BLUEMOUNTAIN INVESTMENT RESEARCH

PROCYCLICALITY AND ITS EXTREMES

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Procyclicality and Its Extremes

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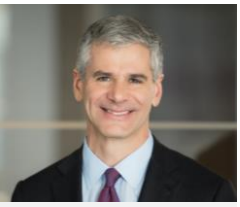

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Imagine a bike race. You are in the middle of the pack. The sun is shining and the road is flat and smooth. The pace is brisk but steady. Legs move in unison, almost as if choreographed. There is camaraderie in competition. You feel great and pedal hard.

The road slopes down and the peloton picks up the pace. The speed of the bikes and the sound of the wind amplifies a surge in adrenaline. You notice others are pedaling even faster, trying to accelerate. Some rise from their seats, swaying their handlebars from side to side, seeking to push the pedals harder. The thrill of the chase and the motivation of competition inspire you to do the same. Riders jockey for position. Soon, disarray replaces order. You start to think that the pace and proximity may be unwise but the intoxication of the moment keeps you from slowing down.

A rider at the front of the pack swerves just enough to touch the wheel of another bike. Riders crash, toppling those who follow. You are ensnared in a giant and unstoppable cascade that seems to unfold in slow motion. A jumble of bikes and bodies end up on the road, broken and bruised.

You gather your wits and peer down the road. It is clear, flat, and empty. But no one gets up. Everyone is dazed, scared, and traumatized. You hear a rider approaching who had kept a sensible distance from the pack, not caught up in the herd. She dodges the fallen riders and sails down the road alone. As she disappears beyond the horizon you realize she will win the race.

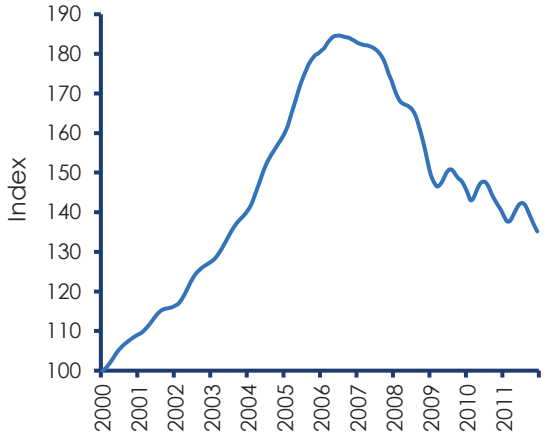
A few of the fallen riders gradually rise and resume pedaling. You get back on your bike, cautiously and gingerly, and start riding as well. The riders are now hesitant and wary. They maintain a safe distance from one another and are hyper-alert to the slightest sign of danger.

Funny, you think to yourself, when everything seemed great we all went too fast and were reckless in retrospect. But now that the road is clear and flat, we are going a lot slower than the conditions justify. We have collectively lost our spirit. You chuckle at the pun: The pack took the cycles to an extreme and the winner avoided the extremity of the cycles. And so it is with markets.

The history of markets teaches us that we have financial cycles. At some times, asset prices reflect a great deal of optimism. Think of the dot-com stocks in the late 1990s or the housing market from 2002-2007 (see exhibit 1).

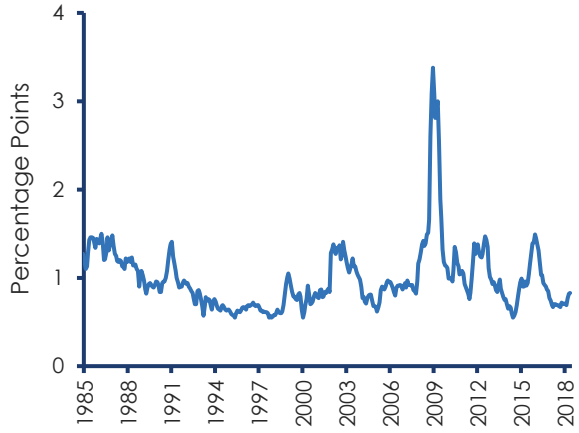
At other times, prices reflect fear. For example, exhibit 2 shows the difference in yield between corporate bonds rated Baa and Aaa by Moody's. This difference reflects the extra compensation that investors demand for low investment grade versus high investment grade bonds. The spread soared to 70-year highs at the peak of the financial crisis in late 2008, four times higher than it was just one year earlier.

