Executive Summary
From time immemorial, capital markets have evolved to address ever-changing investor requirements, tastes and risk appetites (see Figure 1, next page). The ensuing innovations can be classified in three broad categories: financial instruments, trading infrastructure and execution.

The emergence in the early 20th century of specialized markets for listed securities begat what is today's continuous innovation in financial instruments. Numerous equity and debt instruments have emerged over the years to address evolving market needs, as well as to help financial and non-financial firms better manage risk.

The rise in electronic trading in the 1980s marked a key turning point in the innovation continuum. Today's algorithm-driven software for high-frequency trades represents yet another significant disruptive shift. Over the horizon is the promise of self-learning trading algorithms competing with each other, requiring minimal degrees of human intervention. Moreover, as alternative trading venues have emerged to enable large institutions to trade anonymously at a reduced cost, we now have a market in which change appears to be the only constant.

However, there is a downside to fast and furious instrument innovation. For starters, some investment instrument innovations that emerged in the last decade have been tied to the ongoing global financial crisis. Asset-backed securities, for example, were at the core of the sub-prime mortgage crisis of 2007-2008; derivative instruments like these are believed to have set off the full-blown global economic crisis that ensued. Given their ubiquity, and the interconnectedness of the financial services industry with the broader economy, financial instruments are typically associated with economic crises.

In the post-subprime financial market landscape, a key imperative for regulators, industry groups and organizations is to create mechanisms that enhance market safety while permitting innovation to flower and take hold. This can be achieved by preventing the adverse consequences of over-regulation, while ensuring continued rules harmonization by regulatory bodies worldwide to suit the increasingly globalized nature of the business.
Capital market firms must improve their data and risk management capabilities. Risk management should be viewed as a critical compliance and business imperative. It is the key to ensuring compliance, enhanced transparency, healthier business practices and, perhaps most importantly, to rebuild the trust that was lost following last decade’s financial industry crisis. Back-office functions, a hitherto ignored area, deserves a necessary upgrade to revitalize the post-trade function by enhancing efficiency and reducing costs.

Financial Instrument Innovations
Financial instruments have come a long way since the advent of listed stocks that allowed trading on exchanges, aiding in the development of formal marketplaces and liquidity. Some of the innovations that sought to address the requirement of capturing market needs include:

- Mutual funds, which extended professionally managed, diversified asset portfolio benefits to a wider investor population, while helping households acquire financial assets.
- Hedge funds to address the needs of investors with high net worth and a far higher appetite for risk.
- Exchange traded funds (ETF) to provide attractive investment opportunities at far lower costs by focusing on passive investing that mimics select indices.

Meanwhile, instruments emerged to provide risk management benefits. They include:

- Commodity and interest rate futures, which allow businesses to hedge their exposure to adverse commodity price/interest rate movements.
- Inflation indexed bonds, which allow better management of the risks incurred by the adverse impact of a rise in inflation.
- Catastrophe bonds, which insure against the impact of natural calamities.
- Credit default swap (CDS) or credit derivatives, which allow institutions to hedge the credit risks of loans they originate.

Another significant area of innovation is securitization to allow firms to convert streams of loan receivables into tradable securities that are sold to investors with a high tolerance for risk; these instruments enable institutions to extend more credit and meet liquidity demands.

Uniqueness of Instrument Innovations
Innovations in financial instruments differ vastly from innovations in other industries, whose benefits and potential downsides are clear. Unlike a drug whose ill effects may be limited to only those who consumed it, the adverse impact of financial instruments affects the entire economy, not just the parties involved in specific transac-

<table>
<thead>
<tr>
<th>Year</th>
<th>Innovation</th>
<th>Year (cont’d.)</th>
<th>Innovation (cont’d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1600s</td>
<td>Stock Exchange</td>
<td>1900s</td>
<td>Interest Rate Futures</td>
</tr>
<tr>
<td></td>
<td>Publicly Listed Stocks</td>
<td></td>
<td>Fannie Mae</td>
</tr>
<tr>
<td></td>
<td>Central Bank</td>
<td></td>
<td>Exchange Traded Funds</td>
</tr>
<tr>
<td>1700s</td>
<td>Japanese Rice Futures Market</td>
<td></td>
<td>Credit Default Swaps</td>
</tr>
<tr>
<td></td>
<td>Call Options</td>
<td></td>
<td>Electronic Trading</td>
</tr>
<tr>
<td></td>
<td>Mutual Funds</td>
<td></td>
<td>Catastrophe Bonds</td>
</tr>
<tr>
<td></td>
<td>Inflation-linked Bonds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900s</td>
<td>Futures Exchange, Chicago</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hedge Funds</td>
<td></td>
<td>Algorithmic Trading</td>
</tr>
<tr>
<td></td>
<td>Securitization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Black-Scholes Option Pricing Model</td>
<td></td>
<td>High Frequency Trading</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continuous Linked Settlement</td>
</tr>
</tbody>
</table>

