Financial Sector Integration and Information Spillovers: Effects of Operational Risk Events on U.S. Banks and Insurers

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Research Question

- Do operational risk events cause market value losses (spillovers) to non-announcing firms in the U.S. banking and insurance industry?
- Main Results
  - Operational risk events have significant intra- and inter-industry spillover effects
    - Negative impact on stock prices of non-announcing firms
  - Spillover effects are information-based
    - Informed, rather than indiscriminate, re-pricing of stocks

Why We Expect Spillovers: Financial Sector Integration

- Banks and insurers began competing:1970s
- Deregulation led to further integration: 1980s & 1990s
  - Commercial banks enter investment banking
  - Commercial banks enter insurance markets
- Retail integration: Insurers, commercial banks, and investment banks compete for retail asset-accumulation business

Financial Sector Integration II

- Wholesale market integration
  - Insurers, commercial banks, and I-banks compete in investment management, corporate pension funds, commercial mortgages, etc.
  - Investment banks and I-bank subs of C- banks & insurers compete in securities underwriting
- Significant integration of the previously fragmented markets for financial services

Outline

- **Background on operational risk**
- Background on financial sector integration
- Literature review
- Hypotheses
- Data, sample selection and methodology
- Results
- Conclusion

What is Operational Risk?

- In theory, operational risk is the bank's residual risk after accounting for other sources of risk
  - Market risk
  - Credit risk
  - Interest rate risk
  - Exchange rate risk
  - Systemic risk

Basel II Definition of Operational Risk

- Basel II defines op risk more narrowly as "The risk of loss resulting from inadequate or failed internal processes, people, and systems, or from external events."
- Basel II definition does not include:
  - Strategic risk
  - Reputational risk
  - Systemic risk
  - Market risk
  - Credit risk

Famous Operational Risk Events

- NASDAQ "Odd eighths" trading scandal (Christie and Schultz 1994)
- Barings Bank collapse (1995) – $1.3 billion loss due to rogue trader (Nick Leeson)
- Daiwa Bank (1995) – $1.1 billion loss due to unauthorized bond trading (Toshihida Iguchi)
- Leading US securities brokers fined $1.4 billion (2002) – misleading research reports
- Prudential Insurance (US) fined $2 billion for sales abuses (1990s)
- State Farm Insurance loses $1.2 billion for breach of contract (1999)

Basel II: Event Types

- 7 Event types:
  - Internal fraud
  - External fraud
  - Employment practices and workplace safety
  - Clients, products, and business practices
  - Damage to physical assets
  - Business disruption and system failures
  - Execution, delivery, and process management

Why is Operational Risk Important?

- New Basel Capital Accord
  - An explicit capital charge for operational risk
- Deregulation and globalization
  - Increasing complexity of business
  - Incompatible system and integration problems (M&A)
- Advances in technology
  - Increased probability of systems failure
  - Fraud, new and unknown risks from E-commerce
- Rating firms (Moody's, Fitch, S&P)
  - Financial rating partly based on operational risk

Basel II Capital Accord: Overview

- Three Pillars Approach to Bank Solvency Regulation
  - Pillar I: Minimum capital requirements
    - Market risk
    - Credit risk
    - Operational risk
  - Pillar II: Supervisory review process
  - Pillar III: Market discipline

Basel II Capital Accord: Overview II

- Operational risk capital charge
  - Considers sum of expected loss (EL) and unexpected loss (UL)
  - UL is at the 99.9% probability level based on a one year exposure period
  - Envisions significant quantification of operational risk charge – most sophisticated banks will use Advanced Measurement Approaches (AMA)

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Why Are Spillover Effects Important?

- Bank failure contagion (bank-runs) - a main reason for bank regulation
- Important to investigate:
  - Whether there are spillover effects caused by operational losses events, and
  - If so, are the effects
    - Information-based (rational) or
    - Purely contagious (irrational)

Financial Sector Integration: 1970s

- Investment banks vs. commercial banks
  - Checkable money market funds – substitute for bank demand deposits
  - Expansion of commercial paper market – substitute for bank loans
  - Asset-backed securities – move bank assets such as mortgages off-balance-sheet

Financial Sector Integration: 1970s

- Insurers vs. banks
  - Insurers issue privately placed bonds – substitute for securities underwriting through investment banks
  - Insurers introduce single premium deferred annuities and GICs – substitute for bank CDs
  - Insurers compete for commercial mortgages
  - Insurers introduce mutual fund families
  - Insurers introduce variable life and annuities

Financial Sector Integration: Deregulation of 1980s & 1990s

- Regulatory restrictions
  - Glass-Steagal Act of 1933
    - Separated commercial banking and investment banking
    - Restricted inter-ownership between banks and insurance companies
  - National Banking Act (NBA) of 1916 restricted commercial banks from selling insurance

Financial Sector Integration: Deregulation of 1980s & 1990s

- Deregulation: Wholesale financial services
  - In 1987 commercial banks permitted to engage in investment banking through "Section 20" subsidiaries
    - 1987, I-banking limited to 5% of gross revenue
    - 1996, I-banking permitted up to 25% of gross revenue
  - In 1999, Gramm-Leach-Bliley Act removed all remaining restrictions and permits Financial Holding Companies (FHCs) to engage in all types of financial services through subsidiaries

