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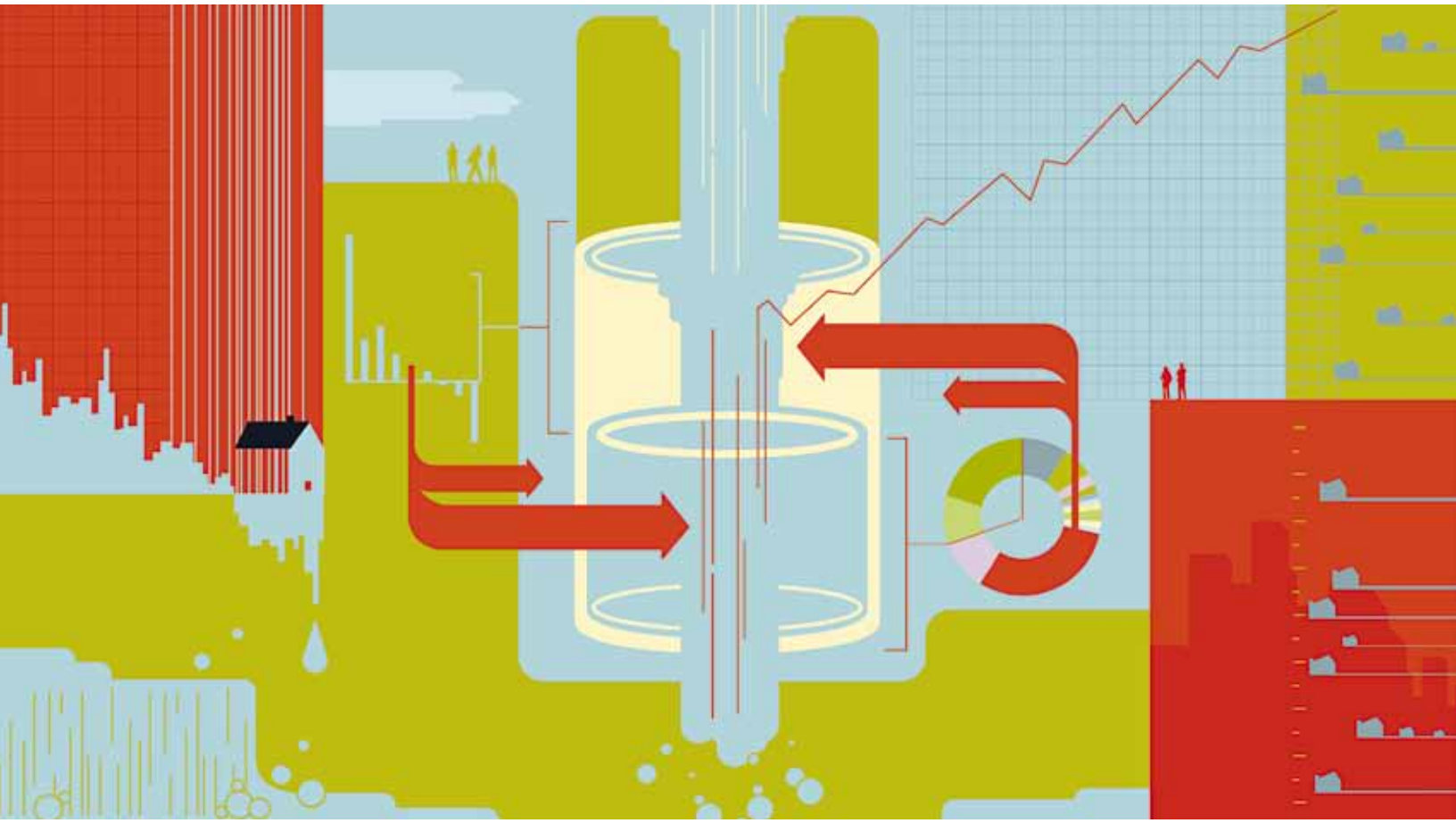
Perspectives on
Corporate Finance
and Strategy



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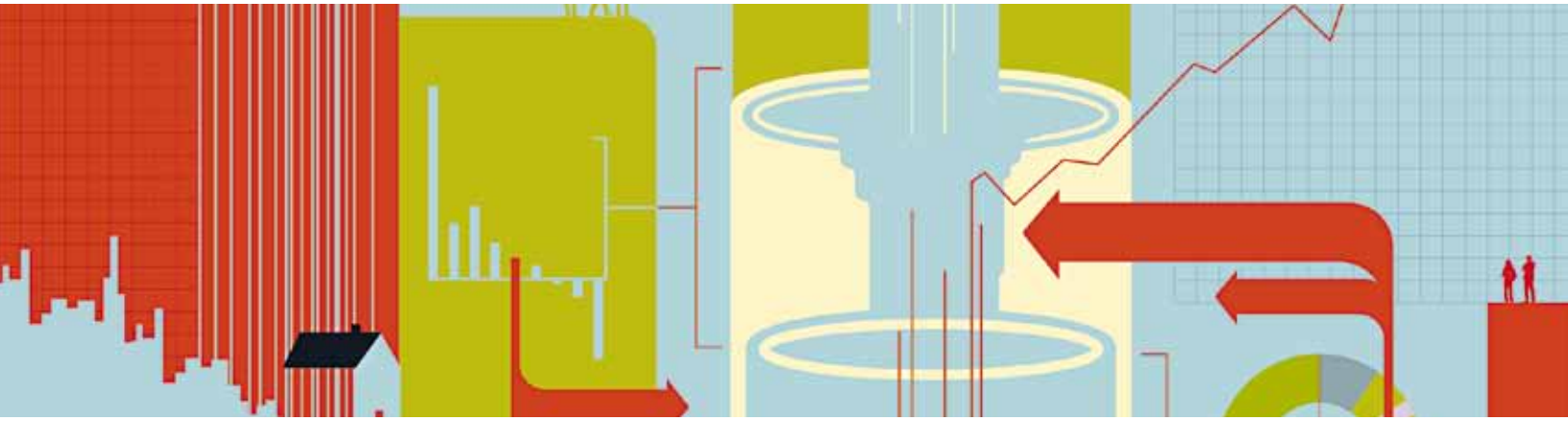


Why value value?

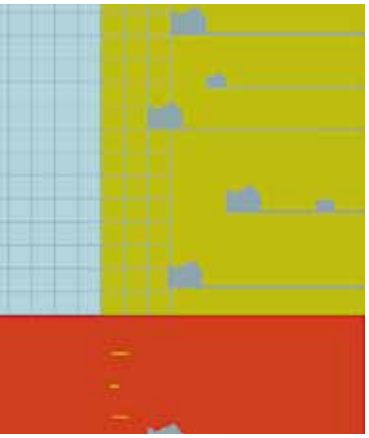
Companies, investors, and governments must relearn the guiding principles of value creation if they are to defend against future economic crises.

Timothy M. Koller

In response to the economic crisis that began in 2007, several serious thinkers have argued that our ideas about market economies must change fundamentally if we are to avoid similar crises in the future. Questioning previously accepted financial theory, they promote a new model, with more explicit regulation governing what companies and investors do, as well as new economic theories.

My view, however, is that neither regulation nor new theories will prevent future bubbles or crises. This is because past ones have occurred largely when companies, investors, and governments have forgotten how investments create value, how to measure value properly, or both. The result has been a misunderstanding about which investments are creating real value—a misunderstanding that persists until value-destroying investments have triggered a crisis.

Accordingly, I believe that relearning how to create and measure value in the tried-and-true fashion is an essential step toward creating more secure economies and defending ourselves against future crises. The guiding principle of value creation is that companies create value by using capital they raise from investors to generate future cash flows at rates of return exceeding the cost of capital (the rate investors require as payment). The faster companies can increase their revenues and deploy more capital at attractive rates of return, the more value they create. The combination



of growth and return on invested capital (ROIC) relative to its cost is what drives value. Companies can sustain strong growth and high returns on invested capital only if they have a well-defined competitive advantage. This is how competitive advantage, the core concept of business strategy, links to the guiding principle of value creation.

The corollary of this guiding principle, known as the conservation of value, says anything that doesn't increase cash flows doesn't create value.[1] For example, when a company substitutes debt for equity or issues debt to repurchase shares, it changes the ownership of claims to its cash flows. However, it doesn't change the total available cash flows,[2] so in this case value is conserved, not created. Similarly, changing accounting techniques will change the appearance of cash flows without actually affecting cash flows, so it will have no effect on the value of a company.

These principles have stood the test of time. Economist Alfred Marshall spoke about the return on capital relative to the cost of capital in 1890.[3] When managers, boards of directors, and investors have forgotten these simple truths, the consequences have been disastrous. The rise and fall of business conglomerates in the 1970s, hostile takeovers in the United States during the 1980s, the collapse of Japan's bubble economy in the 1990s, the Southeast Asian crisis in 1998, the dot-com bubble in the early 2000s, and the economic crisis starting in 2007 can all, to some extent, be traced to a misunderstanding or misapplication of these principles. Using them to create value requires an understanding of both the economics of value creation (for instance, how competitive advantage enables some companies to earn higher ROIC than others) and the process of measuring value (for example, how to calculate ROIC from a company's accounting statements). With this knowledge, companies can make wiser strategic and operating decisions, such as what businesses to own and how to make trade-offs between growth and returns on invested capital—and investors can more confidently calculate the risks and returns of their investments.

