

Rethinking Financial Innovation

Reducing Negative Outcomes While Retaining The Benefits

A World Economic Forum report in collaboration with Oliver Wyman



The information in this report, or upon which this report is based, has been obtained from sources the authors believe to be reliable and accurate. However, it has not been independently verified and no representation or warranty, express or implied, is made as to the accuracy or completeness of any information contained in this report obtained from third parties. Readers are cautioned not to place undue reliance on these statements. The World Economic Forum and its project advisers, Oliver Wyman and Clifford Chance LLP, undertake no obligation to publicly revise or update any statements, whether as a result of new information, future events or otherwise, and they shall in no event be liable for any loss or damage arising in connection with the use of the information in this report.

The views expressed in this publication have been based on workshops, interviews and research, and do not necessarily reflect those of the World Economic Forum.

World Economic Forum

91-93 route de la Capite
CH-1223 Cologny/Geneva

Tel.: +41 (0)22 869 1212
Fax: +41 (0)22 786 2744

E-mail: contact@weforum.org
www.weforum.org

© 2012 World Economic Forum
All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, or by any information storage and retrieval system.

Contents

1	Contents	60	Part III: What experts have to say
2	Tables	61	8. Kirsten Apple: Business Method Patents: Debunking Three Myths
3	Preface	63	9. Thomas Deinet: The investment sector and capital markets are the best breeding ground for financial innovation
4	Steering committee members	64	10. Daniel Hofmann: A Systemic Perspective on Innovation in Insurance
4	Working group members	65	11. Josh Lerner: How Might Patenting Trends Reshape Financial Services?
4	Additional external contributors	66	12. Alexander Ljungqvist: Disruptive Innovation: Are Stock Exchanges Under Threat?
4	Project team	67	13. Margaret Miller: Financial Literacy and Capability and Financial Innovation
4	Disclaimer	69	14. Bill Shew: Innovation in Pharma and Lessons for Financial Services
5	Letter from the Steering Committee	71	15. Piyush Tantia: Behavioural Economics and Consumer Protection
6	Executive summary	72	16. Jennifer Tescher: Self-Regulation and Consumer Trust
9	Introduction – The project journey	73	17. Peter Tufano: Leveraging Financial Innovation to Serve the Poor
10	Part I: Recognizing and appreciating financial innovation	74	18. Tim Wyles: The Agency Problem in Consumer Financial Services
11	1. The Importance of Innovation	76	Appendix
12	1.1 What is innovation?	76	1. Historical Background to Selected Financial Innovations
13	1.2 Degrees of innovation	76	1.1 MBS
14	1.3 The role of innovation in the economy	76	1.2 CDOs
16	2. Focusing on Financial Innovation	78	2. The FSB Principles for Sound Compensation Practices
16	2.1 Defining financial innovation and its benefits	80	Acknowledgements
16	2.2 Benefits of financial innovation	82	References
20	2.3 Understanding the particular qualities of financial innovation	86	Endnotes
24	3. The Role of Financial Innovations in the Financial Crisis		
24	3.1 Introduction		
26	3.2 Mortgage Backed Securities (MBS)		
27	3.3 Collateralized Debt Obligations (CDOs)		
29	3.4 Credit Default Swaps (CDSs)		
31	3.5 Structured Investment Vehicles (SIVs)		
32	4. The Continuing Importance of Financial Innovation		
32	4.1 Financial innovation in the post-crisis world: re-opening Pandora's Box?		
33	4.2 Where financial innovation creates value – four key opportunities for the future		
37	5. Conclusion		
38	Part II: Reducing negative outcomes		
39	6. Structuring a Solution		
39	6.1 The negative outcomes to be avoided		
41	6.2 The innovation process disentangled		
42	6.3 Innovation process – three discrete stages		
43	6.4 Stakeholder groups		
44	7. Recommendations		
45	7.1 Review and adapt your Enterprise Risk Management (ERM) framework to address the incremental risks and uncertainties introduced by financial innovation		
50	7.2 Revisit New Product Approval (NPA) processes to properly address the idiosyncrasies of financial innovation		
52	7.3 Redesign incentives to provide the right motivation		
54	7.4 Recommit and refocus innovation efforts to be customer oriented		
57	7.5 Acknowledge the importance of innovation and its role in a competitive, free-market structure (and thus in pro-competition regulation)		
58	7.6 Strengthen systemic risk oversight in light of the incremental risks and uncertainties introduced by financial innovation		
59	7.7 Collaborate with the industry to monitor and oversee its efforts in managing innovation risks to drive sustainable financial innovation		

Table of Tables

- 16 Table 1: Functions of Financial Innovation Defined by Merton 1995
- 17 Table 2: Examples of Financial Innovation over the Centuries
- 18 Table 3: Functions of Financial Innovation Defined by Tufano 2003
- 19 Table 4: Examples of Financial Innovations and Their Benefits
- 62 Table 5: Top Financial Services Firms and Business Methods Patents

Table of Callouts

- 9 Callout 1: Project Objective
- 11 Callout 2: Selected Quotes on the Importance of Innovation
- 11 Callout 3: The Importance of Innovation – Organisation for Economic Co-operation and Development (OECD) Business and Industry Committee (BIAC)
- 12 Callout 4: Four Types of Innovation – The OECD's Oslo Manual
- 16 Callout 5: Defining Financial Innovation – Lerner and Tufano
- 19 Callout 6: Assessing and Quantifying the Benefits of Financial Innovation
- 22 Callout 7: Knightian Uncertainty
- 22 Callout 8: Increased Uncertainty in Financial Innovation
- 23 Callout 9: Uncertainty and the Financial Crisis
- 25 Callout 10: Structured Finance – Defining Terms
- 28 Callout 11: Regulatory Arbitrage and Financial Innovation
- 32 Callout 12: Post-crisis Attitudes to Financial Innovation – Example Statements
- 35 Callout 13: M-PESA
- 42 Callout 14: The Three Pillars of Success for Innovation
- 50 Callout 15: Regulatory Requirements for the New Product Approval Process
- 52 Callout 16: Incentive Misalignment and the Financial Crisis

Table of Figures

- 13 Figure 1: Innovation Horizons
- 24 Figure 2: How the Banking Crisis Evolved
- 26 Figure 3: US Outstanding Mortgage Debt by Securitization
- 27 Figure 4: Global CDO Issuance
- 29 Figure 5: Outstanding CDSs 2001-2011
- 34 Figure 6: Number of Uninsured and Uninsured Rate in the United States: 1987 to 2010
- 35 Figure 7: Global Micro-finance Overview
- 41 Figure 8: A Framework Approach
- 42 Figure 9: The Innovation Process
- 63 Figure 10: Capital Markets in the EU and the US
- 69 Figure 11: Two Eras of R&D Productivity in Pharma
- 69 Figure 12: Industry R&D Productivity Has Dropped in Pharma
- 77 Figure 13: CDO Structure Based on MBS

Table of Quotes

- 14 Quote 1: Josh Lerner, Jacob H. Schiff Professor of Investment Banking, Harvard Business School
- 14 Quote 2: Bill Shew, Partner, Oliver Wyman
- 15 Quote 3: Josh Lerner, Jacob H. Schiff Professor of Investment Banking, Harvard Business School
- 15 Quote 4: Kirsten Apple, Primary Examiner 3694 on special assignment in the Office of Chief Economist, USPTO
- 16 Quote 5: Kirsten Apple, Primary Examiner 3694 on special assignment in the Office of Chief Economist, USPTO
- 18 Quote 6: Alexander Ljungqvist, Ira Rennert Professor of Finance, NYU Stern School of Business
- 20 Quote 7: Piyush Tantia, Executive Director, ideas42
- 21 Quote 8: Margaret Miller, Senior Economist, Financial Inclusion Global Practice, World Bank Group
- 25 Quote 9: Thomas Deinet, Executive Director, Hedge Fund Standards Board
- 27 Quote 10: Tim Wyles, Partner, Oliver Wyman – Financial Services
- 32 Quote 11: Peter Tufano, Peter Moores Dean and Professor of Finance; Saïd Business School, University of Oxford
- 34 Quote 12: Peter Tufano, Peter Moores Dean and Professor of Finance; Saïd Business School, University of Oxford
- 36 Quote 13: Piyush Tantia, Executive Director, ideas42
- 39 Quote 14: Margaret Miller, Senior Economist, Financial Inclusion Global Practice, World Bank Group
- 41 Quote 15: Alexander Ljungqvist, Ira Rennert Professor of Finance, NYU Stern School of Business
- 43 Quote 16: Daniel Hofmann, Economic Counsellor, International Association of Insurance Supervisors
- 44 Quote 17: Thomas Deinet, Executive Director, Hedge Fund Standards Board
- 46 Quote 18: Jennifer Tescher, President and CEO, Center for Financial Services Innovation
- 50 Quote 19: Bill Shew, Partner, Oliver Wyman
- 55 Quote 20: Tim Wyles, Partner, Oliver Wyman – Financial Services
- 57 Quote 21: Daniel Hofmann, Economic Counsellor, International Association of Insurance Supervisors
- 58 Quote 22: Jennifer Tescher, President and CEO, Center for Financial Services Innovation

Preface



Giancarlo Bruno
Senior Director and
Head of the Financial
Services Industry
World Economic
Forum USA

Since the recent financial crisis, a typical reaction to any mention of financial innovation has been: “Did financial innovation not cause this crisis?” or “Does the world really need further financial innovation?” While many academic studies have confirmed the benefits of financial innovation and its importance to the development of financial systems, there is no doubt that some innovations in financial services mutated from their original purpose and contributed to the crisis.

Therein lies a conundrum: on the one hand, financial innovation is broadly beneficial and is needed to address many of society’s challenges; on the other, negative outcomes associated with financial innovation are too serious to ignore.

In this spirit, the chief executive officers of many of the world’s leading financial institutions, among those committed to the World Economic Forum’s Industry Partnership programme, came together in late 2010 to endorse a new initiative tasked with exploring this issue and to address such questions as:

- Why is financial innovation needed?
- How can financial innovation be improved to better emphasize the positive outcomes and reduce the risk of adverse consequences?
- How can financial innovation be strengthened to better serve society’s needs and economic development?
- What does the enabling framework that allows positive financial innovation to flourish look like?

To answer these questions, for the past year a World Economic Forum team has worked with many constituents and with the active support of Oliver Wyman to analyse the relevant literature and seek the counsel of over 100 businesses, and political and academic leaders around the globe. The project was conducted under the stewardship of a Steering Committee, chaired by Stefan Lippe, the former Group CEO of Swiss Re, supported by a Working Group of senior industry executives, regulators and academics who guided its work.

The project’s findings converge on a core theme, namely that the most important aspect of innovation, in the context of risk, is that there are no historical metrics to determine its impact on the world. Therefore, the industry needs to pay special attention to the ways in which its mechanisms for assessing and managing risk should be adapted to take better account of innovations. Another important finding is that the post-launch management of an innovation, including “downstream variants” and new applications, is more relevant, in many cases, than the original innovation itself. In this respect, this project is very much in line with and relevant to the theme of the World Economic Forum Annual Meeting 2012 – The Great Transformation: Shaping New Models. As well as capturing the current economic and geopolitical situation, that theme also looks to ensure that our future is one of inspired collaboration and bold solutions to the global, regional and industry challenges and not a return to the status quo.

On behalf of the World Economic Forum, I wish to thank all who have contributed their time and expertise to this report, particularly the Steering Committee, the Working Group and the interview and workshop participants, Senior Project Manager Isabella Reuttner, and our partners at Oliver Wyman, in particular Peter Carroll and Dominik Weh.

We trust you will find this report to be a helpful reference to understand the broad challenges that must be tackled to ensure that society continues to benefit from financial innovation.

Steering Committee Members

- Allen, Ben; Chief Innovation Officer; Marsh & McLennan Companies
- Bruno, Giancarlo; Head of Financial Services; World Economic Forum
- Hayford, Michael; Chief Financial Officer; FIS
- Hopkins, Deborah; Chief Innovation Officer; Citi
- Kochhar, Chanda; Chief Executive Officer; ICICI
- Lippe, Stefan; former Chief Executive Officer; Swiss Re (Chair of the Steering Committee)
- Macnee, Walt; President, International Markets; MasterCard
- McDonald, Scott; Managing Partner; Oliver Wyman
- Reyes, Cecilia; Group Chief Investment Officer; Zurich Financial Services
- Ward, Richard; Chief Executive Officer; Lloyds of London

Working Group Members

- Banerjee, Anindya; Chief Strategist; ICICI
- Bies, Susan; Independent Director
- Brackeen, Debra; Managing Director, Head of Strategic Alliances; Citi
- Deinet, Thomas; Executive Director; Hedge Fund Standards Board
- Graham, Dr. Stuart; Chief Economist; United States Patent and Trademark Office (USPTO)
- Hamilton, Christopher; Head of Strategy; Capco-FIS
- Hedrick-Wong, Yuwa; Global Economic Advisor; MasterCard
- Hofmann, Daniel; Economic Counsellor; International Association of Insurance Supervisors (IAIS)
- Karl, Kurt; Chief Economist; Swiss Re
- Ljungqvist, Alexander; Ira Rennert Professor of Finance, NYU; Stern School of Business
- Miller, Guy; Managing Director and Chief Market Strategist; Zurich Financial Services
- Miller, Margaret; Senior Economist, Financial Inclusion Global Practice, World Bank Group
- Steele, Gavin; Secretary to the Council and the Franchise Board; Lloyds
- Tescher, Jennifer; President and CEO; Center for Financial Services Innovation

Additional External Contributors

- Apple, Kirsten; Primary Examiner 3694 on special assignment in the Office of Chief Economist; USPTO
- Lerner, Josh; Jacob H. Schiff Professor of Investment Banking; Harvard Business School
- Schuermann, Til; Partner; Oliver Wyman
- Shew, Bill; Partner; Oliver Wyman
- Tantia, Piyush; Executive Director; ideas42
- Tufano, Peter; Peter Moores Dean and Professor of Finance; Saïd Business School, University of Oxford
- Wyles, Tim; Partner; Oliver Wyman

Project Team

- Carroll, Peter; Partner; Oliver Wyman
- Reuttner, Isabella; Senior Project Manager; World Economic Forum
- Weh, Dominik; Manager; Oliver Wyman

Thanks go to Ann Brady, Rob Jameson, Kamal Kimaoui and Jamie Whyte for their editing and layout work.

Disclaimer

The members of the Steering Committee and the Working Group support the recommendations and views expressed in this report. However, they do not all necessarily agree on every detailed point made herein. The opinions expressed are of a personal nature and do not necessarily reflect the stance of the organizations represented by the Steering Committee and Working Group members.

Letter from the Steering Committee



Stefan Lippe
Steering Committee
Chair, Swiss Re

Dear Reader,

Financial innovation is not a new phenomenon. Modern banking originated in 14th-century Florence and modern insurance can be traced to Lloyd's Coffee House in 17th-century London. Reinsurance is one of the oldest innovations in the insurance sector. These and thousands of subsequent innovations continue to provide valuable financial functions, fundamental to a thriving economy.

Nevertheless, the 2008 financial crisis revealed that financial innovation can sometimes have negative consequences. Complex, synthetic securities that relate to poorly underwritten mortgages are an example.

The objective of this report is to highlight ways to improve the management of financial innovation. We want financial innovation to continue to develop products and services that will benefit society and drive economic development. At the same time, we seek to reduce the chances of unintended negative outcomes.

The report takes the position that the primary responsibility for improving the management of financial innovation lies with banks and insurers. It provides a taxonomy of potential negative outcomes and recommends initiatives for companies, industry bodies and regulators. For institutions, it recommends improvements to existing enterprise risk management techniques, new product impact assessments, better design of incentives, and enhanced "consumer orientation". We believe these changes can materially reduce the odds of unintended negative consequences from innovation. We also believe that industry groups can help foster and promote positive financial innovation to better serve societal and economic needs. Finally, we provide guidance to regulators on the best use of their limited resources, highlighting the ways in which they can allow financial innovation to flourish while reducing the risks for which they have primary oversight responsibility.

Of course, we acknowledge that many efforts in this area are already under way. Many regulatory reforms have been proposed and some enacted that will have an effect on innovation.

Ultimately, our goal is to create a safer environment in which financial innovation will continue to flourish. Due to ongoing reforms, we remain concerned that new laws or regulations could forbid or inhibit innovation in financial services. Through our recommendations we hope to build a more resilient financial system which is less prone to innovations with unintended negative consequences and to encourage dialogue among stakeholders – financial sector businesses, regulators, industry bodies, consumers and non-financial institutions.

The Steering Committee and the Working Group would like to thank those individuals who generously gave their time to support this project. We hope that all will find our report as stimulating to read as we found it to research, debate and write.

Executive summary

Financial innovation has a long history of success, delivering benefits that are widely felt in the industry and across the broader economy. Recently, however, some financial innovations have not been viewed so favourably. This report acknowledges that some financial innovations were centrally involved in the events leading up to the financial crisis and ensuing recession. Indeed, the project was commissioned to examine innovation in financial services in order to understand how or why it may sometimes contribute to negative outcomes. The objective was to provide recommendations that could allow the industry to reduce the future likelihood of such negative outcomes from innovation.

For perspective, the project examined the innovation experiences of other, non-financial industries. Unsurprisingly, it found recurring patterns of success and occasional failure, and not only commercial failure but patterns of “negative outcomes”. In fact, in many industries the term “negative outcomes” can even include fatalities. One need only look at the pharmaceutical industry to see occasional unintended side effects that may include serious personal harm.

It might be comforting to think that the financial services sector is not alone in facing these types of innovation-related challenges. However, while financial services must generally deal with non-fatal risks, the challenge is still critical since the high degree of interconnectedness between financial services and the rest of the economy makes it, if not unique (the utilities sector is similar) then at least, distinctive. Successful innovation in financial services can improve capital productivity with beneficial effects that permeate through the wider economy. Unsuccessful innovation can have the opposite effect. It is important, therefore, to face up to the challenge effectively.

Whether one focuses on extremely damaging unintended outcomes or on lesser ones, a review of other sectors also demonstrates that essentially every industry has some type of governance mechanism that attempts to channel innovation so that society as a whole can enjoy the benefits while exposure to negative outcomes is reduced.

The governance mechanisms in financial services include extensive risk management processes that have been developed over the past decades. Initially focused on credit and interest rate risk, in banking, and on actuarial risk in insurance, the risk management frameworks in financial services have gradually extended their scope to address myriad additional categories of risk, including reputational risk, event risk, operational risk and others. Aside from explicit risk-management frameworks, governance mechanisms also include new product development and approval processes employing various safeguards against unwise innovation. And of course they include an extensive regulatory infrastructure that has been in place since before the crisis and is already being amended and extended as a result of it.

An important finding of this project is that a great deal of the existing governance framework for risk management, while relevant to the particular challenges of innovation, are applicable to the measurement and management of all risks, including those associated with established products. A corollary is that most of the recommendations associated with innovation and its potential for generating negative outcomes are likely to be suggestions for adapting and improving existing governance mechanisms. Another way to state this finding is that concerns over innovation outcomes do not require an entirely new innovation governance framework, but enhancements to existing ones. And that is the pattern of this report's recommendations.

Another important finding is that negative outcomes cannot reliably be predicted for individual innovations. Examining actual innovations and focusing upon those frequently cited for their contributory role in the crisis are inconclusive. While certain factors appear to recur, there is no obvious combination of defining characteristics for an innovation that predicts negative outcomes. Among the factors that recur, one can cite complexity, leverage or embedded leverage, and the alignment of incentives. Yet, while these may be associated with some cases of negative outcomes, they are not always. At best, these factors may, in some combination, signal the need for a higher level of attention to possible future concerns.

This leads to a third finding: it is important to recognize that innovation leads to situations for which there is no history. It introduces "Knightian uncertainty", making its impact in some ways unmeasurable. This is easiest to demonstrate in the context of a new product being introduced to the marketplace. Any attempt to anticipate its future performance runs into various difficulties. If the product is unequivocally original, there will be no empirical evidence to support estimates of its performance or its effect in the marketplace. If the product is innovative but seems similar to a pre-existing one, or could be considered a variant of another, it will be tempting to use available empirical data to frame some estimates of the likely performance of the new one. And this may be even more risky, for the assessment will seem to be "in sample" when it is really "out-of-sample", promoting a false sense of confidence. While it may be relatively easy to recognize an innovation as it emerges from an established new-product development process, it may be significantly harder to correctly identify innovative adaptations, which are a feature of the financial world.

Another way innovation introduces Knightian uncertainty is through the unpredictability of customers' responses to the innovation and, in a broader sense, of unforeseeable ripple effects through the wider economy. And again, where one may be tempted to seek analogies from prior responses to similar or similar-seeming products, an innovation always calls into question the relevance of the analogy.

Pulling together these threads, this report finds that:

- Innovation is a broadly positive force within financial services.
- Innovation, by definition, introduces Knightian uncertainty to financial services.
- This uncertainty occasionally manifests itself in negative outcomes.
- The financial services sector's relationship to the rest of the economy makes it vital to reduce the likelihood of negative outcomes.
- The best way to reduce this likelihood is by adapting existing risk management mechanisms so they are more sensitive to the specific contribution of innovation to uncertainty and risk.

The report makes recommendations to banks and insurers, some of which could also be adopted by industry bodies. The authors are aware that many of these recommendations have either already been implemented or are currently being implemented by a bank, insurer, reinsurer or regulator somewhere within the industry. However, not all of them are fully implemented everywhere. Taken as a group, the recommendations can be thought of as an aspirational set of best practices related to risk management and innovation. The recommendations to industry participants fall into four areas:

- i) Enterprise risk management: a careful step-by-step re-evaluation of the ways risks are counted, measured and managed, with the necessary emphasis on the ways innovation is unique and has unmeasurable consequences.
- ii) New product development and approval processes: again, a careful step-by-step reassessment of existing processes to be sure that innovation-specific dimensions are addressed. Particular stress needs to be placed upon the identification of product “versions” or adaptations that may not appear to be innovations but are, because they move the firm’s experience “out-of-sample”.
- iii) Incentive design and implementation: reassessment and redesign to address the particular challenges of valuation, risk assessment and timing in calculating and paying compensation related to innovation.
- iv) Consumer orientation: recommitment to consumer-friendly principles of product and business process design to steer innovation in a direction that will regain customer trust and create a better alignment of interests between the bank or insurer and its customers.

The report also makes recommendations to regulators, focusing on three areas:

- i) Building a pro-competitive marketplace: follow a handful of basic principles to “do no harm”, “use the lightest touch” and “prefer market solutions” to make rules that allow competition to foster innovation and help distribute its benefits broadly within the industry and throughout the economy.
- ii) Strengthening systemic risk oversight: accept the challenge that comes with the unique role of the regulator, to unravel the drivers of systemic risk, monitor them and act to reduce situations or activities stemming from innovation that increase such risk.
- iii) Monitoring and overseeing the industry: support and extend the industry’s efforts to improve its primary innovation efforts as well as to refine its related management and oversight efforts of the uncertainties introduced by innovation.

This project has concluded that innovation in financial services is broadly beneficial, both within the industry and throughout the wider economy. It has also concluded that financial innovation introduces a type of uncertainty that may sometimes go unrecognized and generates negative outcomes. By making recommendations that can improve the industry’s anticipation and management of these negative outcomes, it is the intent of the report – and its fervent hope – that the industry will continue to be granted the latitude and enjoy the self-confidence to pursue innovation as a path to individual profit, to industry profit and to wide societal benefits.

Introduction - The Project Journey

In light of much financial services innovation having gone off track, particularly in the run up to the start of the 2007 financial crisis, the project goal centred on reducing the chances of negative outcomes from financial innovation in a way that would not reduce the positive benefits of innovations. At the end of our journey, we believe this balanced goal is achievable.

The financial services industry has come to be characterized by a high degree of oversight through multiple levels of regulation and the application of increasingly sophisticated risk management frameworks, tools and processes. Our recommendations therefore focus in large part upon the ways in which these risk management processes can be improved to shed light on the potential unintended consequence that may accompany financial innovation. These risk management mechanisms are themselves already being revised and improved to take account of the wider lessons from the financial crisis.

In the wake of the financial crisis, with many decrying the role of “financial innovation” as a contributor to the crisis and the ensuing recession, we felt we must candidly acknowledge that certain financial innovations did play a contributory role in the crisis, even though these innovations may only deserve a share of the blame.

Furthermore, we noted that the probabilistic nature of financial innovation outcomes – the limited ability to know with certainty what would result from any particular innovation – made any assessment of innovation similar in nature to the assessment of all risks, not just the idiosyncrasies of innovation which we define later on in Chapter 2.3. This led us to two intermediate conclusions. One is that the techniques, methods and processes by which our industry manages risk can be adapted to manage these idiosyncrasies. We did not need to define a new innovation governance framework so much as to define the ways in which existing risk management frameworks can be enhanced to capture innovation idiosyncrasies. Second, following from the first, we needed to pinpoint precisely what it is about innovation that changes or increases risk. The broad answer to that is that innovation, because it does not have a track record of performance, creates uncertainty about future outcomes and it does so in several different ways.

This report is organized in three main parts, the first of which looks at how financial innovation is defined, its importance to society, the benefits of financial innovation and the counterbalancing role of innovation in the recent financial crisis, as well as the future role for financial innovation in helping society address fundamental problems. The second part of the report builds a framework for our recommendations and then outlines and discusses these in some depth. The final supporting part of the report offers analyses from industry experts on key topics related to the report’s recommendations, and also ranges further afield to consider issues such as patent protection in financial services, the misalignment of incentives and the case for industry self-regulation.

The Project Team

Callout 1: Project Objective

“The goal of this project, ‘Rethinking Financial Innovation’, is to promote and strengthen the societal and institutional framework that enables financial innovation to flourish.”

