Taming Global Village Risk II: *Understanding and Mitigating Bubbles*

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Speculative asset bubbles and their subsequent bursts have been a part of capital markets since modern capital markets began to evolve some 300 years ago.[1] Curiously, financial bubbles, when viewed from a distance, apparently build and burst in much the same way. History suggests that three common, although not exclusive, factors often precipitate asset bubbles: financial innovation, the emotions and psychology of investors, and speculative leverage. Although each bubble environment certainly has its own distinguishing characteristics, these three elements form the pertinent ingredients in bubble environments over time. This article explores how these features present themselves in disruptive market bubbles and offers some suggestions for improving our risk management approaches in light of these features.[2]

The origins of the current global credit crisis can be found in the time-worn bubble story. Financial innovation, leverage, and mass psychology link together to form a dynamic feedback loop. Innovation gives rise to complexity, but investors and regulators have a false sense of confidence in their ability to manage risk and predict outcomes from the innovations. Buying begets more buying in a rush to ride the latest wave. This Ponzi approach works for a while as the asset bubble escalates and the success serves to embolden investors, who then take on even more leverage to indulge in imprudent speculation. Armed with groupthink, investors pile on to reap the rewards of the latest innovation. Asset prices rise, but the shift of investors to the same side of the boat means market balance and diversification begins to break down—until a tipping point is reached. Then, the bubble implodes: Investors deleverage, asset deflation replaces asset inflation, innovations are reconfigured, and humility is (hopefully) restored (Minsky [1974]). We will return to the current bubble later, but first we will explore lessons from past bubbles. By understanding our past, we can enhance our ability to better shape our future.

LESSONS FROM PAST BUBBLES AND REACTIONS

An exploration of financial history shows that our current bubble is not unique. Rapid innovation is often followed by herding into the "new" and into speculative leverage, which ultimately produces an asset bubble. The exhibit reports selected asset bubbles.

Goetzmann and Rouwenhorst [2005] discussed the financial revolution that occurred in Holland during the 1600s. The appearance of the world's first stock exchange (Amsterdam), the development of the modern corporation (Dutch East India Company), and the invention of derivatives (options on tulips) partnered to revolutionize investing. Interestingly, Holland was also the site of the world's

EXHIBIT
Bubbles in History

Event	*Percentage Rise*	*Percentage Decline*	*Innovation*
Tulips: Holland (1634–1637)	+5,900	–93	Stock exchange, Derivatives
Mississippi Shares: France (1719–1721)	+6,200	–99	Fiat money
South Sea Shares: Great Britain (1719–1720)	+1,000	–84	Fiat money
Stocks, Bonds: U.S. (1791–1793)	+50	–33	Bank of U.S.
Stocks: U.S. (1921–1932)	+497	–87	Communications, transportation, open-ended investment trusts
Real Estate and Stocks: Japan (1965–)	+3,720	–	Liberalization of Japanese economy
NASDAQ Stocks: U.S. (1999–2000)	+733	–78	Technology, media, communications
Real Estate and Credit: Global (1987–)	+260*	–	New structured credit vehicles

Notes: Fiat money is paper money.
**Change in S&P/Case-Shiller Composite-10 Home Price Index.*
Sources: Knoop [2008], Goetzmann and Rouwenhorst [2005], and author analysis.

first recorded asset bubble, the much-storied Dutch tulip bubble, often referred to as "tulip mania," during the years 1634–1637.

In the early 1700s, Scottish businessman John Law and the French government introduced an innovative financial architecture to solve France's financial woes. Among these innovations, Law introduced paper or fiat money to Europe. Law's contribution to bubble history came with the Mississippi Company. Exaggerating Louisiana's wealth, Law convinced France to convert its national debt into tradable equity shares in the formerly derelict Mississippi Company. The government, in return, granted the Mississippi Company monopoly trading rights to the territories of Louisiana. With the market awash in liquidity, the equity shares rose roughly 65-fold before ultimately collapsing. Law's conversion of paper into money, together with other innovative financial engineering and Law's selling of shares in the Mississippi Company, precipitated a frenzy of speculation that ultimately produced the very first stock market crash, in 1720.[3]

At about the same time, the British fashioned the South Sea Company to mimic the success of the Mississippi Company in raising money for the government. The fate of the South Sea Company and the British market paralleled the experiences in France and culminated in the building and bursting of the famous South Sea Bubble. Interestingly, the Mississippi and South Sea bubbles were government-led events. They were initiated and supported by innovation, not in the private sector, but by the governments of France and England.