Exhibit 1: S&P/Case-Shiller U.S. National Home Price Index, 2000-2011



Source: Robert J. Shiller.
Note: Nominal; monthly data; January 2000=100.

Exhibit 2: Yield Spread between Baa and Aaa Corporate Bonds, 1985-2018



Source: Moody's and Bloomberg.
Note: Monthly data; as of May 31, 2018.

This report discusses procyclicality, and especially its role in bubbles and crashes in financial markets.

In economics, procyclical variables move in the same direction as the overall economy: Consumers, businesses, and investors are bold when economic conditions appear strong and timid in the wake of weakness.

Procyclical behavior need not be reckless or irrational. Some procyclical behavior is warranted because there is more opportunity when the economy is strong than when it is weak. As a result, "the debate about the procyclicality of the financial system is therefore more subtle" than an assumption of trend-reinforcing behavior, according to a report by the Federal Reserve Bank of New York. The question is whether or not the fluctuations are a justifiable result of changes in fundamental values.[1]

In other words, in an upswing, we should ask whether asset prices reflect what Alan Greenspan called "irrational exuberance."[2] And in a downswing, we should ask whether prices reflect "irrational despair."[3]

Unfortunately, investment managers who try to remain prudent during a bubble lose assets to those who are more aggressive and temporarily more successful. Jim Cramer, an investor and television personality, captured this in a speech he delivered in February 2000, immediately prior to the peak of the Nasdaq Composite Index: "If we use any of what Graham and Dodd teach us, we wouldn't have a dime under management."[4]

But successful long-term investors are able to avoid both irrational exuberance and irrational despair, which enables them to take advantage of the extreme behavior of others. As Warren Buffett, the chief executive officer and chairman of Berkshire Hathaway, says, "Be fearful when others are greedy, and be greedy when others are fearful."[5]

Causes of Procyclicality and Its Extremes

Procyclical feedback loops commonly start with fundamental economic strength that becomes virtuously self-reinforcing. For example, an increase in consumer demand leads to greater business investment, which leads to higher employment, which spurs additional demand. The process also works in the opposite direction.

Whether up or down, a trend in fundamentals can morph into a feedback loop that pushes asset prices to an extreme. While it is difficult to isolate the exact cause of a procyclical extreme, we can offer a taxonomy that captures much of the behavior we observe. The boundaries between these categories are blurred, but they reflect most of what we see in markets.

Debt and Leverage. The economist Hyman Minsky was not particularly well known before he died in 1996. But he emerged as a household name after the global financial crisis when it became clear that his financial instability hypothesis (FIH) accurately anticipated the dynamics that led to the crisis.[6] The FIH posits that procyclical credit cycles are the primary drivers of bubbles and crashes.[7]

Not all bubbles and crashes are fueled by debt. But excessive debt was present in many of the worst episodes throughout history. Markus Brunnermeier, an economist at Princeton University, analyzed bubbles all the way back to the Dutch tulip mania in the 17th century. He concluded, "Crises are most severe when accompanied by a lending boom and high leverage of market players, and when financial institutions themselves are participating in the buying frenzy."[8]

Minsky's FIH distinguishes among three relationships between debt and borrower income. "Hedge" debt is low risk—the borrower can meet interest and principal payments with future cash flows. "Speculative" debt is riskier—the borrower can meet interest payments out of future cash flows but expects to refinance when the principal comes due. "Ponzi" debt is the riskiest—the borrower can pay neither interest nor principal from cash flows. Instead, the borrower relies on the appreciation of the underlying asset. Large amounts of speculative and Ponzi debt lead to asset bubbles that are prone to burst.[9]

