Full text available at: http://dx.doi.org/10.1561/0500000038

Should Banks' Stress Test Results be Disclosed? An Analysis of the Costs and Benefits

Itay Goldstein
The Wharton School
University of Pennsylvania
Philadelphia, PA, 19104
USA
itayg@wharton.upenn.edu

Haresh Sapra
The University of Chicago
Booth School of Business
Chicago, IL, 60637
USA
hsapra@ChicagoBooth.edu

now
the essence of knowledge
Boston — Delft

Full text available at: http://dx.doi.org/10.1561/0500000038

Foundations and Trends® in Finance

Published, sold and distributed by:
now Publishers Inc.
PO Box 1024
Hanover, MA 02339
United States
Tel. +1-781-985-4510
www.nowpublishers.com
sales@nowpublishers.com

Outside North America:
now Publishers Inc.
PO Box 179
2600 AD Delft
The Netherlands
Tel. +31-6-51115274

The preferred citation for this publication is

I. Goldstein and H. Sapra. *Should Banks' Stress Test Results be Disclosed? An Analysis of the Costs and Benefits*. Foundations and Trends® in Finance, vol. 8, no. 1, pp. 1–54, 2013.

This Foundations and Trends® issue was typeset in LaTeX using a class file designed by Neal Parikh. Printed on acid-free paper.

ISBN: 978-1-60198-769-3
© 2014 I. Goldstein and H. Sapra

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, mechanical, photocopying, recording or otherwise, without prior written permission of the publishers.

Photocopying. In the USA: This journal is registered at the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923. Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by now Publishers Inc for users registered with the Copyright Clearance Center (CCC). The 'services' for users can be found on the internet at: www.copyright.com

For those organizations that have been granted a photocopy license, a separate system of payment has been arranged. Authorization does not extend to other kinds of copying, such as that for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. In the rest of the world: Permission to photocopy must be obtained from the copyright owner. Please apply to now Publishers Inc., PO Box 1024, Hanover, MA 02339, USA; Tel. +1 781 871 0245; www.nowpublishers.com; sales@nowpublishers.com

now Publishers Inc. has an exclusive license to publish this material worldwide. Permission to use this content must be obtained from the copyright license holder. Please apply to now Publishers, PO Box 179, 2600 AD Delft, The Netherlands, www.nowpublishers.com; e-mail: sales@nowpublishers.com

Full text available at: http://dx.doi.org/10.1561/0500000038

Foundations and Trends® in Finance
Volume 8, Issue 1, 2013

Editorial Board

Editor-in-Chief

George M. Constantinides
Booth School of Business
University of Chicago
United States

Editors

Francis Longstaff
Co-Editor
University of California, Los Angeles

Sheridan Titman
Co-Editor
University of Texas at Austin

Full text available at: http://dx.doi.org/10.1561/0500000038

Editorial Scope

Topics

Foundations and Trends® in Finance publishes survey and tutorial articles in the following topics:

- Corporate finance
  - Corporate governance
  - Corporate financing
  - Dividend policy and capital structure
  - Corporate control
  - Investment policy
  - Agency theory and information
- Financial markets
  - Market microstructure
  - Portfolio theory
  - Financial intermediation
  - Investment banking
  - Market efficiency
  - Security issuance
  - Anomalies and behavioral finance
- Asset pricing
  - Asset-pricing theory
  - Asset-pricing models
  - Tax effects
  - Liquidity
  - Equity risk premium
  - Pricing models and volatility
  - Fixed income securities
- Derivatives
  - Computational finance
  - Futures markets and hedging
  - Financial engineering
  - Interest rate derivatives
  - Credit derivatives
  - Financial econometrics
  - Estimating volatilities and correlations

Information for Librarians

Foundations and Trends® in Finance, 2013, Volume 8, 4 issues. ISSN paper version 1567-2395. ISSN online version 1567-2409. Also available as a combined paper and online subscription.