A look into the beginnings of the United States reveals another bubble event. Shortly after the Revolutionary

War, a financial revolution put the United States on a growth trajectory that would eventually allow the country to flourish. In the short run, however, this innovation brought speculative fever and pain. The Bank of the United States, formed in 1791, was a semi-public national bank, an institution to safeguard all pecuniary transactions. It acted aggressively to restructure the U.S. debt built up during the war. The bank not only stimulated the economy but also enhanced the shaky credit of the government. The Federalists were for it; the Jeffersonians were against it. Within two months of opening, the bank flooded the market with its discounts (loans) and banknotes and investors eagerly participated in the sale, driving prices to lofty levels. Then, the bank sharply reversed course and called in many of the loans. This drain forced speculators to sell their stocks, and when the largest speculator went insolvent in March 1792, the short-lived market paralysis known as the Panic of 1792 occurred.[4] The bubble and panic were remembered for many years by opponents of the bank and eventually led to its demise in 1811.

The three common ingredients of financial innovation, investor emotions, and speculative leverage can easily be discerned in more recent times. Consider the U.S. equity market bubble during the "roaring" 1920s. Innovations that took place during this era included rapid developments in utilities (telephone and electrification), transportation (automobiles), and finance (open-end mutual funds). In many ways, the rapid innovation that describes the early part of the 20th century in the United States parallels that of the late 20th century, which is defined by innovations in internet/technology, media, and telecommunications (sometimes known as the TMT bubble). Both periods were defined by the building and bursting of an asset bubble built on the back of widespread technological innovation, leverage (equities were speculatively leveraged by unrealistic future earnings expectations), and the mass psychology of a new economy that was believed could not falter.

The reaction to the crash of 1929 that followed the 1920s bubble was a plethora of financial market legislation. After examining the causes of the crash, the U.S. Congress set to work passing laws meant to prevent its recurrence. The Securities Act of 1933 directly addressed various fraudulent practices in the marketplace, and the Glass–Steagall Act of 1933 created deposit insurance for commercial banks and sought to reduce speculative securities activity by, in part, erecting a wall between commercial banking and investment banking activities.[5] The Securities Exchange Act of 1934 created the Securities and Exchange Commission to oversee the securities industry. From these activities, it is evident how the enormous cost of systemic risk on society dominated the mindset of the public and prompted the demand for aggressive legislative reforms.

The markets in the 1980s also experienced great innovation in the form of portfolio insurance and program trading.[6] The initial success of the newly developed constant proportion portfolio insurance (CPPI), coupled with the technological innovation of program trading, bred imitators. CPPI purportedly guaranteed portfolio values by insuring against market declines, but eventually herding into these products caused a breakdown in market diversity and the markets wobbled. The interaction of the widespread use of CPPI and program trading caused a vicious systematic feedback loop—initial selling off begat more selling off and a rapid decline ensued. Ultimately, the panic and market decline was short lived, although deep, with markets declining some 20% in a single day. The intense, painful sell-off in October 1987 is not considered a bubble, but the crisis might have been much more severe. The rapid response of the Federal Reserve Board (FRB) to pump liquidity into the markets limited any systemic effects, but also entailed the long-term consequence of moral hazard. Indeed, after such market intercessions were repeated by the FRB in subsequent crisis situations, the hazard earned the moniker "the free Fed put," meaning that the FRB would not allow anything to go wrong with the economy or with capital markets.[7]

Another market crisis arose from the increasing prominence of the lightly regulated hedge fund industry during the late 1990s. In this case, investors and regulators underestimated the impact and complex dynamics produced by the rapid expansion of hedge funds. An example is the initial success and eventual collapse in 1998 of Long-Term Capital Management (LTCM). As with many hedge funds, LTCM operated with little transparency and used significant amounts of leverage. In addition to the huge implicit leverage of its equity book, ultimately LTCM's balance sheet leverage reached some 100 to 1 (Lowenstein [2000]).

In this situation, the FRB rushed to organize a consortium for a preemptive strike against a hedge fund so highly leveraged its solvency threatened the entire financial system. Observers agreed that the eventual bailout of LTCM was necessary to avoid significant ripple effects and disruptive financial panic.[8]

LESSONS FROM THE CURRENT FINANCIAL CRISIS

The recent market bubble had all the ingredients that have historically combined to form market bubbles. It was characterized by innovative and overconfident lenders crowded around the table to package mortgage loans and overconfident investors speculating on real estate asset prices. Easy credit was facilitated by easy monetary conditions, and weak regulatory oversight allowed systemwide excess in borrowing and risk taking. A self-reinforcing *positive* feedback loop ultimately led to a self-reinforcing *negative* feedback loop and ensuing risk cascade. The new product structures and imprudent risk taking expressed through speculative financial leverage combined to put us in the mess we now find ourselves in. Let's now explore the interplay of innovation, psychology and leverage with more discussion of the current crisis as illustration of these factors.