Figure 1
Source: The Economist, World Economic Forum, Oliver Wyman
tions. This is a result of the interconnectedness of financial systems with the general economy, which transmits the benefits and negative impacts of innovations somewhat equally.

In fact, securities firms are both creators and followers of innovation. They both experiment with and adopt new instruments from competitors to create investment standards that build markets and house revenue streams. Robert Merton calls this phenomenon “the innovation spiral,” in which institutions devise new instruments to meet their emerging needs that they then standardize and promulgate into the markets, spreading their breadth and depth.

These instruments continuously mutate, extending the cycle of standardization and adoption. Interestingly, the never-ending hunt for investment returns and competition motivates players to evolve key instruments. ETF, an innovation that sought to provide diversification benefits à la market indices to small investors at far lower costs, is one example. Today’s ETFs invest in a wide array of assets, from commodities through equities.

Trading, Execution and Infrastructure Innovations
Technological advancements have transformed securities trading over the past few decades. The big game changer is electronic trading. Trading has evolved from the days when brokers thronged the floor of the stock exchange, yelling to desk-based traders, backed by powerful computers.

Then came high-speed algorithmic trading, which replaced human traders with software that generates trading orders based on underlying algorithms. High frequency trading (HFT) has already captured around half of the trading volumes today and is set to rise further (see Figure 2).

In the previous era, traders’ physical proximity to the stock exchange floor mattered; however, what matters now is the co-location of servers to achieve trade execution speed advantage, since the difference of a few milliseconds of latency can result in losses or gains of millions of dollars. While algorithm-driven HFT is criticized for causing incredible market volatility, high-frequency trading has upped the ante for institutions to improve their execution speeds. The next wave of innovations on this front will likely come from trading software driven by self-learning algorithms.

Trading venues have also shifted, driven primarily by the desire to consider multiple sources of liquidity in search of better execution. They include alternative trading systems (ATS) in the U.S. and Canada and multilateral trading facilities (MTFs) in Europe, which have given rise to dark liquidity pools. In the U.S., ATSs are gradually gaining market share from the traditional exchanges (see Figure 3, next page).
The dark pools are driven by the desire for anonymity to minimize the market impact cost, as well as the cost of transactions. Another motive is to prevent competitors’ trading algorithms from sniffing their orders in transparent markets. Regulatory frameworks provide pre-trade transparency waivers to dark liquidity pools, subject to certain conditions.6

Despite the strides made in increasing the efficiency of trading venues and securities trading firms’ front offices, inefficiencies still persist in the post-trade infrastructure. The middle and back offices that handle trade confirmations and settlement remain plagued by excessive manual intervention; the lack of automation here is leading to time delays and revenue losses. In the wake of the recent crisis, firms rushed to automate back-office functions to save money, improve operational efficiency and ensure regulatory compliance, overlooking the key functional areas where continued innovation could help drive productivity gains and competitive advantage.

The need for back-end support systems will increase, as the need for participants to comply with the Dodd-Frank Act and the European Market Infrastructure Regulation initiative drives over the counter (OTC) derivatives to be routed through exchanges and swap execution facilities (SEFs). Trades routed through exchanges or SEFs could give rise to the use of algorithms applied to derivatives trading. Greater automation will restrict dealers’ abilities to differentiate on price, thus forcing them to compensate by leveraging better access to their clients.7 With the arrival of central counterparties (CCPs), post-trade events in OTC derivatives will increase, requiring market participants to implement systems that allow straight through processing of these trades.8

Meanwhile, regulatory moves toward CCP-enabled clearing, as well as margin requirements for OTC trades that are not cleared through a CCP, have sparked fears that a bulk of these trades could move to smaller markets in Asia. While such fears appear exaggerated, margin requirements could result in an end to exotic OTC trades.9

The Target2-Securities (T2S) platform is another infrastructure innovation that is taking place to reduce the cost and risk of cross-border transactions in Europe. In the Eurozone, cross-border transactions are considered to be more expensive than in the U.S. T2S is expected to overcome this challenge, along with several of the “Giovannini barriers” identified by the Giovannini Group in its 2001 and 2003 reports.

