

November 2012

## Stress Testing in the Time of Cholera

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**Abstract**

The Federal Reserve has two key goals at present. The monetary policy committee is tasked with stimulating a choleric economy back to health, while bank examiners are busy instituting stress tests to ensure the long-term stability of the banking industry. Care must be taken to design these two activities so that they are mutually effective. On the one hand, policies such as quantitative easing are designed to coerce banks to move capital out of safe investments such as treasury bonds and into more productive uses that spark investment and, ultimately, consumption. Conversely, the safest financial system would involve banks taking no risks with their accumulated capital—basically lending only to the federal government, rather than to companies, investors and households. Given that monetary policy is well-established and that bank stress testing is in its institutional infancy, it makes sense to design stress tests so that monetary policy objectives can be fully accommodated.

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# Stress Testing in the Time of Cholera

BY TONY HUGHES

**T**he Federal Reserve has two key goals at present. The monetary policy committee is tasked with stimulating a choleric economy back to health, while bank examiners are busy instituting stress tests to ensure the long-term stability of the banking industry. Care must be taken to design these two activities so that they are mutually effective. On the one hand, policies such as quantitative easing are designed to coerce banks to move capital out of safe investments such as treasury bonds and into more productive uses that spark investment and, ultimately, consumption. Conversely, the safest financial system would involve banks taking no risks with their accumulated capital—basically lending only to the federal government, rather than to companies, investors and households. Given that monetary policy is well-established and that bank stress testing is in its institutional infancy, it makes sense to design stress tests so that monetary policy objectives can be fully accommodated.

We will assume in this analysis that the primary goal of stress testing is to forestall large-scale bank failures that may cause structural shocks to the economy. The Fed should be willing to design a system that allows the odd bank, especially those with weak management or shaky overall business models, to fail. So long as “too big to fail” banks don’t fail, or as long as bank failures do not accumulate—as they did during the Great Depression, the savings and loans crisis, or the recent Great Recession—we will conclude that stress tests have been successfully implemented. Further, if bank lending grows at an appropriate rate given overall economic activity in coming quarters and years, or if a rise in bank lending leads a strong recovery, it will be fair to assume that stress test design did not hamper the efforts of the monetary policy committee.

In this paper, we will lay out a strategy for stress testing that accounts for the objectives of the monetary policy committee. There are two main ways in which stress testing could either support or overcome deficiencies with the practice of monetary policy. In the first, we propose that a business cycle adjustment be applied to

calculated capital charges. This is a simple idea that allows capital requirements to be broadly lowered in a recession so that banks are encouraged to extend credit and get the economy moving. On the second point, we contend that stress testing could play a key role in the Fed’s ability to identify and control the formation of sector-specific bubbles in the economy. Standard monetary policy is a very blunt weapon when it comes to fighting bubbles, and we feel that stress testing could sharpen the Fed’s arsenal in this regard.

## **Business Cycle Capital Adjustment Factor**

The discussion of “through-the-cycle” and “point-in-time” capital assessment has a long history in the credit risk assessment field. Put simply, through-the-cycle assessment involves trying to abstract from or remove the business cycle from the analysis and thus unearth the fundamental riskiness of the assets being modeled. Point-in-time assessment, meanwhile, relates to an analysis of future credit performance while taking account of the position of the economy in the cycle and by using reasonable projec-

tions of likely performance through the medium term. One criticism of through-the-cycle analysis is that it often ignores the date of loan kickoff. Loans initiated during booms are often of poorer quality, even after taking into account the static credit characteristics of the borrower at the time of origination. The Comprehensive Capital Analysis and Review process correctly uses a point-in-time assessment of credit risk.

This process should be performed as effectively and accurately as possible. Federal regulators should aim to have as clear a view of individual bank default risk as they can possibly muster. Our aim here, though, is to consider this process in the context of monetary policy effectiveness. When the results of the CCAR are applied to banks, the key question is whether sufficient capital is being reserved to cover losses under stress. If bank portfolios are risky relative to the level of capital held, the Fed will require the bank in question to raise more capital, refrain from paying a dividend to shareholders, or curb future lending to move the portfolio back to a balanced position. It is easy to see that the application of any of these policy responses holds the potential to counteract the effectiveness of

monetary policy. A capital increase for the bank will “crowd out” investments in riskier assets, exerting upward pressure on interest rates. Freezing dividends will mean that shareholders will have less cash in their pockets to spend on consumption goods. Curbing lending will mean that households and businesses will face lower credit supply and thus may have to reduce short-term investment or consumption spending that might boost the economy. In a world where Ben Bernanke is desperate to reduce interest rates across the yield curve and boost demand, increasing bank capital requirements as a result of a stress test is completely anathema.