LESSONS FROM INNOVATION

In recent years, we have witnessed a great wave of innovation in financial markets and products. Typically, the innovation has been driven by the desire to affect risk bearing (by reducing, sharing, or transferring it), the desire to improve market pricing, or simply investors' hunger for higher returns. We do not want to eliminate or pull away from beneficial innovation.[9]

But as is clear in current and prior asset bubbles, many innovations fail to deliver on the promises made on their behalf. They perpetuate excessive risk taking by masking it and spreading it around rather than mitigating it. If a new financial product obscures information, that innovation may not reduce risk or the occurrence of risk, but may actually, instead, multiply risk in the system. Consider the massive degree of systemwide complexity, leverage, and concentrated risk created by the recent introduction of sophisticated structured credit products. These products purportedly conquered risk, but they were so complex that, in reality, few understood them or their riskiness.

Part of the surge in structured credit products came from the success of government-sponsored mortgage entities in issuing mortgage pass-through securities over the past 40 years, which confidently led to new structured mortgage services.[10] Using technological advances, investment banks and other parties developed new ways of securitizing mortgages through such structures as collateralized debt obligations (CDOs) and structured investment vehicles. The market for credit default swaps (CDS) as insurance against the failure of CDOs and corporations also grew rapidly.[11] Access to mortgage credit also widened. The introduction of subprime mortgages facilitated mortgage lending to a group of borrowers who were previously ineligible for loans. This widening pool of borrowers led, however, to a cycle of home price inflation. Members of the U.S. Congress even encouraged the expansion of the subprime mortgage sector (*WSJ* [2008]). Lenders used the new tool of financial engineering to create weaker and weaker mortgages. Indeed, subprime mortgages became increasingly popular CDO ingredients. Mortgage *lending* thus became increasingly separated from mortgage *investing* and left the mortgage originator with little incentive to pay attention to the creditworthiness of borrowers. Taken together, these activities, practices, and trends spurred enthusiasm among investors and dispersed the risk broadly across the financial system (not to mention producing a glut of housing). But financial markets do not obey the laws of mathematics and an overly zealous Congress.

Like all good things run amok, the success of innovative mortgage securitization went beyond the point of societal value. The straightforward securitization of home loans, used properly, supports worthy public goals. But recent mortgage securitization created imprudent product structures with layers of complex securitization and lax lending standards—all features that exacerbated the real estate bubble. These overly complex and opaque structures should have been received with great skepticism.

Innovation in CDOs obscured rather than clarified who was taking on what risks. In risk sharing, the risks of two parties combine to offset each party's risk (Jacobs [2009]). So, risk sharing parses risk by dispersing it throughout a system. For instance, a residential mortgage with, say, a 75% loan-to-value ratio suggests that the borrower and lender together share the risk of a price decline in the house. This risk-sharing arrangement must be distinguished from risk *shifting*, which can actually lead to the unintended consequence of propagating risk in the system. Contrary to widely held views, those structured mortgages with a 100% (or higher) loan-to-value merely shifted risk from one party to another. Such residential mortgages, by design, included an embedded option that shifted the risk of a decline in the value of the home from the borrower to the lender. Those borrowers with residential home mortgages having high loan-to-value ratios can, in the event of a decline in home prices, simply walk away

from the property and "put" the home back to the lender.[12]

The interconnections between innovation and the regulatory framework are important in our understanding of the genesis of asset bubbles. We cannot know ahead of time how the economy will absorb a shift in technology or structure associated with innovation. Consider again the pooling of residential mortgage-backed securities by government-sponsored enterprises (GSEs) into ever more complex structures. The impact of those innovations and the dynamics they created were not well understood by either regulators or users. Regulation always lags innovation. Regulators respond to market dynamics and new institutions and technologies as they evolve and grow. Such lags, sometimes combined with lax regulation, provide opportunity for some users to stretch innovations beyond their initial and prudent intended use.

And as for users, rarely are such innovations fully stress tested in regard to their economic impact in advance of their commercial application. Moreover, complexity obscures risk and diminishes an investor's ability to understand the degree of risk to which they are exposed. Making matters worse, investors fear admitting ignorance and too often lack the will to admit the emperor is wearing no clothes. Indeed, the implications and ultimate uses of innovative products and institutions may not be fully understood even by their creators, confounding the market's ability to comprehend fully the innovations' risk-associated effects.[13]

In short, the complex innovations of recent years have increased macroeconomic unknowns, making the management of risks by both regulators and investors inherently challenging. Therefore, whereas recent innovations were an important agent of financial growth, they ultimately contributed, ironically, to financial instability—a "Minsky moment."