Market bubbles

During the dot-com bubble, managers and investors lost sight of what drove ROIC; indeed, many forgot the importance of this ratio entirely. When Netscape Communications went public in 1995, the company saw its market capitalization soar to $6 billion on an annual revenue base of just $85 million, an astonishing valuation. This phenomenon convinced the financial world that the Internet could change the way business was done and how value was created in every sector, setting off a race to create Internet-related companies and take them public. Between 1995 and 2000, more than 4,700 companies went public in the United States and Europe, many with billion-dollar-plus market capitalizations.

Many of the companies born in this era, including Amazon.com, eBay, and Yahoo!, have created and are likely to continue creating substantial profits and value. But for every solid, innovative, new business idea, there were dozens of companies that turned out to have virtually no ability to generate revenue or value in either the short or the long term. The initial stock market success of these flimsy companies represented a triumph of hype over experience.

Many executives and investors either forgot or threw out fundamental rules of economics in the rarefied air of the Internet bubble. Consider the concept of increasing returns to scale—also known as "network effects" or "demand-side economies of scale"—an idea that enjoyed great popularity

during the 1990s in the wake of Carl Shapiro and Hal Varian's book *Information Rules: A Strategic Guide to the Network Economy.*[4]

The basic idea is this: in certain situations, as companies get bigger, they can earn higher margins and returns on capital because their product becomes more valuable with each new customer. In most industries, competition forces returns back to reasonable levels. But in industries with increasing returns, competition is kept at bay by the low and decreasing unit costs incurred by the market leader (hence the "winner takes all" tag given to this kind of industry).

Take Microsoft's Office software, a product that provides word processing, spreadsheets, and graphics. As the installed base of Office users expanded, it became ever more attractive for new customers to use Office as well, because they could share their documents, calculations, and images with so many others. Potential customers became increasingly unwilling to purchase and use competing products. Because of this advantage, in 2009 Microsoft made profit margins of more than 60 percent and earned operating profits of approximately $12 billion on Office software—making it one of the most profitable products of all time.

As Microsoft's experience illustrates, the concept of increasing returns to scale is sound economics. What was unsound during the Internet era was its misapplication to almost every product and service related to the Internet. At that time, the concept was misinterpreted to mean that merely getting big faster than your competitors in a given market would result in enormous profits. To illustrate, some analysts applied the idea to mobile-phone service providers, even though mobile customers can and do easily switch providers, forcing the providers to compete largely on price. With no sustainable competitive advantage, mobile-phone service providers were unlikely ever to earn the 45 percent ROIC that was projected for them. Increasing-returns logic was also applied to Internet grocery-delivery services, despite these companies having to invest (unsustainably, eventually) in more drivers, trucks, warehouses, and inventory as their customer bases grew.

The history of innovation shows how difficult it is to earn monopoly-sized returns on capital for any length of time except in very special circumstances. That did not matter to commentators who ignored history in their indiscriminate recommendations of Internet stocks. The dot-com bubble left a sorry trail of intellectual shortcuts taken to justify absurd prices for technology company shares. Those who questioned the new economics were branded as simply "not getting it"—the new-economy equivalent of defenders of Ptolemaic astronomy.

When the laws of economics prevailed, as they always do, it was clear that many Internet businesses, including online pet food sales and grocery-delivery companies, did not have the unassailable competitive advantages required to earn even modest ROIC. The Internet has revolutionized the economy, as have other innovations, but it did not and could not render obsolete the rules of economics, competition, and value creation.

Financial crises

Behind the more recent financial and economic crises beginning in 2007 lies the fact that banks and investors forgot the principle of the conservation of value. Let's see how. First, individuals and speculators bought homes—illiquid assets, meaning they take a while to sell. They took out mortgages on which the interest was set at artificially low teaser rates for the first

few years but then rose substantially when the teaser rates expired and the required principal payments kicked in. In these transactions, the lender and buyer knew the buyer couldn't afford the mortgage payments after the teaser period ended. But both assumed either that the buyer's income would grow by enough that he or she could make the new payments or that the house's value would increase enough to induce a new lender to refinance the mortgage at similar, low teaser rates.

Banks packaged these high-risk debts into long-term securities and sold them to investors. The securities too were not very liquid, but the investors who bought them—typically hedge funds and other banks—used short-term debt to finance the purchase, thus creating a long-term risk for whoever lent them the money.

When the interest rate on the home buyers' adjustable-rate debt increased, many could no longer afford the payments. Reflecting their distress, the real-estate market crashed, pushing the values of many homes below the values of the loans taken out to buy them. At that point, homeowners could neither make the required payments nor sell their houses. Seeing this, the banks that had issued short-term loans to investors in securities backed by mortgages became unwilling to roll over the loans, prompting the investors to sell all such securities at once. The value of the securities plummeted. Finally, many of the large banks themselves owned these securities, which they, of course, had also financed with short-term debt that they could no longer roll over.

This story reveals two fundamental flaws in the decisions made by participants in the securitized mortgage market. They assumed that securitizing risky home loans made the loans more valuable because it reduced the risk of the assets. This violates the conservation-of-value rule. Securitization did not increase the aggregated cash flows of the home loans, so no value was created and the initial risks remained. Securitizing the assets simply enabled their risks to be passed on to other owners: some investors, somewhere, had to be holding them. Yet the complexity of the chain of securities made it impossible to know who was holding precisely which risks. After the housing market turned, financial-services companies feared that any of their counter parties could be holding massive risks and almost ceased to do business with one another. This was the start of the credit crunch that triggered a recession in the real economy.

The second flaw was to believe that using leverage to make an investment in itself creates value. It does not, because—referring once again to the conservation of value—it does not increase the cash flows from an investment. Many banks used large amounts of short-term debt to fund their illiquid long-term assets. This debt did not create long-term value for shareholders in those banks. On the contrary, it increased the risks of holding their equity.

In the past 30 years, the world has seen at least six financial crises that arose largely because companies and banks were financing illiquid assets with short-term debt.

Excessive leverage

As many economic historians have described, aggressive use of leverage is the theme that links most major financial crises. The pattern is always the same: companies, banks, or investors use short-term debt to buy long-lived, illiquid assets. Typically, some event triggers unwillingness among lenders to refinance the short-term debt when it falls due. Since the borrowers don't have enough cash on hand to repay the short-term debt, they must sell some of their assets. But because the assets are illiquid, and other borrowers are trying to do the same, the price each borrower can realize is too low to repay the debt. In other words, the borrower's assets and liabilities are mismatched.

In the past 30 years, the world has seen at least six financial crises that arose largely because companies and banks were financing illiquid assets with short-term debt. During the 1980s, in the United States, savings-and-loan institutions funded an aggressive expansion with short-term debt and deposits. When it became clear that these institutions' investments (typically real estate) were worth less than their liabilities, lenders and depositors refused to lend more to them. In 1989, the US government was forced to bail out the industry.

In the mid-1990s, the fast-growing economies in East Asia, including Indonesia, South Korea, and Thailand, fueled their investments in illiquid industrial property, plants, and equipment with short-term debt, often denominated in US dollars. When global interest rates rose and it became clear that the East Asian companies had built too much capacity, those companies were unable to repay or refinance their debt. The ensuing crisis destabilized local economies and damaged foreign investors.

Other financial crises fueled by too much short-term debt have included the Russian-government default and the collapse of the US hedge fund Long-Term Capital Management, both in 1998; the US commercial real-estate crisis of the early 1990s; and the Japanese financial crisis that began in 1990 and, according to some, continues to this day.

Market bubbles and crashes are painfully disruptive, but we don't need to rewrite the rules of competition and finance to understand and

avoid them. Certainly the Internet has changed the way we shop and communicate. But it has not created a "New Economy," as the 1990s catchphrase went. On the contrary, it has made information, especially about prices, transparent in a way that intensifies old-style market competition in many real markets. Similarly, the financial crisis triggered in 2007 will wring out some of the economy's recent excesses, such as people buying houses they can't afford and uncontrolled credit-card borrowing by consumers. But the key to avoiding the next crisis is to reassert the fundamental economic rules, not to revise them. If investors and lenders value their investments and loans according to the guiding principle of value creation and its corollary, prices for both kinds of assets will reflect the real risks underlying the transactions.

