Testing Macroprudential Stress Tests: The Risk of Regulatory Risk Weights

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Why do we need macroprudential stress tests? (1/2)

Crises occur when

- Common asset shock (Shleifer and Vishny (1992))
- Short-term debt rollover problems (Diamond and Dybvig (1983))

Why don't we obtain privately efficient outcomes?

- Externalities (Acharya, Pedersen, Philippon and Richardson (2010))
- Debt-overhang problem (Jensen and Meckling (1976), Myers (1977)): undercapitalized banks do not raise capital on their own

Macroprudential stress tests can help address this market failure:

- Bring capitalization of the financial sector in line with market perceptions of risk
- Restore financial sector's access to short-term funding

Why do we need macroprudential stress tests? (2/2)

Regulators assess capital requirements in "normal" times by

- attaching risk weights to different asset classes
- requiring a fraction of risk-weighted assets be funded with equity

Regulatory risk weights are, however, currently static in nature

Risks of asset classes change over time, especially in "stress" times

- changing the ability to fund assets with leverage in private markets

Stress tests could potentially help in dealing with this "risk that risks will change" (Engle (2009))

An alternative to stress tests: Vlab

We provide a test of regulatory macro stress tests by comparing their outcomes to those from a simple methodology (Vlab) that relies on publicly available market data.

The Volatility Laboratory (Vlab): vlab.stern.nyu.edu/welcome/risk/ ▸ Vlab

SRISK: the capital a firm would need to raise in the event of a crisis (Acharya et al. (2010, 2012); Brownlees and Engle (2011))

$$\begin{aligned} SRISK_{it} &= \mathrm{E}_t\left[k(Debt_{it+h} + MV_{it+h}) - MV_{it+h} | R_{mt+h} \leq -40\%\right] \\ &= kDebt_{it} - (1-k)(1-LRMES_{it}) * MV_{it} \end{aligned}$$

where MV_{it} is the market value of equity of the bank, $LRMES_{it}$ is its long-run marginal expected shortfall, and k is the prudential capital ratio.

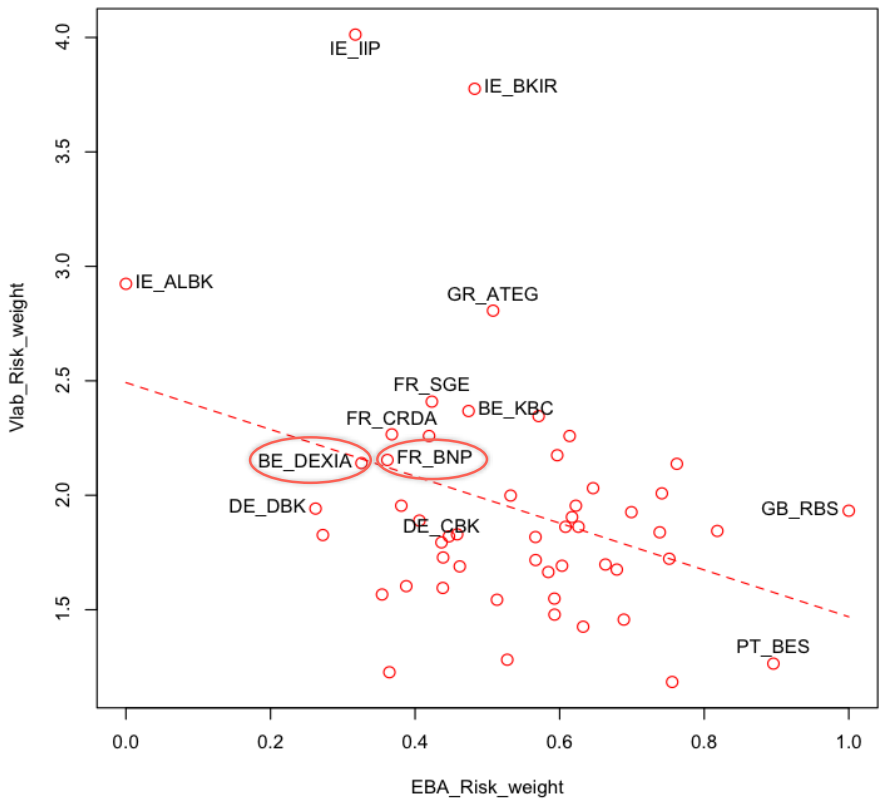
Regulatory risk weight vs. market risk weight (EBA 2011)