In the repackaging of home mortgages, the financial products—although promoting tremendous growth of the sector—allowed and encouraged erosion in residential mortgage lending standards. The growth in mortgage structures, in turn, promoted expansion of new, complex structured products with poor transparency. According to the Bank for International Settlements, the notional amount of CDSs grew from a trivial amount early in this decade to some $45 trillion in notional value by the end of 2007. Similarly, subprime originations tripled from about $200 billion in mid-2003 to more than $600 billion in 2005, when they accounted for approximately 20% of all new residential mortgages, up dramatically from the historical share of this sector of around 8%. A major contributor to the rise was overconfidence on the part of investors in their abilities to predict outcomes on the basis of complex risk models that were built on the consistently rising home prices of the prior decade; the models apparently ignored periods of falling real estate prices.[14]

Although not all innovations are considered complex, many certainly seem to be constructed with the notion of "the more complex, the better." But complexity may disguise and amplify the true degree of financial risk. For example, consider the byzantine nature of some exotic securitized CDOs. By placing a variety of asset-backed securities into a single pool, CDOs purportedly reduce risk via diversification. Diversification can, indeed, reduce risk, but in recent years, the ingredients of the CDO tranches were obscured and presented as of higher quality than dictated by economic reality.[15] Rather than diversifying risk, such pooling merely concentrated risk in the "toxic waste" tail of the return distribution.

A final point regarding innovation—too many financial innovations are designed with the seller in mind rather than the user. The problem is akin to that of the misalignment between the interests of agents and their principals. Consider how rating agencies, the guardians of risk assessment, fell short in their due diligence responsibilities to principals. Many seller-motivated products are, even at best, overly sophisticated and complex and, therefore, almost always hamper an investor's ability to accurately assess risk. At the sleaze end of the spectrum, the seller misrepresents the investment risks. The result is high uncertainty about how markets will react during crises.

LESSONS FROM INVESTOR PSYCHOLOGY

These effects of innovation are compounded when combined with another key ingredient in bubbles—the psychological makeup of investors. The success of innovation brings imitators seeking to achieve similar success. Investors (wrongly) convince themselves that they fully understand how the innovation works (exhibiting *overconfidence*) and *herd* into the newfound success to "get a piece of the action." Success encourages more imitators, and with investors basing their investment decisions on prior success, the cycle continues. The euphoria is grounded in a false belief, however, that prior success is predictable and will continue into the future.[16] Not only investors but also regulators develop a false sense of

confidence in their ability to predict outcomes related to the use of innovations.

The initial success of innovations, therefore, engenders overconfidence and complacency and feeds herding behavior. Under the charm of groupthink, investors transfer success into speculation. A widening pool of speculators is made possible by investors providing the necessary credit and liquidity for a cycle of price expansion.

With continued speculative herding, risk becomes concentrated in a narrow set of market sectors. When concentration trumps diversification and herding displaces individual judgment, markets become unbalanced and disrupted. The bubble becomes larger but also thinner.

LESSONS FROM LEVERAGE

To make matters worse, investors, in their efforts to enhance returns from the newfound "sure thing," contribute the third key ingredient to the bubble—speculative leverage.[17] Excessive economic leverage factors prominently in market meltdowns.

Not that risk and leverage are evil twins. Risk taking and leverage are required ingredients in a prosperous capitalistic system. Risk taking often takes the form of leverage. Think of our fractional reserve banking system. This system allows credit expansion and demand deposit accounts that trade at the buck. This works well as long as everybody doesn't want all their cash at the same time.

As such, leverage is not possible without liquidity. As discussed in Sullivan [2008], the availability of liquidity is mostly determined endogenously by profit-seeking financial intermediaries or liquidity providers that exist outside of the direct purview of the central bank. These intermediaries compose the so-called shadow banking system that consists of unregulated levered intermediaries seeking profit and risk. Consequently, the system is financially fragile and volatile.

The pool of risk capital driven by this shadow banking system therefore oscillates with the ebb and flow of liquidity. In this sense, market liquidity relies on the faith of the financial markets. Increased risk appetite among investors facilitates greater liquidity via easing credit conditions. This chain of events precedes a willingness to underwrite greater risk and increasing financial leverage via investment vehicles such as CDOs, SIVs, and the like.

And as we've seen, liquidity can dry up with startling rapidity depending solely on the market's tolerance for risk. In the case of a sudden, systematic reduced risk appetite, the ensuing liquidity withdrawal precipitates forced selling that can affect prices negatively and can create a self-reinforcing cycle—a downward Minsky-type spiral of delevering and collateral-related liquidity seeking by levered investors.[18] Hence, market instability can quickly erupt into a high-intensity risk-aversion storm. A seemingly minor economic shock may become severely destabilizing, joined by a run on the shadow banking system—and risk.

Consider how problems in one corner of the U.S. market spilled over into other completely unrelated corners; from subprime mortgages into the entire fixed-income market, and then into the equity market, and then into the global economy. The extent of the propagation relates to the confluence of risk, leverage, liquidity, and the interconnectedness of the financial system. Leveraged risky positions impacted by a sudden reduced risk appetite results in the need to liquidate in a market that cascades downward in price as liquidation orders rise and liquidity providers diminish.

