OLIVER WYMAN

Stress Testing: The Post-crisis Elixir of Regulators

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“Hindsight is a wonderful thing”

– David Beckham

“Hindsight bias makes surprises vanish”

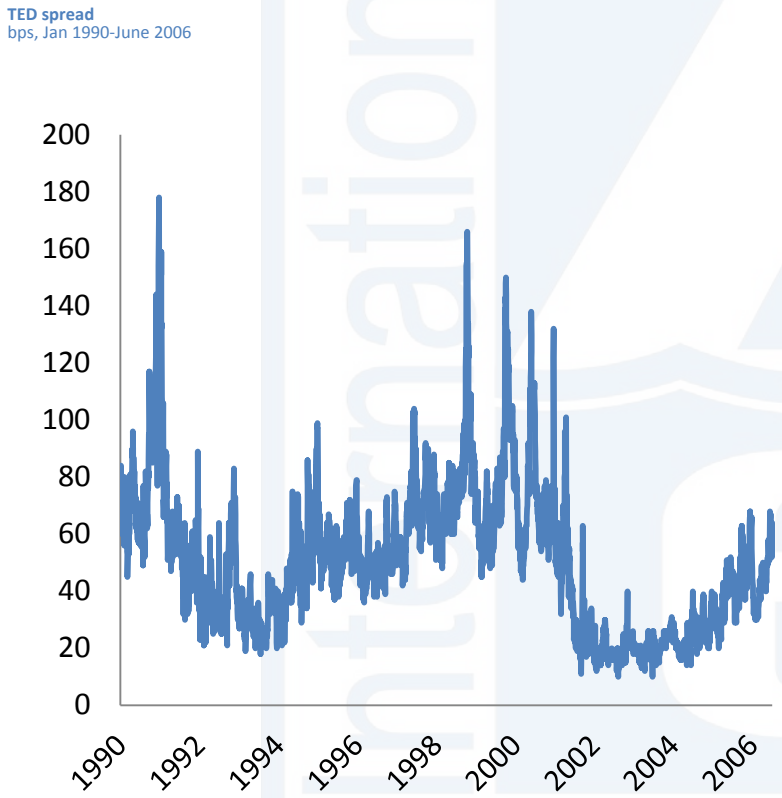
– Daniel Kahneman
(2002 Nobel Prize winner in economics; author of *Thinking Fast, Thinking Slow*)

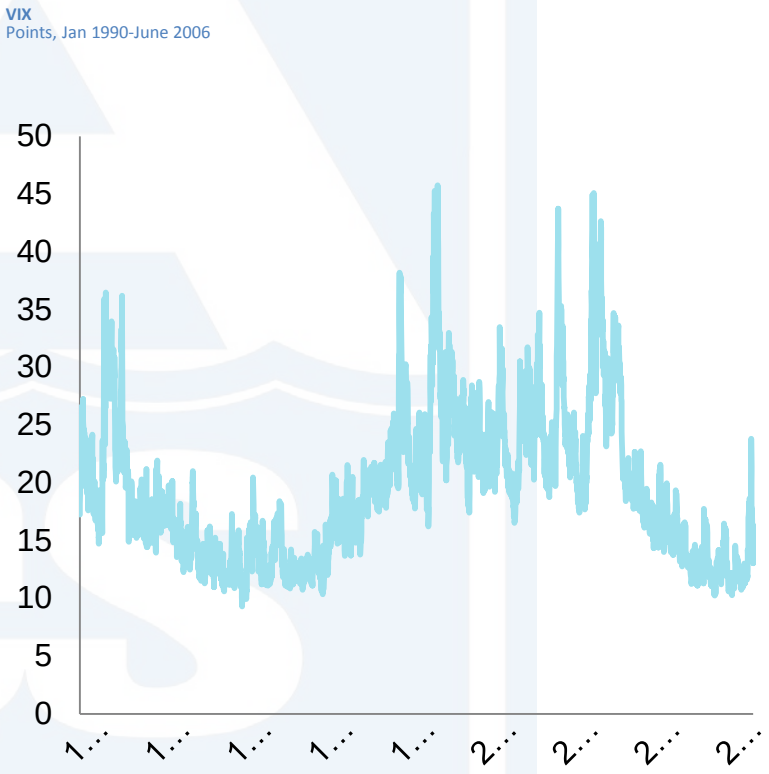
My big take-away from the crisis: it's really, really, really hard, ex ante, to predict what will, let alone what might happen

