

All Bank Risks are Idiosyncratic, Until They are Not: The Case of Operational Risk



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The views expressed in this presentation are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Systemic Risk & Operational Risk

Systemic risk is broadly defined as the risk imposed by interlinkages and interdependencies in the financial system, where the breakdown of a single entity can cause a cascading failure, which could potentially bring down the entire system.

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events. Operational risk is often perceived as a largely idiosyncratic risk for a given institution with limited systemic implications.

Could Operational and Systemic Risks be Related?

Operational losses at major financial institutions, even when “idiosyncratic”, can potentially pose a threat within an interconnected financial system if they are big enough.

Similarly, if large losses are not random but rather are clustered through time, that might amplify systemic effects.

Some examples:

- Large-scale fraud might affect multiple institutions or entail counter-party risk (e.g., Bernard Madoff, rogue trading)
- Common business practices or similarly structured financial products expose institutions to correlated legal risk (e.g., the failure of ARS markets in 2008, RMBS-related litigation)
- Execution or delivery problems at an important institution can quickly propagate across other market participants

Summary of Findings

- Higher operational losses are associated with increased systemic risk at U.S. banking organizations
- The association is magnified:
 - In adverse macroeconomic environment
 - For institutions that are closer to distress
- The association is driven by:
 - Operational losses in the following event types: Internal Fraud (IF); Clients, Products and Business Practices (CPBP); Execution, Delivery and Process Management (EDPM)
 - High-severity operational risk tail events

Related Literature

Our study contributes to the following literature on:

- Systemic risk
 - The nature of systemic risk (e.g., Brunnermeier et al.(2012), and Engle et al.(2014))
 - The impact of regulatory actions on systemic risk (e.g., Berger et al. (2017), and Sedunov (2018))
- Operational risk
 - Determinants of operational risk (e.g., Chernobai et al.(2012), Cope et al.(2012), and Wang and Hsu (2013))
 - Operational risk and the macroeconomic environment (e.g., Hess (2011), Cope and Carrivick (2013), Abdymomunov et al. (2017))
 - Impact of operational risk (e.g. Cummins et al.(2006), and de Fontnouvelle et al.(2006))

Policy Implications

Our results support that:

- Firm capitalizations should reflect exposure to tail operational risk, as large-scale operational risk events could pose a threat to systemic stability (e.g., convex weighting of tail events)
- In calculating operational risk-based regulatory capital, relatively larger weights be applied to the income components generated by retail banking

Data

Data sources: FR Y-14 (operational losses); FR Y-9C (financial statement data); CRSP (stock returns); FRED (macroeconomic data)

Final data set is a panel:

- 26 large publicly traded US BHCs subject to DFAST (with total assets \geq \$50B)
- 1070 BHC-quarter observations over [2002:Q1-2016:Q4]

Systemic Risk (PC)

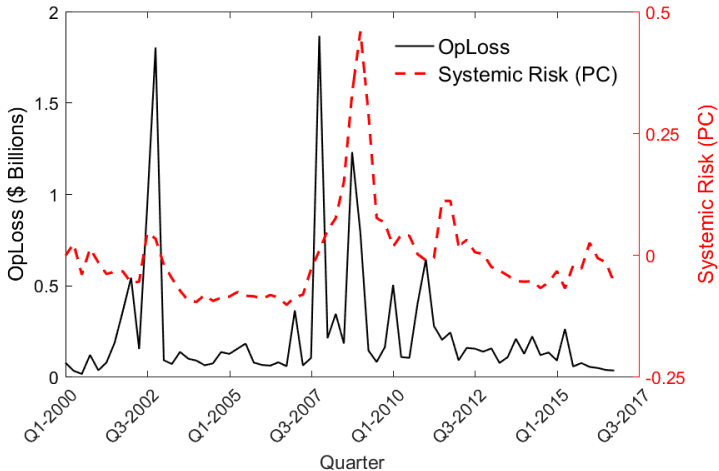
BHC systemic risk is measured as the first principal component of:

- Systemic Expected Shortfall (SES): measures a BHC's propensity to be undercapitalized when the system as a whole is undercapitalized
- Expected Capital Shortfall (SRISK): measures how much capital a BHC would need in stress to maintain 8% book equity to assets ratio
- Change in Conditional Value at Risk (Δ CoVaR): measures the change in the value at risk of the financial system conditional on a BHC being in distress relative to the BHC being in a median state

Operational Risk

- **OpLoss:** The financial impact sum of operational loss events incurred by a BHC over a calendar quarter in billions of U.S. Dollars.
- **N Tail Evt:** The number of loss events incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets higher than the 99.0th, 99.5th or 99.9th quantile of the unconditional distribution of the ratio.
- **N Body Evt:** The number of loss events incurred by a BHC over a calendar quarter that have a ratio of loss amount to BHC assets lower than the 99.0th, 99.5th or 99.9th quantile of the unconditional distribution of the ratio.