Equity markets

Contrary to popular opinion, stock markets generally continue to reflect a company's intrinsic value during financial crises. For instance, after the 2007 crisis had started in the credit markets, equity markets too came under criticism. In October 2008, a *New York Times* editorial thundered, "What's been going on in the stock market hardly fits canonical notions of rationality. In the last month or so, shares in Bank of America plunged to $26, bounced to $37, slid to $30, rebounded to $38, plummeted to $20, sprung above $26 and skidded back to almost $24. Evidently, people don't have a clue what Bank of America is worth."[5] Far from showing that the equity market was broken, however, this example points out the fundamental difference between the equity markets and the credit markets. The critical difference is that investors could easily trade shares of Bank of America on the equity markets, whereas credit markets (with the possible exception of the government bond market) are not nearly as liquid. This is why economic crises typically stem from excesses in credit rather than equity markets.

The two types of markets operate very differently. Equities are highly liquid because they trade on organized exchanges with many buyers and sellers for a relatively small number of securities. In contrast, there are many more debt securities than equities because there are often multiple debt instruments for each company and even more derivatives, many of which are not standardized. The result is a proliferation of small, illiquid credit markets. Furthermore, much debt doesn't trade at all. For example, short-term loans between banks and from banks to hedge funds are one-to-one transactions that are difficult to buy or sell. Illiquidity leads to frozen markets where no one will trade or where prices fall to levels far below that which reflect a reasonable economic value. Simply put, illiquid markets cease to function as markets at all.

During the credit crisis that began in 2007, prices on the equity markets became volatile, but for the most part they operated normally. The volatility reflected the uncertainty hanging over the real economy. The S&P 500 index traded between 1,200 and 1,400 from January 2008 to September 2008. In October, upon the collapse of US investment bank Lehman Brothers and the US government takeover of the insurance company American International Group (AIG), the index began its slide to a trading range of 800 to 900. But that drop of about 30 percent was not surprising given the uncertainty about the financial system, the availability of credit, and its impact on the real economy. Moreover, the 30 percent drop in the index was equivalent to an increase in the cost of equity of only about 1 percent,[6] reflecting investors' sense of the scale of increase in the risk of investing in equities generally.

There was a brief period of extreme equity market activity in March 2009, when the S&P 500 index dropped from 800 to 700 and rose back to 800 in less than one month. Many investors were apparently sitting on the market sidelines, waiting until the market hit bottom. The moment the index dropped below 700 seemed to trigger their return. From there, the market began a steady increase—reaching about 1,100 in December 2009. Our research suggests that a long-term trend value for the S&P 500 index would have been in the 1,100 to 1,300 range at that time, a reasonable reflection of the real value of equities.

In hindsight, the behavior of the equity market has not been unreasonable. It actually functioned quite well in the sense that trading continued and price changes were not out of line with what was going on in the economy. True, the equity markets did not predict the economic crisis. However, a look at previous recessions shows that the equity markets rarely predict inflection points in the economy.[7]

[1] Assuming there are no changes in the company's risk profile.
[2] Indeed, the tax savings from debt may increase the company's cash flows.
[3] Alfred Marshall, *Principles of Economics,* Volume 1, New York: Macmillan, 1920, p. 142.
[4] Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy,* Boston: Harvard Business School Press, 1998.
[5] Eduardo Porter, "The lion, the bull and the bears," *New York Times,* October 17, 2008.
[6] Richard Dobbs, Bin Jiang, and Timothy M. Koller, "Why the crisis hasn't shaken the cost of capital," mckinseyquarterly.com, December 2008.
[7] Richard Dobbs and Timothy M. Koller, "The crisis: Timing strategic moves," mckinseyquarterly.com, April 2009.

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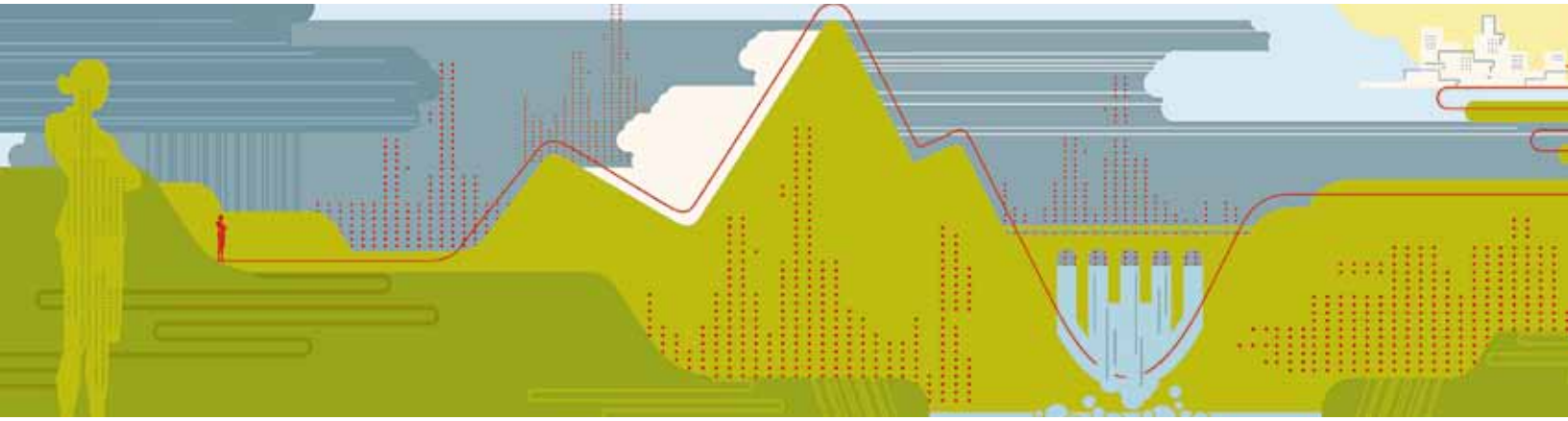


Thinking longer term during a crisis: An interview with Hewlett Packard's CFO

Cathie Lesjak reflects on the company's response to the recent global financial crisis—and the long-term effects it will have on performance.

Paul Roche

What CFO didn't face a baptism by fire during the economic crisis? Wild swings in currency rates, dramatic shifts in supply and demand, and the virtual freezing of the financial markets tested the mettle of even the most veteran CFO.

Hewlett-Packard's Cathie Lesjak was no exception. She ascended to the CFO role in January 2007, after nearly two decades in the treasury and other finance leadership positions at the company. As the global financial crisis escalated during the second half of 2008, the company was integrating its $13.9 billion acquisition of Electronic Data Systems (now known as HP Enterprise Services). When the crisis peaked, Lesjak was suddenly faced with severe cost-cutting measures, unprecedented uncertainty, and the full spectrum of crisis-related management challenges. Yet, a little more than a year later, the company announced its $2.7 billion acquisition of 3Com, signaling its intention to continue investing in future growth even during the challenging economic environment.

Lesjak recently sat down with McKinsey's Paul Roche, a partner in the Silicon Valley office, to recall the steps she took to ensure that HP could continue to meet its commitments to the market and to look ahead at the company's strategy. The interview took place in Lesjak's office at the company's headquarters, in Palo Alto, California.

McKinsey on Finance: *What was your immediate response when the financial crisis hit?*

Cathie Lesjak: Our business began to decline in late November of 2008, and by early December we were looking at a lot of different scenarios. The first thing we did was try to ascertain how bad the economy might get and how it would affect our financial performance.

The challenge was to pull together a big picture of all the moving parts, put in place additional measures, and, frankly, get everyone more focused on the tough environment. We started modeling more "what if" scenarios of what we thought could happen and what types of actions we would need to take. By mid-February, we had announced several initiatives. Some were short-term actions, such as cutting travel by almost 90 percent in all but our revenue-generating activities. It's interesting to note that a lot of that travel is never going to come back, even as things are getting better, because people have gotten more comfortable using our Halo video-conferencing solutions. So some things have changed culturally as a result of tough times.

In addition, most of our employees took a pay cut, which gave us an additional cushion. And what we ultimately did, which I think is a little unique, is we converted that pay cut to a bonus opportunity. At the end of the year, when it turned out that we didn't need the extra cushion, we paid bonuses that in the aggregate exceeded the total amount of the pay cuts.

McKinsey on Finance: *How did the mix of HP's business portfolio play out, in products as well as services?*

Cathie Lesjak: Service businesses have recurring revenue, which makes them very resilient. In this respect, the EDS acquisition couldn't have come at a better time, because it gave us stability just when it was most needed. And our technology services business, for example, continued to do well through the first half of 2009 and only started to feel the impact of the downturn in the second half of the year. The printer supplies business is also very resilient, and, in fact, if you look at the mix of hardware versus supplies in 2009, we had 60 to 65 percent of our revenue coming from supplies. Those are very-high-margin businesses, which also provides a certain amount of resiliency.

On the other hand, our PC, server, and storage businesses require a lot of operating leverage, so their operating profit was down almost twice as much as their revenue was in 2009. Obviously, the good news is that in 2010 we have an opportunity for that profit to come back as the economy picks up.

