# Risk as an Economic Decision Problem

Integrating Economics and Data Science

# Why This Matters

- Business risk metrics are often treated as technical model outputs
- This limits their strategic value
- Business risk exists because decisions are made today under uncertainty
- Leadership oversee decisions on:
  - Capital allocation
  - Growth vs resilience
  - Incentives and controls
  - Risk appetite and governance

**Key message:**
Risk is not just something to *measure* — it is something to *decide about*.

# “Business Risk”

- **Risk can originate from:**
  - Technology failures
  - Operations
  - Cyber events
  - Medical or biological uncertainty
- These risks may be non-economic in origin
- But the firm’s exposure, response, and trade-offs are economic decisions

# Why Risk Exists at All

**Firms must act now for stochastic outcomes in future:**

- Invest
- Price
- Hire
- Insure
- Contract
- Innovate

**Outcomes depend on:**

- Imperfect information
- Incentives and behaviour
- Contract limitations
- External shocks

**Risk metrics exist to support these forward-looking decisions**

# The Role of Risk Metrics

**What risk metrics do well**

- Quantify uncertainty
- Rank exposures
- Support comparison and monitoring

**What they cannot do alone**

- Decide risk appetite
- Resolve trade-offs
- Align incentives
- Translate risk into strategy

**Metrics are inputs — not decisions**

# Why Economics Matters for Risk Decisions

**Economic reasoning is needed because risk is not only about probability—it is about choices under uncertainty.**

**Economics helps explain:**

- What should be measured and why it matters
- How risk affects pricing, capital, and portfolio strategy
- How to align incentives, governance, and contracts with risk appetite
- Which risks are systemic vs diversifiable, and what that implies for resilience
- Which risks the firm should retain, transfer, or mitigate

**Economics provides the decision framework that turns risk metrics into action.**

# Key Economic Drivers of Business Risk

- **Risk preferences:** downside matters not just averages
- **Information asymmetry:** others may know more than we do
- **Incentives:** actions respond to rewards and penalties
- **Incomplete contracts:** not all contingencies are covered
- **Externalities:** risks imposed on or received from the ecosystem
- **Systemic exposure:** correlated shocks across the firm or industry

**These drivers affect risk generation, amplification, and transmission**

# Example: Life Insurance Mortality Risk

**Mortality risk is:**

- Biological
- Largely outside the firm's control

**Yet a single mortality risk model informs:**

- Pricing
- Capital allocation
- Reinsurance
- Portfolio diversification
- Product design
- Sales incentives
- Underwriting governance

**Insight:**
One risk estimate, interpreted economically, drives many decisions.

# One Risk View Informs Many Decisions

**Without a common framework:**

- Pricing, capital, incentives drift apart
- Risk is managed in silos
- Controls tighten, but growth suffers

**With an economically grounded framework:**

- Decisions are coherent
- Trade-offs are explicit
- Risk appetite is enforced consistently

# Data Science and Economics

**Quantitative models**

- Measure risk
- Detect patterns
- Estimate probabilities

**Economic reasoning**

- Interprets what the metrics mean
- Connects them to a structured framework
- Guides action when data is sparse, or regimes shift

**Together:** measurement + decision logic

# In Uncertain Times

- Historical data may lose relevance (e.g., COVID, regulatory change)
- Risks materialise before the data fully updates
- Purely backwards-looking models fail in regime shifts

**Economic reasoning helps navigate uncertainty when data alone is insufficient**

# What Good Risk Management Looks Like

**Good risk management:**

- Protects the downside
- Enables sustainable growth
- Uses risk metrics consistently across functions
- Supports faster, better decisions — not just tighter controls

# Key Takeaway

**Risk management applies economic reasoning, combined with rigorous quantitative measurement methods**

**When risk is framed as a decision problem:**

- Metrics become actionable
- Strategy becomes coherent
- Governance becomes effective