POP

Alas, all bubbles—past, present and future—eventually collapse under their own weight. The bubble grows thinner and thinner until eventually it must pop. Initially, a few investors sell, causing prices to fall. Levered investors must sell assets to meet margin calls. Pessimism replaces exuberance in the herd as more and more investors sell and deleveraging ensues. A downward price spiral follows as investors rush to get rid of ill-fated assets and to meet lenders' demands. Asset deflation may then spread into other market segments, even affecting safe assets as investors seek to pay off outstanding liabilities. Thus, the bubble may spill over into the real economy. A seemingly isolated event that began in the financial sector evolves into a systemic crisis. In this way, the partnership of financial innovations with leverage and overconfident investors is particularly troublesome.[19]

FROM LESSONS TO CRISIS MITIGATION

Einstein purportedly commented that "today's problems cannot be solved by thinking the way we thought when we created them." New, robust ideas—not provisional and makeshift—are clearly needed to ensure a more stable economy. Lessons from the past and present crises, however, can serve as a solid foundation to build a better

way forward. Recent events underscore that we must avoid crises that undermine the entire financial system. The market regulatory framework in free-market countries is built on the premise that government is an important auxiliary overseer of capital markets, though not a substitute overseer. The private sector must assume primary responsibility for investment oversight and must begin with the principle of ethical dealing. In the realm of financial markets, public policymakers have three principal objectives: financial stability, investor protection, and market integrity (Bernanke [2007]). For success in its regulatory role, oversight agencies must aim to reduce the frequency and severity of global asset bubbles and banking crises. The primary goal is to preserve the benefits of innovation, while ensuring a fundamentally sound financial system. Additionally, investors must be allowed to bear the consequences of their risk decisions; the discipline of markets is powerful. Of course, the tug of war between innovation and safety can never be won by either side. Policymakers, therefore, will not be able to completely prevent financial shocks and periodic bouts of damaging financial instability, but a global regulatory framework with agencies working together would come closest to achieving such a goal.

New, complex products and institutions have increased in importance in recent years but have been left largely unregulated. The globalization of finance has added to the complexity and reach of these innovations. These developments have critical implications for how we go about putting in place a robust regulatory framework. In light of the scope of changes and events, a focus on the structure and design of regulation in broad terms, not a narrow focus on a single asset class or institution makes sense. A broad focus will allow us to scan the whole market to suggest where problems may occur. A focus that is too narrow, such as on a single asset class (e.g., CDS) or institution (e.g., hedge funds) in an attempt to pinpoint the source of risk-bearing problems will be ineffective in our complex, globally integrated, and dynamic markets. A broad focus on risk bearing associated with the agents of bubbles—mass sentiment, leverage, and innovation—is required.

With regard to innovation, we need first to recognize that market risk is the financial equivalent of energy.[20] That is, like energy, risk cannot be *eliminated* via financial engineering. Yes, we can shift risk, move it around, and even share it through financial alchemy, but once created, risk cannot be eliminated. Nevertheless, many financial innovations are purported by their inventors to squelch risk. Consider how the innovation of slicing up CDOs gives the appearance that risk has been eliminated through diversification when it has actually been concentrated in the tail of the distribution (e.g., a toxic credit tranche). A cynic would see that much of financial innovation enriches the innovators at the expense of investors.

Combining the complexity and reach of modern financial innovations with a rigid regulatory framework that is ill equipped to handle the complex, dynamic nature of innovations increases the risk in the system by injecting additional unknowns into market dynamics. A dynamic global economy requires a dynamic global policy and oversight framework.

Moreover, because constant tension will always exist between the innovative forces of free markets and control by regulators, regulation should not try to eliminate future financial market progress by narrowly looking in a rearview mirror. Though understanding prior economic crisis is vitally important, investor safety cannot be achieved by regulation that simply invokes a stringent set of rules and guidelines based on hindsight alone.

Instead, policymakers should endeavor to put in place a wise, *principles-based* regulatory framework rather than a rigid rules-based framework. The system must be flexible and proactive enough to cope with not only past issues, but future issues, and it should use common sense and judgment. In this form, regulation will have a chance to adjust to complex adaptive markets and the fragile interconnections of new forms of risk-bearing innovations. Such a regulatory framework, and the will on the part of global regulators to implement it fully, may be imperfect but should foster promising *prudent* innovations.

As noted earlier, much of the current regulatory framework was put into place subsequent to the market crash of 1929. This framework is due for reform. If a revamping is to be carried out, we should base our regulatory structure largely on a careful assessment of the causes of asset bubbles and should erect a framework for containing systemic risk. The intention is to reduce market complexity rather than layering on additional regulations that may actually increase market complexity. At the international level, critical elements are consistency and mutual reinforcement among policies.

