

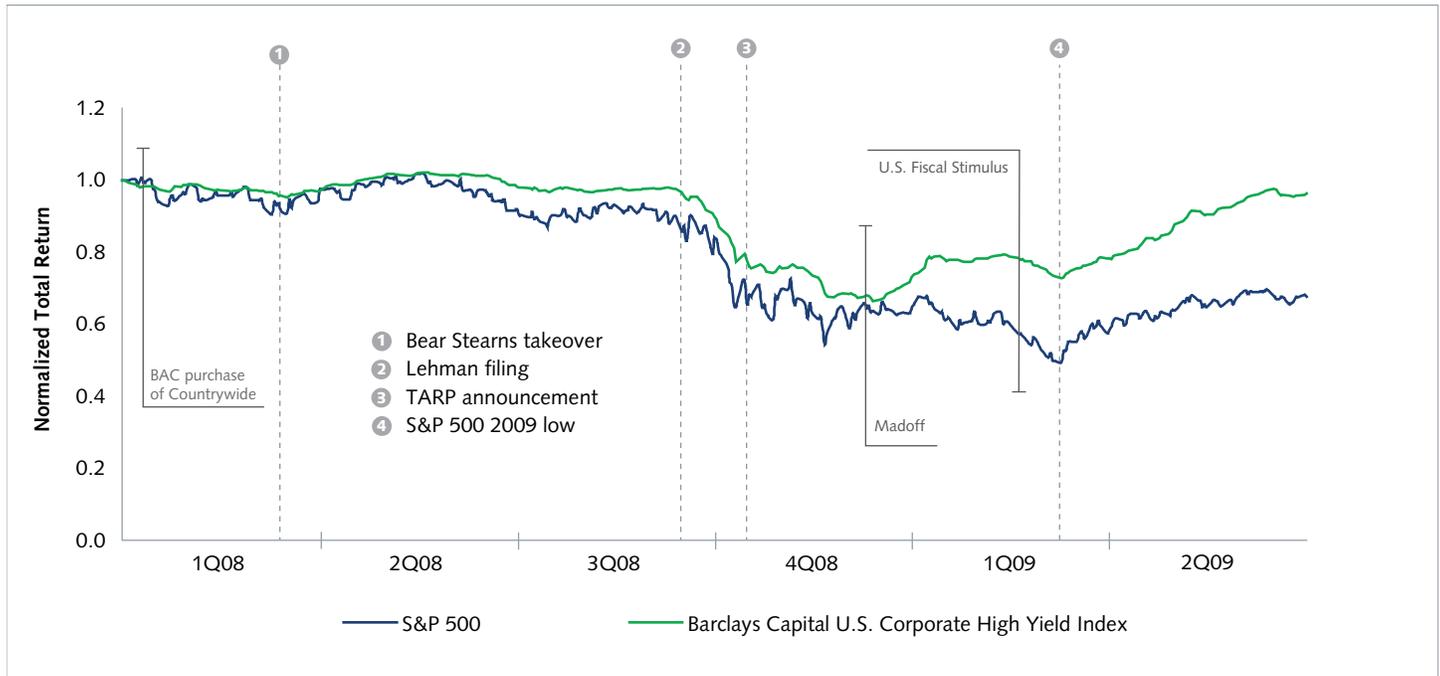
Is It Better Yet?

Charting the Course of Various Asset Classes through a Global Financial Crisis

IN A FINANCIAL CRISIS, it's often said, "all correlations go to 1." That may or may not be the case. More certain, however, is that crisis-induced dislocations will move various asset classes and market indicators in surprising directions. Those movements generally are most discernable once a crisis subsides and markets trend back towards normalcy.

This *Market Insights* examines the performance of a number of different asset classes from the beginning of 2008 through the end of 2Q09. Using charts and commentary, we highlight a variety of interesting changes in financial markets during that span and discuss the possible causes of those shifts. In the timelines of each chart, we've denoted important milestones that provide context for each of the asset classes shown. Four of these events (the Bear Stearns takeover, Lehman bankruptcy filing, TARP program announcement, and S&P 500 2009 year-to-date low) are presented in all of the charts, and additional events of special relevance to the chart in question are also included.

Exhibit 1. U.S. High-Yield Credit Outperforms U.S. Large Cap Stocks



THIS CHART PRESENTS NORMALIZED¹ total returns for the S&P 500 and Barclays Capital U.S. Corporate High Yield Index (the “high-yield index”) over the past 18 months.

- Given that the high-yield index typically has a beta of roughly 0.4 to the S&P 500, high-yield credit considerably underperformed large cap stocks in 4Q08, returning about the same as equities on an unadjusted basis.
- However, high-yield bonds have massively outperformed equities year-to-date, posting (in January, April, and May) the three highest monthly excess returns since 1989.

Why have we seen these swings in the relative performance of credit to equity within the past year and a half? We believe these movements can be attributed to:

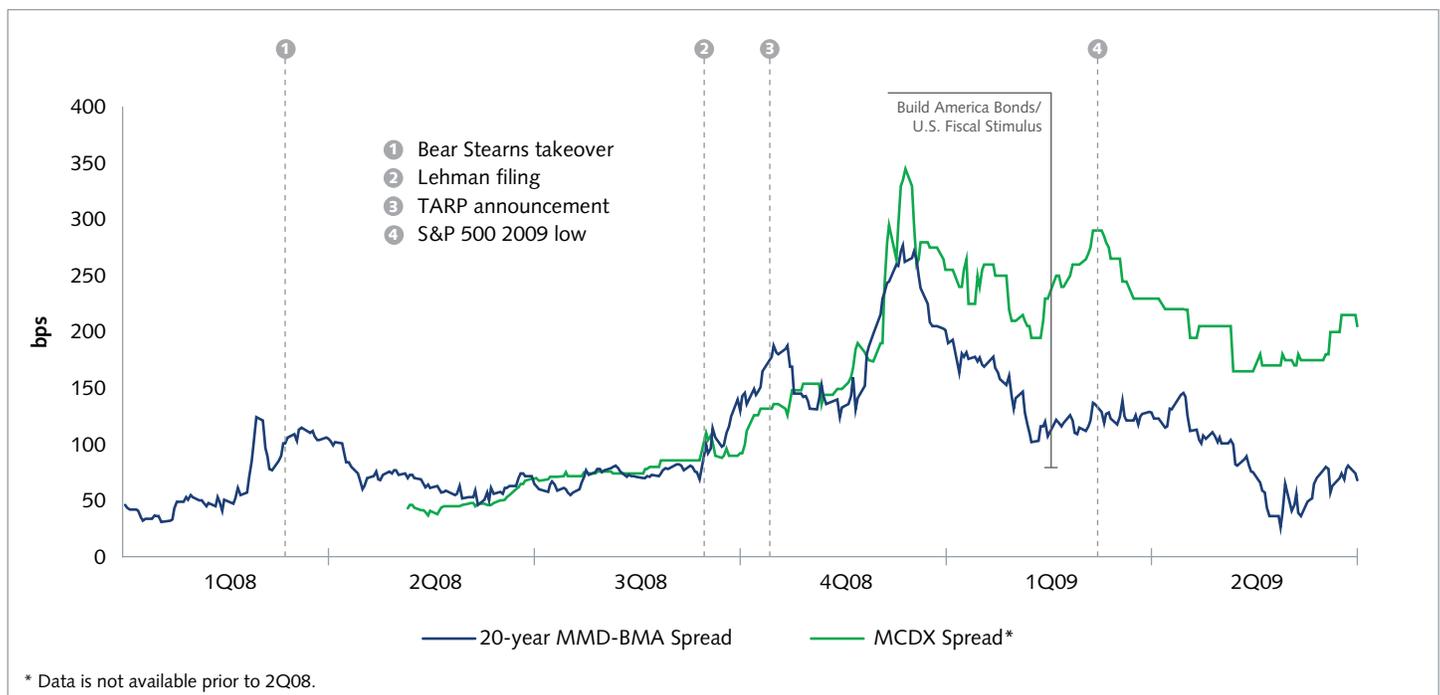
- *Cash-CDS basis.* The relationship or “basis” between pricing on U.S. corporate bonds and associated credit default swaps (“CDS”) widened significantly (cash bonds cheapened) in 3Q08 and 4Q08 but tightened sharply through 2Q09. We estimate that this factor accounts for about 70% of the swings in the performance of high-yield credit relative to equities during the period shown.
- *Punishment or reward for company dependence on capital markets.* We believe the remaining 30% of the movements in performance comes from this factor. At the height of the credit crisis, the high-yield market priced in very high near-term default rates for any credit with upcoming maturities. This increase in the sensitivity of companies to leverage meant that high-yield bonds (and stocks of companies that were similarly linked to the capital markets, such as financials) were severely punished on the market’s way down and rallied harder when the skies began to clear. As funds began flowing back into the market in 2Q09 and new issues were completed, very risky credits, which are heavily dependent on the capital markets, jumped in value.