Full text available at: http://dx.doi.org/10.1561/0500000038

Foundations and Trends® in Finance
Vol. 8, No. 1 (2013) 1–54
© 2014 I. Goldstein and H. Sapra
DOI: 10.1561/0500000038

Should Banks' Stress Test Results be Disclosed? An Analysis of the Costs and Benefits

Itay Goldstein
The Wharton School,
University of Pennsylvania,
Philadelphia, PA, 19104,
USA
itayg@wharton.upenn.edu

Haresh Sapra
The University of Chicago
Booth School of Business,
Chicago, IL, 60637,
USA
hsapra@ChicagoBooth.edu

Full text available at: http://dx.doi.org/10.1561/0500000038

Contents

1 Introduction **2**

2 The Nature of Stress Tests and their Disclosure **7**

3 The Benefits of Disclosure **11**
3.1 Disclosure and market discipline 11
3.2 Disclosure and supervisory discipline 13

4 Problems with Disclosure **14**
4.1 Impact of disclosure on risk sharing and the operation of the interbank market 17
4.2 Impact of disclosure on ex ante incentives of bank managers 20
4.3 Impact of disclosure on ex post actions of market participants: Coordination failures and runs 29
4.4 Impact of disclosure on the ability of regulators to learn from the market 38

5 Policy Recommendations **43**

6 Conclusion **48**

Acknowlegements **49**

References **51**

Full text available at: http://dx.doi.org/10.1561/0500000038

Abstract

Stress tests have become an important component of the supervisory toolkit. However, the extent of disclosure of stress-test results remains controversial. We argue that while stress tests uncover unique information to outsiders — because banks operate in second–best environments with multiple imperfections — there are potential endogenous costs associated with such disclosure.

First, disclosure might interfere with the operation of the interbank market and the risk sharing provided in this market. Second, while disclosure might improve price efficiency and hence market discipline, it might also induce sub-optimal behavior in banks. Third, disclosure might induce *ex post* market externalities that lead to excessive and inefficient reaction to public news. Fourth, disclosure might also reduce traders' incentives to gather information, which reduces market discipline because it hampers the ability of supervisors to learn from market data for their regulatory actions.

Overall, we believe that disclosure of stress-test results is beneficial because it promotes financial stability. However, in promoting financial stability, such disclosures may exacerbate bank-specific inefficiencies. We provide some guidance on how such inefficiencies could be minimized.

I. Goldstein and H. Sapra. *Should Banks' Stress Test Results be Disclosed? An Analysis of the Costs and Benefits*. Foundations and Trends® in Finance, vol. 8, no. 1, pp. 1–54, 2013.

DOI: 10.1561/0500000038.

Full text available at: http://dx.doi.org/10.1561/0500000038

1

Introduction

In the wake of the financial crisis, the Federal Reserve expects large, complex bank holding companies (BHCs) to hold sufficient capital to continue lending to support real economic activity even under adverse economic conditions. Stress testing is one tool that helps bank supervisors achieve that goal. The Dodd–Frank Wall Street Reform and Consumer Protection Act (DFA) requires the Federal Reserve to conduct an annual stress test of large BHCs and nonbank financial companies designated by the Financial Stability Oversight Council (FSOC) for Federal Reserve supervision to evaluate whether they have sufficient capital to absorb losses resulting from adverse economic conditions. (DFA, Section 1115(a)). The DFA also requires BHCs and other nonfinancial companies supervised by the Federal Reserve to conduct their own stress tests: for systemically important firms, these tests must be performed on a quarterly basis and for other firms–those with assets exceeding $10 billion — they should be performed on a semi-annual

Full text available at: http://dx.doi.org/10.1561/0500000038

basis (DFA, Sections 1115(a), 1115(b)). The Federal Reserve adopted rules implementing these requirements in October 2012.[1]

Interestingly, Congress left it to the regulatory agencies to specify the nature and design of these stress tests so that several important questions remain unanswered — and controversial. For example, should bank-specific stress-test results be publicly disclosed? If so, to what extent? Should the tests follow the traditional approach of focusing on the resilience of each bank individually or should they instead focus more on the resilience of the banking sector to a common macroeconomic shock?