- The risk manager's perennial problem
- A consequence of the efficient market hypothesis, and a recognition that the market is the best information aggregator we have
  - Can't systematically predict returns (on average, alpha = 0)
  - … but some people are better informed than others
- Oddly, volatilities are (somewhat) predictable
  - E.g. GARCH models
  - But that is not helpful for predicting market disruptions
- These ideas have several Nobel prizes behind them
- It is hard to predict tail outcomes
  - It is really hard to predict far tails
  - It is nearly impossible to predict disruptions
    - And when one does happen, it is really hard to know if it's short or long duration

However, it doesn't seem to stop us from feeling confident about designing stress scenarios

Risk managers would frequently look towards historical precedents as an indicator for the worst case scenario stress event…





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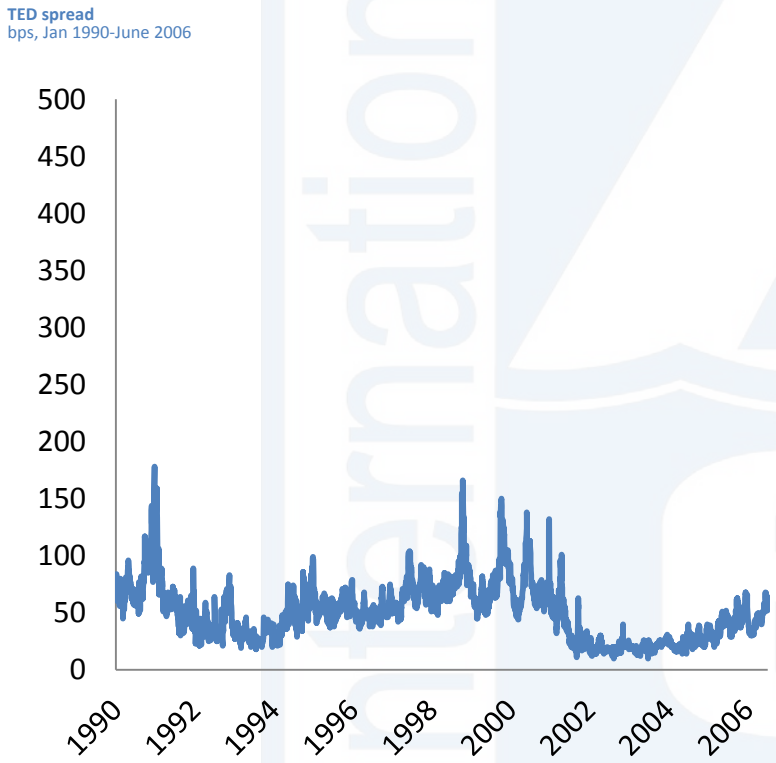
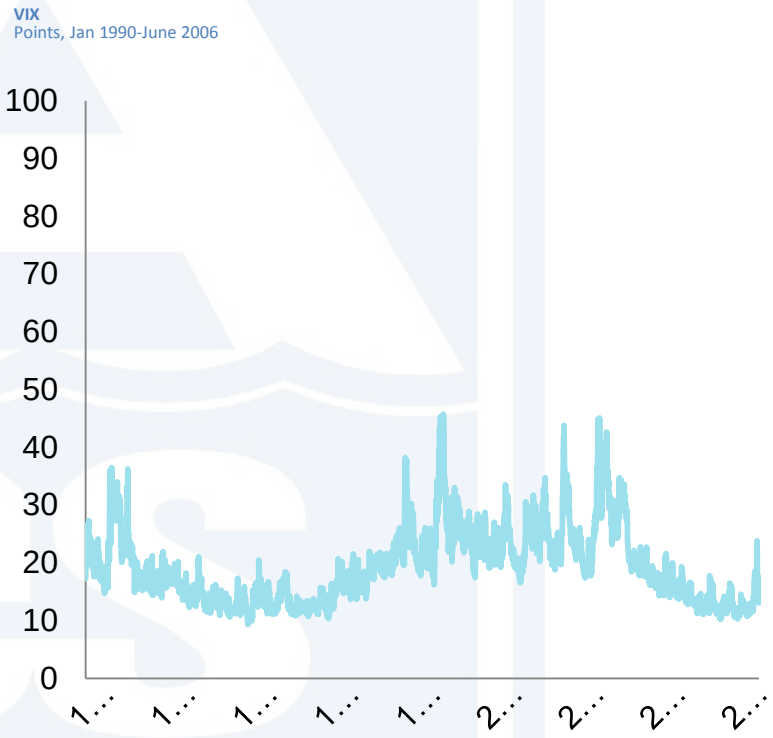
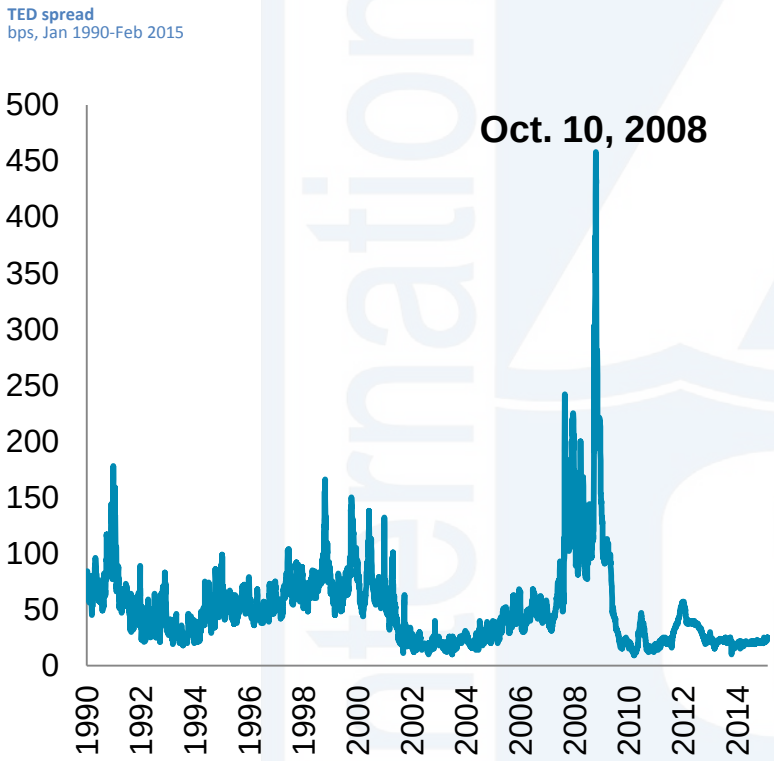
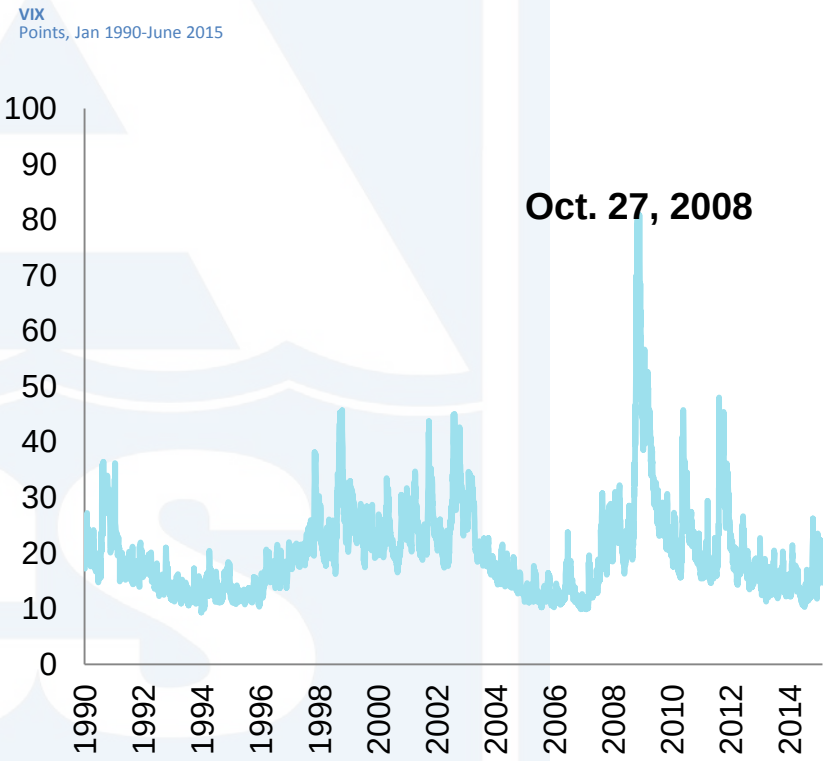




