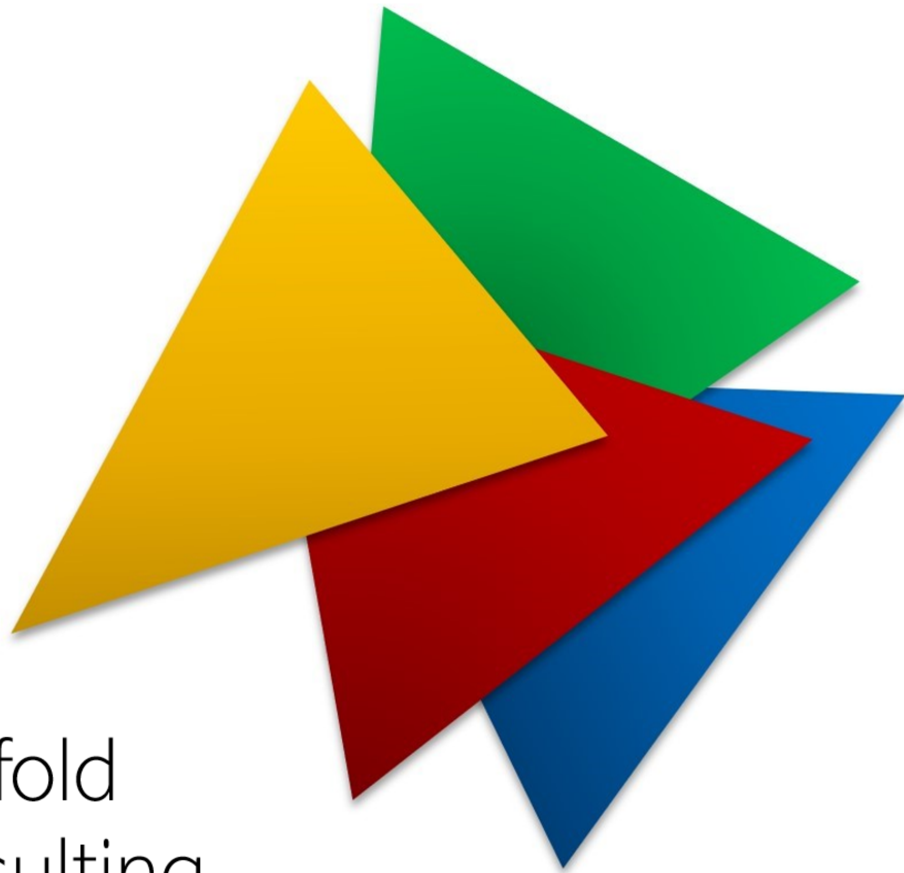
MARKET RISK ASSESSMENT

A “MINSKY MOMENT” IN EQUITY MARKETS



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EXECUTIVE SUMMARY

Financial markets are predicted to be the brink of a severe crisis, likely followed by a deep recession. This report details evidence that markets are at a 'Minsky Moment'.

INTRODUCTION

With analysis of current trends and past data, it is predicted that we are at the brink of a severe market crash, followed by a deep recession. Our present situation appears to be a late-stage Minsky Cycle. This report delves into the underpinnings of this cycle, and the reasons that a correction is predicted.

The Minsky Cycle is a theoretical model which describes market bubbles. It is named for Hyman Minsky, an American post-war Keynesian economist who opposed deregulation. Minsky instead championed federal oversight of financial markets to ensure stable economic growth. The term 'Minsky Moment' was coined by Paul McCulley of PIMCO in 1998 to describe the underpinning fragility which contributed to the 1998 Russian financial crisis, but the concept applies to any market bubble.

For decades, observers have struggled to identify the peak of a bubble *as it is occurring*. The Minsky Cycle has characteristic pattern that is best recognized in retrospect, once the cycle has taken its course. Analytic tools are needed to identify the likelihood of abrupt shifts *in the future*. Making these predictions requires an understanding of the driving forces behind market bubbles.

One approach is to measure the discrepancy between reality and perception. This approach to individual or group decision-making can be modeled by linear programming, by applying one of the key methods of Conifold Theory. In this view, equity markets are elastically tied to the real economy, with the perception of future earnings represented by the markets and the actual potential for future earnings represented by labor and consumer metrics. While there may be some back-and-forth movement, perceptions of earnings cannot stray too far from reality or something will break.