McKinsey on Finance: *You mentioned some of the modeling that you did. What have you done to the planning and budgeting process itself to build in new capabilities or new ways of looking at, for example, scenarios? Did you change that, or was this more of a crisis, in that you responded and moved on?*

Cathie Lesjak: There was a real demand placed on the finance function throughout 2009. The challenge wasn't just the recessionary environment; it was also the currency volatility. The late November–December 2008 period was very challenging because we'd get new forecasts showing massive moves in revenue, and obviously therefore in profit. Even through mid-2009, there were still some pretty big month-to-month jumps from a forecasting perspective. Revising the annual plan multiple times

to get a sense of what was happening from a currency perspective wasn't something we could put the organization through as often as we wanted, so we spent a lot of time coming up with new models to understand how the different businesses within HP would respond under different sets of circumstances. We were in a position to help senior management really understand the dynamics that were going on—which gave finance a bigger voice at the table.

It was a great learning experience for the business folks as well, because the finance people couldn't do it by themselves. They had to go and talk to people, and by asking the types of questions that the finance function asks they got the business guys thinking as well. So it became a much more collaborative effort to deliver the new models and the new understanding of how businesses would respond under a variety of economic conditions.

McKinsey on Finance: *Can you give some examples of that?*

Cathie Lesjak: If you go back to some of the modeling that I talked about, finance people were saying, "OK, what happened in the past, when the dollar has either dramatically strengthened or weakened? How quickly did you either raise or lower prices?" Having those types of discussions brings a heightened awareness to everybody about how long it has taken to pass increased costs or savings through to customers in the form of higher or lower prices.

Cathie Lesjak

Vital statistics
Born in 1959

Education
Graduated with a BA in biology in 1981 from Stanford University

Earned an MBA in finance in 1986 from the University of California, Berkeley

Career highlights
Hewlett-Packard
CFO and executive vice president (2007–present)

Senior vice president and treasurer (2003–07)

Group controller, HP Software Solutions (2000–03)

Controller and credit manager, HP Commercial Customer Organization (1998–2000)

Fast facts
Serves as a director of Neoware, a company HP acquired in October 2007

When we first started asking these questions, it wasn't like somebody said, "Oh, you know, for industry standard servers, it's three to four months. For PCs, it's a week." People didn't have those frames of reference. Now, after really thinking it through, there is a better understanding of what the "puts and takes" are for a business, as well as for the P&L. This is helpful to the business folks too.

McKinsey on Finance: *When you do budgeting in one of the businesses or in a function, do you have a process through the year where spending can be ratcheted up and down without having to do a complete replan?*

Cathie Lesjak: We absolutely do, although it's not as if you start the year with a plan and build in the conditions up front. It really happens as the quarters evolve and the year unfolds that you start to think, "Okay, we've got room to make some additional investments that are going to be important to HP in the long term." In 2009, our strategy was to continue investing in sales coverage and R&D to put HP in a stronger position. We wanted to build in the confidence and the cushion so that we could make these investments and take advantage of the downturn, as opposed to being on our back foot the entire time.

McKinsey on Finance: *On another topic, did the financial crisis accelerate or change the way you viewed the shift of revenue and the shift of markets globally?*

Cathie Lesjak: Longer term, not really. For quite some time, we've been focused on the fact that emerging markets were going to be a good growth opportunity for us—and they have been. In 2009, for example, China actually ended up growing. The first quarter was a bit tough, and we were concerned, but if you look at our fourth quarter, China grew in excess of 40 percent in PCs and more than 20 percent for HP.

The rest of the BRIC[1] countries and the emerging markets definitely had a tougher time. But we still believe, in the long term, that emerging markets are where a lot of the growth will take place. For example, if you look at PC penetration rates in the emerging markets, they're a fraction of what they are in developed markets. So the opportunity is definitely there.

Now, no question, you've got to have the right products. We have set up R&D facilities in India, China, and other locations specifically to do development *in* local markets *for* local markets. We've got to design the right set of products, both in the premium and value markets, to make sure that we're targeting the overall market correctly.

McKinsey on Finance: *What does expected growth in China as well as in some of the other emerging markets imply for the size and staffing of the finance organization, the treasury organization, controlling, and so forth in those regions?*

Cathie Lesjak: Two or three years ago, we concluded that we would need to staff emerging markets differently. Some of them are small, but complex and growing rapidly. If we used our normal rule of thumb in terms of the level and amount of resources that we would place in those countries, we'd end up with less experience than we actually needed there. We realized we'd have to staff these markets as if they were bigger countries, because of the complexity and rapid growth. Folks who are less experienced are fine if a market is growing on a predictable,

relatively slow basis. But when business grows exponentially, you need more skilled, experienced people who have seen a variety of things.

So we've decided to overhire, from our rule-of-thumb perspective, so that we're able to take advantage of what each market is going to be, rather than what it is today.

McKinsey on Finance: *What effect has the financial crisis of 2009 had on the treasury department within HP?*

Cathie Lesjak: There was a whole revamping of our thought process, especially in late 2008 and early 2009. For example, we used to rely heavily on S&P and Moody's and Fitch for their investment ratings, but now we need another layer of scrutiny.

Today, you want to look at a variety of indicators of credit strength, as opposed to just relying on a rating that comes out. Because, frankly, if you looked at asset-backed investments and money markets that invested heavily in asset-backed securities, the ratings in many instances—not in all—just didn't hold up. I mean, things that we thought were AA and AAA, they certainly didn't act like AA and AAA investments. And so, in addition to the ratings, we're looking at other filters, such as the credit-default-swap spreads, to figure out what we want to do.

There have also been a number of changes in treasury as a result of the financial markets in terms of what the opportunities are, what the yields are, and how much risk we want to take. It doesn't help that the yields are incredibly low right now. Almost no matter what you do—unless you go very risky—the yields are low, and I think that's impacting a lot of companies. I get a lot of questions from treasury organizations on what we're doing about the yields.

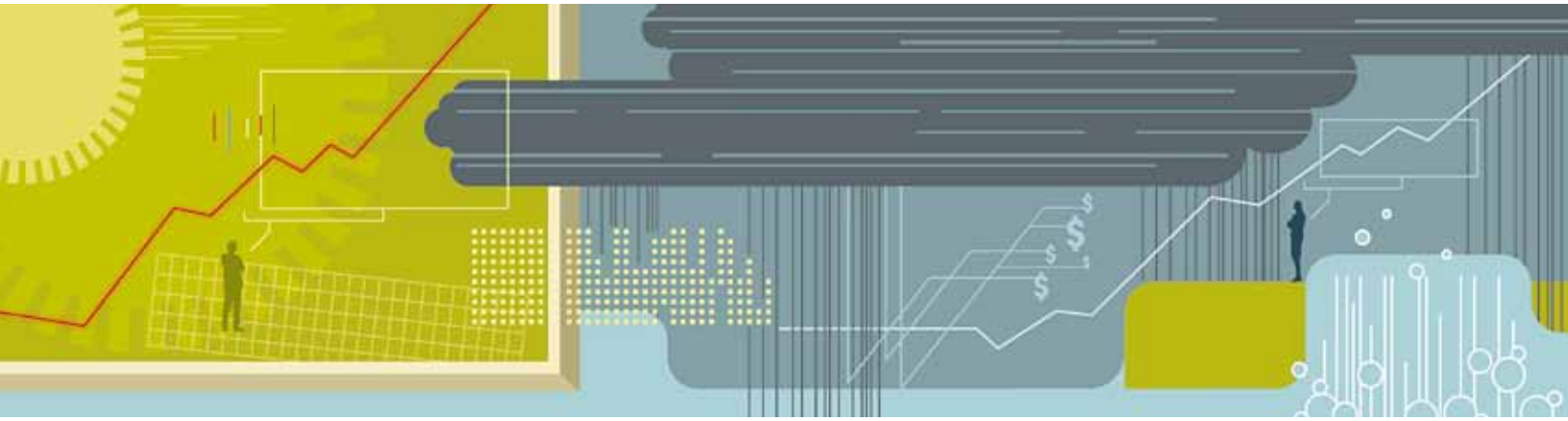
McKinsey on Finance: *What's your sense about the balance that HP's looking for between operating improvement and growth? Because clearly, over the years you've achieved some of each, but outsiders in the Valley would certainly look at HP and say, "Wow, the operational improvement has been tremendous." What's the right mix?*

Cathie Lesjak: Getting your cost structure right is the enabler to growth, so we'll always be focused on both cost initiatives and growth. In 2010, we are definitely taking additional cost actions because we're always going to do that, but we're also making more significant investments to cover our total addressable market.

So the folks inside HP are going to hear a lot more about sales coverage in 2010 than they did in 2009. For example, we view the 3Com acquisition as more of a growth acquisition than a cost story, because while there are some synergies—the real long-term value of 3Com is to address more of the market, which includes both networking and data centers. Also, a good chunk of 3Com's business is in China, including a strong R&D presence that we can build on for the future.

[1] Brazil, Russia, India, and China.

Paul Roche (Paul_Roche@McKinsey.com) is a partner in McKinsey's Silicon Valley office.