… but during the crisis many of these metrics reached unprecedented levels





All hope is not lost. Creatively designed stress test scenarios allows the regulated and the regulators to probe the tails

- Regulators
- Choice of scenario should expose and probe the vulnerabilities of the financial system
  - Of banks and other financial institutions
  - Requires close collaboration between economists and banking supervisors
- Scenario can only expose vulnerability of the "average" bank
  - Not all banks are vulnerable to the same scenario

- Banks (and other FIs)
- Choice of scenario should probe the vulnerabilities of the firm
  - Type of business
  - Products sold
  - Clients served
  - Geographies covered
- Combination of systematic risk factor exposure (housing? FX? oil?) and idiosyncratic risk (cyber; earthquake; robo advisors)
- Tied to strategic plan
  - Forces confrontation of firm's optimists with the possibility of bad outcomes

Stress testing has become a big deal in banking, on both sides of the Atlantic

- Currently, 33 US bank holding companies participate in the Fed's CCAR program
  - They represent about 80% of domestic US banking system assets
  - Together they have $14.3 TN in assets supported by $1.2 TN in common equity Tier 1
  - Total assets held by all publicly traded non-financial firms in the US is $16.7 TN*
- Banks submit several 100,000s data items and 10,000s pages of support documentation
- Post-stress, these banks had more capital than all US banks had YE 2006: $886 BN vs. $743 BN
- The EBA and ECB ran stress testing exercises for significant institutions in 2016
  - Coverage >70% of total EU banking assets
  - Banks with total assets > € 30 BN
  - 53 banking groups of which 37 supervised by the SSM
  - SSM** stress tested (privately) another 56 banks not in EBA exercise
- In 2014, ECB/SSM conducted a Comprehensive Assessment (AQR & ST) of 130 banking groups from 19 countries, covering over 80% of total banking assets in euro-land (€22 TN)

* Source: SNL; all numbers YE2015
** SSM: Single Supervisory Mechanism

Macro-prudential stress testing started as a crisis response tool and has evolved to a peacetime tool for bank oversight

Stress testing as a crisis response tool

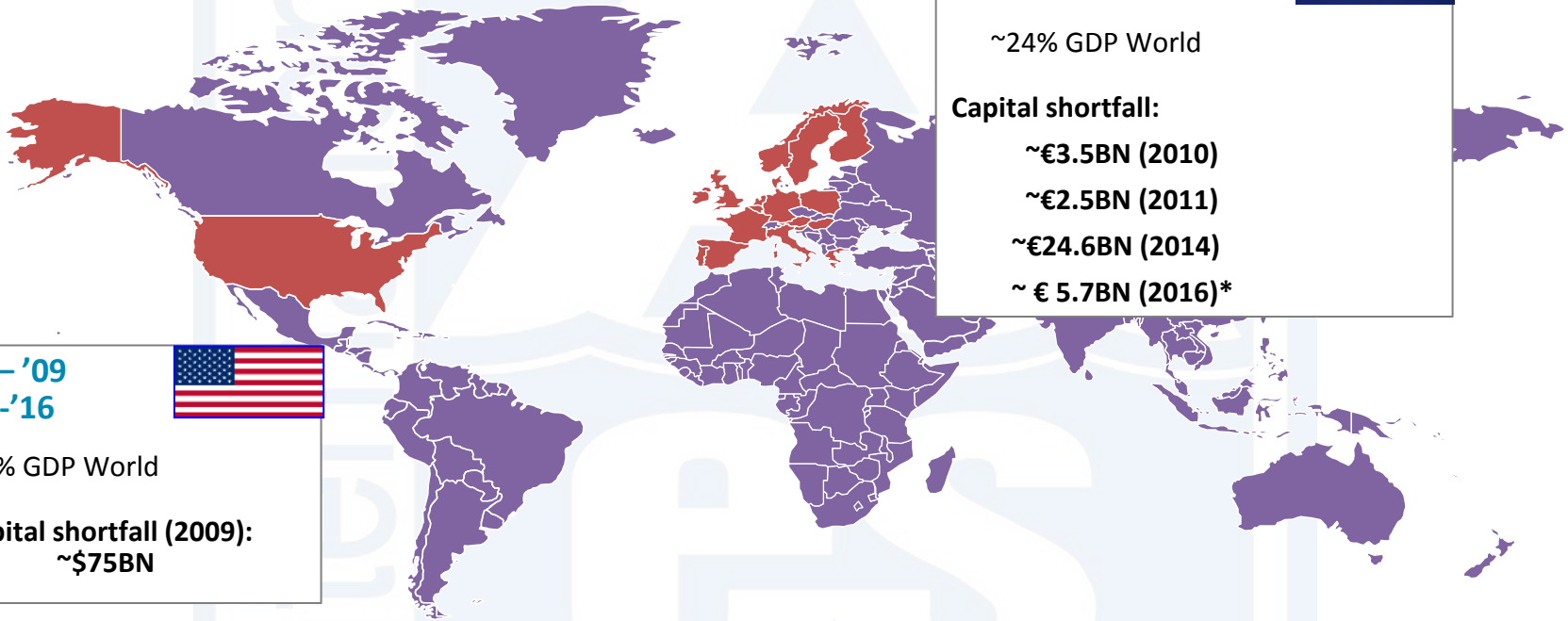
- Stress test is deployed as a one-time response to a specific crisis (e.g. SCAP)
- Main purpose is to provide assurance to the markets by
  - Credibly (and conservatively) sizing the potential impact of a crisis
  - Providing evidence that a bank has sufficient capital to withstand crisis
- Given purpose, quantitative output of stress test is most important (i.e. does a bank have enough capital to withstand the stress)