In light of these goals, policymakers must frame their efforts broadly to simplify and clarify the machinery of the market including risk-bearing innovative products, institutions, and assets. Special vigilance must be given in regulations to limiting opaque innovations and firm structures[21]

as well as speculative leverage because of their destructive effects. Specifically, our oversight framework must strive to be guardians of financial stability. Implementing the following suggestions should go far toward reducing future shocks that cascade through our financial system:[22]

- Increasing transparency in all corners of the market must play a critical part in new regulation. The embroiled toxic assets of the current economic crisis were hidden assets. Transparency is necessary for market participants to assess the risk and rewards of investments and institutions. Gaining an accurate picture means wide dissemination of information to all parties and elimination of the problem of asymmetrical information. Because of the conflicts of interests inherent in principal-agent relationships, the opacity of products and institutions must be laid to rest by way of mandating open books. Oversight applied to only portions of the market (e.g., excluding hedge funds) will be ineffective.
- Transparency can be improved by the construction of exchanges and clearinghouses to handle various types of complex OTC derivatives.[23] In this effort, regulators and investors should look beyond the CDS market to include other sectors, such as currencies and commodities. Only in this way can we monitor an institution's full market exposure and ensure that necessary collateral is in place to cover its trade-related obligations.[24] By clearing and settling trades, clearinghouses would limit risk to the larger financial system from any single firm. Given that CDS instruments are more an insurance contract than a swap contract, such instruments should be allowed to be owned only by those who own the underlying bonds, not by others who wish only to speculate against a firm or a country.
- Full transparency unambiguously requires that all financial institutions, including hedge funds, should be subject to registration and oversight. As part of oversight, audit and custodial processes for investment organizations, regardless of size, must be taken seriously. In the U.S., auditors must pass muster with the Public Company Accounting Oversight Board. Due diligence must not be pushed aside in favor of hope.
- With the interconnectedness of markets, regulators and investors need to work continuously to identify the greatest risks to the financial system and focus oversight resources on those areas. It is unlikely that market crises can be eliminated entirely, however, a wise framework should provide for a global network of systemic-risk regulators charged with preventing bubble escalation through an ongoing assessment of global risk, leverage, and liquidity. This network of systemic-risk regulators should oversee all financial institutions determined to be systemically important, including banks, broker/dealers, hedge funds, insurance companies, and others. The market-stability regulators would also have the authority to monitor these financial firms and any affiliated firms, and to ensure that financial firms have sufficient capital in place to reduce the risks they pose to the financial system. Excessive economic leverage and speculation in the global markets can be tamed through ongoing oversight and enforcement of high international risk standards. Given the impact of the unregulated so-called shadow banking system (Sullivan [2008]), with its significant leverage and liquidity implications, we can benefit from better management of the levels of liquidity, financial leverage, and systemic risk in the global capital markets. Monetary policy, alone, is too blunt a tool to be fully effective on this front, a more robust framework is needed.
- Leverage and risk taking are not to be eliminated, but policymakers need to debate, set, and review the proper limits to leverage. At the level of financial institutions, excess leverage might be managed via prudent margin and capital requirements, and at the consumer level, it might be managed by, for example, setting minimum downpayments on home purchases. Proper institutional oversight must seek to manage risk on a system-wide basis because, for example, allowing some financial institutions, such as commercial banks, to shift risks from their books to others with less-stringent capital requirements leads to undesirable macro risk levels. We are reminded, too, that efforts to manage risk must also seek to keep pace with financial innovation.
- More financial market stability is needed than regulation alone can bring to bear. Changes in market mechanisms are needed. One such change would be to alter the incentive structure under which firms now operate. Today, interest paid on debt provides a corporate tax deduction, but dividends paid on equity do not. Given the dangers of excessive leverage, incenting firms to use debt versus equity makes no sense. Why not simply level the playing field?[25]
- We must resolve the "too big to fail" issue that permeates our financial system. Perhaps if it's too big to

fail, it's just too big. Looking forward, one way to govern size might be to impose capital requirements that vary with firm size. The bigger the financial firm, the greater the mandatory capital requirements ratio. This approach would automatically regulate the size and leverage of any single financial entity, discouraging firms from getting too large and implementing too much leverage. Given the interconnectedness of the financial system, however, many smaller players pursuing similar strategies could prove equally disruptive. A strong role for vigilant oversight will still be required. This again suggests a role for a systemic risk–regulator network. Better guardrails are needed to ensure the economy stays on the tracks. Here, we should start with reinstating the Glass-Steagall Act that was largely repealed by Gramm-Leach-Bliley in 1999.

