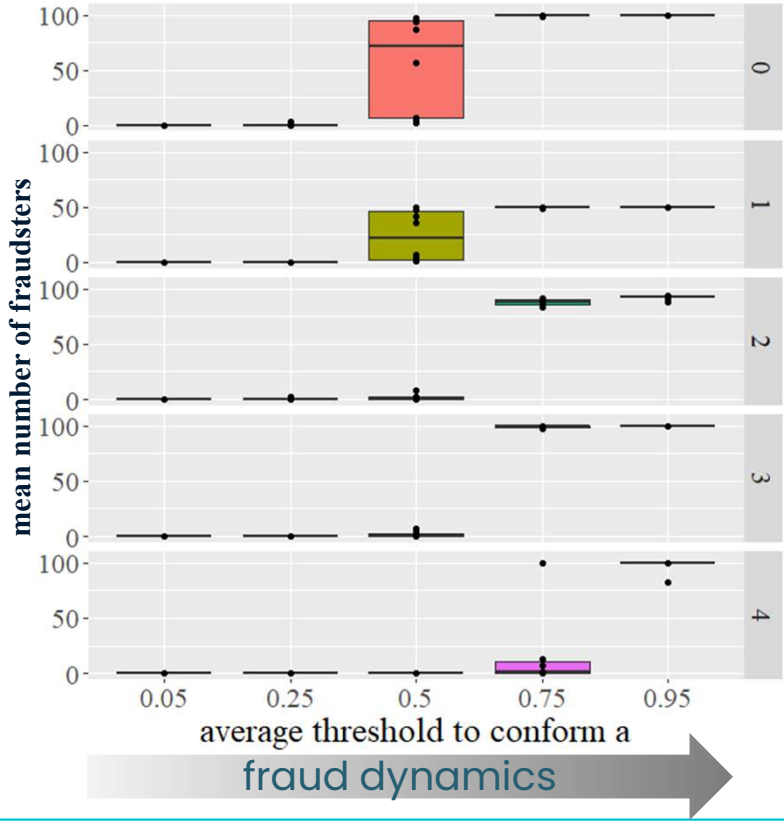


works best when dynamics are **low** ✓

A social norm mechanism leads to different fraud dynamics in organizations

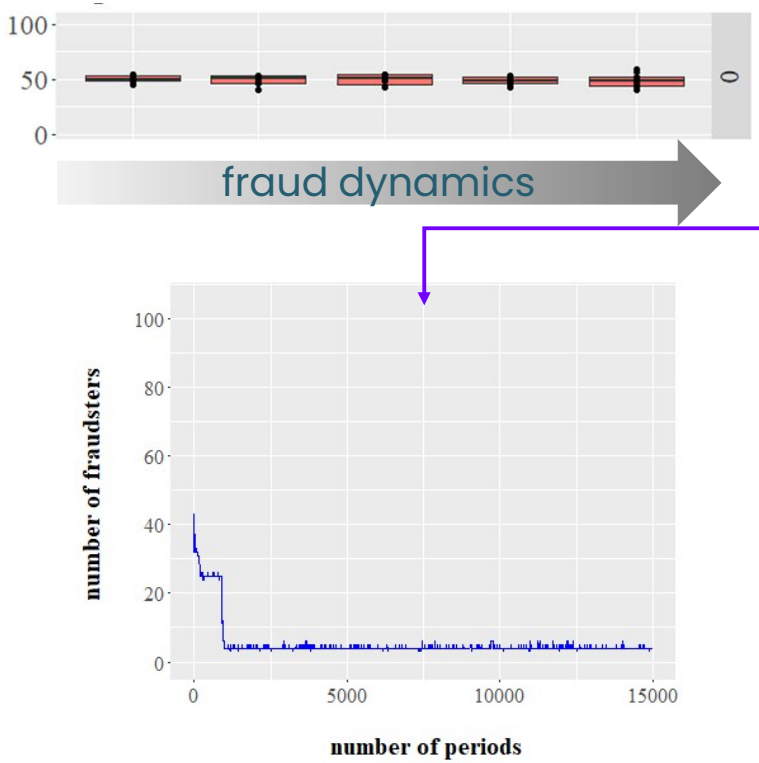


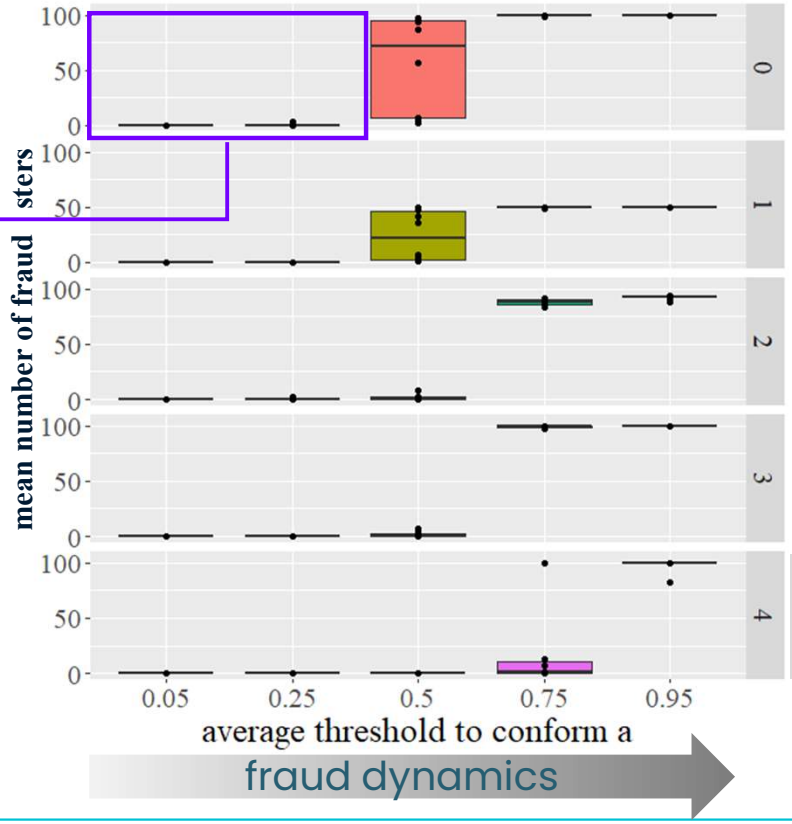




- no intervention
- tighter controls
- tone at top
- ethical training