Many proponents of disclosure of stress-test results have linked the severity of the recent financial crisis to bank opacity. They argue that many banks took on excessive risks that were not adequately disclosed so that such risks could not be properly priced by the market. Disclosure of stress-test results informs outsiders whether banks are sufficiently capitalized to absorb negative shocks, thereby enhancing *market discipline*. Such market discipline, in turn, would have prevented insiders from engaging in excessive *ex ante* risk taking behavior that may have contributed to the recent financial crisis. Greater transparency of a bank's risks would have also allowed banking regulators to better monitor the banks and allowed them to intervene early enough to take corrective actions by recapitalizing weak or insolvent banks. Unfortunately, by the time regulators intervened, it was too late as there was a widespread panic because the market could not distinguish a solvent bank from an insolvent bank and such panic brought the whole financial system to its knees. By disclosing stress test information, investors' confidence in the banking sector would be restored and such a boost in investor confidence would, in turn, positively influence the real economy. While the rationales for disclosing the results of these stress tests seem intuitive, some have argued that disclosing the results of these stress tests may actually have unintended consequences. For example, instead of providing market discipline, if stress tests are not properly

[1]The Federal Reserve previously highlighted the use of stress tests as a means of assessing capital sufficiency under stress during the 2009 Supervisory Capital Assessment Program (SCAP) and the 2011 and 2012 Comprehensive Capital Analysis and Review (CCAR) stress test exercises.

Full text available at: http://dx.doi.org/10.1561/0500000038

designed, disclosure of their results may actually create more panic, thereby lowering confidence in the banking sector. A lower confidence in the banking sector may have more negative consequences on the real sector.[2]

In any debate regarding the desirability of disclosures, the objective of such disclosures must be specified. In the case of stress tests, these tests could serve either a microprudential and/or macroprudential objective. A microprudential goal implies that an individual bank has enough capital buffer to absorb potential losses, thereby ensuring its solvency. A macroprudential goal implies that the banking system as a whole has the ability to survive a systemic crisis, thereby promoting financial stability. In this monograph, we will argue that these two goals may not necessarily be compatible with each other — while stress-test results accompanied with appropriate disclosures could promote overall financial stability, they might simultaneously induce inefficiencies at the individual banks.

We will also argue that the benefits of disclosing stress-test results are clear: stress tests may uncover unique information about banks allowing both bank supervisors and market participants to exercise discipline on the bank's behavior. However, because banks operate in second-best environments that are prone to externalities, we argue that there are endogenous costs associated with such disclosures. We believe that a proper understanding of the sources of these costs would better inform the debate and guide regulators in both designing these tests and handling the disclosures. More precisely, we believe that — at least from a macroprudential financial stability perspective — the benefits of disclosing stress-test results are undeniable. Instead, our goal is to explain how, conditional on disclosure of these stress-test results, the costs associated with these tests could be minimized via the design of stress tests and the nature of the disclosure.

To better understand the sources of the endogenous costs, we will first review several theoretical frameworks for discussing the costs and

[2] This debate is described in the article "Lenders Stress over Test Results," Wall-Street Journal; March 5, 2012. See http://online.wsj.com/article/SB10001424052970204276304577261554100410414.html.

Full text available at: http://dx.doi.org/10.1561/0500000038

benefits of greater disclosure. In the absence of a clear sense of the potential costs and benefits associated with greater disclosure, the knee jerk reaction is that more information is always better, since usually more information provides better market discipline. However, we will explain why the conventional wisdom that more disclosure leads to better market discipline need not hold for banks as they operate in *second-best* environments, i.e., environments with market and informational frictions. First, banks engage in risks that are notoriously opaque, hard to verify, and easily susceptible to asset substitution. Second, banks operate in environments that are prone to externalities. In such environments, there are endogenous costs to disclosure that supervisors must take into account in determining both the design of the tests and how to handle the disclosure of the results. In such environments, greater disclosure may actually sometimes impede welfare. The main insight of our monograph is that, when it comes to the disclosure of stress-test results, perhaps too much importance has been attached to how such disclosure would improve market discipline.[3] If the goal of disclosure of stress tests' results is to improve market discipline, we will show that market discipline is a necessary but not sufficient condition for economic efficiency. Furthermore, in second-best environments, the incentives of all market participants need to be taken into account in understanding how and when disclosure would affect market discipline.

