



Assessing financial stability – A toolkit including stress testing

FSI Seminar on Financial Stability and Stress Testing

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Basel, 6 May 2014

Disclaimer: The views expressed in this talk are my own and do not necessarily correspond to the views of the BIS/BCBS

Agenda

1. Macroprudential tools used to support financial stability
 - A brief overview on the concept
 - How to use them?
2. Concept of stress testing: Bottom-up versus top-down, macro and micro stress testing
3. Use of stress testing in assessing financial stability



1 How to assess financial stability? (1)

- Broad perspective: **Macroprudential policy** is used to achieve the stability of the (financial) system as a whole, ie directed at mitigating systemic risk (ie ultimately the loss of GDP / fiscal costs)
- The notion "macroprudential" is not new, but goes back to the 1970s (Cooke Committee)
- After the crisis "macroprudential" became a buzzword - Borio (2010) "We are all macroprudentialists now" (Paraphrasing Milton Friedman)
- **Tangible goals of good macroprudential policies:**
 - Detecting both the slow build-up and the sudden materialization in systemic risk (IMF, 2012)

1 How to assess financial stability? (2)

- **Major challenge is how to operationalise MaPPs**, and has been subject to recent efforts, e.g.:
 - IMF
 - Towards Operationalizing Macroprudential Policies (GFSR, 2012)
 - Key Aspects of Macroprudential Policy (Board Paper, 2013))
 - BIS
 - Work building upon Borio (2003)
 - CGFS: Operationalising the selection and application of macroprudential instruments (2010, 2012)



1 How to assess financial stability? (3)

- MaPP tools are used to detect risks in:
 - **Financial Sector (focus of this seminar)**
 - **Solvency**
 - **Liquidity**
 - **Contagion**
 - Financial Markets
 - External Sector
 - Real Sector
 - Corporate Sector
 - Household Sector

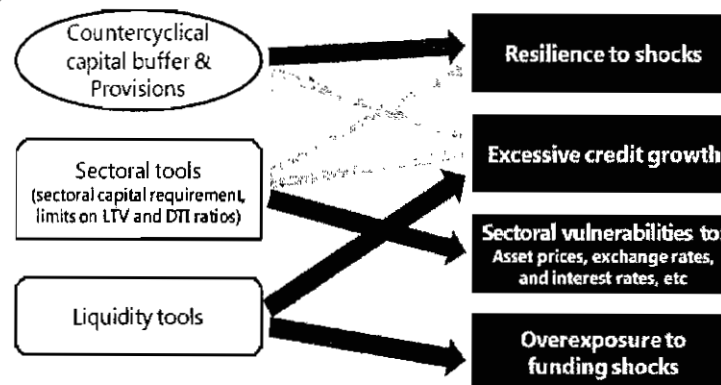
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See Gadanez and Jararam (2009), IFC Bulletin no. 31, for example.

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2 How to act? (1)

In the *time dimension*, a range of complementary tools can contain the build-up of systemic vulnerabilities.



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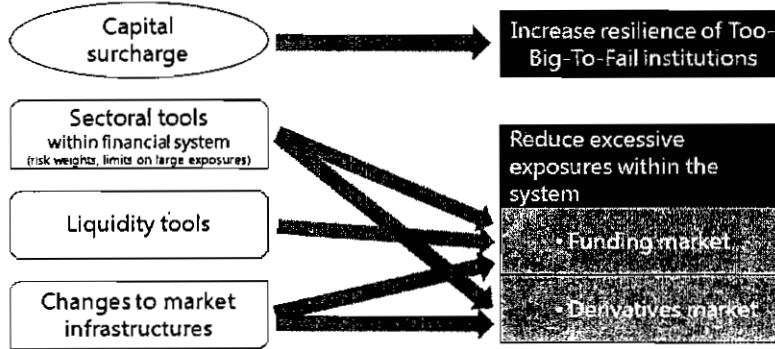
Source: IMF

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2 How to act? (2)

In the *structural dimension*, a range of tools can contain risks from interconnectedness within the financial system.