Stressed regulatory risk weight $= RWA_S / TA_S$

Vlab RWA: $SRISK \leq 0 \Leftrightarrow MV \geq \frac{k}{1-(1-k)LRMES} TA$ (Acharya, Engle and Richardson (2012))

Vlab risk weight $= (1-(1-k)LRMES)^{-1}$ (rank correlation: -0.238)

Dexia and BNP: below 25% quantile of RWA_S / TA_S, above the 75% quantile of Vlab risk weight distribution



Stress tests vs. Vlab losses: rank correlations

- Vlab MV loss = $LRMES * MV$
- Stress test "Total Loss" is the projected loss over the stress scenario horizon
- Stress test "Total Net Loss" = *Projected Loss* – *Projected Revenue*
- Loan losses and trading losses are the most important sources of losses (85% in the CCAR 2012)

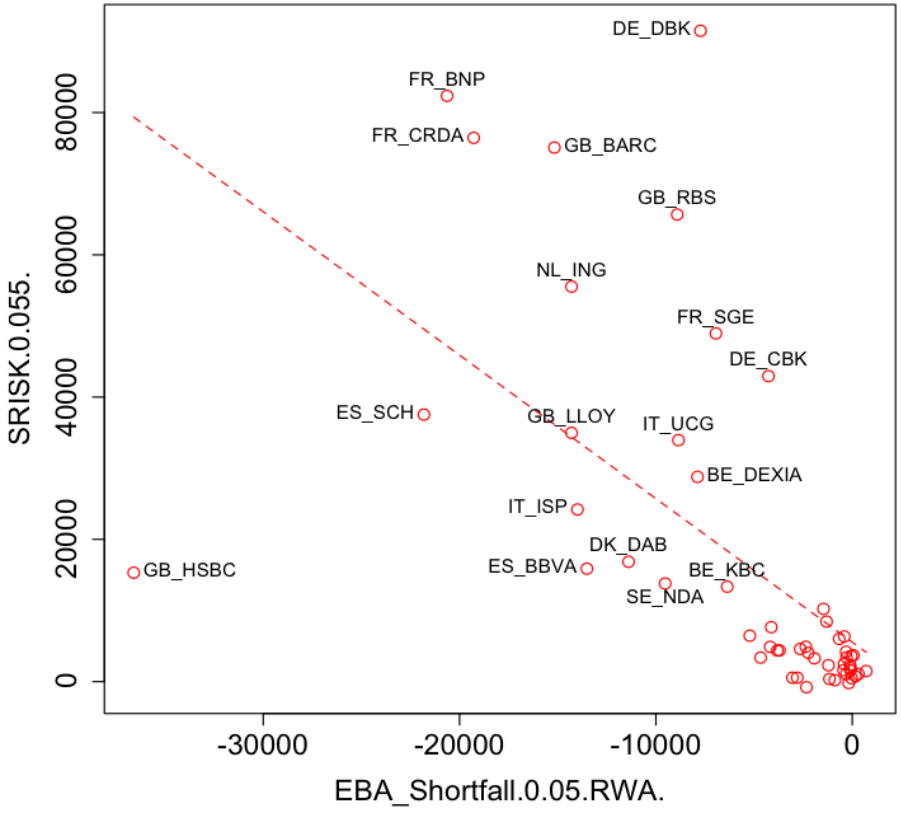
Panel A: Rank correlations with Vlab MV loss

Stress tests losses	SCAP 2009	CCAR 2012	CCAR 2013	CEBS 2010	EBA 2011
Loan losses	0.580*	0.555*	0.662**	0.837**	0.751**
Trading losses	0.477*	0.660**	0.589*	0.731**	0.694**
Total Loss	0.682**	0.851**	0.842**	0.830**	0.760**
Total Net Loss	0.280	0.604**	0.507*	-0.296*	-0.476**