This concept of 'elasticity' replaces the concept of the bubble. While a bubble can be stretched to an unknown degree, the concept of elasticity has a calculable non-linear force determined by empirical factors.

Over time, perceptions eventually grow to match reality. The Minsky Cycle is a mechanism of correction, in this sense. In the original formulation of this economic concept, the cycle of bubble formation and burst was proposed in a descriptive manner. In the more recent formulation, the amount of elasticity remaining in the dynamic system is determined more accurately by taking into account both real economic indicators *and* discrepancies in stakeholder perception with regard to these indicators. This approach allows more timely predictions of market movement.

Below is a broad outline detailing this natural, cyclical process of matching perception with reality, and an analysis of how the recent history of US equity markets compare to the expected course.

THE MINSKY CYCLE

Shock: A catalyzing event signals the start of a new paradigm for the market, leading to an initial sell-off. Starting in March 2020, *the COVID-19 pandemic* caused a paradigm shift in US equity markets, causing the Main Street economy to collapse and global earnings expectations to fall accordingly.

Expansion: Markets shake off an abrupt correction, as investors buy the dip and prices recover. Excitement increases, with more retail investors entering the game. From April-June 2020, *a federal stimulus* contributed to the apparent recovery in US equity markets, providing the impression that rallies would be underwritten to prevent systemic failure.

Overstretch: With the federal government insuring against losses but not providing regulatory guidance, investors are offered the idea that significant support will always be forthcoming to prevent losses and bad behavior might be tolerated. Holding this perception, the logical course is to take advantage of the situation, even with the full awareness that assets are overvalued. This context is a bull trap that appears to be a bear trap, and many investors are fooled here. In July-August 2020, *media attention* drove wild enthusiasm for tech stocks, encouraging the public to perceive these companies not only as a route to easy money but also as a solution to all problems challenging the world.

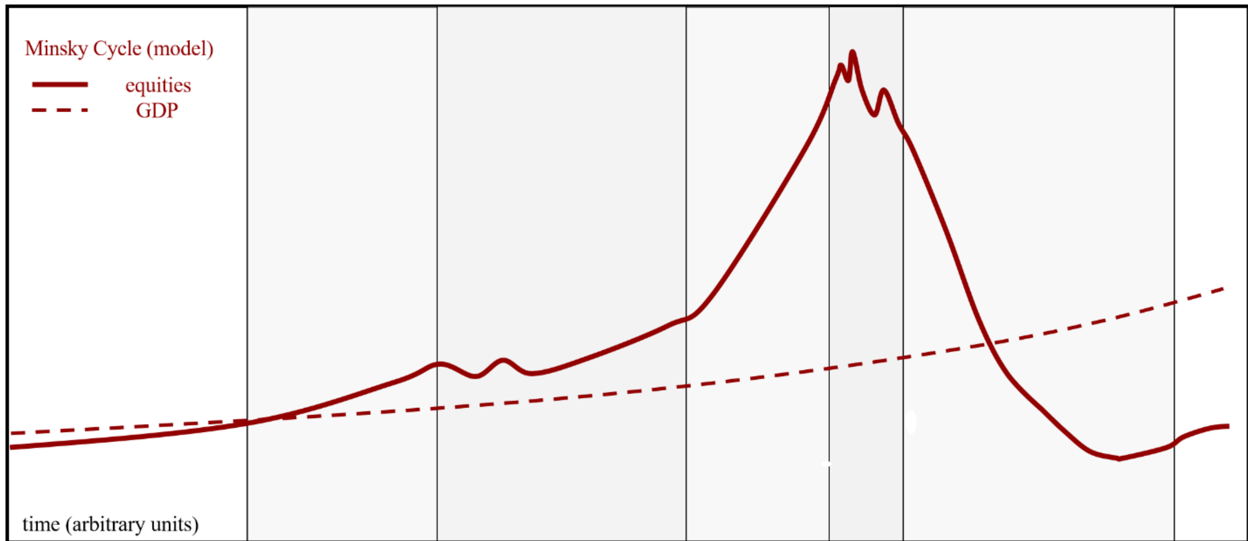
Reality Hits: In the context of some catalyzing event, the discrepancy between reality and misguided perception cannot stand. Institutional investors withdraw funds from the market in preparation for the crash. Insider trading skyrockets, as those with large holdings quietly exercise their options to realize market gains. This stage is the infamous “Minsky Moment” – the point at which financial markets are at their most fragile, as the denial of reality is fading.