Stefan Lippe, former CEO of Swiss Re and Chair of the Steering Committee

Part I:

Recognizing And Appreciating Financial Innovation

1 The Importance of Innovation

Callout 2: Selected Quotes on the Importance of Innovation

“Innovation is the specific instrument of entrepreneurship – the act that endows resources with a new capacity to create wealth.”
Peter Drucker

“Innovation is the vital spark of all human change, improvement and progress.”
Theodore Levitt

“Innovation is the central issue in economic prosperity.”
Michael Porter

Innovation is recognized as the critical source of economic growth and of improvements in social welfare. It is given much of the credit for the rise in living standards since the 18th century and policy-makers, almost universally, see innovation as a vital lever for creating employment and raising productivity. Callout 2 offers typical statements of how dependent the world feels on the power of innovation.

These are not only words. Recognizing the way in which innovation supports economic growth, many governments around the world encourage investment in research and development by allowing companies to claim tax credits for the amount spent on it, particularly for technology-driven innovations.¹

The power of innovation derives from its combination with investment and competition. Innovation initially benefits the innovator and investment magnifies the returns. Competition then helps to distribute the benefits of innovation more widely across society, driving down prices and making new products and services widely available. Some innovations prove to be what are called general purpose technologies, defined in more detail in section 1.2, upon which a myriad of further innovations can be built. Electricity generation is a 19th-century example of such an innovative wellspring, transistors and microchips are 20th-century examples and the Internet is a modern one.

Perhaps the key thinker about the role of innovation within the capitalist system is Joseph Schumpeter, the Austrian economist, who first described the critical part played by entrepreneurial innovation both in creating new ideas and in displacing established products, processes and industries:

“The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumer goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates. ... This process of Creative Destruction is the essential fact about capitalism.”²

Innovation always changes the status quo, but some innovations cause greater disruption than others. In the most severe cases, radical innovations fundamentally change society and spawn further generations of innovation.

At the other end of the spectrum, incremental innovations help to differentiate a company from its competitors and, for the consumer, offer a constant round of useful improvements to existing products, processes and services, as well as to reductions in real prices.

Callout 3: The Importance of Innovation – Organisation for Economic Co-operation and Development (OECD) Business and Industry Committee (BIAC)

“Today, more than ever before, innovation, enterprise and intellectual assets drive economic growth and increase standards of living. Innovation is instrumental in creating new jobs, providing higher incomes, offering investment opportunities, solving social problems, curing disease, safeguarding the environment and protecting our security. To help achieve these objectives, governments must create appropriate incentives for continued growth in innovation and technology development and embrace sound policies for assuring broad social diffusion and access to key scientific and technological advances that enable us, as Newton first observed, “to stand on the shoulders of geniuses”.

Source: OECD (2003) Creativity, Innovation and Economic Growth in the 21st Century. Business and Industry Advisory Committee to the OECD

1.1 What is Innovation?

In the public mind, innovation is often thought of in terms of revolutionary new physical products or a new technology. However, innovation is clearly a much wider phenomenon, seen across many dimensions of economic life, including manufacturing and other business processes, as well as new business and organizational models.

For example, the Model T Ford, launched in 1908, is clearly an innovative product in itself. But Henry Ford's most radical innovation was actually the assembly line factory that built the car using revolutionary working processes. In modern industries, innovation can be as much about new approaches to design, business models and global supply networks as about innovation in tangible products.

This wider definition of innovation is commonly accepted by economists and is set out in the Oslo Manual of the OECD, a key cross-industry publication that offers standards and guidelines for measuring technological, product and process innovation.

The manual identifies the four types of innovation described in Callout 4:

- i. Product innovation
- ii. Process innovation
- iii. Marketing innovation
- iv. Organizational innovation

Importantly, in relation to the focus on financial services, the manual's definition embraces innovative services as well as physical products and technologies, and includes significant improvements to existing products and services as well as truly revolutionary ideas.

This report adopts the manual's wide definition and uses it as a platform for the more precise definition of financial services innovation discussed in section 2.

Callout 4: Four Types of Innovation – The OECD's Oslo Manual

- "A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. The term "product" is used to cover both goods and services. [...]"
- "A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. [...]"
- "A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales. [...]"
- "An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. Organizational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. [...]"

Source: OECD. (2005) Oslo Manual, Guidelines for Collecting and Interpreting Innovation Data. 3rd edition. Paris: OECD Publishing. pp. 47-52

1.2 Degrees of Innovation

History shows that innovations vary hugely in terms of the size and nature of their effect, which may be profound or relatively trivial. Innovations also vary in terms of how revolutionary they are in relation to existing technologies or existing approaches to the relevant market.

One useful way of thinking about this can be found in the concept of “innovation horizons” recently introduced by Christian Terwiesch and Karl Ulrich.³ Under this approach, most innovations face two types of uncertainty – technological uncertainty and market uncertainty. The specific degree of uncertainty along each of these dimensions characterizes the innovation and hints at whether the effect of the innovation is likely to be incremental or radical.

A “radical innovation” is defined as an innovation that significantly disrupts the market into which it is born. This disruption has costs attached to it but these are generally outweighed by the long-term benefits. Importantly, the benefits largely accrue to the innovator and the consumer of the product, and the costs accrue to established market suppliers.

This is the phenomenon captured in Schumpeter’s phrase “creative destruction”, which acknowledges the erosion of value that established companies experience when another company introduces a radical innovation.⁴ However, this temporary effect is counterbalanced by the innovation’s eventual contribution towards sustainable, long-term economic growth.⁵

For example, if the innovating company already has access to the technology underlying the innovation, the level of technological uncertainty is low. The uncertainty rises if the technology exists, but is outside the firm’s control and experience, and becomes very high if the innovation depends on an entirely new discovery.

Likewise, an innovation that caters to a firm’s existing customers has a low level of marketing uncertainty, compared to an innovation aimed at customer segments served by other firms or, at the extreme, customer segments that have not yet been identified and targeted in the marketplace.⁶

Each innovation can be characterized in line with the horizon it occupies with respect to these two dimensions. For example, the innovations within Horizon 1 of Figure 1 are clearly incremental and account for most of the innovations, by number, seen in the world around us. Incremental innovation helps to ensure a healthy marketplace as companies compete to improve their existing products, services and ways of doing things. This kind of innovation might be sourced within the firm using either traditional methods or, increasingly, crowd sourcing techniques to elicit ideas from employees, such as that employed by Toyota.

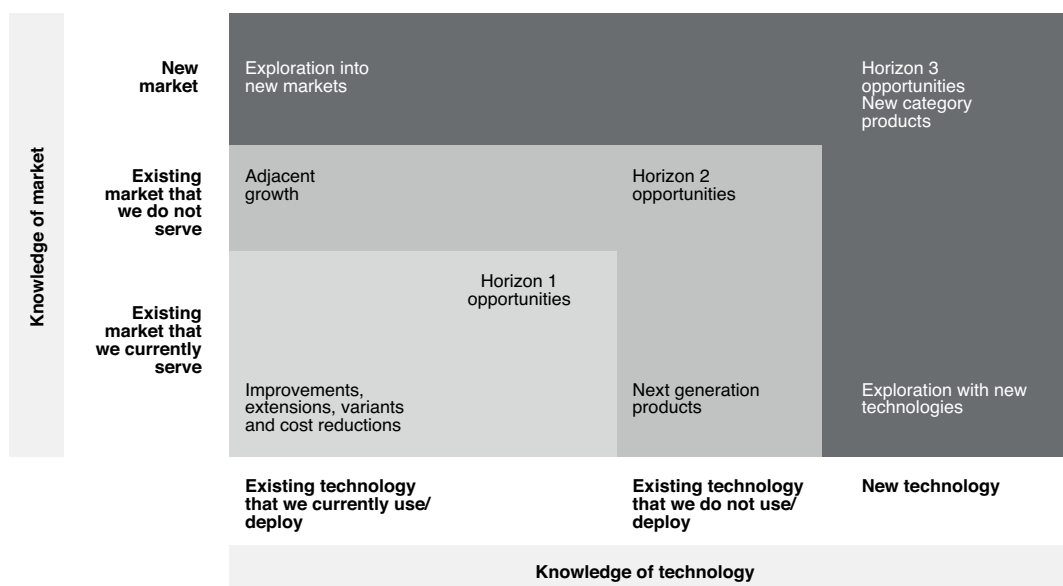
By contrast, Horizon 2 innovations make use of technology and markets that are known but exist outside the firm, while Horizon 3 innovations are the kind of revolutionary leaps that the R&D labs of major companies dream about. In the case of history’s truly radical innovations – from the steam engine to the Internet – neither the market for the product, nor the enabling technology existed before the vital period of innovation. “Radical innovations” are positioned here.

In some cases, an innovation not only has a radical, positive effect on a single area of economic life but fundamentally changes the economy. This kind of radical innovation, sometimes referred to as a general purpose technology (GPT),⁷ has three key characteristics:

- Pervasiveness across a broad range of sectors
- Improvement over time as further refinements are made
- Further innovations in the form of novel products and processes.

By definition, all GPTs are disruptive because they fundamentally change the structure of the current marketplace. A trivial example might be the disruption to candle makers caused by electric lighting.

Figure 1: Innovation Horizons⁸



Source: Adapted from Terwiesch, C. & Ulrich, K. (2009)

Quote 1: Josh Lerner, Jacob H. Schiff
Professor of Investment Banking,
Harvard Business School

The use of patent law to protect intellectual property has increased dramatically in US financial services over the last decade or so, in response to a general strengthening of patent protection as well as court rulings specific to the financial sector. The trend may increase the rate of innovation in financial services and change the shape of the industry.

(See Chapter 11 for the full contribution)

Quote 2: Bill Shew, Partner, Oliver
Wyman

Innovation is the lifeblood of pharmaceutical companies, which typically spend in excess of 15% of sales on R&D annually. Pharmaceutical companies have to continually reinvest in R&D to replenish their product portfolios to remain competitive and sustain growth and profitability.

(See Chapter 14 for full contribution)

1.3 The Role of Innovation in the Economy

1.3.1 Innovation, Competition and Investment – A Complex Relationship

The complex relationship between innovation, investment and competition is fundamental to modern economies. Policies that affect one of the three tend to have unforeseen effects on the others as well.

Without competition, for example, monopolists and oligopolists have far less incentive to innovate and introduce novel or improved products and services. Competition is seen as so essential to innovation that the US Department of Justice and the Federal Trade Commission cite worries about the potential negative effect upon innovation in over a third of merger challenges.⁹

The history of the mobile phone illustrates why the relationship is so important. The American Telephone and Telegraph Company (AT&T) held a virtual monopoly of the American communication market for most of its 100-year existence before it was forced to spin off parts of its business in 1984. By effectively controlling the communications market, AT&T was able to determine the direction of the industry including the development of novel systems and infrastructure. Cellular telephones were developed in the United States by Bell Labs (a part of AT&T) as early as the 1940s and were used for a variety of niche purposes. However, AT&T did not believe there was a sufficient market for cellular phones and invested relatively little in research, development and infrastructure.

Shortly after the breakup of AT&T, Motorola released the first widely available mobile telephone. While AT&T had originally estimated that the global mobile phone market would reach 1 million people by the year 2000, instead the market grew to 740 million by that date.¹⁰

It is easy to dwell on the benefits of successful innovation to the innovator but this example perhaps shows that competition is at least as strong a spur to innovation as “the spoils of the upside”.

If competition supports innovation, the reverse is also true. Without innovation, much of the creative power of competition to support society’s goals is lost too. Imagine, for example, a pharmaceuticals industry where competition existed simply to make the production and marketing of existing drugs more efficient.

Innovation in the pharmaceutical industry is essential for continued improvements in healthcare. However, drug development is a particularly capital- and cash-intensive undertaking, as the contribution by Bill Shew in Part III describes. Furthermore, the vast majority of novel discoveries never go into production and therefore never provide any revenue.

This introduces a tension into the relationship between innovation, competition and investment. Only through patenting their discoveries can pharmaceutical companies ensure that their investment in research and development will generate profits if and when they do, eventually, produce a successful product.

Patents allow companies to protect their research and development interests by preventing competitors from replicating or imitating the resulting innovation for a period of time, allowing the innovator to recover their investment and make an attractive profit.¹¹ Without the safeguard of patents, investment in innovation would be much less tempting.¹²

Patents are, in effect, temporary monopolies. In history, kings and other rulers have granted such monopolies to favoured subjects for more than 2,000 years. But it was 17th-century Europe that introduced the critical dimension of associating such grants with new mechanisms and new inventions. This, in effect, is a mechanism to protect innovations and to provide an incentive to innovate as new ideas and techniques are typically disseminated and then quickly copied. In such cases, the firm cannot capture all the benefits generated by its innovation, which lessens the incentive to invest in innovation activities. For some innovation activities, the imitation cost is substantially lower than the development cost.

Therefore, society must continually balance the need to encourage innovators by protecting the rewards from their innovation, with the need to avoid creating or perpetuating damaging monopolies. Getting this balance right is important not only for protecting innovation, but also for protecting competition. Kirsten Apple's contribution as well as Josh Lerner's contribution in Part III take this discussion a step further by looking at the possible effect of the recent strengthening of patent law on competition in US financial services.

More generally, the strong, complex, relationship between innovation, investment and competition must be taken into account by policy-makers when making decisions that could discourage productive innovation.

**Quote 3: Josh Lerner, Jacob H. Schiff
Professor of Investment Banking,
Harvard Business School**



Financial services is not a new industry, like biotech, in which patenting can play a key role in determining the initial industry structure. Instead, established financial institutions gain substantial benefits from their broad distribution networks. The creation of large patent portfolios may only reinforce this power.



(See Chapter 11 for full contribution)

**Quote 4: Kirsten Apple, Primary
Examiner 3694 on special assignment in
the Office of Chief Economist, USPTO**



The recent Bilski versus Kappos decision by the US Supreme Court validated that 'a business method is simply one kind of "method" that is, at least in some circumstances, eligible for patenting under 101.' These types of patent are not a special exception to general practice, but instead are commonly sought by companies both inside and outside the financial services sector. Increasingly, companies throughout the economy are using these patents to protect their innovations and to support their corporate strategies.



(See Chapter 8 for full contribution)

2 Focusing on Financial Innovation

2.1 Defining Financial Innovation and its Benefits

This report defines financial innovation as the act of creating and then popularizing new financial instruments, technologies, institutions, markets, processes and business models – including the new application of existing ideas in a different market context.

This definition, drawn from the source presented in Callout 5, is deliberately wide. It includes innovations across the financial world, whether their source is a regulated institution, a member of the wider financial community or shadow banking sector, or an individual inventor. However, no definition can quite capture the complexity of innovation in financial services where a single new product might bring together innovative features in terms of function, marketing and customer segment, and the supporting infrastructure.

The definition matters because this report will later recommend ways in which financial service firms and their regulators will need to adapt traditional risk management and other processes to minimize the potential unintended consequences associated with innovation. An important aspect of that adaptation will be recognizing the implications of innovations that are not always obvious.

Another way to think about financial innovation is in terms of its function. Economists say that the overall function of financial innovation is to reduce financial market imperfections.

Innovations might help to fill a gap in the products or services available to consumers (e.g. by providing a new type of secure Web payment mechanism) or to correct the imbalances of information available to contracting parties (e.g. through an innovative pricing or risk estimation technology).¹³

They might also reduce market frictions, such as the high costs of transacting some products (e.g., illiquid securities such as equities in non-public companies), bring consumers together to offer them economies of scale or provide a novel way of communicating with potential consumers or vendors through some kind of marketing innovation.

Above all, perhaps, financial innovation has introduced new ways for people to gain mutual advantage from complementary needs, e.g. the desire to borrow money, raise investment capital, or offset a risk, on the one hand, and the desire to lend, invest money or assume a risk in exchange for a fee on the other.

There are various ways to categorize these attempts to perfect the world's financial markets and Table 1 sets out one of the best known. The table reminds us that, traditionally, economists have thought about innovation as a way to make financial services more useful, transparent, accessible and efficient.

Callout 5: Defining Financial Innovation – Lerner and Tufano

"Financial innovation is the act of creating and then popularizing new financial instruments, as well as new financial technologies, institutions and markets. The innovations are sometimes divided into product or process variants, with product innovations exemplified by new derivative contracts, new corporate securities or new forms of pooled investment products, and process improvements typified by new means of distributing securities, processing transactions or pricing transactions. In practice, even this innocuous differentiation is not clear, as process and product innovations are often linked. Innovation includes the acts of invention and diffusion, although in point of fact these two are related as most financial innovations are evolutionary adaptations of prior products."

Source: Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. Annual Review of Financial Economics, 3, pp. 6

Table 1: Functions of Financial Innovation Defined by Merton 1995¹⁵

Functions	Examples ¹⁴
To provide ways of clearing and settling payments to facilitate trade	Credit and debit cards, PayPal, stock exchanges
To provide mechanisms for the pooling of resources and for the subdividing of shares in various enterprises	Mutual funds, securitization
To provide ways to transfer economic resources through time, across borders and among industries	Savings accounts, loans
To provide ways of managing risk	Insurance, many derivatives
To provide price information to help coordinate decentralized decision-making in various sectors of the economy	Contracting by venture capital firms
To provide ways of dealing with the incentive problem created when one party to a transaction has information that the other party does not or when one party acts as agent for another	Price signals, extracting default probabilities from credit default swaps (CDS)

2.2 Benefits of Financial Innovation

2.2.1 Background – The History of Financial Services Innovation

Generally speaking, if an industry exists for a long period of time, it is because it provides a valued service and has fostered a long series of useful innovations that maintain its vitality. The financial services industry is no exception. Table 2 offers a brief chronology of important innovations from the history of banking and insurance, which can be related to the fundamental functions of financial innovation and the financial services sector in more general as set out in Table 1 above.

As the overview on historic financial innovations in Table 2 makes clear, it would be difficult to pick any particular historical moment over the past centuries in which to declare that the financial services are somehow complete and should cease to innovate. Few commentators on financial innovation have argued the world would be better without loans, car insurance or stock exchanges. (Other than Shakespeare: "*Neither a borrower nor a lender be.*"¹⁶)

Instead, the controversy over financial innovation focuses on more recent innovations. This section therefore restricts discussion of the benefits of financial innovation to the period after the Second World War and mainly after 1960.

It is worth noting in passing that many of the historical examples of financial innovation listed in the timeline have at some point been misused and misapplied by market participants, and have contributed to significant financial system disruptions. Over time, however, most have been accepted as beneficial.

Quote 5: Kirsten Apple, Primary Examiner 3694 on special assignment in the Office of Chief Economist, USPTO

“

In conclusion, financial services companies do not appear to be restricting themselves to patenting in the business-method subjects, and in fact were patenting prior to the State Street decision. Many of these companies continue to innovate in technologies, methods and service offerings, and approximately one-half of the patents they have sought over time are in fields outside of the ‘business method’ patent classification at the USPTO.

”

(See Chapter 8 for full contribution)

Table 2: Examples of Financial Innovation over the Centuries¹⁷

Year	Innovation	Description	Year	Innovation	Description
9000 BC onwards	Medium of exchange	Bartering of produce and cattle	1950s	Repurchase agreements grow	Repo market expands from late 1950s onwards
5000 BC	Shell money	Spondylus shells traded in south-eastern Europe	1960	Automated teller machines (ATMs)	US patent filed for early cash dispenser
4000 - 2500 BC	Credit	Mesopotamian tablets record ancient loans and interest paid	1961	Reverse mortgage	Former Maine bank CEO's idea helps senior citizens access housing equity
2500 BC	Insurance	Babylonian goods transport insurance	1968	Securitization (originate to distribute)	Ginnie Mae guarantees first mortgage pass-through security
1700 - 1100 BC	Annuities (first recorded)	First purchased by Egyptian prince	Late 1960s	ATMs operational	Cash dispensers deployed in London and elsewhere
1000 BC	Metal money and coins	Early Chinese "tool money" and primitive coins	1971	Floating exchange rates	United States abandons fixed exchange rate system
700 - 600 BC	Modern coinage	Coinage takes modern form in Lydia, western Turkey	1971	Money market mutual funds	Bruce R. Bent and Henry B. R. Brown set up first money market fund in United States
321 - 185 BC	Bills of exchange	Early bills of exchange, promissory notes, Mauryan Empire, India	1972	Debit cards	City National Bank of Cleveland issues ATM account debit card
2nd - 3rd century AD	Annuities (widespread)	Annuities common in Roman Empire	1970 - 1972	Foreign currency futures	Development of FX futures in New York and Chicago
806-1023	Representative money	Banknotes and paper money appear in China	1973	Black-Scholes model	Nobel prize winning option-pricing model helps launch modern derivatives industry
14th century	Bonds	War as the "father of the bond market" in Renaissance Italy	1973	Point of sale terminals	IBM launches POS terminals linked to mainframe store computer
14th - 15th century	Reinsurance	Early marine reinsurance	1974	Automated clearing houses (ACH)	Electronic payments process replaces paper cheques for routine payments
1602	Publicly listed stock	Dutch East India Company on Amsterdam Stock Exchange	1974	IRA accounts	United States introduces individual retirement arrangements
1609	Standardized currency	Issued by Amsterdam Exchange (Wisselbank)	1975	Interest rate futures	Introduction of interest rate futures in the United States
1656	Fractional reserve banking (fiat money)	Innovation attributed to Swedish Riksbank	1976	Modern micro-finance	Muhammad Yunus begins research leading to first micro-finance bank in 1983
1688	Insurance brokerage	Edward Lloyd's London coffee house, centre for marine insurance	1978	401(k)	401(k) plan in the US encourages tax-friendly retirement savings in stocks and bonds
18th century	Options	First call options on some Dutch stocks	1981	CHIPS (same day settlement)	Clearing House Interbank Payments System – a settlement wire transfer system for the banking industry
1710	Futures	Japanese rice futures market	1982	Consumer online stock trading	First full-service consumer trading system connects traders around the world
1742	Monopoly on issuing banknotes	Bank of England	1982	Stock index futures	Kansas City Board of Trade introduces stock index futures
1744	Insurance fund	Modern insurance industry with statistical basis begins in Scotland	1987	Automated underwriting	Allfinanz begins automation of life insurance industry underwriting process
1773	Check clearing house	London bankers introduce clearing house	1988	International capital requirements for banks	Basel Accord (Basel I)
1774	Mutual funds	Early closed-end mutual fund set up by Dutch merchant	1989	Exchange traded funds	First ETF launched in Canada
1829	Deposit insurance	New York first state to establish bank-obligation insurance programme (circulating notes and deposits)	1992	Insurance-linked securities	Life insurers transfer risk while releasing its value to the open market through asset-backed notes
1874	Standardized futures exchange	Chicago introduces standardized futures contract and clearing house	1992	Public-private partnerships	UK government launches programme of public-private investment partnerships
1880s	Workers' insurance and the welfare state	Otto von Bismarck supports insurance and pensions for German workers	1994	Credit default swap	JP Morgan structures one of the first credit default swaps
1913	Federal Reserve System	Woodrow Wilson signs US Federal Reserve Act	1994	Value at Risk	JP Morgan publishes VaR methodology
1933	First national deposit insurance scheme	US creates Federal Deposit Insurance Corporation in response to bank failures	1996	Weather derivatives	Electric power company contract contains first weather derivative deal
1938	Secondary mortgage market	Fannie Mae establishes secondary market for US mortgages	1999	Online payment service	PayPal launches online payments
1946	Venture capital	Private equity firms established in United States	2004	Usage-based insurance	Pay-As-You-Drive car insurance
1949	Hedge funds	Absolute return or "hedged fund" created by Alfred Winslow Jones	2004	Longevity bonds and swaps	First longevity bond announced
1950	Early credit card	Diners Club International launches first multi-purpose charge card			
1958	Modern credit card	Bank of America launches credit card with revolving credit line			

2.2.2 Benefits since the Second World War

The last half century or so has proved enormously productive in terms of financial innovation, powered by a number of developments, most notably the twin engines of financial liberalization and significant advances in technology. Financial innovation can be seen as a response to wider economic and social forces and challenges. Since the 1970s, financial liberalization around the world has created newly liquid markets (e.g. currency markets) and the need for new financial instruments to manage these market risks, while advances in computer technology have increased the speed of computation and enabled a host of innovations, from the network-enabled ATM to Internet banking.

The benefits are perhaps most obvious to the general public in terms of specific retail innovations. For example, debit cards offer both an easy way to pay for goods and services, and obtain cash and account services, as well as a significant benefit in terms of personal safety (compared to carrying large amounts of cash). Credit cards, in addition, offer short-term financing to consumers and a safe way to make purchases by telephone and on line.

Innovations spawned by the Internet revolution – itself a wider GPT style innovation – such as online banking offer the consumer huge convenience and, often, better returns on savings and other investment products. They have not caused major difficulties to date, despite some continuing concerns about the stability of bank Internet systems and new opportunities to commit fraud.

Beneficial innovation in the financial services sector extends well beyond innovative retail products. Some commentators¹⁸ believe that the main benefits of financial innovation lie in improvements to the way in which financial services fulfil their classical functions in the broader economy.

Table 3 lists some post-Second World War innovations against the classification scheme offered in Tufano, 2003.