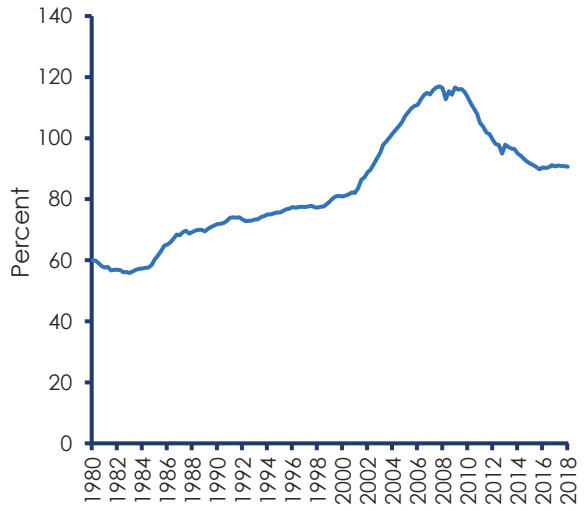
Minsky's theory is procyclical. He argues that prolonged periods of stability and prosperity lead to greater risk taking. Profit-seeking "merchants of debt" aggressively peddle speculative and Ponzi debt when the opportunity arises.

Minsky did not believe that an exogenous shock is necessary to burst a bubble. He suggests that the inflationary pressures that are the result of the debt buildup would inevitably lead to monetary policy or regulatory response. Those actions curtail or destroy the risky debt, leading to a crash.

Economists have applied Minsky's insights to all sorts of bubble denouements. Paul McCulley, formerly an economist at the asset management firm PIMCO, coined the term "Minsky Moment" to refer to the point when an unsustainable debt burden implodes to cause a crash.[10]

Minsky's theory is about the relationship between a borrower's debt and cash flow (debt-to-cash flow). When that ratio gets too high, the bubble bursts. Minsky did not test his theory empirically, but recent work finds that the level of debt-to-cash flow is a useful warning sign of a pending debt crisis.[11] For example, exhibit 3 shows that the U.S. household debt-to-personal income ratio spiked in the years preceding the financial crisis.

Exhibit 3: U.S. Household Debt-to-Personal Income Ratio, 1980-2018



Source: Bureau of Economic Analysis and Board of Governors of the Federal Reserve System.
Note: Quarterly data; as of March 31, 2018.

Other theories focus more on the ratio of loan-to-value (LTV) than on debt-to-cash flow. Naturally, value is highly correlated with cash flow for many assets. But the same level of cash flows result in different values if investors discount them at different rates. And credit is sometimes not secured by an asset at all. In these cases, the borrowers have to come up with cash flows from other sources.

John Geanakoplos, a professor of economics at Yale University, developed a theory called "the leverage cycle." Geanakoplos argues that the availability of leverage, not interest rates, is the most important variable in understanding bubbles and crashes.[12]

You can measure leverage as the amount of debt a buyer obtains to acquire an asset. Leverage is the complement of the equity a buyer needs to put up to purchase the asset. The equity is also known as the down payment, margin, or haircut. When the down payment, margin requirement, or haircut is low, leverage is easily available and buyers can use a small amount of equity to obtain a large amount of credit.

For example, a homeowner who can borrow $95 to buy a $100 house has a down payment of 5 percent and a leverage ratio of 20 times. A homeowner who can borrow only $80 against the house has a down payment of 20 percent and a leverage ratio of 5 times. The first homeowner has access to much more leverage. You can readily extend the thought to investors who borrow to buy securities or banks that borrow to fund their balance sheets.

A central premise of Geanakoplos's theory is that it is often the case that some buyers place a higher value on an asset than others, which rejects the notion that asset prices always reflect fundamental value. This can be the result of differences in relative optimism, risk tolerance, or utility functions. Geanakoplos calls these more eager buyers the optimists. When leverage is easily accessible, optimists use it to bid up asset prices.