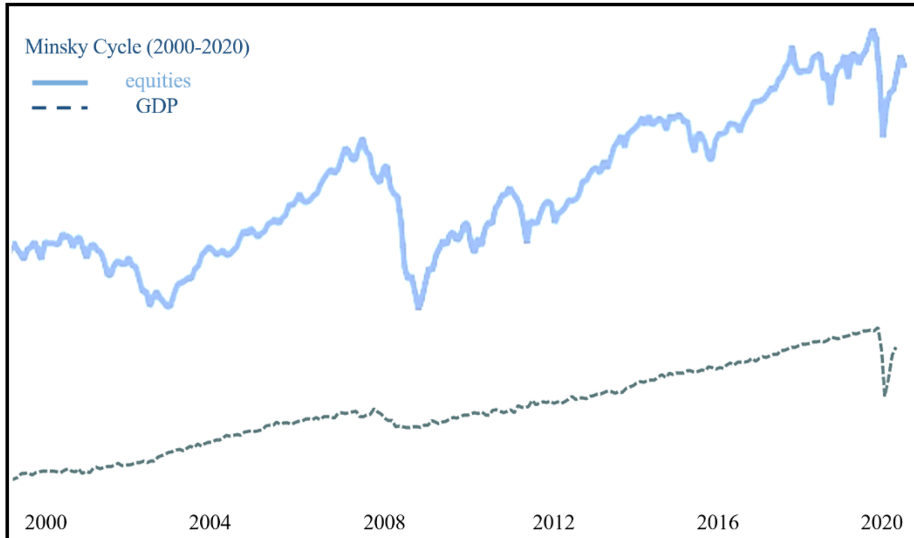
Correction: The markets cannot stray too far from the underpinning economy for too long – and the larger the overstep, the sharper the penalty. As perceptions begin to match reality, denial dissipates, and the correction completes its course. Once this stage is initiated, uncertainty turns to panic, investors exit equity markets, and prices drop precipitously.

THE PRESENT CYCLE – 2000 THROUGH 2020

A growing discrepancy between wishful and realistic expectations of near-future earnings has played out over recent months. Yet this discrepancy can also be viewed in the context of a larger Minsky Cycle which has been shaped over the past twenty years. Rather than considering the coronavirus pandemic as a trigger for paradigm shift, leading to a correction and quick recovery, it may be more sensible to consider post-9/11 policy over the past two decades as the real paradigm shift. Prior to 2020, there was already a long-standing misperception that real economic indicators no longer informed the financial markets. Deregulation of the banking industry in the 1990s permitted free rein for financial products to diverge in value from their underpinning assets, allowing a misplaced confidence to take hold. And because no significant regulatory oversight emerged from the 2008 financial crisis to prevent institutional investors from making gains by acting in bad faith, financial markets easily shook off that correction and entered the next stage of the cycle. When perception diverges from reality, gains will skyrocket – until reality hits and a correction is made.

Small iterations of the cycle, occurring within the larger cycle, will grow more frequent as the Minsky Moment arrives, and these will correspond to bursts of volatility whenever the market reaches a new peak. By contrast, if valuations of equities remain well matched with revenues, and expectations for future earnings are well matched with reality-based projections, this kind of volatility should not be observed in financial markets as wealth grows across the economy.





(Top Graph) A general model of the Minsky Cycle is shown, with the sequential stages of *shock*, corresponding to a paradigm shift; *expansion*, characterized by increasing market participation; *overstretch*, characterized by increasing volatility; *recognition of reality*, characterized by insider sell-offs; and *correction*, characterized by precipitous price drops. (Bottom Graph) Notable volatility in equity markets was observed over the first half of 2020, although asset prices and corporate debts were historically high relative to GDP even before the coronavirus pandemic led to an abrupt collapse in the real economy.