However, on a beta-adjusted basis, high-yield credit has outperformed large cap equities by a wide margin over the entire period shown. Why?

¹ Throughout this paper, “normalized” refers to setting different data series to 1.0 at the beginning of the period so that relative changes over time may be discerned using the same scale.

- Some of this relative outperformance may derive from the benefits accruing to credit from dilutive equity issuance and government efforts to reduce systemic risk.
- These market movements have coincided with the outperformance of high-beta equities and credits more generally. The high-yield index, of course, contains companies of lesser credit quality. The stocks of many such companies also tend to have high betas, and higher beta stocks have generally outperformed over the past 18 months. This makes it difficult to determine how much of the outperformance derives from the dynamics of credit and how much is a high-beta effect.

Exhibit 2. Spreads on Municipal Cash Bonds Tighten Beyond Pre-Crisis Levels



THIS CHART SHOWS INDICATORS of the general health of the U.S. municipal bond market. As is typically the case, wider spreads signal diminished health and narrower spreads imply improved health.

- The Municipal Market Data Index (“MMD”) is composed of natural (*i.e.*, not enhanced by bond insurance) AAA-rated cash municipal bonds. The Bond Market Association Index (“BMA”) (also called SIFMA on the short end) is an index of municipal bond swaps that tracks a rate that is analogous to LIBOR.
- The MMD-BMA spread is roughly similar to the spread over LIBOR of a corporate bond index. It therefore contains a credit risk factor *and* a funding risk factor.
- The MCDX Index tracks a basket of credit default swaps on certain large municipal credits, including some of lower credit quality. As an index that tracks synthetic securities, MCDX does not have exposure to funding risk.

What’s striking is how the MMD-BMA spread has tightened back to pre-Lehman levels (although it began to widen again in the last few days of 2Q09). We believe the narrowing of this spread has four proximate causes:

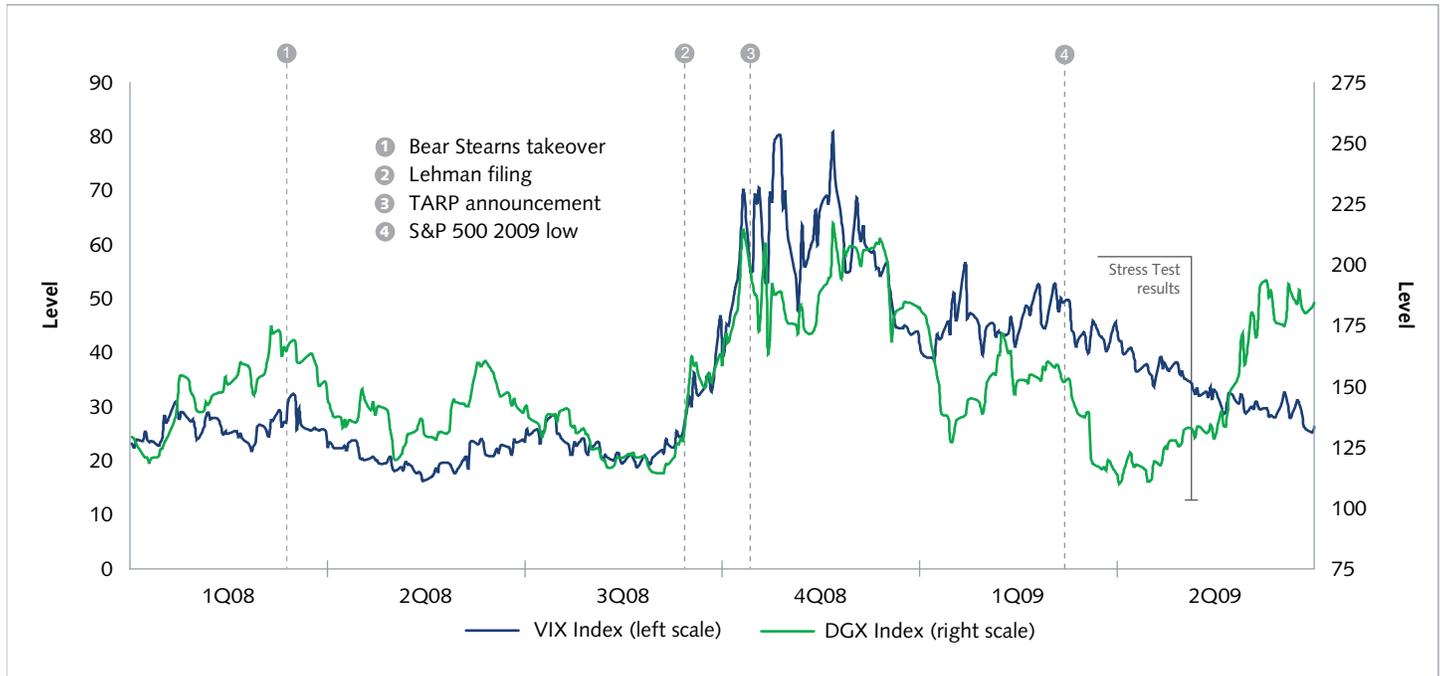
- the MMD-BMA spread was arguably already too wide because of some technical effects (which were not enduring and later partially reversed) that stemmed from investors replacing credit-protection trades they had on with Lehman and from banks hedging municipal bond counterparty credit risk as rates fell;
- a general reduction in risk premia and increasing confidence that the U.S. economy would not collapse into a full-blown depression;
- the movement of “real money” (mostly retail) back into the product, reducing the cash-synthetic basis component; and
- the introduction of Build America Bonds (“BABs”), a program included in the U.S. fiscal stimulus package under which municipalities are permitted to issue taxable (instead of tax-exempt) bonds and receive payments from the U.S. Treasury equal to 35% of the interest paid to investors.