Table 3: Functions of Financial Innovation Defined by Tufano 2003²⁰

Functions	Examples ¹⁹
Innovation exists to complete inherently incomplete markets	Zero coupon bonds, derivatives, exchange traded contracts
Innovation persists to address inherent agency concerns and information asymmetries	Embedded options, direct selling, automated underwriting, credit scores
Innovation exists so parties can minimize transaction, search or marketing costs	ATMs, smart cards, ACH technologies, e-401(k) programmes, e-commerce
Innovation is a response to taxes and regulation	Zero coupon bonds, Eurodollar Eurobonds, mortgage-backed securities (MBS) and asset-backed securities (ABS), various equity-linked structures used to monetize asset holdings without triggering immediate capital gains taxes, and trust preferred structures
Increasing globalization and risk motivate innovation	Foreign exchange futures, swaps and options; interest-rate futures, swaps, options, and forwards to manage increased volatility and new risks arising from globalization
Technological shocks stimulate innovation	OpenIPO, folioFN

Financial innovations have helped certain kinds of firms to cut the cost of funds raised for investment and to raise funds more securely and quickly. For example, the venture capital industry, a financial services innovation, helped to launch many of the high technology firms that created prosperity in the United States from the 1950s through to today, including E-Bay/PayPal and Amazon. Innovation has thus helped direct capital more efficiently towards the right firms, and in doing so may have helped establish the United States as the home of key technology companies. Finding new ways to identify the most productive entrepreneurs and fund their inventions might be almost as important as the technical breakthroughs themselves.²¹

Many other innovations in the financial system, such as incremental improvements to the world's stock exchanges and clearing houses, have also made the flow of capital to business more efficient.

Other more recent and radical innovations that may help the world to direct its capital more efficiently include the Internet marketplaces that have sprung up to provide a new route to liquidity for investors in start-ups and other private companies (see the contribution by Alexander Ljungqvist in Part III on new innovative financial services providers).

Quote 6: Alexander Ljungqvist, Ira Rennert Professor of Finance, NYU Stern School of Business



New private markets such as SecondMarket and SharesPost provide a welcome addition to the US financial landscape and fill an important gap by enabling employees and investors to gain liquidity for their shares in private companies. ... What remains to be seen is whether the negative effects on the wider financial market – the externalities, in the language of economists – can be contained through thoughtful regulatory responses.



(See Chapter 12 for full contribution)

Somewhat more controversially, the use of derivatives to manage risk can be shown to offer business consumers a genuine benefit in many markets. Derivatives help to shift risk from one party (e.g., a manufacturing corporation with exposure to a volatile foreign currency) to another (e.g. a bank that can lay off much of the risk in the wider market and thereby diversify that risk).

Certain kinds of derivative and complex financial security were factors in the recent crisis, as discussed in the next section. But many other derivative markets continue to allow participants to manage risks that threaten and might destroy their businesses.

While it is easy to cite examples of how successful financial innovations have improved the world economy over the last few decades, and the choices available to consumers, it is harder to quantify these benefits. In particular, it is difficult to express in numerical terms the net benefit of financial innovations after taking account of both positive and negative effects. However, it is worth highlighting one recent qualitative study that concluded that, on balance, there have been more beneficial innovations than bad ones in recent years. Callout 6 provides more detail on Robert Litan's assessment.

Callout 6: Assessing and Quantifying the Benefits of Financial Innovation

Assessing and quantifying the benefits of financial innovation is widely recognized as being almost impossible due to the distinct characteristics of financial innovation outlined in Chapter 2.3. Many academics, economic writers and other stakeholders agree on this, which is why the assessment of financial innovation is usually qualitative. The “web of externalities”, as expressed by Lerner and Tufano, makes it almost impossible to adequately quantify the costs and benefits of financial innovation to arrive at the overall net impact.

This problem is cause for many frustrations that are expressed repeatedly in public. For example, on 13 May 2010, an article titled “Financial Innovation, Known Unknowns” appeared in the Free Exchange Economics blog of The Economist. It states:

“...[T]he extent to which discussion of the potential costs and benefits of financial innovation tends to lack empirical estimations of what, numerically speaking, those costs and benefits might be and whether the costs are bigger than the benefits or the other way around ... eight years and a financial market implosion later, we’re still stunningly short of anything resembling conclusive evidence ... Perhaps the significant and obvious costs of financial innovation are entirely offset by dispersed and subtle benefits. But while it’s important to be open to this possibility, I don’t think there’s any reason to simply assume that it’s true. ...”

But why is it considered so important to know the exact impact of financial innovation? The assessment is most likely to influence regulation and policy of financial innovation ultimately determining the extent to which financial services can and will innovate going forward. If the benefits of financial innovation are not acknowledged, clearly and in full, allowing the financial services sector to address continuing social and economic challenges (see Chapter 6), we may lose out on many positive developments. “The real question is how do we keep the good parts of innovation without being stuck with the bad,” as finance professor Raghuram Rajan says.

Source: Surowiecki, J. (2008) What microloans miss. The New Yorker, March 17. Available at: http://www.newyorker.com/talk/financial/2008/03/17/080317ta_talk_surowiecki

In the following Table, a qualitative assessment of a few selected financial innovations appears. One of the most cited references for this work is the paper “In Defense of Much, But Not All, Financial Innovation” by Robert Litan, Vice-President for Research and Policy at the Ewing Marion Kauffman Foundation in Kansas City (Litan, 2010). The following assessment combines some of Litan’s findings with additional assessments for a wider range of products, such as insurance.

While there are many examples of beneficial financial innovation – and a few are introduced in the text – the following table (largely based on Litan, 2010) focuses on some less common examples, highlighting the fact that sometimes benefits are subtle and dispersed, and so not obvious to everyone:

Table 4: Examples of Financial Innovations and Their Benefits

Innovation Examples	Qualitative Assessment
Index Mutual Funds (Collective investment scheme replicating movements of an index)	<ul style="list-style-type: none"> This scheme provides access to capital markets at lower cost with similar long-run returns as actively managed funds. Less expensive delivery of portfolio diversification than active management is indicative of a productivity gain. This is balanced by reduced incentives for shareholders to closely monitor individual companies. Thus, there can be a downside if index funds account for a high proportion of all equities – scale plays an important role in judging benefit and risk.
Pay-as-you-go insurance (Leveraging telematics to capture data on the insured party’s behaviour – e.g., auto insurance)	<ul style="list-style-type: none"> Data on a policy-holder’s behaviour can be used to determine an accurate risk profile, translating into risk-reflective pricing. This insurance increases transparency and fairness, and also encourages “safer” behaviours once the policy-holder reflects that her behaviour directly impacts her premium.
Credit scoring (Statistical assessment of creditworthiness of customers using prior credit tradeline payment data)	<ul style="list-style-type: none"> Credit scoring improved the pricing of risk for lenders, allowing lenders to extend credit to a wider group of consumers and clearly increasing access to credit. Efficiency increased as well since credit scoring enabled more cost-efficient underwriting processes. Credit scoring is considered to have amplified more spending in good times with no effect in bad times when consumers tighten spending. Reliance on low-cost, accurate credit scores may have marginalized other traditional underwriting dimensions in the pre-crisis credit markets.
Business interruption policies for non-physical damage (Covers non-physical damage through business interruption)	<ul style="list-style-type: none"> This insurance allows the real economy to mitigate risks associated with unexpected natural events that do not cause any physical damage but lead to the interruption of business activities, e.g., the damage that occurred to the aviation and airline industry during the volcanic ash cloud in spring/summer 2010. It allows businesses to better predict and anticipate the impact these risks could have on their business once they materialize and ensure that they do not lead to failure.
Micro-insurance (Access to insurance for the poor)	<ul style="list-style-type: none"> Studies have shown that, while the benefits of insurance in developed markets are apparent to the consumer, there is little consumer acceptance across emerging markets. By combining insurance products with micro-credit products, access to necessary insurance products, such as life and health insurance, is increased. In less-developed markets, the impact of a health emergency on the financial situation of a family can be devastating but micro-insurance can provide a key hedge against this damaging possibility.

Overall, the argument that financial innovation has offered a net benefit to society is almost unassailable over the very long term, and it remains a strong argument for the period since the Second World War.

The real challenge is how to increase the extent of this net benefit by reducing the sometimes powerful negative outcomes associated with certain financial innovations and their application in a given context. The clues for how to do this most effectively are likely to reside in the special nature of the financial services sector and its innovations.

2.3 Understanding the Particular Qualities of Financial Innovation

2.3.1 Some General Observations

The financial industry has distinctive characteristics,²³ many of which shape the nature and the effects of financial innovation. In particular, the industry:

- Plays a major role in allocating capital and thus enables economic growth and improved social welfare
- Is characterized by balance sheet leverage at levels that are unique compared to other industries
- Is highly interconnected so that an innovation adopted by one party may negatively affect a third party with no direct connection to the innovation

The very reasons financial firms can be so beneficial to society – their links to the wider economy, leverage and interconnectedness – magnify the economic and social effects of failures in innovation risk management. It is not only the individual institution that will feel the effect of its failure but the wider economy through spillover effects.

Special Features of Financial Innovations

Many financial innovations arrive with special features that determine the size and shape of both positive and negative outcomes.

One is the long-term nature of many financial services products compared to, say, most manufactured products or services. (Although this feature is not unique to the financial services industry: Innovations in other industries, such as asbestos and the thalidomide drug, required a long time to show their negative side effects.) It may take decades for a flaw to become apparent in an innovative pension or a long-term insurance product, not least because the product is only asked to pay-out – to “work” – at the end of its contractual life. While physical products such as cars and other durable goods can represent relatively long-term purchases, these purchases are usually put to use immediately, making it easier to spot major design defects.

Additionally, financial products often contain embedded features that trigger changes in outcome a relatively long time after the sale of the product, e.g. the change in the interest rate for a mortgage from a fixed to a floating rate.

In turn, the time it takes for outcomes to become apparent means that the innovative product may have been sold in large numbers before the error is found. It may not even be considered an innovation by the time its side effects begin to become apparent. Mortgages had been securitized for decades in standard formats before significant negative side effects emerged during the financial crisis beginning in 2007.

The fact that financial products are often paper or electronic rather than physical goods also tends to increase the volumes that can quickly be produced (and adopted) before the product has been tested by time – as well as making it easy to make further incremental innovations that may affect the nature of the outcome (e.g. by tweaking the characteristics of the original product).

The long-term nature of many financial products and services is compounded by the potential for asymmetries of information between the seller and the buyer. The designer of a new mortgage product is almost certain to understand the fundamental risks associated with the product better than most borrowers.

Financial products are also big-ticket items, wrapped up in the most important decisions in our lives. Few purchase decisions are bigger than financing a house and choosing a pension, or more potentially important than selecting life or health insurance.

In addition, the financial services industry is vulnerable to behavioural bias, or the frequent tendency for humans to make less than rational decisions (obviously not unique to financial services). The contributions by Piyush Tania and Margaret Miller in Part III of this report discuss this topic and take a look at how behavioural science might help put “guard rails” around the process of innovation in the retail financial sector.

Finally, leverage is a distinct feature of many financial products (as well as a feature of the financial industry as a whole). It often acts to magnify the effect of negative outcomes. In May 2007, before the events of the financial crisis unfolded, Ben Bernanke (Chairman of the Federal Reserve) elaborated on leverage in relation to financial innovation:

“The leverage that can be embedded in new financial instruments and trading strategies compounds the difficulties of risk management. Embedded leverage can be difficult to measure; at the same time, like conventional leverage, it may increase investor vulnerability to market shocks. Some credit derivatives do make it easier for investors to take leveraged exposures to credit risk.”²⁴

Quote 7: Piyush Tania, Executive Director, ideas42

“

With the help of behavioural economics, perhaps financial innovators will adopt safe design practices as routine, just like engineers in other domains. Someday, we may even see a financial services ad showing off impressive “crash test” results and safety features, just like car manufacturers do today.

”

(See Chapter 15 for full contribution)

Quote 8: Margaret Miller, Senior Economist, Financial Inclusion
Global Practice, World Bank Group



Financial literacy and capability initiatives can help to mitigate potential negative outcomes of rapid financial innovation and should be part of a more comprehensive strategy for responsible finance, which includes consumer protection and working with providers to raise the bar on product and service quality. Financial capability efforts may also be able to contribute to the adoption of new products and services as well as sustained positive behaviours, such as loan repayment, committing to savings, etc. But to be successful at these tasks, financial literacy and capability programmes themselves need to continue to innovate. This is happening as the focus is shifting from simply providing information to consumers to understanding the factors that influence their financial behaviours and then using new tools and technologies to support behaviour change.



(See Chapter 13 for full contribution)

Patterns of Innovation in the Financial Services Sector

On top of these special sector characteristics and product features, some commentators believe that certain patterns of innovation are characteristic of the financial services sector.

First, financial innovations are usually highly dynamic, implying that as a financial innovation diffuses from early adopters to the mass market, the structure of the product and the uses to which it is put change over time – as well as the costs, benefits and externalities associated with the innovation.²⁵ It is likely, for instance, that the risk to consumers from a new kind of washing machine, or even a new way of building bridges, will change little over time. However, the risk to the consumer and to society from an innovation in derivatives technology might be highly dynamic. An innovative component of derivatives contract might be beneficial in one market and yet associated with negative outcomes in another.

Second, financial innovations can spawn a series of further incremental innovations. Merton (1992) introduced the term “financial innovation spiral effect” to describe this process. He pointed out that the development of a market in standardized products often then leads to more tailored, bilateral products. These tailored products are then hedged on the standardized market, leading to yet more volume, lower trading costs, and more encouragement to launch similar contracts and markets, “spiralling toward the theoretically limiting case of zero marginal transaction costs and dynamically complete markets”.²⁶

Third, the distinct pattern by which consumers adopt financial products may itself shape the likelihood of positive or negative outcomes. Many marketing experts (e.g. Rogers 1962)²⁷ think about product adoption in terms of a hierarchy that ranges from early adopters (opinion leaders), through the majority of the population, to late adopters. Early adopters tend to be better educated, more confident and more willing to take time to learn about a product and experiment, while later adopters tend to be less knowledgeable, less willing to learn and more conservative.

Clearly, this could lead to problems in the area of financial innovation, particularly in the field of credit and investments.²⁸ For instance, it suggests that the early adopters capable of understanding the risks of a financial product will be followed by larger numbers of consumers who are unwilling or unable to make the same kind of intellectual investment. Yet while a poor decision by the consumer about a hair dryer has few material consequences, a poor decision about a big-ticket, long-term financial product tends to be harder to bear. If large numbers of consumers are involved (e.g. in a mortgage market), there may be implications for the solvency of the provider, systemic risk and a serious effect on the real economy.

2.3.2 Knightian Uncertainty and the Dynamic Nature of the Financial Services Innovation Environment

Characteristics of financial innovations that tend to increase the chance of negative outcomes were mentioned earlier, including the long-term nature of many products and the tendency for asymmetries of knowledge to develop.

However, two major complicating factors act in concert with these characteristics to increase the risk of negative outcomes: Knightian uncertainty and the dynamic innovation environment presented by the financial markets and financial services sector.

Human endeavours are always vulnerable to risk. However, as first clearly set out by the economist Frank Knight in 1921 as shown in Callout 7, this risk comes in two different flavours: risk and uncertainty. The Massachusetts Institute of Technology re-introduces Knightian distinction to help analyse the recent financial crisis and the underlying behaviours.²⁹

“As Knight saw it, an ever-changing world brings new opportunities for businesses to make profits, but also means we have imperfect knowledge of future events. Therefore, according to Knight, risk applies to situations where we do not know the outcome of a given situation, but can accurately measure the odds. Uncertainty, on the other hand, applies to situations where we cannot know all the information we need in order to set accurate odds in the first place. ‘There is a fundamental distinction between the reward for taking a known risk and that for assuming a risk whose value itself is not known,’ Knight wrote. A known risk is ‘easily converted into an effective certainty,’ while ‘true uncertainty,’ as Knight called it, is ‘not susceptible to measurement.’ [...] Ricardo Caballero, chair of MIT’s Department of Economics and the Ford International Professor of Economics, Macroeconomics, and International Finance, [...] stated in a lecture at the International Monetary Fund’s research conference last November [2009]: When investors realize that their assumptions about risk are no longer valid and that conditions of Knightian uncertainty apply, markets can witness ‘destructive flights to quality’ in which participants rid their portfolios of everything but the safest of investments, such as US Treasury bonds.”

The distinction between risk and uncertainty is important to any discussion about financial innovation for a number of reasons. One is straightforward: by their nature, innovations tend to attract a high amount of Knightian uncertainty beyond measurable risk (see Callout 8 for an example statement).

A second reason is that some negative outcomes in financial services seem to be caused by either ignoring a key uncertainty simply because it is immeasurable – it often lies hidden among the key assumptions surrounding an innovation – or wrongly classifying a Knightian uncertainty as a measurable risk.

Determining whether an innovation is subject largely to measurable risk or immeasurable uncertainty is not, in itself, an easy task. In the case of incremental innovations (Horizons 1 and 2 in Figure 1), there is often a temptation among innovators to look to the performance of similar, earlier products in terms of both their performance track record and the fundamental data that informs their design (e.g. default rates). However, such analogies can be dangerous if an apparently small incremental change to a financial product significantly affects its risk and return profile.

In the case of a radical innovation there is, by definition, no track record to look back on. There may also be no easy way to be confident that it is appropriate to apply the available fundamental data to estimate key variables. The ultimate consequence might be wrong estimates and biased expectations that lead institutions to set aside an inadequate amount of capital – in the case of a retained risk – or to communicate the wrong product risk profile to a consumer.

Finally, there may be no clear line between an incremental and a radical innovation. A relatively small change in the wording of a financial product, or a change to a marketing strategy, as mentioned earlier, can significantly change outcomes; conversely, many products are described as innovations in the marketplace when they are really simply a dressing up of an established product. The difference between these two cases tends to be less obvious in the case of an opaque financial product than it might be in the case of some more tangible innovation such as, for example, a new form of car engine or a way to generate electricity

Callout 7: Knightian Uncertainty

“Uncertainty must be taken in a sense radically distinct from the familiar notion of risk, from which it has never been properly separated.... The essential fact is that ‘risk’ means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating.... It will appear that a measurable uncertainty, or ‘risk’ proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all.”

Source: Knight, F.H. (1921) *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx; Houghton Mifflin Company

Callout 8: Increased Uncertainty in Financial Innovation

By definition, innovation carries financial institutions into uncharted waters. It changes the profile of risk and, as a departure from established practice, it makes that risk harder to assess. And the more radical the innovation, the higher the attendant uncertainty.

Source: Panel remarks titled “Welfare effects of financial innovation” by Jaime Caruana, General Manager, Bank of International Settlement, November 2011

The Dynamic Nature of the Financial Services Innovation Environment

In many industries, innovations are released into or directed towards a relatively unchanging environment, aside from the effects of competitive innovation itself. For example, although there are certainly dynamic components to the pharmaceutical industry, the environment into which most pharmaceutical innovations are released – the human body – is fairly stable, if complex. Innovations in solar technology can, at least, rely on the unchanging sun.

The environment into which financial innovations are born is different. It is a complex, volatile, social environment that is constantly changing in ways that create uncertainties for the innovator.

Some of this dynamism is created by the financial sector's links to the real economy and to fundamental drivers of change, such as economic and technology trends and political decisions. Perhaps the real complication, however, is the degree of interplay and feedback between these forces, the interconnected financial markets and the process of innovation itself.

It is helpful to think about this in three dimensions:

- **Innovation interaction:** Innovations are born into a world of continuing, connected innovations that can make outcomes difficult to predict. Those involved in the development of the first credit cards could not have imagined the role this product would come to play in the Internet economy some decades later
- **Behavioural change:** Innovations are subject to, and help to create, changes in human behaviour as outlined in the previous sub-chapter
- **Economic and market change:** Financial innovations can trigger changes in the fundamentals of an economy or market that, in turn, create a new environment for the innovation (and for many other innovations). Perhaps the most dramatic example of this in recent years occurred in the run up to the financial crisis beginning in 2007 as financial innovations helped promote a rise in US house prices which, in turn, reinforced beliefs about the stability of the market and fostered further rounds of product innovation.

As a result of these complex interplays, financial innovation takes place in an almost uniquely dynamic environment – one of daily volatility in the financial markets and constant structural evolution. Each environmental change may test a key assumption underpinning a financial innovation, perhaps concerning how we behave, how fast the economy is growing, or what the rates of interest or inflation will be.

This represents an opportunity as well as a challenge: a more overt recognition by the industry of the role of uncertainty and market dynamism in producing negative outcomes may, in itself, represent a step forward. Furthermore, while change in financial services is rapid, the kind of feedback that helped create the crisis in the US mortgage market does not happen overnight. An improved understanding of potential feedback effects in relation to the characteristics of an innovation may facilitate the kind of monitoring and early action that can decrease negative outcomes.

Callout 9: Uncertainty and the Financial Crisis

This dynamics of financial innovation shows that the main players were not internalizing the effects of uncertainty, as innovators normally do. This finding is more important than the mistakes uncovered by the unfolding of events. Mistakes cannot be avoided when dealing with uncertainty. However, the effects of these mistakes are amplified by externalities, which are the major problem with old and new forms of banking. The key issue for policy-making is not preventing mistakes in the innovation process, for new and old ones will never be alike and the only way to avoid them is to stifle innovation altogether. A sensible overhaul of financial regulation should rather focus on the externalities of financial innovation.

Source: Paccos, A. M. (2010) *Uncertainty and the Financial Crisis*. *Journal of Financial Transformation*, 29, pp. 79-93

2.3.3 Consequences for the Financial Services Industry

To conclude, there are two major points that can be taken away from this section:

- The nature of financial innovation means that what it affects cannot be easily calibrated. Put simply, there are unknowable probabilities and outcomes surrounding the introduction of financial innovations.
- The effects of financial innovation are uncertain, unmeasurable and depend upon the interactions of innovators, users, consumers, competitors, etc.

Thus, financial innovations are challenging for companies, policy-makers and clients because they cannot fully assess *ex ante* the implications of the innovation.

3 The Role of Financial Innovations in the Financial Crisis

3.1 Introduction

The financial services sector and several financial innovations have been assigned much of the blame for the financial crisis beginning in 2007 and the ensuing global recession. This has led many prominent politicians and academics to question the value of financial innovation in general. For example, Paul Volcker, Former Chairman of the Federal Reserve, famously commented: "I wish someone would give me one shred of neutral evidence that financial innovation has led to economic growth — one shred of evidence."³⁰

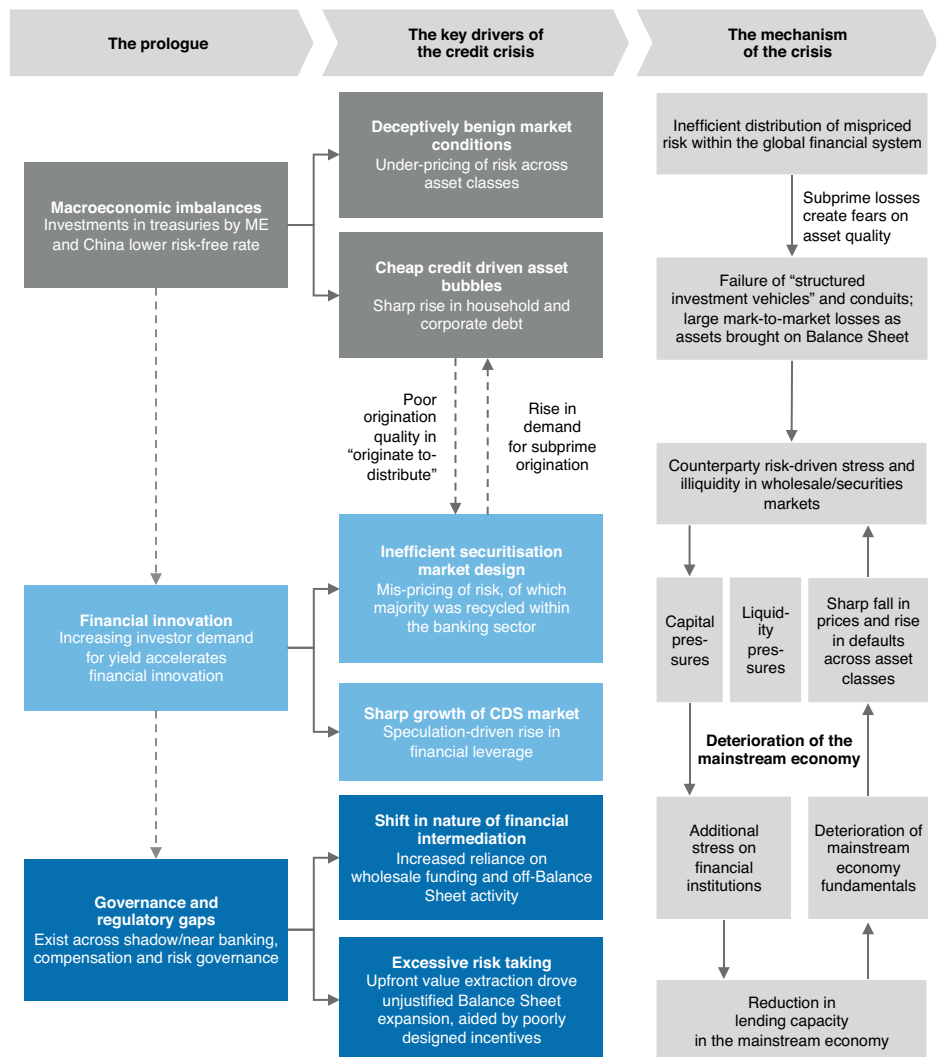
To others, innovation seemed to act as a cloak to prevent any questioning of hazardous practices. Joseph Stiglitz, professor of economics at Columbia University and recipient of the Nobel Memorial Prize in Economic Sciences (2001), commented that the worst elements of the US financial system, such as toxic mortgages, were exported around the world, "in the name of innovation, and any regulatory initiative was fought away with claims that it would suppress that innovation. They were innovating, all right, but not in ways that made the economy stronger".³¹ Instead, Stiglitz believes the innovators were mainly devoting their talents to getting around standards and regulations designed to ensure the safety of the banking system.