- To mitigate the negative effects of principal-agent conflicts of interests, incentive structures in global financial institutions must be properly aligned. For this reason, hybrid government–private ownership structures, such as the GSE mortgage firms, should be avoided in the future. Existing GSE activities should be spun off to the private sector, but remain under the regulatory umbrella. Financial firm management's gambling for the upside of $50 million paydays with the public's money must also be stopped. Gamblers must alone bear the consequences of their decisions.
- Part of an intelligent, principles-based regulatory review and oversight process is that innovations and associated investment institutions and products would be fully stress tested before they are made available to the wide marketplace. A wise oversight process would go beyond ferreting out fraudulent agents to include a complete assessment of the risks and benefits of innovations, both initially and ongoing. In practice, the process might work much as the U.S. Food and Drug Administration review process works for innovations in health care. (Or the U.S. Consumer Product Safety Commission might be expanded to alert consumers to dangerous financial products.) Such an organization would be charged with promoting and protecting our financial health by helping safe and beneficial financial products reach the marketplace.
- Policymakers should give serious consideration to structuring more frequent market respites, when appropriate, to sooth investor irrationality and reduce the spread of fear and panic associated with market cascades. Slowing the frenetic pace of markets by way of circuit breakers and market closings can help to replace panic-induced activity with sound judgment. Providing time for investors to move beyond their emotions can help restore calm during periods of belief-based market volatility.[26]

CONCLUSION

Financial markets have provided tremendous public benefits in a variety of ways, but perhaps the most important way is the efficient allocation of capital that leads to widespread improved living standards. If that allocation suddenly becomes directed by investor emotions connected to some new innovation, however, the combination fuels imprudent speculation. Emotion assigns more promise to an innovation than a clearer view would dictate. Capital allocation directed by groupthink and a disregard for risk can quickly become disconnected from reality.

Thomas Jefferson once said, "The price of freedom is eternal vigilance." This article has extended the argument presented in Sullivan [2008] that a holistic and vigilant risk management framework is needed to control market meltdowns and ensuing contagion. Here, we have explored how common features present themselves in disruptive market bubbles and revealed ways to restore long-term market viability. Because the formation of modern capital markets, the interactions of financial innovation, hubris, and leverage have laid the groundwork for market bubbles, a clear understanding of these interactions can suggest better ways forward. We must anticipate and fight the convergence of bubble cocktail ingredients.

A sweeping wave of regulatory intervention appears in the making. But we must be careful. Any regulatory framework comes with unpredictable consequences of its own. Adding complexity and uncertainty of regulatory outcomes to an already complex market reduces our ability to fully understand the various forces governing market dynamics. Meeting these challenges head on is certainly not easy, but we must avoid haphazard responses to the global crisis. The lasting elements of a reformed system begin with a flexible, wise, principles-based regulatory framework that pragmatically balances risks and benefits. Our flexible regulatory framework should be built on a solid understanding of the common elements in bubble formations. A stable capital market foundation also insists on transparency of products and institutions. Finally, proper ethics and independent decision making on the part of investors are critically important. In response to the present global market crisis, we can start with these building blocks to create a solid foundation for stronger capital markets.

ENDNOTES

This article reflects the views of the author, and does not represent the official views of the author's employer, CFA Institute.

[1]See Shiller's [2005, p. 2] definition of a speculative bubble: "A situation in which news of price increases spurs investor enthusiasm, which spreads by psychological contagion from person to person, in the process of amplifying stories that might justify the price increases and bringing in a larger and larger class of investors, who, despite doubts about the real value of an investment, are drawn to it partly through envy of others' success and partly through gambler's excitement."

[2]This article expands on the discussions presented in Sullivan [2008], which examined markets as complex adaptive systems that possess a large number of interactive agents adjusting dynamically to events in unanticipated and nonlinear ways.

[3]Equity shares rose from around 150 to 10,000 livres (see Goetzmann and Rouwenhorst [2005, pp. 233–234]). Although history has certainly not dealt kindly with Law, Goetzmann and Rouwenhorst suggested that Law was a financial innovator worth studying more carefully.

[4]Goetzmann and Rouwenhorst [2005] discussed how the crisis of 1792 eventually led to the formal establishment of the New York Stock and Exchange Board in 1817.

[5]Legislation included the Securities Exchange Act of 1934 (which addressed the secondary market), the Maloney Act of 1938 (which allowed the creation of self-regulating organizations, including the NASD, which is now the Financial Industry Regulatory Authority), the Investment Company Act of 1940 (which regulated investment companies, including mutual funds), and the Investment Advisers Act of 1940 (which required investment advisory registration). The National Housing Act of 1934 created deposit insurance for savings and loans. And later, in 1970, the Securities Investor Protection Act created an insurance fund for customer claims from broker/dealer failures.

[6]In the 1980s also came the development of the "junk bond" market. This innovation also got off to a rough start. According to Kindleberger and Aliber [2005], more than half the issues underwritten by innovator Drexel Burnham Lambert had defaulted by the end of the 1980s.