Leverage availability is procyclical. Borrowers generally gain access to more leverage when the economy strengthens or asset prices rise. But this access can reverse quickly when the economy weakens or asset prices fall. This becomes self-reinforcing.

Geanakoplos offers the anatomy of a crash. First, asset prices drop because of "scary bad news." Scary bad news is news that increases volatility, uncertainty, and disagreement. In the subprime financial crisis, the scary bad news was distress in the residential mortgage market.

The steep decline in asset values causes a big drop in the wealth of asset owners who have a lot of debt. As a result, these owners are forced to sell assets to meet their margin requirements. This selling leads to further declines in asset values, which leads to further selling, and so on.

Before prices can settle at a new equilibrium, lenders tighten margin requirements because of the increased uncertainty and disagreement. Some buyers get wiped out and go out of business, leaving fewer buyers to support prices. Spillovers occur when owners in one asset class cover their losses by selling in other asset classes. Investors who survive are in a position to seize on a great opportunity.

Let's run through the math to see how this works (see exhibit 4). A fund buys an asset worth $100 and the initial margin requirement is 15 percent. The fund can borrow $85 and has a leverage ratio of 6.7 times ($100/$15).

Exhibit 4: The Leverage Cycle Plays Out

Initial margin	15%
Loss in value	5%
New margin at lower value	25%
Redemptions	10%

	Asset Value	Equity	Borrowing	Leverage Ratio	Margin
At start	100.0	15.0	85.0	6.7	15%
After loss of value	95.0	10.0	85.0	9.5	11%
After margin call	66.7	10.0	56.7	6.7	15%
After increase in margin	40.0	10.0	30.0	4.0	25%

Source: Based on International Monetary Fund, "Global Financial Stability Report: Financial Market Turbulence: Causes, Consequences, and Policies," October 2007.

Now comes a bout of bad news, the first of the three elements, which ushers in uncertainty. Consistent with the second element of the cycle, the value of the asset declines by 5 percent to $95. This creates a sharp loss in the equity, from $15 to $10, and increases the fund's leverage ratio to 9.5 times ($95/$10).

The fund's broker makes a margin call, which forces the fund to sell assets to pay down debt and bring leverage back to the initial margin. The fund has to sell $28.3 worth of assets to pay down debt and return to a 6.7 times ratio ($66.7/$10). This dynamic is even more acute for higher levels of initial leverage.

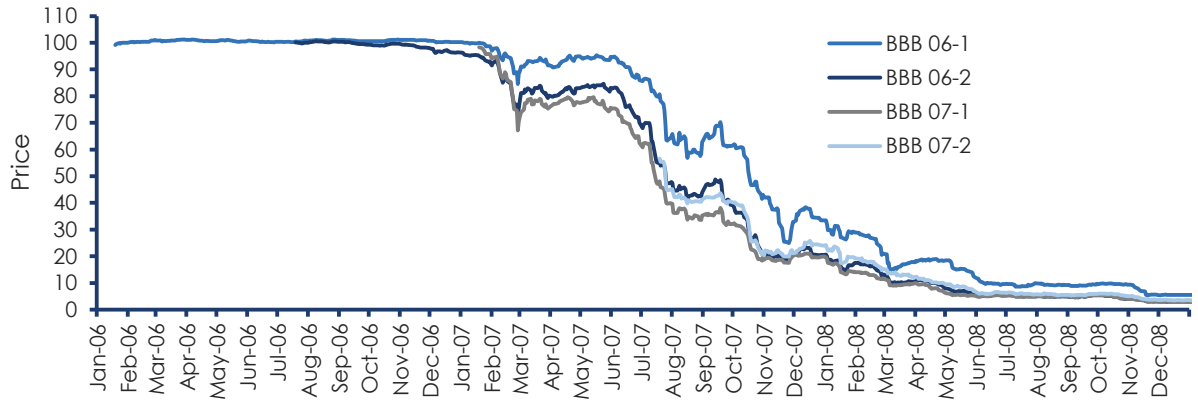
The final element is a change in the collateral requirement. The broker increases the margin requirement to 25 percent to reflect higher perceived risk for the asset. This requires the fund to sell even more assets to pay down debt and get the leverage ratio to 4.0 ($40/$10). With only $10 in equity, the fund has to reduce debt to $30 and shrink its asset value to $40.