There are many thoughtful and detailed reports into what went wrong in the run-up to the financial crisis beginning in 2007 and it is not the intention of this report to reprise all the arguments here. While the multi-layered complexities of the crisis mean that the blame game can never quite be played to a definitive conclusion, most commentators agree that innovation played a significant role alongside other fundamental drivers, such as global macroeconomic imbalances, cheap money, excess leverage and governance and regulatory failings (Figure 2).

This report maintains that the financial services sector should acknowledge that to at least some degree its innovations contributed to causing the crisis. The question for the future is whether one can understand exactly how this happened and begin to shape remedies.

This section takes a closer look at the role of some financial innovations in structured finance as defined in Callout 10, which are often blamed for the crisis. It will try to answer the question of whether the harm was caused by the inherent design of the innovation or by the way that the innovation was applied in the marketplace. Each innovation is introduced with a discussion of the problem it was designed to solve. This will show how difficult it can be to divide innovations into "socially useful" and "socially useless" camps before negative outcomes are apparent.³³

Figure 2: How the Banking Crisis Evolved³²



Source: Published in the Bischoff Report: Based on Lord Turner's analysis (speech at The Economist, January 2009), with Citi, Oliver Wyman additional analysis

Quote 9: Thomas Deinet, Executive Director, Hedge Fund Standards Board

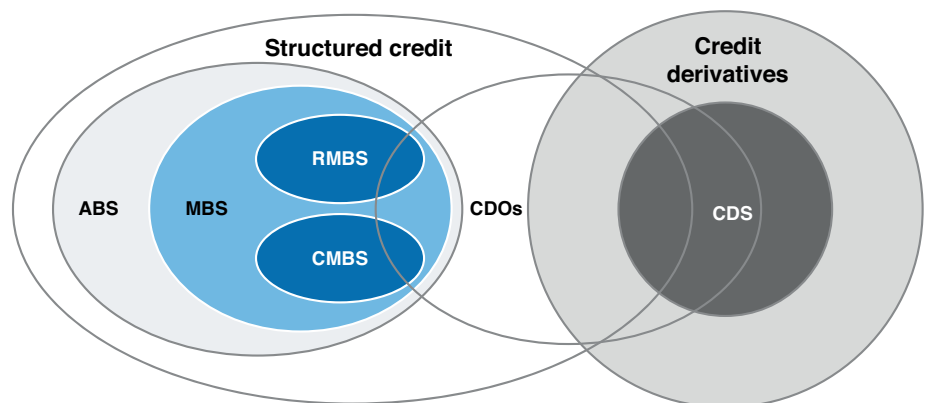
Perhaps one of the key lessons to be drawn from the financial crisis is that we need less too-big-to-fail banking which is implicitly guaranteed by the taxpayer and more risk taking by diverse, entrepreneurial players with the capacity to absorb losses and small enough to fail, as some inevitably will, without causing systemic waves. The result would be better investment decisions, lower systemic risk and more innovation.

(See Chapter 9 for full contribution)

Callout 10: Structured Finance – Defining Terms

Vink and Thibeault distinguish the market for asset securitization as follows: “Blum and DiAngelo [1997] and Choudhry and Fabozzi [2004] mention that the capital market in which these securities are issued and traded consists of three main classes: asset-backed securities (ABS), mortgage-backed securities (MBS), and collateralized debt obligations (CDO). As a rule of thumb, securitization issues backed by mortgages are called MBS, and securitization issues backed by debt obligations are called CDO (see Nomura [2004] and Fitch Ratings [2004]). Securitization issues backed by consumer-backed products — car loans, consumer loans and credit cards, among others — are called ABS (see Moody’s Investors Service [2002]).”

The IMF classifies the overlap/connections between structured credit and credit derivatives as per the graphic below:



Note: ABS = asset-backed security; MBS = mortgage-backed security; RMBS = residential mortgage-backed security; CMBS = commercial mortgage-backed security; CDS = credit default swap; and CDOs = collateralized debt obligations. Not proportionally representative.

With regard to structured finance, the IMF states: “Structured finance can be beneficial, allowing risks to be spread across a larger group of investors, each of which can choose an element of the structured finance product that best fits its risk-return objectives. However, some complex, multi-layered structured finance products provide little additional economic value to the financial system and may not regain the popularity they garnered before the US subprime mortgage crisis.”

The above graphic illustrates how structured credit and credit derivatives can overlap through the employment of synthetic structures: Some of the overlaps refer to whether the underlying assets of a CDO (which provide the cash flows) are “cash-funded” financial instruments (such as ABS and MBS) or are synthetically created via derivatives.

Sources:

Vink, D. & Thibeault, A. E. (2008) ABS, MBS and CDO Compared: An Empirical Analysis. Social Research Network. Available at: <http://ssrn.com/abstract=1016854>

Soundness, R. F. (2008) Global Financial Stability Report: Containing Systemic Risks and Restoring Financial Soundness. International Monetary Fund. Available at: <http://www.imf.org/external/pubs/ft/gfsr/2008/01/pdf/text.pdf>

Blum, L. & DiAngelo, C. (1997) Structuring efficient asset-backed transactions. In: Bhattacharya, A.K. & Fabozzi, F.J. eds. (1997) Asset-backed securities. New Hope, PA: Frank J. Fabozzi Associates. pp. 237-268

Choudhry, M. & Fabozzi, F.J. (2004) The Handbook of European Structured Financial Products. Hoboken, NJ: John Wiley and Sons

Nomura Fixed Income Research. (2004) CDOs in plain English. Available at: http://www.vinodkothari.com/Nomura_cdo_plainenglish.pdf

Fitch Ratings. (2004) Global criteria for collateralised debt obligations. Credit Products Criteria Report. Available at: <http://pages.stern.nyu.edu/~igiddy/ABS/fitchcdorating.pdf>

Moody’s Investors Service (2002) European ABS and WBS Market Summary. International Structured Finance Special Report. Available at: http://www.alacrastore.com/research/moodys-global-credit-research-European_ABS_and_WBS_Market_Summary_Third_Quarter_2002-PBS_SF16787

3.2 Mortgage Backed Securities (MBS)

Impetus for Invention and Benefits

One of the most important US financial innovations of the later 20th century was born out of the needs of government to remove mortgage-related debt from the federal budget, the desire to make mortgages more easily available to US households, and the need to manage interest rate risk exposure.

Up until the millennium, the MBS market seemed to offer many benefits to the wider public and to the financial industry, despite some worries about the implicit government backing for the credit portfolios of the government sponsored entities (GSEs).

Furthermore, MBS offered two key potential benefits to investors. The pooling of the mortgages seemed in itself to offer major diversification benefits, and the resulting cash flows could be sold off in tranches to investors with various appetites for risk and reward. Those investing in senior tranches could expect a relatively low return with a relatively low risk, while those investing in junior tranches received a higher return and a higher risk that the cash flow would be disrupted. This allowed investors to build and shape investment portfolios to fit their investment needs. There was also a tax advantage of non-bank investors over banks when investing in mortgage securities.

For more historical background please refer to Appendix 1.

Crisis Contribution

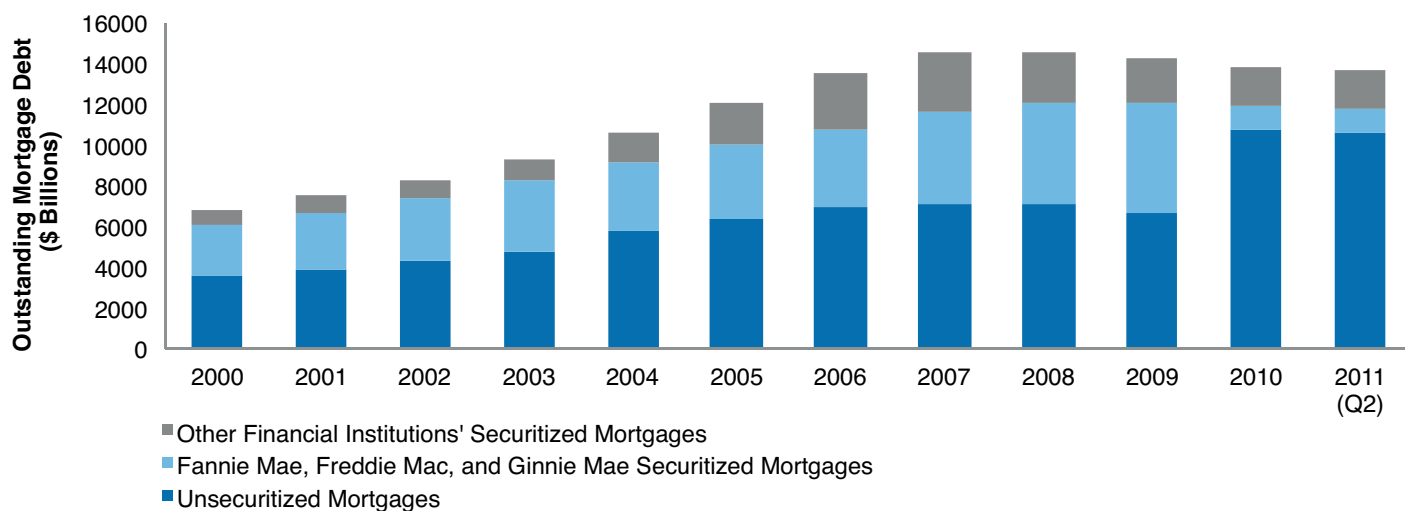
The rising demand for MBS from investors ultimately played a part in the market's downfall. Figure 3 illustrates the increasing amount of both securitized and unsecuritized outstanding mortgage debt in the United States from 2000 through 2011. It also shows how the amount securitized by Wall Street grew in proportion to that securitized by the GSEs.

As investor demand rose for MBS based on mortgages of all risk profiles, including subprime, many lenders moved further towards the "originate to distribute" business model, with the explicit intention of securitizing and selling the mortgages after completing them. Additionally, the rating of MBS tranches with the best mark "AAA" led to believe that risks were understood and the investments were safe.

The easiest way to compete was to loosen standards. Market participants began promoting types of mortgages with risky features (e.g., negative amortization, high loan-to-value (LTV)) that increased the risk of default to MBS investors. In the real estate market, meanwhile, property values had been rising steadily, encouraging more renters to buy and encouraging speculation in houses and condominiums. A common observation in the mid-2000s was that average US home values had never actually declined over a one-year period – an observation designed to encourage a belief that home values could only ever rise. Underwriting standards fell for all kinds of loans, and the definition of a good loan became one that could be sold on to a securitization firm and a final investor rather than one that was likely to be repaid in full.³⁴

The eventual result, in terms of the loss of faith by investors in MBS, and those holding large MBS portfolios, is by now a well-known story. Figure 3 illustrates the effect on the MBS market itself, with outstanding volumes declining from 2008.

Figure 3: US Outstanding Mortgage Debt by Securitization³⁵



Source: US Federal Reserve and Oliver Wyman analysis

**Quote 10: Tim Wyles, Partner,
Oliver Wyman**

Uncertainty is a defining element of the Principal-Agent problem in the first place. Increased uncertainty makes the problem harder by definition. And uncertainty is an element of the information asymmetry between the financial services firm and its customer. Whether an innovation takes the form of a new product or a new business process, the normal degree of difference in understanding between bank and borrower, or between insurer and insured, inevitably rises.

(See Chapter 18 for full contribution)

Lesson from the Crisis

History’s verdict is likely to be that MBS and other asset-backed securities are a valuable innovation, but that they possess particular vulnerabilities that were not properly controlled in the run-up to the crisis. The originate-to-distribute model triggered behavioural changes in the market in all parties of the value chain, from consumers to investment banks, that were not anticipated but that could have been monitored and managed by the industry and its regulators.

Over the long term, securitization will probably be regarded as a beneficial innovation and contribute positively to the general economy. It will, however, be approached differently and with a greater emphasis on the importance of sound underwriting standards and greater transparency regarding the underlying assets and their risk characteristics.

3.3 Collateralized Debt Obligations (CDOs)

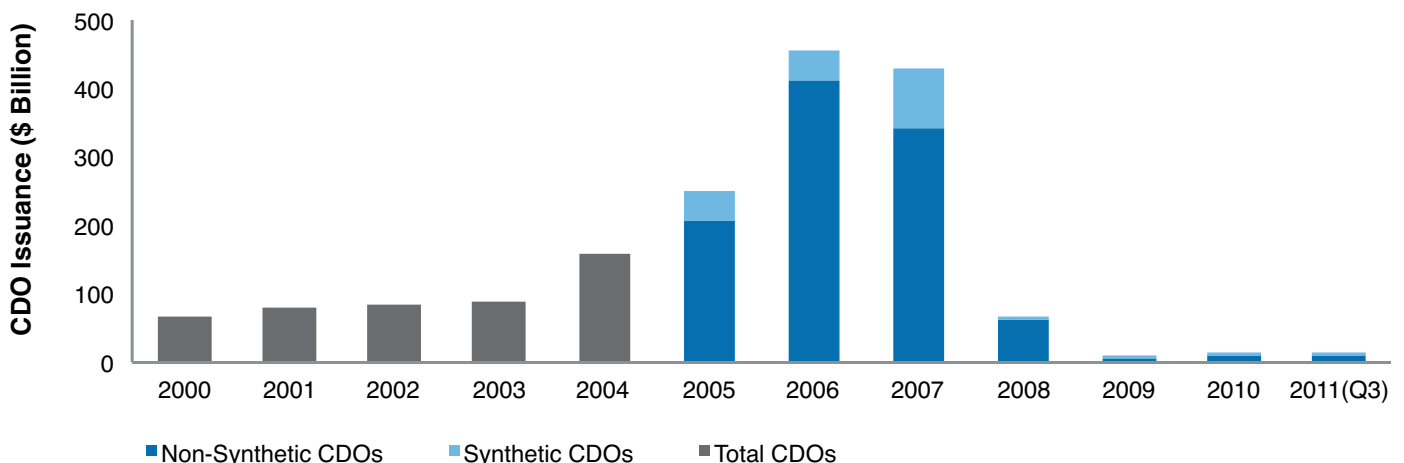
Impetus for Invention and Benefits

The now-defunct investment bank Drexel Burnham Lambert created some of the first collateralized debt obligations (CDOs) in 1987 as a way of turning the cash flows from bundles of low credit quality corporate bonds with defined payment schedules into separate investment tranches, each with its own risk profile.³⁶ Bundling the bonds helped spread the risk of default from any single bond and, as with MBS, the tranching allowed investors to select a particular risk profile to suit the needs of their investment portfolio.

An additional innovation on the back of this – synthetic CDOs – made it possible to offer a CDO to investors without first purchasing the underlying assets. This was warmly welcomed as investor appetite for CDOs increased and threatened to overwhelm the available supply of seemingly-suitable mortgage assets. Instead, synthetic CDOs replaced actual assets with “reference assets”, which had the additional advantage of making synthetic CDOs much quicker and easier to create. Of course, the growth of synthetic CDOs in the market between 2005 and 2007 (Figure 4) helped investors to increase their exposure to already risky markets.³⁷

For more historical background please refer to Appendix 1.

Figure 4: Global CDO Issuance³⁸



Source: SIFMA and Oliver Wyman analysis

Crisis Contribution

A relatively early manifestation of the crisis was the fate in July 2007 of two Bear Stearns hedge funds. The CDO assets held by these hedge funds had declined in value, due in large part to increasing defaults on subprime mortgages. The now defunct Bear Stearns, at that time the fifth-largest US securities firm, announced on 18 July 2007 that investors in its two failed hedge funds would get little if any money back after “unprecedented declines” in the value of securities exposed to subprime mortgages, despite investment-grade ratings from rating agencies.

As CDO investment products began to underperform, the opacity of the products – with regard to the nature and quality of the assets that underpinned their value – further discouraged investors and led to fears in the market about exposed institutions and CDO underwriters. In effect, CDOs had allowed institutions to increase their leveraged bet on the housing market, boosting returns in the short run but increasing the damage once doubts were raised.

Synthetic CDOs increased returns on the “upside” as the housing market boomed but, as doubts emerged, they were also one of the mechanisms through which investors could build a short position on the “downside” of the US housing market.³⁹

As Figure 4 shows, synthetic CDOs were a short-lived phenomenon and the market for CDOs generally has also largely ceased to exist since the crisis. It seems unlikely that synthetic CDOs will return to financial markets in anything approaching their original form.

Callout 11: Regulatory Arbitrage and Financial Innovation

There are many lessons to be drawn from this extraordinary crisis for the global economy, [...] [G]lobalization and the pervasive interconnections among markets it has spawned have to be better understood. This should inform both the structure and the operation of regulatory systems. It requires getting the “perimeters of regulation” right: they should be sufficiently broad to avoid regulatory arbitrage, sufficiently comprehensive to cover all systemically important firms, and sufficiently “smart” to allow firms to intermeditate efficiently. [...]

The financial crisis was both stunningly modern and as old as markets themselves. Financial products of amazing complexity were traded 24/7 around the world, but markets were suffering from excess liquidity, asset bubbles, greed and the ascendancy of hope over common sense, which is hardly new. Markets are efficient but not always right, as they can only process the available information. Transparent information and early warning systems for both market investors and policy-makers were less than stellar. Regulatory gaps and regulatory arbitrage opportunities were evident, as were shortfalls in regulatory cooperation across nations and even within certain major countries. The financial crisis provides the impetus to learn from what went wrong, and to introduce reforms that will make such crises less likely and less traumatic in the future. It will be important to learn these lessons well.

Source: Lynch, K. (2010) Avoiding the financial crisis: Lessons from Canada. Policy Options, May Issue. Available at: <http://www.irpp.org/po/archive/may10/lynch.pdf>

Lesson from the Crisis

CDOs helped to funnel money to the mortgage markets by encouraging investors to believe they were making safe investments in instruments that were based on low quality assets. The existence of CDOs allowed many institutions to further leverage their exposure to mortgage assets, and subprime mortgage assets in particular. In doing so, the CDO innovation helped fuel the over-lending that precipitated the housing crisis.

Robert Litan of The Brookings Institution says, “the subprime mortgage debacle likely would not have occurred – or if so, would have been much less damaging – had the CDO never been invented. The [originate-to-distribute] lending model does not work unless there are buyers at the end of the lending pipeline. The developers of the CDO became the buyers, or actually the intermediate buyers (since the purchasers of the securities were the ultimate buyers) of subprime mortgages...it is difficult to imagine a more destructive financial innovation.”⁴⁰

To some degree, the inherent qualities of CDOs helped to create the damage. If MBS created a distance between the originator of mortgage risk and the eventual holder of that risk, this distance was significantly extended by CDOs. Synthetic CDOs, meanwhile, broke the link completely and allowed investors to make an unlimited number of bets on an underlying risk they did not understand.

The complexity of the CDO and synthetic CDO structures was a particular problem. The opacity of the products made it difficult to determine a market value and discouraged investors from understanding the fundamental risks associated with the CDO investments.⁴¹

3.4 Credit Default Swaps (CDSs)

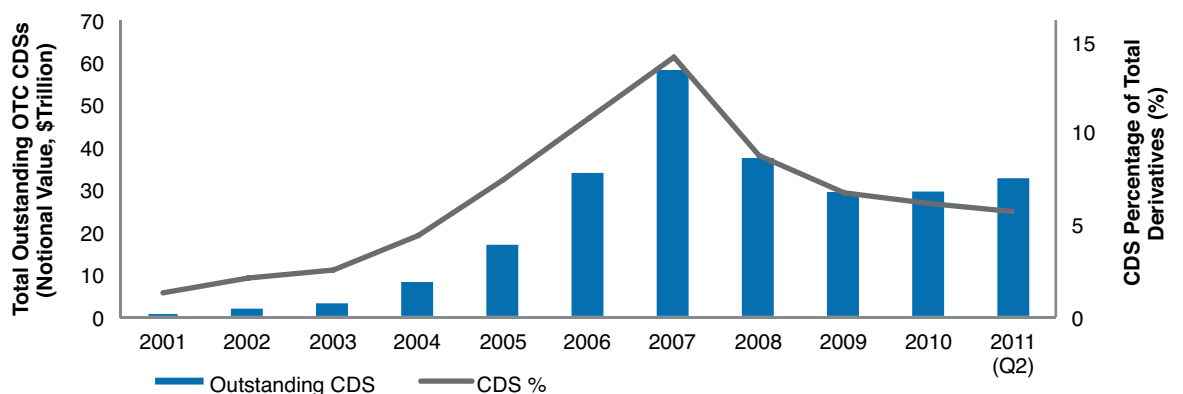
Impetus for Invention and Benefits

JP Morgan is generally credited with the invention of the credit default swap (CDS) in its current form in 1994, following the extension of a US\$ 4.8 billion line of credit to Exxon to cover a potential legal liability in the aftermath of the Exxon Valdez oil spill. To mitigate the effect of this large credit line on JP Morgan's balance sheet and capital requirements, JP Morgan created a CDS with the European Bank for Reconstruction and Development – effectively swapping the default risk in return for fees.⁴²

A CDS provides protection against defaults on credit securities, such as corporate bonds. The protection provider counterparty of the deal receives regular payments but must ultimately pay out the loss in value of the bond if there is a credit event. While CDS contracts were initially between interested parties, the buyer of protection need not have any interest in the underlying asset – these are called “naked” CDS positions. Thus, the market for CDSs grew far larger than the corporate bond market. Though initially developed for the corporate bond market, CDSs can also be written on other types of securities, notably MBS. In addition to their use by banks for loan risk management and capital relief, CDSs are employed by many large corporations to protect themselves from the effects of a default. As the market for CDSs developed, they were also used by the financial industry to speculate upon credit risk in ways that both increased the liquidity of the CDS market and, potentially, offered more negative outcomes, as outlined below.

CDSs are not particularly complex instruments. However, as bespoke products agreed between two counterparties, CDSs are traded over the counter, not on an exchange, and it is difficult to build a clear picture of ultimate net exposures in the fast-growing credit derivative market.⁴³ To increase transparency, CDS clearing houses are being set up. Figure 5 illustrates total CDS notional values (bar chart) and CDS notional values as a percentage of the notional values of all credit derivative products (blue line).^{44, 45} The graph shows that the volume of CDSs fell back after the crisis but that it remained at around 2006 levels and in 2011 began to increase again slightly.

Figure 5: Outstanding CDSs 2001-2011^{46, 47}



Source: Bank of International Settlements (2011), ISDA (2010)

Note: Total Derivatives Market includes total IR swaps, currency swaps, IR options and CDS outstanding as per ISDA market survey

Crisis Contribution

While CDSs offered many benefits to individual market participants who used them to hedge risk during the financial crisis and subsequent economic downturn, there are two areas where the existence of the CDS market considerably worsened the crisis.

First, as mentioned above, CDSs contributed to the CDO market and its problems.⁴⁸ CDS technology allowed CDO managers to create hybrid and synthetic CDOs at a considerable pace. It also enabled hedge funds to execute complex hedging and correlation strategies that involved the purchase of junior and equity tranche securities while shorting other tranches using CDSs. Second, the CDS market allowed investors and others to transfer risk, from the CDO market and elsewhere, to CDS issuers that were not in a position to bear that risk. The most famous casualty, AIG, seems to have badly misunderstood the risks it was running and sold an excessive amount of credit protection through CDSs without holding sufficient capital in a loss reserve. Such a misunderstanding of risks can often be a function of excessive leverage that some financial instruments can facilitate.

Lesson from the crisis

The de facto failure of AIG and the step-in of the US government to ensure that its CDS contracts would be honoured is an illustration of an important failure of risk management and counterparty risk management by many of the institutions involved in the CDS market. AIG itself massively underestimated the risks associated with CDS contracts. In turn, the banks underestimated their counterparty risk with AIG. And, finally, the Office of Thrift Supervision, which supervised AIG Financial Products Corporation – the issuer of the CDS contracts – also failed to recognize the risks involved with these products.

However, it is less clear that this market failure can be attributed to qualities inherent in CDSs as a financial technology rather than failures in the operation and regulation of an immature market, and the misapplication of CDSs in the CDO market.

CDSs and other kinds of credit derivatives will probably continue to play a role in the world economy in future years, although the practices, regulation and infrastructure surrounding the market will be considerably changed. For example, the EU has introduced restrictions on the use of CDSs, especially in the context of short selling.⁴⁹

Of all the new instruments and practices reviewed in this section of the report, CDSs perhaps provide the clearest example of the industry's failure to manage the risk of an inherently useful innovation rather than the failure of the innovation itself.

3.5 Structured Investment Vehicles (SIVs)

Impetus for Growth and Benefits

The final example of a financial innovation that contributed to the financial crisis beginning in 2007 – this time a business model or process innovation rather than a product innovation – is the Structured Investment Vehicle (SIV) invented by Citigroup in 1988.

SIVs, which were mostly spun out of banks, used the short-term commercial paper market to fund the purchase of longer-term securities such as MBS and CDOs. Profits were generated by the difference between the interest paid on the money borrowed and the interest the products earned.

However, the real attraction for the sponsor banks was that SIVs acted as holding tanks for large volumes of ABS and MBS that would have incurred significant capital charges had they been held on the banks' balance sheet directly.⁵⁰

In return, however, sponsoring banks were obliged to offer backstop liquidity facilities to their SIVs to reassure wary investors that the SIV would be able to survive any disruption in its short-term funding markets.

The SIV market peaked at US\$ 400 billion in securitized assets in July 2007 after around 20 years of growth.

Contribution to Crisis

Traditionally, banks that offer mortgages finance this lending through relatively stable sources such as government-insured retail bank deposits. SIVs, however, funded themselves primarily with short-term commercial paper, a form of borrowing that was typically collateralized using highly rated securities (e.g. ABS or MBS) on the SIV's balance sheet.

Despite the collateralization, the SIV business model depended on maintaining the complete confidence of a set of highly risk-averse investors. If a SIV could not issue new commercial paper to replace the maturing paper – i.e. “roll over” its short-term debts – it would very quickly be in trouble,⁵¹ whether or not it had built a sound portfolio of longer-term assets.