The remainder of the monograph is organized as follows. In Section 2, we review in detail the nature of stress tests, discussing the unique information they provide to outsiders. In Section 3, we review the conventional wisdom and explain how disclosure of stress tests could provide regulatory and market discipline and how such discipline may indeed have a positive impact on economic efficiency. Section 4, which is the main section of the monograph, reviews in detail possible costs of disclosure. We first explain in general why the conventional wisdom may not hold up well for banks. Then, we discuss four theories that highlight problems with disclosure and link them to the context of stress testing in the banking system. First, disclosure might harm

[3]We discuss later how the benefits of disclosure of stress-test results might be due to supervisory discipline in addition to market discipline.

Full text available at: http://dx.doi.org/10.1561/0500000038

the operation of the interbank market and the provision of risk sharing achieved in this market. Second, detailed ex-post disclosure might adversely affect the ex-ante incentives of bank managers and lead them to take myopic inefficient actions to pass the test. Third, greater disclosure might lead to inefficient ex-post reaction from market participants, who face a coordination problem (e.g., a run) and put excessive weight on public information rather than on their own private information. Fourth, the disclosure of stress-test information publicly might crowd out the private information in market prices and reduce the ability of regulators to learn from market prices. With the benefits of the insights gained from the discussions in Section 4, in Section 5 we explain that there is a non-trivial trade-off associated with disclosure of stress-test results. We believe that such disclosure serves an important purpose in promoting financial stability, in particular at the aggregate level. However, there are costs of detailed disclosure at the bank specific level. In order to minimize these costs, we provide several recommendations to regulators about how to handle the design and disclosure of stress tests results. Section 6 concludes.

Full text available at: http://dx.doi.org/10.1561/0500000038

References

F. Allen and D. Gale. Financial contagion. *Journal of Political Economy*, 108:1–33, 2000.

G. M. Angeletos and A. Pavan. Efficient use of information and social value of information. *Econometrica*, 75:1103–1142, 2007.

T. E. Bakke and T. M. Whited. Which firms follow the market? an analysis of corporate investment decisions. *Review of Financial Studies*, 23:1941–1980, 2010.

B. Bernanke. Stress testing banks: What have we learned? `http://www.federalreserve.gov/newsevents/speech/bernanke20130408a.htm`, 2013.

S. Bhojraj and R. Libby. Capital market pressure, disclosure frequency-induced earnings/cash flow conflict, and managerial myopia. *The Accounting Review*, 80:1–20, 2005.

D. Blackwell. Comparison of experiments. In *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability*, pages 93–102. University of California Press, 1951.

P. Bolton, M. Brunnermeier, and L. Veldkamp. Leadership, coordination and mission driven management. *Review of Economic Studies*, 80:512–537, 2013.

P. Bond and I. Goldstein. Government intervention and information aggregation by prices. Working Paper, University of Pennsylvania, 2013.

P. Bond, I. Goldstein, and E. S. Prescott. Market-based corrective actions. *Review of Financial Studies*, 23:781–820, 2010.

Full text available at: http://dx.doi.org/10.1561/0500000038

P. Bond, A. Edmans, and I. Goldstein. The real effects of financial markets. *Annual Reviews of Financial Economics*, 4:339–360, 2012.

M. Bouvard, P. Chaigneau, and A. De Motta. Transparency in the Financial System: Rollover risk and crises. Working Paper, McGill University, 2013.

Q. Chen, I. Goldstein, and W. Jiang. Price informativeness and investment sensitivity to stock price. *Review of Financial Studies*, 20:619–650, 2007.

Q. Chen, I. Goldstein, and W. Jiang. Payoff complementarities and financial fragility: Evidence from mutual fund outflows. *Journal of Financial Economics*, 97:239–262, 2010.

M. Cheng, K. R. Subramanyam, and Y. Zhang. Earnings guidance and managerial myopia. Working Paper, Columbia Business School, 2010.

