

November 2008

## “Six sigma”: CFO insights to create value in a volatile environment



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## 1. Six Sigma? So what?

The term “six sigma” originally referred to a quality-control system, developed in the 1980s and widely adopted soon thereafter, in which firms sought to reduce manufacturing defects. Today, this term is also used to describe unexpected events in financial markets. In a downside scenario analysis, a six standard deviation, or six-sigma, event occurs only *once per one billion* opportunities. Amazingly, events we once thought of as six-sigma shocks are bombarding financial markets daily as part of the subprime-related meltdown.

The subprime crisis began in the summer of 2007, as falling house prices in the U.S. led to a precipitous drop in the value of securities backed by subprime residential mortgages. Due to heightened levels of leverage in our economy and the interconnectedness of global financial markets, a crisis that initially afflicted a narrow segment of the financial markets has expanded to produce widespread and unprecedented consequences.

One of the hallmarks of the subprime crisis is that many financial market metrics have reached historically high levels of volatility *all at once*. For example, the Chicago Board Options Exchange Volatility Index, or “VIX,” closed at 80.1% on October 27th. This is the highest closing level in the 19-year history of the index, and it is about eight times as high as the recent low of 9.9% reached in January 2007. Similarly, non U.S. equity markets, foreign-exchange rates, interest rates, and commodity prices have reached historically high volatility levels. These metrics suggest levels of economic uncertainty that are largely unprecedented.

What does this financial-market uncertainty mean? Which aspects of financial decision-making are most affected by high volatility? Should firms change their approach to capital structure, financing, or investment decisions? Can some firms create value by taking advantage of increased uncertainty? Most executives in developed markets are unaccustomed to operating in a sky-high volatility environment. To assist them, we suggest that senior decision-makers modify their financial strategies to protect against—or even capitalize on—high volatility. Our insights on volatility relate to six key aspects of corporate finance:

- (1) **Capital structure:** Firms make capital-structure decisions by combining a desire for a low cost of capital, protection against downside shocks, and sufficient financial flexibility to execute growth strategies. Higher volatility augments the benefits of downside protection and of flexibility, and hence less levered balance sheets become more attractive when volatility is high.
- (2) **Capital allocation:** The range of outcomes in a discounted cash flow or capital-allocation model should be adjusted to reflect greater uncertainty. Additionally, the cost of capital tends to rise when market volatility is high, which suggests that firms should reassess their hurdle rates.
- (3) **Mergers and acquisitions:** High volatility and illiquid credit markets increase the importance of internal capital markets. As a result, diversifying or scale-enhancing acquisitions are more likely to create value. Also, in an environment where stock deals are more prevalent, downside protection for a target firm’s shareholders will become more expensive but more desirable.

(4) **Executive compensation:** The value of option-based executive compensation is heavily influenced by changes in the value of the stock, but also by the volatility of the underlying stock. This could mean fewer options or higher compensation expense in a volatile environment.

(5) **Risk management:** In an environment where six-sigma events have occurred more often than “predicted,” firms should not rely solely on traditional measures of uncertainty and downside risk. Downside scenarios can become more pronounced and severely impact firm value, emphasizing the importance of hedging. With higher volatility, however, hedging costs are likely to rise.

#### EXECUTIVE TAKEAWAY:

Understanding the impact of high volatility on the corporate-finance toolbox can help senior decision-makers maximize shareholder value in an uncertain environment.

(6) **Monetizing volatility—financing and buybacks:** The option component of convertible bonds becomes more valuable when volatility is high. Thus, all else being equal, firms with more volatile equity can achieve lower coupons on convertible issuances. Regarding share buybacks, some execution methods allow firms to monetize volatility and buy shares at even lower prices.

## 2. What is volatility?

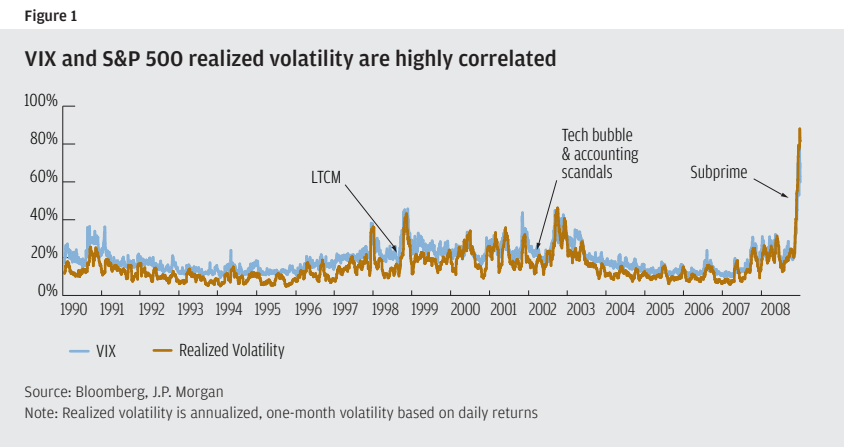
In the financial markets, “volatility” relates to how much the price of a financial asset or measure (such as a stock price or interest rate) fluctuates over time. For example, the prices of internet stocks tend to change more than the prices of industrial stocks, so the behavior of internet stocks can be described as more volatile. This relationship was true during both the dot-com boom and the dot-com bust, so volatility by itself does not imply the direction of price movement.