In particular, the BABs program increased demand for municipal bonds by opening up the asset class to investors that typically invest in taxable debt and otherwise reduced the supply of tax-exempt bonds in the market, creating a bit of scarcity value. As a consequence, municipalities could issue debt more cheaply. Even though issuance of BABs has been a relatively small percentage of total muni issuance, the program helped revive the market.

MCDX has remained at wider levels for two primary reasons.

- Unlike MMD-BMA, which exclusively tracks AAA-rated issues, MCDX also has exposure to credits of far lower quality. This is an example of a theme that we’ll revisit in the context of asset-backed securities (Exhibit 7): lower quality assets have not recovered as much as higher quality assets relative to their pre-Lehman levels.
- MCDX is the hedging/shorting vehicle of choice for investors concerned about credit risk, and that concern remains somewhat prevalent among market participants.

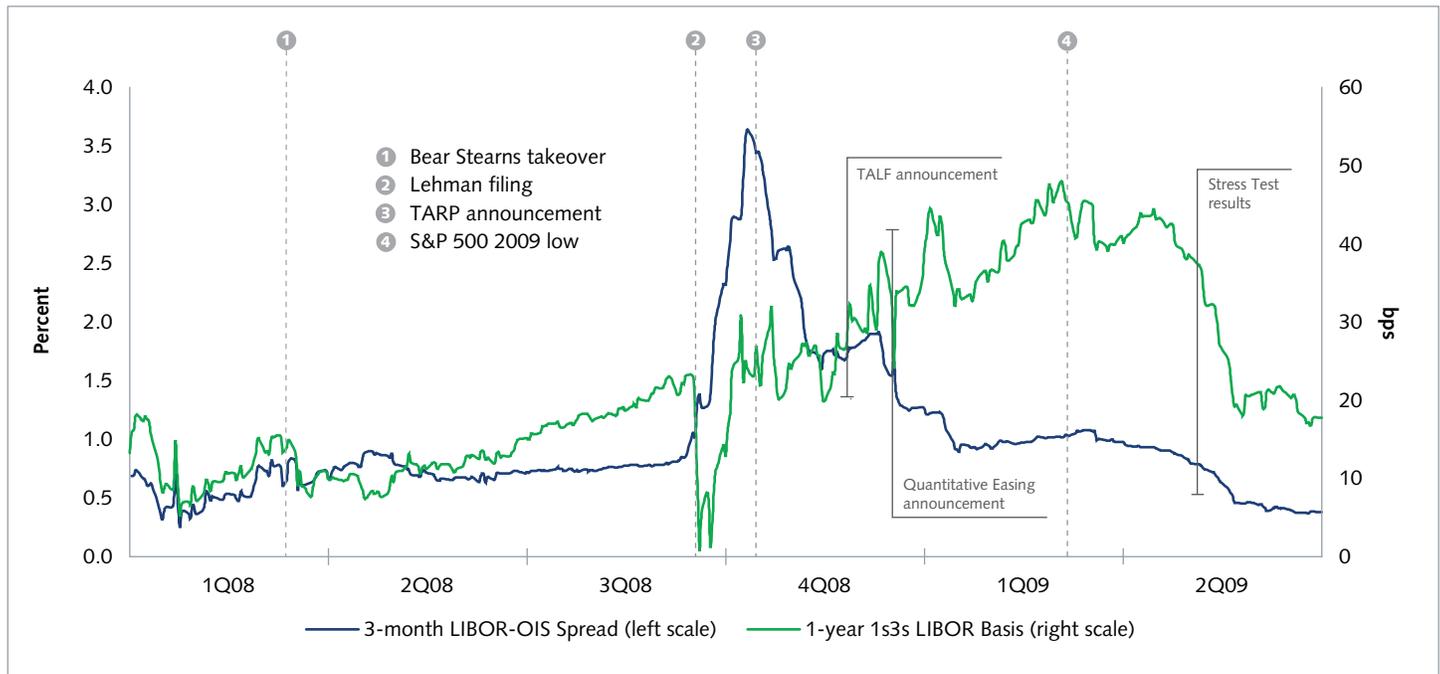
Exhibit 3. Interest-Rate Implied Volatility Spikes Relative to Equity Implied Volatility



THIS GRAPH SHOWS EQUITY implied volatility (as measured by the VIX Index) and short-term interest-rate implied volatility (as measured by the DGX Index).

- The VIX and DGX tracked each other relatively closely, with both spiking sharply following Lehman’s default.
- More recently though, short-term interest-rate volatility has jumped relative to equity volatility.
- At the end of 2Q09, short-term interest-rate implied volatility approached the peak reached just after Lehman’s bankruptcy, while equity implied volatility was not terribly far from its lows.
- We believe this relative increase in short-term interest-rate implied volatility stems from uncertainty in interest-rate markets, where the battle among deflation and recession fears, “green shoot” sightings, and inflation concerns is being fought.

Exhibit 4. Bank Funding Costs and Term Funding Premia Soar, then Tighten



THIS GRAPH PROVIDES TWO windows on the state of the U.S. dollar funding market.

- The 3-month LIBOR-OIS spread is the difference between the rate at which banks can borrow uncollateralized in the interbank market for three months (U.S. dollar LIBOR) and, roughly, the effective Fed Funds rate expected over the next three months. (Overnight indexed swaps, or “OIS,” are typically pegged to Fed Funds.) This spread provides a basic indicator of the amount of stress in the banking system and, by extension, the overall health of the financial system.
- The 1-year 1s3s (“ones, threes”) LIBOR basis spread shows the rate at which banks expect to borrow from each other over the next year if done on a one-month versus three-month rolling basis. This spread increases when longer-term funding becomes more dear. It’s considered an expression of risk, term, and liquidity premia for short-term funding markets.

The move in the LIBOR-OIS spread was one of the more extraordinary of the crisis, reflecting the high level of stress experienced by the banking system after Lehman filed for bankruptcy.