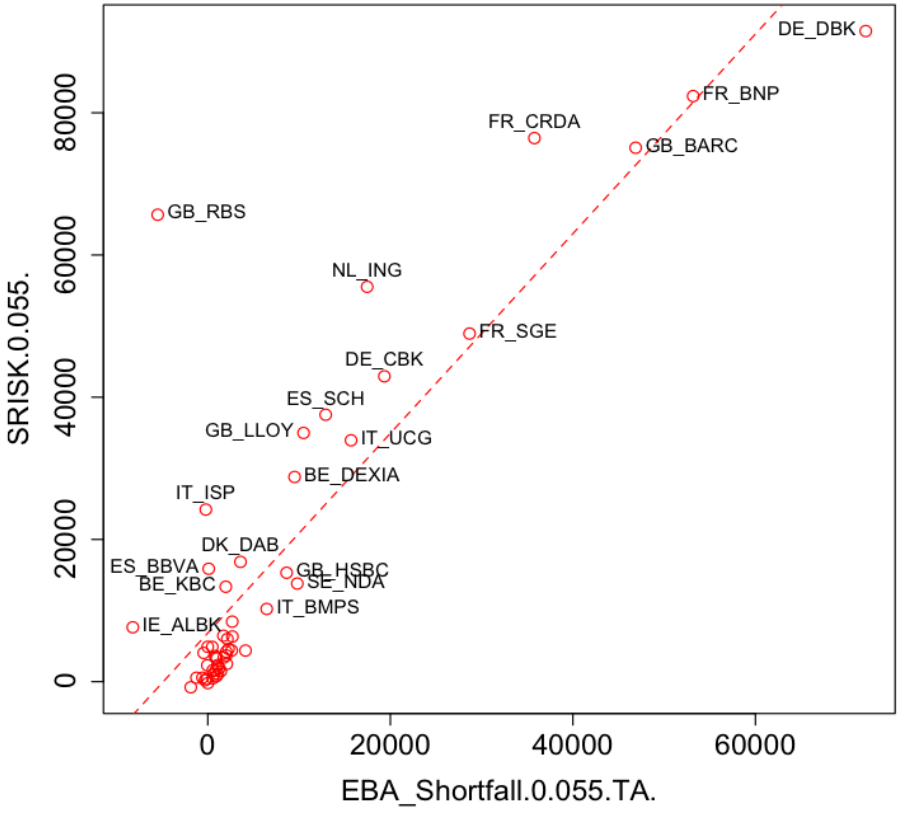
* Significant parameter at 5%; ** at 1%.

Risk-based capital vs. leverage-based capital shortfall (EBA 2011)

Risk-based shortfall
$k' * RWA_S - Capital_S$
(correlation with SRISK: -0.790)
Total shortfall (53 banks): 1.2 EUR bn



Leverage-based shortfall
$k * TA_S - Capital_S$
(correlation with SRISK: 0.679)
Total shortfall: 390 EUR bn



Benchmarking the European Central Bank's Asset Quality Review and Stress Test (2014)