There is a widely accepted convention for defining volatility in quantitative terms. A financial asset’s volatility, denoted as  $\sigma$  (the Greek letter **sigma**), is measured as the standard deviation of the asset’s return, relative to its average or “expected” return, over a given time period. The standard unit of time is generally one year. For example, if a stock has a 10% expected return and 25% volatility, then over a one-year period, a -1 to +1 standard deviation range (encompassing 68% of possible outcomes) would correspond to a realized return of roughly -15% to +35%.

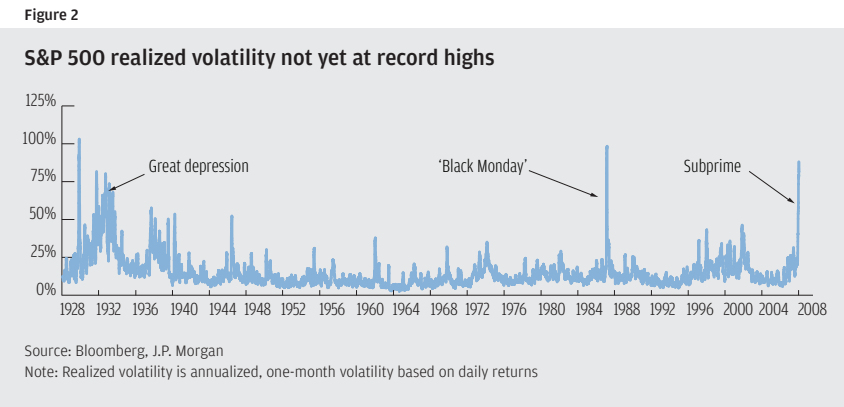
One can estimate volatility for stocks, indices, bonds, currencies, or any other data series. When the results are compared over time and across asset classes, the results are useful in determining the level of relative price risk associated with various assets. To estimate future volatility in financial markets, we generally use two methods. One approach applies the standard deviation formula to a series of historical prices or returns (**historical volatility**), and the other approach extracts the volatility that is implied by quoted option prices (**implied volatility**). The advantages of implied volatility are that it is forward-looking and reflects actual prices at which traders are willing to transact. The disadvantages of implied volatility are that it is not available for many financial metrics and can be influenced by short-term trading imbalances.

### 3. Unprecedented volatility?

Is today's volatility truly unprecedented? It depends on the definition of “unprecedented.” To gauge volatility in a historical context, we examine the volatility of various markets, starting with the **U.S. equity market**. Figure 1 below shows both the standard deviation of historical realized returns of the S&P 500 and the VIX, a measure of the S&P 500's implied volatility. We start in 1990 when VIX data became available. Two key findings emerge: (1) historical and implied volatilities are highly correlated (87%) and (2) the VIX closed at an all-time high of 80.1% on October 27, 2008.<sup>1</sup>



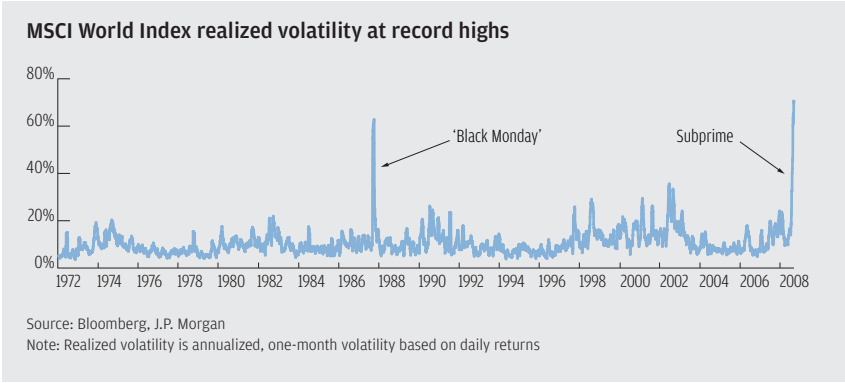
While the data in Figure 1 confirm that we are in a truly volatile environment, VIX information is only available dating back to 1990. How volatile were equity markets during the 1929-1932 Great Depression and 1987's Black Monday? We show historical volatility starting in 1928 in Figure 2. Twice last century, during the 1929-1933 period and the 1987 crash, historical volatilities spiked around 100%. These results suggest that while today's environment is very volatile, it may not be entirely unprecedented.



<sup>1</sup> The U.S. financial markets did not open on Sep 11th and remained closed until Sep 17th, so the equity volatility measures do not reflect the uncertainty during that time.

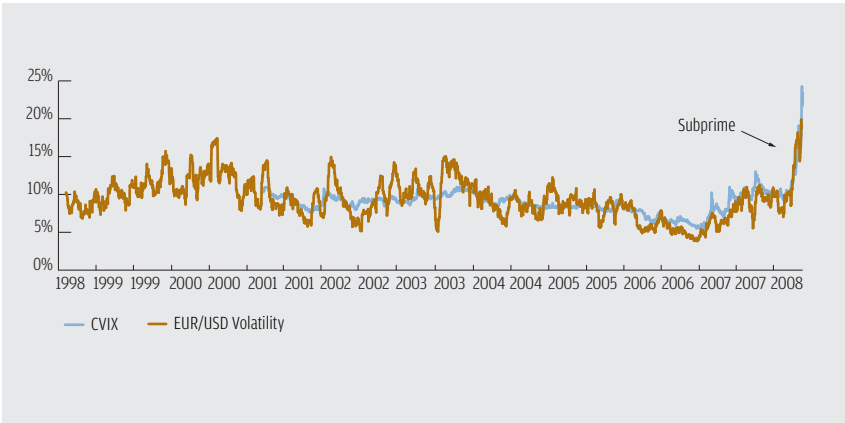
When we expand our data to include **global equity markets** (in Figure 3), we find that today's realized volatility is higher than it was around Black Monday (70% vs. 63% respectively). This reflects the wide impact of the current crisis on the equity markets in Europe and in emerging economies. For example, in USD terms, equity markets in Russia dropped by 76% from the beginning of 2008 until October 31, 2008, while the Brazilian market lost about 50% in that span.