This played out during the financial crisis. Exhibit 5 shows the BBB-rated tranches of the Markit ABX Home Equity Index, which tracks the prices of securities tied to home equity loans made to subprime borrowers. The value of these tranches plummeted between March 2006 and December 2008 as a result of bad news, which led to price declines and stricter collateral requirements.

Exhibit 6 illustrates the procyclicality of available leverage. It compares haircuts for various assets in June 2007, before the crisis, to those in June 2009, in the midst of the crisis.

For example, a buyer could purchase $100 of high-yield bonds by putting up $20 and borrowing $80, with the securities acting as collateral, before the financial crisis. Just 24 months later, a buyer would need to put up $40 to buy the same $100 of securities. In other words, $40 would have allowed you to purchase $200 of these securities in 2007 but just $100 worth two years later, a 50 percent drop in purchasing power.

Exhibit 5: Markit ABX Home Equity BBB Index, 2006-2008



Source: IHS Markit.

Exhibit 6: Haircut for Various Assets Before and After the Financial Crisis

	June 2007	June 2009
Government bonds, short-term (G7 countries)	0.5 percent	2 percent
Government bonds, medium-term (G7 countries)	0.5	3
Investment grade bonds (AAA and AA)	5	15
Equities (G7 countries)	20	25
Prime mortgage-backed securities (AAA)	10	30-100
High-yield bonds	20	40
Asset-backed securities	20	100
Equities (emerging economies)	35	40

Source: Bank for International Settlements, "The role of margin requirements and haircuts in procyclicality," Committee on the Global Financial System Papers, No. 36, *March 2010.*
Note: Transactions with an unrated counterparty; Average haircuts across survey participants; G7 is the Group of Seven, which includes Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

The 2007-2009 financial crisis was a particularly acute example of the leverage cycle. Almost 40 percent of homeowners in the U.S. had negative equity. From peak to trough, the stock market declined by 57 percent, and it took over four years to recover to pre-crisis levels. Analysis by the Federal Reserve Bank of Dallas suggests the financial crisis cost the U.S. between $6 and $14 trillion in lost output and precipitated a $16 trillion hit to household net worth.[13]

Geanakoplos believes the crisis was so severe because leverage got to a level higher than ever before and margin requirements got tighter than ever before.[14] The magnitude of the bubble was amplified by two leverage cycles, in housing and in mortgage-backed securities, that reinforced one another. The introduction of a derivatives index on subprime mortgage-backed securities further accelerated the price decline.

The Madness of Crowds. The wisdom of crowds can generate remarkably accurate answers when there are three conditions in place: agent diversity, a well-functioning aggregation mechanism, and proper incentives.[15] When one or more of the conditions are violated, the wisdom of crowds flips to the madness of crowds, leading prices to veer from fundamental value.[16] Humans are social beings. Fads, fashions, and information cascades are evidence that opinions can become homogeneous from time to time. This violates the condition of agent diversity, and it can lead to bubbles and crashes in markets.

The dot-com bubble in the late 1990s is a vivid recent example among many in the history of markets. The Nasdaq Composite stock market index rose more than six-fold from the beginning of 1995 to its peak in 2000. A relatively small number of companies dominated the value of the index. The price-earnings (P/E) multiple for the Nasdaq reached 200, while the median P/E for the Value Line Index was just 12.7 times.[17] When the bubble burst, the S&P declined 49 percent from peak to trough. From its nadir in October of 2002, it took almost five years for the S&P to return to its March 2000 level. The S&P finally reached a new peak at the end of September 2007, seven and a half years after its prior top.

