New Network Model

Value of a Network to One User

$$V_{i,j} = \Sigma B - \Sigma C$$

Where:

V = value of network $_j$ to user $_i$

B = the benefit value of all transactions

C = the cost of all transactions

Online Book Purchase Case

If it costs $26 to buy the book in a store or $16 to buy it over the Internet, including shipping, the net value is $10.

$$V = B - C$$
$$V = \$26 - \$16$$
$$V = \$10$$

New Network Model

Network Value is Summation of Value to All Users

$$V[j] = \Sigma V_{i,j} = \Sigma B - \Sigma C$$

New Network Model

Beckstrom's Law

$$\sum_{i=1}^{n} V_{i,j} = \sum_{k=1}^{m} \frac{B_{i,k}}{(1+r)^{t_k}} - \sum_{l=1}^{p} \frac{C_{i,l}}{(1+r)^{t_l}}$$

Where:

$\Sigma V_{i,j}$ = value of a network $_j$ to all users

$V_{i,j}$ = net present value of all transactions to user$_i$ with respect to network $_j$, over any time period

$_j$ = identifies one network

$_i$ = one user of the network

$B_{i,k}$ = the benefit value of transaction $_k$ to individual $_i$

$C_{i,l}$ = the cost of transaction $_l$ to individual $_i$

r_k and r_l = the discount rate of interest to the time of transaction $_k$ or l

t_k or t_l = the elapsed time in years to transaction $_k$ or $_l$

n,m,p = maximum number of individuals i and transactions $_k$ and $_l$

The "Network Effect"

For those networks where…

$$\sum_{i=1}^{n+1} V_{i,j} > \sum_{i=1}^{n} V_{i,j}$$

More users add to more total value

The "Network Effect"

From the current network member perspective

$$\sum_{i=1}^{n+1} V_{i,j} - V_{i=n+1,j} > \sum_{i=1}^{n} V_{i,j}$$

The "Inverse Network Effect"

For those networks where…

$$\sum_{i=1}^{n+1} V_{i,j} < \sum_{i=1}^{n} V_{i,j}$$

More users reduce total value

The "Inverse Network Effect"

From the current network member perspective

$$\sum_{i=1}^{n+1} V_{i,j} - V_{i=n+1,j} < \sum_{i=1}^{n} V_{i,j}$$

Examples

Private Golf Clubs

Support groups

FaceBook

YPO

Twitter

Internet

AARP

Costco

Coops

Your social networks

Your customers

...

Economics of Security

Basic Model

$$V = B - C$$

Security Model

$$V = B - C' - SI - L$$

Where:

SI = Security Investments

L = Losses

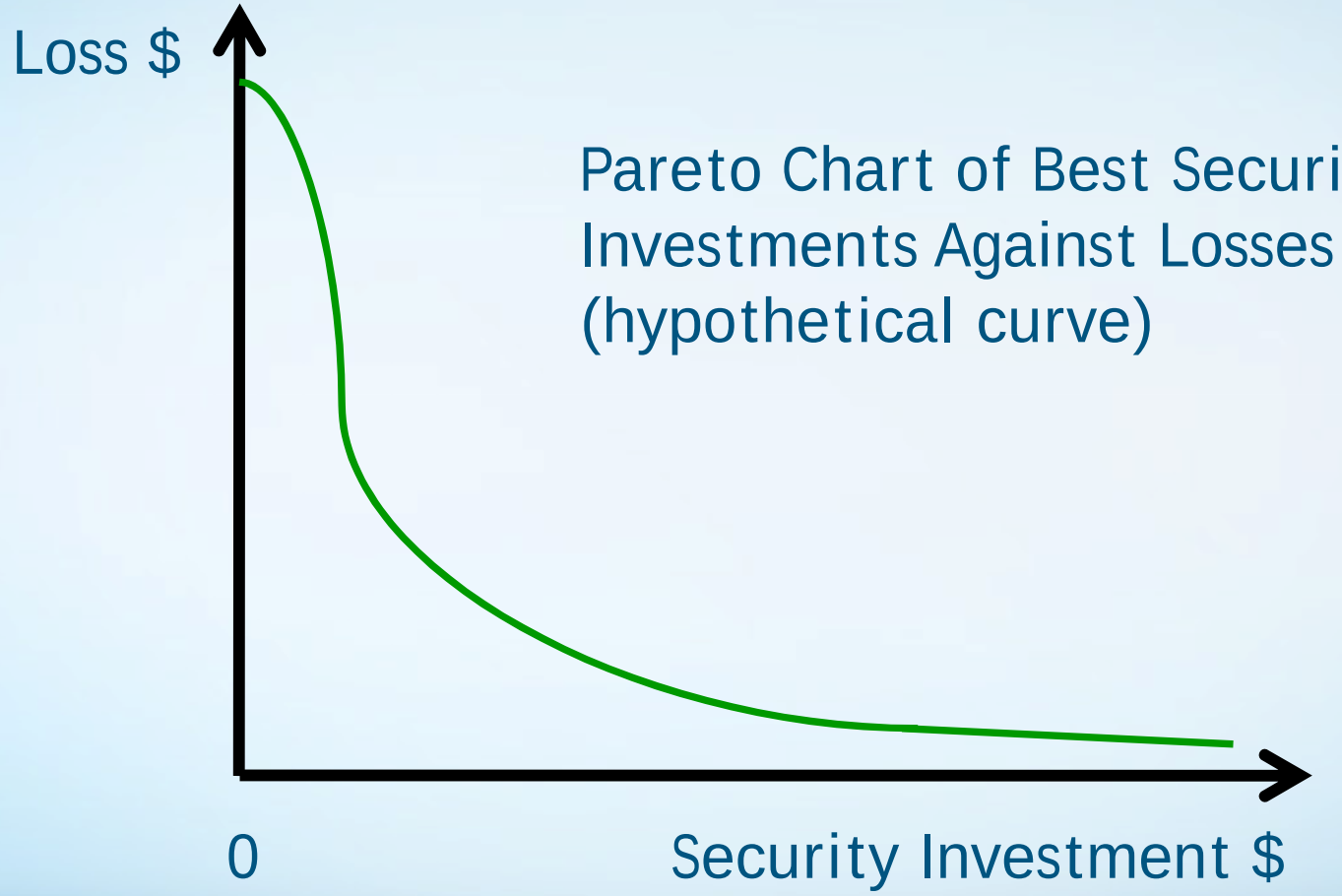
C' = C – SI – L (all costs except SI & L)