A Tale of Two Leverage Ratios

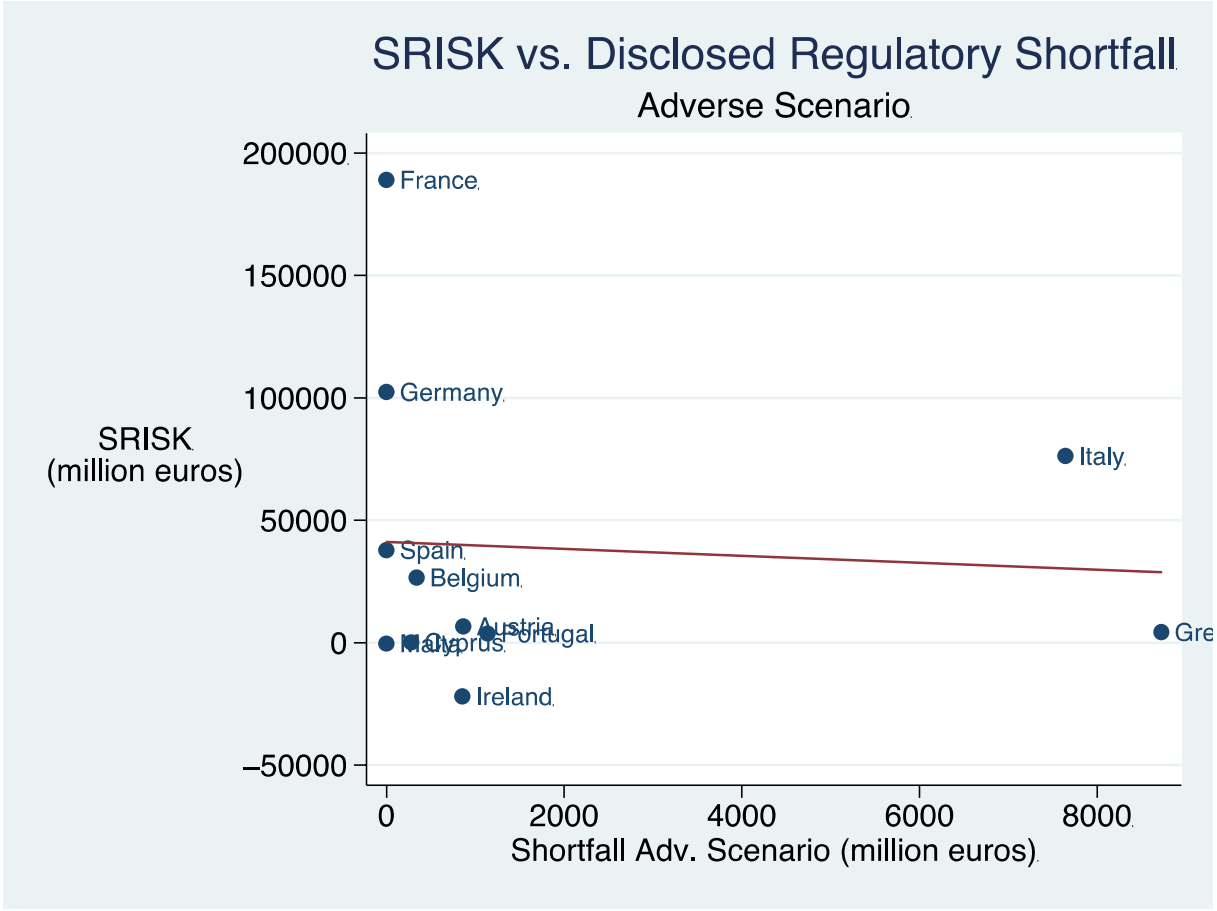
Viral V Acharya and Sascha Steffen, Dec 2014

SRISK suggests that shortfalls are 20 times higher than regulatory shortfalls

Country	Market Equity/Assets	Market-to-Book	RWA/Assets	MarketCap	SRISK	ECB Shortfall Adverse Scenario
France	3.23%	0.68	0.26	127,696	189,042	0
Germany	2.19%	0.61	0.23	50,570	102,406	0
Italy	4.29%	0.61	0.48	83,000	76,287	7,640
Spain	7.05%	1.00	0.48	146,082	37,914	0
Belgium	6.89%	1.18	0.31	17,305	26,616	339
Austria	5.31%	0.72	0.49	11,453	6,677	865
Greece	8.26%	0.95	0.58	26,945	4,360	8,721
Portugal	4.03%	0.91	0.51	4,978	3,821	1,137
Ireland	6.11%	0.98	0.43	9,816	3,053	855
Cyprus	3.75%	0.57	0.69	229	167	277
Malta	11.97%	1.58	0.49	1,557	0	0
Slovakia	9.20%	0.70	0.59	964	0	0
Total	**4.27%**	**0.75**	**0.35**	**539,083**	**450,343**	**19,834**