Recency Bias. People have a tendency to overweight recent events. When the market is strong, investors assume it will always be strong. When it is weak, they assume it will never recover.[18]

This phenomenon isn't limited to financial markets. Nate Silver is a statistician best known for his analysis of baseball and political elections.[19] He uses an example from baseball to explain recency bias.[20] Silver studied bids for free agents over many years. He found teams overweight recent performance and underweight longer track records. As a result, they regularly overpay for a player coming off a career year.

Silver does a thought experiment to illustrate how recency bias may have contributed to the financial crisis. He imagines an investor in early 2008 trying to gauge the risk of a major downturn in the U.S. economy, defined as an annualized four percent drop in real gross domestic product in one quarter. If the investor considered the prior 20 years through 2008, the probability would appear to be 4/100 of 1 percent, or one such crash every 624 years. But if the investor evaluated the 60 years through 2008, the probability would be 3.2 percent, or one such crash every 8 years.

Silver extends this thought experiment back in time, assuming a twenty-year historical measurement horizon on each occasion. He finds that in 1995, the data lead investors to forget about the oil crisis of the 1970s just as the dot-com bubble starts to inflate. In 2002, the data fail to reveal the economic turmoil of the early 1980s just as the housing bubble starts to inflate.

Finance professors Aleksandar Andonov and Joshua Rauh show how recency bias influences the return expectations of institutional investors.[21] They did a study that finds return expectations exhibit significant correlation to trailing ten-year returns. Those expectations, in turn, influence asset allocations. The paper shows that the actual performance data does not support the extrapolation of recent returns. This bias may contribute to procyclicality and could lead to bubbles, as investors over-allocate to asset classes or strategies that have had strong recent performance, even if the asset class or strategy no longer offers an attractive risk-adjusted return.

Complacency. People take more risk when they perceive conditions to be benign. It's built into human nature. Sam Peltzman, a professor of economics at the University of Chicago, revealed this aspect of human nature in a study he did in the mid-1970s.

Peltzman looked at automobile safety and deaths involving cars. He asked whether new safety features mandated in the late 1960s, including seat belts and improved windshields and brakes, reduced fatalities. In the years following these changes, automobile-related deaths did not decline as expected.

Peltzman found the better equipment actually encouraged drivers to take more risk than they did before.[22] The Peltzman effect says that people assume more risk when they feel safe.

The same thing happens in financial markets. Complacency leads to riskier behavior. William Dudley, the former president of the Federal Reserve Bank of New York, notes that we should be extra vigilant when the waters are too calm. People take too much comfort from periods of low volatility. It's at those times they "take more risk than what's really appropriate."[23]

Confirmation Bias. Psychological studies find that people are twice as likely to seek evidence that confirms rather than contradicts existing beliefs.[24] When investors believe the market is going up, they look for facts that support their bullish view. When investors believe the market is going down, they look for facts to support their bearish outlook and ignore signs of hope.

One model, based on the principles of behavioral finance, reveals that investors prone to confirmation bias contribute to bubbles and crashes.[25] Biased traders amplify positive news when they are optimistic and negative news when they are pessimistic. This causes procyclical price moves that deviate from fundamentals.

Desperation. Individuals and institutions invest savings to satisfy future liabilities. Individuals need to plan for a comfortable retirement, companies have to satisfy pension obligations, and universities have to fund operations. When asset returns are low, it gets harder to meet those objectives without assuming greater risk.

In *The Alchemy of Finance*, Mervyn King, the Governor of the Bank of England from 2003-2013, identifies concerns about low asset returns as one cause of the financial crisis. In the years preceding the crisis, interest rates and asset returns had declined steadily. As a result, "financial institutions and investors started to take on more and more risk, in an increasingly desperate hunt for higher returns, without adequate compensation."[26]

Many investors face such a dilemma today. Future obligations continue to grow while expected returns are muted. As a result, some investors have increased the risk they are willing to assume to generate satisfactory returns. A senior investor at an endowment based in the United States notes, "The low-return environment pushes people into investments they wouldn't have made eight to 10 years ago."[27]

Institutional Policies and Practices. Institutions create rules and norms that guide portfolio construction and risk management decisions. These rules are developed to help institutions safely and effectively navigate financial markets. But, sometimes, the rules amplify financial cycles.

