



# Operational Risk Management: Preventive vs. Corrective Control

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# Overview

The authors propose a general modeling framework for operational risk management of financial firms.

- Operational risk events are shocks to a financial firm's value process
- Investments in **preventive controls** reduce the frequency of operational risk events
- Investments in **corrective controls** reduce the severity of operational risk events
- Model is calibrated using data from a commercial bank in China

# Contribution

- Provides a framework to study operational risk management in the form of preventive and corrective controls
- Gives insights into optimal control policies as a function of the investor's risk sensitivity and the stochastic nature of operational risk events
- Quantify the potential performance improvement through investment in corrective and preventive controls for a commercial bank in China

# Model

$$dX_t = \left( r(t) - \frac{1}{2}\sigma(t)^2 - u(t) - v(t) \right) dt + \sigma(t)dB_t - dJ_t^{G,K}$$

$$J_t^{G,K} = \sum_{i:\tau_i \geq t}^{N_t^G} K(\tau_i, v(\tau_i), Y_i)$$

$N_t^G$  SPP with  $\tilde{\lambda}(t) = G(t, u_t, \lambda_t)$

## Theoretical Predictions

- When the risk tolerance level increases, the investment in preventive controls decreases, because the investor becomes less risk averse (P1)
- The optimal corrective investment increases in investor's risk aversion under certain conditions (P4)
- When investment in both controls is optimal, the optimal preventive investment ratio increases and the optimal corrective investment ratio decreases as the investor becomes more risk averse (P10)

## Comments - Investment in infrastructure

- Investment in infrastructure is not a first order concern in the banking and financial industry
- Operational controls and risk management are primary focus
- Controls impact either the frequency or the severity but not both at the same time

→ The model framework can still be convincingly used but the authors are probably better off rethinking the rationale or motivation

## Comments - Proportionality with firm value

- Losses and investment in controls are assumed to be proportional to firm value
  - Literature shows that losses are related to size, but is the same true for the value of the firm?
  - Investment in controls have a significant fixed component which likely makes the relation non-linear
  - Firm with higher value may need lower investments in controls if already priced

## Comments - Interpretation of results

- It would be very helpful if the authors would provide more intuition on the following results:
  - In the analysis where controls are studied separately, why would a more risk-averse investor always invest in preventive controls and not always more in corrective controls?
  - In the corrective control region for the joint investment scenario, why does a less risk-averse investor invest more in corrective controls?

## Comments - Risk-averse investor

- To derive the optimal level of investment, the model introduces a risk-averse investor that invests in the firm and chooses optimal investment in controls. How should we think of this investor?
- Why finite horizon?

## Comments - Empirical results

- How representative is the sample?
- Severity of losses is determined by the Bank of China through a score system and then *transformed* into a value for the study
- The empirical results are simulation based. Has the bank made any investment during the sample period that could be used to assess the impact?

→ The empirical experiment is a nice addition to the paper but, in the current state, it may create problems

- Why not use one of operational risk databases available to the public?

## Conclusion

- The operational risk literature is lacking theory papers and works like this one are very appreciated
- We really enjoyed reading it and we believe it has good potential
- For publication in a finance journal it probably needs a few improvements on the motivation side
  - The operational literature section seems to be missing a few milestone papers