Stress testing as an ongoing risk management tool

- Regulatory stress test is a regular occurrence
- Broader purpose
  - Assessment of capital adequacy (quantitative)
  - Assessment of an institution's risk identification, measurement, management and governance capabilities (qualitative)
- Leverages perhaps the only informational advantage of the regulator:
  - Ability to compare horizontally
  - Useful for quantitative **and** qualitative

If wartime is about getting capital into banks, peacetime is about deciding whether to let it out

Stress tests in U.S. and Europe



CEBS – ’10
EBA – ’11,’14,’16

~24% GDP World

Capital shortfall:

~€3.5BN (2010)

~€2.5BN (2011)

~€24.6BN (2014)

~ € 5.7BN (2016)*

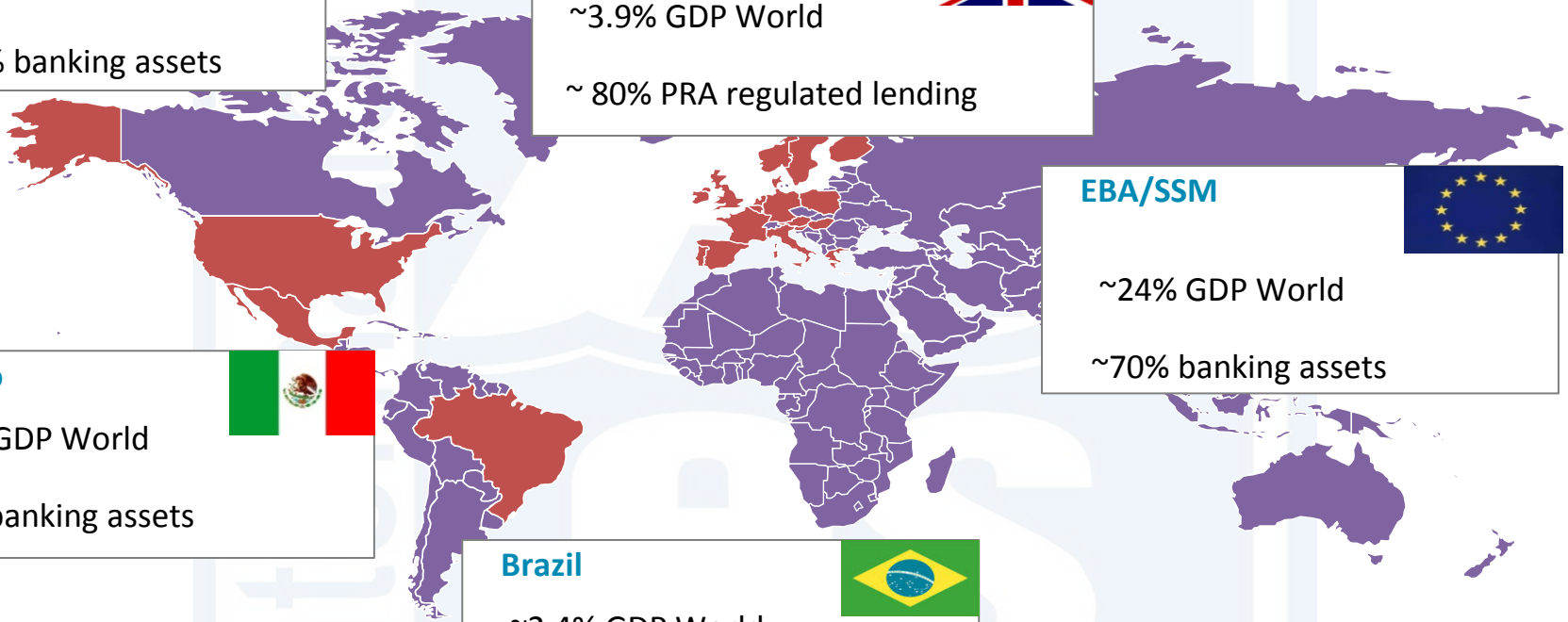
USA – ’09
2011-’16

~24% GDP World

Capital shortfall (2009):
~$75BN

* No pass/fail threshold. Monte Paschi projected min CET1 was -2.4%

Stress tests around the world in 2016



USA (CCAR & DFAST)

~24% GDP World

~90% banking assets

UK

~3.9% GDP World

~ 80% PRA regulated lending

EBA/SSM

~24% GDP World

~70% banking assets

Mexico

~1.6% GDP World

~ 95% banking assets

Brazil

~2.4% GDP World

~ 90% banking assets

All stress tests share a common feature: take a scenario, map to outcomes

Stress testing separates (somewhat) systematic from idiosyncratic risk

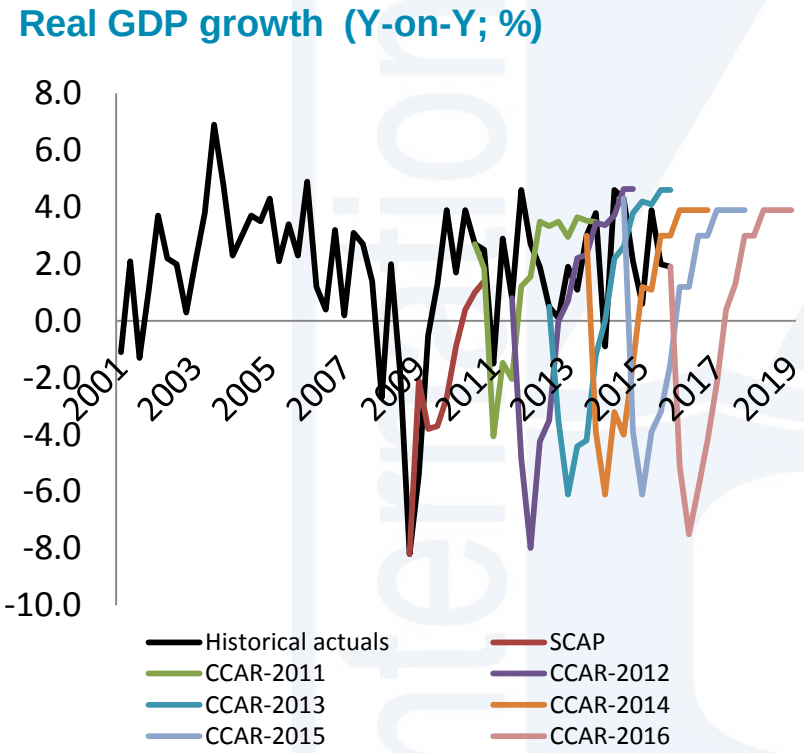
The basic approach to stress testing is the same on both sides of the Atlantic (and elsewhere)