Financial Sector Integration: Deregulation of 1980s & 1990s II

- Deregulation: Retail financial services
  - National Banking Act interpreted more liberally allows subs of banks to sell insurance if headquartered in towns of < 5,000 population
  - Office of Comptroller of Currency (OCC) deregulation
    - 1985: OCC allowed banks to sell fixed-rate annuities
    - 1990: OCC allowed banks to sell variable-rate annuities
    - 1996: OCC actions upheld by U.S. Supreme Court
- 1999: GLB Act permits FHCs to own insurance companies

Bank Share of Individual Annuity Premiums ($ billion)

Year	Total	Bank	Bank Share (%)
1995	98.7	14.2	14.4%
1996	111.4	17.2	15.4%
1997	126.1	19.3	15.3%
1998	131.5	19.7	15.0%
1999	156.5	26.4	16.9%
2000	190.5	31.0	16.3%
2001	184.5	38.3	20.8%
2002	217.9	48.9	22.4%
2003	210.8	50.1	23.8%
2004	217.9	48.3	22.2%

Integration: Cross-sector M&As in US

Acquirer	Commercial Bank		Investment Banks		Insurers	
Target	Inv Banks	Insurer & Agencies	Comm Banks	Insurer & Agencies	Comm Banks	Inv Banks
Total # of Deals 1985-2004	151	229	52	49	22	76
Average # of Deals per Year 1985-1994	2	1.2	1	1.3	0.5	1.7
Average # of Deals per Year 1995-2004	11.2	20.5	3.3	2.4	1.2	4.2

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Prior Literature – Aharony and Swary (1983)

- Negative information spillover (contagion) effect
  - "The spillover effects of events affecting specific firms to others"
- Pure spillover effect (contagion)
  - Indiscriminant re-pricing of all shares (bank runs)
    - The spillover effect to other firms regardless of the cause of the event and the non-announcing firms' risk characteristics
    - Pure spillovers create social costs
- Information-based spillover effect
  - Informed re-pricing of shares
    - If the cause of event is correlated across firms, only the correlated firms are affected
    - Investors are able to differentiate firms based on risk characteristics
    - No social costs

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    - No social costs

Prior Literature – Lang and Stulz (1992)

- Competitive effect
  - Announcement of bankruptcy need not only convey negative information
  - Value of rival firms can be increased by redistributing wealth from the announcing firm
  - Industries with similar cash flow characteristics exhibit negative information spillovers (contagion)
  - Competitive effect dominates in highly concentrated industries and cannot occur in a competitive industries
- Positive and negative spillovers may both be present – empirical estimates measure the <u>net</u> effect

Cummins, Lewis, and Wei (2006)

- Research Question
  - What is the effect of operational risk events on market value of <u>**announcing**</u> banks and insurers?
- Main Results
  - OpRisk events have a strong, statistically significant negative stock price impact on announcing firms
  - Moreover, the market value loss significantly exceeds the amount of the operational loss reported
  - Investors price operational risk into their views on the future profitability of a firm

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How Are Spillovers Generated?

- Arise if events cause investors to revise downward estimates of future cash flows for non-announcing firms
  - Events provide information on previously unknown risks to all institutions
  - Events cause customers to be wary of financial institutions and disintermediate
  - Events may induce greater regulatory scrutiny

Hypotheses – Intra-industry Effect

- Null H1: Announcements of operational loss events have no intra-sector effect.
- 3 Scenarios:
  - Within insurance industry
  - Within commercial banking industry
  - Within investment banking industry
- Alternative hypotheses: either negative or positive information spillovers dominate

Hypotheses – Inter-industry Effect

- Null H2: Announcements of operational loss events have no inter-sector effect.
- 4 Scenarios:
  - Effect of commercial bank events on investment banks
  - Effect of investment bank events on commercial banks
  - Effect of C-bank & I-bank events on insurers
  - Effect of insurance events on C-banks and I-banks
- Alternative hypotheses: either negative or positive information spillovers dominate

Hypotheses – Inter-industry Effect:
Commercial and investment banking sectors

- Commercial banks have expanded into the investment banking arena since 1980s
  - The Fed lifted restriction under Section 20 of the Glass-Steagall Act of 1933
- But, many investment banks remain largely pure investment banks and do not offer traditional commercial bank products
- Thus, investment bank events should affect both non-announcing commercial and investment banks.
- Commercial bank events mainly affect non-announcing commercial banks

Hypotheses – Inter-industry effect:
Effect of insurance events on banks

- Commercial banks enter insurance, mid-1980s
  - Annuities account for 2/3 of banks' insurance premiums
  - Premiums from life and P-L insurance also growing rapidly
- Commercial banks rather than investment banks have been the major players during the banks' expansion into the insurance market
- Thus, insurance events expect to have stronger impact on commercial banks than on investment banks

Hypotheses – Inter-industry effect:
Effect of bank events on insurers

- Competition with investment banks
  - Securities issuance
  - Commercial mortgages & mortgage backed bonds
  - Mutual funds
- Competition with commercial banks
  - Annuities, mutual funds, life insurance
  - SPDAs, GICs
  - Pension plan management
- No clear prediction on whether insurers respond more strongly to C-bank events or I-bank events

Hypotheses - Deceptive Sales I

- Market conduct (deceptive sales) problems
  - Especially severe for insurers
  - A byproduct of competitive pressures caused by bank entry into annuity and insurance markets
- Null H3: Non-announcing insurers are not affected by the deceptive sales events of a few insurers.
- Alternative hypotheses: either negative or positive information spillovers dominate

Hypotheses- Deceptive Sales II

- Null H4: The banks are not affected by insurer deceptive sales events.
- Alternative hypotheses: either negative or positive information spillovers dominate
- Do the deceptive sales problems extend to bank distribution channel?
  - Do banks have differential response to insurer deceptive sales events?