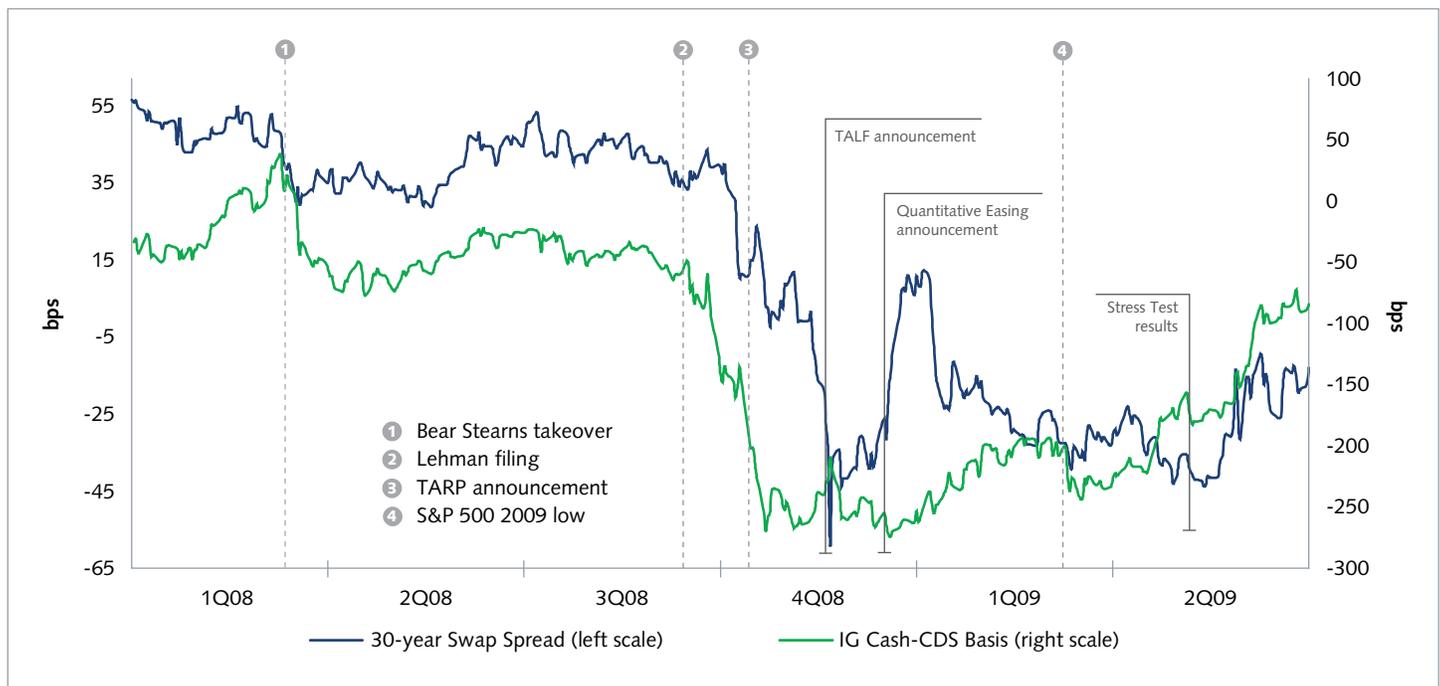
- Having held steady at less than 10 basis points for much of 2005 to early 2007, the LIBOR-OIS spread seemed on the verge of stabilizing at wider levels in 1H08.
- The spread then blew out after the Lehman filing, as credit and liquidity conditions deteriorated, and concerns over the creditworthiness of financial institutions led to higher borrowing costs and lower trading volumes in funding markets.
- As liquidity in short- and long-term funding markets evaporated, those banks unable to borrow in the Fed Funds market were left with few options to finance their liabilities, thereby increasing demand for interbank funding.
- This unleashed a vicious cycle, as liquidity constraints increased fears about credit quality, and rising borrowing costs made it more likely that banks would be unable to meet their obligations.

- These fears dissipated when the U.S. Treasury and U.S. Federal Reserve Bank instituted liquidity programs to secure funding for financial institutions, thus alleviating the pressure on short-term funding markets and helping to reverse the spiraling liquidity and credit fears.
- As financial conditions improved, the premium that banks had to pay when borrowing narrowed to a level not seen since the beginning of 2008.

The tightness in money markets also reflected a strong desire for term funding.

- As financial conditions deteriorated before Lehman’s collapse, and certainly afterwards, the 1-year 1s3s LIBOR basis spread steadily widened as funding concerns grew.
- While the basis collapsed immediately following Lehman’s bankruptcy, this was a technical move, perhaps caused by market participants replacing trades they had on with Lehman, and was quickly reversed.

Exhibit 5. Prices of Cash Instruments Steeply Decline and Then Recover, Reflecting Movements in Funding Markets



AFTER FUNDING COSTS SKYROCKETED in the wake of Lehman’s filing, the prices of cash instruments experienced a corresponding steep decline—albeit with a noticeable lag—relative to comparable synthetic instruments. In other words, cash-synthetic basis went more negative.

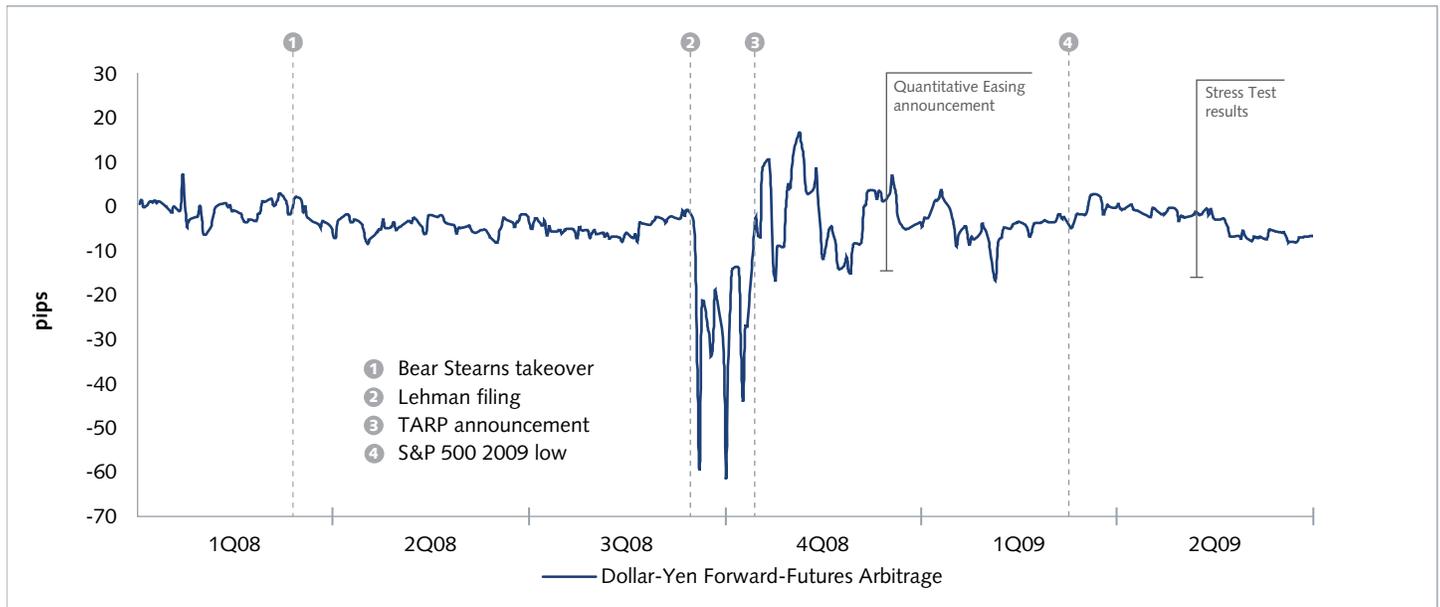
This chart attempts to capture the cash-synthetic basis in two markets for cash instruments: U.S. Treasury bonds (“30-year Swap Spread”) and investment-grade corporate credits (“IG Cash-CDS Basis”).

- In addition to cash-synthetic basis, which is embedded in both IG cash-CDS basis and the 30-year Swap Spread, the swap spread also contains credit risk, as swaps are based on an interest rate, LIBOR, that has some unsecured credit risk. When cash-CDS basis goes more negative, it will drive the swap spread more negative as well. On the other hand, the credit risk embedded in the swap spread drives it more positive.