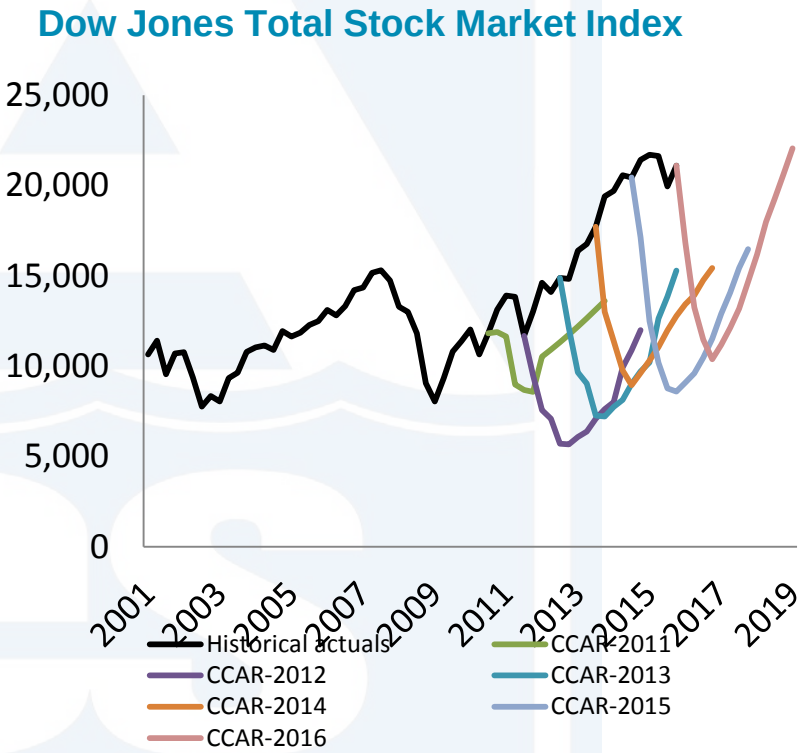
1. Design a scenario
   - Which risk factors?
   - How harsh?
   - Harsh for who?
2. Translate to outcomes
   - Losses: loans, securities, trading position
   - Net revenues: net interest income, non-interest income, non-interest expense

   → capital impact

- How to translate or map the scenario to the outcomes?
  - Who?
  - Whose models?
- A big difference between left and right side of Atlantic approach has been the use of models to generate projections
  - Heavy on left, light on right (but getting heavier)