M. Darrough and N. Stoughton. Financial disclosure policy in an entry game. *Journal of Accounting and Economics*, pages 219–243, 1990.

D. Diamond and P. Dybvig. Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, 91:401–419, 1983.

R. Dye. Proprietary and nonproprietary disclosures. *Journal of Business*, 59: 331–366, 1986.

D. D. Evanoff and L. D. Wall. Subordinated debt as bank capital: A proposal for regulatory reform. *Federal Reserve Bank of Chicago Economic Perspectives*, 24:40–53, 2004.

R. Feldman and J. Schmidt. Supervisory use of market data in the federal reserve system. Working Paper, Federal Reserve Bank of Minneapolis, 2003.

M. Flannery. Stabilizing large financial institutions with contingent capital certificates. Working Paper, University of Florida, 2009.

F. Furlong and R. Williams. Financial market signals and banking supervision: Are current practices consistent with research findings? *Federal Reserve Bank of San Francisco Economic Review*, pages 17–29, 2006.

F. Gigler, C. Kanodia, H. Sapra, and R. Venugopalan. How frequent financial reporting causes managerial short-termism: An analysis of the costs and benefits of reporting frequency. Forthcoming *Journal of Accounting Research*.

I. Goldstein and Y. Leitner. Stress tests and information disclosure. Working Paper, University of Pennsylvania, 2013.

I. Goldstein, E. Ozdenoren, and K. Yuan. Learning and complementarities in speculative attacks. *Review of Economic Studies*, 78:263–292, 2011.

Full text available at: http://dx.doi.org/10.1561/0500000038

S. J. Grossman and J. E. Stiglitz. On the impossibility of informationally efficient markets. *American Economic Review*, 70:393–408, 1980.

O. Hart and L. Zingales. A new capital regulation for large financial institutions. *American Law and Economic Review*, 13:453–490, 2011.

F. A. Hayek. The use of knowledge in society. *American Economic Review*, 35:519–530, 1945.

R. J. Herring. The subordinated debt alternative to basel II. *Journal of Financial Stability*, 1:137–155, 2004.

A. Hertzberg, J. M. Liberti, and D. Paravisini. Public information and coordination: Evidence from a credit registry expansion. *Journal of Finance*, 66:379–412, 2011.

J. Hirshleifer. The private and social value of information and the reward to inventive activity. *American Economic Review*, 61:561–574, 1971.

E. Kamenica and M. Gentzkow. Bayesian persuasion. *American Economic Review*, 101:2590–2615, 2011.

J. M. Keynes. *The General Theory of Employment, Interest, and Money*. Macmillan, London, 1936.

J. Krainer and J. A. Lopez. Incorporating equity market information into supervisory monitoring models. *Journal of Money Credit and Banking*, 36: 1043–1067, 2004.

Y. Leitner. Financial networks: Contagion, commitment, and private sector bailouts. *Journal of Finance*, 60:2925–2953, 2005.

Y. Luo. Do insiders learn from outsiders? evidence from mergers and acquisitions. *Journal of Finance*, 60:1951–1982, 2005.

R. McDonald. Contingent capital with a dual price trigger. *Journal of Financial Stability*, 9:230–241, 2013.

I. Michael. Accounting and financial stability. *Financial Stability Review*, pages 118–128, June 2004. Bank of England.

S. Morris and H. S. Shin. The social value of public information. *American Economic Review*, 92:1521–1534, 2002.

E. S. Prescott. Should bank supervisors disclose information about their banks? *Federal Reserve Bank of Richmond Economic Review*, 94:1–16, 2008.

E. S. Prescott and S. Slivinski. A case against disclosing camels ratings. *American Banker*, page 174, 2009.

Full text available at: http://dx.doi.org/10.1561/0500000038

T. Schuermann. Stress testing banks. Working Paper, 2013.

J. Stein. Efficient capital markets, inefficient firms. *Journal of Finance*, 44: 1335–1350, 1989.

D. Tarullo. Lessons from the crisis stress tests. Remarks Made to the International Research Forum on Monetary Policy, Washington D.C., 2010.