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Source: IMF

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2 How to act? (3)

Effective arrangement should provide for

1. Effective identification, analysis, and monitoring of systemic risk

- Access to relevant information
- Using existing resources and expertise
- Challenging dominant views

2. Timely and proper use of macroprudential policy tools

- Strong mandate and accountability
- Incentive and willingness to act
- Ability to acquire new power and tools

3. Active coordination across policies aiming to address systemic risk

- Avoid concentration of power
- Coordination across different policies
- Preserving autonomy of separate policy functions

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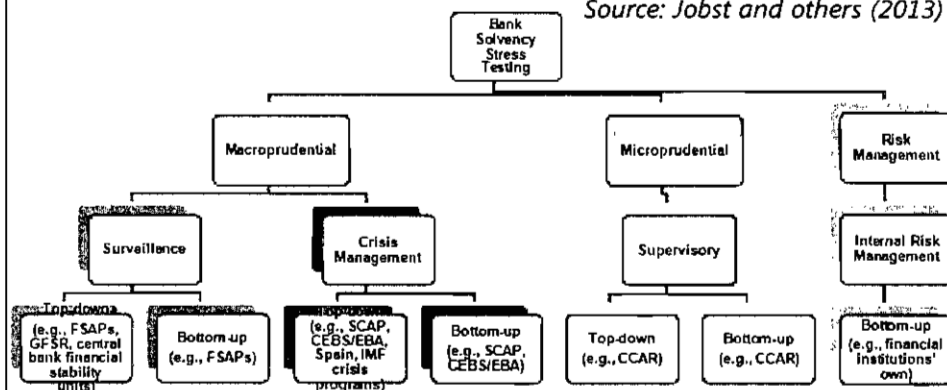


3 Stress testing: concept and use

- Two main dimensions:
 - **Purpose of stress test**
 - Microprudential: Analysis of resilience of single banks from a regulatory (Basel II/III) and/or economic perspective (ICAAP, etc)
 - Macroprudential: Analysis of resilience of financial system
 - **Mode of analysis**
 - Top down: Stress tests (usually) run by authorities, based on a common scenario
 - Bottom up: Stress test (usually) run by banks, aggregated by authorities

3 Use of stress tests: Overview

Source: Jobst and others (2013)



Note: STs are "only" one element of the Financial stability analysis toolbox



3 Micro- or macroprudential?

- Microprudential stress testing:
 - Pros: *Narrow but (very) detailed* perspective within a bank (ie asset by asset level considerations of the impact)
 - Cons: Usually less rich (ad hoc) scenario definition, systemic effects not captured
- Macroprudential stress testing:
 - Pros: *holistic approach* for a group of systemically large banks, or by jurisdiction for the banking/financial system; explicit or implicit focus on big picture and systemic effects (eg, contagion, feedback loops)
 - Cons: Usually not as granular as microprudential tests (*ie some simplification required*)

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3 Top-down or bottom up?

- Pros and Cons of top-down (TD) and bottom-up (BU) stress tests *at the example of liquidity risk*

Type of Test	Pros	Cons
BU test (run by banks)	Cash flow level data, use of models developed by banks, P&L effects of liquidity shocks and cost of funding shocks can be incorporated more easily.	Less consistent than TD
TD tests (run by authorities)	Consistent approach, authority is flexible to run various scenarios, transparency of situation to authority	Less detailed data, bank-specific situation less recognized; data are outdated rapidly, which can be prevented by a high, but burdensome frequency of reporting

Source: Schrieder and others (2012)

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3 How to run good stress tests?