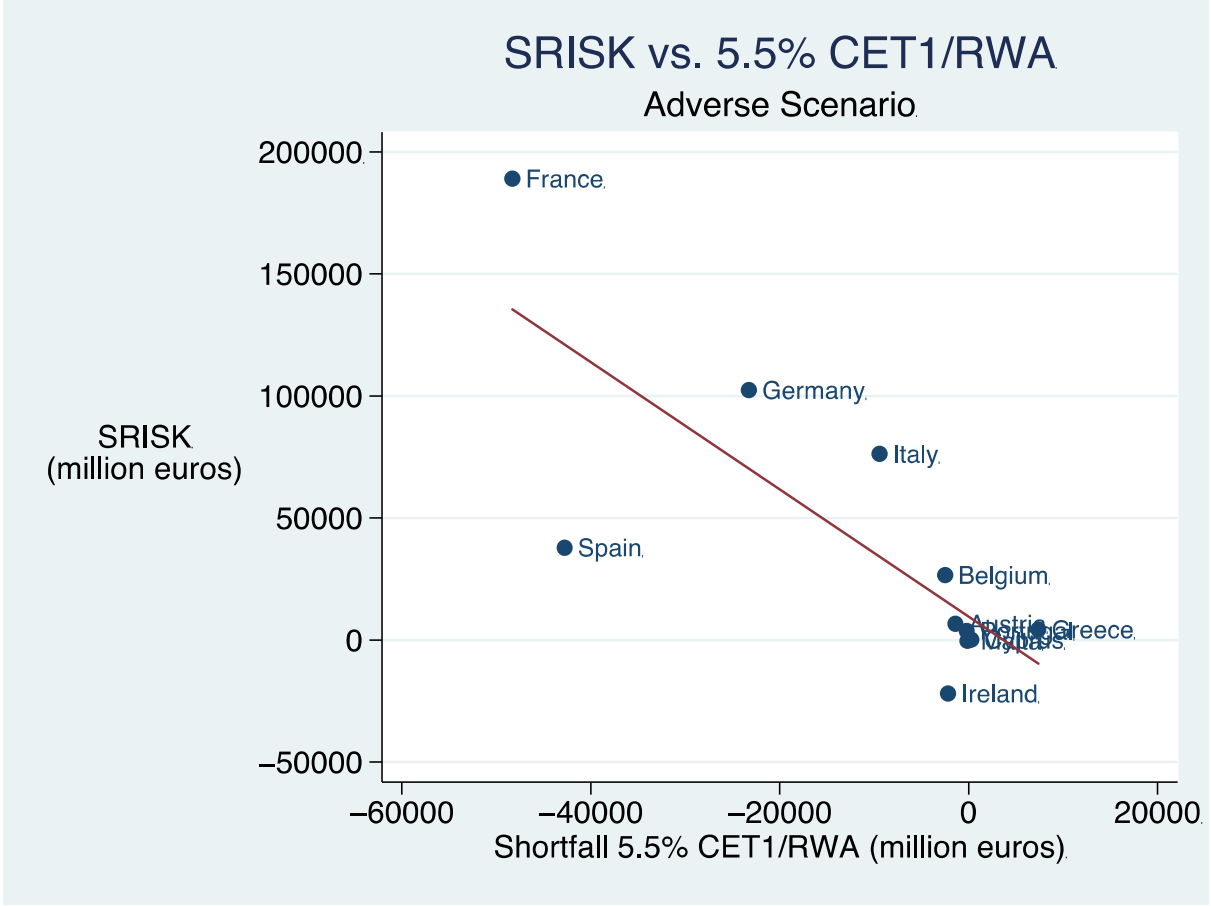
- Magnitude is a function of assumption about size of shock and LVG ratio
- Banks with high SRISK have low MTB and RWA/TA.

SRISK versus disclosed regulatory shortfall suggests even a somewhat negative correlation



