

Diversification & Contagion: Connections and Regulatory Implications

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Conglomerates & distress risk

- Traditional view
 - Conglomerates benefit from diversification
 - Reduces risk of distress
- View since the financial crisis
 - Contagion leads to market destabilization
 - Move towards segmentation
 - Ring-fencing international operations of banks
 - Separate commercial and investment banking
- How are diversification & contagion related?

A stylized example

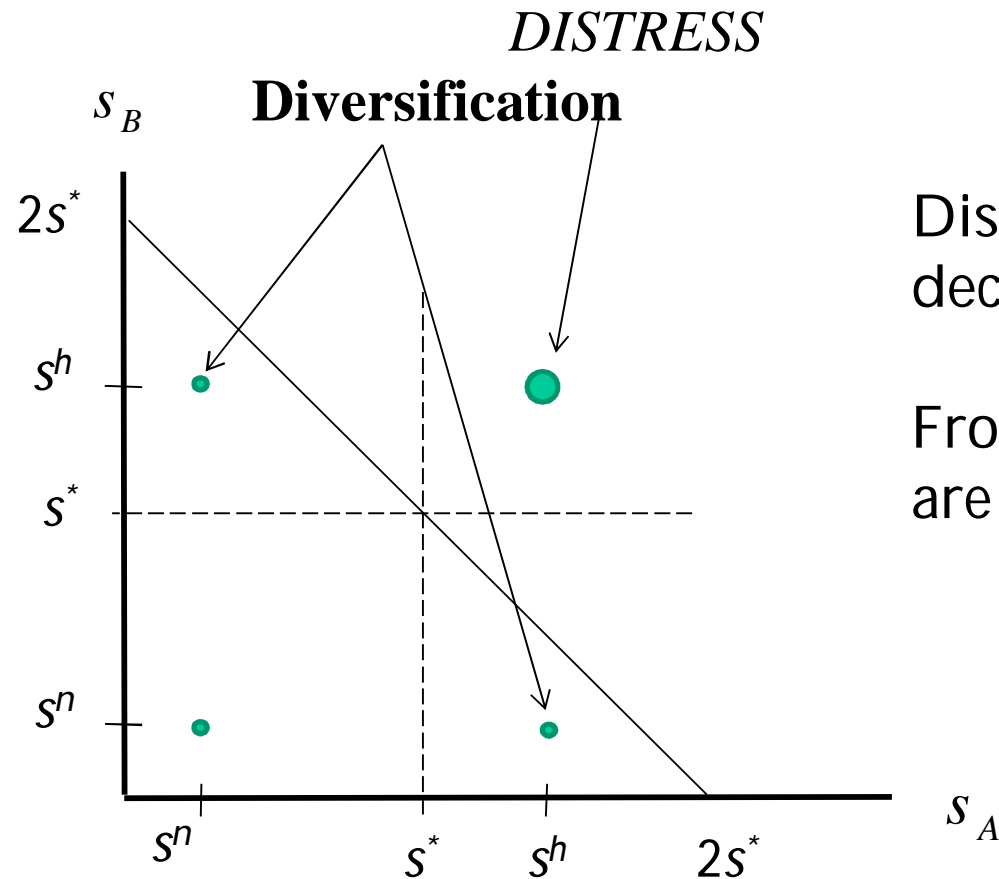
- Two banks, A and B
 - A could be a bank, B its insurance business
 - A could be European and B its US operations
 - A could be commercial and B its investment banking business.
- Suppose each bank may experience a shock s_A, s_B in the form of a loss to assets (trading loss, write down of bad loans...)
 - Shocks can be normal (s^n) or high (s^h), with $p = \text{Prob}(s^n)$

Stylized example

- Each bank is capitalized so as to withstand a shock up to magnitude $s^* > s^n$, but $s^* < s^h$.
 - If $s_A > s^*$, bank A is in distress.
 - By construction, stand-alone bank has a distress probability $1 - p$.
 - If $1 - p$ small enough this may be acceptable for regulator
- How does distress probability change when banks A and B are integrated?
 - Integrated bank experiences distress if