- Key precondition for success: stress tests have to be well-defined
 - Stress testers have to have a good idea of object to be stressed (i.e. banks or systems)
 - Use of appropriate framework (concept)
 - Use of meaningful ("plausible") scenarios (baseline-type; tail risk)
 - The "right" way of communication
- *Bottom line: Stress test is as strong as its weakest link*
- ... note that there will also be limitations, eg data availability, etc

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3 "Prominent" Solvency Stress Tests

Test	US 2009 (SCAP)	EU 2010	EU 2011	US 2013 (CCAR)
Number of banks	19 (>60% of assets)	91 (65% of assets)	90	18
Projection horizon	2 years (till end 2010)	2 years (till end 2011)	2 years (till end 2012)	3 years (till end 2014)
Pass rate	4% Common Equity Tier 1	6% Tier 1	5% Core Tier 1	5% Common Equity Tier 1
Scenario (vs. baseline)	Cumulative drop of GDP by 3ppts	Cumulative drop of GDP by 3ppts	Cumulative drop of GDP by 4ppts	Cumulative drop of GDP by 5ppts
Outcome	9, capital shortfall: \$75 bn	7 banks failed, capital needs: EUR 3.5bn	8 banks, EUR 2.5bn shortfall (20 banks, EUR 27bn w/o capital increase)	1 bank did not pass, another one passes with capital action

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Source: US Fed, EBA

Upcoming 2014 EU Stress Test

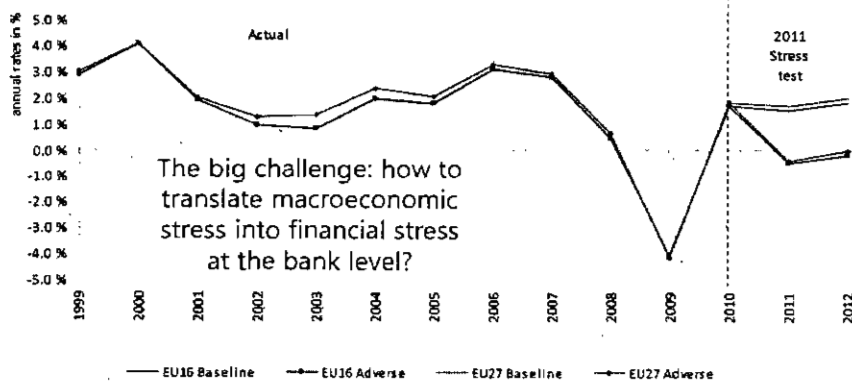


3 Scenario design

- Scenario specification: Which elements (parameters, etc.) should one focus on? What are the main risks of a system/bank?
- Scenario design:
 - How to define meaningful scenarios ("extreme yet plausible")?
 - What do the scenarios really tell me about the risks?
- Actual computation: How to translate a scenario into risk? Which methods/concepts?
- Outcome: What to do with the outcome to have an impact (provided that there are risks)?

3 EBA Stress Test 2011: Scenario

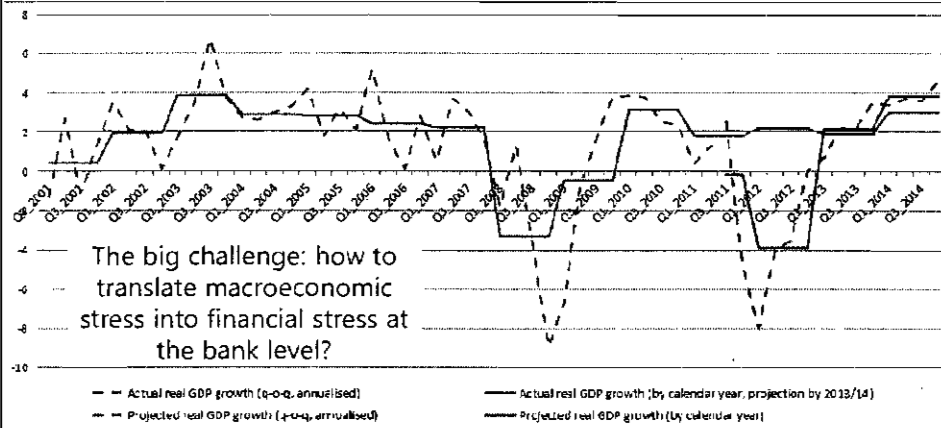
Chart 1. Real GDP growth for EU27 and euro area under the baseline and adverse scenarios in comparison to historical developments