Notable in this chart is that:

- The cash-CDS basis in investment-grade credit (and in high-yield credit as well) rallied considerably in 2009, but the 30-year Swap Spread did not recover nearly as much.
- The level in the swap spread should not be interpreted to mean that banks expect to lend or borrow at rates lower than those on U.S. government securities over the next 30 years.
- Rather, the level in the swap spread should be mostly understood as an expression of (1) the illiquidity of 30-year Treasuries, (2) an imbalance in supply and demand as the government issued large amounts of long-dated paper just as investor appetite moved to the short end of the yield curve, and (3) the high margin costs associated with funding such a relatively illiquid U.S. Treasury instrument.
- Highly conspicuous in the chart is the spike in the 30-year Swap Spread towards the end of 2008. This short-term move appears to have been technical in nature, probably driven by bank fixed-income desks using swaps to hedge certain exotic instruments and a few large players employing swaps to bet that 30-year rates would temporarily rise.

Exhibit 6. The Market in U.S. Dollars for Overseas Investors Returns to Normal after Experiencing a Severe Shortage



THE SHORTAGE OF FUNDING also manifested itself in a shortage of U.S. dollars faced by overseas investors. Here we see how tightness in U.S. dollars was reflected in the dollar-yen exchange rate just after Lehman's default. The forward-futures arbitrage line in this chart reflects the difference between the actual forward exchange rate and parity-implied forward exchange rate. This measure went to extreme levels after the Lehman filing² for two primary reasons.

One reason derived from the dynamics of financing dollar-denominated assets.

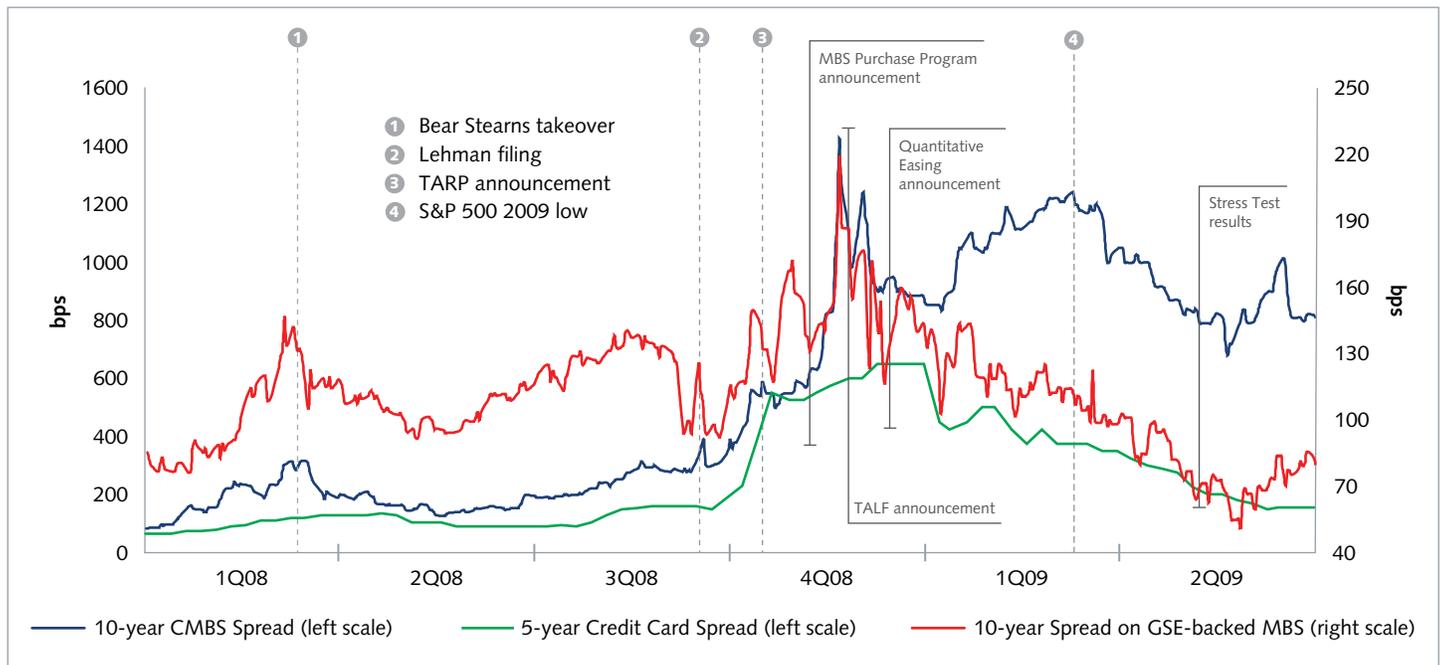
- After Lehman defaulted and U.S. dollar funding generally became scarce, overseas investors in dollar assets lost, or worried about losing, their financing and so had a considerable need for funding beyond year-end.
- A yen-based investor, for example, could mitigate this need and effectively borrow dollars by (1) buying dollars in the spot market (driving the spot dollar-yen exchange rate higher) and (2) selling those dollars back for yen in the forward market (driving the forward dollar-yen exchange rate lower) to reduce exchange-rate risk.

A second driver of the dollar shortage stemmed from losses on dollar-denominated assets.

- Even if overseas investors did not worry about losing their funding, losses on dollar-denominated assets meant that they had to post margin on positions in their investment portfolios.
- Usually, this margin would be posted in U.S. dollars, but if posted in a foreign currency, the lending bank would typically convert the funds received into dollars.
- Either way, dollars would have to be raised in the spot market to cover variation margin payments or to hedge dollar exposure resulting from a decline in the value of their dollar-denominated assets.
- While there isn't an associated forward leg of this trade, it nonetheless contributed to the dislocation by exacerbating the U.S. dollar shortage in the spot market.

² At the end of August 2008, the difference between the 3-month forward and spot price on dollar-yen was -55 pips. (In the context of the dollar-yen exchange rate, 1 pip represents a move of 0.01 yen.) The 3-month forward market was pricing in yen strengthening because 3-month interest rates in Japan were lower than equivalent rates in the United States. Based on pricing in the forward and spot markets, pricing parity required that the dollar-yen forward rate decline (yen strengthen) by about 0.48% in order to offset the extra carry earned in dollars, and this is close to what we saw in the market. Consequently, the arbitrage (between currency forwards and an interest-rate future or similar instrument) was *de minimis*. At the end of 3Q08, the forward-spot spread gapped out to -143 pips, implying that the yen would strengthen by about 1.35% over the next three months. In order to justify this pricing, the annualized interest-rate differential between the United States and Japan needed to be approximately $1.35\% \times 4$ or 5.40%, but it was only 3.04%.

Exhibit 7. Government Intervention Helps Certain Asset-Backed Securities More Than Others



THIS GRAPH JUXTAPOSES spreads on the following AAA-rated asset classes: the 10-year spread on 30%-enhanced last-cash-flow (“super-duper”) senior commercial mortgage-backed securities (“CMBS”), the 5-year spread on senior credit card debt, and the 10-year spread on mortgage-backed securities (“MBS”) guaranteed by U.S. government-sponsored enterprises (“GSEs”) like Fannie Mae.