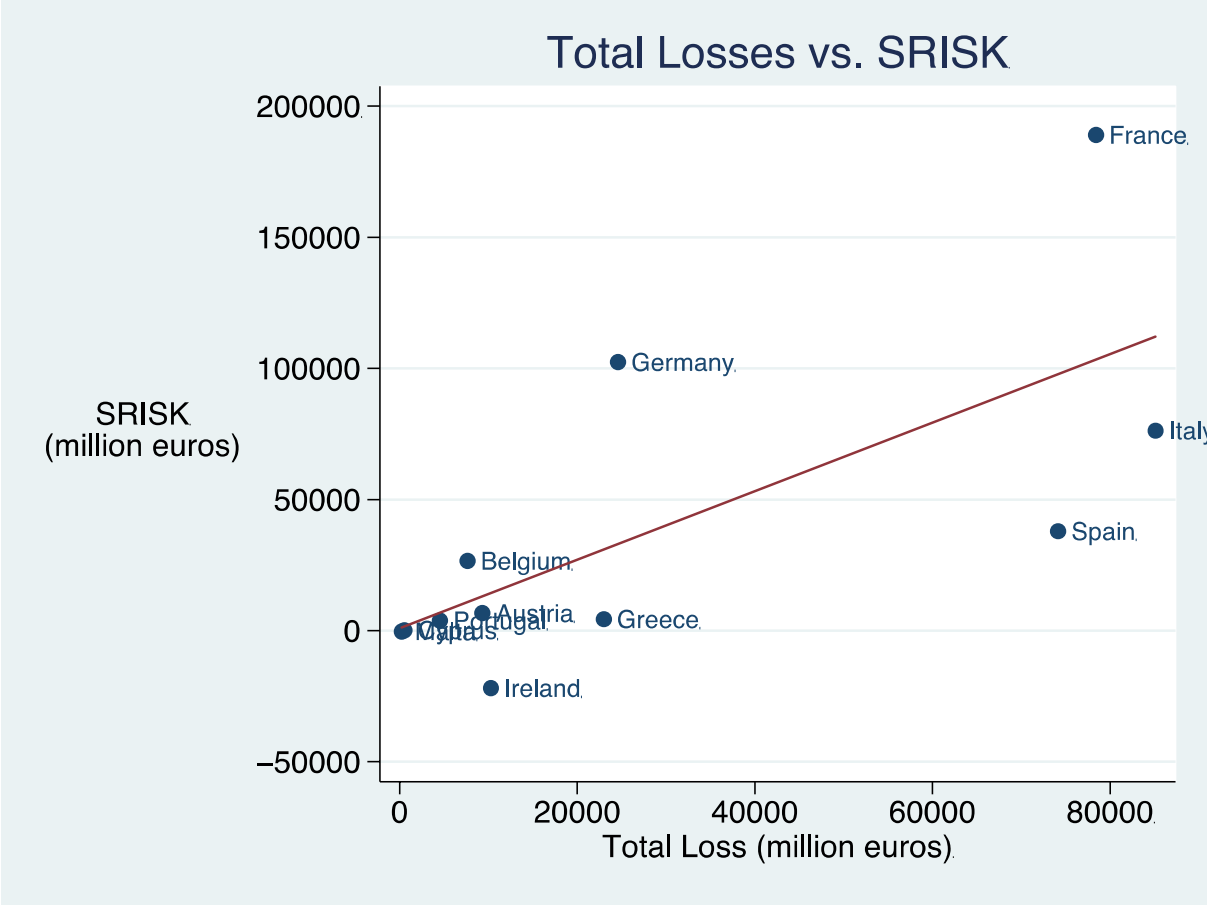
- Regulatory capital shortfall = **max[0, 5.5% x RWA – CET1]**

SRISK versus un-truncated regulatory shortfall suggests even significant negative correlation