Hypotheses – Pure vs. Information-Based Spillover Effects

- Testing for pure vs. information-based spillovers
  - Cross sectional regression:
    dependent var = market value loss (CAR in %)
  - Event or firm characteristics as independent variables
  - Information-based: significance of some variables reveals market is penalizing correlated insurers
  - Pure contagion: no significant explanatory variables reveals indiscriminate effect regardless of correlation among firms

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Data

- OpVar Quantitative Loss database
  - Compiled by Algorithmics, member of Fitch Group
- Data on operational loss events in several industries from the 1970s-present from public sources
  - Event date – the first public announcement of events
  - Settlement date
  - Description of event
  - Event type and business lines
  - Loss amount – final settlement amount
- Most events (97%) are after 1985
  - Unique opportunity to study the effect of integration

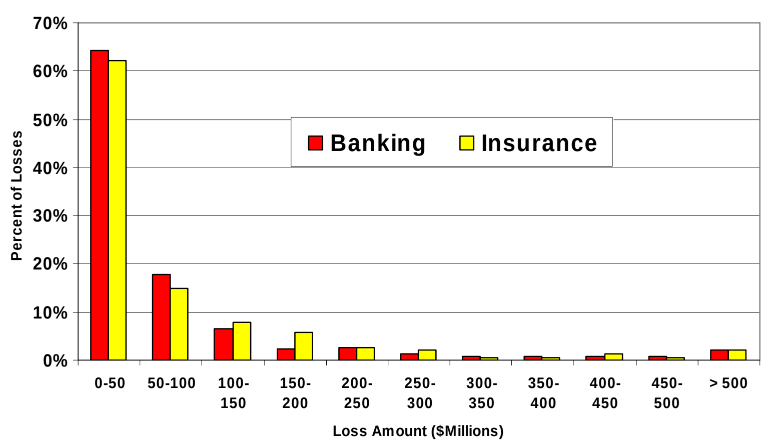
Summary Statistics (Millions $)

	Mean	Median	Std Dev	Min	Max	N
Banks						
All Operational Losses	193.20	101.35	277.90	50.20	2,532.39	247
Deceptive Sales Events	156.51	82.28	150.96	51.02	774.54	49
Insurers						
All Operational Losses	224.14	117.80	377.60	50.16	2,256.75	91
Deceptive Sales Events	340.55	137.61	572.64	52.72	2,256.75	34