Figure 3:



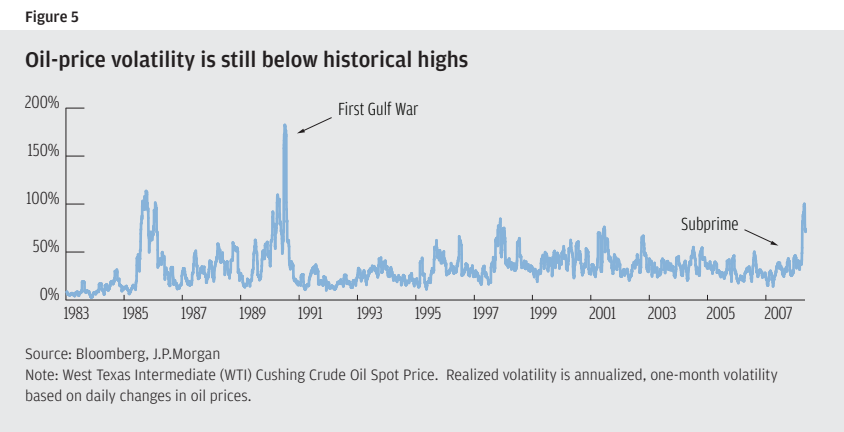
The results are similar when we examine volatility in **foreign-exchange markets**. Figure 4 below depicts the realized one-month volatility of the EUR/USD exchange rate, which reached an all-time high of 19.9% on October 29, 2008. Similarly, the foreign-exchange volatility index, CVIX, which weighs changes in the EUR, JPY, GBP, and other major currencies, reached its all-time high of 24.2% on October 27, 2008.

Figure 4

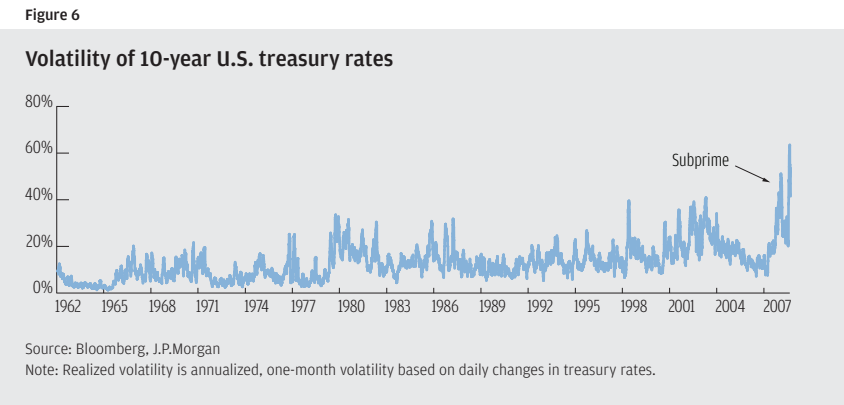


While data on the EUR is available only from 1999, one can examine longer horizons for the JPY and other major currencies to place today's volatility into context. The JPY/USD volatility recently peaked at 30.4%, which is much higher than its average volatility of about 9.0% since 1971. It is still, however, slightly lower than its maximum volatility of 33.4% in 1973.

We reach similar conclusions by analyzing the volatility in **commodity markets**. In Figure 5, we illustrate historical oil-price volatility, which peaked at 100% last month. This level is much higher than its mean and median (34% and 31%) volatility over the 1983-2008 period, but lower than the levels reached during the First Gulf War (182%).



In Figure 6 below, we analyze the volatility in the **fixed-income market** by studying the volatility of 10-year U.S. treasury notes. Today's volatility is at its highest level since at least 1962, when our data begin.



**EXECUTIVE TAKEAWAY**

Most metrics suggest that we are at extremely high levels of volatility in equities, commodities, interest rates, and currencies. Though we may find periods of even higher volatility in individual markets if we consider data prior to the 1990s, the uniqueness of this crisis is that volatility has peaked in many different markets simultaneously.