Equity analysts: Still too bullish

After almost a decade of stricter regulation, analysts' earnings forecasts continue to be excessively optimistic.

Marc H. Goedhart, Rishi Raj, and Abhishek Saxena

No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typically overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.[1]

Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest.[2] For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.

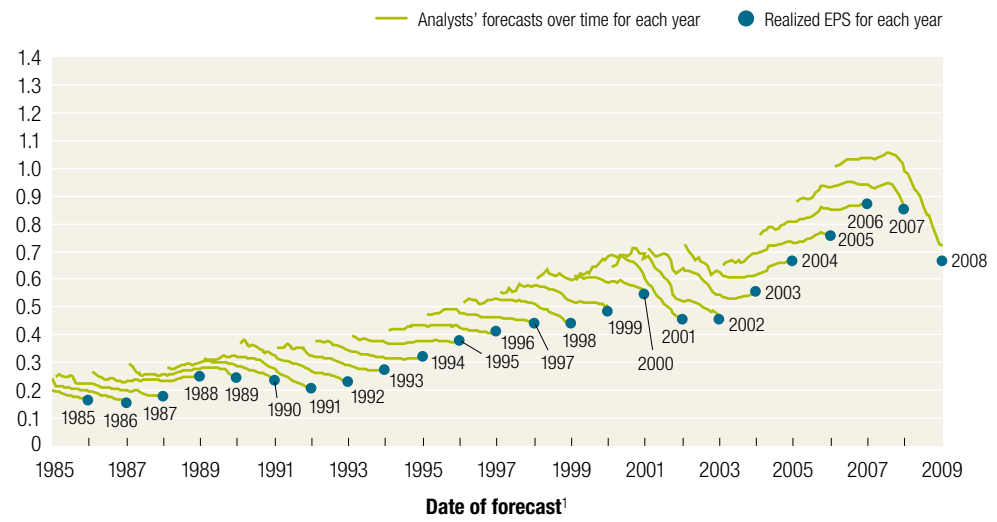
Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark.

Exhibit 1

Off the mark

With few exceptions, aggregate earnings forecasts exceed realized earnings per share.

Earnings per share (EPS) for S&P 500 companies, $



[1]Monthly forecasts.

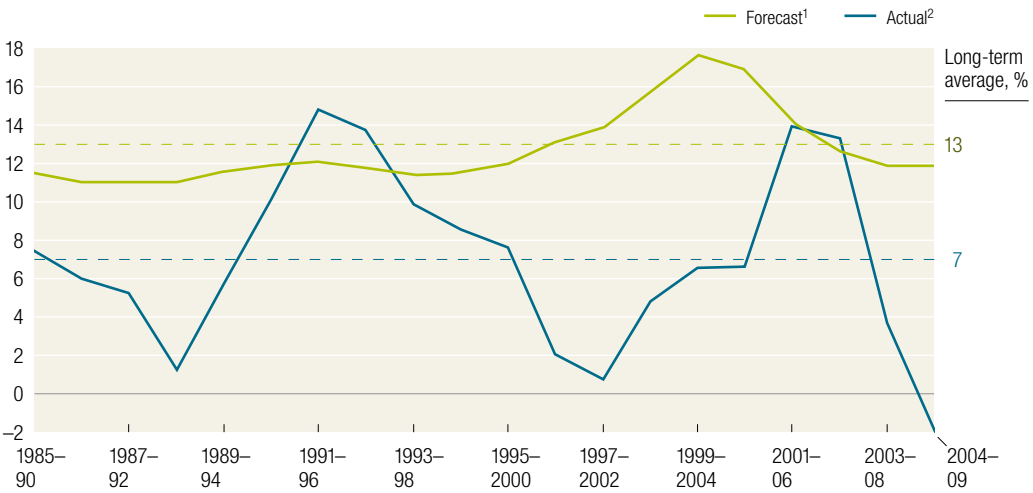
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 2

Overoptimistic

Actual growth surpassed forecasts only twice in 25 years—both times during the recovery following a recession.

Earnings growth for S&P 500 companies, 5-year rolling average, %



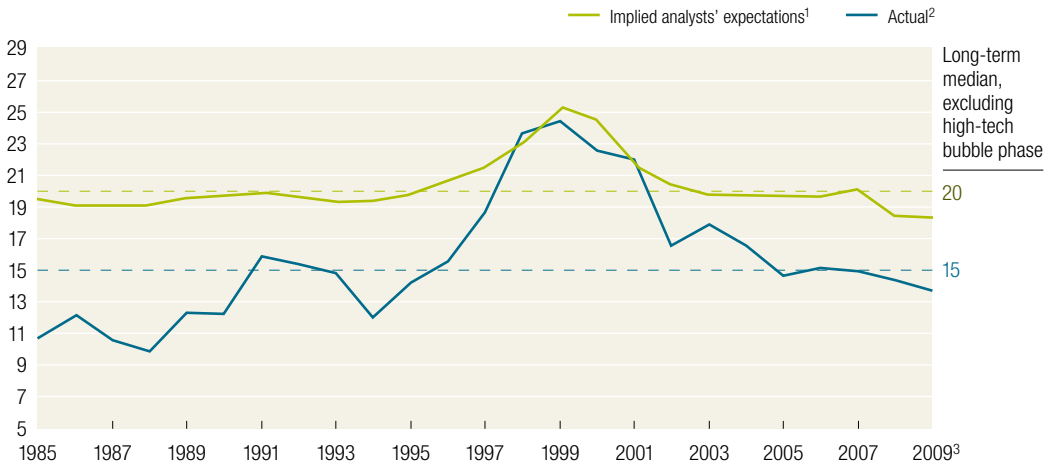
[1]Analysts' 5-year forecasts for long-term consensus earnings-per-share (EPS) growth rate. Our conclusions are same for growth based on year-over-year earnings estimates for 3 years.
[2]Actual compound annual growth rate (CAGR) of EPS; 2009 data are not yet available, figures represent consensus estimate as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 3
Less giddy

Capital market expectations are more reasonable.

Actual P/E ratio vs P/E ratio implied by analysts' forecasts, S&P 500 composite index



[1]P/E ratio based on 1-year-forward earnings-per-share (EPS) estimate and estimated value of S&P 500. Estimated value assumes: for first 5 years, EPS growth rate matches analysts' estimates then drops smoothly over next 10 years to long-term continuing-value growth rate; continuing value based on growth rate of 6%; return on equity is 13.5% (long-term historical median for S&P 500), and cost of equity is 9.5% in all periods.
[2]Observed P/E ratio based on S&P 500 value and 1-year-forward EPS estimate.
[3]Based on data as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases.[3] So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006.

Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year,[4] compared with actual earnings growth of 6 percent.[5] Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession (Exhibit 2). On average, analysts' forecasts have been almost 100 percent too high.[6]

Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999–2001, actual price-to-earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts (Exhibit 3). What's more, an actual forward P/E ratio[7] of the S&P 500 as of November 11, 2009—14—is consistent with long-term earnings growth of 5 percent.[8] This assessment is more

reasonable, considering that long-term earnings growth for the market as a whole is unlikely to differ significantly from growth in GDP,[9] as prior McKinsey research has shown.[10] Executives, as the evidence indicates, ought to base their strategic decisions on what they see happening in their industries rather than respond to the pressures of forecasts, since even the market doesn't expect them to do so.

[1] Marc H. Goedhart, Brendan Russell, and Zane D. Williams, "Prophets and profits," mckinseyquarterly.com, October 2001.
[2] US Securities and Exchange Commission (SEC) Regulation Fair Disclosure (FD), passed in 2000, prohibits the selective disclosure of material information to some people but not others. The Sarbanes–Oxley Act of 2002 includes provisions specifically intended to help restore investor confidence in the reporting of securities' analysts, including a code of conduct for them and a requirement to disclose knowable conflicts of interest. The Global Settlement of 2003 between regulators and ten of the largest US investment firms aimed to prevent conflicts of interest between their analyst and investment businesses.
[3] The correlation between the absolute size of the error in forecast earnings growth (S&P 500) and GDP growth is –0.55.
[4] Our analysis of the distribution of five-year earnings growth (as of March 2005) suggests that analysts forecast growth of more than 10 percent for 70 percent of S&P 500 companies.
[5] Except 1998–2001, when the growth outlook became excessively optimistic.
[6] We also analyzed trends for three-year earnings-growth estimates based on year-on-year earnings estimates provided by the analysts, where the sample size of analysts' coverage is bigger. Our conclusions on the trend and the gap vis-à-vis actual earnings growth does not change.
[7] Market-weighted and forward-looking earnings-per-share (EPS) estimate for 2010.
[8] Assuming a return on equity (ROE) of 13.5 percent (the long-term historical average) and a cost of equity of 9.5 percent—the long-term real cost of equity (7 percent) and inflation (2.5 percent).
[9] Real GDP has averaged 3 to 4 percent over past seven or eight decades, which would indeed be consistent with nominal growth of 5 to 7 percent given current inflation of 2 to 3 percent.
[10] Timothy Koller and Zane D. Williams, "What happened to the bull market?" mckinseyquarterly.com, November 2001.