The solution is for a credit cycle adjustment to be applied to bank capital assessments. A simple cost-benefit analysis would suggest that society as a whole will, at times, be willing to risk an elevated probability of banking system failure with the payoff being a short-term increase in lending, fueling a more rapid recovery from recession. The probability that widespread bank failures will cause a deep recession in, say, 2015 feels very low at present. For the sake of argument, let's say there's a 1% probability of such a scenario unfolding. In the context of 8% unemployment, we may, as a community, be willing to allow the probability of a bank-caused recession to double—to 2%—if it means that the unemployment rate rapidly returns to 6%. A correctly implemented stress test should allow us to quantify and understand this underlying probability of disaster and thus make informed choices about the level of risk we are willing to take as a community. The Fed should also be trying to enumerate the effect of reduced bank capital requirements on the broader economy, i.e., if the probability of banking system failure rises by X after lowering bank capital reserves by Y, just how much will economic growth be boosted in the short to medium term?

Armed with the results of this analysis, the Fed should be willing and able to adjust capital requirements of banks across the board. Banks that are seriously under-capitalized may still need a partial top-up after the adjustment is applied, but banks that are marginally under-capitalized may get

a reprieve and thus be able to expand their portfolios in the short term.

One key point here is that if quantitative easing were not necessary, the business cycle adjustment factor would not be, either. In a scenario where the federal funds rate was not stuck at the zero lower bound, the Fed could boost bank lending simply with lower rates. An artificial mechanism to increase access to credit would not be necessary, and the stress test could be fully applied. On the flip side, in a booming economy, the adjustment would not be necessary, either, since the monetary policy committee could quell widespread excessive bank lending through rate hikes. Only when monetary policy cannot easily be made more accommodative do techniques such as the one proposed here become necessary and desirable.

Given that the U.S. has been liquidity-trapped for the past five years—and very possibly will be for the next five—the Fed should design a way to give banks a reprieve from the full effects of stress testing and get the industry growing again.

### Adjusting Bank Capital for Industry-Wide Concentrations

Some people blame Fed monetary policy for causing the Great Recession. Presumably, according to these folks, the Fed should have raised interest rates more rapidly as housing markets were booming in 2005 and 2006. In reality, the 2000s were marked by a mild recession followed in 2003 and 2004 by a “jobless recovery” that required the Fed to keep its foot planted on the accelerator for longer than it perhaps would have liked. Sure, housing was booming, but the overall economy was not. In general, monetary policy is very bad at targeting bubbles in specific sectors of the economy. When one sector is booming in a sluggish economy, fiscal policies aimed squarely at the booming industry are far more effective than monetary policy, which affects all interest-rate-sensitive sectors. If the economy is booming broadly, by way of contrast, monetary policy can be very effective in tamping down activity and thus harnessing economy-wide inflationary pressures.

Identifying and fixing lending bubbles is perhaps not as straightforward as the preced-

ing paragraph implies. In 2006, there was a very real debate taking place about whether a bubble in the U.S. housing market even existed. How should we go about identifying bubbles and can stress tests help in the endeavor?

The data collected during an industry-wide bank stress test should enable regulators to identify bubbles. As part of the CCAR process, the Fed is collecting information on very small slivers of each bank's portfolio. The question is whether we can compile these data in such a way as to identify excessive concentrations of loans to particular sectors and thus design appropriate policy responses. In a healthy, broad-based economic recovery we might expect:

- » Strong industry-wide loan growth in many, most or all broad product categories.
- » Individual banks pursuing changes in strategy according to their own business models, independently of the actions of other banks. There should thus be no discernible excess correlation between banks in terms of the concentration of new loan growth in any given product.

Looking at the lead-up to the subprime crisis, the following observations are pertinent:

- » Many (but not all) banks pursued mortgage lending with vigor, while other categories were either stagnant or growing in line with the overall economy. The result was that residential mortgages were growing quickly in importance for many banks. Point 1, above, was thus violated.
- » In a related manner, late entrants to the subprime mortgage lottery would almost certainly have been incentivized by the early success of the pioneers to rush to join the party. It would be naïve to view the actions of these late entrants as independent of the actions of the early lenders.

Presumably, a true lending bubble will manifest itself in several ways. First off, several or many banks will witness uncharacteristically rapid growth in lending to the

affected sector. Banks that are involved in the practice of fueling the bubble will see the share of capital applied to the sector increase quickly as the bubble matures. Some banks, especially those known to employ a conservative business model, will show no evidence of a reconfiguration of the balance sheet toward the affected sector. Rapid, balanced economic growth may be associated with strong loan growth but few, if any, banks will light up on the radar as rapidly redeploying resources from cold sectors toward hot ones. Strong, broad-based, rapid economic growth will show up as loan growth in many or most sectors in most banks. If we have a situation in which many banks are all quickly increasing their relative exposure to a particular sector without similar growth in other sectors, we may conclude with some justification that a bubble is likely forming in the affected sector.

We contend that an effective stress test should account for these relative changes in concentration and adjust capital requirements appropriately. The key is to identify herd behavior among banks and then to require herding banks to hold more capital than lone wolves with a similar risk profile. This also implies that the capital charges applied to one bank will be dependent, in part, on the actions of competitor banks.