3 US Stress Test 2013 (CCAR): Scenario

Macroeconomic shock scenario (real GDP growth)



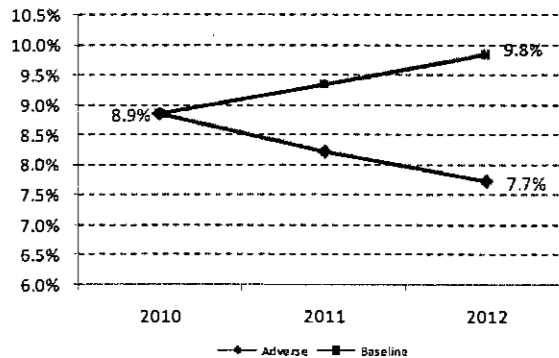
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Source: US Fed, 2013 Comprehensive Capital Analysis and Review

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3 Outcome of 2011 EBA Stress Tests (1)

Chart 5 The evolution of CT1 ratios under the baseline and adverse scenarios shows a 210bp drop



Note: Without capital action CT1 would drop to 7%, ie close to 2ppts from the initial level

GDP semi-elasticity of capital ratio: ~0.5 (ie cumulative drop of GDP by 4 ppts compared to the baseline leads to a drop of capital ratios by about 2 ppts (Hardy/Schmieder, 2013)

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Source: EBA

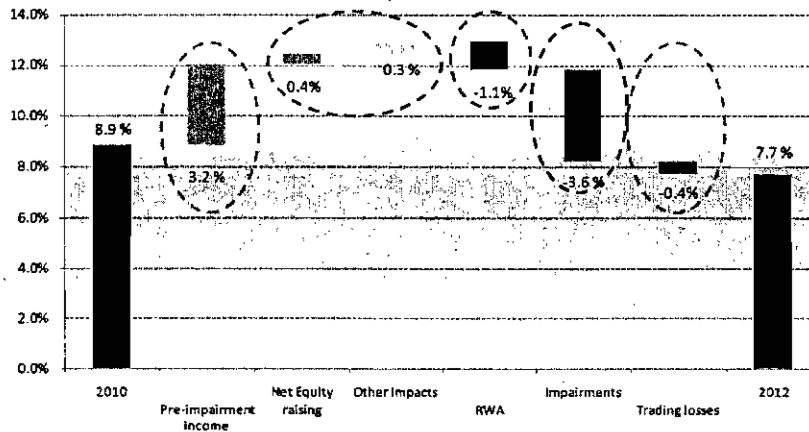
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3 Outcome of 2011 EBA Stress Tests (2)

Chart 6 Core Tier 1 ratio evolution

Pre-impairment income (impact on numerator)
 Credit Losses (numerator, denominator)
 Risk-weighted assets (RWA) (denominator)

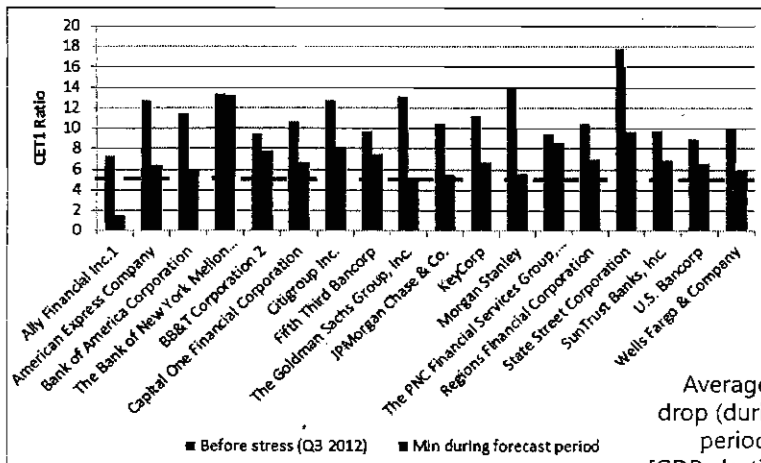


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Source: EBA, 2011 EU-wide stress testing results