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Board directors and experience: A lesson from private equity

Independent directors contribute an outside perspective to governance, but analysis of private-equity firms suggests they need relevant managerial expertise too.

Viral V. Acharya and Conor Kehoe

Independent directors are very much in fashion. Many companies, particularly in Europe, are looking to fill openings on their boards with professionals they hope will bring close oversight, renewed enthusiasm, and broader perspectives on strategy.

Similar attributes—such as independence and deep engagement in setting strategy and managing performance—are often cited as the primary reasons for the success of the better private-equity firms. Indeed, our own past analyses have found that these firms persistently outperform the S&P 500 because their partners are active directors of the businesses in their funds. They are more engaged with setting strategy and managing performance as their own interests are tied to the success of a business.[1]

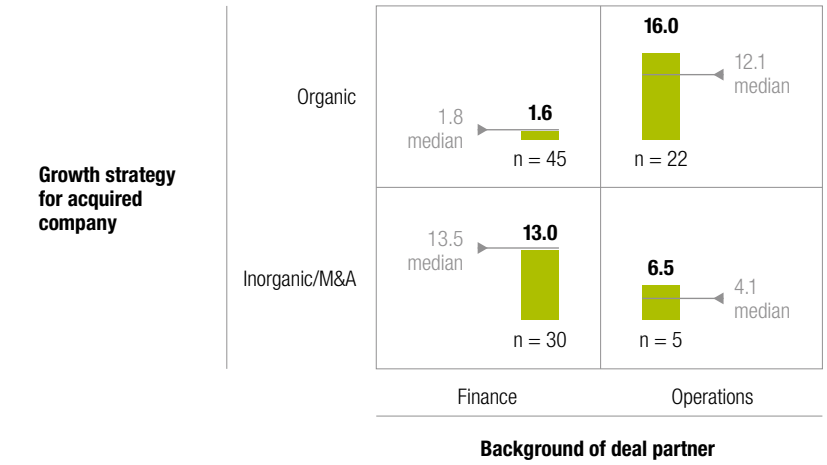
Yet greater involvement is apparently not the whole story. Our new research on private-equity firms shows that deals generate the greatest value when the skills of the lead partner are directly relevant to the business strategy of the portfolio companies to which they are assigned.[2] Partners with a finance background, for example, do best when acquisitions are central to a value creation strategy, and partners with managerial backgrounds do better with companies whose chosen route to value is organic development (exhibit). And both strategies led to outperformance: companies that developed organically grew sales in line with

Exhibit

A good match

The deals that generated the greatest value involved deal partners whose skills were directly relevant to the business strategy for the acquired company.

Outperformance[1] for 110 of the largest European deals from 1996 to 2005, simple average, %



[1]Rate of return on equity (ROE) of a deal minus that of quoted peers and excluding the effect of debt.

their public-company peers but improved their margins more rapidly through faster improvements in productivity. Companies that grew through acquisitions improved their value by increasing expected future profits[3] more than quoted peers did—for example, because of higher expected margins once acquisitions are properly integrated.[4]

For public companies, these findings raise interesting questions about the expertise and experience they should be seeking even from independent directors—and their ability to match the strengths of a board to their overall strategies. The challenge goes beyond finding directors who will dedicate enough time to the company and who understand it (perhaps as the result of experience in its industry). The findings suggest that directors might also be chosen for their experience in having executed similar strategies elsewhere—perhaps in industries that have evolved further.

For private-equity firms, our findings raise questions about how they assign partners to deals. Do these firms consider the way value will be added to an acquired company? Should they deploy small teams of partners with different backgrounds for deals requiring more complex strategies? Are the firms doing enough to develop and expand the skills of partners beyond what they learned before entering private equity?

[1] See Andreas Beroutsos, Andrew Freeman, and Conor F. Kehoe, "What public companies can learn from private equity," mckinseyquarterly.com, January 2007; and Viral Acharya, Conor Kehoe, and Michael Reyner, "The voice of experience: Public versus private equity," mckinseyquarterly.com, December 2008.
[2] We looked at 110 of the largest European deals in the decade from 1996 to 2005.
[3] Expressed as the multiple of current profits at which they were valued.
[4] The companies in our sample typically started out with average margins—so they were not turnarounds.

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A better way to measure bank risk

One capital ratio tops others in foreshadowing distress—and it's not the one that's traditionally been regulated.

Kevin S. Buehler, Christopher J. Mazingo, and Hamid H. Samandari

In response to the global banking crisis, regulators and policy makers worldwide have united behind efforts to increase financial institutions' minimum capital requirements and to limit leverage, hoping to reduce the likelihood of future bank distress.[1] As of this writing, the debate over proper capital requirements continues, with major implications for the industry and the economy—yet there have been few specifics on which ratios should be targeted or at what levels.

To shed some light on the discussions, we analyzed the global banking crisis of 2007 through 2009[2] to identify relationships that different types of capital and capital ratios have to bank distress.[3] Our analysis is observational, based on historical data, and not a real-world experiment, which would have required randomly selected financial institutions to hold different capital levels to gauge their effects. As a result, the findings do not definitively establish how institutions might perform in the future if minimum capital ratios were changed, but we believe that the evidence we provide is a valuable input for current policy discussions.

We found that one capital ratio—the ratio of tangible common equity (TCE)[4] to risk-weighted assets—outperforms all others as a predictor of future bank distress. We also found that requiring a minimum leverage ratio would not have offered any insights that couldn't have been found

by studying the right capital ratio. And, not surprising, we found that a higher bar on capital requirements, while reducing the likelihood of bank distress, comes at an increasing cost.

One capital ratio outperforms the rest

Among the various ratios, the one that offers the greatest clarity into the likelihood of bank distress actually measures TCE (the portion of equity that is neither preferred equity nor intangible assets) against risk-weighted assets, or RWA (Exhibit 1). TCE, like Tier 1[5] capital, can absorb losses because it offers banks the contractual flexibility either to eliminate repayments entirely or to defer them for extended periods of time. It can also absorb losses whether or not a bank remains a going concern. Moreover, our analysis found that the measures most commonly regulated currently—those based on the combined Tier 1 plus Tier 2[6] capital levels—are the least useful, in part because banks can seldom use Tier 2 capital to absorb a loss if they are to continue operating. For example, unrealized gains on securities may be unavailable in times of severe economic stress, and subordinated debt may trigger default if payments are deferred.

In addition, banks have successfully arbitraged capital ratios traditionally watched by regulators through the banks' increasing use of non-common-equity instruments, such as cumulative preferred stock and trust-preferred securities, that qualify for treatment as Tier 1 capital but could be issued at lower cost than common equity. This practice weakens the ability of an institution to absorb losses and the ability of regulations to limit its riskiness.

Leverage ratios add little benefit

Our analysis also found that an additional leverage ratio would not have offered any insight into the likelihood of bank distress beyond that provided by the TCE/RWA ratio. The same number of banks are affected (and the same amount of distress avoided) whether or not limits are placed on leverage.

Exhibit 1

From the analysis

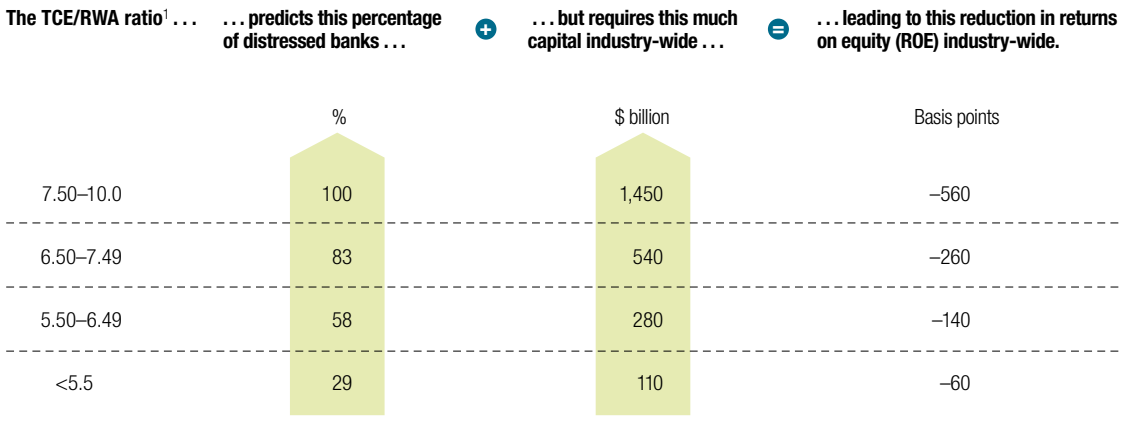
The TCE/RWA capital ratio outperformed every other metric in predicting how many banks were likely to become distressed.