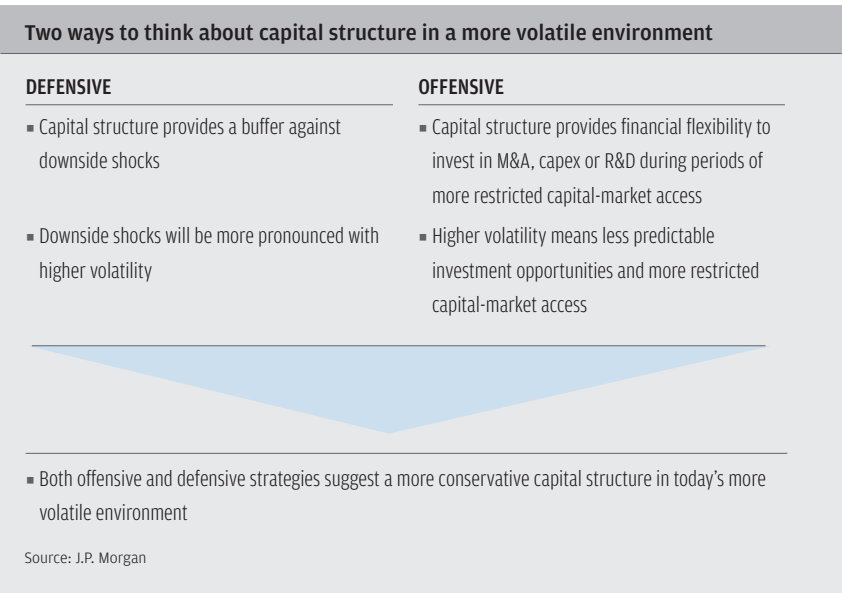
Overall, these results highlight the unique aspect of today's market environment: Nearly all markets, from equities and commodities to treasury rates and FX, have experienced historically high (or near-high) volatility levels *simultaneously*. It is fair to assume that this high level of total market volatility is reflective of significant uncertainty in the worldwide economy. In turn, the financial-market volatility is likely to accentuate the economic downturn.

## 4. Six keys to managing sigma

### 4.1. Capital structure

**How should firms think about capital structure when financial markets are more volatile?** Traditional models suggest that a firm should choose a capital structure that minimizes its cost of capital. These models account for two opposing considerations associated with higher leverage: (1) the beneficial effect of tax shields on debt and (2) the negative effect of a higher expected cost of financial distress (narrowly defined based on the likelihood of losing the ability to operate as a going-concern). Many executives recognize, however, that due to the limitations of capital markets, a robust trade-off theory would have to examine the opportunity costs of lost financial flexibility. Thus, senior decision-makers consider the benefits of a capital structure that is less levered than the trade-offs between tax shields and costs of distress alone would suggest. To understand how the choice of optimal capital structure changes in today's high-volatility environment, we illustrate two approaches that characterize these executive considerations. We summarize the key features of these two capital-structure philosophies, which are not mutually exclusive, in Figure 7. **Both approaches suggest that more conservative capital structures create greater value in a more volatile environment.**

Figure 7



**The defensive capital structure—a buffer against downside shocks:** Many executives target a capital structure that meets a minimum rating level or a maximum leverage ratio even in a downside scenario. The rationale for these types of targets includes the preservation of access to a specific capital market (e.g., maintaining tier-1 commercial paper market access with an A1/P1 rating), avoiding the need to post collateral, maintaining a buffer to avoid violating a debt covenant, or meeting a regulatory requirement.

How does higher volatility alter this defensive approach to leverage? Assume, for example, that a firm defines its leverage threshold at 4.0x debt/EBITDA. If the firm's expected EBITDA is \$300mm, falling within a possible range of \$250mm to \$350mm, then it could

EXECUTIVE TAKEAWAY

Less-levered balance sheets and stronger credit ratings provide greater downside protection and financial flexibility. Higher volatility increases the magnitude of downside shocks and also augments the value of financial flexibility. As a result, more volatile markets call for less levered capital structures. Consistent with this view, firms with stronger ratings have outperformed firms with weaker ratings since the beginning of the subprime crisis. While raising equity or selling assets to de-lever the balance sheet also becomes more challenging in a volatile environment, preserving excess liquidity and financial flexibility for the option to act on attractive investment opportunities may prove valuable.

target a debt level of \$1,000mm to maintain an expected leverage ratio of 3.3x and a maximum target leverage of 4.0x (\$1,000mm divided by \$250mm). If the environment were to unexpectedly become more volatile, then the firm's EBITDA could become less predictable, with a wider range of EBITDA possibilities of \$200mm to \$400mm. To maintain the 4.0x maximum leverage in this scenario, the firm would have to target a reduced debt level of \$800mm, lowering its expected leverage to 2.7x. Thus, with less predictable cash flows, this firm should reduce its debt level from \$1,000mm to \$800mm and its expected leverage from 3.3x to 2.7x.

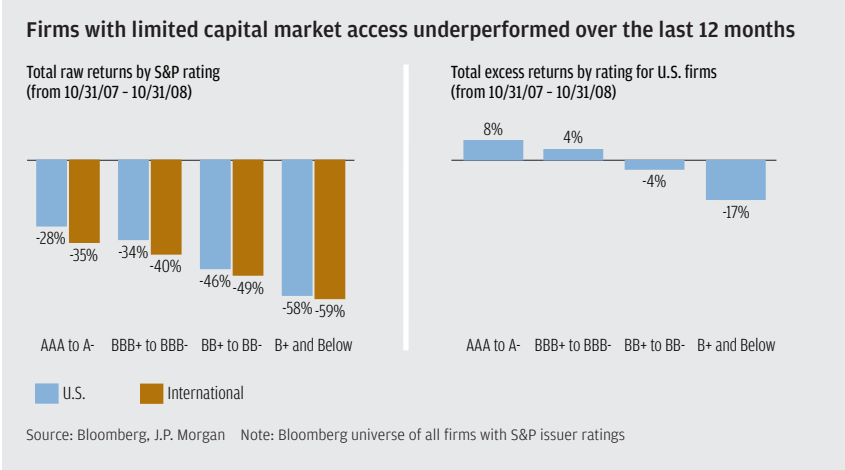
**The offensive capital structure—financial flexibility:** Many senior executives evaluate their capital structure in the context of financial flexibility. They consider the effect of the leverage decision (and in a similar vein, the liquidity decision) on their firm's capacity to engage in

future M&A activity or finance new capital expenditures or research. As a consequence, they focus on a minimum rating or maximum leverage level, and target debt capacity in excess of this maximum leverage level for opportunistic, value-enhancing investments. Maintaining financial flexibility typically implies a higher cost of capital and negative carry costs from holding excess liquidity, but offers the advantage of having the option to act on investment opportunities if the circumstances permit. In a more volatile and stressed economic environment, investment opportunities may arise unexpectedly as liquidity constraints sideline competitors and M&A targets become cheaper. Hence, maintaining a fortress balance sheet that allows a firm to take advantage of strategic opportunities is more valuable in a volatile environment.