Given the complicated nature of the cross-border trading cycle in the Eurozone, this is a welcome move that could help reduce settlement and operational risks and enable a move toward shorter settlement cycles of T+2. But continued delays have meant that the project has experienced repeated delays and is expected only in 2015. (For additional insight, see “Target2-Securities Platform: Implications for the Post-Trade Arena.”)

### Percent of U.S. Equity Market Volume

Growing market share of alternative trading systems

*Exchanges include BATS, NASDAQ, NYSE Area and regional exchanges*


Figure 3
Innovation’s Role in Financial Market Crises

Amid the ongoing financial crisis, financial instrument innovation of the early 21st century is being closely examined for the severe adverse economic consequences that ensued. Given their ubiquity, financial instruments are typically found at the center of economic crises. Innovations per se are neither evil nor good. They can evolve and be applied to meet specific objectives. The objectives are influenced by a host of external and internal factors. As The Economist recently put it, “When bubbles froth, innovations are used inappropriately – to take on exposures that should not have been, to manufacture risk rather than transfer it, to add complexity.” This is also summarized by Steve Kohlhagen, an advisory board member at the Stanford Institute for Economic Policy Research (SIEPR), who said that blaming financial innovation for crises is like blaming the Wright brothers for 9/11.

The systemic significance of innovations arises when the markets for these instruments grow wider and deeper and pose unintended consequences. ETF’s rapid growth is a case in point (see Figure 4). A Kauffman Foundation report warns of potential systemic risks that can arise due to the growing influence of ETF investments, which are increasing correlations among index constituents.

The benign or malignant consequences of financial innovations are determined by three sources – the environment, innovation itself and the area of application.

Environmental forces that shape markets and drive innovation typically change over time and influence outcomes. Innovations attempted in an unhealthy environment that provides the wrong incentives are likely to produce negative outcomes. On the contrary, a healthy environment that fosters a long-term view that encourages firms to appropriately assess attendant risks can lead to positive outcomes. In the run-up to the recent crisis, the environment was beset by a host of adverse factors, including the following:

- **Prolonged deregulation** paved the way for shadow banking (see Figure 5, next page) to flourish.
- **Institutions took part in opaque OTC derivatives**, coupled with high leverage (see Figure 6, page 7).
- **Central banks remained solely focused on inflation targeting**, even as asset prices bubbled.
- **Environmental factors such as overt tax incentives for debt**, a prolonged rise in property values and easy availability of mortgages even for subprime borrowers, incented individuals to expose their household balance sheets to excessive debt.
- **At the institutional level, back offices that process trades remained largely antiquated**, even as the front offices made headway to meet increasing market demand.

---

**Here to Stay**

Exchange-traded funds, assets in trillions

![Commodity, Equity, Fixed Income](Source: “Playing with Fire,” The Economist, Feb. 25, 2012 Figure 4)
Beyond environment factors, innovation *per se* can sow the seeds of destruction via inappropriate disclosure and a lack of transparency about attendant risks. The move to create structured investment vehicles, for instance, was rooted in the industry’s desire to move debt from bank balance sheets into new structures, thus circumventing capital provisioning mandates, in addition to allowing banks to extend credit beyond healthier limits. Another example is synthetic ETF, whose underlying swaps – in addition to exposing investors to counterparty risk – can result in collateral that does not resemble the assets the ETF is meant to track.

Perhaps the larger blame goes to how these innovations were applied. The problem with mortgage backed securities (MBS) and collateralized debt obligations (CDOs) – which many pundits believe set off the global financial crisis – was not due to the instruments themselves but to the fact that sub-prime loans were packaged with so-called “better ratings.” Reduced documentation requirements for mortgage qualification (a variant devised originally for the rich self-employed and small business owners), was offered to low-income borrowers, which undermined the underwriting process. The deciding factor was the worthiness of the sale of these loan instruments to MBS investors rather than whether borrowers were capable of repaying the principal, plus interest. Similarly, availability of CDS (credit default swaps) encouraged firms to undermine credit risk assessment.