CURRENT INDICATORS OF FRAGILITY

There are seven clear indicators that we are at a "Minsky Moment" in September 2020:

1. The Main Street economy does not underpin current gains in the equity markets.

The coronavirus pandemic affected a broad swath of industries. Tourism was halted, airlines grounded flights; cruise lines ceased operations; hotels, restaurants and entertainment venues closed their doors; revenues collapsed. Manufacturing plants across China were shut for several months, causing ripples in the supply chain which continue to plague US businesses. Haulage declined. With far fewer vehicles moving freight and people, oil prices plunged in April. The price of crude has since recovered into positive territory, although not enough to balance the budgets of oil-rich countries such as Saudi Arabia whose economies are entirely dependent on oil revenues. As the long-term trend is moving away from fossil fuels and toward renewable energy, these countries will have to pivot their economies before their cash reserves run out. This may lead to political instability and economic crises globally.

Airline stocks rose this past week, after Morgan Stanley announced an expected comeback in 2021. Yet Scott Kirby, the CEO of United Airlines, stated that the company's profits are expected to remain flattened at 50% of 2019 levels until the pandemic has passed. UAL revenues were $43.3 billion in 2019 and are forecast to be $27.6 billion in 2021, after flights and revenues dropped by nearly two-thirds in 2020. But the company's debt-to-equity ratio was 177% in February, before the pandemic even took hold in the states. As flights remained grounded during 2020 Q2, the company lost $40 million per day; the daily loss only dropped to $25 million during Q3. This is not business as usual.

Misplaced optimism reigns in other industries as well. After movie theaters closed, many applauded the opportunity to revisit the drive-in. Restaurants began to offer al fresco dining, particularly in locations with orders against groups gathering indoors. However, these stopgap measures are temporary, and they will not hold once the weather changes. As winter arrives, these industries will be bitten again, and hard. Until there is a vaccine available for COVID-19, there can be no full economic recovery on Main Street, and any realistic earnings expectations must reflect that.

2. Commercial real estate markets are collapsing.

The $30 trillion commercial property market is slumping. With over 13.4 million Americans claiming continuous unemployment in August, and 68% of employed Americans still working from home, many offices are being left empty. The residential housing market remains strong: while equity values fell by $7.8 trillion in 2020 Q1, real estate values increased by $400 billion during that time. Yet both commercial and residential properties are sustaining significant damage due to wildfire and floods, with these risks only beginning to be priced into high-value markets such as Miami, New York and San Francisco. Over one-fifth of commercial mortgage-backed securities are comprised of loans on east coast properties at high risk of flooding, according to the Bloomberg Barclays Aggregate Index. The Commodity Futures Trading Commission reported earlier this week that 3 million of California's 12 million residential homes are at risk from wildfires. These risks to property, agriculture, and the insurance industry are not currently priced into the financial markets.

3. Markets were historically overvalued even before the pandemic struck.

Several indices demonstrate the current discrepancy between the real economy and the financial markets. The Q ratio, devised by Nobel Laureate James Tobin, compares the market value of assets to their replacement cost. This index, which measures the discrepancy between perceived asset value and real asset value, stands at record levels. The CAPE ratio, devised by another Nobel Laureate, Robert Shiller, compares S&P 500 dividend yields with the same equities' price-to-book ratios and their actual price-to-earnings ratios, over the most recent twelve-month period. This index has also reached record levels, even higher than levels immediately preceding the 1929 crash. Yet another index, the Buffet indicator, raises alarms. This ratio between the market cap and GDP demonstrates how overvalued equities are, in comparison to the wealth actually being produced. At 140%, the stock market is considered highly overvalued. The current market cap to nominal GDP ratio is 177% and the current market cap to real GDP ratio has been 195% over much of 2020. As this index hit historical highs this past quarter, Berkshire Hathaway chose to dispose of US stocks and invest over half a billion dollars in Barrick Gold Corp, a Canadian gold mining firm.

4. Insider trading and speculation have skyrocketed in recent months.

2020 has seen record levels of insider selling, with amounts exceeding $15 billion in three of the past four months. Some of Tesla's biggest shareholders have rebalanced their portfolios this past quarter; Apple has also seen significant shareholder exits recently. Insiders know there is no more room for growth in equity prices when there is no room for growth in revenues, and so, they are getting out with their gains intact. In the ensuing volatility, speculation is rife. Goldman Sachs estimates that one-fifth of all S&P 500 options traded in 2020 Q2 had a maturity of less than a day, compared with one-twentieth of options traded from 2011 to 2016.