- detection & termination

Results are only partially comparable due to effect of social norm





- no intervention
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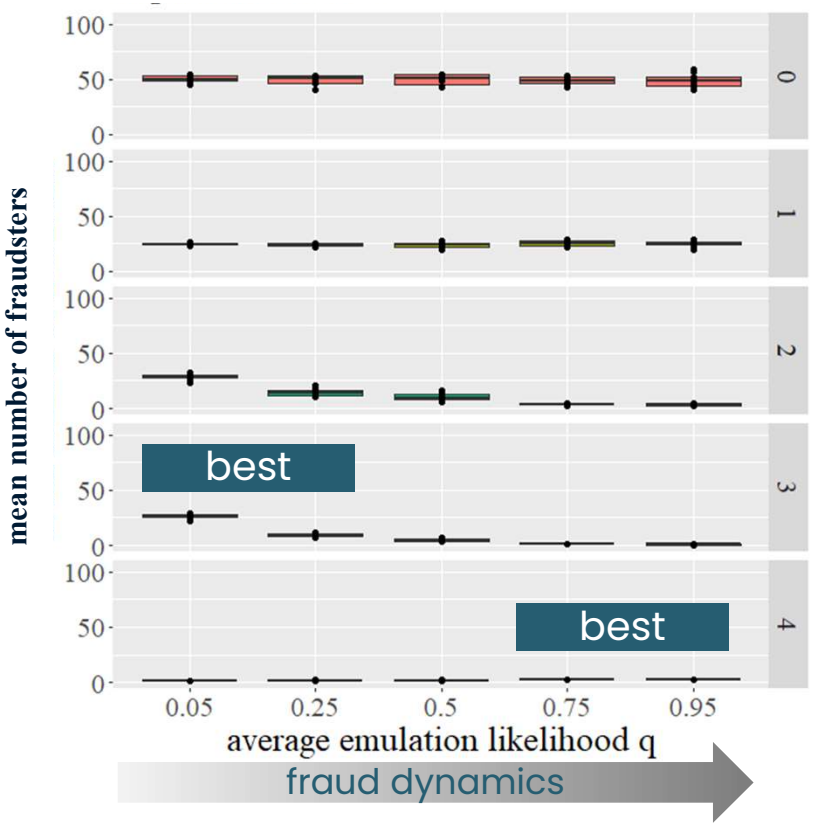
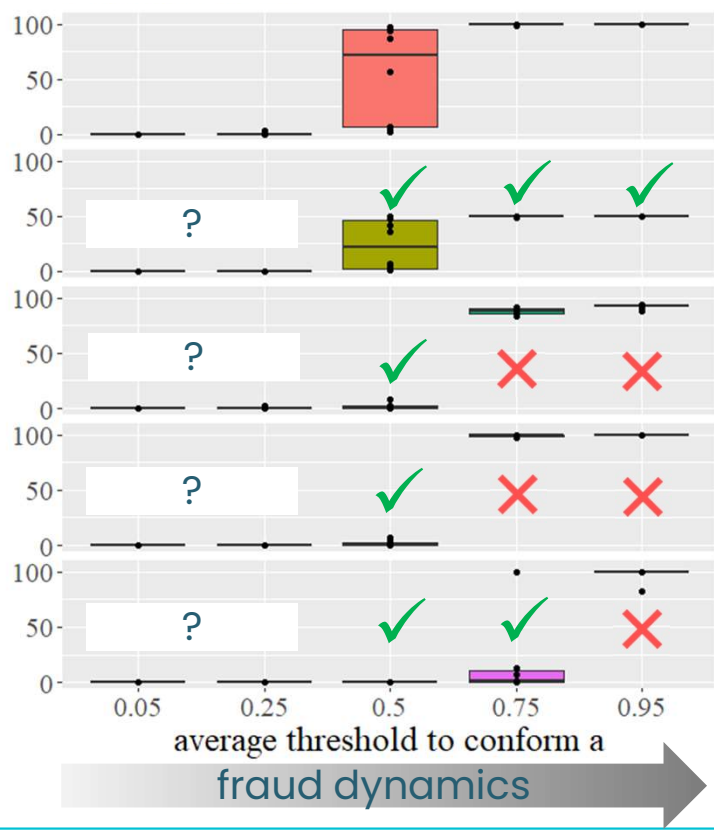
Davis & Pesch's qualitative findings are partially robust