To gauge how firms with stronger balance sheets have performed relative to those with weaker balance sheets, we grouped firms by S&P credit rating and examined their returns over the past year. The first graph in Figure 8 shows that, in both U.S. and international markets, companies with higher ratings have outperformed those with lower ratings. For example, firms rated A- or better have outperformed those in the BBB category by 6% in the U.S. and 5% outside of the U.S. Lower-rated companies may be smaller and/or more levered, characteristics often associated with higher market risk (beta). As a result, it would be expected for lower-rated firms to lag the market during downturns. But even on a beta-adjusted basis we find that lower-rated firms in the U.S. have underperformed in this crisis, as illustrated in the second graph. In a volatile market where risk-aversion and risk-pricing has increased, companies with better credit quality maintain greater access to capital than lower-rated firms. Higher-rated firms can therefore continue to exploit good investment opportunities, while lower-rated firms find it more difficult to access capital markets to finance new investments—or even maintain operations and refinance existing debt.



Figure 8

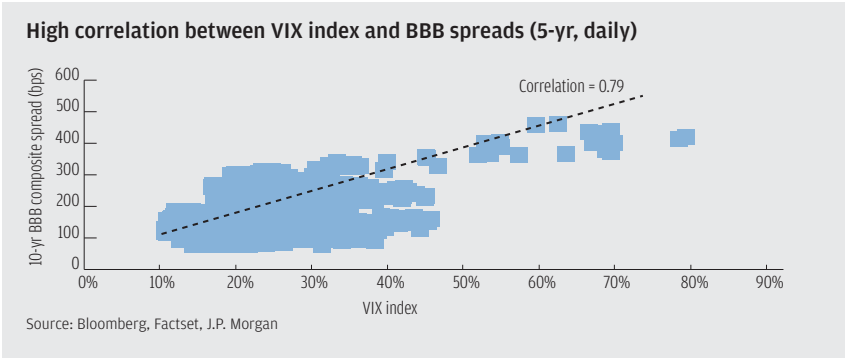


4.2. Capital allocation

Higher market volatility affects capital-allocation decisions, primarily through its impact on (1) discount rates and (2) future cash-flow assumptions.

**Higher hurdle rates:** Should discount rates be higher when the volatility is high? According to modern portfolio theory, the discount rate is only impacted by the risk that cannot be diversified by investing in other securities in the market. What happens when the overall market becomes more volatile? Investors typically demand a higher return on their investment, for two reasons: (1) investors anticipate a wider possible range of cash flows and require higher compensation for the higher level of uncertainty; and (2) investors engage in a “flight to quality,” becoming more risk-averse and demanding a greater premium for any given level of risk. Figure 9 depicts a strong correlation (79% over the past five years) between the VIX index and 10-year BBB credit spreads. This relationship suggests that when equity markets are more volatile, bond investors demand higher premiums. And since equity investors are junior claimants to bondholders, one can infer that equity risk premiums also rise when volatility increases and credit spreads widen. Higher costs of debt and equity imply a rising cost of capital for any given capital structure and partly explain the massive devaluation in asset prices witnessed this year—higher rates are used to discount cash flows, which in turn may be lower due to weaker economic prospects. Some firms are already postponing investment projects due to the higher cost of capital.

Figure 9



**Cash flow estimates:** Assuming a prolonged downturn, expected future cash flows are likely to be revised lower, but higher volatility suggests that the *range* of possible outcomes around this expected figure is now wider. Although valuation models will discount these lower expected cash flows at a higher rate, we believe it is incrementally useful to incorporate the wider range of cash-flow outcomes to understand how returns might behave in the more extreme downside scenarios we are now witnessing.

EXECUTIVE TAKEAWAY

With higher volatility, firms can expect a higher cost of capital and greater uncertainty in their cash-flow projections. This should impel firms to scrutinize their capital-allocation decisions by revising hurdle rates, re-evaluating cash-flow projections, and running sensitivity analyses on project cash flows.

**Real options:** High volatility is not uniformly bad. Consider, for example, an oil exploration project that is profitable only if the price of a barrel of oil exceeds \$75. If oil is at \$74 and the volatility of oil is 0, then the oil price will stay at \$74 and this project will never be profitable. If the oil price becomes more volatile, however, then it could be further below \$74 or above \$75, in which case the project could be profitable. Thus, this type of project is actually worth more when volatility is high. Only an option-

valuation approach can fully assess the value of this type of project, which is common in mining, shipping, power, and other sectors. We also recommend this “real option” approach to value the equity and debt of distressed firms.