5. Much apparent growth in the economy is built on debt and debt repackaged as financial products.

Total domestic non-financial debt rose by 11.7% to reach $55.9 trillion in 2020 Q1. Federal government debt jumped 14.3% in 2020 Q1, surpassing $26 trillion, while household debt rose 1.1% in 2020 Q1 to reach $14.3 trillion. Corporate debt, excluding the financial sector, rose 18.8% in 2020 Q1, from $9.6 trillion at the end of 2019. Companies drew $220 billion from existing credit lines and issued over $300 billion in new corporate bonds over just seven weeks. Corporate and household debt are still rated highly. But this does not mean the discrepancy between risk and valuation has not been recognized by institutional investors. It simply means that institutional investors have recognized the problem, and they are reducing their exposure to toxic assets. Doing so without alarming the financial markets takes time. This is the reason that insider selling has exceeded $50 billion over the past four months. Institutional investors are unloading before much-needed corrections are announced more broadly.

US banks are the largest owners of risky debt. In mid-2019, they owned one-third of the $3.2 trillion global market in leveraged loans and collateralized loan obligations (CLOs). Leveraged loans are held on the balance sheet or packaged into a special purpose vehicle such as a CLO, which is then either sold or held. Asset managers and hedge funds own large quantities of these risky financial products, but the retail banks Wells Fargo ($36bn), JPMorgan ($24bn) and Citibank ($21bn) are also significant holders of CLOs. In spring 2020, the IMF issued a Global Financial Stability Report, warning that, in a recession only half as severe as

the 2008 financial crisis, the fraction of corporate bonds with 'junk status' could double globally to $19 trillion. The ratings of household debt and municipal bonds are similarly precarious and dependent on external circumstances. Since both corporate bonds and mortgage debt are frequently packaged into collateralized loan obligations, any downgrade in these assets due to 'unforeseen events' would spread through the derivatives market. Such an event would strain the capitalization of banks. Since liquidity in the banks is holding up the equities market, this could cause a wide crash.

6. US industry lacks supply chain resiliency to deal with crises prompted by hidden risk factors.

Over recent decades, US businesses have sought opportunities for lower-cost manufacturing, primarily by moving operations to southern Asia. Yet as wages and tariffs increase, these decisions become less cost-effective. Kearney, a consulting firm, has calculated a 'US reshoring index' which identifies the ratio of manufactured imports in relation to total US GDP, accounting for goods arriving from China, Taiwan, Hong Kong, Cambodia, Vietnam, Thailand, Singapore, Malaysia, Indonesia, Philippines, India, Pakistan, Sri Lanka and Bangladesh. This index decreased from $816 billion in 2018 to $757 billion in 2019, a contraction of 7.2% during a time of solid domestic growth. Many of these historic declines came from reducing supply chain reliance on China, with a 17% year-on-year drop in Chinese manufactured goods imports attributed mainly to increased tariff costs. In 2020 these gradual shifts in the supply chain became a matter of urgency. Fully 94% of Fortune 1000 companies experienced supply chain disruption due to the pandemic. Many companies did not have risk management procedures in place to identify a crisis, switch to alternative suppliers, and alter day-to-day operations. Even fewer had deep infrastructure in place to monitor operational threats with early-warning systems. Having learned a lesson from the pandemic, US companies may in future sensibly weight the cost-effectiveness of outsourced manufacturing against previously-unaccounted-for or hidden risk factors.

Hidden risk factors can severely reduce the cost-effectiveness of outsourcing. These factors may include: requirements for bribery to continue operations; proprietary technology being stolen in nations without a suitable legal framework to protect intellectual property; sensitivity to a larger array of local disruptions such as natural disasters; sensitivity to a larger assortment of policy shifts and political events; costs of monitoring events, and brand reputation costs if lower manufacturing expenses are discovered by consumers to rely on slave labor or environmental destruction. While continuously monitoring risks and opportunities, staying aware of local norms and laws, and building flexibility in a global supply chain can provide general resiliency, there are two major risk factors which demand further attention.