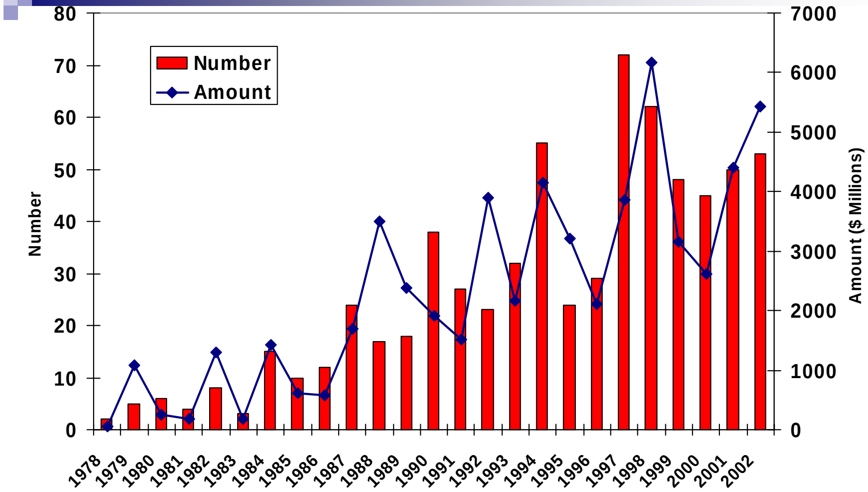
20%

37%

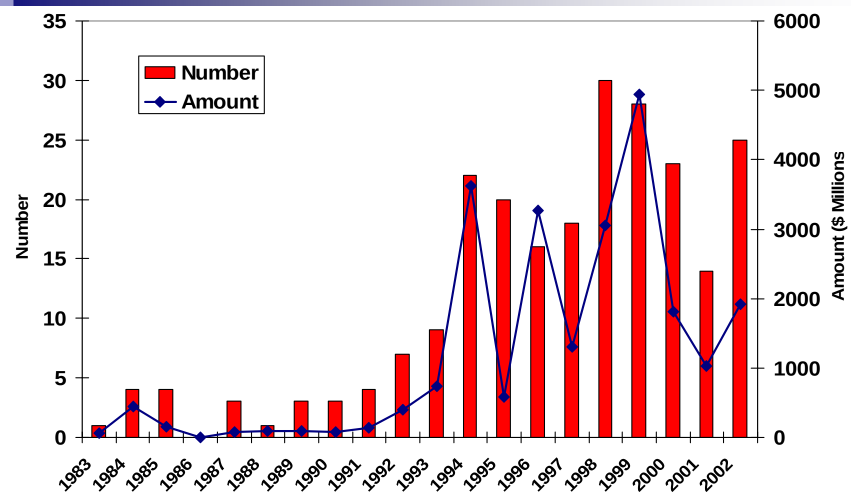
Operational Loss Severity Distribution



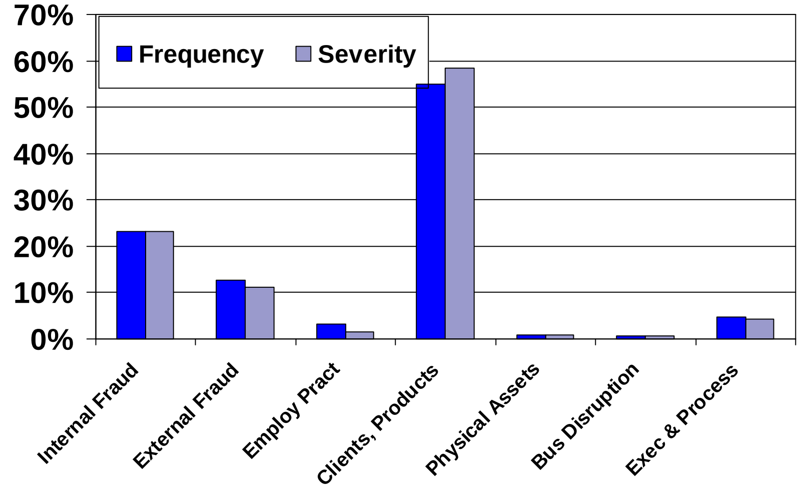
Operational Loss Events: US Banks



Operational Loss Events: US Insurers



Events by Event Type: US Banks



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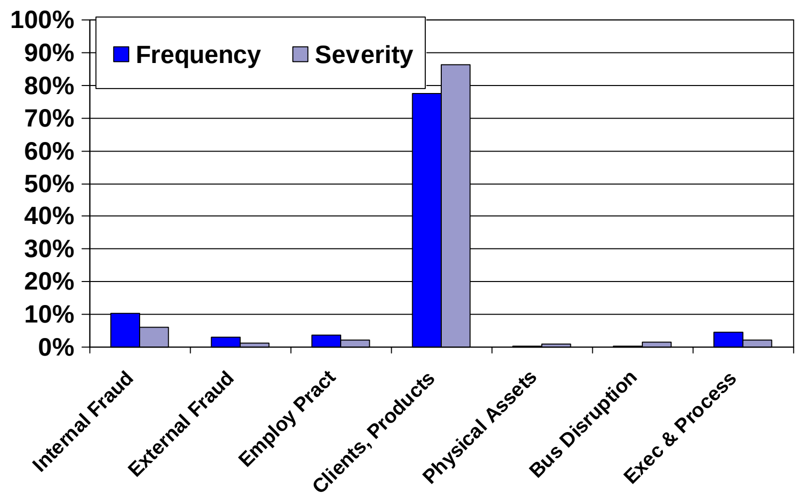
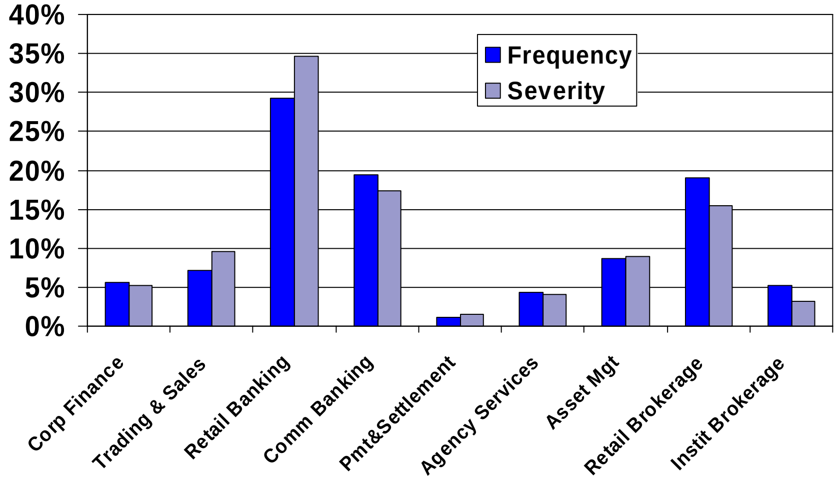
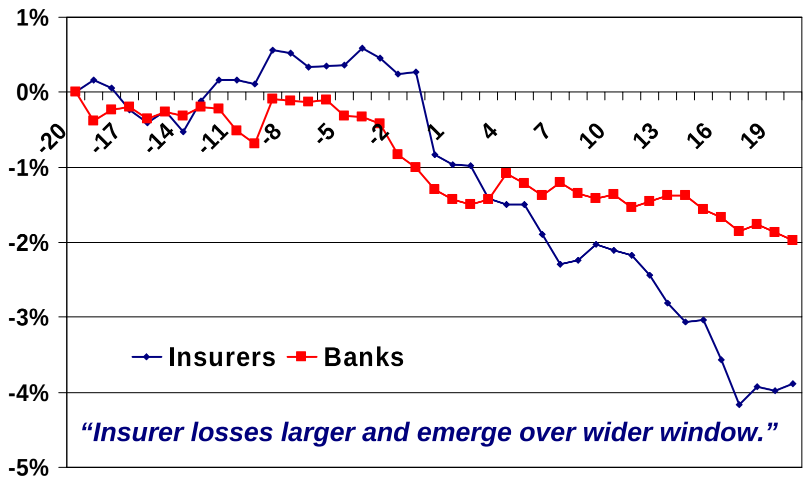