Economics of Security

The Fundamental Security Risk Management Function

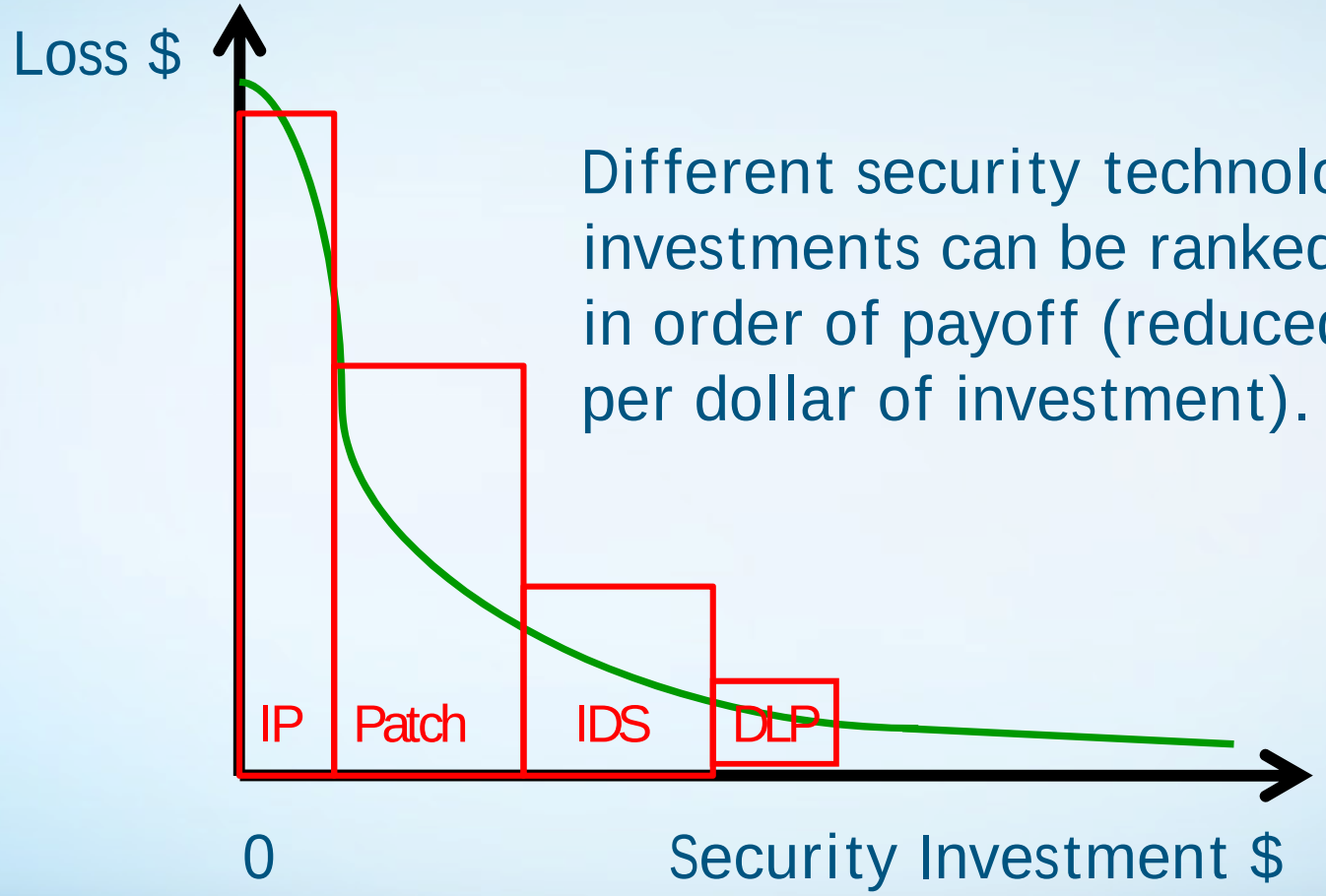
Minimize Security Costs = SI + L

Economics of Security



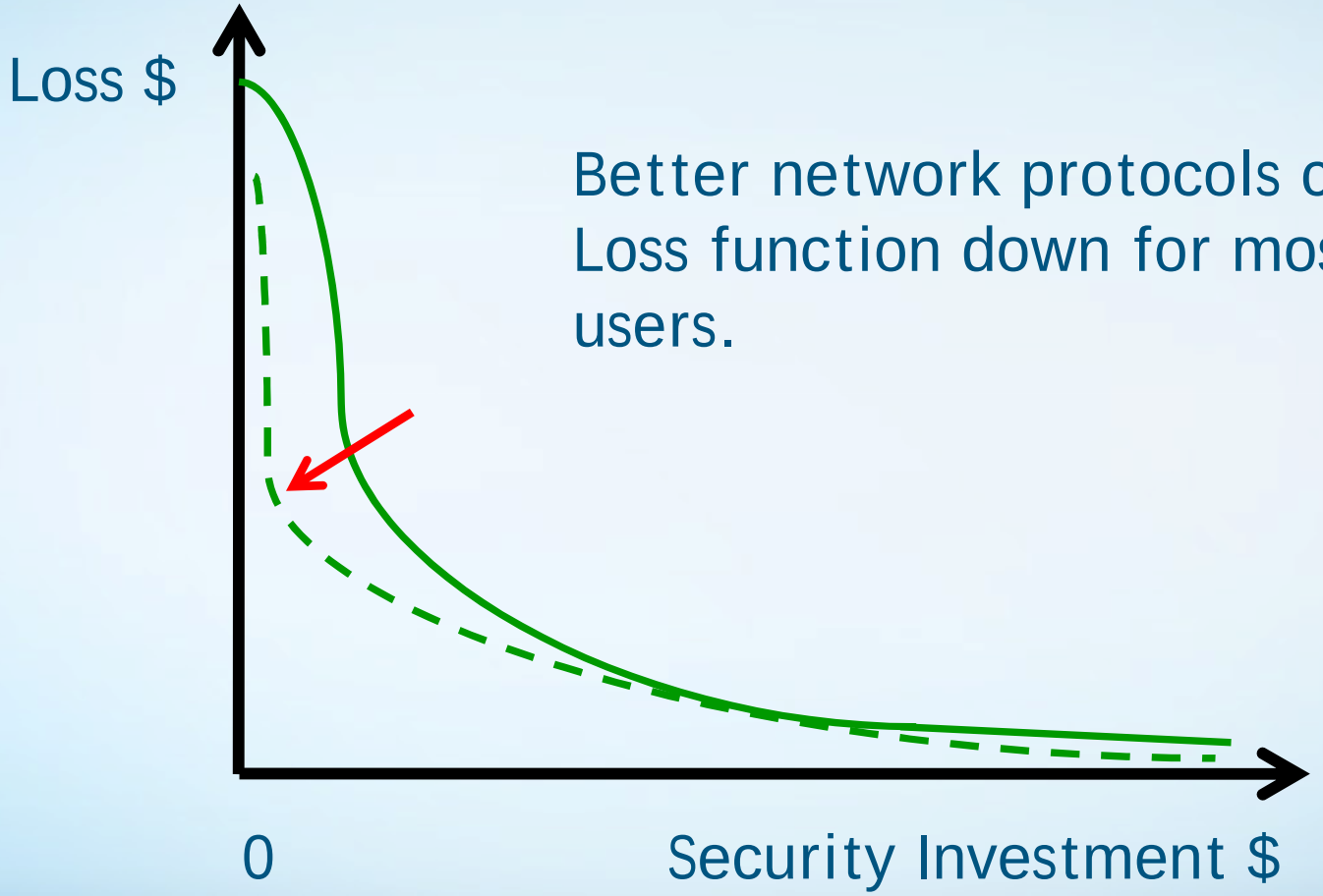
Pareto Chart of Best Security Investments Against Losses (hypothetical curve)

Economics of Security



Different security technology investments can be ranked in order of payoff (reduced losses per dollar of investment).

Economics of Protocols



Better network protocols can drive Loss function down for most or all users.

Economics of Deterrence

Minimize the Hacker's Gain

For example, by seeking to reduce their Benefit or take.

Increase their operating costs (making stealing more difficult).

Force them to invest more in their own Security Investments (making it harder for them not to get caught).

Increase their losses by improving enforcement and increasing penalties and imprisonment, for example.

Economics of Networks

- Value of network to individuals
- Total value of a network
- Security economics
- Security risk management
- Hacker economics
- Economics of deterrence
- Supply chain incentives
- Economics of Internet protocols (architecture)
- Economics of outages
- Economics of resiliency (correlation of losses)

The Model Can . . .

Be used to calculate or determine:

The value of a network

How to optimize a company's security investments

How to optimize a country's security investments

- Rigorously compare alternative security investments
- The economics of hacking
- The incredible leverage of supply chain hacking
- Incentivize discovering supply chain hacks

Incentivize better supply chain testing

- The value of re-architecting the Internet
- Analyze internet business models
- Value of having a diversity of networks
- Value of having redundant protocols within a network

ICANN

Beckstrom's Law Benefits

Granular
Scalable
Subset-able
Accurate
Similar to P&L concepts
Leverages cost accounting techniques
Testable
As simple as it can be but no simpler
A foundation for derivative models

Beckstrom's Law Downside

You have to get the data or estimate it

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