When a random sample predicted this percentage of distressed banks . . .	. . . the TCE/RWA[1] ratio predicted this:	The next-best predictor of distress was . . .
20%	**33%**	Tier 1 + Tier 2 Capital/RWA ratio predicted 33% (matching TCE/RWA here, but less predictive at every other level)
40%	**67%**	Tier 1 Capital/RWA predicted 54%
80%	**100%**	Tier 1 Capital/RWA predicted 96%

[1]TCE, or tangible common equity, is shareholders' equity, less preferred shares, goodwill, and other intangibles; RWA is risk-weighted assets.

Exhibit 2
Costly security

Higher capital ratios leave fewer banks at risk of distress but also come with a higher price tag—and lower returns for banks.



[1]TCE, or tangible common equity, is shareholders' equity, less preferred shares, goodwill, and other intangibles; RWA is risk-weighted assets.

This finding does not prove that regulating leverage ratios is a bad idea. It does suggest, however, that the rationale must be based on other considerations. For example, leverage ratios might protect the liability side of the balance sheet against greater-than-expected haircuts on repurchase (or repo) financing, which could precipitate a systemic crisis. They also might help prevent future errors in risk weighting and regulatory arbitrage of risk weightings. But the use of leverage ratios has also arguably created an incentive for the growth of off-balance-sheet activities, which remove certain assets from the leverage ratio calculation and increase risk while circumventing additional capital requirements.

Lowering risk has a cost

While it is possible to lower a bank's level of risk by increasing its TCE/RWA ratio, the trade-off is higher costs. Reducing the number of banks at risk through a higher capital base decreases the returns on equity (ROE) for the industry (Exhibit 2). For instance, a TCE/RWA ratio of 10 percent would have affected all of the banks that became distressed during the recent crisis but would have required an incremental $1.45 trillion in capital[7] and reduced industry-wide average ROEs by an extraordinarily high 560 basis points. In addition to the impact on ROEs, increasing the required capital levels would likely have macroeconomic costs, including the effects of a short-term contraction in the availability of credit and the potential long-term effects of reduced lending levels, which result in lower GDP growth.[8]

One test for regulators is wisely balancing the incremental benefits of higher capital requirements against the costs that they impose on financial institutions, borrowers, and society more broadly. For example, our analysis indicates that requiring banks to hold a TCE/RWA ratio in the range of 6.5 to 7.5 percent would have affected 83 percent of banks that became distressed while requiring $540 billion in incremental capital and a decrease in ROE of 260 basis points.

• • •

In the effort to prevent future banking crises, regulators would do well to set minimum capital requirements by balancing the benefits of reduced distress with the costs that come from higher capital requirements.

[1] For example, the Basel Committee on Banking Supervision (an international consortium of banking regulators) proposed a major series of revisions to minimum capital standards in December 2009. The committee proposed regulating ratios that had not previously been regulated internationally, such as the ratio of tangible common equity (TCE) to risk-weighted assets (RWA) and the leverage ratio.

[2] Our approach was simply to take a snapshot of global bank balance sheets, including capital position as of December 31, 2007, and to estimate the relationship between initial capital and leverage ratios and subsequent bank performance in 2008–09. We analyzed 115 large global banks (minimum asset size, $30 billion) representing $62.2 trillion in total assets—about 85 percent of developed-market banking assets and 65 percent of global banking assets.

[3] We deemed a bank to be in distress if it met any of four conditions: (1) it had declared bankruptcy, (2) it had been taken over by the government or placed into government receivership, (3) it had merged with another bank under duress, or (4) it had received a government bailout of more than 30 percent of its Tier 1 capital as of December 31, 2007. Using this definition, 24 banks with $18.5 trillion in assets were considered distressed.

[4] TCE is shareholders' equity, less preferred shares, goodwill, and other intangibles (for instance, deferred-tax assets and mortgage-servicing rights).

[5] Tier 1 capital includes issued and fully paid common stock, perpetual noncumulative preferred shares, reserves created out of retained earnings or surpluses related to share issuance, and minority interests in consolidated subsidiaries, less disallowed intangibles (for instance, goodwill).

[6] Tier 2 capital includes undisclosed reserves, unrealized gains on securities, asset revaluation reserves, general provisions and loan-loss reserves, hybrid capital instruments, and an allowable portion of subordinated debt.

[7] Incremental capital required is the estimated amount of additional capital required for all global banks below the maximum capital ratio in the range to reach that level. It is measured by the banks' capital position as of December 31, 2007.

[8] See, for example, Tamim Bayoumi and Ola Melander, "Credit matters: Empirical evidence on U.S. macro-financial linkages," International Monetary Fund working paper 08/169, July 2008; and David Greenlaw, Jan Hatzius, Anil K. Kashyap, and Hyun Song Shin, "Leveraged losses: Lessons from the mortgage market meltdown," US Monetary Policy Forum report number 2, Rosenberg Institute at the Brandeis International Business School and the Initiative on Global Markets, University of Chicago Booth School of Business, 2008.

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A new look at carbon offsets

Carbon markets will continue to play a role in pricing—and limiting—emissions, but the opportunity in developing markets may be less promising than once expected.

Marcel Brinkman

The CFOs of any company that uses or produces energy were naturally interested in the outcome of December 2009's Copenhagen round of global climate negotiations, for both the potential new costs and new opportunities. Although the conference did not lead to the legally binding global carbon reduction treaty that a lot of climate watchers had hoped for, many are still watching closely as regional (rather than global) carbon markets continue to evolve. For despite the uncertainty in Copenhagen, current global carbon market arrangements will probably survive. The pricing that these markets set for carbon emission allowances will continue to be increasingly important for businesses—in particular, those facing the cost of buying allowances (so-called carbon credits) or developing projects for which carbon credits are anticipated sources of revenue.

Emission caps and related carbon trading in developed nations are a very effective way to reduce carbon emissions if supported by other forms of regulation, such as energy-efficiency standards. Moreover, developed nations will continue to be bound by domestically defined emission caps and can trade their carbon allocations among each other and through the offset market for developing nations.

However, the role of carbon markets in developing nations (through offset financing) is still unclear and might be relatively limited compared with their

role in developed nations. The difference is a result of both the large potential of and requirements for emission reduction in developing countries and the limited demand for offsets from developed nations, given the current proposals on the table. This imbalance may limit the ability of companies in developed markets to benefit from offset credits for investments in developing nations. Indeed, if carbon markets do not take off in developed nations in a major way, companies could be left holding credits for which there is no demand.

The economics of offset markets

Even though a global deal remains elusive, domestic and regional carbon markets will continue to grow—from slightly less than €100 billion in 2008 to around €800 billion in 2020, according to recent McKinsey estimates. The European Union, for example, already has a domestic carbon market—currently the only one of its size, with trading volumes expected to increase as the market matures and liquidity increases. The United States is poised to establish one, with climate change legislation awaiting action this year. And a number of other countries, including Australia, Canada, Japan, and New Zealand, are considering the introduction of domestic carbon markets. At the same time, multiple regional markets exist (within the United States, for example) or are being considered (as in China), mostly voluntary in nature.

Companies in these markets have a choice of reducing their own emissions to stay within their caps, buying credits from other companies, or buying international offsets. Abatement achieved through domestic carbon markets counts toward the economy-wide targets, as do purchased international offset credits. Without a mechanism linking the various domestic carbon markets, prices, driven by local market conditions, will probably vary significantly.

The offset market plays a key role, as it is the de facto international carbon price mechanism, in the absence of direct market linkage. In theory, an originator of offset credits—say, an offset project developer—can sell its credits to a government in an Annex I country[1] (which will use these credits to offset its carbon reduction commitments) or to a company in a domestic carbon market. These activities can create price arbitrage between various domestic carbon markets and the international carbon market.

Two factors hamper price equalization among the offset market, domestic carbon markets, and the global market as envisioned by the assigned amount units (AAU) established in the 1997 Kyoto Protocol on climate change.

- On the one hand, countries have limited the amount of offsets that can be imported into domestic carbon markets. For instance, the European Union will allow only 1.6 metric gigatons[2] (GT) of offset credits to be imported into its market from 2008 to 2020, or on average 0.1–0.2 GT per annum. As this quota will probably be exhausted by 2015, prices on the European carbon market might start to deviate from offset market prices.

- On the other hand, the demand for offsets from Annex I countries is less certain, as the global market is oversupplied with "hot air,"[3] which limits the need to buy offset credits. Therefore, national demand for offset credits is typically seen as "soft."

Offset market supply also plays a key role in offset market prices. Initially, offsets were based on

relatively cheap sources; for instance, many reductions in levels of greenhouse gases other than carbon dioxide require little upfront investment. As the market matures, more expensive sources of abatement, often requiring an upfront investment, will be pursued. Supply will also be determined by the offset market's future structure. Currently, carbon offsets are project based, which requires independent verification of projects—a slow and bureaucratic process. There are also concerns about the so-called additionality of project-based offsets.[4]

Multiple proposals have been put on the table to scale up offset markets. Key options include a reformed project-based mechanism, a programmatic mechanism that would award policies with credits, a sector no-lose mechanism that would reward abatements but not punish their absence, outright sector caps, or any combination of the above. The eventual supply of credits and their relative cost will be determined by the choice of mechanism, as well as the type of offset credits allowed (for example, whether they include carbon capture and storage, nuclear power, or efforts to cut emissions by reducing deforestation and the degradation of forests).