Events by Business Line: US Banks



Mean CARs: Announcing Banks and Insurers



Study Design: Spillover Effects

- Impact on non-announcing publicly traded banks and insurers around each event
  - OpVar, CRSP, Compustat
- Non-announcing firms
  - Commercial banks: SIC 602, 6711
  - Investment banks: SIC 621, some 6282
  - Insurers: SIC 631 (life) and 633 (P-L)
- Large Events – exceeding $50 million

Methodology

- Event study is conducted to measure the effect of op risk events on stock prices
  - Standard market model

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt}$$

  - Abnormal return

$$AR_{jt} = R_{jt} - \hat{a}_j - \hat{b}_j R_{mt}$$

  - Cumulative abnormal return

$$CAR_{(T_1,T_2)j} = \sum_{t=T_1}^{T_2} AR_{jt}$$

Significance Tests

- Since all non-announcing firms are paired with each event, and some events happen on the same day, clustering of events is present

- Jaffee's (1974) calendar time t-test used to correct for cross-sectional dependence caused by clustering

- Other tests also conducted to check robustness
  - Variance adjusted z-test
  - Non-parametric (generalized sign z) test

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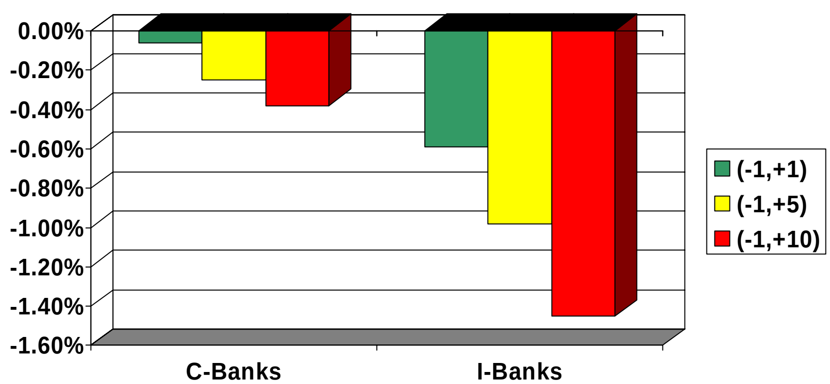
Banking Industry: Intra-Sector Effect

All events: Mean CAR

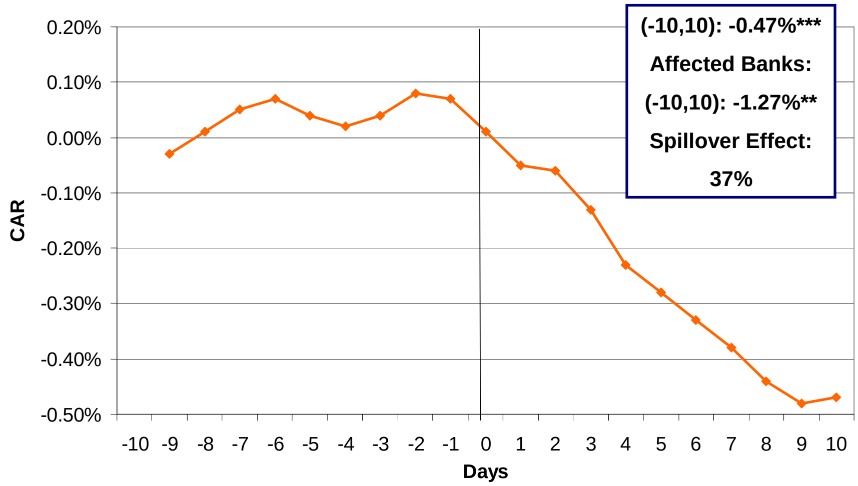
Days	N	Mean CAR	Variance adjusted z-stat		Calendar time t-test		Generalized sign z-test	
Commercial bank events:								
(-1,+1)	158	-0.06%	-12.275	***	-1.784	$	-5.727	***
(-10,+10)	158	-0.51%	-14.402	***	-1.745	$	-4.518	***
(-1,+10)	158	-0.38%	-18.233	***	-2.382	*	-7.678	***
Investment bank events:								
(-1,+1)	89	-0.59%	-8.512	***	-1.354		-5.098	***
(-10,+10)	89	-0.68%	-3.772	***	-0.462		-1.492	$
(-1,+10)	89	-1.45%	-9.844	***	-1.169		-5.683	***