In addition to a quality effect discussed in the context of Exhibit 2 (higher quality credits rallying more of the way back to their pre-Lehman levels than lower quality issues), the data indicate that U.S. government intervention has helped (narrowed the spreads of) agency mortgages and credit cards much more than CMBS.

- In November 2008, the U.S. Federal Reserve announced a program to purchase securities guaranteed by GSEs. The program was designed to provide support to the mortgage and housing markets by driving mortgage rates lower and thereby making housing more affordable.
- Through the first six months of 2009, the Fed purchased a total of nearly \$600 billion in MBS, and during that period the spread on GSE-backed issues compressed over 100 bps.
- The spread on credit card debt tightened dramatically from approximately 650 bps to 150 bps (a move of 80%!) after the Fed announced its Term Asset-Backed Loan Facility (“TALF”) program at the end of 2008.
- Until recently, the TALF program had focused on consumer asset-backed securities (“ABS”) (e.g., auto, student, and equipment loans and credit card debt). The expansion of funding under the program paved the way for substantial new issuance, better secondary-market liquidity, and significant participation from non-TALF investors.

In the CMBS space, however, spreads remained wide and volatile given uncertainty about the size and form of any government involvement (*i.e.*, whether TALF could be successfully applied to CMBS).

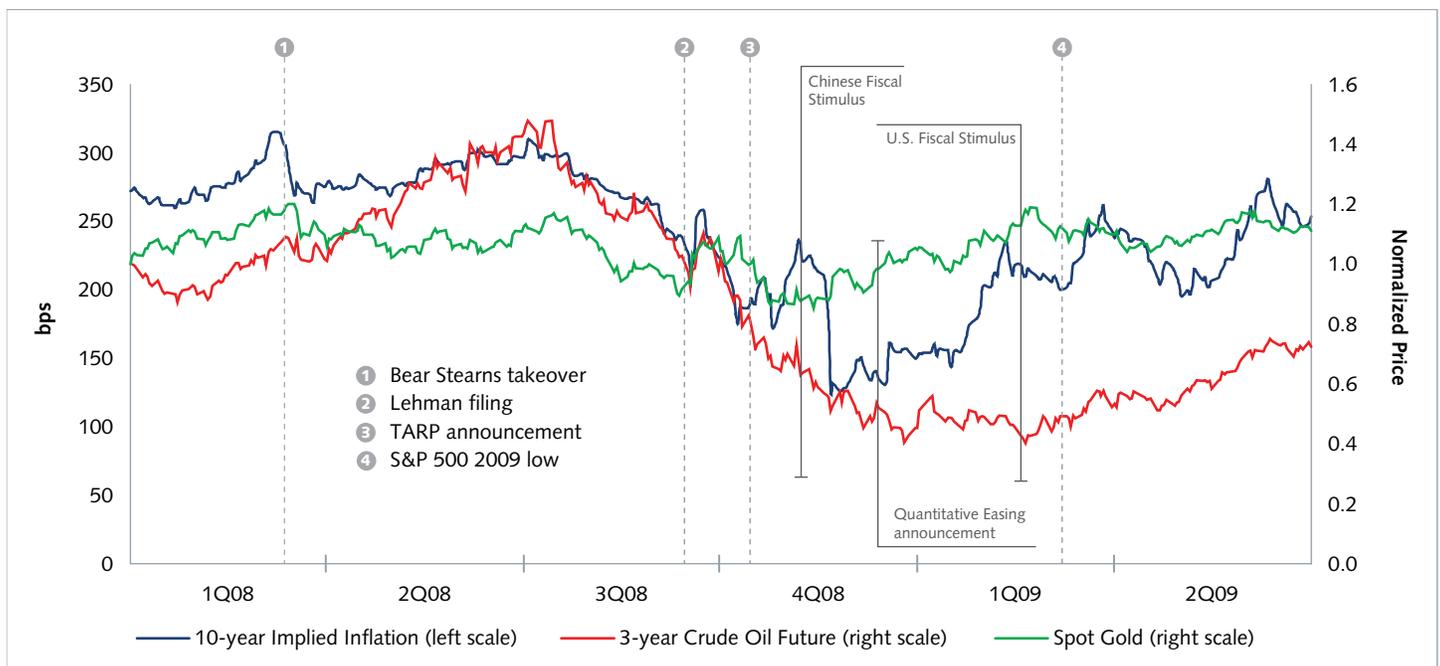
The difference in performance is not solely due to government intervention, however, given the impact of two other factors:

- While the collateral underlying deals backed by credit-card debt and CMBS has displayed significant deterioration in the past nine months, there is more fear and uncertainty on CMBS. Investors generally feel they have greater

visibility about the losses that can be expected on credit card debt while opinions vary significantly about potential losses on CMBS.

- The incentives of consumer ABS issuers are strongly aligned with the holders of the securities they issue because (1) the issuers tend to hold a large residual interest in the deal and rely on continued access to funding (meaning they have a strong incentive to protect the investments of debt holders); and (2) portfolios of credit card receivables turn over at a high frequency, meaning the servicer can take initiatives to improve credit quality (e.g., tightening credit limits when borrowers appear more risky).
- Since the end of 2Q09, however, the uncertainty about CMBS noted above has dissipated somewhat as detailed information has been released regarding the U.S. government’s support for CMBS (and non-GSE MBS) through its Public-Private Investment Program. This, coupled with the first investor subscriptions for CMBS under the TALF program in July 2009, has resulted in
 - CMBS spreads tightening by approximately 100 bps on average;
 - reduced price volatility; and
 - significant differentiation in pricing between better quality, earlier vintage CMBS that will retain a AAA rating (and thus be eligible for TALF) and newer issues that contain riskier collateral.