$$s_A + s_B > 2s^*.$$

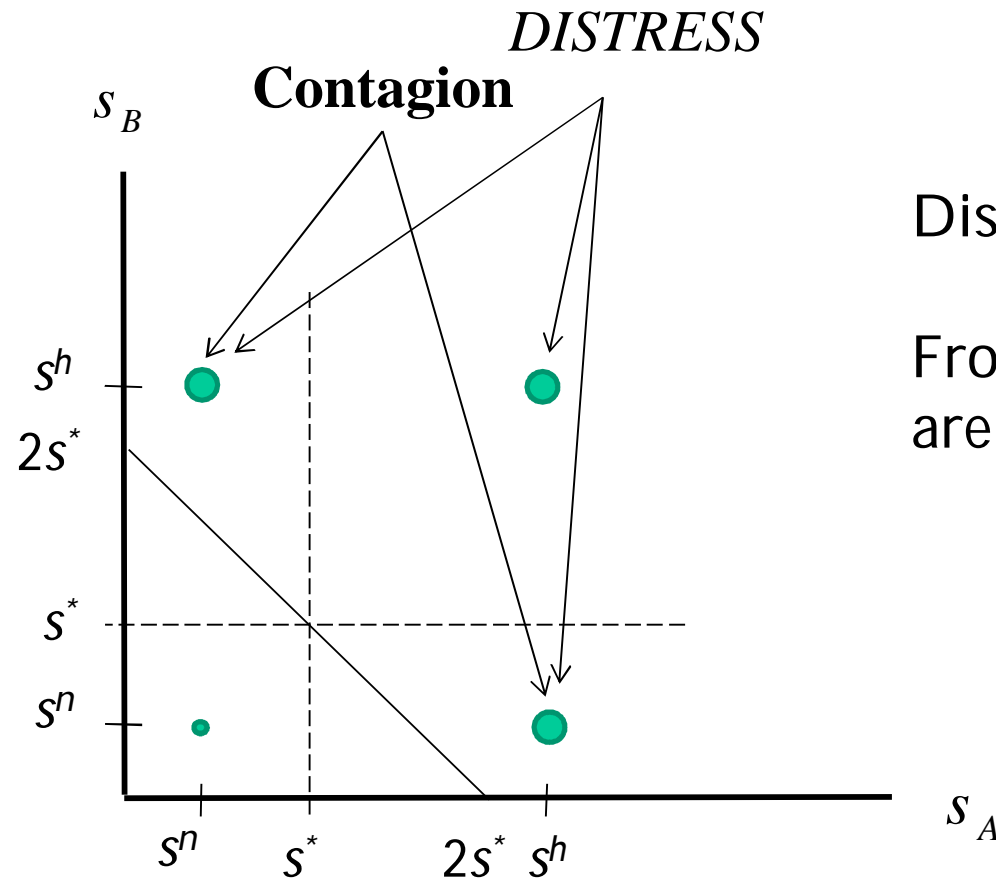
Diversification



Distress probability decreases.

From $1 - p$ to $(1 - p)^2$ if shocks are independent.

Contagion



Distress probability increases.

From $1 - p$ to $1 - p^2$ if shocks are independent.

Take-away

- Diversification & Contagion are two sides of the same coin
- Which effect obtains depends on threshold s^* relative to s^n and s^h .
 - p didn't matter for the argument
 - Only because distress is a rare event doesn't imply we are in the diversification region.
- Impact of correlation on crisis probability
 - Diversification case: low correlation is good.
 - Contagion case: low correlation is bad.

Implications for regulators

- Objective: Set s^* high enough to keep distress probability below some threshold
- If diversification case applies
 - Conglomerates should have less stringent capital requirements (lower s^*)
- If contagion case applies
 - Conglomerates should have more stringent capital requirements (higher s^*)

Comment on policy debate

- Regulatory changes of last few years have
 - increased capital requirements (s^*) significantly, *and*
 - increased ring-fencing.
- Interaction of policies ignored in the debate
 - As capital requirements (s^*) increase, we move from contagion to diversification region.
 - Contagion is a problem when capital requirements are low \Rightarrow integration may be harmful
 - When capital requirements are high, diversification is a benefit \Rightarrow integration may be a good thing
- Is it really optimal to do both, increase capital requirements *and* discourage integration?