Intra-Sector Effect: Banks

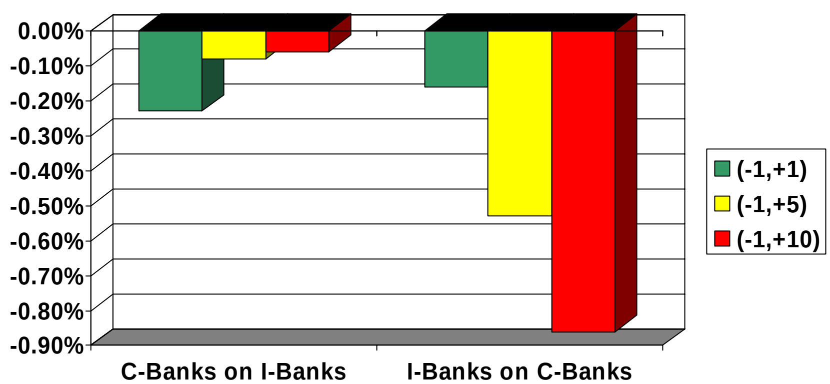


Banking Industry: Intra-Sector Effect

All Events: Mean CAR (-10,+10)



Inter-Sector Effect: Banks



I-Banks events have strong effect on C-Banks.

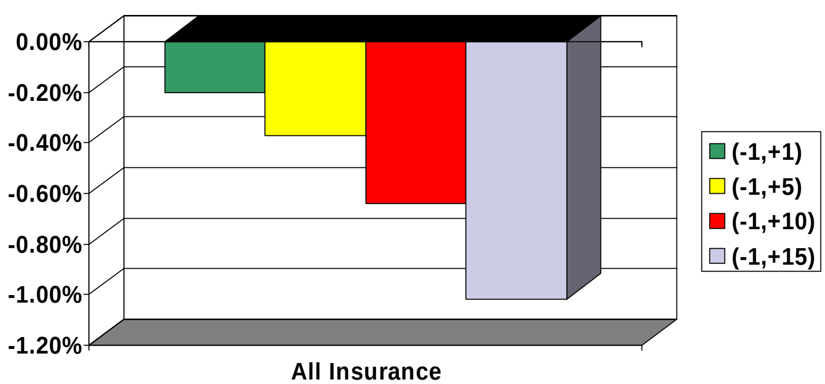
C-Bank effect on I-Banks dissipates rapidly.

Insurance Industry: Intra-Sector Effect

All Events: Mean CAR

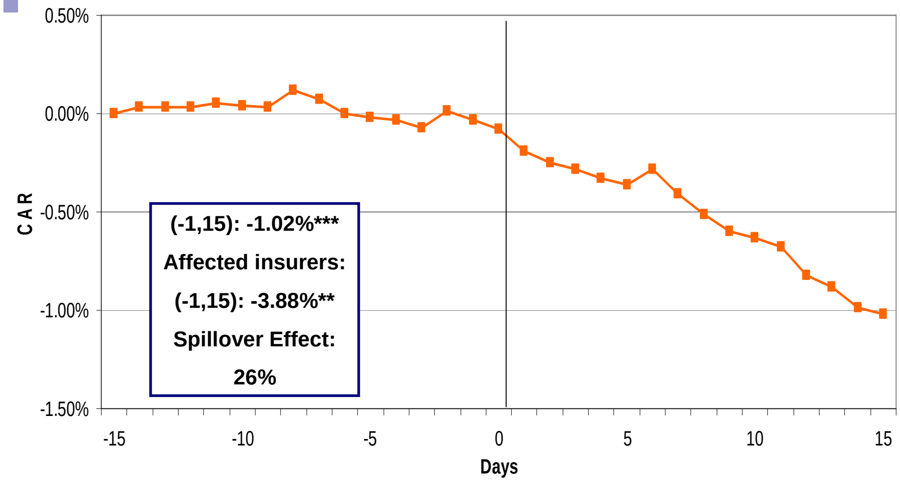
Days	N	Mean CAR	Variance adjusted z-stat		Calendar time t-test		Generalized sign z-test	
(-1,+1)	91	-0.20%	-3.981	***	-1.561		-4.212	***
(-5,+5)	91	-0.36%	-3.601	***	-1.916	$	-2.519	**
(-10,+10)	91	-0.68%	-3.902	***	-2.080	*	0.012	
(-15,+15)	91	-0.96%	-4.480	***	-2.194	*	-0.443	
(-15,-1)	91	0.03%	0.616		0.449		2.944	**
(-1,+5)	91	-0.37%	-4.697	***	-2.280	*	-2.956	**
(-1,+10)	91	-0.64%	-6.384	***	-2.600	*	-1.535	$
(-1,+15)	91	-1.02%	-7.393	***	-3.536	***	-5.304	***