Just such a liquidity crunch began between August and October 2007 as investors began to lose faith in securities linked to the mortgage market and to worry about the stability of large banking institutions. The first casualties were SIVs holding relatively large amounts of subprime MBS and similar assets, but soon more conservatively managed vehicles were also forced to look to their bank sponsors, restructure or liquidate.

As funding markets dried up, liquidity became scarce very rapidly and even high-quality collateral became impossible to sell or finance at anywhere near its true value. In the face of the crisis, many banks took their SIVs back onto their balance sheets and the SIV industry largely ceased to exist.

Lesson from the Crisis

The Financial Crisis Inquiry Report was relatively mild in its criticism of SIVs, compared to other potential causes of the crisis, such as the mortgage origination machine and CDO structuring. It concluded that the events of 2007, “had brought to its knees a historically resilient [SIV] market in which losses due to subprime mortgage defaults had been, if anything, modest and localized”.⁵²

However, whether SIVs were an inherently sound innovation remains uncertain. Elements that seem fundamental to the success of the SIV business model – in particular, the degree of reliance on short-term funding and the degree of contingent liquidity support offered by the banks – also seem inevitably wrapped up in their failure.

4 The Continuing Importance of Financial Innovation

4.1 Financial Innovation in the Post-Crisis World: Re-opening Pandora's Box?

Financial innovation contributes to the vitality and growth of the global economy and will continue to open up new opportunities for economic growth and wealth-creation around the globe, despite the part it might have played in the financial crisis beginning in 2007. It will also help to solve many pressing problems in both developed and less-developed societies.

This belief is shared by many policy-makers, regulators and industry leaders, who also share the commitment to finding better ways to manage the risks of innovation in light of the crisis (Callout 12).

The belief in the continuing power of innovation also captures the reality on the ground. Some innovations implicated in the crisis have been chased out of the financial markets but the wheel of innovation has not stopped turning. Many financial markets across the world remained in good health through the crisis, even in the crisis-stricken developed world, and innovation continues at a sometimes startling pace.

While financial innovation may be inescapable, it should not be looked on as a necessary evil. On the contrary, it can help address some of the world's most fundamental challenges.

This section of the report first sets out a broad typology of the key areas where innovation can help to beneficially shape the world of tomorrow, and then takes a more detailed look at the varying nature of the challenge in different kinds of economies: the developed, developing and less developed regions.

Callout 12: Post-crisis Attitudes to Financial Innovation – Example Statements

- “Society continues to face significant unmet needs which we believe are likely to remain unresolved without significant and continuing development of new financial products and markets. This will occur through changes in financial market participants, the products they use, the platforms they interact on and the processes they follow. The Government, the industry and regulators must continue to encourage and welcome financial research and development where it delivers economic benefit, broader access, increased efficiency and greater safety.”
HM Treasury, UK international financial services – the future, A report from UK based financial services leaders to the Government, May 2009
- “The concept of financial innovation, it seems, has fallen on hard times.... Indeed, innovation, once held up as the solution, is now more often than not perceived as the problem. I think that perception goes too far, and innovation, at its best, has been and will continue to be a tool for making our financial system more efficient and more inclusive. But... we must be more alert to its risks and the need to manage those risks properly.”

Source: Bernanke, B. S. (2007) Speech to Federal Reserve Bank of Atlanta's 2007 Financial Markets Conference, May 15. Available at: <http://www.federalreserve.gov/newsevents/speech/bernanke20070515a.htm>

- “The Working Group recognizes that financial markets will remain global and interconnected, while financial innovation will continue to play an important role to foster economic efficiency.”
G20 Working Group 1, Enhancing Sound Regulation and Strengthening Transparency, final report, 25 March 2009

Quote 11: Peter Tufano, Peter Moores
Dean and Professor of Finance; Saïd
Business School, University of Oxford



Financial innovation – like any innovation – can be used for many purposes. There is an important role for regulation to ensure that financial products are offered responsibly to consumers. It is just as important to ensure that we continue to discover, test and offer new products and services that will improve the everyday financial lives of families.



(See Chapter 17 for full contribution)

4.2 Where Financial Innovation Creates Value – Four Key Opportunities for the Future

The role of financial innovation is to make financial markets more complete so that households, firms and governments can obtain finance, find the most suitable investments, and share risks in a mutually rewarding manner.⁵³

Within this broad definition, financial innovation is likely to create value through four key opportunities, whatever an economy's stage of development:⁵⁴

- Finance and grow the private economy
- Promote inclusiveness
- Improve efficiency, access and the customer experience
- Rebalance risk across sectors of the economy.

4.2.1 Finance and Grow the Private Economy

Financial innovation is held in low regard across much of the developed world since the financial crisis beginning in 2007. However, there are many areas where financial innovation can and should be used to address urgent economic problems.

Indeed, it is possible that the tougher economic and regulatory conditions since the financial crisis will act to increase the rate of financial innovation, through the introduction of a new business and regulatory environment. New challenges nearly always invite a new round of innovation.

In particular, legislative and regulatory actions to change the shape of the industry will both require and stimulate innovation. For example, new business models are likely to emerge, new ways of managing risk will be developed and new products will be required to match the increased strictness of prudential regulation.

One particular area of concern is the supply of credit. The developed world is demanding a sounder banking system way of increased regulatory capital and liquidity requirements. At the same time, governments are looking to the financial system to help provide the credit to grow the economy out of recession.

This is a conundrum, and for the moment the supply of credit remains low, particularly in Europe. Mario Draghi, President of the European Central Bank (ECB), said at the World Economic Forum Annual Meeting in Davos-Klosters in January 2012 that, while the ECB's new round of loans to banks had averted a major credit crunch, "credit remains seriously impaired in parts of the euro area".⁵⁵

It is likely that part of the solution to this credit conundrum lies in:

- Sustainable innovative products to hedge exposures and diversify risks, thereby freeing up capital
- New business models that provide access to capital in innovative and sustainable ways beyond the traditional banking sector.

In some sections of a developing economy, microfinance can be an important tool for encouraging self-employment and the setting up of micro-businesses. However, the real economic prize lies in working out how to encourage the small- to medium-sized business (SME) sector, which accounts for much of the employment in developed economies.⁵⁶ These businesses are too small to raise money from traditional commercial banks, let alone by issuing bonds on the debt markets, and are also often not well served by local institutions.

The answer may be to harness new ideas and technologies rather than trying to copy banking services in developed economies. For example, Garanti Bank, the second largest bank in Turkey with more than 9 million customers, lends to SMEs via a unique point-of-sale (POS) system.⁵⁷ The loans are for relatively small amounts (TRY 2,000-9,000; roughly US\$ 1,000 to US\$ 5,000) and short term (3 to 12 months) and require neither a guarantor nor collateral. Instead, a transaction-based credit scoring model allows for loan decisions to be made within five minutes.

The developed world also faces many deep challenges unconnected to the financial crisis that are likely to require new approaches to finance and, very likely, novel financial instruments.⁵⁸ These challenges include:

- Financing pensions and retirement plans in the face of demographic pressure (especially increased longevity with all its associated costs)
- Major infrastructure requirements
- Increasing healthcare costs
- New and renewable energy sources
- Cleaner industries

By contrast to the developed world, the capital markets of the developing world are relatively immature. Many experts think, for example, that it will be vital for emerging economies to develop bond markets in their local currency to stimulate investment, boost growth and improve financial system stability. Strong local bond markets will help corporations ease their reliance on bank finance and reduce the risk of currency and funding mismatches.⁵⁹

The speed with which local bond markets are predicted to develop is striking. In 2007, developing economy bond markets accounted for 11% of the world's bond markets, but it is thought this may rise to over 30% by 2030 and to nearly 40% by 2050.⁶⁰

Bond markets are not only developing in the fast-track BRIC nations but also in more challenging political and economic environments. For example, in the summer of 2011 PADICO Holding, the largest privately owned company in the Palestinian territories, issued five-year bonds at a value of US\$ 70 million. The oversubscribed offer was privately placed with a group of 14 Palestinian and Jordanian banks.⁶¹

4.2.2 Promote Inclusiveness

Contrary to popular belief, the problem of access to financial services affects many developed as well as developing economies. The situation in the United States provides a striking illustration.

In a national survey of the “unbanked” and “under-banked” conducted in the United States in 2009, the Federal Deposit Insurance Company (FDIC) found that many people in households with low-to-moderate income were unable to access simple financial products such as bank accounts or loans on reasonable terms. In particular, around 9 million US households (7.7% of the total), did not even have a checking or simple savings account, while a further 21 million (17.9%) of the “under-banked” regularly used services alternative to the mainstream financial industry (such as payday loans or pawn shops).⁶²

The FDIC found that a lack of banking services made many households, “more vulnerable to loss or theft and [they] often struggle to build credit histories and achieve financial security”.⁶³

The problem extends well beyond banking. The United States Census Bureau recently published a report on income, poverty and health insurance coverage⁶⁴, finding that over 16% of people were without health insurance in 2010. Around 9.8% of those under the age of 18 – over 7 million children and teenagers – lacked health insurance.

The problem is not going away. Figure 6 shows that the percentage of uninsured people, as well as the absolute number, continued to climb in the United States through 2008.

Many other countries in the developed world also face a challenge in making sure that everyone has access to minimum levels of financial services, healthcare and insurance.

Quote 12: Peter Tufano, Peter Moores Dean and Professor of Finance; Saïd Business School, University of Oxford

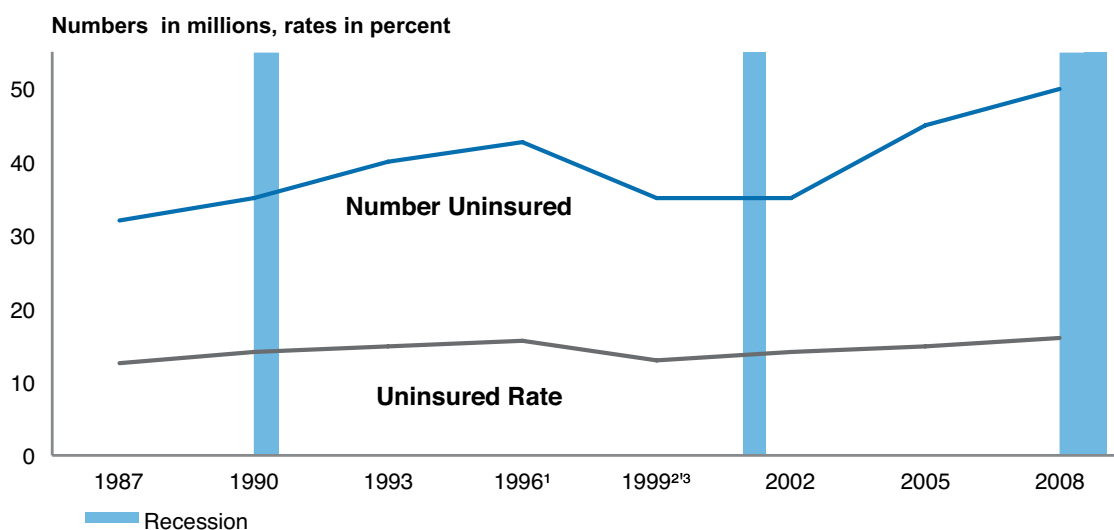


Rather than simply defend financial innovations, there is evidence that financial innovations can be designed for, and serve, the masses and especially the poor. Michael Sherradan’s pioneering work on Individual Development Accounts (IDAs), first discussed in his book *Assets and the Poor*, created a new asset-building vehicle for low-income families. IDAs are matched savings accounts for poor individuals, combining financial education and matched funding for certain activities (typically housing purchases, education and small business). There is evidence that this innovation, which is patterned loosely after 401(k) programmes, has had beneficial impacts on low-income savers. A newer innovation, Children Savings Accounts, is showing promise in asset building for low-income families.



(See Chapter 17 for full contribution)

Figure 6: Number of Uninsured and Uninsured Rate in the United States: 1987 to 2010⁶⁵



1. The data for 1996 through 1999 were revised using an approximation method for consistency with the revision to the 2004 and 2005 estimates.

2. Implementation of Census 2000-based population controls occurred for the 2000 ASEC, which collected data for 1999. These estimates also reflect the results of follow-up verification questions, which were asked of people who responded “no” to all questions about specific types of health insurance coverage by health insurance, bringing the CPS more in line with estimates from other national surveys.

3. The data for 1999 through 2009 were revised to reflect the results of enhancement to the editing process.

Source: U.S. Census Bureau, Current Population Survey, 1988 to 2011 Annual Social and Economic Supplements.

Like developed economies, developing and least developed nations face a challenge in making sure most people are able to access key financial services. However, the challenge is larger in scale.

Some innovations have been making a significant difference to living standards in under-developed countries for decades, notably the microfinance and micro-insurance movements. Micro-finance was pioneered by the Nobel Prize Laureate Muhammad Yunus and since the 1970s has been used to offer some of the poorest people in the world access to financial services including loans and money transfer.⁶⁶ Micro-insurance increasingly offers the poorest households a way to protect themselves against key risks in return for the regular payment of premiums.⁶⁷

The micro-finance industry now operates on a significant scale (see Figure 7). For example, since it was established in 1976 by Professor Muhammad Yunus, Grameen Bank has lent approximately US\$ 10.8 billion to some of the world's poorest individuals.⁶⁸ With nearly 8.4 million borrowers, the bank is the world's largest micro-lender.

For the general population, given the growth in microfinance lending, the key problem is perhaps not access to credit but to savings vehicles. While Women's World Banking research shows that the poor often save as much as 10% to 15% of their monthly income, there is often nowhere secure to keep it. Generally speaking, microfinance organizations do not offer savings accounts and need the permission of local regulators to do so. This is beginning to happen and there may be significant opportunities to develop savings institutions even in poorer regions of the world.

Another example that should be mentioned here is the use of mobile banking in countries such as Kenya, where this innovation provided access for millions of households to financial services. Callout 13 provides some interesting statistics on this financial innovation, which is a key contributor to economic growth in Kenya and a model for other economically undeveloped nations.

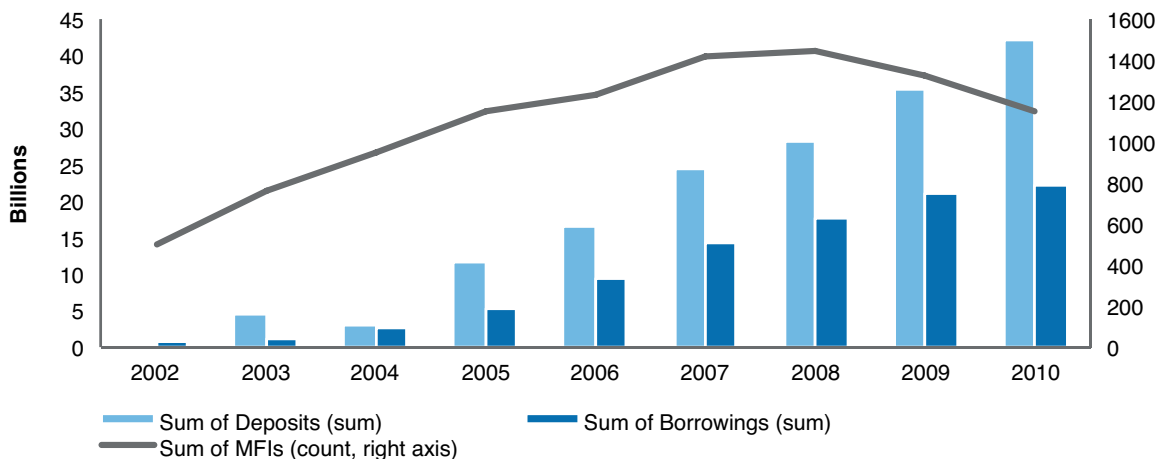
If innovation can help to make financial services more widely available in the least developed parts of the world, then the social and long-term economic gains will be huge. Households that are unable to save or access the most basic types of insurance are easily undermined by a financial shock such as a medical emergency. Such shocks in turn deplete household resources that might otherwise be used to improve educational opportunities or start a small business.⁷⁰

Callout 13: M-PESA

“M-PESA is a small-value electronic payment and store of value system that is accessible from ordinary mobile phones. It has seen exceptional growth since its introduction by mobile phone operator Safaricom in Kenya in March 2007: it has already been adopted by 9 million customers (corresponding to 40% of Kenya's adult population) and processes more transactions domestically than Western Union does globally. M-PESA's market success can be interpreted as the interplay of three sets of factors: (i) pre-existing country conditions that made Kenya a conducive environment for a successful mobile money deployment; (ii) a clever service design that facilitated rapid adoption and early capturing of network effects; and (iii) a business execution strategy that helped M-PESA rapidly reach a critical mass of customers, thereby avoiding the adverse chicken-and-egg (two-sided market) problems that afflict new payment systems.”

Source: Mas, I. & Radcliffe, D. (2010) Mobile Payments go Viral: M-PESA in Kenya. Bill & Melinda Gates Foundation. Available at: http://siteresources.worldbank.org/AFRICAEXT/Resour ces/258643-1271798012256/M-PESA_Kenya.pdf

Figure 7: Global Microfinance Overview⁶⁸



Source: MIX crossmarket analysis report <http://www.mixmarket.org/profiles-reports/crossmarket-analysis-report>

4.2.3 Improve Efficiency, Experience and Access for Customers

Innovation can increase the speed and efficiency of financial services, improve the customer experience and expand customers' access to financial services. Here, two areas are highlighted: technology-driven innovations and customer protection.

Technological innovation is already improving many aspects of the customer experience and new products, such as the latest generation of mobile devices and the iPad and its competitors, are reshaping how customers purchase goods and make use of payments services. Incremental innovations are likely to further leverage the potential of mobile and online banking, and fingerprint technology will be one of several new ways to establish a person's identity.

The second dimension of innovation likely to prove important concerns consumer protection. A new emphasis on protection may arise partly out of post-crisis regulatory concerns and partly out of the ever-increasing complexity of the financial world. Individuals must process an increasing amount of information and are increasingly able to enter into financial contracts at the click of a button. New approaches to consumer protection will be required if customers are to obtain the services they really want, make informed decisions and pay fair fees and interest rates.

One interesting driver of this area of innovation is the rise in behavioural economics and its effect on how regulators and the industry think about consumer protection. This is discussed in more detail in the contributions by Piyush Tantia and Margaret Miller in Part III of this report.

4.2.4 Rebalance Risk Across Sectors of the Economy

Risk management is an area where innovation is likely to be essential if the financial system is to benefit society. Risk management innovation has a diminished reputation, partly because of the misuse of derivatives and novel securitizations in the run-up to the financial crisis and partly due to the more general failure to anticipate and ward off the serious losses incurred in the crisis.

Yet it is difficult to imagine how society will cope with certain risks without further innovation, in particular:

- **Longevity:** The US Central Intelligence Agency states that, in developed countries, the length of time one can expect to live has increased to 77-83 years.⁷¹ It is likely to continue increasing, though no-one can be quite sure of the rate of improvement. While an increase in longevity is to be welcomed, without changes in public policy it will impose massive costs and financial risks on society that will need to be better addressed.
- **Climate change:** It is widely accepted that the climate is changing. This will require adaptation and impose new risks on many industries, most obviously agriculture. In the same way that 19th-century innovations facilitated agriculture and trade, financial innovation will again be necessary to manage these risks and to shift some portion of them to others in the financial system in return for a fee. To a degree this is already happening, and since the 1990s, the insurance and banking industries have developed weather derivatives that allow those exposed to unexpected weather events to offset the financial effects.⁷²

These risks will require new insurance markets and products, and innovative capital market solutions, if the financial services industry is to help society meet the challenge.

Quote 13: Piyush Tantia, Executive Director, ideas42



The safety of products can be evaluated at the design stage by simply examining the product dimensions and possibly doing some behaviourally informed consumer testing. Broadly speaking, three types of problems can occur:

- 1. Not paying attention to product terms and associated risks**
- 2. Paying attention, but misunderstanding the terms and risk**
- 3. Understanding the terms, but making a poor choice.**



[\(See Chapter 15 for full contribution\)](#)

5 Conclusion

Innovation is vital to society, because it is a key part of the three-part mechanism by which innovation, investment and competition combine to create wealth and distribute beneficial effects widely throughout society. Innovation helps to meet important needs, increase productivity, drive economic growth and create and distribute wealth.

This is as true for the financial services sector as for the rest of the economy. However, innovation is also important for reasons that are unique to the financial services sector. In particular, innovation in financial services not only acts to increase the efficiency of the sector itself but also capital productivity right across the economy. This can be seen through history and also in the recent decades since the Second World War.

Without the screening and capital allocation functions performed by finance, many of today's most productive industries would not exist in their present form. Innovation in financial services therefore has a multiplicative effect on the entire economy.

These beneficial effects can, however, be thrown into reverse when innovation is poorly applied and managed. The particular qualities of the financial industry and its products – its interconnectedness and use of leverage – mean that any negative outcomes from innovation can affect the financial system as a whole and the entire economy.

This section has explored how negative outcomes can arise from poorly thought out innovations as well as from the misapplication of innovations that might otherwise be fundamentally positive for the economy. With hindsight, it is clear that some products did more harm than good, notably CDOs. It is important to consider, however, whether this harm was inherent to the financial market innovation, or whether it resulted from using the innovation in the wrong way within the wrong market context.

Society must find a way of harnessing the beneficial effects of financial innovation while minimizing its negative effects. Many issues fundamental to human society and the development of the world economy require a degree of financial innovation, if they are to be successfully addressed. Part II of this report will explore the ways the financial industry can better manage innovation so as to mitigate the risk of poor outcomes while preserving the potential for positive outcomes.

Part II:

Reducing Negative Outcomes

6 Structuring a Solution

This part of the report moves on from a discussion of the benefits and pitfalls of financial innovation to offer a series of recommendations designed to reduce the chance of negative outcomes while not restricting innovation as a whole.

Before detailing the recommendations, however, it is helpful to set out more precisely the negative outcomes that they try to address, and to define the main elements and actors within the innovation process.

6.1 The Negative Outcomes to be Avoided

There are various ways to classify the negative outcomes sometimes associated with financial innovations. The four main types of negative outcomes are derived from interviews and discussions with industry practitioners, regulators, academics and other stakeholders:

- Consumer disservice
- Insolvency of institutions
- Systemic risk
- Loss of market integrity

Taking measures to reduce the likelihood of these four outcomes will also reduce the chance of most other negative outcomes. For example, an innovation that has a negative impact on the real economy usually first causes a loss of market integrity or a systemic crisis.

While distinct, these four types of negative outcomes are not mutually exclusive. Indeed, in the recent crisis, fear of one type of outcome (e.g. the insolvency of a financial institution) often led to another (e.g. a loss of market integrity) and various negative outcomes overlapped each other or appeared in parallel.

One should draw a clear line between these four classes of negative outcomes and the innovation outcome that Schumpeter called “creative destruction”. The process of creative destruction has negative effects for some established market participants, potentially even including insolvency but, overall, innovation that leads to creative destruction acts to increase the wealth of the economy by causing a reallocation of resources (e.g. labour and capital) to more efficient uses, thereby benefiting the economy.

By contrast, the negative outcomes defined below act against the interest of consumers and to the long-term detriment of the economy, while some entail violent short-term disruption to the whole market and its participants. They are cases of “destructive destruction” involving negative externalities for society at large.

Quote 14: Margaret Miller, Senior Economist, Financial Inclusion Global Practice, World Bank Group



Financial capability refers to the combination of knowledge, understanding, skills, attitudes and especially behaviours that people need to make sound personal finance decisions suited to their social and financial circumstances. Some of the most important behaviours for financial capability include:

- 1) making ends meet;**
- 2) keeping track of one’s finances;**
- 3) planning ahead;**
- 4) choosing financial products wisely; and**
- 5) staying informed about financial matters, often also termed “getting help”. In an environment of rapid financial innovation, these behaviours take on even more importance.**



(See Chapter 13 for full contribution)

6.1.1 Consumer Disservice

Throughout the history of financial services there have been incidents of both misfeasance and malfeasance committed in both the business and retail segments of the business.

Malfeasance and outright fraud are extraordinarily damaging but also, fortunately, extremely rare. However, many of the most frequent and still-damaging incidents of consumer disservice inhabit a greyer area in which no criminal act is committed and yet consumers are treated poorly. Financial innovations have sometimes played a role in this type of consumer disservice.

Suitability is a central issue. A financial product might be designed to offer an appropriate option to one consumer segment but then be provided inappropriately to another segment. For example, low-documentation mortgages were originally developed for affluent self-employed consumers and small business owners for whom traditional documentation standards were onerous. For a slightly higher fee or interest rate, such borrowers could reduce the complexity of a loan application and speed the overall process. Later, this product was offered to low-income borrowers with poor credit for whom it was less suitable. Other products might create problems if their suitability is a function of a rare event. This can lead some borrowers to choose adjustable-rate mortgages (ARM) or so-called option-ARMs or other introductory-rate products in settings where they may be inappropriate, perhaps because the applicants systematically under-estimate the chance of rate increases, or the likelihood that they will continue to hold the product over a long enough time for upward rate changes to materialize.

Consumers can also be disserved by sales staff who do not themselves understand the true risk and return profile associated with a new product. Where this happens systematically in favour of the institution, perhaps driven by incentives for the sales team, it may be difficult to draw a clear line between intentional and unintentional inappropriate sales. However, the result in the long term is similar: problems for the consumer and potentially for the institution.

At this stage it should be acknowledged that prudential regulation both in the banking but also in the insurance industries focuses very much on the protection of the depositors (in the case of banks) as well as the policy-holders (in the case of insurance) by ensuring the institution in question is financially sound. Additionally, there are numerous efforts under way to build financial literacy and ensure that consumers can navigate the increasingly complex financial services landscape. This will be elaborated in further detail in the recommendations sections as well as in the contribution by Margaret Miller in Part III.