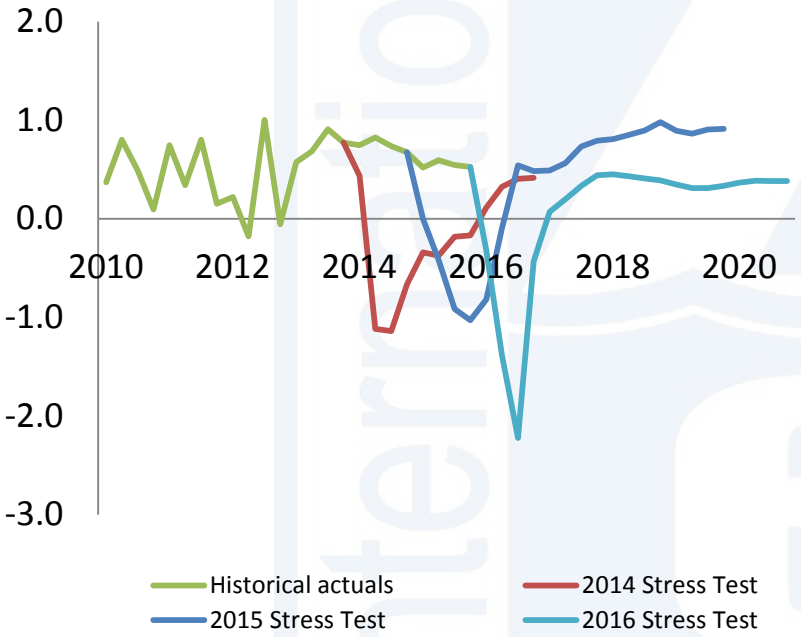
Federal Reserve Stress Scenarios



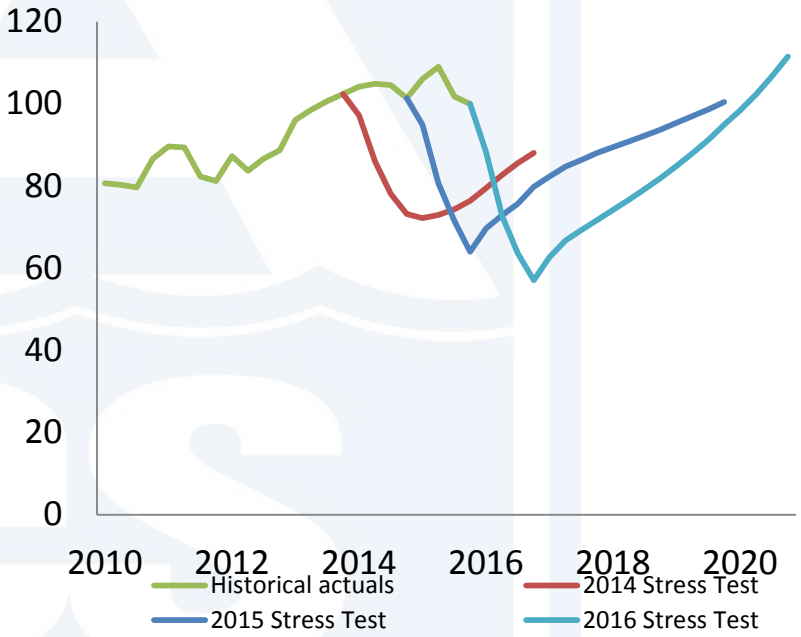


Bank of England Stress Scenarios

Real GDP growth (Q-on-Q; %)



FTSE All Share Index



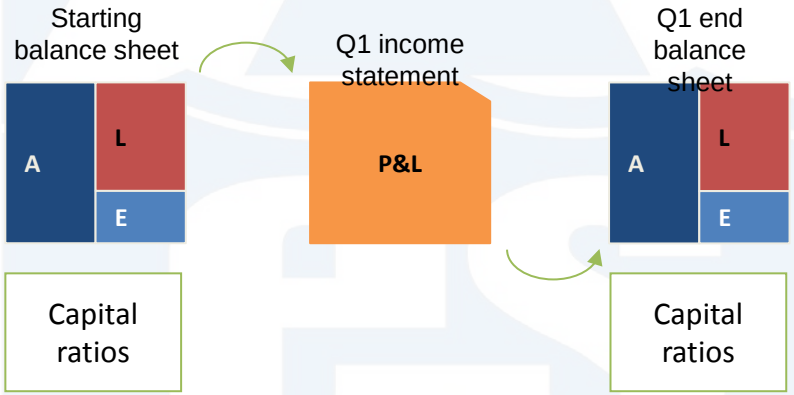
The Fed has gone furthest in terms of building internal capability to generate projections of bank financials via supervisory models

Fed's modeling capabilities allow for projection of full financials

All losses, all revenues, costs, funding, balance sheet, RWA

Incorporation of planned capital actions: dividend increases, share repurchases, capital stack restructuring

Using quarterly (and for some consumer products like mortgages, monthly) data feeds from banks, often loan level



This is very powerful, but very resource intensive!

Also allows for robust challenge by Fed of models used by banks

What should we be worrying about with stress testing in peacetime? (1/2)

Scenario design

Hard to balance coherence (reliance on past joint distribution of risk factors) with imagination (stuff breaks down)

Run many different scenarios

- Different and less (or more) harsh are not the same thing
- Force banks to design several of their own – in ways that probe on their vulnerabilities (already the case in US CCAR program)

More broadly, a narrow gene pool of ideas and tools

On scenarios: nearly all (all?) are a variation on the crisis and last recession

On translation to outcomes: we're all looking at the same data (banks and supervisors alike), and it's hard to resist the temptation to make models more "accurate" instead of robust

Small gene pool → population (system) very vulnerable to the next financial virus

What should we be worrying about with stress testing in peacetime? (2/2)

Opacity of stress tests

Stress tests are often opaque, reducing the regulators' accountability

The same opacity makes it difficult for outside experts to catch problems or point out trade-offs

Stress tests re-nationalize capital regulation that we'd been working hard to make global

May well create problems with geographical regulatory arbitrage

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