



Aaron Brown

Risk, Reserves, and Capital

Risk management is all that stands between a poor mathematician and pleasant riches

I'm a risk manager. I got into the field based on a simple argument: it's not hard to make money in finance if you have some money to start with and don't blow up. Simple quantitative analysis and patience can get any reasonable person the wealth needed for a comfortable life. You could go to work for a regulated financial institution to get the start-up capital, but it can be hard to get the job, it can be unpleasant to do the job, and, however smart you are, you may be incapable of preventing the institution from blowing up. If you could figure out on your own how not to blow up, and could convince investors that you wouldn't blow up, you should be able to make money on your own terms. So risk management is all that stands between a poor mathematician and pleasant riches.

As recently as 200 years ago, many people believed that banks could not blow up. Hence, anyone who could jump through the hoops necessary to get a bank charter could get rich without work. The belief was not as crazy as it sounds today. Banks loaned money only on goods in pro-



Unexpected run on bank #1

duction or available for sale, and not for longer than 90 days. Prices were stable, money was gold or silver, and collateral was nearby and easy to evaluate.

Of course, it has been known for 600 years (and probably for much longer) that if every depositor asked for money back at once, the bank could not pay. Also, an extreme price movement, or natural disaster or fraud might reduce the value of the collateral enough to prevent

repayment of all depositors in full. But the chance of the latter occurring is remote in a well-run bank, given the collateral haircuts taken and the equity in the bank. If the latter is unlikely, there is no reason for the former to happen. And if the former never happened, the bank would eventually earn its way out of things, even if the latter happened. This would mean even less chance of the former occurring. I could go on, but you probably get the point. There would be a slim chance that some depositors might have to wait a month or two for their money, and the repayment might be a few cents on the dollar short, but that's not a blowup.

From this perspective, it's counterproductive to insist on a certain level of reserves or equity in a bank. That limits the size of the balance sheet, meaning fewer depositors and fewer loans. Fewer depositors means less predictability about withdrawals. Fewer loans means less diversification, since the loan risk is

almost entirely idiosyncratic, and smaller earnings to wash problems away.

Dexter sinister

Andrew Dexter changed that happy view. I've always had a soft spot for Andy, America's first overleveraged real estate speculator. He created magnificent projects, including the Exchange Coffee House in Boston (the tallest and most expensive building in the Americas at the time)

and the city of Montgomery, Alabama. Andy's only flaw was that he only sort-of had the money to do these things.

Back in 1809, Detroit was a frontier outpost, weeks of dangerous travel from anywhere. So Andy founded a bank there. Then he took over a bank in a town in Rhode Island with no road connecting it to anywhere (you had to walk through forest paths). He printed up lots of bills on the Detroit bank and shipped them to Rhode Island. He printed up lots of bills on the Rhode Island bank and shipped them to Detroit. He knew it would take months or years or forever for the bills to make their way back to the issuing banks, so he got interest-free, maybe repayment-free, loans. He had other banks as well, but none as remote or aggressive as these two.

Why would people accept bills from obscure, faraway banks? The history books talk about how suspicious people were in those days before government deposit insurance. That is true, but there was an exception. If a faraway bank's bills were common enough, people assumed it must have traveled a long way, through many suspicious hands. A lone bill or two might be fobbed off on ignorant or foolish people, but if lots of bills circulated freely at great distances, they must be good. So Andy got a free ride until the Rhode Island bank became America's first (but not last) bank failure and the whole scheme came crashing down.

We reserve the right

The result of the 1811 failure was a spate of state bank regulations, including a reserve requirement. I have taught the course Money and Banking, and as anyone who has done that knows, most people confuse reserve requirements with capital requirements. They are, in fact, opposites. A reserve is an asset, calculated as a fraction of liabilities. Capital is a liability or equity, calculated as a fraction of assets. But forget about capital for about a century – we're still in the reserve period.

Most states passed laws requiring banks to hold a certain fraction of deposits in liquid form: silver or gold in the vault, or government bonds in the vault or on deposit. It's not usually explained this way, but I think the important

point is that reserve requirements are based on a model of depositor behavior. The model says that every time a depositor asks for and receives money back immediately, remaining depositors get more faith in the bank. Therefore, if a bank has enough liquid assets to cover any random fluctuation in net withdrawals plus the early stages of any panic, it can stay in business forever. It can earn its way out of any asset problem.

That simple reserve requirement has given birth to a complex of practices and regulations designed to keep depositors from withdrawing out of fear of a bank collapse. We have central banking systems acting as lenders of last resort, government deposit insurance, and a huge reserve banking system.

We used to have a much better protection: inefficiency. Thirty years ago, you had to go to a

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bank in person, stand in line (no single-feed lines), write out your request and wait while a person counted the money twice. The biggest obstacle to a bank run was the line. Also, financial news traveled far more slowly and banks were typically open only about 1,500 hours per year. The times were inconvenient for people with jobs (and tellers took the same lunch hours as office workers), and the locations were inconvenient for everyone else.

The complex and expensive regulations were of little help in the most recent bank crisis. Northern Rock's problems snowballed out of control – in part because it was so easy to withdraw on the internet that lots of people did it, eventually exceeding the bandwidth of the site, and adding to the panic. E*Trade's bank was subjected to a similar stress, but survived. We can trace this back to Ned Johnson, who, in 1974, came up with the idea of letting Fidelity mutual fund

holders write checks against their accounts. An industry built around making it easy to get your money in, and hard and expensive to get your money out, underwent explosive transformation and growth as a result.