Empirical analysis of the risk of Banks and Insurance companies in Europe

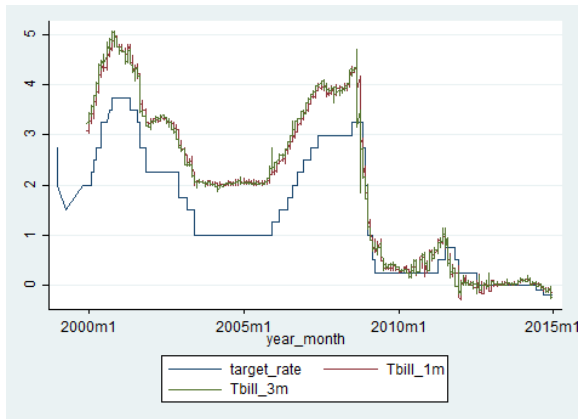
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Belgian Financial Forum

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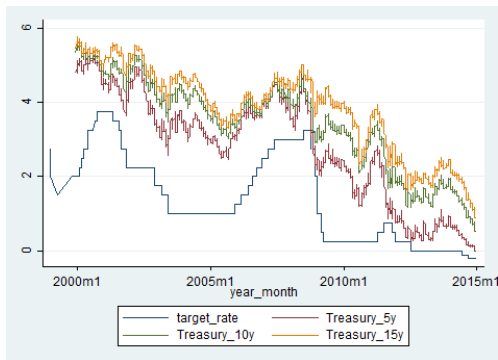
- 1 Introduction
- 2 Correlation matrix
- 3 Cash flow and interest rate co-movements
- 4 Conclusion

EZ short term interest rates



- (1) Long period of low interest rate level, big challenges for insurance companies and banks

EZ long term interest rates



(2) Can banks do more diversification? Which industries?

Comparison of Bank, Insurance		
Criterion	Bank	Insurance
Main assets	Customer loans, interbank assets, securities	securities
Main Liabilities	Customer deposits, interbank liabilities	insurance polices obligations
Tradi Channel	Branch	Agent, broker
Time Horizon	Intermediate	Long (life), long or short (non life)
Main risks	Credit risk, funding liquidity risk	Underwriting risk, investment risk
Risk transfer mechanism	Securitization, credit, guarantee	Reinsurance,

- Banks hold long term assets and short term liabilities ; $r \uparrow \rightarrow PV$ (long asset) decrease more \rightarrow Bank value decrease
- Insurance hold short term assets and long term liabilities : $r \uparrow$, decrease of PV (short asset) smaller than those of their liabilities

- In favor of a more integrated financial services industry :
 - Banks' mergers with insurance or property & casualty insurance firms may reduce risk
 - Downside risk can be reduced through financial conglomeration across European banks and insurers
- Argument against financial conglomerates :
 - Significant diversification discount for banks engaged in multiple business activities
 - Neither increase of return nor reduce on risk through diversification of bank loans across sectors and industries
- Diversification may reduce firm-specific risk, but at the expense of adding to systemic risk due to the increased interconnectedness among FIs
- Financial sector highly integrated in recent years and that a high degree of interconnectedness appeared during financial crisis

This paper :

- Search the possible diversification
 - Look at the correlations across all the 19 industries in Europe
 - Further study the pair correlations of banks and insurance companies through a series of accounting variables
- Investigate the banks' cash flows to interest rate movements

- For European firm level data, annual accounting information from Infinancials during 1999-2014 :
 - Banks and insurance companies : 297 firms, 2669 firm-year observations
 - Firms in other industries : 9498 firms, 86483 firm-year observations
- Interest rates data : 1-month,3-month, annual, 2-years, 5-years, 10-years treasury rates and fed funds target rates from Board of Governors of the Federal Reserve System for US and from Datastream and ECB for Eurozone
- For some French institutions : quarterly firm level data from firms' officially public websites
- List of financial conglomerates from ECB

Computation of correlation matrix

- 1 Every firm i at time t , compute : $ROE_{it} = \frac{NetIncome_{it}}{Equity_{it}}$;
- 2 Calculate the weight ω_{it} of each firm according to firm size ;
- 3 Compute the value-weighted ROE of each industry :
$$\overline{ROE}_{Ind,t} = \sum_{i=1}^I \omega_{it} ROE_{it}$$
- 4 Compute the correlation of $\overline{ROE}_{Ind,t}$ between industries

Definitions of variables

- Net sale=total revenue from operating business in industrial firms
- Net sale=Financial income in banking sector
- Gross ROE= $\text{EBITDA}/\text{Equity}$
- Earning before tax
=EBITDA-Depreciation-Amortization-EX event
- ROA=Net income/Total asset