One example is value-at-risk (VaR), which is a technique to estimate the probability of a loss greater than a certain threshold. Banks and other financial institutions use VaR to limit the amount of risk in investment portfolios and trading books.

The economists Tobias Adrian and Hyun Song Shin document the procyclical behavior that results from the use of VaR models.[28] VaR regimes require firms to reduce exposures when the market environment gets riskier. The idea is that a riskier environment increases the probability of hitting the loss threshold, so to keep the risk of loss in check, exposures must be cut. VaR regimes typically use market data from the past six months to calibrate the riskiness of the environment. When the past six months have been benign, financial institutions take on more leverage, buy more assets, and increase risk. And when the past six months have been volatile, those same institutions reduce leverage, sell assets, and decrease risk. Hence VaR regimes effectively institutionalize the recency bias and are profoundly procyclical.

Another example is the accounting rules for U.S. public pension funds. A paper by three finance professors, Aleksandar Andonov, Rob Bauer, and Martijn Cremers, shows how these rules lead to an increase in risk-taking.[29] The Government Accounting Standards Board allows U.S. public plans to use their expected returns to discount their pension liabilities. Higher expected returns lead to a higher discount rate, which in turn lowers the present value of liabilities. The lower the present value of liabilities, the better funded the plan looks.

These links create an incentive to invest in riskier assets to justify higher expected returns. The professors compare public plans in the U.S. with private plans in the U.S. as well as with public plans in Canada and Europe. The other plans are required to discount their liabilities at high-quality debt rates. The researchers find U.S public plans respond to their incentives and invest in riskier assets than their private and international peers.

The artificially high discount rate also understates the amount of unfunded liabilities. Joshua Rauh, a finance professor at Stanford Business School, explains, "What is in fact going on is that the governments are borrowing from workers and promising to repay that debt when they retire, but the accounting standards allow the bulk of this debt to go unreported through the assumption of high rates of return." This understatement of debt can lead investors to misjudge the riskiness of public borrowers, leading to overextension and mispricing of credit. Rauh likens this practice to "financial fraud."[30]

Government policy. Government policies, whether fiscal, monetary, trade, or social, can also contribute to market bubbles and crashes. For example, analysts often cite federal housing policy as a significant contributor to the financial crisis. The U.S. government encouraged and subsidized home ownership and mortgage debt through the tax code and through its support of Fannie Mae and Freddie Mac.[31]

Another example is the Federal Reserve's interventions following stock market declines in 1987 and 1998. Observers came to call this the "Greenspan put," considered insurance against market crashes. The belief was that Alan Greenspan, Chairman of the Federal Reserve from 1987 to 2006, would intervene in markets by lowering interest rates and increasing liquidity. The existence of this put encouraged risk taking and may have helped lay the foundation for the dot-com bubble.[32]

Actions of policymakers in one country or region can contribute to procyclical pressures in other countries. Mervyn King documents how policies of emerging economies played a major role in the financial crisis. In the years leading up to the crisis, trade policies of emerging economies led to massive surpluses and a buildup of foreign reserves, especially the dollar. Those countries held large amounts of those reserves to protect against foreign currency shortages, like the ones that led to the Asian financial crisis of the 1990s. Those reserves created a global savings glut that was recycled into the financial markets of developed economies via the banking system, leading to increasingly risky lending.[33]

A working paper by scholars at the International Monetary Fund explains how these reserve management activities exacerbated the downside as well as the upside.[34] Many of the reserves were invested directly into riskier securities, but financing was abruptly withdrawn at the beginning of the crisis. This retraction of credit contributed to the funding pressures at U.S. and European banks and the forced liquidation of leveraged assets.

Indicators of Procyclicality

Extreme valuations. The goal of many active money managers is to benefit from perceived gaps between price and value. In so doing, the investment community keeps price and value in rough concordance. Procyclical behavior tends to push asset prices to excess. The first indicator of procyclicality is extreme valuations.