6.1.2 Insolvency of Institutions

Most financial institution failures and insolvencies are not linked to financial innovations. However, as the recent crisis has shown, the misapplication or wrong design of financial innovations can sometimes play a role in the downfall of an institution. This is not Schumpeter's "creative destruction", where one party significantly out-competes another, leading to the latter's demise; it is a case of one party innovating in ways that prove damaging, either to itself or to an imitator because of unintended side effects or externalities.

This is particularly the case where the innovation introduces an unfamiliar kind of risk or obfuscates risk – for example, an unacknowledged contingent risk such as a liquidity risk. The institution enjoys the short-term rewards of pricing risk too cheaply until the market or events make transparent the true level of risk exposure and the institution rapidly loses the confidence of investors and counterparties.

6.1.3 Systemic Risk

Systemic crises happen periodically in financial systems and these crises are not necessarily caused by financial innovations. The interconnected and highly leveraged nature of the financial sector tends to make the financial system intrinsically sensitive to confidence.⁷³

However, as the recent crisis indicated, a financial innovation is sometimes implicated in the build-up of risk across the financial system to such a degree that a solvency or liquidity crisis occurs and governments and regulators eventually have to step in to prevent collapse.

The goal should be to identify how financial innovations might lead to or exacerbate systemic risk – alone or in combination – so that the danger can be recognized and reduced before a crisis crystallizes. Based on Merton's innovation spiral introduced earlier in this report, the mutation and massive proliferation of innovation is the focus of interest here. More attention should be given to rapid and perhaps excessive business volume growth in particular innovative products.

It should be noted that systemic risk is difficult to define and even harder to measure, as the report will discuss in some depth in the recommendations to the regulator.⁷⁴

6.1.4 Loss of Market Integrity

The economy relies on a variety of markets functioning effectively – the stock and bond markets, the foreign exchange markets and the futures and options markets.

If confidence in the integrity of a market is lost, then participants withdraw from it, liquidity dries up and the market may effectively shut down. The trigger for a chain of events like this might be loss of faith in the ability of a key market participant to honour his/her obligations, or a sudden loss of faith in the value of a key product traded in the market.

A large market participant could potentially use his/her dominant position to influence market outcomes to his/her own advantage, undermining general market integrity. There are various ways in which a financial innovation might be implicated in such a loss of market integrity.

The collapse of the asset-backed securities market during the 2007-2008 market crisis is one example of such a loss of market integrity. Recent allegations that quotes in the LIBOR market were manipulated by key participants could prove to be another example that threatens to undermine confidence in this vast and critical money market.

A loss of market integrity may lead to a sharp fall in both trading volume and market prices as participants seek to limit the damage to their portfolios and preserve liquidity, which in turn may have spillover effects in other markets and, potentially, the system as a whole.

6.2 The Innovation Process Disentangled

Figure 8 illustrates the financial innovation process and how the potential for a negative or positive outcome unfolds between two discrete sets of forces:

- The characteristics of each innovation and the associated environment, which differ across innovations such as a new payments mechanism, mortgage product, or longevity swap in the insurance industry. Important examples include:
 - Degree of leverage or embedded leverage involved in the product
 - Complexity and opacity
 - Range and variance of possible future values
- The combination of tools, processes and other mechanisms by which the industry and its regulators try to assess and manage the risks arising from innovations. Examples include:
 - Enterprise risk management and its various components
 - Regulatory requirements for stress testing
 - Disclosure requirements for consumer products
 - Rights of rescission in loan contracts

These two sets of forces act in opposition to each other to determine the net likelihood of a negative outcome arising from any particular innovation, and the extent of any damage.

This perspective on the innovation process suggests a number of considerations that help shape the recommendations.

First, the innovation process can be divided into three discrete stages: 1) the innovation environment from which innovation springs, 2) the innovation itself, and 3) its application in the market environment by the various stakeholders, including its use by customers.

Second, as this implies, a number of distinct groups of stakeholder helps to shape the innovation process. For the purposes of this report, the following distinctions are made: 1) individual institutions, 2) industry groups, 3) the regulator, and 4) the consumer.

Third, the financial services sector embraces a wide range of business models and markets. The recommendations differentiate between 1) banking, 2) insurance, and 3) the investment industry.

The following sections offer a short discussion about each of these considerations.

Quote 15: Alexander Ljungqvist, Ira Rennert Professor of Finance, NYU Stern School of Business

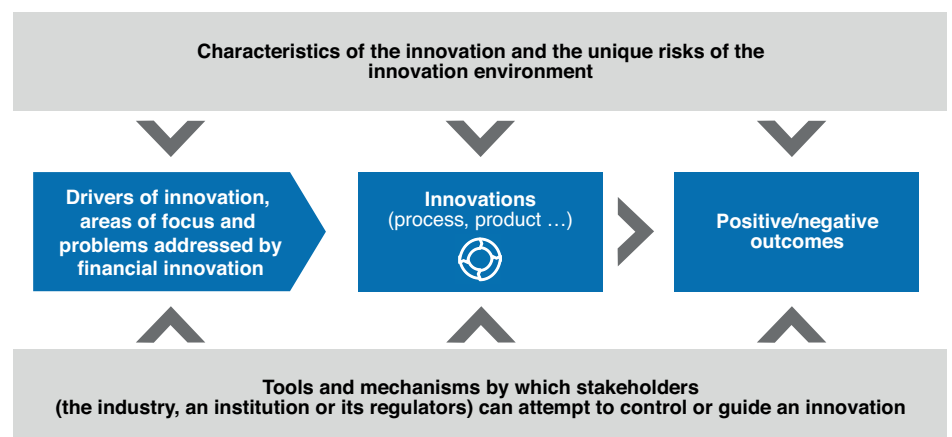


While providing a useful and valuable service, SecondMarket and SharesPost have the potential to affect the US financial landscape in quite fundamental ways [...]. As essentially unregulated markets, SecondMarket and SharesPost provide little, if any, investor protection. It seems only a matter of time before this will lead to problems. ... Such events – which will surely happen sooner or later – might undermine confidence in the marketplace. In turn, this could even lead to onerous regulation that kills off this financial innovation altogether.



(See Chapter 12 for full contribution)

Figure 8: A Framework Approach⁷⁵



Source: World Economic Forum and Oliver Wyman research

6.3 Innovation Process – Three Discrete Stages

Three stages in the innovation process need to be considered (Figure 9). First, the environment from which an innovation emerges may increase the chance of the innovation having a negative outcome. Innovations arising in an unhealthy environment, for example where the innovator is driven by the wrong incentives, are more likely to be damaging. Innovations can be viewed more positively if they emerge from an institutional and market environment that is focused on long-term profitability and where innovators can demonstrate the ability to assess associated risks. Organizations whose culture places great weight on reputation and seeks to minimize reputational risk as a key element of its innovation process will be less likely to bring forward new products or services that generate negative outcomes.

Second, the innovation itself affects the outcome through its novel characteristics and through the way it is presented to the market. Does the innovation fulfil “basic” standards for good product design? Are the mechanics of the innovation fully disclosed? Has the innovator made any risks in the innovation transparent to other users and adopters?

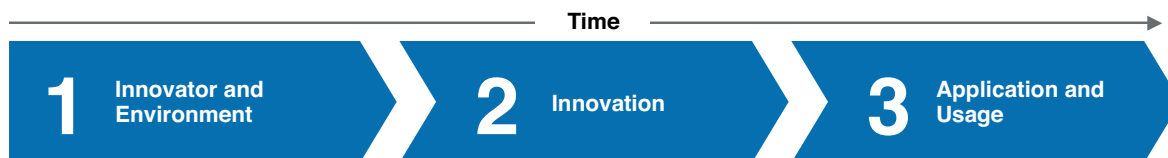
Third, once an innovation is released, the application of the innovation in the market and how it is used by consumers can be crucial. Problems often crop up when an innovation that was carefully tailored to answer the needs of a specific customer segment is marketed more widely, or lacks the supporting infrastructure available in the original market – perhaps especially when the innovation is copied by third parties who were not its originators.

Callout 14: The Three Pillars of Success for Innovation

“But the success of any innovation depends on three things. The first is how good the product is to begin with. Some financial products are poorly conceived or designed. Next is the appropriate use of the product: Is the product meant for a particular market or type of risk? And finally, the value of an innovation hinges on the competence of the person implementing it. Many of the products associated with the financial crisis failed on all these fronts.”

Source: Schrager, A. (2011) Innovations and Limitations: Where financial innovation went wrong, and how to set it right. National Review, October 3. Available at: <http://www.nationalreview.com/nrd/?q=MjAxMTEwMDM=>

Figure 9: The Innovation Process⁷⁶



Source: World Economic Forum and Oliver Wyman research

6.4 Stakeholder Groups

The success of an innovation is determined by a number of different stakeholders, each with different incentives and roles within the innovation environment:

Institutions are likely to be both innovators and users of innovations. As an innovator, the institution is responsible for an important part of the governance that should surround financial innovations. This takes the form of internal processes and policies and should form part of the institution's wider enterprise risk management framework. The institution is responsible for making sure its products, particularly innovative products, are responsibly sold and positioned in the market. Institutions are also customers for innovations brought into the market by others. As customers in the institutional sector, these firms have self-interest in improving their own "financial literacy".

Industry groups or associations play an important role in disseminating best practices and encouraging self-regulation mechanisms. The financial industry should set out standards surrounding innovation processes more clearly than at present and establish a set of best practices for innovations. Finally, industry groups should work with the regulator in monitoring how an innovation is applied in the market and used by consumers. It is in the financial industry's interest to help the regulator uncover nuisances and potential dangers arising from innovations, rather than leaving this responsibility with the regulator alone.

Regulators have a role in formal oversight and in establishing regulations that are often binding and enforced by law, for example, in relation to consumer protection. Less obviously, but importantly, regulators should work to ensure that the environment from which innovations spring is one that encourages a long-term perspective. There are also some particular risks that regulators should emphasize in their approach to governance (for example, because they cannot realistically be undertaken by individual firms). The recommendations section highlights some examples. However, regulators should not attempt to micro-manage the risks of innovation at the level of the individual product. While resource constraints alone may make this impractical, any such attempt might also suffocate beneficial innovation.

Consumers and clients play an active role in the process. Where firms fail to provide enough information, consumers increasingly feel empowered to demand it and to seek out advice. Consumers increasingly provide feedback through channels such as the Internet, consumer bulletin boards and consumer associations.

6.4.1 Financial Services – A Heterogeneous Industry

Financial services encompass a wide range of business models and markets. Rather than crafting a dedicated set of conclusions for each of these sectors and subsectors, the recommendations acknowledge the following broad categories:

- Banking is generally defined to include all firms accepting deposits and providing credit.⁷⁷ Most of the innovative products that are said to have contributed towards the financial crisis came out of the banking sector, and the banking sector is particularly vulnerable to systemic risks.
- Insurance can be defined to include all firms that engage in the business of effecting or carrying out contracts of insurance.⁷⁸ In the traditional insurance industry, systemic risk is relatively insignificant compared to banking, though the degree of difference in this regard may be decreasing.
- Investment embraces firms and professionals who regularly provide investment services to third parties and perform investment activities on a professional basis.⁷⁹ Many different kinds of entities are included in this sector and these specifics are addressed as required in the detail of the recommendations.

Within each of the sectors, there are some markets where sophisticated institutions deal with each other or with large corporations, and other markets where sophisticated institutions sell products to consumers. Clearly, the rule of "buyer beware" is more appropriate in some markets than others. The detail of the recommendations takes this into account as required.

Quote 16: Daniel Hofmann, Economic Counsellor, International Association of Insurance Supervisors



It has long been taken for granted that insurers would never be at the core of systemic crises and that innovation in insurance would consequently never become an issue of systemic relevance. But the current financial crisis has questioned this assumption of innocence. Financial innovation, perhaps also in insurance, is in the dock.



(See Chapter 10 for full contribution)

7 Recommendations

In this section, the recommendations from the project work are outlined. They are meant to strike an appropriate balance between a comprehensive, detailed and prescriptive set of recommendations for all parties – an almost impossible task – and a far more general, high-level summary of “issues to be addressed” – which may not prove to be very useful. Following this logic, these recommendations comprise an organized set of ideas and examples for how to better address the Knightian uncertainty associated with financial innovation.

The recommendations will not try to create a new regulatory or management infrastructure focused solely on “innovation risk governance”. Rather, recommendations will concentrate on changes to existing frameworks and processes needed to zero in on the ways innovation reshapes exposure to uncertainty and risk. Financial services is characterized by a very high degree of industry oversight through several layers of regulation; it is also an industry that, over the last 15-20 years, has developed and implemented an extraordinary range of risk-management processes employing sophisticated analytics to enumerate, quantify and control risk exposure. The recommended changes will attempt to focus on the distinctive aspects of risk and uncertainty – and associated negative outcomes – that are amplified by innovations.

The recommendations are developed in seven separate areas. The overarching theme will be introduced before detailing each set of recommendations. These recommendations are split across the stakeholder groups they address: individual institutions, industry groups and regulators.

The recommendations build upon two pillars: First, they address known weaknesses in the governance of financial services and draw upon ongoing efforts to address them, such as the well debated incentives problem and improved New Product Approval processes. Second, they try to apply lessons from other industries, especially in the modelling field, such as the use of real options and fuzzy logic.

Current market practices show a wide range of sophistication. Some institutions employ cutting-edge methods in their governance model while others are in the process of catching up to best practice. Thus, some of the recommendation may simply address known weaknesses by adopting best practice. However, the primary and secondary research conducted in the course of this project suggest that, for a significant part of the industry, addressing these weaknesses is an important agenda item now and in the immediate future.

Lastly, there are differences between banking and insurance: These differences may make a recommendation more relevant for one sector or the other, which are highlighted with suitable examples.

An overview of the seven recommendations can be found below, before they are elaborated in detail on the following pages.

Recommendations Oriented to Individual Institutions and Industry Groups

1. Review and adapt your Enterprise Risk Management (ERM) framework to address the incremental risks and uncertainties introduced by financial innovation
2. Revisit New Product Approval (NPA) processes to address the idiosyncrasies of financial innovation
3. Redesign incentives to provide the right motivation
4. Refocus your innovation efforts on customer orientation

Recommendations Oriented to the Regulator

5. Acknowledge the importance of innovation and its role in a competitive, free-market structure (and thus in pro-competition regulation)
6. Strengthen systemic risk oversight in light of the incremental risks and uncertainties introduced by financial innovation
7. Collaborate with the industry to monitor and oversee its efforts in managing innovation risks to drive sustainable financial innovation

Quote 17: Thomas Deinet, Executive Director, Hedge Fund Standards Board

“

Capital markets provide a fertile breeding ground for financial innovation because of the large number of sophisticated, entrepreneurial players operating in that environment. ... [M]any risk management techniques, including short selling and derivatives hedging, were pioneered in the hedge fund sector and the industry has acted as a driver of financial innovation.

”

(See Chapter 9 for full contribution)

Recommendations Oriented to Individual Institutions and Industry Groups

7.1 Review and adapt your Enterprise Risk Management (ERM) framework to address the incremental risks and uncertainties introduced by financial innovation

The crisis has shown that improvements can be made to the way Enterprise Risk Management frameworks address the risks and uncertainties that are related to financial innovations.

Consequently, the first set of recommendations is a review of best practices in the field of Enterprise Risk Management to account for the risks that can be introduced by financial innovation:

- A. Address the lack of historical data through forward-looking adjustments to parameterize models and provide adequate stress testing and scenario analyses
- B. Review the usefulness of flexible methodological approaches, such as real options and fuzzy logic, to address the out-of-sample properties of financial innovations
- C. Use flexible limits to encourage innovation and allow in-market testing of new ideas while managing total exposures until sufficient real-world observations permit further expansion
- D. Adapt organizational structures (including roles and responsibilities) to deal with financial innovation
- E. Improve Management Information Systems (MIS) to better monitor financial innovation

A. Address the lack of historical data through forward-looking adjustments to parameterize models and provide adequate stress testing and scenario analyses

Stress tests are a well-established tool within the risk management framework of most institutions to test individual risk categories (such as credit risk and market risk) as well as the institution as a whole. This report will not elaborate on stress testing and its current use but rather will focus on what stress tests could do for managing the risk of financial innovation.

Two ways that stress testing could be employed to manage financial innovation should be considered. On the one hand, financial innovations should be stress tested as a whole under different scenarios to assess the impact on the institution and how it may or may not shift the risk profile of the institution and other market participants. On the other hand, the underlying assumptions that influenced the innovation design should be stress tested to assess the impact of what happens if these assumptions do not hold true or adverse conditions unfold.

Stress Testing the Innovation

One needs to acknowledge some underlying difficulties when trying to include innovations (e.g. new products) in a stress test. The Bank for International Settlement released a Working Paper in January 2012 on macro stress testing in which it calls out the difficulties associated with financial innovation:⁸⁰

“All stress tests – like all models – rely on historical data to estimate empirical relationships. Given typical econometric techniques, these models reflect average past relationships among the data series, rather than how the series interact under stress. Their reliance on past data also means that these models are not well suited to capturing innovations or changes in market structure. And yet, innovations – be they financial, such as structured credit products, or ‘real’, such as the invention of railways – are often at the centre of the build-up of financial imbalances and the following distress [...] As always, assumptions are necessary to stress test new products. It is common practice to approximate the characteristics of new products by those of others for which historical information is available. This process involves potential pitfalls, which can result in a severe underestimation of risk.”

Nevertheless, stress testing a financial innovation is a key tool for identifying its risk profile. The limited historical data available must be augmented with forward-looking adjustments, acknowledging the specifics of an innovation, such as the unknown behaviours and potential out-of-sample characteristics. The next recommendation will outline methodologies that could be used to improve traditional stochastic approaches.

Including tail risk in the stress testing is important. The financial crisis has taught that Value at Risk (VaR) calculations based on short time periods are poor at identifying tail risk. The use of extreme stress scenarios that include second and third order effects should become the standard.

Stress Testing the Underlying Assumptions

Product innovations typically evolve based on a set of observed conditions, such as a low or high interest environment, abundant liquidity or inflation.⁸¹ These underlying assumptions need to be stress tested to assess the impact of adverse developments. This is less true of business model and process innovations but is still a consideration.

New products usually go hand-in-hand with a business plan that anticipates revenue development, operational costs and simulated risks (such as credit risk, etc.). These calculations should be revisited within a set of scenarios that explicitly stress these underlying assumptions, having the general question in mind “How bad could it be?” or “How bad would it have to be?” Reverse stress testing is one way to identify the thresholds in parameters which will lead to a failure of the institution or the system.

A simple example from consumer banking can illustrate this. Negative amortization mortgages were popular in the pre-crisis era with low interest rates attracting customers (see also the contribution on behavioural economics by Piyush Tandia in Part III for further insights). Even if the consumer is aware of the potential payment shock once the mortgage payments convert to amortizing payments which cover interest and principal, the financial impact on a household of these mortgages is strongly dependent on housing prices and can be especially painful for low to middle income families.

If housing prices decline, the borrower would quickly owe more than the property is worth, increasing the credit risk for the bank. Thus, before this new mortgage product was launched, an assessment of the underlying assumptions (for example, continuous increase in housing prices, stable macroeconomic situation, no adverse developments in the employment situation) could have highlighted that the bank would face unexpected risks, if conditions deteriorated.

Thus, a stress test should simulate the target size of the portfolio and its credit risk in case the favourable conditions become adverse developments. Under a falling housing price scenario, estimates of the probability of default (PD), the loss given default (LGD) and delinquency payments would have revealed the significant credit risk for the institution.

Ultimately, this would influence the approval of the new product by either limiting the permissible exposure to stay within risk appetite limits in the scenarios or by delaying or prohibiting the launch of the new product due to further considerations, such as the reputational impact implied by the scenarios. The latter aspect should be a key consideration for the innovating institution. As outlined in the contribution by Jennifer Tescher in Part III, trust has become a fundamental issue for financial services consumers. Once weaknesses of financial innovations, as in the case of the negative amortization mortgage, are discovered, tailoring this product to a target group that understands the risks and wants to take them on rather than launching it for the general public could prove more sustainable for the innovating institution and the industry as a whole.

Quote 18: Jennifer Tescher, President and CEO, Center for Financial Services Innovation

“

Trust is the currency of the financial services industry. One of the lasting consequences of the recent financial crisis is a lack of trust, which in turn creates an inhospitable environment for innovation.

Despite a raft of new regulations and capital requirements designed to protect consumers and strengthen financial markets, consumer confidence in financial institutions continues to be low.

”

(See Chapter 16 for full contribution)

B. Review the usefulness of flexible methodological approaches, such as real options and fuzzy logic, to address the out-of-sample properties of financial innovations

Current practices could be improved by augmenting traditional stochastic approaches with more flexible methodologies to address the “out-of-sample” nature of financial innovation. Several tools are available for this task, though they currently have only limited application within the financial services industry. (That said, some firms in the reinsurance sector are at the cutting-edge of methodological advances in risk management.) Examples of such new methodological approaches include real options and fuzzy logic – though these are just two from a long list of available methods that could be considered.

Real Options

Real options are a powerful alternative method to assess the value of Research and Development (R&D) projects and innovations. Originally introduced by Stewart Myers in 1977, “real options” refers to the application of option pricing theory to non-financial or “real” investments with learning and flexibility, such as multi-stage R&D. The method has received increased attention since the late 90s and now has many applications.⁸² However, nowadays the term “real options” extends to the general discipline of decision-making under uncertainty and is thus an increasingly popular method for business strategy formulation.⁸³

It is not the intention of this report to provide an extensive review of the strengths and weaknesses of real options as there are a number of standard publications available for reference from leading universities, such as Stanford and MIT Sloan School of Management. Real options are merely an example of how decision-making under uncertainty can be improved by staging decisions: business conditions are volatile, outcomes are uncertain and there is a risk of negative outcomes. Thus there is a high investment risk to any decision to proceed with innovations.

Real options address these risks and acknowledge that there is significant upside. They reflect the value of such possibilities as well as the option to abandon the project if circumstances prove worse than expected.

In fact, other industries explored in the course of this project, such as pharmaceuticals and the oil and gas industry, have been using real options for several years to evaluate risks and returns associated with R&D investments.⁸⁴

Fuzzy Logic

As proposed by Zhou and Dong,⁸⁵ fuzzy logic addresses situations where membership in a set is a matter of degree. In other words, it deals with problems in which a source of vagueness is involved, as well as interpretation that is approximate rather than fixed or exact. Fuzzy logic and probabilistic logic are mathematically similar (that is, both have values for a given “state” that range between 0 and 1.0) but conceptually distinct due to different interpretations. Fuzzy logic corresponds to “degrees of truth” which may be “absolutely true,” “absolutely false” or some intermediate truth degree: a proposition may be more true than another proposition, whereas probabilistic logic corresponds to “likelihood”.

There are many examples of how fuzzy logic could improve decision-making under uncertainty in the field of innovation and new product approval processes. These examples are mainly drawn from the non-financial services world. An interesting application of fuzzy logic can for example be found in the article, “A fuzzy-logic-based decision-making approach for new product development”⁸⁶, where the authors outline three distinct applications of fuzzy logic to improve decision-making under uncertainty and address the idiosyncrasies of innovation:

- Selection of innovative ideas: Pseudo-order fuzzy preference model (Roy and Vincke, 1984)⁸⁷
- Selection of the best innovative idea: Fuzzy weighted average method (Vanegas and Labib, 2001)⁸⁸
- Selection of the best development strategy: Fuzzy AHP method (Triantaphyllou, 2000).⁸⁹

A distinct feature of fuzzy logic is that its reasoning is similar to human reasoning. Being able to process incomplete data and involve expert judgement by applying the “degrees of truth” are key strength in this approach. Crucial here is obviously the selection of experts, i.e. the staff involved in the assessment.

A similar application in the space of financial innovation – tailored to the specific innovations and idiosyncrasies that characterize financial innovation – seems worth considering. It can prove to be a powerful tool for the industry to improve its decision-making under uncertainty.

A number of other approaches could be considered here to augment traditional stochastic methods currently predominantly in use in financial services. The examples given above are simply illustrations drawn from observations in other industries and disciplines to improve the ability to make decisions under uncertainty and increase the likelihood of favourable outcomes in the field of innovations.

C. Use flexible limits to encourage innovation and allow in-market testing of new ideas while managing total exposures until sufficient real-world observations permit further expansion

Flexible internal limits can be used for new products if they are considered risky relative to other financial innovations. Financial innovation needs to be tested in the market in order to assess the true externalities, behavioural changes and potential risks.⁹⁰ Rather than denying the introduction or launch of innovations, a trial period which allows the innovator and other stakeholders, such as customers and the regulators, to observe and evaluate an innovation should be considered.

An internal set of limits for new products that evolves and is responsive to observations could help in evaluating financial innovations. This is standard practice in insurance and reinsurance but other financial services might also benefit from applying this approach. Depending on the nature of the innovation and innovating institution, these limits could take different forms, for example:

- Internal capital limits: Dedicated capital limits for innovative products to minimize extensive leverage in the beginning and restrict unanticipated losses
- Volume limits for new products: Cap the exposure to innovations for individual institutions to provide some time to review and assess the innovation and its risks in the market until better understood. Limiting the “types” of customers to whom the new product would initially be sold mitigates risk exposure and avoids sales to unsophisticated consumers.

These self-imposed limits would likely discourage further regulatory limits and are tools for the Chief Risk Officer to encourage prudent launch of innovations. Also, this approach provides additional data points for a more accurate risk assessment of innovations after they have been launched.