Correlation matrix of Net Sale

Table 1 Correlation matrix of Net Sales in Europe

	Ins	FC	Auto	BRes	Chemi	Constr	FinS
Bank	0.5677	-0.4278	0.1324	0.7851	0.7876	0.8544	-0.1650
	0.0218	0.0983	0.6251	0.0003	0.0003	0.0000	0.5413
Ins		-0.0494	0.5998	0.6013	0.6404	0.6296	-0.2871
		0.8558	0.0141	0.0138	0.0075	0.0090	0.2810
FC			-0.0739	-0.5898	-0.6140	-0.6175	0.3055
			0.7856	0.0162	0.0114	0.0108	0.2500

- Bank and Insurance are not the most highly correlated
- FC seems to have a better diversification with lower correlations

Correlation matrix of ROE

	Ins	FC	Auto	BRes	Chemi	Constr	FinS
Bank	0.6066	0.8832	0.6492	0.5977	0.2226	-0.0022	0.5576
	0.0127	0.0000	0.0065	0.0145	0.4073	0.9935	0.0248
Ins		0.6053	0.1212	0.5162	0.8393	0.5793	0.6029
		0.0130	0.6547	0.0406	0.0000	0.0187	0.0134
FC			0.6271	0.6229	0.2501	0.0870	0.4977
			0.0093	0.0099	0.3502	0.7486	0.0498

- Correlations vary after different accounting deduction terms

Aggregate Correlations of sub-sectors (Table 6)

- Full line insurance are highly correlated with banks
 - $\text{Corr}(\text{Full, Bank})$ of ROE is 0.4858, much lower than 0.92 in net sale
 - $\text{Corr}(\text{Life, Bank})$ of ROE is 0.67, while those of net sale is not significant
- Both business difference and accounting rule difference play a key role

Sub-conclusion

- Bank and Insurance industries are significantly correlated for most the variables considered, but lower than some industries
- In other words, there is room to do some diversification among banks and insurance companies
- Similar results can be obtained if computing the pair correlations

Key Variables

- NBI=Net Banking income = "Produit net bancaire"
- ez_short=Eurozone short term interest rate= Mean of the 1-month T-bill rates over the EZ countries
- ez_long=Eurozone long term interest rate

BNPP case study

m=5		
	NBI	NBI
ez_short	-1.646***	-1.679***
ez_long	1.369**	0.999*
us_short	0.715***	0.628***
us_long	-2.545***	-1.661***
france_gdp		-0.365
		1.088
us_gdp		-0.578*
ex_rate		3.743***
Constant	14.93***	8.419***
Obs	69	65
R-squared	0.719	0.792

- Consistent negative relation with short term rates for Banks
- Positive correlated with long term rates (with m=2, 5, 10)
- BNPP will benefit from the high Eurodollar exchange rate

BNPP case study

VARIABLES	Insurance		Rest	
	NBI	NBI	NBI	NBI
ez_short	-0.00121	0.0141	-1.568***	-1.648***
ez_long	-0.0532**	-0.0787***	0.927**	0.676
us_short	0.0403***	0.0227	1.099***	0.850***
us_long	-0.0714***	-0.0291	-2.041***	-1.202**
france_gdp		-0.0144		-0.294
ez-gdp		0.0406		0.866
us_gdp		-0.00320		-0.534
ex_rate		0.218***		3.454***
Constant	0.609***	0.286***	11.51***	6.238***
Observations	69	65	69	65
R-squared	0.757	0.814	0.716	0.780

- Insurance department shows different relation to short term rates compared to the rest of business or the total bank' business

Comparison with SG, CA and BPCE

VARIABLES	Group SG		BNPP	
	NBI	NBI	NBI	NBI
ez_short	-0.492**	-0.603***	-1.646***	-1.679***
ez_long	0.274	0.141	1.369**	0.999*
us_short	0.476***	0.331**	0.715***	0.628***
us_long	-0.907***	-0.321	-2.545***	-1.661***
france_gdp		-0.455		-0.365
ez-gdp		0.700**		1.088
us_gdp		-0.263		-0.578*
ex_rate		2.496***		3.743***
Constant	7.028***	3.181***	14.93***	8.419***
Observations	69	65	69	65
R-squared	0.555	0.721	0.719	0.792

- SG is doing more similar business to BNPP compared to the other French financial conglomerates
- Their NBIs show the same reactions to all the factors

- Banks and insurance companies' accounting variables are positively correlated, but not perfectly
- Their level of correlation does not appear particularly high compared to the other industries
- BNPP's insurance division is not affected in the same way as the banking activities by interest rates