Exhibit 8. Government Intervention Heightens Long-Term Inflation Expectations



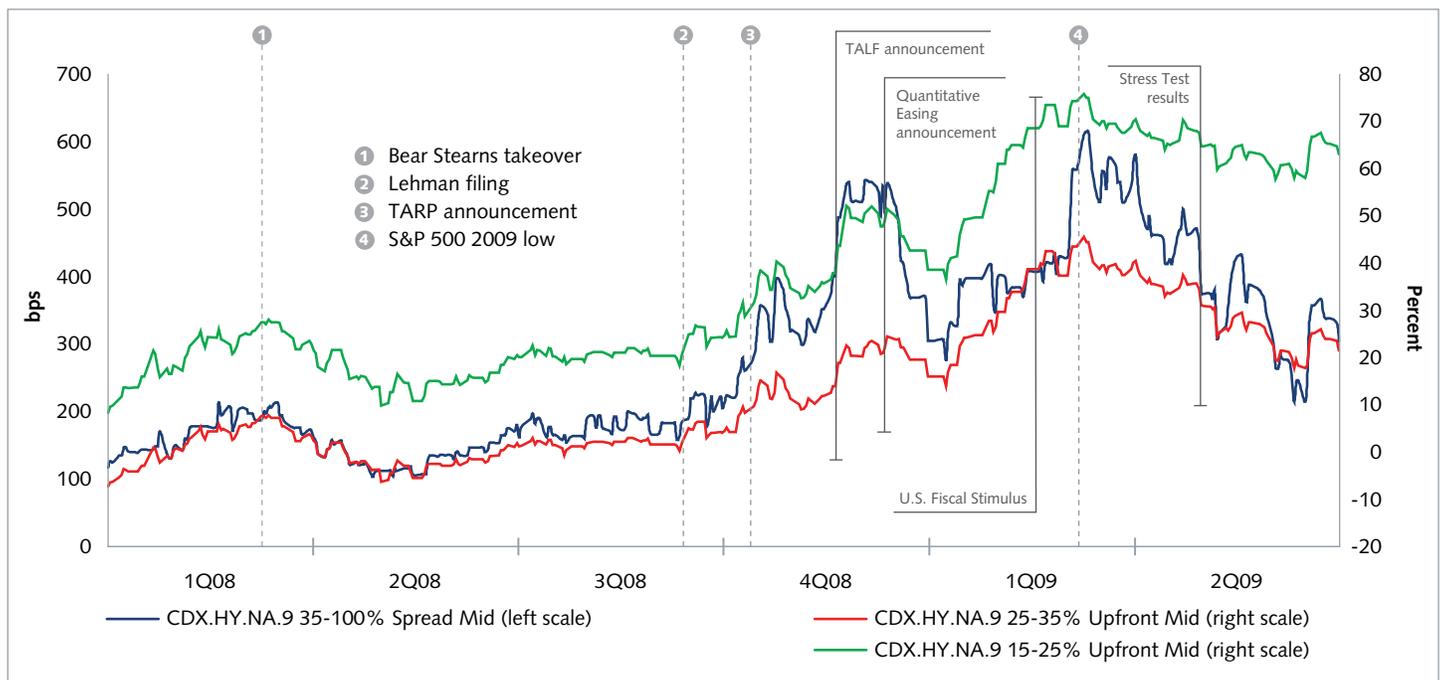
THE DEBATE OVER INFLATION has dominated the financial press in recent months.

- Some argue that inflation is bound to jump given the U.S. government’s quantitative easing programs and passage of a significant fiscal stimulus program.
- Others contend that inflation fears are overblown because no industrialized economy has ever experienced sustained inflation when the output gap (the excess of potential supply over actual demand) has been as large as it currently is in the United States.

This graph shows U.S. consumer price inflation expectations (derived from inflation swaps) alongside normalized prices for oil and gold.

- Inflation expectations declined sharply in 4Q08 and at the beginning of 2009 as fears of a prolonged recession intensified.
- Towards the end of 1Q09, inflation expectations returned to more typical levels as concerns of a deep recession began to fade after a number of governments around the world undertook aggressive fiscal measures and green shoots were reported in economic data.
- Gold steadily increased in price after Lehman's collapse as investors found different reasons to own the asset. Some viewed gold as a safe haven in a more uncertain environment, while others bought it as a hedge against inflation.
- Commodities such as oil, which are more linked to production, have been much more volatile and rebounded strongly in 2Q09.

Exhibit 9. The Market Prices in a Recession, Not a Depression



THE CDX.HY.NA.9 is a CDS index that references 100 high-yield companies and matures in December 2012.

The market trades “tranches” on this index. For example, the 15-25%, 25-35%, and 35-100% tranches are contracts that pay off if the index ends up suffering certain levels of cumulative loss.

- From the perspective of an investor buying protection, the 15-25% tranche will begin to pay off once there have been 15% losses in the index, and it will have paid off completely once there are 25% losses in the index. When the tranches look riskier (*i.e.*, more likely to pay off), the market price of buying/selling protection on them (whether quoted as upfront points or running spread) increases.
- The 35-100% tranche, which will pay off only if there are losses in excess of 35% in the index, might be considered an indicator of tail or “depression” risk. The 25-35% tranche could be interpreted as reflecting “serious recession or worse” risk. And the 15-25% tranche might be viewed as a proxy for “mild recession or worse” risk.

- Since all of the tranches reference the underlying index, they usually move wider or tighter together as the index moves wider or tighter.

It's interesting to compare where the tranches were around the time of the TALF and Quantitative Easing announcements to where they were at the end of 2Q09.

- The 35-100% tranche is significantly tighter.
- The 25-35% tranche is about the same.
- The 15-25% tranche is significantly wider.

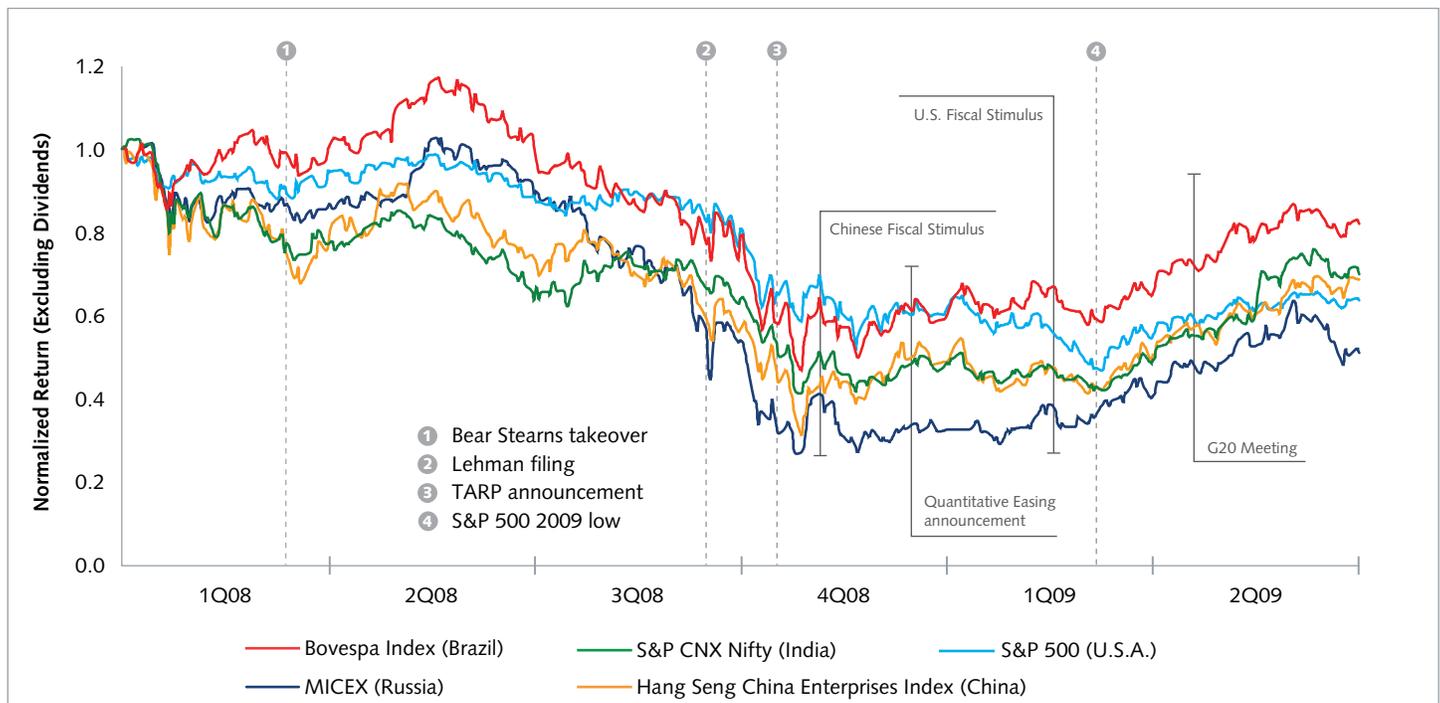
What do these data points reveal? After Lehman filed for bankruptcy, the market reflected a view that, "Things are very bad, but also very uncertain. There's a relatively high risk of a "Great Depression II" scenario, and still a high chance that things will come out okay—after all, there haven't been many defaults yet."