D. Adapt organizational structures (including roles and responsibilities) to deal with financial innovation

The organization of innovation in financial firms can be improved in two ways:

- Introduce a dedicated senior role to manage the idiosyncrasies of financial innovation
- Ensure appropriate Board oversight, for example by broadening the role of the Board Risk Committee

While this may seem to state the obvious, the financial crisis has highlighted various governance shortcomings. Readers should view this as a “call to action” rather than the introduction of a new idea.

Senior Role

An innovative financial institution should have a senior employee within the risk organization who addresses the idiosyncrasies of financial innovation as part of their job. The risks and uncertainties of financial innovation affect many internal processes and policies (such as ERM, MIS, New Product Approval Processes, Stress Testing and others). A centralized role responsible for ensuring that the risks of financial innovation are adequately addressed across the organization may prove useful. The person who fills this role would require a deep understanding of the risks and uncertainties of innovations to successfully oversee and manage innovations.

This role should probably report to the Chief Risk Officer (CRO), but it could conceivably be located elsewhere. While the role should not only include the dedicated oversight of financial innovation activities within the organization from a risk perspective, it could also report into the relevant structures responsible for the new product development or new product approval processes to assess the risk-return trade-off, including the negative outcomes/externalities identified as the focus of this report.

The role may be better positioned in a stakeholder view rather than the pure shareholder value approach. As such, the role would look out for the interests of all stakeholders: “The stakeholders in a corporation are the individuals and constituencies that contribute, either voluntarily or involuntarily, to its wealth-creating capacity and activities, and that are therefore its potential beneficiaries and/or risk bearers.”⁹¹

Board Oversight

The Basel Committee's Principles for enhancing corporate governance (published in October 2011) recommend that the failings of Corporate Boards to 1) understand or control risks taken by the executive, 2) limit exposure to complex or leveraged lending, and 3) allow their banks to operate with a material liquidity shortfall, should be addressed by establishing a Board-level risk committee.⁹²

Further, it should be made an explicit task for the Board Risk Committee to oversee the innovation activities of the institution and receive dedicated reporting on this subject embedded in the existing Board reporting, i.e. not a separate report (see also the next recommendation). The Board should be able to understand the risks associated with innovation and the likelihood of negative externalities associated with the innovations. The risks for the institution if an innovation fails or develops a set of negative externalities can be severe, ranging from reputational impacts to bankruptcy in the worst case.

Delegation to management is not questioned by this recommendation. It is rather in the spirit of enhanced corporate governance as required by the Basel Committee and other oversight bodies to ensure the Board is explicitly aware of the risks and uncertainties of innovations.

E. Improve Management Information Systems (MIS) to better monitor financial innovation

The demands placed on MIS at financial institutions have increased significantly over the last four years. Increased regulatory requirements to provide tailored reports were certainly a driver but the appetite of internal stakeholders (such as the Board, Executive Management and Operational Management) for actionable and effective reports has also increased. As it is not within the scope of this report to outline best practices for MIS as a whole, the following will focus only on what MIS should ensure from a financial innovation perspective: how it can increase awareness of the risks and support decision-making. However, reporting is not a panacea and robust feedback loops from monitoring to decision are mandatory to ensure MIS has "teeth". Even though MIS and monitoring may exist, the "call on action" is where failures could be observed in the past.

On an institutional and an industry level, periodic reports dedicated solely to financial innovations and their developments can be a useful source of information for the Board and the Executive Management, including the CRO, to take informed decisions in steering the institution.

Tracking revenues to see the percentage coming from products of different degrees of "newness" (e.g. a spectrum of "innovation vintages" across ranges such as "less than 6 months old", 7-24 months, 25-60 months, greater than 5 years) can provide insight into potential volatility of earnings and the inherent risks in those revenues. Earnings at Risk is a well-established metric in a financial firms' MIS; it shows the impact of an interest rate change on net income. A similar metric could be constructed to show how a shift in the factors and assumptions associated with revenue-generating products, by "innovation vintage" could change total income.

All the previously outlined aspects that could be addressed from an ERM perspective should feed into the MIS and adjustments made to monitor each of these aspects adequately. Improved MIS will provide several benefits to individual institutions and the industry:

- Help management and Board members understand the effect of innovation on current income while reflecting the associated risks, and the sensitivity of revenues and income to innovation uncertainties
- Benchmark each institution against the industry, using metrics such as "revenue innovation vintage", to support decision-making for risk management and new product approvals
- Monitor and challenge the underlying assumptions for innovations and their planned or budgeted role in the portfolio of the institution. Stress testing will be effective only if it is adequately reported and leads to actionable decisions
- Track the utilization of internally imposed limits for innovations at the institutional level

7.2 Revisit New Product Approval (NPA) processes to properly address the idiosyncrasies of financial innovation

The following recommendations deal with the adequacy of the internal innovation management process and in particular with the new product approval (NPA) process. As with Enterprise Risk Management processes, New Product Approval processes need to be revisited to address the incremental uncertainty introduced by financial innovation. The previously introduced elements such as stress testing, limits and MIS are part of the innovation processes and feed into the NPA process.

NPA processes are not new within financial services; most banking and insurance regulators require them and explicitly address the question of how to treat customers fairly (see Callout 15).

In the insurance sector, the requirement for NPA processes is similar if not even stricter than in the banking sector. Generally speaking, there is a “caveat emptor” approach on the commercial side of insurance while personal lines (such as auto, home owner, life) frequently require a pre-approval by the regulator on product design including pricing and other characteristics.⁹³ This is similar to what is observed in other industries, such as pharmaceuticals where regulatory pre-approval of innovations before they are launched is a foundation of innovation governance (see contribution by Bill Shew in Part III).

Some adjustments to the standard NPA process to better address the introduced idiosyncrasies of financial innovation and internalize potential externalities before they can occur are suggested:

- A. Allow for a trial phase for new (especially consumer) products to collect data for testing the use of the product and its associated risks
- B. Improve the identification and handling of mutations and adaptations of financial innovations to assess incremental innovations arising from changes to existing products
- C. Improve the MIS to address recommendations A and B

Quote 19: Bill Shew, Partner, Oliver Wyman



While a subject of some debate, most industry observers believe that regulatory agencies worldwide have taken a stricter stance, particularly with regard to safety, in recent years. Many point to the 2004 withdrawal from the market of Merck’s blockbuster anti-inflammatory drug Vioxx as the demarcation point for greater regulatory scrutiny.



(See Chapter 14 for full contribution)

Callout 15: Regulatory Requirements for the New Product Approval Process

- The Basel Committee requires that “Banks should have approval processes for new products. These should include an assessment of the risks of new products, significant changes to existing products, the introduction of new lines of business and entry into new markets. [...] This should include a full and frank assessment of risks under a variety of scenarios, as well as an assessment of potential shortcomings in the ability of the bank’s risk management and internal controls to effectively manage associated risks. [...]”

Source: Bank for International Settlements (2010) Principles for Enhancing Corporate Governance. Available at: <http://www.bis.org/publ/bcbs176.htm>

- The European Banking Authority states: “An institution shall have in place a well-documented new product approval policy (“NPAP”), approved by the management body, which addresses the development of new markets, products and services and significant changes to existing ones.”

Source: European Banking Authority, (2011) EBA Guidelines on Internal Governance (GL 44). Available at: http://eba.europa.eu/cabs/media/Publications/Standards%20and%20Guidelines/2011/EBA-BS-2011-116-final-%28EBA-Guidelines-on-Internal-Governance%29-%282%29_1.pdf

- The Financial Services Authority advocates “Treating Customers Fairly”: “Firms should consider how best to factor in treating customers fairly (TCF) as part of the new product development process. This might include:
 - Developing products appropriate for specific target markets, based on a clear understanding of the likely needs and financial capability of each group of consumers; and/or
 - Assessing the risks a product may pose to groups of customers under different scenarios, including an understanding of the impact of extreme scenarios (this has been referred to as stress testing).”

Source: The UK Financial Services Authority, (2012) Product design: Considerations for treating customers fairly. Available at: http://www.fsa.gov.uk/pages/doing/regulated/tcf/pdf/product_design.pdf

A. Allow for a trial phase for new (especially consumer) products to collect data for testing the use of the product and its associated risks

In the retail world, where time horizons are long (home mortgages, for example), a trial phase for new products may prove useful to observe the product in the market. Contrary to the previously suggested limits, as part of the NPA an institution may also want to consider setting a certain timeline to conduct dedicated market trials with focus groups of a new product similar to clinical trials in pharma. Market trials would not only produce real data on usage but these data could be supplemented through the use of ethnographic research to observe how consumers actually use the product, compared to assumptions made during the NPA process.

This would address the potential for mis-selling or customer disservice in the industry. In line with the FSA's efforts for "Treating Customers Fairly", it is important that the innovating company understands "[...]and] can identify and put in place appropriate controls to ensure customers are not exposed to inappropriate risk".⁹⁴

This phase would not only allow for some assessment of risks inherent in the product but also risks arising from misuse. The innovator can evaluate the product design but also the associated disclosure, suitability and comprehensibility of the product and improve these dimensions where required.

B. Improve the identification and handling of mutations and adaptations of financial innovations to assess incremental innovations arising from changes to existing products

Improvements to and variations of existing products are frequently de facto innovations. These adaptation-innovations can exhibit the same increases in Knightian uncertainty that is more visible with "new-new" products. In fact, an adaptation-innovation may be even riskier. It may be easier to recognize the absence of relevant empirical data when evaluating a "new-new" innovation. In the case of an adaptation, it is possible to make the mistake of thinking that empirical data from an earlier version of the same product are a statistically reliable guide to the future behaviour of the adaptation.

This may cause distress in financial markets precisely because the necessary sense of increased Knightian uncertainty is replaced by a false sense of high certainty. Especially in cases where the original innovation is not a problem at all, this may hold true as it might only be the n-th mutation, which changes the underlying characteristics of the original, that will cause the trouble. Alternatively, the adaptation of an innovation for a different purpose than originally intended may lead to a set of externalities previously not considered and therefore not anticipated in the risk management processes governing this innovation.

A firm's internal risk management framework and New Product Approval process must account for changes to existing products. To repeat the guidance given by the EBA, with added emphasis: companies "... shall have in place a well-documented new product approval policy ... which addresses the development of new markets, products and services and significant changes to existing ones". Once characteristics are changed (not the appropriate interest rate for a mortgage but a change to the characteristics of the mortgage), the nature and size of risks may need to be reassessed.

As the framework by Terwiesch and Ulrich referred to in Part I highlighted, innovation is not only characterized by new markets and new technologies but also includes "improvements, extensions, variants and cost reductions".⁹⁵ There are two major possibilities for these "mutations":⁹⁶

- Use of innovations beyond their original core purpose (for example, risk mitigation, capital relief, hedging, revenue enhancement, client need, etc.), especially with increasing opacity, complexity and heterogeneity of financial innovations, the intended or unintended misuse could increase, leading to adverse outcomes
- Use of innovations beyond the original target market or client (for example, retail, institutions, particular industry or sector, infrastructure, etc.) exposing customers to risk which was not planned for.

Based on the project review, "scale" should be added to this list. Innovations and their effects can significantly change with increased volume in the market. New risks can be introduced (such as systemic risk) and the originally determined risk profiles may have shifted.

Thus, similar scrutiny should be applied as for "full" innovations that are not in the grey area of variations and modifications. This includes the combination of products for new strategies (e.g. investment or hedging) that may result in a new risk profile, which is not the mere addition of the products involved.

There is a limit to the extent to which the innovator can be held responsible for modifications and adaptations of financial innovations in the market. Taking the example of CDSs, JP Morgan as the innovator should not be held responsible for any abuse of this innovation in conjunction with CDOs; rather, the "incremental innovator" introducing these new structures should have re-assessed the risks and likelihood for negative outcomes.

Consequently, a key question to be answered by the individual institution but also by the industry as a whole is where the threshold between innovations and mere updates should be set. This will ultimately determine where the full application of governance mechanisms is required.

C. Improve the MIS to address recommendations A and B

The previously introduced aspects to MIS as part of the first recommendation hold true. For the second recommendation, it should be noted that the use and diffusion of an innovation should be monitored, in large part so the adaptations that should be treated as innovations can be made more reliable. This is particularly true for an industry level MIS where industry associations could monitor the use and adaptation of innovations in the marketplace.

Some innovations may require additional attention and a call for action on an industry level with regulatory engagement, especially those that are used beyond their original purpose or beyond their original target segments. The use of financial innovation beyond its purpose and the implications that can arise were outlined earlier in this report, in the section on financial innovation and the role in the crisis for examples such as CDSs and ABS.

7.3 Redesign Incentives to Provide the Right Motivation

Once the crisis had unfolded, incentives quickly became a focal point for change (see Callout 16). An October 2011 report for the Institute of International Finance (IIF) highlighted progress made by financial institutions in implementing the principles of incentive design set out by the Financial Stability Board (FSB) in 2009. These principles were needed, according to the FSB, because “[c]ompensation at significant financial institutions is one factor among many that contributed to the financial crisis that began in 2007”.⁹⁷ The full set of principles can be found in Appendix 2.

Although the FSB report was able to highlight significant progress on all of these dimensions, three areas were singled out as areas of difficulty where further progress was needed:

- The need for continued efforts on risk data and stress testing. Data challenges are an ongoing area of work for all banks and the survey highlighted that the majority of respondents are continuing work on the accuracy of their data, which is addressed in a previous recommendation.
- Technical issues related to new measures such as bonus-malus and clawback clauses. These features are now in place but many banks note that they need to address some remaining practical issues over the application of performance based bonus-malus and clawback clauses.
- The treatment of material risk takers (MRTs). Institutions are complying with the requirement to identify MRTs and tailor their compensation approaches to these individuals. However, a wide range of approaches is used to identify and incentivize MRTs, making meaningful comparisons across institutions difficult.

These three areas are noteworthy because the challenges posed by effective incentive design are made harder in the context of innovation. The objective is not to assess risk in financial services but to highlight the ways in which financial innovation might increase risks through unintended consequences. Many risks of financial innovation are immeasurable, creating a particular type of uncertainty.

In the following, two particular aspects for incentive design are reviewed:

- Clarify the challenges that innovation creates for incentives systems
- Review incentive system designs to address the uncertainties around innovation and encourage better customer orientation

Callout 16: Incentive Misalignment and the Financial Crisis

Incentives are recognized as a cause of the financial crisis, especially in connection with home mortgages and mortgage-backed securities. On the consumer side, the incentives paid to mortgage brokers and mortgage originators in what had become an “originate-to-distribute” business model were earned and paid when the loan was granted, and often geared to loan value (on a mark-to-market basis). This separated the incentive payments in time from the life of the loans, and therefore from their true unfolding values. It also provided a direct incentive to “mark up” loans to borrowers. Marking up a loan, by charging a higher interest rate than the ultimate lender’s “best rate”, immediately raises the likely gain-on-sale of that loan; it is also easier to do when the borrower has poor credit, which implies fewer borrowing alternatives, and when the borrower has low financial literacy. The subprime and near-prime mortgage market segments became focal points for this type of mis-selling in the United States.

Equally, the packaging for the sale of securities backed by these loans was, for a time, a very lucrative business for investment banks. The structured credit units that managed this business were booking profits from the sale of these securities and paying substantial end-of-year bonuses to bankers and salesmen. The true value of the securities emerged over a longer timeframe.

The problem of incentives is pervasive. One can argue that poorly designed incentives also played a role in recent years in the mismatch of expectations between various parties: shareholders of financial services firms and their senior managers; senior managers and the unit heads and employees; purchasers of these mortgage securities and their own institution’s shareholders.

One of the most often repeated quotes from the recent crisis is this statement, made in a July 2007 interview with the Financial Times, by Chuck Prince, who was Chief Executive Officer of Citigroup at the time: “When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you’ve got to get up and dance. We’re still dancing.”

The comment was made shortly before Lehman Brothers’ demise. Prince was commenting on Citibank’s loans to private equity firms, but the quote has been widely seen as a reflection of the pressures on senior bankers to continue with business practices that are already raising concerns because of the need to meet profit expectations and maintain market position. In fact, Mr Prince later elaborated on what he had meant, saying that if Citi had backed away from this kind of lending it would have lost market share and key employees from the affected divisions. He said it was “... impossible to say no and still have any bankers left”.

So too in the mortgage world: the structure of incentives within the prevailing business models of mortgage origination and securities sales led to a perverse situation in which nobody could summon the will to stop what they were doing, even when it had become apparent that the situation was risky. What is worse is that the structure of incentives may have directly contributed to the growth of the problem, not just to the unwillingness to step back from it late in the game.

A. Clarify the challenges that innovation creates for incentives systems

Innovation makes it harder to measure profit (or value) at the time of sale and therefore to determine an appropriate incentive payment. The industry can usefully explore new methods for estimating future cash flows, including associated uncertainties, and hence value, some of which is examined elsewhere in this report. But no approach will offset the need to incorporate some degree of deferral and the possibility of clawbacks in future incentive designs.

The period of deferral need not be set equal to the term of the underlying instruments or assets, such as 30 years for mortgage-backed securities. The degree of uncertainty associated with the value of a long-tenure product decreases rapidly during the early years of its life. Even so, the concept of annual bonuses, paid in full, but driven by underlying products with effective tenures of three to six years, is inappropriate.

The principles of effective incentive design are broadly applicable. In the context of financial innovation, those relating to risk adjustment, alignment in time, deferral and clawback are particularly important.

The recent crisis highlighted deficiencies with incentives on the consumer-facing side of the banking business. The US mortgage market, in particular, had similar misaligned incentives in which the annual compensation of mortgage brokers, mortgage originators and structured credit salesmen was heavily incentive-driven, encouraging more and more loan production with weaker and weaker underwriting standards.

Quite apart from the problems associated with the recent housing bubble and related subprime mortgages, the industry has seen many mis-selling problems in several national markets. These kinds of mis-selling problems have given rise to calls from various parties for the financial services industry, in both banking and insurance, to adopt a more pro-consumer perspective. These calls range from the idea that individual banks or insurers should adopt a pro-consumer charter, or set of core principles, to the idea that they do so through some kind of industry group, thereby binding everybody to a common set of standards and avoiding a “race to the bottom” in terms of market practices. Alternatively, calls have been made for such principles to be imposed by industry regulators.

Elsewhere in this report, the economic argument for a pro-consumer strategy is discussed. Whether a pro-consumer strategy is necessarily more economically sound than a traditional strategy cannot readily be determined. However, various factors are likely shifting the balance in that economic argument away from a doctrine of caveat emptor in the direction of a more pro-consumer, or “caveat venditor” strategy.⁹⁸ In such an environment, it is useful to consider what changes it would imply to the design of incentives for banks and insurers, or their agents, especially in the context of innovation.

Several helpful principles, derived from Principal-Agent Theory, have guided incentive design historically:

- Align incentive payments with the intrinsic profitability (or value) to the company of the item that is sold; this steers agents away from selling unprofitable products.
- Make sure that the assessment of profit (or value) is correctly adjusted for risk; this guards against over-rewarding based on an improper assessment of true value.
- Keep reward close to effort: make incentive payments at a time that is close to the period in which sales are made; this has been shown to be effective and reflects basic psychology:
 - But offsetting this is a requirement to align the timing of reward payments over the life of the product being sold; if the assessment of profit (or value), including associated risk, is very reliable, this need not be a factor in incentive design but if the assessment at the time of sale is uncertain and the value of a sale can only be observed over the life of the product, then “keeping reward close to effort” needs to be balanced with “alignment over time”.
- Design the incentive to reward productivity; there are several dimensions to this point, many in the form of typical errors to be avoided:
 - Make the incentive award “linear”; more sales should garner more reward.
 - Avoid “cliff events” in which an extra reward or prize is given for reaching a particular threshold, which introduces a massive distortion for incremental sales made close to the threshold; also avoid goals, caps, floors, minima, all of which introduce distortions.
 - Avoid other “kinks” in the reward structure, such as different rewards rates on different tranches of achieved sales.
 - Avoid the use of different targets for various products which also introduces distortions to the behaviour of agents.

B. Review incentive system designs to address the uncertainties around innovation and encourage better customer orientation

In the context of incentive design, the elements that are most sensitive are the proper assessment of profit or value, an accurate adjustment for risk, and the timing of incentive payments.

In the context of an innovation, it is intrinsically harder to assess the profit or value that will result from a sale, including the appropriate risk-adjustment of that measure. And if the product has a tenor significantly more than one year, it would argue for greater deferral of reward payment in the context of an innovation, with the possibility of clawbacks for mis-selling.

Financial innovation may also reduce risk. Adaptive behaviour may occur in the insurance world when a new form of insurance or its pricing triggers significant behaviour change. One current example of this is emerging in the case of personal lines of insurance where “telematics” are increasingly used to set auto insurance premiums that are more in line with risk. Once drivers know that their premium reflects such factors as their average speed, top speed, aggressive braking and aggressive acceleration, many of them respond by changing their driving style. The consumers have adapted to the insurance pricing in a predictable manner, but because the financial innovation is “out-of-sample,” the degree of adaptation is not known a priori.

At the risk of over-generalizing, incentive design within financial services is not uniformly aligned with the principles set out above. The industry can certainly do more to establish effective and non-distorting incentive schemes for employees and third parties who act as agents for banks or insurers. With respect to innovation, however, the particular emphasis in incentive design should be on:

- Attention to the challenges of profit or value and risk assessment, both of which should influence the amount of any incentive payment:
 - Dealing with out-of-sample situations
 - Making reasonable assumptions about future behaviours
- Attention to challenges of payment timing and clawbacks, where the product life is significantly greater than one year:
 - If the product life is greater than one year, and if expected cash-flows in the out years cannot readily be anticipated, it will be prudent to defer part or all of the incentive award until those cash-flows materialize.
 - In practice, the incentive award may need to be larger to offset the inherent reduction in perceived value to the agent in such a scheme.

7.4 Recommit and Refocus Innovation Efforts to be Customer Oriented

Four kinds of negative outcomes that can be associated with financial innovation were identified in Chapter 6. One is “consumer disservice”. Industry observers cite many examples of innovation that have led to disservices to consumers, including negative amortization mortgages, some forms of credit insurance, high-load investment funds, variable annuities – even debit cards. Indeed, some observers allege that some innovations may actually be inspired by a desire to generate opportunities for such disservice, through the deliberate creation of complex products whose true likely value is obscure and whose terms and conditions are arcane.

Whether deliberate or accidental, the existence of consumer disservice through financial innovation does not benefit society and should be discouraged by public policy.

Changes are occurring in the way individuals see and respond to financial products – and to financial institutions. It seems certain that this will tilt the game-theory logic the other way, towards a more consumer-friendly strategy. Some of these changes were triggered by the recent financial crisis, during which banks in particular, and even some insurance and reinsurance firms, found themselves in financial straits. When these firms were “bailed out” they became to some extent “public property” – especially where governments invested directly, as in the cases of Northern Rock, RBS, HRE, Commerzbank, and others. There have also been revelations regarding questionable business practices that have led to legal challenges and new regulations. In short, certain poor practices have become much more visible.

Refocusing on customer benefit will require two steps:

- A. Recognize that your action today matters for your options tomorrow, driving alignment between the best economic strategy and an ethical strategy of “consumer orientation”
- B. Adopt a “caveat venditor” strategy for retail customers.

A. Recognize that your action today matters for your options tomorrow, driving alignment between the best economic strategy and an ethical strategy of “consumer orientation”

It is increasingly likely that consumers will discover when they have been taken advantage of and respond negatively. And it is increasingly likely that there will be regulatory redress for inappropriate practices towards consumers. This means that the best economic strategy will be one of “consumer orientation” or “acting in the customer’s best interest”.

A practical definition of a “consumer orientation” strategy might include these principles:

- Products will be designed to meet real consumer needs and to help consumers reach broader, non-financial life goals.
- Products will be simple or at least only as complex as required to meet the need.
- Consumers will be “matched” to products in a reasonable way, by segment or group (this is a statement that stops short of a commitment to “optimize” a sale to each individual consumer, something that is costly to attempt and theoretically challenging to achieve).
- Pricing will allow for flexibility between a floor that assures the bank of a break-even economic profit, and a ceiling that offers a higher profit but eliminates excessively high prices for consumers.
- Firms will make a good-faith effort to supply financial products that meet the needs of their target segments, thereby promoting consumer inclusion.
- Communications between firm and consumer will promote “transparency”, rebuilding trust between parties.

This approach promises the consumer a fair deal, but not necessarily a perfect deal.

Quote 20: Tim Wyles, Partner, Oliver Wyman



From lessons learned in recent years, three significant guidelines have emerged, regarding the Principal-Agent problem:

1) Keep products simple: the more complex the product, the more likely it is to end up being sold inappropriately, whether accidentally or deliberately

2) Manage time-horizons: be particularly careful whenever the item being sold by the Agent has a term or effective maturity significantly longer than a year

3) Practise moderation: do not let incentives or aggressive sales management come between you and your customers.



(See Chapter 18 for full contribution)

B. Adopt a “caveat venditor” strategy for retail customers

In a “caveat venditor” world, what would a financial firm do?

