

Testing Macroprudential Stress Tests: The Risk of Regulatory Risk Weights

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Recent Concerns on Macro Stress Tests

Macroprudential stress tests: part of the macroprudential toolkit (Greenlaw et al. (2012))

Concerns on macro stress tests:

- Stress tests remain microprudential (Greenlaw et al. (2012))
- Basel risk regulation (capital ratios)
 - Capital ratios are not a binding constraint (Hanson et al. (2011))
 - Regulatory risk weights are inconsistent (Basel Committee on Banking Supervision (2013); Haldane (2011, 2012))

An alternative to stress tests: Vlab

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

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

$$\begin{aligned}SRISK &= E[k(Debt + MV) - MV | crisis] \\ &= kDebt - (1 - k)(1 - LRMES) * MV\end{aligned}$$

where MV is the market value of equity of the bank, $LRMES$ is its long-run marginal expected shortfall, and k is the prudential capital ratio.

Testing Macro Stress Tests against 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.

- 1 Vlab and stress tests *projected losses* are well correlated & both predict well the actual realized losses during the European sovereign debt crisis.
- 2 The *required capitalization* in stress tests is found to be rather low, and inadequate ex post, compared to that implied by market data (Vlab).
- 3 This discrepancy arises due to the reliance on *regulatory risk weights*.

The Risk of Regulatory Risk Weights

Static regulatory risk weights are flawed

- Actual and stressed regulatory risk weights have no link with the realized risk of banks during a crisis
- Regulatory risk weights are informative only when we control for other more important risk factors (leverage ratio, market risk)
- Provide perverse incentives to build exposures to low-risk weight asset categories (see Acharya and Steffen (2013) for empirical evidence)

- 1 Testing stressed losses
- 2 Testing stressed capital shortfalls

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Stress tests vs. Vlab losses

- Vlab MV loss = $LRMES * MV$
- Stress test “Loss” is the projected loss over the stress scenario horizon
- Stress test “Net Loss” = $\max(0, \text{Projected Loss} - \text{Projected Revenue})$

		Stress tests estimates		Vlab estimates
US	Sample	Loss	Net loss	MV loss
SCAP 2009	18 US BHCs	590 \$ bn	229 \$ bn	438 \$ bn
CCAR 2012	18 US BHCs	529 \$ bn	226 \$ bn	447 \$ bn
CCAR 2013	17 US BHCs	457 \$ bn	197 \$ bn	525 \$ bn
EU	Sample	Loss	Net loss	MV loss
CEBS 2010	50 EU banks	425 € bn	39 € bn	399 € bn
EBA 2011	53 EU banks	381 € bn	70 € bn	402 € bn

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%.

Forecasting losses during the European sovereign debt crisis (EBA 2011)

$$\text{Realized loss}_{i,t,W} = -MV_{it} * \sum_{t+1}^{t+1+W} \ln(p_{it}/p_{it-1})$$

where $t = 06/30/2011$ and $W = 130$ (six months).

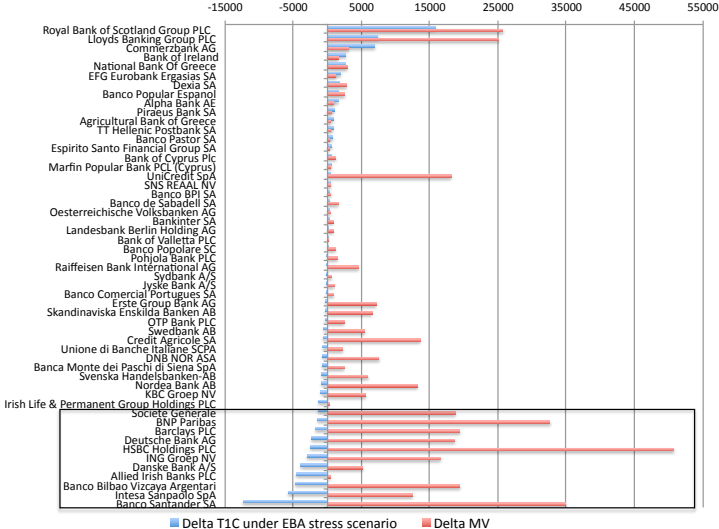
Panel A: Rank correlations with the 6-month realized EUR loss

	Estimated losses	Large	Small	All	RMSE
Vlab	MV loss	0.293 (0.289)	0.610 (0.000)	0.832 (0.000)	5086
EBA	Total Loss	0.557 (0.000)	0.527 (0.000)	0.803 (0.000)	4945
EBA	Total Net Loss	0.329 (0.232)	-0.100 (0.549)	-0.272 (0.048)	11202

P-values in parentheses.