At the close of 2Q09, by comparison, the data on tranches indicate that the market believes

- the probability of a mild recession or worse is higher,
- the probability of a serious recession or worse is about the same, and
- the probability of a "Great Depression II" is lower.

So the market currently seems to be saying, "It's relatively clear that we'll have a mild-to-serious recession. It's less likely we'll escape unscathed but also less likely that we'll have a Great Depression."

Exhibit 10. Emerging Markets Look More Resilient Than Some Anticipated

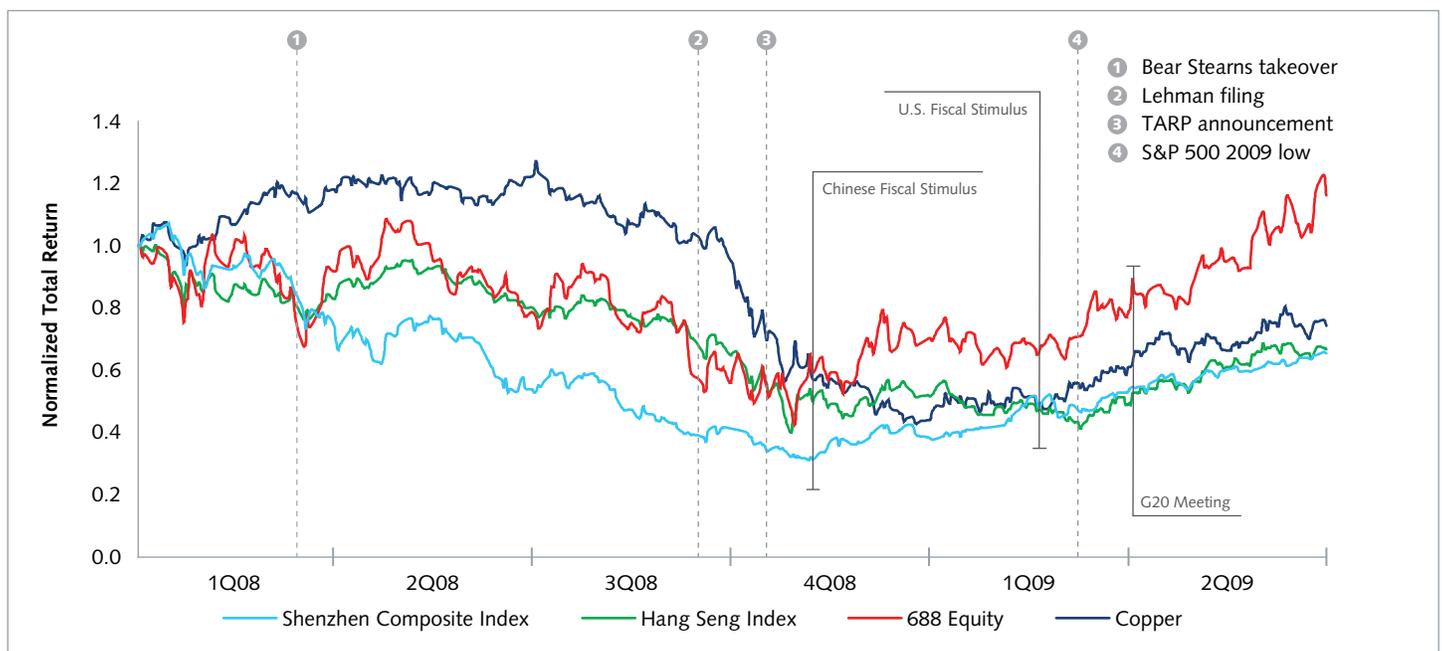


BROADLY SPEAKING, emerging market growth has been driven by (1) commodity production, (2) global trade, and/or (3) credit expansion. This chart presents normalized returns (excluding dividends) for the stock markets of the "BRIC" countries—Brazil, Russia, India, and China—alongside the return of the S&P 500.

- Over the course of 2008, as commodity prices, global trade, and credit all simultaneously collapsed, emerging markets significantly underperformed.
- The hopes for a clear decoupling of the emerging markets from the economically stricken developed world were dashed soon after Lehman's bankruptcy, as a "flight to safety" became a "flight to dollars," resulting in massive capital exodus and a collapse of many emerging market currencies.
- The BRIC economies are highly leveraged to the global cycle through trade, capital, and commodity flows. Consequently, a credit crisis that began in the advanced industrialized countries was mirrored in the BRICs: a violent collapse and overshooting driven by contracting trade and capital repatriation, followed by tentative signs of normalization.
- Russia, with its significant exposure to foreign credit and commodities, underperformed the other emerging market economies but has begun to recover with the uptick in commodity prices.
- Brazil, on the other hand, with a relatively higher degree of internally funded credit expansion, has exhibited significant resilience throughout the crisis.

For emerging markets in general, 2009 year-to-date has brought new life as the likelihood of disaster tail scenarios has receded with the G20's renewed commitments to the International Monetary Fund and the nascent stabilization of the world economy. Global trade has begun to pick up, and so have the fortunes of emerging markets.

Exhibit 11. China Leads the World Recovery



HAVING PUT IN PLACE an aggressive stimulus package and suffered less damage during the financial crisis than other economies, China has been at the vanguard of the global economic recovery. The Chinese and Hong Kong stock markets, as measured by the Shenzhen Composite Index ("SZCOMP") and Hang Seng Index, respectively, began to recover about four months before the S&P 500, and the SZCOMP subsequently more than doubled in value. This chart depicts a handful of assets that provide a view on the performance of the Chinese economy. Consider that data in the context of the following factors:

- The economic stimulus in China has been particularly successful because the government has been able to increase credit flow through state-controlled banks.

- The expansion of credit has flowed into equities and real estate. China Overseas Land & Investment Limited is a real estate investment trust listed on the Hong Kong Stock Exchange (stock code "688") that invests in property and infrastructure in China. Real estate investments have benefitted from China's fiscal stimulus and low interest rates.
- U.S. monetary policy has leaked into China and particularly Hong Kong, where the authorities peg the Hong Kong dollar to the U.S. dollar and shun capital controls. Anecdotally, high-end real estate in Hong Kong and the coastal areas of mainland China has returned to peak levels.
- China has also propped up demand for commodities. Because the country has remained on a relatively steep growth path, China has not only continued to import large quantities of commodities for production purposes but, given its sizable capital reserves, has also stockpiled commodities, allowing it to take advantage of contango. According to Macquarie Research, China is the largest buyer of copper, constituting about 28% of worldwide demand in 2008 and almost 40% at the end of 1Q09. China's share of global demand for aluminum, zinc, lead, and other metals is in line with the figure for copper.

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