The risk of natural disasters should be taken into account to set future earnings expectations. It is hard to calculate this kind of uncertainty, as no one event can be predicted. However, the frequency of events *can* be predicted. Hurricanes, wildfires, tornados, volcanoes, and earthquakes are local events which generally begin and end within days, at which point rebuilding of the local economy can restart with little impact outside the affected region. However, pandemics are drawn-out events which devastate global prospects for economic growth and corporate resiliency. Pandemics are no longer once-in-a-century events. The risks of zoonotic disease or 'spillover events' are continuing to increase as bat habitats continue to be altered in the course of deforestation. SARS, COVID-19, HIV, Nipah, Marburg, Ebola and Hendra have all arisen from bat populations whose habitats were disturbed. Moreover, the risk of these outbreaks turning into global pandemics escalates in a highly connected world. Infectious disease remains a clear and increasing danger

to our species; emerging pathogens also pose a risk to animals involved food production, such as hogs and bees. To accurately assess risk in financial markets, it is wise to monitor what is happening in the real world.

Manmade threats should also be taken into account to properly set future earnings expectations. The risk of escalating tariffs and trade wars mounting into a perilous crisis is increasing, particularly in the context of US policy toward China and Chinese policy in southeast Asia. Trade wars, if not handled diplomatically, can become hot wars, and hot wars make it difficult, if not impossible, to trade. China threatens sovereign nations in the South China Sea; Russia threatens NATO nations of the former Soviet bloc in eastern Europe; western nations that have been destabilized by Putin's interference, including the US and the UK, threaten their own citizens. Economic policies adopted by these nations have not only diminished the spending power of consumers, but also have led to social unrest. Such hampered domestic economies are ill-equipped to compete against foreign rivals. This international context generates uncertainty and potential volatility in day-to-day operations. If the US decides to attack Iran, the Shanghai Cooperation Organization (SCO) will likely come to the aid of their ally. But because Iran is not a full member of the SCO, China and Russia can decide whether to become involved or not, choosing on their own terms how to counter US actions.

These systemic issues must be addressed with federal policy, as such disruptions ripple throughout the economy, affecting manufacturing, haulage, and retail sectors. Keynesian post-war economic policies lent heavy governmental support to entire industries in both the US and Europe, in exchange for partial or full equity. It is worth noting that this high-regulation, high-taxation era corresponded to the greatest sustained economic growth in human history, with the longest-running stock market gains and the largest wage increases for workers. Federal government involvement provided a balance in perspective, favoring long-term stability of both natural and manmade environments against the short-term horizons favored by market indices and corporate decision-making. These national policies also allowed national security interests to be tied to economic growth, with federal support of manufacturing supporting huge advances in the defense and computing industries. The current trend of outsourcing manufacturing, particularly in electronics, may prove to be an unsustainable strategy for both small and large firms throughout the western world. It might be wiser in the long run for corporations to lobby governments to support them in building a domestic supply chain, to reduce exposure to hidden costs and build their brands by establishing a trusted reputation in local markets.

7. The entire market 'ecosystem' is unhealthy.

Amazon, Apple, Alphabet, and Microsoft are carrying the US market. With a combined capitalization of $6.7 trillion, these four big tech companies comprise 23% of market share and have accounted for 91% of market returns this year. With little diversity, there is little competition in the market 'ecosystem'. A healthy, thriving market ecosystem allows innovation to flourish and new wealth to be generated, while unhealthy market ecosystems undergo atrophy. Markets with a healthy ecosystem are characterized by continual replenishment of small firms with new offerings, competing not only for existing market share but also creating niche markets that did not previously exist. Markets with an unhealthy ecosystem are characterized by low adaptability, stemming from a lack of diversity, and dominant players, who consume most of the ecosystem's resources. Catastrophic events in market ecosystems, as in natural ecosystems, are natural outcomes of atrophic cycles. These events allow new species to flourish after a period of decline.

FALSE INDICATORS OF STABILITY

- Stock exchange indices are at record highs.