3 Outcome of 2013 US CCAR

Common Equity Tier 1 ratio of the 18 CCAR bank holding companies



Average maximum drop (during projection period): 4.3ppts
 [GDP elasticity: 0.65 (with drop of output by 6 ppts)]

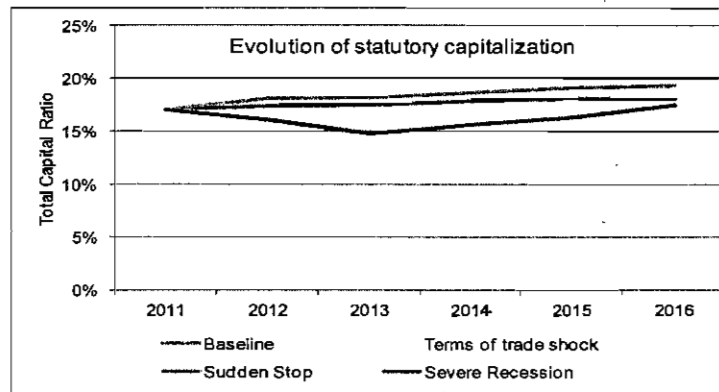
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Source: US Fed, 2013 Comprehensive Capital Analysis and Review



3 Outcome of an FSAP stress test (1)

Solvency stress test for Brazil (Standardised Approach)



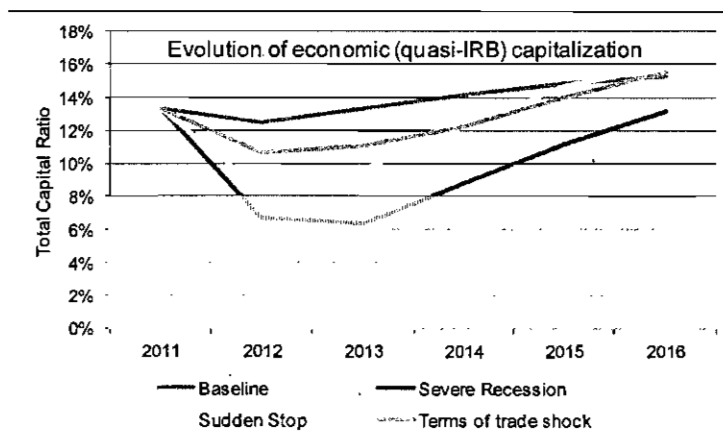
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Source: IMF, Brazil FSAP, Technical Note on Stress Testing

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3 Outcome of an FSAP stress test (2)

Solvency stress test for Brazil: implied outcome for IRB



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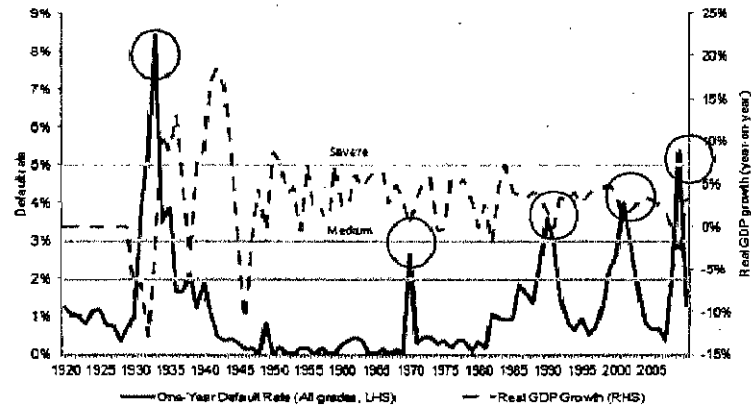
Source: IMF, Brazil FSAP, Technical Note on Stress Testing