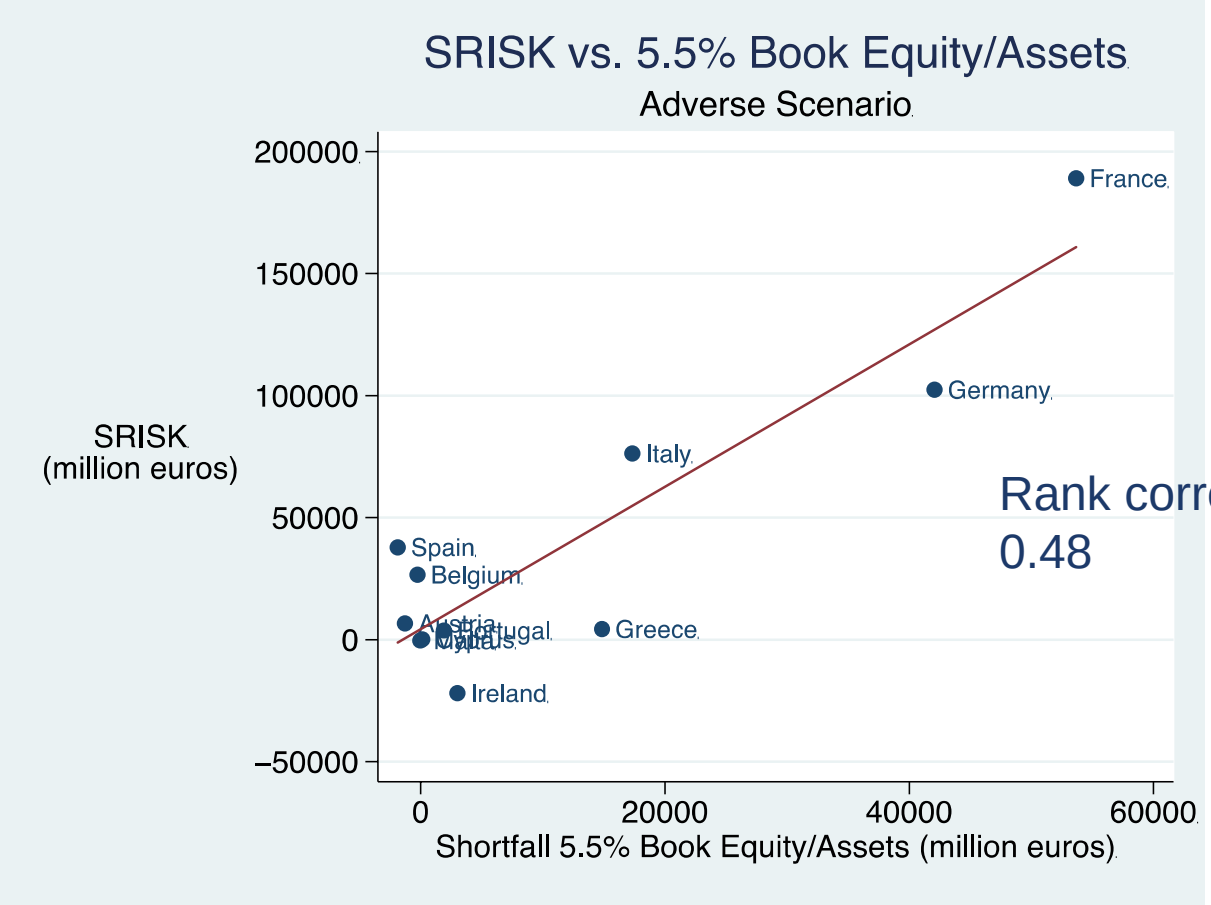
- *Un-truncated* regulatory capital shortfall = **5.5% x RWA – CET1**
- Rank correlation -0.77

SRISK is *positively* correlated with total losses in the banking and trading book in the adverse scenario



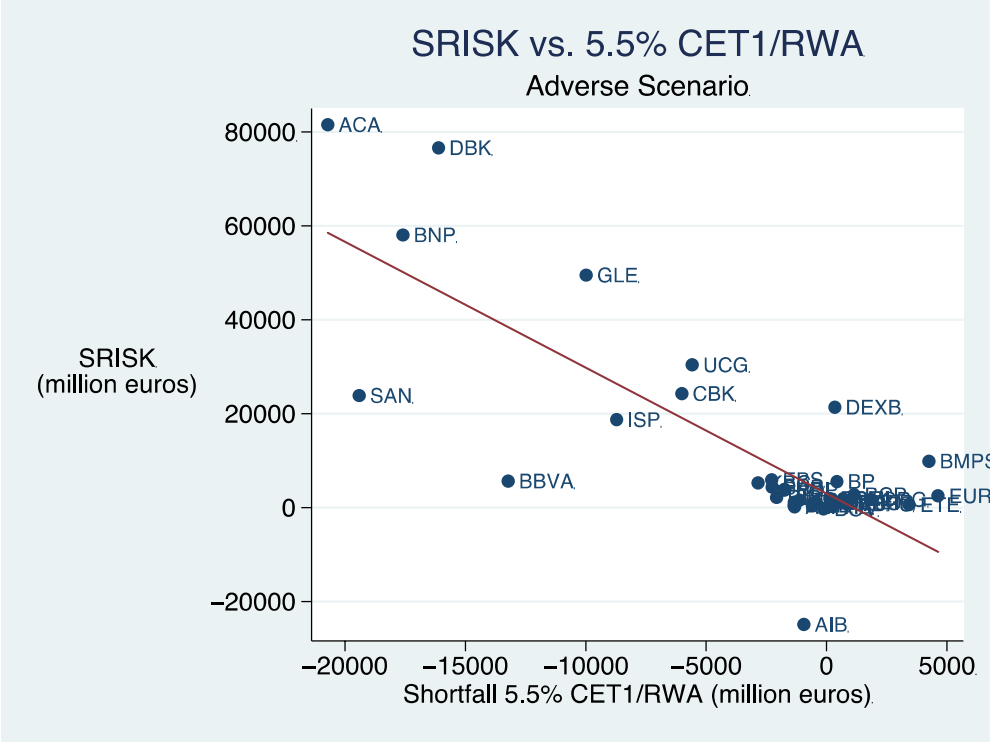
- It is not losses driving negative correlation but specification of prudential capital requirement