McKinsey has developed a carbon market model based on the firm's most recent greenhouse-gas-abatement cost curve.[5] This tool models all domestic and international carbon markets over time and estimates emission reductions and long-term fundamental carbon price levels by markets, as well as the flows among them. The model is not a price-forecasting tool but does help users understand relative price differences between markets and the fundamental factors that explain those differences. The "hard" demand for offsets is expected to be around 1.4 GT by 2020—adding up demand from domestic carbon markets, including the European carbon market and the expected US one. Additional soft demand from Annex I countries, arising from their reduction commitments, could add a further 0.5 GT of demand but depends critically on the resolution of the hot-air overhang from the 2008–12 Kyoto period and the absence of hot air after 2012.

The model calculates that 2020 carbon prices in the EU emission-trading system (around €29 a ton) will be well above the price in the offset market (around €13 a ton, which reflects the exhaustion of the system's offset quota). The US carbon market price (€16 a ton) is much closer to the offset market price. The difference results from the offset discount factor proposed in the American Clean Energy and Security Act of 2009.[6]

Abatement: A modest role in developing countries

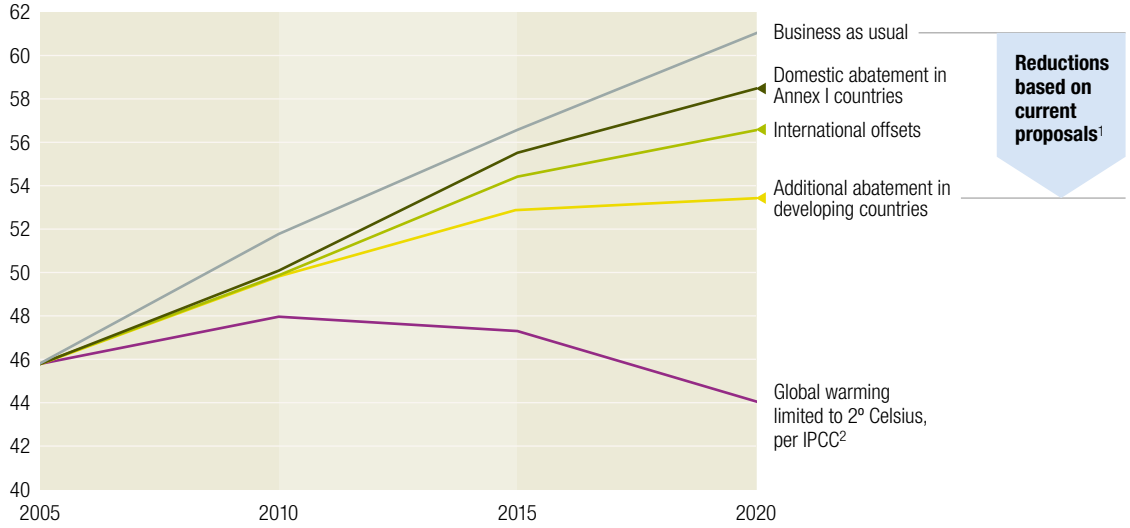
The Intergovernmental Panel on Climate Change (IPCC) suggests that the global community needs to limit emissions to 44 GT in 2020 in order to limit global warming to two degrees.[7] That goal would require global cuts of up to 17 GT of emissions by 2020. A large share of this decline will have to take place in developed nations, but their potential is limited to 5 GT by 2020. Faster-growing developing nations have more room to make low-carbon choices in energy efficiency and power (6 GT by 2020), as well as most of the emission reduction potential of preserved forests (roughly another 6 GT by 2020).

McKinsey's carbon market model offers a view on the likely outcomes of the global regulatory debate, and in particular the role played by carbon markets. To do so, the model assesses the effectiveness of existing and proposed climate change regulations, including those outside the emissions directly capped by carbon markets. Emission reductions of all kinds influence carbon market outcomes. As an example, energy

Exhibit
Only halfway

Based on current proposals, the world will achieve only half of the emission reduction required to limit global warming to 2 degrees Celsius by 2020.

Global greenhouse gas emissions,
metric gigatons of carbon dioxide equivalents



[1]From Annex I and developing countries. Under the Kyoto Protocol, Annex I countries are those 37 industrialized nations that committed themselves to a reduction of greenhouse gases.
[2]Intergovernmental Panel on Climate Change.

efficiency in European buildings (not covered by the EU Emission Trading System) will reduce demand for power and thereby the power sector's emissions (which are covered). In a similar fashion, climate change regulation in developing nations can influence the availability of offset supply, particularly in sectorwide offset programs.

A detailed assessment of all proposals from Annex I and non–Annex I countries currently on the table[8] shows that the world will be able to realize only about half of the emission reduction potential required to limit global warming to two degrees (exhibit). Of this emission potential, three GT of reductions will be achieved as domestic abatements in Annex I countries, up to two GT will be international offsets (which count toward the domestic abatement of Annex I countries), and a further three GT will be achieved by autonomous action from developing nations, potentially with financial support from Annex II nations.[9]

Actions currently envisioned by developing countries include a 70 percent reduction of deforestation in the Amazon rainforest by 2017 (which Brazil has proposed) and the increase of renewable power in China to 15 percent of its energy mix in 2020. In reality, most developing nations are unwilling to make stringent commitments before that year, while some have proposed quantified caps thereafter. South Africa, for instance, proposes to let its emissions peak in 2025 before reducing them after 2035.

Offset demand of up to 2 GT represents significant growth compared with 2008, when 140 megatons of offset credits were issued. Yet 2 GT is a relatively modest amount in light of the up to 17 GT of abatement required to limit global warming to two degrees.

We need to be critical of this assessment, however, as the scenario modeled is only one possible

outcome of ongoing discussions. In coming years, countries could markedly improve their proposals for domestic emission caps. The Europena Union has offered to reduce emissions to 30 percent below 1990 levels if other countries make similar commitments. Japan has already announced a target of reducing emissions 25 percent below 1990 levels by 2020. Although that goal is conditioned on the willingness of other countries to take similarly bold action, it is much more ambitious than the country's previous goal.

Furthermore, developed nations proposed substantial financial support for developing ones in the nonbinding political Copenhagen Accord: $30 billion in the period from 2010 to 2012 and up to $100 billion a year by 2020. This money might make developing nations more willing to reduce emissions and could therefore raise global performance. However, it might not be possible to achieve the recommended environmental outcome even given a more ambitious scenario with stricter national targets.

As a result of this uncertainty, companies are likely to move away from projects—such as the capture of gases other than carbon dioxide and the reduction of emissions from cooking stoves,[10] which are responsible for up to 18 percent of global warming—that rely completely on offsets as their income stream. Instead, they will look for projects that also have other income streams, such as power market revenues and government subsidies, even if these projects require significantly more investment.[11]

[1] Under the Kyoto Protocol, Annex I countries are those 37 industrialized nations that committed themselves to a reduction of greenhouse gases.
[2] Metric tons: 1 metric ton = 2,205 pounds.
[3] Russia, Ukraine, and various other Eastern European nations have emission caps above their current emission levels, because of the 1989 collapse of the Soviet Union. The result is a significant overhang of credits.
[4] In other words, some projects might have been undertaken without any revenue from carbon credits and therefore may not have any "additional" environmental advantages.
[5] McKinsey's global greenhouse-gas-abatement cost curve assesses the technical potential to reduce carbon emissions and the cost by country, industry, and lever. For a full description, see "Pathways to a low-carbon economy," available free of charge on mckinsey.com.
[6] Sponsored by US Representatives Henry Waxman and Edward Markey, the act includes provisions on clean energy (and the transition to an economy based on it), energy efficiency, global warming, and agriculture- and forestry-related offsets.
[7] This scenario assumes that carbon content in the atmosphere is reduced to 450 parts per million (ppm) by 2100, with an overshoot to 510 ppm in the intermediate period.
[8] The proposals in the assessment include the recent submissions to the United Nations Framework Convention on Climate Change (January 31, 2010), the European Union's commitment to reduce carbon emissions to 20 percent below the 1990 level by 2020, and the targets in the American Clean Energy and Security Act of 2009, passed by the US House of Representatives in 2009 and awaiting consideration by the Senate.
[9] An Annex I subset of nations that have made a commitment to pay the incremental cost of mitigation and adaptation for developing (non–Annex I) nations. Annex II nations are Australia, Austria, Belgium, Canada, Denmark, the European Union, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.
[10] See Elisabeth Rosenthal, "Third-world stove soot is target in climate fight," *New York Times,* April 15, 2009.
[11] A company can claim offset income, however, only if a project is not otherwise expected to make a hurdle rate of return. The upside of such investments is therefore capped.

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