4.3. Mergers and acquisitions

**Diversifying acquisitions and internal capital markets:** In the current market environment, executives may consider diversifying acquisitions to reduce earnings volatility and enhance firm value. Diversifying acquisitions spread a firm’s revenue sources across geographies and business lines, which reduces the firm’s earnings sensitivity (on a consolidated basis) to sudden changes in a specific market or region. Also, M&A can result in cost savings and synergies, which are often lower-risk means of boosting earnings than new investment. Post-acquisition, the firm can utilize excess liquidity in one division to compensate for reduced liquidity in another division or in the financial markets. This benefit becomes more important when volatility is high. Rating agencies also harbor positive views of large and diversified firms. In fact, some studies indicate that scale is the most important factor in determining a company’s credit rating.

While diversifying acquisitions offer significant benefits, firms should note several caveats. First, larger and more diversified firms are less transparent to investors. If, for example, two divisions have substantially different growth profiles, the faster-growing division might be traded at a discount since investors cannot fully capture its growth potential. Second, equity and credit analysts may find it harder to analyze a firm that operates in different industries. Finally, firms should beware of “over-diversification” that can lead to a departure from historical strength and expertise.

**Risk management in M&A transactions:** The current market environment presents value-enhancing M&A opportunities for both buyers and sellers, but also introduces execution and risk-management challenges. For stock deals, high volatility in equity markets leads to greater uncertainty regarding the final acquisition price. In order to make a transaction more attractive to the target firm’s shareholders, deals are sometimes designed to fix the

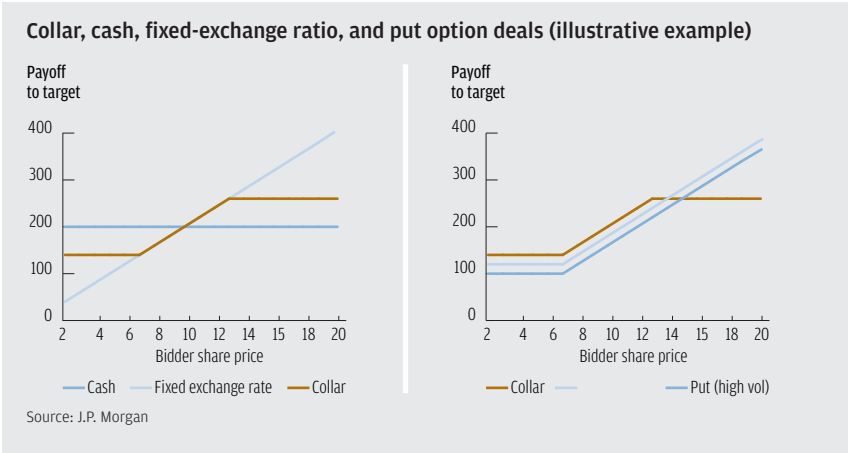
total transaction value by varying the number of shares used as acquisition proceeds. Similar protection is often provided through the use of option collars (or “M&A collars”), which provide a hedge against share price declines below a specified level in exchange for upside participation.

Consider, for example, the shareholders of a target firm who expect to receive 20mm shares of an acquiring firm, currently trading at \$10 per share. In this case, the shareholders are exposed to changes in the bidder’s share price. The first graph in Figure 10 demonstrates how option collars can provide protection from downside scenarios (relative to fixed-exchange ratio deals) while still capturing some of the upside potential (as opposed to cash deals). These traditional collars are structured using both call and put options. Some firms choose to hedge only the downside scenarios, using just put options (sometimes called “one-sided collars”). When volatility increases, the value of the put and call option each increase, so the impact on an overall collar’s value may be modest. In the case of a one-sided collar, however, higher volatility may appropriately require a higher price concession by the target firm’s shareholders, as illustrated by the second graph in Figure 10. A one-sided collar needs to be used carefully, as it could expose the acquirer to significant dilution risk when the target is relatively large.

EXECUTIVE TAKEAWAY

Diversifying acquisitions can reduce earnings sensitivity to sudden changes in the market. While diversifying acquisitions may not always be well-received, they may yield significant benefits when volatility is high. The value of the collar in an M&A transaction may be impacted by higher volatility.

Figure 10



4.4. Executive compensation

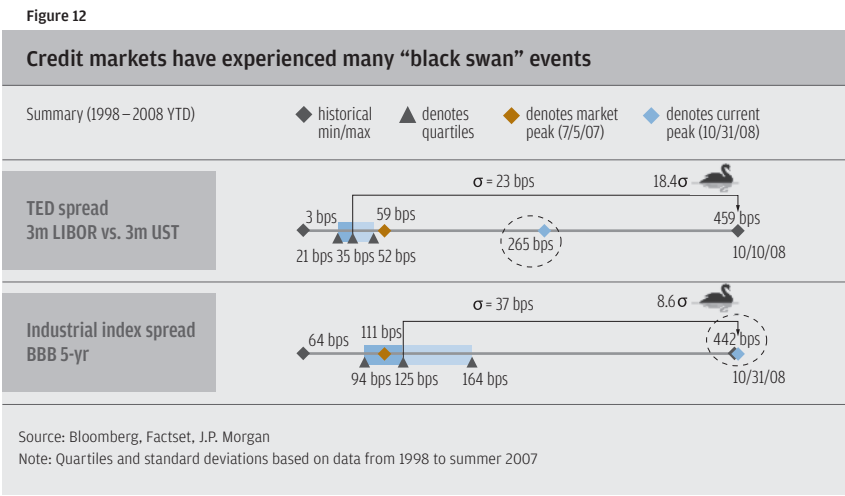
For companies that are heavy issuers of employee stock options (“ESOs”), the combination of record volatility and falling stock prices creates a unique set of issues. ESOs are typically call options that become exercisable after a specified vesting date (for example, three years after the options are issued). ESOs have a “lapse clause,” removing the right to exercise if the holder decides to leave the firm. Compensation consultants recommend ESOs based on their shareholder-friendly incentive as well as their retention value—i.e., their power to dissuade executives from leaving their firms.