Another cause of the innovation-influenced downturn was disregard for the financial literacy needed to understand the complexity of instruments such as derivatives. Typically, innovations take shape within the confines of an institution and are gradually adopted by the wider market. The knowledge of risks associated with the product evaporates as it moves further from the original innovators. Even sophisticated buyers of instruments are known to lack understanding of their implications.

The application of innovation is known to be influenced by broader industry motivation. Moral hazard arising from the prospect of government bailouts in the event of failure is a well-known motivation. Firms were known to dilute their underwriting policies, since the securitization of MBSs and CDOs allowed them to shift the credit risk to third-party syndicates.

### Cleaning Up from Innovation’s Aftermath

The impact of the economic crisis and the measures undertaken will be felt for a long time to come. The foremost challenge ahead of the financial market regulators, industry groups and institutions is to evolve mechanisms to make financial innovations safer. At the organizational level, institutions need to focus on developing robust data and risk management capabilities for meeting the twin challenge of compliance and competencies.

---

**Shadow Bank vs. Traditional Bank Liabilities**

![Graph of Shadow Bank vs. Traditional Bank Liabilities](figure5.png)


*Figure 5*
Making Innovation Safer
Innovations are necessary for the evolution of financial markets. The ability to innovate has never been a challenge for most financial firms. As is evident from the recent crisis, the biggest challenge for regulators, industry groups and financial services firms is to develop ways and means to minimize the ill effects of instrument innovation (as referenced above).

The crisis presents an opportunity to reinvent the system. As Andrew Lo of the Massachusetts Institute of Technology suggests, the financial industry needs to establish an independent body modeled on the lines of the National Transportation Safety Board (NTSB), which has the impeccable track record of continuously increasing the safety of commercial aviation. Robert Shiller, an economist and Professor of Economics at Yale, advocates the idea that the government has to assume sponsorship of innovation, just as it does with scientific innovation.

Industry groups also have a useful role to play. They can work toward evolving best practices around innovation processes and ensure their dissemination among participating institutions. These groups can also join hands with regulators in applying innovations to monitor unfolding negative outcomes.

Striking the Right Regulatory Balance
Innovations are known to cause market disruption, which has to be managed by proper controls, regulation and availability of warning signals informed by the capture and analysis of the appropriate data (i.e., investment ratings). The reason why last decade’s instrument innovation delivered unintended negative consequences was the lack of financial controls, poor data availability and regulations that could not keep pace with rapid change.

Regulators are appropriately positioned to shape a healthy environment that influences positive outcomes from financial innovations. The key is to strike the right balance, since excessive regulation can choke innovations crucial to the natural evolution of markets. Much of the financial regulation underway on both sides of the Atlantic is aimed at addressing these issues. Regulators are also attempting to bring more market players into the scope of regulatory enhancements; they are also seeking to curb leverage and raise capital requirements.

OTC derivatives reforms intend to bring these trades to the exchanges or swap execution facilities and clear them through central clearinghouses. Swap data repositories are expected to aid regulators in monitoring likely systemic threats from concentrations of counterparty exposures. The idea that central banks should pay

Leverage at the LCFIs
High leverage levels marked the pre-crisis period


Figure 6
serious attention to asset price bubbles is gaining ground, while the appropriate ways and means of doing so are still being debated. Nevertheless, the potential dangers of over-regulation and the lack of regulatory harmonization worldwide threaten to undercut ongoing reforms in markets that today are far more interconnected globally than ever before. Finding the right level of regulation and harmonization is necessary for ensuring a healthier and better marketplace.

**Improve Data and Risk Management**

Institutions must improve data and risk management to survive market uncertainties. Financial services organizations, banks and capital markets firms, in particular, should focus their efforts on building a culture that devotes greater attention to reputation and refrains from pursuing innovations that may undermine it. Organizational innovation processes need to be reinvented and integrated into an enterprise-wide risk management framework.