EBA capital increase under stress (EBA 2011)

The projected profits under the EBA stress scenario lead to increasing Tier 1 capital levels for many SRISK top banks



Outline

- 1 Testing stressed losses
- 2 Testing stressed capital shortfalls

Stress tests capital shortfalls vs. SRISK

$$Vlab \text{ SRISK} = kDebt - (1 - k)(1 - LRMES) * MV$$

$$\text{Stress test disclosed capital shortfall} = \max(0, [k' * RWA_S - Capital_S])$$

		Stress tests estimates	Vlab estimates
US	Sample	Shortfall	SRISK
SCAP 2009	18 US BHCs	63.1 \$ bn (9)	674 \$ bn (18)
EU	Sample	Shortfall	SRISK
CEBS 2010	50 EU banks	0.2 EUR bn (1)	796 EUR bn (48)
EBA 2011	53 EU banks	1.2 EUR bn (4)	886 EUR bn (51)
EBA Capital Exercise	44 EU banks	72 EUR bn (22)	1059 EUR bn (42)

In parentheses: number of banks with capital shortfall > 0 under stress.

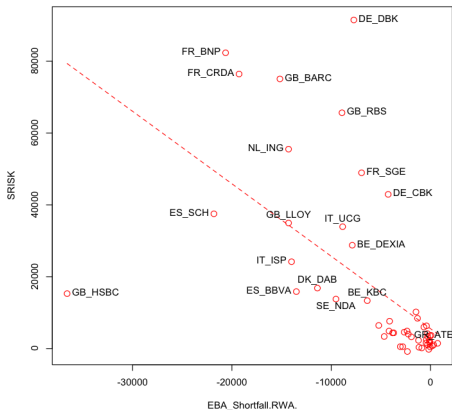
Risk-based capital vs. leverage-based capital shortfall (EBA 2011)

Risk-based shortfall

$$k' * RWA_S - Capital_S$$

(correlation with SRISK: -0.790)

Total shortfall (53 banks): 1.2 EUR bn

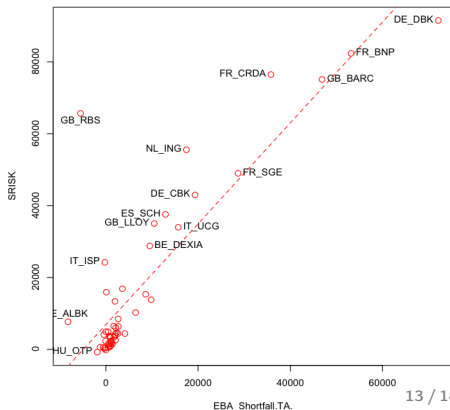


Leverage-based shortfall

$$k * TA_S - Capital_S$$

(correlation with SRISK: 0.679)

Total shortfall: 372 EUR bn



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 rather low, and 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
- if not, a capital requirement based on the size and leverage of banks delivers more consistent results (Basel III T1 leverage ratio)

Stress tests with bank-level disclosure

	Disclosure	Institutions	Tier 1 Capital	Scenario horizon
SCAP 2009	May 2009	19 US BHCs	837 \$ bn	2009 - 2010
CCAR 2012	March 2012	19 US BHCs	907 \$ bn	Q4 2011 - Q4 2013
CCAR 2013	March 2013	18 US BHCs		Q4 2012 - Q4 2014
CEBS 2010	July 2010	91 banks, 65% of EU-27 assets	1162 € bn	2010 - 2011
EBA 2011	July 2011	90 banks, 65% of EU-27 assets	1218 € bn	2011 - 2012
EBA Capital Exercise	Dec 2011	65 banks, excl. Greek banks	1190 € bn	no scenario

Regulatory capital ratios

Numerator: different qualities of capital based on Basel requirements

- **Tier 1 Common (Core) Capital (T1C)**
- **Tier 1 Capital (T1)**
- **Total Capital** = T1 + T2 + (additional T3 for market risk)

Denominator: **Total Assets** or **Risk-Weighted Assets (RWA)**

Regulatory ratios in the US:

- Tier 1 Common Capital ratio = $T1C/RWA$ (5%)
- Tier 1 Capital ratio = $T1/RWA$ (4%)
- Total risk-based capital ratio = $Total\ Capital/RWA$ (8%)
- Tier 1 Leverage ratio = $T1/Total\ assets$ (3-4%)

Regulatory ratio in the EU: Core Tier 1 capital ratio = $T1C/RWA$ (5%)

P&L and balance sheet assumptions (EBA 2011)

Some banks are making profits during the EBA stress scenario

- EBA stress scenario is a deviation of the baseline scenario
- The net interest income is increasing for some banks due to higher interest rates
- Directional market risk stress test: “depending upon the size and direction of their exposures, banks may make gains on certain portfolios”

Balance sheet evolution assumption

- static in SCAP and EBA
- dynamic in CCAR