To a risk manager, the lesson is that the model of depositor behavior has to change. The cost of withdrawing, including the cost of getting the information that leads to the decision, has declined from substantial to negligible. Depositors no longer observe one another getting their money, but even people who are not paying attention are instantly alerted to any failure. Another old-fashioned reason not to withdraw is that there was no safer place to put the money (unfamiliar financial institutions might be in even worse shape, bills were of uncertain value, gold and silver could be stolen). Today, the government offers offi-

cial money, easy internet access to direct government investments, and investor-friendly government-guaranteed assets. And all of these options can be researched on the internet, and your money transferred with the click of a mouse.

Capital idea

Reserve requirements are not the only protection mandated for financial institutions. Capital rules have been around since the 1920s, acquiring an explicit risk basis in the 1970s. The idea is that financial institutions should hold a certain fraction of risk-adjusted assets in the form of equity or debt subordinated to customer claims.

In theory, a firm with positive equity capitalization can increase equity capital indefinitely. Say, for example, that a firm has 100 million shares selling for \$100 each. It suffers an \$8 billion loss, so its shares fall to \$20 each. In theory, it could issue 400 million new shares to replace the

\$8 billion loss, in which case it would have the same financial statements as before the loss; it should therefore get back the \$10 billion market capitalization, making its shares worth \$20. In practice, this ability is limited by the equity market's faith in the company's management and business strategy. If the loss shook market confidence, the firm might have to issue 800 million new shares at \$10 each, and only get the market capitalization up to \$9 billion. But it should be able to survive, especially if it has nonfinancial assets like government approvals and captive cus-

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tomers, which are not affected by financial losses.

Clearly, this idea has broken down in the past six months. To take one example, simplifying and using rounded numbers, monoline insurance company AMBAC saw its market capitalization fall from \$10 billion to \$1 billion, while rating agencies told it that it needed \$1 billion additional capital to stay in business. It announced a plan to raise the equity, only to see its stock value fall to \$0.5 billion, which imperiled the offering and made it seem to be against shareholder interest. AMBAC withdrew the offering. Six weeks later it tried again; this time it needed \$1.5 billion. The stock price fell again. At least part of the reason for the equity declines is that some analysts thought that the size of the equity offerings were insufficient to save the business. The outcome remains in doubt at the time of this writing.

I don't know any of the details at AMBAC, so this is not intended as any criticism of its management. Maybe it made the best decisions. But on paper it didn't seem to conform to the strategy of early full disclosure to keep equity market confidence and rapid, proactive replacement of enough equity capital to replace losses and cushion increased risks. This appeared to be true of

other financial institutions as well. New equity raised was a fraction of reported losses, and reported losses were a fraction of analyst estimates of true losses. No additional equity seemed to be raised to offset increased riskiness. Disclosure was not made with the clarity and timeliness necessary to earn market confidence. The market responded by slashing financial institution stock prices and inflating credit spreads. This may or may not have represented good business decisions by financial institutions from the standpoint of maximizing long-term

shareholder value, but it clearly meant that the financial system had more risk than if the institutions had made earlier and better disclosures and raised more equity capital.

The three pillars of Basel II are capital adequacy, regulatory supervision, and market discipline. Collectively, these should keep financial institutions safe if they are willing to raise equity aggressively in bad times. If not, far more capital would be required than is currently held by any institutions to keep default probabilities below levels that used to be considered indications of extreme distress.

Where this leaves us

This reminds me of a time-lapse replay of the 1970s and 1980s. In the 1970s, money market mutual funds with check-writing caused a slow-motion run on the bank that reserve requirements were powerless to prevent. In the late 1970s and early 1980s, a host of factors wiped out financial institution equity. In both cases, changing circumstances changed investor (depositors in the first case, equity investors in the second) behavior, so the old rules were useless. That's what sent me into risk management. It seemed

not unreasonable that the era of big financial institutions was over, and that individuals with more brains than money could prosper in the vacuum left behind. If reserves and capital couldn't protect you, maybe IQ could.

As most of you know, the financial institutions came back, bigger than ever. The Federal Reserve System grew in size and complexity, and exploded in public profile. A vast new capital regime was invented and installed at the cost of many billions of dollars. Financial institutions hired lots of risk managers.

But I wasn't completely wrong. Hedge funds, which substitute brains (or alleged brains, anyway), for reserves and capital,¹ prospered as well, as did a host of companies and special purpose entities doing things that regulated financial institutions used to do, also without reserves or capital. There were attempts to pull these entities into the regulated orbit directly, or indirectly through their dealings with regulated institutions.

Now we've seen in six months the kind of damage it took 16 years to inflict in the 20th century. Those earlier problems led to thorough redesign and dramatic empowerment of reserve and capital systems, which were supposed to be at their brand new, shiny peaks at the beginning of the crisis. It would take quite an optimist to think that future recurrences can be prevented by another redesign or even more powers. The problem may be much more fundamental: that the kind of people who in bad times would leave their money in banks, and provide new equity for financial institutions, no longer exist (or no longer have money). That's not a bad thing; people have better alternatives today.

So maybe this all blows away, and becomes a footnote to financial history. But if not, we may see a new era when the brain is mightier than the purse.

FOOTNOTE

1. Of course, hedge funds have capital. But they don't have minimum capital requirements, and they generally don't have the ability to raise new capital as necessary to cover losses.