Intra-Sector Effect: Insurers



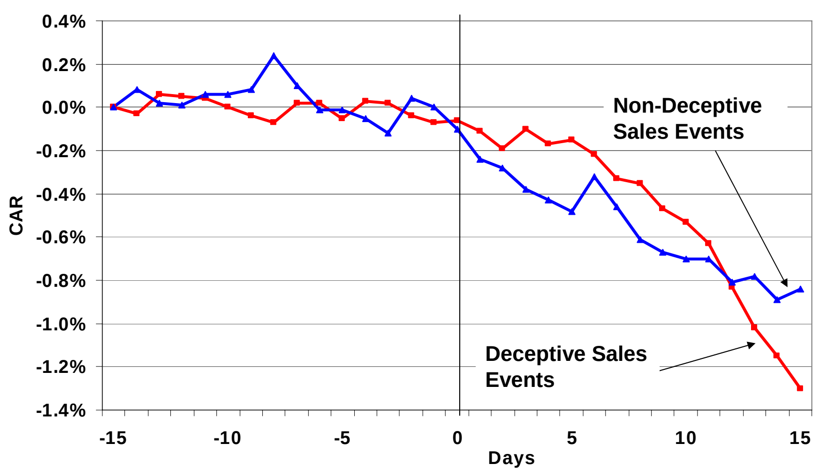
Insurance Industry: Intra-Sector Effect

All Events: Mean CAR



Insurance Industry: Intra-Sector Effect

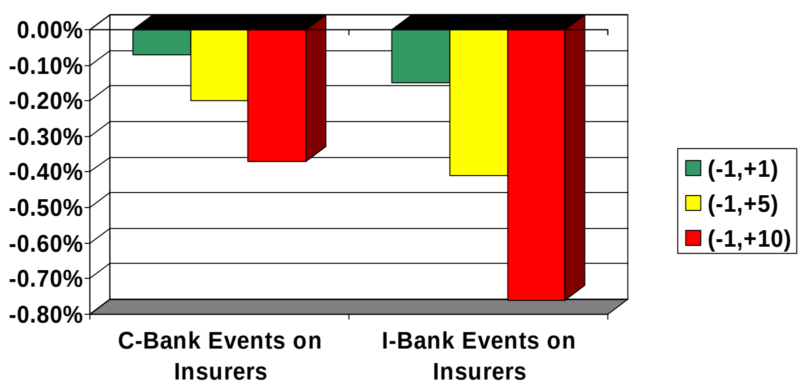
Deceptive Sales Events: Mean CAR



Inter-Sector Effect: Bank Events on Insurers

Days	N	Mean CAR	Variance adjusted z-stat		Calendar time t-test		Generalized sign z-test	
Impact of commercial banks events:								
(-1,+1)	158	-0.07%	-3.996	***	-1.013		-0.509	
(-10,+10)	158	-0.39%	-6.077	***	-1.713	$	0.761	
(-1,+10)	158	-0.37%	-8.068	***	-1.929	$	-1.276	
Impact of investment banks events:								
(-1,+1)	89	-0.15%	-6.016	***	-2.339	*	0.178	
(-10,+10)	89	-0.23%	-5.336	***	-1.812	$	2.005	*
(-1,+10)	89	-0.76%	-14.988	***	-3.141	**	-5.758	***

Inter-Sector Effect: Bank Events on Insurers

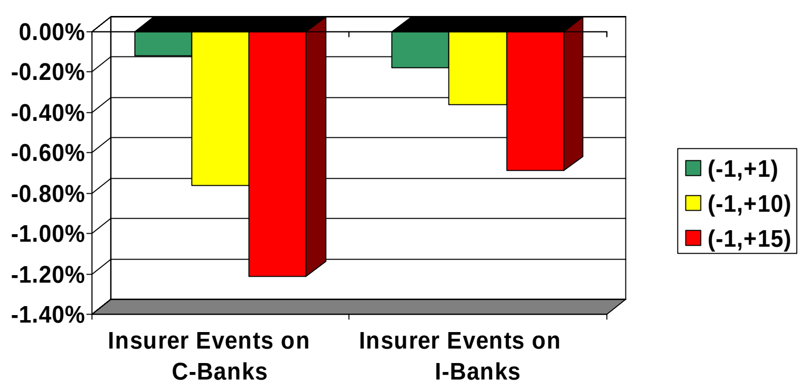


I-Bank events affect insurers more strongly than C-bank events.

Inter-Sector Effect: Insurance Events on Banks

Days	N	Mean CAR	Variance adjusted z-stat		Calendar time t-test		Generalized sign z-test	
Impact on commercial banks:								
(-1,+1)	91	-0.12%	-4.471	***	-1.109		-0.100	
(-15,+15)	91	-1.52%	-21.884	***	-1.900	$	-10.490	***
(-1,+15)	91	-1.21%	-23.760	***	-2.852	**	-11.771	***
Impact on investment banks:								
(-1,+1)	91	-0.18%	-1.898	*	0.327		-2.136	*
(-15,+15)	91	-0.15%	0.261		0.751		1.771	*
(-1,+15)	91	-0.69%	-2.564	**	-0.400		-1.021	

Inter-Sector Effect: Insurance Events on Banks



Insurer events have only weak effects on I-Banks.

Insurer events affect C-banks as strongly as insurers.

Regression Analysis

- Pure versus information based effects

Regression Hypotheses – Pure vs. Information-Based Spillover Effects

- Size of operational loss events
  - Negative spillover effect
    - Indicate possible size of future loss of non-announcing firms
    - Large losses less frequent – more likely to convey new information
  - Competitive effect
    - Indicate the severity of losses for announcing firm
    - Larger losses lead to larger gains in market value for rivals
  - Null Hypothesis 5: Size of operational loss has no relation with the market value impact on non-announcing firms

Regression Hypotheses – Pure vs. Information-Based Spillover Effects II

- Firm's growth prospects
  - If announcement of events changes investors' expectation about the future cash flows of non-announcing firms
  - Firms with higher growth prospects are likely to have a more severe effect
    - More likely to have to forego positive-NPV projects due to future operational losses
  - Q = (MV Equity + BV Liabilities)/BV Equity
  - Null Hypothesis 6: Market-value losses of non-announcing firms are unrelated to their growth prospects.