Risk management should be viewed as a key business and compliance imperative. As the crisis abates, financial firms need to continually focus on compliance, risk management, cost efficiencies and rebuilding client trust. Their technology infrastructure has not kept pace with the wave of instrument innovation that swept across the industry over the past decade.

Financial firms need to give high priority to making technological enhancements to their banking systems, as this is crucial for achieving several key objectives, from improving processes, to creating transparency and enhancing compliance. To achieve this, they need to overhaul their legacy banking systems, a key part of which is creating consistent data structures across the organization. No wonder enterprise data management has emerged as an important area of focus for financial services firms as they look to prepare for a highly regulated future.

Integrated data structures will enable hitherto siloed data to be standardized, removing inconsistencies and errors, thus enabling a single version of the truth for all concerned functional departments. This will have several benefits, the most important being reduced complexity and improved reporting for compliance purposes. Moreover, the use of advanced analytical tools on the “big data” accumulated through new instruments, as well as the return to greater trading volumes of all securities, can reveal hidden insights that can guide financial firms toward greater efficiencies, better product and service innovation and a forecast of emerging trading scenarios and opportunities by combining historic data with expected events.

Improved data management is also crucial for another top priority: better risk management, which is a top agenda item for regulators seeking to safeguard systemic stability. Consequently, the risk management function, hitherto a domain of a few experts equipped with quantitative tools, has now moved to the top of the corporate agenda. The view that risk management was predominantly a compliance issue is giving way to a more proactive and holistic approach. As a result, firms need to take an enterprise-wide stance that allows them to move beyond a fragmented understanding of their risk exposure.

**Looking Ahead**

To say these are trying times for financial services firms would be a vast understatement. Among the many challenges these firms face is a severe crisis of confidence that undermines their strategic thinking and move-forward planning activities. Regaining investor “trust,” which is the real capital for financial firms, remains a work in progress. No matter how difficult this is to resolve, firms must view trust building as an opportunity to reinvent and reorient their innovative capabilities to better serve not only investors but also their own interests.

The key to this resides in laying the right cultural foundation. As Robert Shiller suggests in his book *Finance and the Good Society,* “The financial crisis reminds us that innovation has to be accomplished in a way that supports the stewardship of society’s assets. And the best way to do this is to build good moral behavior into the culture of Wall Street through the creation and observance of best practices in its various professions – CEOs, traders, accountants, investment bankers, lawyers and philanthropists.”
Footnotes


2 Ibid


6 Ibid


11 Comment by Steve Kohlhagen, SIEPR Advisory Board, while moderating the discussion on “Financial Innovation and the Economic Crisis” SIEPR Economic Summit 2012, http://www.youtube.com/watch?v=tk93jQcUc-s.

12 “Playing with Fire,” The Economist.


15 Ibid


17 “Rethinking Financial Innovation,” World Economic Forum and Oliver Wyman.

18 “Playing with Fire,” The Economist.


20 “Playing with Fire,” The Economist.
About Cognizant

Cognizant (NASDAQ: CTSH) is a leading provider of information technology, consulting, and business process outsourcing services, dedicated to helping the world's leading companies build stronger businesses. Headquartered in Teaneck, New Jersey (U.S.), Cognizant combines a passion for client satisfaction, technology innovation, deep industry and business process expertise, and a global, collaborative workforce that embodies the future of work. With over 50 delivery centers worldwide and approximately 145,200 employees as of June 30, 2012, Cognizant is a member of the NASDAQ-100, the S&P 500, the Forbes Global 2000, and the Fortune 500 and is ranked among the top performing and fastest growing companies in the world.

Visit us online at www.cognizant.com for more information.

Credits

Author
Rajeshwer Chigullapalli, Head of the Thought Leadership Practice, Cognizant Research Center

Analyst
Akhil Tandulwadikar, Senior Research Analyst, Cognizant Research Center

Subject Matter Expert
Sudhir Gupta, Assistant Vice-President, Cognizant Banking and Financial Services Practice

Design
Harleen Bhatia, Creative Director
Suresh Sambandhan, Designer

About Cognizant


“Rethinking Financial Innovation,” World Economic Forum and Oliver Wyman.


“Rethinking Financial Innovation,” World Economic Forum and Oliver Wyman.


23 “Rethinking Financial Innovation,” World Economic Forum and Oliver Wyman.