- no intervention
- tighter controls
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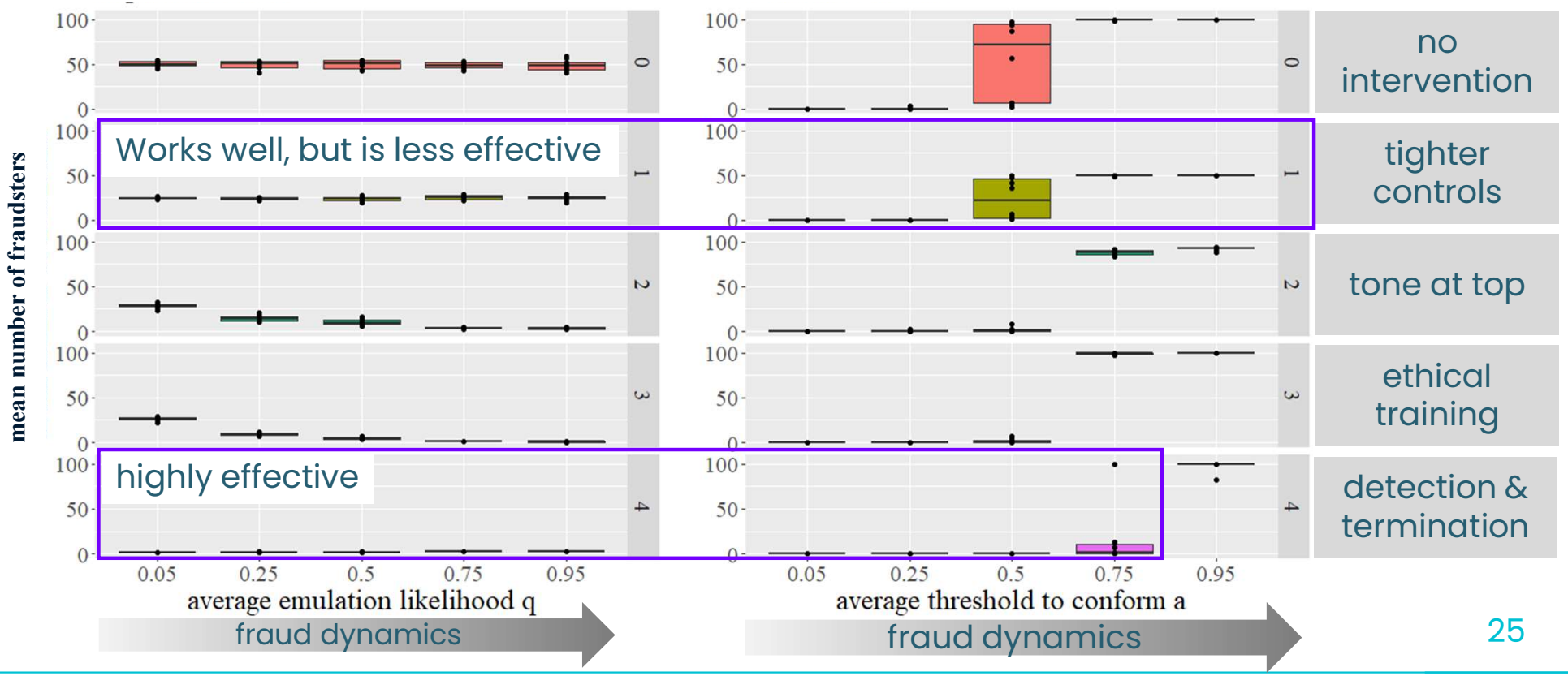
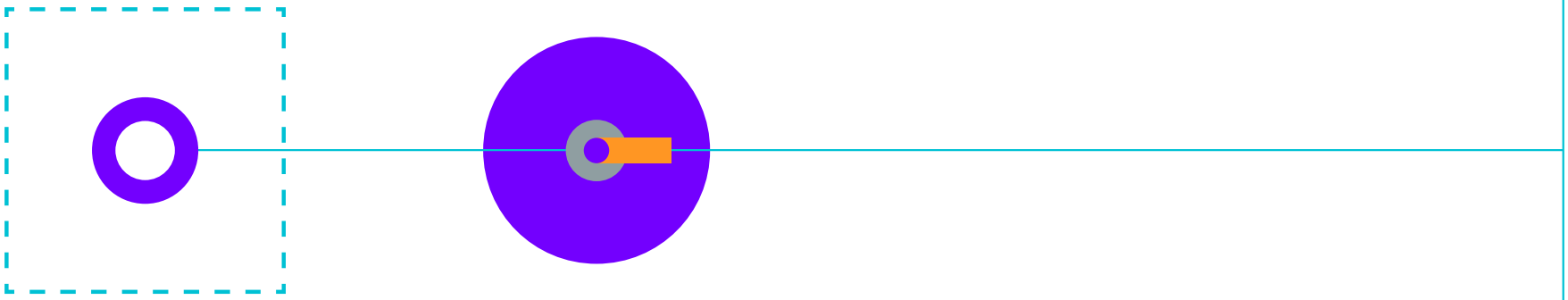
Across conditions, two kinds of controls seem promising



