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Agenda

Introduction 2’
- The economics of information security
- Investigating investment dynamics in cybersecurity

Extending the GL model 8’
- The impact of Big Data Analytics on the GL model
- Suggesting a multi-period model
- Relaxing the assumption of continuity

Application to Critical Infrastructure Protection 2’

Concluding comments 2’

Further research 1’

Q&A and discussion 5’
Introduction

Economics of Information Security as a complementary approach

Cyber Security issues = bad incentives + bad design
Introduction

Investigating investment dynamics in cybersecurty

SINGLE PERIOD MODEL
Introduction

Investigating investment dynamics in cybersecurity

MULTI-PERIOD MODEL

DISCONTINUOUS FUNCTION

Cost of cyber security failure, $S(Z, v)I$
Extending the GL model

The impact of Big Data Analytics on the GL model

Security Analytics: from bad signatures to bad actions

MINIMIZING COSTS

CONVENTIONAL CYBERSECURITY MEANS

LIMITED SUCCESS
Extending the GL model

The impact of Big Data Analytics on the GL model

Security Analytics: from bad signatures to bad actions
Extending the GL model

The impact of Big Data Analytics on the GL model

From resilience to anticipation: the next generation of information technologies

Real time analytics

Dynamic detection

Early warnings
Extending the GL model

1st impact: Suggesting a multi-period model

Max $\text{ENBIS}(z) = [v - S(z, v)] L - z$

Max $\text{ENBIS}(z_i) \left\{ \sum_{i=1}^{n} [v_i - S_i(z_i, v_i)] L_i - z_i \right\}$
Extending the GL model

2nd impact: Relaxing the assumption of continuity

Cost of cyber security failure, $S(Z, v)L$

Cost of cyber security investment, $Z$

Total cost, $Z + S(Z, v)L$

Optimal cyber security investment

Optimal amount of cyber security investment, $Z^*$
Extending the GL model

2nd impact: Relaxing the assumption of continuity

**Proposition 1.** If BDA is employed for producing cyber security, then investments in cyber security will decrease from \( \sum_{i=1}^{n} z_i(v_i) \leq \sum_{i=1}^{n} \frac{1}{e} v_i L_i \) to \( \sum_{i=1}^{n} z_i(v_i) \ll \sum_{i=1}^{n} \frac{1}{e} v_i L_i \) due to greater efficiency of BDA compared to conventional tools.
Application to CIP

An urgent need for efficiency and effectiveness improvement
Concluding comments

Extending the GL model for radically innovative and disruptive technologies

\[
\text{Max } ENBIS(z_i) \left\{ \sum_{i=1}^{n} \left[ v_i - S_i(z_i, v_i) \right] L_i - z_i \right\}
\]

Cost of cyber security failure, \( S(Z, v)L \)
Cost of cyber security investment, \( Z \)
Total cost, \( Z + S(Z, v)L \)
Optimal amount of cyber security investment, \( Z^* \)
Further research

A game theory experiment for collecting data

An econometric model for testing our hypothesis
Q&A and discussion