[7]The investment community responded to the 1987 market crash with the implementation of circuit breakers to halt trading when a market's decline reaches a pre-specified trigger level and by terminating the use of CPPI.

[8]For the interested reader, Lowenstein [2000] presented a full analysis of this fascinating story.

[9]A healthy capital market encourages a stream of innovation, and financial innovation brings economic benefits to society. History abounds with innovative financial ideas that fulfill their promises of creating substantial public benefits. The financial revolution that has been going on over the past 300 years includes the development of capital markets, which has brought enormous economic benefits. Capital markets pool and subdivide financial resources and mobilize efficient capital allocation. They also foster improvements in market efficiency and information sharing. The markets provide information on securities prices, and the financial reporting demanded by market participants provides information on governance and information useful in managing and reducing risk.

[10]The creation of government-sponsored enterprises (GSEs)—namely, Ginnie Mae and Freddie Mac—fostered the creation of a securitized residential mortgage market. The first mortgage pass-through securities were issued by Ginnie Mae and Freddie Mac in 1970. Freddie Mac introduced collateralized mortgage obligations in the early 1980s. The mortgage securities volume of the GSEs rose from $200 billion in 1980 to more than $4 trillion in 2007 (Bernanke [2007]). Turning what would otherwise be a heterogeneous, illiquid set of residential mortgages into a homogeneous pool of liquid assets via securitization facilitated the development of the mortgage-backed securities market. These new developments effectively lowered the cost of borrowing and made the dream of homeownership easier for millions. Homeownership brings important societal benefits, of course. People wish to live in safe neighborhoods with good schools, libraries, and so on. Encouraging people to take ownership stakes in their homes makes such neighborhoods more likely.

[11]CDO ratings were often increased to AAA via the purchase of monoline insurance. Monoline insurers guarantee the timely repayment of bond principal and interest when an issuer defaults. They are so named because they provide services to only one industry.

[12]The degree of risk sharing is proportionate to the loan-to-value ratio. Mortgages with loans less than 100% of the home value expose both the lender and the borrower to home price declines, and as that percentage falls, the risk-sharing arrangement becomes more constructive.

[13]Some have suggested that CDSs were called "swaps" rather than "insurance" to avoid the regulatory reserve requirements associated with insurance contracts.

[14]Lewis [2008] reported that rating agency residential mortgage models had no ability to accept a negative change in real estate prices.

[15]Jacobs [2009] provided an in-depth review of securitization preceding the current credit crisis.

[16]The list of behavioral considerations was discussed more fully in Sullivan [2008]. Also, a substantial literature on the psychology of asset bubbles exists. See, for instance, Kindleberger and Aliber [2005] and Shiller [2009].

[17]In "speculative leverage," the investment debt cannot reasonably be expected to be repaid via the income stream generated by the asset; that is, investor expectations are disconnected from fundamentals.

[18]Minsky [1986] codified the insights of Keynes into a financial instability hypothesis that suggests financial instability

is endemic to capitalist economies. Euphoric expectations lead to a secular trend of rising debt and eventually a debt-induced crash. Asset prices can only move back into equilibrium via asset price deflation or current price inflation.

[19]Warren Buffett has purportedly suggested: "First come the innovators, then the imitators, then the idiots."

[20]Thanks to Marty Fridson for suggesting this analogy.

[21]Opacity also enables fraud as evidenced by Bernie Madoff's Ponzi scheme, among others.

[22]This section reinforces and extends the ideas explored in Sullivan [2008].

[23]A clearinghouse takes deposits in the form of margin from all participants and uses the money to backstop potential losses. This so-called initial margin is supplemented with daily marked-to-market variation margin to account for market changes during the contract period. As this article goes to print, a clearinghouse for standardized CDSs is being launched and other competitor clearinghouses are under construction.

[24]Some have suggested that creating a regulatory framework with a central clearinghouse would harm investor flexibility and market efficiency. Clearly, however, uniquely customized OTC contracts with unique terms create an illiquid, heterogeneous, and opaque market. A less-complex homogeneous market with standardized contracts would improve liquidity and transparency. A market with a central clearinghouse and mandated disclosure would clarify the full extent of the financial leverage of all parties.

[25]William Poole [2009] takes this idea even further. He suggests that all commercial banks modify their capital structure by inserting a new subordinated debt component just above preferred stock. The bank would issue this debt each year in accordance with the size and duration of their loan portfolio. If the market accepts the new issuance, the bank can continue to expand; if not, the bank must contract and modify its loan portfolio accordingly. Under this approach, banks would replace some portion of their FDIC insured borrowings with non FDIC market debt.

[26]For example, following the attacks of 11 September 2001, the NYSE was closed from 11 September until 17 September 2001. When it reopened, it did so calmly.

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