4. Contribution



Contributions to Theory

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1. We **show that** Davis & Pesch's (2013) (DP) model and results are **internally valid**
2. We **find** that the **external validity** of DP's findings can partially be increased
3. Our findings contribute to the accounting literature on the
   - **drivers of fraud:** both individual and social drivers of fraud matter for assessing organizational fraud risks and designing better controls
     - Trompeter, G. M., T. D. Carpenter, N. Desai, K. L. Jones, and R. A. Riley. 2013. "A Synthesis of Fraud-Related Research." *AUDITING: A Journal of Practice & Theory* 32 (Supplement 1): 287–321. doi:10.2308/ajpt-50360.
     - Morales, J., Y. Gendron, and H. Guénin-Paracini. 2014. "The Construction of the Risky Individual and Vigilant Organization: A Genealogy of the Fraud Triangle." *Accounting, Organizations and Society* 39 (3): 170–94. doi:10.1016/j.aos.2014.01.006.
     - Suh, I., J. T. Sweeney, K. Linke, and J. M. Wall. 2020. "Boiling the Frog Slowly: The Immersion of C-Suite Financial Executives into Fraud." *Journal of Business Ethics* 162 (3): 645–73. doi:10.1007/s10551-018-3982-3.
   - **role of social norms in accounting:** nourishing a **social norm** may constitute a **potential lever** for containing fraud
     - Maas, V. S., and M. van Rinsum. 2013. "How Control System Design Influences Performance Misreporting." *Journal of Accounting Research* 51 (5): 1159–86. doi:10.1111/1475-679X.12025.
     - Cardinaels, E., and H. Yin. 2015. "Think Twice Before Going for Incentives: Social Norms and the Principal's Decision on Compensation Contracts." *Journal of Accounting Research* 53 (5): 985–1015. doi:10.1111/1475-679X.12093.

Contributions to Practice

1. If we do not know anything about the social dynamics in an organization:
   - **detection**
   - **tighter controls**
2. If we aim for a cultural control:
   - nourishing a **social norm** might be an option

Contributions to Practice

1. If we do not know anything about the social dynamics in an organization:
   - **detection**
   - **tighter controls**
2. If we aim for a cultural control:
   - nourishing a **social norm** might be an option*

* Subject to further research:
  - **empirical model validation:** Is the social norm mechanism a realistic assumption in the context of fraud? (analogous to honesty in reporting)
  - **empirical model calibration:** What are the realistic parameter ranges that need to be investigated further? (Is the honesty norm strong enough to contain fraud?)

Thank you!

We would also like to thank:

Clara Robertson – for implementing the replication and the extension models in R, and for supporting us with a preliminary analysis of the simulation results.

Magdalena Michalka – for designing tables and info graphics as used in and further adapted to this presentation.

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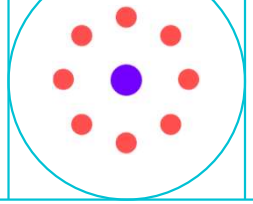

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