Imagine there are two parallel universes and that a particular bank holds exactly the same asset and liability structure in both universes. The hypothetical bank has always had a strong focus on commercial real estate lending, and this component takes up an unrepresentatively large proportion of the bank's balance sheet. In one universe, however, 12 other banks are moving into CRE lending and rapidly increasing their exposure to the sector. Yields are therefore falling and people are concerned about the existence of a lending bubble in the sector. Asset prices are increasing quickly and, given the structural importance of CRE lending, regulators are worried about a crash. The bank in question, through no fault of its own, should be required to retain more capital because of the threat posed by these circumstances, even though it holds exactly the same balance sheet in each universe.

This may sound unfair to some people, and indeed it is. But remember, central banking is not concerned with *fairness*, it is concerned with *stability*. If the Fed can improve stability along a desirable growth path by favoring one sector or group of people at the expense of others, it should vigorously pursue the policy in question. Elected officials can always legislate to compensate those investors who are hurt by the Fed's actions<sup>1</sup>. Outcomes viewed by the population as unfair should result in election losses for incumbents, not spleens vented at unelected public servants.

Naturally, the 12 banks will also have to take an elevated capital charge. There will thus exist strong incentives for banks not to rush to join herds. Banks pursuing lone-wolf strategies that involve rapid increases in lending in a particular sector can rest assured that the proposed stress test will not disproportionately affect them. Indeed, the Fed should not be trying to quash all risk-taking by banks, it should be focusing on the subset of strategies that specifically relate to the formation of bubbles.

In concrete terms, we are talking about the Fed undertaking a detailed review of concentrations in the banking industry and using the results to adjust capital requirements accordingly. It should be possible to design a metric that rises for banks that are showing signs of actively running with the herd and remains constant for banks pursuing conservative strategies or risky lone-wolf lending policies. The metric should be related, in a nonlinear manner, to the size of the herd and the sensitivity of the economy to problems in the sector in question. Twelve big banks heavily engaged in subprime mortgage or commercial real estate lending will thus require a much higher capital charge than six big banks moving heavily into auto lending. This holds true even if a loan-by-loan analysis of each bank in isolation indicates identical expected losses under stress.

<sup>1</sup> An argument is often made that by pursuing low rates in a bid to restore the natural rate of unemployment, the Fed is negatively impacting retired people reliant on fixed-interest securities. This argument is correct, but it is of no concern to those responsible for monetary policy. Those worried about the victims of Fed policy should lobby their representatives in Congress to increase support for this group.

### Conclusion

In instituting stress testing protocols, central bankers have a unique opportunity to boost their ability to manage the economy. The data collected through the CCAR process alone should provide a crystal-clear window into banking system imbalances. Current approaches to stress testing apparently rely too heavily on a consideration of bank balance sheets viewed in isolation. This development is understandable, given that most of the techniques applied to bank capital assessment grew out of the Basel Accords that were framed mainly prior to the financial crisis of 2008/09. The events of the past few years, however, highlight the fact that the collective actions of many banks, and thus the formation of structurally significant asset price bubbles, pose the biggest threat to global prosperity.

At a time when the global economy is performing well-below par, stringent stress testing is penny-wise and pound-foolish. We need stress tests that identify banks that are behaving irresponsibly but that reward reasonable risk-taking that is conducive with strong economic growth. Risk and reward are, after all, opposite sides of the same coin. Stress tests should be designed so that we lie on the efficient frontier implied by the relationship between these two concepts—the most return for a given level of risk or the lowest risk for a given return. Targeting stress tests to the riskiest banking behaviors, while downplaying more idiosyncratic risks, should accomplish this goal. Once we are on the efficient risk-return frontier, we can decide, as a society, the level of risk we are willing to accept and reap the rewards that come our way as a result.

The concepts discussed here are related to the notion of macroprudential stress testing espoused by Greenlaw, Kashyap, Schoenholtz and Shin (2012) and the microprudential approach taken by most stress testers and discussed at length in a paper recently released by the International Monetary Fund. In contrast, the points made here suggest that the best approach to stress testing would involve a fusion of the two sets of concepts. Rather than a strictly macro or strictly micro stress test, we are arguing for a fundamentally microprudential approach that reflects the fact that no bank is an island unto itself.

# About the Author

## Tony Hughes

Tony Hughes is senior director of Credit Analytics at Moody's Analytics. His main responsibility involves managing the company's credit analysis consulting projects for global lending institutions. An expert applied econometrician, Dr. Hughes also oversees the development of Moody's CreditCycle and manages the data and forecasting products CreditForecast.com and CreditForecast.co.uk. His varied research interests have lately focused on problems associated with loss forecasting and stress testing credit portfolios.

Now based in the U.S., Dr. Hughes previously headed the Moody's Analytics Sydney office, where he was editor of the Asia/Pacific edition of the Dismal Scientist web site and was the company's lead economist in the region. He retains a keen interest in emerging markets and in Asian/Pacific economies.

A former academic, Dr. Hughes held positions at the University of Adelaide, the University of New South Wales, and Vanderbilt University, and has published a number of articles in leading statistics and economics journals. He received his Ph.D. in econometrics from Monash University in Melbourne, Australia.

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