For example, the price-to-book ratio for the S&P 500 reached a peak of 5.0 at year-end 1999 and a trough of 1.6 times in February 2009. Considering monthly values since 1990, the peak was nearly three standard deviations above the average and the trough was just less than two standard deviations below the average.

The story is similar for bonds. The spread between the yields of the Moody's Bond Index of Baa securities and the U.S. 10-year Treasury note soared to 600 basis points at year-end 2008, a level nearly five standard deviations above average. The data considered are monthly spreads from 1960 through April 2018.

Very easy or difficult access to capital. There are periods when gaining access to capital is relatively easy and other times when it is hard. Underwriting standards are an important barometer of procyclical behavior.

For example, the subprime mortgage market grew sharply in the early 2000s, spurred by lower standards for documentation and higher loan-to-value ratios. Home buyers were able to show less financial information and borrow more than before. In the period following the financial crisis, subprime lending plummeted as lending standards were tightened materially.

Coping with Procyclicality

In practice, the best way to prepare for procyclical markets is to constantly consider the distribution of possible outcomes. Here are some methods for coping with, and hopefully profiting from, procyclicality.

Employ historical data intelligently. Use historical data to inform expectations about future distributions but be diligent not to overly defer to history to assess extreme outcome probabilities. It is also important to understand the nature of shocks. For example, some shocks are strong but short-lived whereas others are less pronounced but protracted.

One example of how to use history effectively is the use of base rates, which reflect the outcomes of a particular reference class. Base rates, when combined with judgment, help to ensure that you properly consider a range of alternative outcomes.

Consider technical indicators. Maintain a vigilant watch for signals that indicate the future may be different than the past. For example, in early 2018 the volatility for the S&P 500, measured as the Cboe Volatility Index (VIX), was low by historical standards. At the same time, investors were allocating record amounts of capital into exchange-traded notes (ETNs), including one called XIV. These securities bet on continued declines in volatility.

Through early 2018, the XIV had generated a total return of more than 1,500 percent in the past decade. A number of the elements of procyclicality, including recency bias and complacency, were in place. Caution was in order because the level of the VIX was low, and a lot of investors were betting against a rise in the index.

Within a short period in February, the level of the VIX tripled and those who were short the index had to cover. The levels of the index zoomed from below to above average. But the spike did not last long, and the level of the VIX soon settled back to low levels.

Keep an eye on distributions. Rather than dwell on spot market levels and volatilities, try to steadfastly focus on distributions of outcomes. For example, emphasize the possible range of outcomes to project potential volatility regardless of the mark-to-market value, which can be procyclical. Consider narratives related to investments to ensure you are aware of how and when events and value realization may unfold.

Stress test. One of the challenges in considering the future is that we are naturally overconfident and hence think we have a more accurate view of the future than is justified. One antidote to that overconfidence is to do stress tests and to consider what happens to an investment, a portfolio, and the availability and cost of leverage under extreme conditions. Stress tests contribute to the preparation for procyclicality, especially on the downside.

Investment process. Try to incorporate methods and techniques to manage or mitigate bias in the investment process. One suggestion is to form an investment committee. The goal of the committee is to bring together a group with diverse views and experiences, encourage them to identify and articulate alternative views, and establish a range of value outcomes with associated probabilities.

Process audits. One key to improving the quality of decisions is to track the decision-making process and to revisit that process regularly to learn lessons from successes and setbacks. An investment firm may codify this process through periodic reviews of portfolios and memos.

Procyclicality reflects both underlying economic realities and psychological forces. Managing and profiting from procyclicality requires a constant, thorough assessment of possible outcomes.

In a future report, we will look at current market conditions and ask whether there are warning signs of procyclical bubbles. We will review various markets and asset classes, and we will consider valuations as well as a number of the causes and contributors described in this report.

Endnotes

[1] Tobias Adrian and Hyun Song Shin, "Procyclical Leverage and Value-at-Risk," *SRC Discussion Paper No. 1*, September 2013.
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