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3 Long-term view: Data matters

- Annual default rates for the universe of names rated by Moody's



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Source: Hardy and Schmieder (2013), based on Moody's and US Fed

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3 Challenges for Liquidity Stress Tests

- Liquidity risk is a low frequency / high impact risk
- Each crisis is different & highly institution specific
 - Probabilistic approach based on historical frequencies not feasible
- Liquidity crises are ...
 - Partly determined by psychological factors/confidence
 - Partly determined by very broad set of economic / financial conditions and individual bank characteristics
- Externalities can be substantial

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3 Benchmark Scenarios (note caveats)

Scenario	Moderate Stress Scenario	Medium Stress Scenario	Severe Stress Scenario	Very Severe Stress Scenario
Severity (x times Lehman ¹)	0.25	0.5	1	2
Liquidity Outflows				
Customer Deposits				
Customer deposits (Term)	2.5 percent	5 percent	10 percent	20 percent
Customer deposits (Demand)	5 percent	10 percent	20 percent	40 percent
Wholesale Funding				
Short-term (secured)	5 percent	10 percent	20 percent	40 percent
Short-term (unsecured)	25 Percent	50 Percent	100 Percent	100 Percent
Contingent liabilities	0 Percent need funding	5 Percent need funding	10 Percent need funding	20 Percent need funding
Liquidity Inflows				
Haircut for Cash	0 Percent	0 Percent	0 Percent	0 Percent
Haircut for Government Securities ²	1 Percent	2 Percent	5 Percent	10 Percent
Haircut for Trading Assets ³	3 Percent	6 Percent	30 Percent	100 Percent
Proxies, specific assets	Equities: 3; Bonds: 3	Equities: 4-6; Bonds: 3-8	Equity: 10-15; Bonds (only LCR eligible ones): 5-10	Not liquid
Haircut for other securities	10 Percent	30 Percent	75 Percent	100 Percent
Proxies, specific assets	Equities: 10; Bonds: 10	Equities: 25; Bonds: 20 (some not liquid)	Equity: 30; Bonds (only LCR eligible ones): 20-30	Not liquid
Percent of liquid assets encumbered ⁴	10 Percent (or actual figure)	20 Percent (or actual figure plus 10 ppt)	30 Percent (or actual figures plus 20 ppt)	40 Percent (or actual figures plus 30 ppt)

Source: Schmieder and others (2012)

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4 Conclusion (1)

- Stress test is one key element to assess vulnerabilities to the system, but not an ultimate solution to all issues
- Financial stability analysis have to dig deeper (as in the past) to reveal upcoming risks early on, eg in the real estate sector
- Usefulness of stress tests depends on quality, which ranges widely due to challenge to run meaningful tests
- Two general types of tests: (i) scenarios close to baseline to assess capital needs and (ii) tail risk tests to assess potential worst case outcomes
- Assigning probabilities to scenarios highly challenging, which weakens many tests

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4 Conclusion (2)

- But: Best test useless if there is no strong message to be conveyed to decision-makers (senior management in banks, policy-makers in institutions) as implementing solutions requires buy-in from decision-makers and action, if needed
- Rules of thumb could be one limited contribution to these challenges (see Hardy and Schmieder, 2013)
- Challenges (this is not comprehensive!)
 - Link between solvency and liquidity, and contagion effects
 - Coming up with meaningful scenarios and their translation to bank solvency under stress (one of the contributions: Taleb et al, 2012)
 - How to bring together experts from various disciplines (stress tests tend to be as strong as the weakest element)?

(Selected) References

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