SRISK highly correlated with Book Equity shortfall after applying losses in adverse scenario

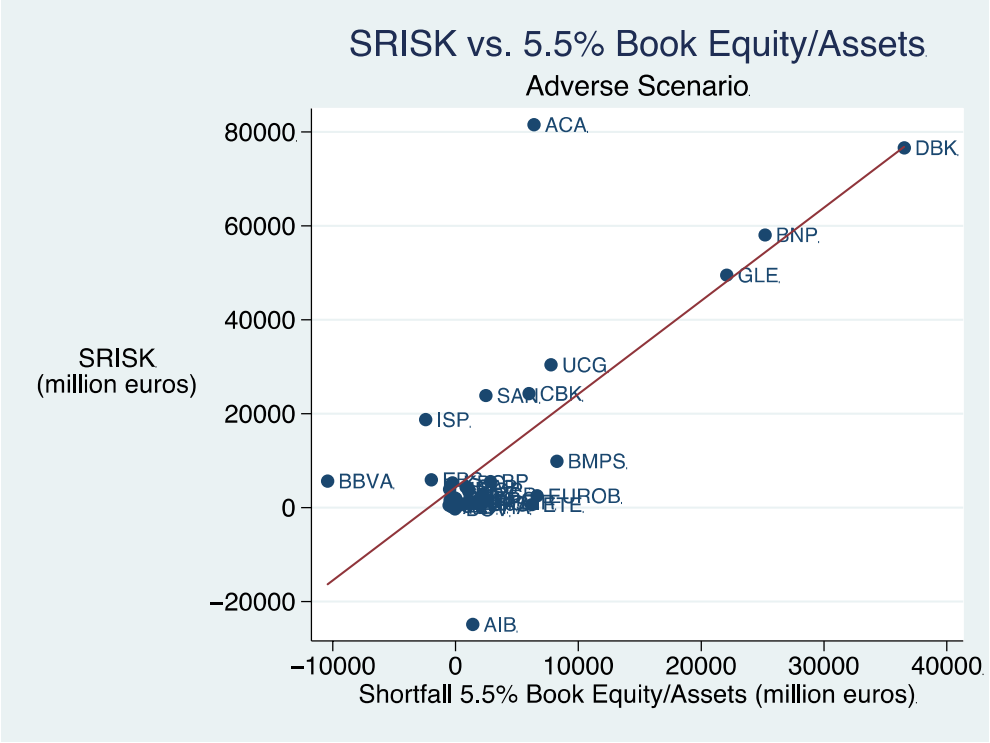


- Book capital shortfall = **5.5% x TA – Book Equity**
- Total shortfall: €129 billion (only public banks!)

Bank-level shortfall estimates strikingly show the effect of risk-weighting



Rank Correlation: -0.57



Rank Correlation: 0.38

Conclusion

- Vlab and stress tests *projected losses* are well correlated & both predict well the actual realized losses during the European sovereign debt crisis.
- The *required capitalization* in stress tests is found to be inadequate ex post (especially in Europe), compared to SRISK.
- This discrepancy arises due to the reliance on *regulatory risk weights*.

Static regulatory risk weights are flawed and provide perverse incentives to build exposures to low-risk weight asset categories (Acharya and Steffen (2013)).

Recommendations:

- complement the assessment of banks and system risks with market measures of risk
- use multiple ratios in bank capital requirements to reduce regulatory arbitrage (e.g. T1CR *and* T1 LVGR)