Regression Hypotheses – Pure vs. Information-Based Spillover Effects III

- Insolvency risk: Prediction ambiguous
  - Firm with low equity-to-assets ratios more likely to enter into financial distress from possible future losses $\Rightarrow$ inverse relationship of E/A and MV loss
  - "Deep Pockets" theory of liability: firm with low equity-to-assets ratio are less likely to be sued $\Rightarrow$ direct relationship of E/A and MV loss
  - Option theory: stock price of a firm with low equity-to-assets ratio is less sensitive to new information $\Rightarrow$ direct relationship of E/A to MV loss
- Null Hypothesis 7: MV loss of non-announcing firms not related to insolvency risk.

Regression Hypotheses – Pure vs. Information-Based Spillover Effects IV

- Market conduct problems
  - Reputation is a very valuable intangible asset of financial service firms
  - These events might influence firm value more than other types events due to:
    - Reputational damage
    - Increase in compliance costs
  - Events at announcing firms could drive customers to non-announcing firms, producing competitive effect
- Null H8: Market conduct problems have no differential effects compared with other events.

Regressions – Bank Events
Dependent Variable: CAR(-10,10)

	All Bank Event on Banks		**ComBank Evt on Banks**		**InvBank Evt on Banks**		**All Bank Event on Insurers**	
Intercept	0.001		0.004		-0.025	***	0.011	***
LogMve	-0.002	***	-0.001	***	-0.003	***	-0.002	***
Log Loss	0.003	***	0.001		0.007	***	0.002	***
Q Ratio	-0.003	***	-0.003	***	-0.004	***	-0.012	***
Equity/Assets	0.012	**	0.016	**	0.015	*	0.007	*
Deceptive	-0.002	*	-0.003	**	0.023	***	-0.001	
Deceptive* IBankEvent	0.025	***					0.015	***
CBank			-0.004	*				
IBank					-0.008	***		
IBankEvent							-0.006	***

Bank Event Regressions: Implications I

- Log(MVE) < 0 implies larger banks have larger market value loss
  - More vulnerable due to complex operations
- Log(Loss) > 0 implies larger losses cause lower MV loss at non-announcing firms
  - Some evidence of competitive effect
- E/A > 0 implies lower MV loss for better capitalized firms: Fin. distress dominant

Bank Event Regressions: Implications II

- Q < 0 implies firms with stronger growth prospects have larger MV loss
- Deceptive sales (DS) dummy implies
  - Commercial bank DS events have negative information spillovers to banks
  - Investment bank DS events have positive spillovers to banks (competitive effect)
  - Bank DS events do not have differential spillover effect on insurers

Bank Event Regressions: Implications III

- Investment bank events have stronger effect on insurers than commercial bank events
- Investment bank deceptive sales events have a positive effect on insurers
  - Evidence of competitive effect

Regressions – Insurance Events
Dependent Variable: CAR(-15,15)

	Insurance Events on Insurers		Insurance Events on Banks	
Intercept	0.079	***	0.113	***
LogMve	-0.004	***	-0.002	***
Log Loss	-0.007	***	-0.008	***
Q Ratio	-0.023	***	-0.060	***
Equity/Assets	0.016	*	0.054	**
Deceptive	-0.011	***	-0.001	
ComBank			-0.017	***
Life	0.001			
Deceptive*ComBank			-0.001	

Insurer Event Regressions: Implications

- Log(MVE) < 0 implies larger insurers have larger market value loss
- Log(Loss) < 0 implies larger losses cause higher MV loss at non-announcing firms
  - Evidence of contagion effect
- E/A > 0 implies lower MV loss for better capitalized insurers and banks
  - Financial distress effect dominant

Insurer Event Regressions: Implications II

- Q < 0 implies firms with stronger growth prospects have larger MV loss
- Deceptive sales dummy implies
  - Insurer deceptive sales events cause higher loss to other insurers than other types of events
  - Insurer events do not differentially affect banks
- Insurer events affect C-banks more than I-banks

Conclusions: Negative Information Spillovers?

	Banks	Insurers
Bank Events	Yes	Yes
Insurance Events	Yes	Yes

	Commercial Banks	Investment Banks
Commercial Bank Events	Yes	Yes for (-1,+1), then dies out
Investment Bank Event	Yes	Yes

Conclusions: Information Based Spillovers

- Evidence on information-based contagion
  - Firms with high growth potential are more adversely affected
  - Financially vulnerable firms are more adversely affected
  - Insurance deceptive sales event have more adverse effect then other types of events – but only within insurance industry
  - Insurance events affect C-banks more than I-banks

Conclusions: Information Based Spillovers II

- Evidence on information-based contagion
  - For commercial and investment banks, intra-industry spillovers are significantly larger than the inter-industry spillovers
  - Investment bank events negatively affect both commercial and investment banks
  - Commercial events mainly negatively affect commercial banks – I bank response for (-1,+1) but dies out rapidly

Conclusions: Overall Implications

- Negative information spillovers are information based and hence not likely to cause social costs or panics
- Strong inter-sector effects provide evidence that the U.S. financial sector has achieved significant integration
- Information spillovers imply that market discipline is an effective regulatory tool

The End

Thank you!