Visual Evidence



Regression Specifications

Ordinary Least Squares:

$$\text{Systemic Risk}_{i,t} = \beta_i + \beta_t + \beta_1 \text{Operational Risk}_{i,t} + \beta_k \text{Ctrls}_{i,t} + \epsilon_{i,t}$$

where β_i denote BHC fixed effects and β_t denote time fixed effects (year and seasonality). *Operational Risk*_{*i,t*} measures operational risk of BHC *i* in quarter *t*. *Ctrls*_{*i,t*} is a set of BHC-level controls including bank size, market-to-book ratio, non-interest to interest income ratio, RoA, risk management quality, leverage as well as proxies for credit risk, liquidity risk and interest rate risk. Standard errors are clustered at the BHC and quarter levels.

Systemic Risk and Operational Losses

Operational losses are positively related to BHC systemic risk.

	Systemic Risk (PC)			
	(1)	(2)	(3)	(4)
Ln(OpLoss)	0.085***	0.078***	0.073***	0.067***
BHC Controls	Yes	Yes	Yes	Yes
BHC FE	No	Yes	No	Yes
Time FE	No	No	Yes	Yes
N	1,070	1,070	1,070	1,070
Adj R ²	0.404	0.481	0.562	0.599

*, **, and *** denote significance at the 10%, 5%, and 1% level

Operational Loss Event Types and Business Lines

When we estimate the relation between systemic risk and operational losses by event type, we find that:

- Losses in IF, CPBP and EDPM are the primary drivers of the significant relation

When we estimate the relation between systemic risk and operational losses by business line, we find that:

- Losses from retail banking and “corporate-other” are the primary drivers of the significant relation

Tail Operational Risk

The positive association between systemic risk and operational risk is driven by tail operational losses.

	Systemic Risk (PC)					
	(1)	(2)	(3)	(4)	(5)	(6)
N Tail Evt 99.0	0.251**		0.267**			
N Body Evt 99.0		-0.009	-0.009			
N Tail Evt 99.5				0.569***		0.567***
N Body Evt 99.5					-0.009	-0.009
BHC Controls	Yes	Yes	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,070	1,070	1,070	1,070	1,070	1,070
Adj R ²	0.587	0.590	0.591	0.588	0.590	0.592

*, **, and *** denote significance at the 10%, 5%, and 1% level

Macroeconomic Environment

The positive association between systemic risk and operational risk is particularly pronounced in adverse macroeconomic conditions.

	Systemic Risk (PC)			
	(1)	(2)	(3)	(4)
Ln(OpLoss)	0.070***	0.031**	0.062***	-0.026
Financial Crisis	0.134***	0.123***		
Financial Crisis * Ln(OpLoss)		0.084***		
ME Index			0.006***	0.006***
ME Index * Ln(OpLoss)				0.004***
BHC Controls	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes
Time FE	No	No	No	No
N	1,070	1,070	1,070	1,070
Adj R ²	0.569	0.576	0.645	0.668

*, **, and *** denote significance at the 10%, 5%, and 1% level

BHC Distance to Default

The positive association between systemic risk and operational risk is more pronounced for BHCs closer to distress.

	Systemic Risk (PC)			
	(1)	(2)	(3)	(4)
Ln(OpLoss)	0.065***	0.115***	0.069***	0.036***
Inv Z-Score	0.000	-0.000		
Inv Z-Score * Ln(OpLoss)		0.002**		
PD			1.892***	1.594***
PD * Ln(OpLoss)				2.628***
BHC Controls	Yes	Yes	Yes	Yes
BHC FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
N	1,030	1,030	1,065	1,065
Adj R ²	0.602	0.610	0.650	0.679

*, **, and *** denote significance at the 10%, 5%, and 1% level

Conclusion

- While operational risk is often perceived as a largely idiosyncratic risk with limited systemic implications, this study documents that increased operational risk is associated with increased systemic risk at U.S. banking organizations.
- The positive relation is driven by high severity operational risk tail events, and is especially pronounced during adverse macroeconomic conditions and for BHCs that are closer to distress.
- This research provides new evidence on the effect of operational risk on systemic risk with potential implications for the supervision and regulation of financial institutions.