4.5. Risk management

Because of the inability of existing risk-management practices to prevent major losses at financial institutions, and given the reliance of modern risk management on volatility-based metrics, senior executives should consider reassessing their risk-management systems in light of the new reality.

**The practice of risk management:** Risk management relies heavily on analyzing volatility. Standard value-at-risk methods estimate the likely impact of commodity, currency, or other shocks based on volatilities and correlations. In this approach, a two-sigma event is very unlikely, a three-sigma event is extremely unlikely, etc. A value-at-risk system may estimate, for example, how an extreme event could consume liquidity or reduce EPS or cash flow. In turn, the firm can decide to protect itself against these downside scenarios through hedging or by avoiding the activities that may cause such harmful shocks. Unfortunately, the subprime crisis has been characterized by many “black swan”<sup>2</sup> events that, based on historical data, should have been nearly impossible occurrences. For example, the spread on five-year, BBB, industrial bonds had typically varied between 94bps and 164bps over the 10 years from 1998 to summer 2007. Yet, it recently reached 387bps, a seven-sigma move relative to its 10-year historical average, as we show in Figure 12. Based on a traditional analysis of the data, the odds against this move should have been 750 billion to one. Naturally, the 18-sigma shift in the TED spread should have been an even more remote possibility.



**The need for downside protection:** During financial crises, liquidity evaporates, windows to capital access shorten, and capital providers demur from committing large amounts of financing. This leaves many firms in a tight liquidity position, and thus the need for downside protection increases dramatically. In this environment, firms should better quantify downside risk and hedge to protect against harmful scenarios. Hedging against risks in interest rates, currencies, commodity prices, input costs, counterparty credit, or other variables can mitigate the impact of downside shocks.

<sup>2</sup> The term “black swan” refers to a notion posed by Nassim Nicholas Taleb. Taleb describes old Western explorers’ assumption that all swans were white because they had never seen swans of another color. The shock of discovering black swans in 17th century Australia highlighted the fallacy of concluding that events are highly improbable merely because they have not been observed before.

EXECUTIVE TAKEAWAY

The cost of insurance is higher in a volatile market because its value is inherently greater. But in a stressed credit environment, a significant downside shock can be lethal for fragile firms. Accordingly, decision-makers should update their risk-management systems and consider hedging their exposures, as the cost of not doing so could be much greater.

**The cost of insurance:** Buying protection against a downside event is equivalent to buying a put option (an option to sell at a pre-set price). Put options become more expensive when volatility is high. Intuitively, the seller of protection is anticipating more severe shocks, so the seller of the put will require a higher premium in volatile markets. With higher costs for protection, many firms are tempted to reduce or defer the insurance purchase, waiting for a “better” price. This could leave those firms significantly exposed to downside shocks, an unwise decision for any company that could become capital-constrained.

4.6.1 Monetizing volatility – Financing

The cost of debt and equity capital tends to rise with market volatility, suggesting that financing becomes more onerous during financial crises. There are some financial instruments, however, that allow firms to monetize the volatility of their equity value. Hence, firms can raise financing at potentially more attractive terms by including these instruments in the capital structure.

**Is volatility mean-reverting?** Although the future is always hard to predict, Figure 1 of this report suggests that equity volatility is cyclical and will eventually revert to a lower level—perhaps 15% to 20% for the S&P 500. With this backdrop, we believe that firms should examine capital-markets transactions that are most appropriately executed at the top of the volatility cycle. For companies seeking financing, issuing a convertible bond or warrant may be a compelling proposition, as higher volatility directly improves pricing.

**Convertibles:** The convertible bond market grew in recent years as hedge funds became the majority of the investor base. While the current financial crisis has caused dislocation in this market, our view is that demand for convertibles will rebound and the longer-term trend favoring market efficiency will return.

A convertible bond consists of a discount bond (i.e., a bond that would trade below par based on the coupons alone) and an embedded equity option. Convertible bondholders have stock price exposure from the equity option, which they hedge by managing a short position in the underlying shares. As the stock price changes, the number of shares required as a hedge also changes, causing option holders to buy shares after a stock price decline and sell shares after a stock price increase. This “buy low, sell high” activity generates gains for option holders in proportion to stock price volatility. In theory, the price one should pay for an option can be calculated by estimating future volatility and computing anticipated hedging gains. Arbitrage investors put this theory to practice by trading convertibles and other options and hedging in the stock market. For arbitrage investors, “buying options” has become synonymous with “buying volatility.”

The two largest drivers of convertible pricing are volatility and credit risk. The recent increase in credit spreads will raise the cost of both straight debt and convertibles. Higher volatility, however, lowers the cash cost of the convertible, both absolutely and relative to straight debt. We highlight the benefit of convertibles versus straight debt in a high-volatility environment in Figure 13.