Equities markets are indeed fired up. But the primary reason equities are strong is because many investors perceive there is nowhere else to go; supply chain issues are causing havoc in commodities and corporate bond interest rates are low. In addition, federal stimulus has been propping up equities; this policy approach makes these assets appear to be low risk. However, insuring against losses in the long-term is unsustainable. And yes, derivatives markets are also fired up. But because this activity is driven by ill-informed retail investors, this enthusiasm does not reliably indicate a healthy financial market – it only indicates enthusiasm by naïve retail investors.

- But the equity markets have been in positive territory this past week.

Sometimes there are gains, or sideways movements for a week or so. This always happens, even in severe crises, and these events do not necessarily indicate a sustainable reverse of a downward trend during a much-needed correction. These market moments are bull traps and novice traps. Crashes take a long time to unfold and they are characterized by up and down movements in the markets from day to day. That said, recoveries from crises in the financial markets are occurring faster in recent decades than in the previous century. However, this path is always determined by federal policy, and a quick recovery should not be assumed under the current circumstances.

- It is hard to tell the difference between a bear market cycle and a bull market cycle.

This is not only true; it is a very good point. However, this is exactly why it is worth employing a neuroscience-based approach in information processing to identify discrepancies between perception and reality. The approach taken here is to maximize predictive efficacy with regard to financial markets by accounting for both real economic indicators and discrepancies in stakeholder perception with regard to these indicators. *Again, market enthusiasm which is built on a denial of reality is a strain in group mentality which cannot be sustained.* The volatility resulting from this strain is an indication of many individuals struggling to make accurate assessments, with different outcomes between investors determined largely by information availability and information acceptance. High levels of uncertainty and risk fuel both inaction (choosing to maintain the status quo) and impulsive, non-optimal action (proceeding with trades without taking sufficient information into account). The greater the number of naïve investors entering the market with a low quantity and quality of information, the greater the market itself diverges from reality. The inevitable result of these divergences is a correction, whose severity is proportional to the divergence of the market from real asset valuations.

POTENTIAL CATALYSTS

The 'Minsky Moment' is a time of extreme fragility in the financial markets, immediately prior to a severe correction. It is brought on by reckless speculative activity built on an unsustainable bull run. While the underpinning cause of the subsequent market crisis is *an untenable discrepancy between perceived asset prices and real-world value*, the initiating event for the correction is usually a real-world event which abruptly reduces that discrepancy.

Widespread worker strikes could trigger a catastrophic collapse in financial markets, as it would become impossible to ignore the connection between asset prices and the real economy. Walkouts might occur if the pandemic resurges this coming winter, if no childcare is available due to school closures or if return to the workplace is perceived to entail unacceptable risk. Any political situation that leads workers to believe their long-term survival and economic prospects are better served by protecting their families at home, rather than remaining in current employment, may also create a crisis in markets.

Alternatively, natural or manmade disasters might cause a sudden downgrading of corporate or household debt as assets lose their value. Risks caused by climate change, national security threats, and rising inequality should therefore be recognized and mitigated as much as possible to stabilize markets, since events which broadly reduce labor availability, consumer buying power, and the long-term sustainability of debt obligations can lead to significant losses and disruption to financial markets.

CONCLUSIONS

With analysis of current trends and past data, it has become apparent that we are likely at the brink of a severe market crash, which is likely to be followed by a deep recession. The current status of equity markets appears to be a late-stage Minsky Cycle, or 'Minsky Moment'. This upswing did not start with the financial crisis and recovery in spring, at the onset of the coronavirus pandemic, but rather is part of a much larger cycle encompassing the past twenty years. Due to the unsustainable discrepancy between asset prices and values, and the grim outlook for revenues over the next few years, a market correction is due. This correction is expected to begin between autumn 2020 and spring 2021.

The level of confidence in this prediction of events is high, although the timing of price drops is somewhat uncertain. This confidence arises from two causes: firstly, the normal indicators that a bubble is overstretched, including the Q ratio, the CAPE ratio, and the Buffet index; and secondly, the reformulation of the Minsky Cycle as a physical process of information processing, in which discrepancies between perception and reality are constantly corrected, also indicates that a correction is due. The natural outcome from too much divergence between perception and reality is a correction. The longer the divergence has been permitted to grow, the more severe the correction. The time evolution of divergence and the quantity of information within the system are key factors in calculating the size of the bubble and the measure of its elasticity. Given these parameters for US equity markets, we expect that a severe correction is both necessary and imminent.

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