Figure 13

| Convertible bonds—higher volatility implies greater coupon savings  |               |                      |            |                    |                          |                        |
|---|---------------|----------------------|------------|--------------------|--------------------------|------------------------|
| 5-year treasury   | Credit spread | Straight debt coupon | Volatility | Convertible coupon | Coupon vs. straight debt | Embedded warrant value |
| 2.75%   | 4.00%         | 6.75%                | 20%        | 4.50%              | -2.25%                   | 9.3%                   |
| 2.75%   | 6.00%         | 8.75%                | 30%        | 4.25%              | -4.50%                   | 17.6%                  |
| 2.75%   | 8.00%         | 10.75%               | 40%        | 4.00%              | -6.75%                   | 25.1%                  |
| 2.75%   | 10.00%        | 12.75%               | 50%        | 3.75%              | -9.00%                   | 31.8%                  |
| Source: J.P. Morgan   |               |                      |            |                    |                          |                        |
| Note: Assumes 5-year convertible, 30% conversion premium; warrant value assumes discounting at straight debt rate |               |                      |            |                    |                          |                        |

**Warrants:** Many firms are considering issuing equity or terming out debt to strengthen their balance sheets. Supplementing a capital raise with warrants may be another attractive financing alternative. Like a convertible, a warrant allows the issuer to monetize volatility. Warrants can also be designed to preserve some upside for the issuer and are considered equity by the rating agencies. Additionally, warrants are not immediately dilutive to shares outstanding and the premium received for a warrant is tax-free.

EXECUTIVE TAKEAWAY

Volatile markets create more challenging financing. Still, firms can monetize volatility by tapping the convertible market or by selling warrants. In both instances, the belief that volatility trends are cyclical suggests that firms can reduce financing costs by harvesting this volatility.

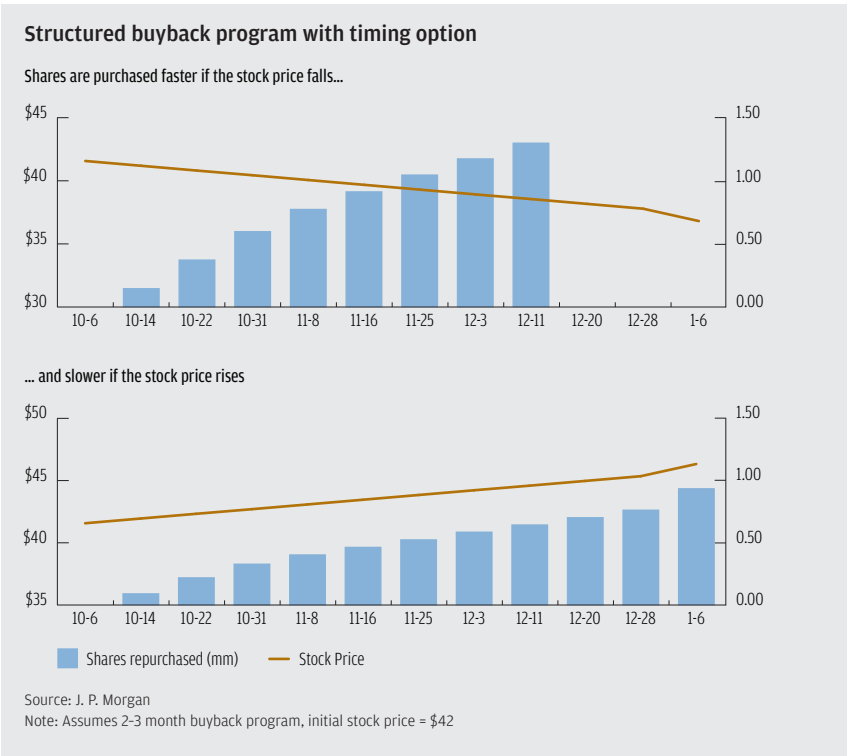
4.6.2. Monetizing volatility – Buybacks

**Preserve liquidity or buy back stock?** In the face of dwindling bank-provided liquidity, declining asset values, and a weakening economy, most firms are seeking to raise capital and preserve liquidity. Some firms, however, still have strong balance sheets and continue to generate excess cash flow which they plan to return to shareholders. These firms may, in fact, argue that stock buybacks are particularly attractive today based on their current depressed share prices.

**Benefiting from stock volatility:** Many structured buyback programs are designed to help firms benefit from the volatility of their stock. Under such a program, the issuer pays a fixed purchase price to an investment bank and receives a number of shares (some upfront and some later) based on the average share price over a subsequent period. The repurchase period must fall within a specified time horizon with the investment bank notifying the company when the program has been completed. To hedge the program, the investment bank will purchase shares more rapidly if the stock price falls and less rapidly if the stock

price appreciates (see Figure 14 below). An accelerated share repurchase with timing flexibility is similar to an equity option because the hedging party (the bank) will realize hedging gains from stock price volatility. Based on volatility estimates and the economics of carrying the hedge, banks will guarantee buyback execution at a discount to the volume-weighted average price (“VWAP”) during the term of the program. For example, an issuer with a \$42 VWAP may receive a \$1.00 discount, thereby repurchasing stock for \$41 per share. During periods of high volatility, the VWAP discount offered to the company will be higher (i.e., increase to \$1.50). As a result, high volatility increases the efficiency of the firm’s buyback program.

Figure 14



EXECUTIVE TAKEAWAY

Many structured buyback programs include features to encourage the investment bank to purchase shares faster if the stock price falls. These features are more valuable when the stock is more volatile. Hence, firms repurchasing their stock will receive a higher guaranteed discount to the volume-weighted average price when volatility is higher.