1. To the extent a firm had ever done so, it would stop creating products or operating business practices that may be too complex, opaque and confusing. It would reconfigure its new product development process around the twin goals of identifying distinct customer needs that its products will be designed to meet, and of identifying customers’ frustrations and “hassles” with existing products and processes that its new approach will be designed to reduce or eliminate. Appropriateness and suitability would become watchwords of the product development process.
2. It would redesign its incentive compensation system to remove or cap the temptation to price products for short-term gains. Again, suitability would become an important goal.
3. It would adopt new product design principles that embrace transparency, disclosure, plain language and product simplification. These principles could draw on recent findings in the area of behavioural economics to favour consumer-positive outcomes.
4. It would encourage consumer literacy in various ways, including the creation of general information that it would make available on its website and through its branches. It would also develop methods for guiding customers, in the context of specific transactions, towards a broadly suitable product option. Suitability guidelines could, at a minimum, help steer customers away from poor product choices. The language here stops well short of giving advice in the sense of helping the customer to a perfectly matched product, with connotations of fiduciary responsibility for the correctness of the outcome. Outside of a trust environment or selected private banking and advisory areas, this is probably too high a standard for banks to achieve in the market at large, or at least to achieve without prohibitive cost.
5. It would observe its own customers and their behaviour to see if any were falling into product use patterns that were harmful and offer interventions to remedy this behaviour. For example, if customers were incurring overdraft fees at an unusual rate – where “unusual” could be defined statistically as simply an outlier among the bank’s pool of customers – then it could provide counsel, including a switch to an alternative product or pricing package.

6. It could increase consumer optionality by creating broader rights of rescission, or even by adopting a stricter standard of “positive affirmation”. Under positive affirmation a customer would not only enjoy the option of withdrawing from a consummated purchase within a specified number of days (something that exists in some countries for some products under current law), but would be required to affirm, through an independent channel, that he or she wished to complete the transaction in question. Affirmation through an independent channel could also support elements of consumer education and increased literacy. For example, as an element of the process, before its conclusion, the consumer could be advised that the product in question has been rated “poor” in terms of its suitability or its features/price combination by that third party or by a cross-industry advisory body.
7. The firm could participate in an industry-wide or third-party rating scheme for its products.
8. Finally, it would work to develop an internal culture that emphasized transparency and authenticity in all dealings with customers.

Of course many of the points made above would apply in the case of established products as well as innovative ones. But they would materially influence the way in which innovations were pursued and introduced into the marketplace. As noted earlier, the purely economic case for such a strategy is not unequivocal; it is possible that a strongly pro-consumer orientation gives up more in profit margin than it yields in benefits such as share-of-wallet, customer retention and word-of-mouth recommendations. But it seems increasingly likely that such a strategy is the best economic policy.

Recommendations Oriented to the Regulator

7.5 Acknowledge the importance of innovation and its role in a competitive, free-market structure (and thus in pro-competition regulation)

Innovation can benefit society by generating economic growth and improving social welfare. Competition not only helps to distribute the benefits of innovation broadly throughout the economy and society, but can also be a significant spur to innovation in its own right. Competition is a pillar of dynamic economies. In the United Kingdom, “the Competition Commission (CC) is an independent public body which conducts in-depth inquiries into mergers, markets and the regulation of the major regulated industries, ensuring healthy competition between companies in the UK for the benefit of companies, customers and the economy”.⁹⁹

In the United States, there are two government bodies that focus on creating a pro-competitive environment and market structure: The US Department of Justice’s Antitrust Division has the mission to “promote economic competition through enforcing and providing guidance on antitrust laws and principle”.¹⁰⁰ The Federal Trade Commission has a complementary task to the Antitrust Division by preventing “business practices that are anti-competitive or deceptive or unfair to consumers; to enhance informed consumer choice and public understanding of the competitive process; and to accomplish this without unduly burdening legitimate business activity”.¹⁰¹ Similar bodies can be found in other Western economies to reinforce competition.

The US example emphasizes the two distinct aspects underlying a pro-competitive regulatory approach: competition is considered to especially benefit the economy and the consumer, who has more choice and lower prices. This is obviously also true for the financial services sector where competition is key. Thus, the first recommendation for the regulator is to encourage a pro-competition approach when regulating the financial services sector.

Three recommendations are derived that will be outlined in the following:

- A. Do no harm by needlessly limiting financial innovation
- B. Use the lightest touch possible to achieve the regulatory agenda in relation to financial innovation
- C. Prefer market solutions where possible to govern financial innovation

A. Do no harm by needlessly limiting financial innovation

As outlined in the contribution on the insurance industry by Daniel Hofmann in Part III, the regulator should generally follow a principle borrowed from the world of medical ethics: as in the Hippocratic Oath, supervisors should endeavour to “do no harm”. Relating back to financial innovation, this highlights that the regulator should promote and support financial innovation as a vital part of a competitive market structure.

An overly restrictive approach towards financial innovation would be counter-productive by potentially decreasing the amount of financial innovation that is ongoing in the market – in part by decreasing competition. The specifics of financial innovation, such as the need to observe the product in the market before it can be completely assessed from a risk perspective, make it even harder to justify prudent regulatory approaches that would involve a strict pre-approval of each innovation that should be launched in the market.

Quote 21: Daniel Hofmann, Economic Counsellor, International Association of Insurance Supervisors



Borrowing from the guiding principle of medical ethics, supervisors should do no harm. Both innovation and the supervisory intervention to prevent a potentially negative social outcome of innovation may have unintended consequences. Credit default swaps are an innovative and efficient tool to spread risk. The reason why they and other structured products were seemingly at the heart of the financial crisis had little to do with inherent flaws. While no single factor caused the financial crisis, inadequate risk management (and that includes liquidity and capital management) by suppliers and buyers of structured products goes a long way towards explaining the violent downturn in financial asset prices. Tougher product controls would not have addressed weak risk management and asset prices would still have been poised for a sharp correction.



(See Chapter 18 for full contribution)

B. Use the lightest touch possible to achieve the regulatory agenda in relation to financial innovation

Based on the complexities around financial innovation and the “web of externalities” that can be triggered by financial innovation,¹⁰² the regulators increasingly wish to be involved in the governance of financial innovation. In the context of financial innovation, the regulator has to weigh up benefits from intervention associated with protecting innocent parties (depositors, policy-holders, taxpayers, etc.) against the lost opportunities for society from stifling innovation. Thus, in the spirit of doing no harm and not needlessly suffocating financial innovation, regulators must attempt to use the lightest touch possible to achieve the goal of reducing the risk of undesirable externalities.

In light of the recommendations for the industry and the individual institutions, the regulator should monitor and evaluate these efforts and provide guidance where needed. The industry should seek an open dialogue with the regulator on these issues to collaboratively work on the risks of financial innovation. But this report would not encourage the regulator to get overly involved and intervening with financial innovation, potentially suffocating the positive in an attempt to eliminate the negative.

The seventh recommendation will pick up on this dialogue between regulator and industry and address how the regulator should review and ensure the adequacy of industry efforts.

C. Prefer market solutions where possible to govern financial innovation

Ideally, a free market solution is preferred over external, top-down regulation in the spirit of strengthening and emphasizing pro-competitiveness. However, it is clearly acknowledged that these free market solutions should build upon regulatory requirements to manage the risks of financial innovation.

There are several reasons for this market-based approach, but two are worth highlighting:

- The industry is making a strong attempt to address current shortcomings. This will also help to restore trust in the industry and its capabilities to adequately manage its risks (see also Jennifer Tescher’s contribution in Part III on industry self-regulation in that respect).
- The regulator is a scarce resource with limited capacity and thus market participants are better placed to address these concerns.

Quote 22: Jennifer Tescher, President and CEO, Center for Financial Services Innovation



How can the financial services industry regain consumer trust and restore credibility to the idea that financial innovation can be a net benefit for society? Meaningful self-regulation can be a powerful way for industry to articulate the value it provides and to demonstrate a commitment to consumer-friendly innovation.



(See Chapter 16 for full contribution)

7.6 Strengthen systemic risk oversight in light of the incremental risks and uncertainties introduced by financial innovation

The project team talked with former and active regulators across the United States and EMEA. These conversations reconfirmed that the oversight and management of systemic risk are key tasks for global regulators since they require a holistic view of the whole financial services industry. The extent to which an individual institution or even an industry group can successfully monitor and manage systemic risk appears limited, partly due to data availability but also because no single firm has the incentive to do so. In the following, the recommendation around strengthening systemic risk oversight with a financial innovation perspective is elaborated. We thank Til Schuermann* for this contribution on this dedicated subject, which reflects the perspective of the project team.

Imagine trying to monitor the next outbreak of a virulent pandemic flu. You have managed to identify and develop an inoculation for the last few bugs, but the next one will surely have mutated to look different. You do not know what it will look like, you do not know where it will emerge, you do not know how quickly it will spread, however, you have some idea which pathways it might take as it spreads throughout the system. Now imagine that the monitoring has to cover not the outbreak of a virus but of a systemic financial crisis.

What are we looking for when we are monitoring “systemic risk”? Risk managers and policy-makers frame the problem in terms of shock transmission and absorption. Households, firms, banks, banking systems and the global financial system are all susceptible to shocks. Idiosyncratic shocks (for example, to a specific firm or household) do not propagate and are easily absorbed. A large systematic shock for example, a stock market crash à la 1987) will cause more widespread damage but is ultimately contained; it propagates through the financial system without fundamental disruption. However, a systemic shock is one that races through the financial system seemingly out of control, emerges in unexpected places and, importantly, causes damage to the real economy. It is this last effect – spillovers from Wall Street to Main Street – that motivates policy-makers to intervene when a systemic financial crisis looms.

Monitoring systemic risk does seem like an impossible task, but to start one can look at three elements of the problem: size, connectedness and complexity. Size is obvious but hardly sufficient. Large, globally active banks are the canonical example of systemically risky institutions. Large banks are more correlated with each other and with the rest of the economy than any other sector, so shocks propagate more quickly and they are more highly leveraged than any other sector (10:1 versus 1:1 for the average non-financial firm) making them more fragile.

Connectedness is also relatively easy to point to. Interbank lending, repo financing, the hedging of exposures (as opposed to selling them) – all have grown enormously as the global financial system has become more interconnected, allowing risk and capital to be moved around quickly and efficiently. But now, when a Bear Stearns sneezes, everyone might catch the flu.

Complexity is the most elusive yet perhaps the most important – from a monitoring perspective – of the three elements of systemic risk. Financial instruments can be complex (look at structured credit products like CDOs), firms can be complex (Lehman had over 900 different legal entities in 40+ countries when it went down) and the financial system has become undoubtedly more complex. What is the hope of detecting and monitoring systemic risk? To be sure, it is not entirely hopeless, and some of the public sector responses show promise. Perhaps most important, any effort to detect and monitor systemic risk must cast the net widely, across sectors and ideally borders, spanning financial institutions and markets, regulated and unregulated. Only in this way can one hope to go beyond the obvious and apparent sources of correlation and interconnectedness. Systematic data gathering and supervision across activities (including financial innovation), firms and sectors, such as the creation of the Financial Stability Oversight Council (FSOC) and the enhanced supervision with stress testing by the Federal Reserve that is mandated in the Dodd-Frank Act, are positive examples. The FSOC is able to designate banks and non-banks to be systemically important and thus subject to Fed supervision, enabling the Fed to fold these institutions into its monitoring and stress testing process.

All supervisors and regulators are at an informational disadvantage vis-à-vis the institutions and markets they supervise and regulate. But they do have one advantage, and it is an important one: the ability to compare across institutions. The stress testing exercises in the US (administered by the Fed) and in Europe (administered by the European Banking Authority – EBA) are invaluable in assessing common vulnerabilities. Unfortunately, because both the Fed and the EBA stress tests are conducted relative to Basel risk weighted (as opposed to simple unweighted) assets, they remain susceptible to systemic model risk.

But without systematic data gathering and analysis, these agencies fly blind. The European analogue of the FSOC, the European Systemic Risk Board (ESRB), has currently no independent authority to gather data that are proprietary to financial institutions (and thus private and hidden from the market). By contrast, the FSOC, through its Office of Financial Research (OFR), will be able to gather such data from the institutions designated by the FSOC to be systemically important. Some of these data can be made public; in this way the OFR has the potential to provide an absolutely invaluable service. It is too much to ask of the designated supervisory and regulatory agencies, on their own, to ferret out and monitor systemic risk. By making at least some of the system-wide data public, the OFR allows the large and diverse research community to attack the data and allow innovative solutions such as, for example, CoVaR to emerge.¹⁰³ This is a good example of how innovation in risk management and oversight can help to address potential negative outcomes of financial innovation in the product space. This may be the single best hope for finding the next financial mutation before it wreaks havoc on our financial system.

*The author Til Schuermann is a Partner in Oliver Wyman's Financial Services unit, based in New York. He was formerly a Senior Vice-President at the Federal Reserve Bank of New York where he held numerous positions, including head of Financial Intermediation in Research and head of Credit Risk in Bank Supervision. His research focused on risk measurement and management in financial institutions and capital markets. He is also a Research Fellow at the Wharton Financial Institutions Center and an Associate Editor for the Journal of Risk and the Journal of Financial Services Research.

7.7 Collaborate with the industry to monitor and oversee its efforts in managing innovation risks to drive sustainable financial innovation

This report advocates that the financial industry take the lead in the matter of governing financial innovation and reducing negative outcomes. However, the regulator will clearly need to play a role to ensure and monitor the adequacy of the industry's efforts. However, the principles outlined in the fifth set of recommendations above on acknowledging the importance of innovation and its role in a competitive, free-market structure still hold true here in the approach to supporting the industry.

In practice, the industry and its industry bodies are encouraged to seek a dialogue with the regulators to improve the governance of financial innovation. Regulatory monitoring and oversight as well as regulatory support (through discussions, guidance and a holistic perspective) can be considered a key success criterion in the industry efforts to do so.

In discussions with various regulators in the United States and Europe, the project team gained the clear impression that regulatory bodies will welcome such an initiative by the industry. There seems to be a strong appetite for industry self-regulation and governance with the enforcement and support of official regulatory authorities. As outlined by our contribution from Jennifer Tescher in Part III, this is also likely to re-establish trust in the industry and help rebuild its reputation, which suffered during the financial crisis.

Part III:

What Experts Have To Say

8 Business Method Patents: Debunking Three Myths

By Kirsten Apple

In 1998, a US appeals court decided in the *State Street Bank versus Signature Financial Group* case that US patent protection extended to so-called “business methods”.¹⁰⁴ While patenting in such business methods has exploded at the US Patent & Trademark Office (USPTO) since, there are still many misperceptions and myths about what “business method patents” are and how they relate to financial innovations. In an effort to encourage greater understanding, we offer a reality check to three of these myths.

Myth #1: A business method patent is a “special” type of patent – False

A business method patent is a type of utility patent relating to a “method” for a business process such as payments, banking, advertising or logistics, which frequently has parallel apparatus or systems elements as well. The *State Street* decision, consistent with the US Supreme Court allowing as patentable “anything under the sun that is made by man”,¹⁰⁵ held that business methods were not exempt from patentable subject matter so long as they met the other requirements of patentability such as novelty, utility and non-obviousness. After *State Street*, the growth in the number of business method patents issued has been rapid, from 120 in 1995 to 4,031 in 2010. While the term “business method patent” is a common expression used in the popular and scholarly literature^{106 107}, legally the application is treated no differently than any other type of standard utility patent. Accordingly, these applications have the same legal and regulatory treatment as a new chemical molecule, a new machine or a new manufacturing process.

The *State Street* case did not change existing law – it merely interpreted it. Over 50 years ago the US Congress declared that patentable subject matter extends to “any new and useful process, machine, manufacture or composition of matter”,¹⁰⁸ and the *State Street* court found that an invention, a business method used to calculate a stock price, was a “useful process” under that language.

In conclusion, business method patents are not a “special” type of patent. The subject matter of these patents – methods of doing business – is permissible as a “useful process” under US law, but must like any invention meet the other requirements of patentability (such as utility, novelty and non-obviousness) to be granted as a patent by the USPTO.

Myth #2: Business method patents are sought mainly by financial services firms – False

While previous research had suggested a relationship between financial services firms and business method patenting,^{109 110} more recent analysis shows that less than 10% of business method patents (as defined by class 705) are sought by financial services firms.¹¹¹ To investigate whether business methods are held primarily by financial services companies, we analysed USPTO patenting data. In the USPTO technology classification system, business method inventions are commonly assigned to class 705. For convenience, we follow previous research and restrict our analysis to patents granted in class 705 and its subclasses.^{112 113} Business methods patents related to financial processes are classified in class 705 subclasses 35-45, while other key areas include marketing in subclasses 14.1-14.73, logistics in subclasses 7.11-12 and healthcare (including healthcare insurance) in subclasses 2-4.

By collecting data from USPTO records, we were able to identify the top 100 company assignees of patents (by number) in class 705 through December 2010. Using Compustat financial data to match these companies to their Standard Industrial Classification (SIC) code, we found that only 16 of 100 were classified in the two-digit SIC “FIRE” (Financial Services, Insurance or Real Estate) category.

We found that none of the top three business-method patenting companies is a financial services firm. IBM had the most with 895 patents, followed by Pitney-Bowes with 487 patents, followed by Microsoft with 232 patents. The highest ranked FIRE company is 10th in the list: JP Morgan was assigned 140 business method patents through 2010. The balance of the top 100 list includes some “FIRE” companies, but also a widely distributed mix of Internet companies (such as Amazon, EBay and Yahoo!), telecommunications firms (such as AT&T, Sprint and Motorola), consulting services (such as Accenture) and traditional manufacturing companies (such as General Electric, Xerox, Boeing, Honda and Hewlett-Packard).

Thus, while financial services firms are engaged in business method patenting, the FIRE industry does not dominate in this area. Furthermore, when we examine the 16 FIRE companies that are listed in the top 100 patenting, we see that the types of businesses represented are mixed. Among these are five depository institutions, four non-depository institutions, five securities and commodity brokerage firms, and five insurance companies.

In conclusion, business method patents are not sought primarily by financial services firms. Only a small portion (approximately 10%) of business method patents are being sought by FIRE companies, with the remainder being demanded by a wide variety of industries.

Myth #3: Financial Services firms are filing business methods patents exclusively – False

There is a widely held perception that patenting by financial services companies began with *State Street* and that all patenting activity by these companies occurs in business method patenting. However, our analysis of the 16 financial services companies listed in Table 1 demonstrates that patenting by these companies in class 705 (business methods) totals 783 while all other patenting (outside of class 705) totals 734. So, just under 50% of patenting in these FIRE companies was distributed among other technology classes.

For some companies, that “non-705” patenting began much earlier than 1998. For instance, Citibank was granted a patent on a system for automated data entry and display in 1978,¹¹⁴ while MasterCard was issued a patent on a security system for electronic funds transfer in 1983.¹¹⁵ Clearly, financial services companies have been engaged in the patenting of inventions before business methods were declared patentable subject matter in *State Street*, and continue today in technologies outside of the “business method” subject matters.

It is likely that many of the patents classified outside of class 705 are not business methods, but others may be, or otherwise related together. While many researchers (including ourselves) rely upon class 705 as a convenient definition for “business method patents”, inventions disclosing methods of doing business are routinely classified in related or “sister” classes such as “telecommunication – billing” (class 455/406) and “database – data structure management”, among others. Thus, patents assigned to class 705 do not necessarily constitute the universe of “business method” patents, and a precise census of the universe of such patents may require the use of different methods, such as bibliographic analysis of the claim language.¹¹⁶

In conclusion, financial services companies do not appear to be restricting themselves to patenting in the business-method subjects, and in fact were patenting prior to the *State Street* decision. Many of these companies continue to innovate in technologies, methods and service offerings, and approximately one-half of the patents they have sought over time are in fields outside of the “business method” patent classification at the USPTO.

The Future of Business Method Patents

The recent *Bilski versus Kappos* decision by the US Supreme Court validated that “a business method is simply one kind of ‘method’ that is, at least in some circumstances, eligible for patenting under 101”.¹⁷ These types of patent are not a special exception to general practice, but instead are commonly sought by companies both inside and outside the financial services sector. Increasingly, companies throughout the economy are using these patents to protect their innovations and to support their corporate strategies.

Table 5: Top Financial Services Firms and Business Methods Patents

Financial Service Firm Rank	Business Methods Firm Rank	Company Name	Total Business Methods Patents	Total Non-Business Methods Patents	Sic Code
1	10	JP MORGAN CHASE BANK, N.A.	140	99	60, DEP. INST.
2	12	AMERICAN EXPRESS TRAVEL, INC.	128	249	61, NON-DEP. INST.
3	23	GOLDMAN, SACHS & CO.	69	16	62, SECURITIES
4	27	CITIBANK N.A.	65	55	60, DEP. INST.
5	34	MORGAN STANLEY	52	14	62, SECURITIES
6	35	BGC PARTNERS, INC.	52	10	62, SECURITIES
7	47	UNITED SERVICES AUTOMOBILE ASSOCIATION (USAA)	40	51	63, INSURANCE
8	55	FANNIE MAE	35	9	61, NON-DEP. INST.
9	64	CAPITAL ONE FINANCIAL CORPORATION	31	51	61, NON-DEP. INST.
10	65	FEDERAL HOME LOAN MORTGAGE CORP.	30	4	61, NON-DEP. INST.
11	66	CHICAGO MERCANTILE EXCHANGE, INC.	29	3	62, SECURITIES
12	74	MASTERCARD INTERNATIONAL, INC.	25	61	60, DEP. INST.
13	78	BANK OF AMERICA CORPORATION	25	64	60, DEP. INST.
14	82	THE NASDAQ OMX GROUP, INC.	23	0	62, SECURITIES
15	91	HARTFORD FIRE INSURANCE COMPANY, INC.	21	4	63, INSURANCE
16	99	CITICORP DEVELOPMENT CENTER, INC.	18	44	60, DEP. INST.
TOTAL			783	734	

Acknowledgements: I would like to thank the following individuals at the USPTO, Stuart Graham, Chief Economist, Wynn Coggins, Director of Technology Center 2800, Greg Vidovich, Director of Technology Center 3600 and Bob Weinhardt, Business Practice Specialist, for their helpful comments on the draft.

Kirsten Apple is Primary Examiner 3694 on special assignment in the Office of Chief Economist USPTO.

9 The investment sector and capital markets are the best breeding ground for financial innovation

By Thomas Deinet

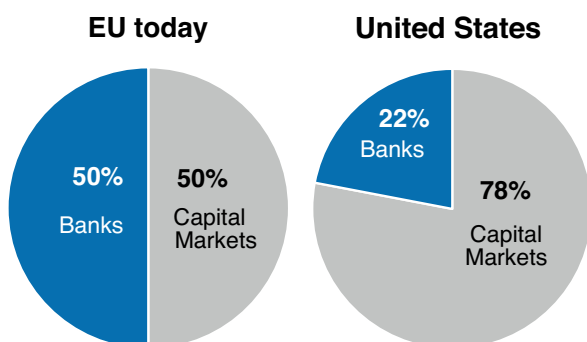
Although the barrage of new financial regulation being introduced in the wake of the financial crisis shows little sign of abating, the regulatory smoke is beginning to clear around the long-term impact. In their determination to make systemically important banks less risky and prone to taxpayer bailouts, policy-makers and regulators have introduced a range of measures to reduce leverage in the banking system and curb more speculative activity.

On the one hand, this has involved imposing much tougher capital and liquidity requirements on banks. On the other, measures such as Dodd-Frank will in effect ban proprietary trading activity within regulated banks and restrict the banks' ability to own private equity businesses or hedge funds.

Inevitably efforts to make the banking sector more resilient will make banking a more expensive source of finance and the consequence will be that capital markets will become more important in providing investment for economic growth. The impact of this will be felt much more keenly in Europe than in the US where capital markets have long played a much bigger role in financing business than has the banking sector.

For instance, the capital markets in the US account for more than three-quarters of financial assets and the banking sector for less than one quarter. By contrast the position looks a lot different in the European Union, which has always relied much more on the banking sector as a source of finance. Bank assets in Europe account for half of the total.

Figure 10: Capital Markets in the EU and the US¹¹⁸



Source: IMF Global Financial Stability Report 11/2011 (Selected indicators on the size of the capital markets, 2010). Definitions: Capital markets = stock market + Debt securities; Banking sector = Bank assets

The balance between financing through the capital markets or banks is now likely to undergo a significant shift since both the US and Europe have seen a raft of new regulatory measures imposed on players in the capital markets in the wake of the financial crisis. Ironically, it was large bank balance sheets that posed the biggest threat to financial stability during the financial crisis and it is worries about the safety of European banks that now lie at the heart of the concerns over the euro crisis. Yet there has now been significant focus on developing extensive regulation for the asset management sector including hedge funds and capital markets. The Alternative Investment Fund Manager (AIFM) Directive is a case in point.

Despite this, the trend towards increased reliance on financing through the capital markets is set to gather pace in Europe. And it is a trend devoutly to be welcomed.

For the corporate sector, it means more flexibility and choice in financing options. For investors, it provides a diverse range of opportunities to generate returns and calibrate risk levels in their portfolios. For the wider economy, it has the benefit of helping to spread risk and make the financial system more resilient; instead of intermediation between providers and users of capital by a relatively small number of systemically important banks, risk-taking is spread much more widely throughout the financial system. If something goes wrong, it is the end investors who absorb losses and take the hit rather than the cost being met through the taxpayer bailouts of banks.

Finally – and importantly – the capital markets provide a fertile breeding ground for financial innovation because of the large number of sophisticated, entrepreneurial players operating in that environment. They may be working in hedge funds, private equity firms or other parts of the alternative investment industry that has emerged over the past decade or two.

The hedge fund industry with its US\$ 1.8 trillion in assets under management globally may be small in relation to the size of the traditional banking sector – the world's top 50 banks account for US\$ 63 trillion in assets. But hedge funds' record in driving innovation and change in the financial industry means they have a disproportionate influence.

This is reflected in the development of specific techniques as well as the willingness to challenge the investment consensus and take a contrary view. For example, many risk management techniques including short selling and derivatives hedging were pioneered in the hedge fund sector and the industry has acted as a driver of financial innovation. Many sophisticated trading strategies have been pioneered in the hedge fund industry, for example absolute return strategies that seek to reduce investor exposure to market risk by combining long and short positions in stock markets, or global macro strategies, which seek gain from major macroeconomic trends by investing in a broad array of financial instruments in various countries, taking into account factors such as foreign exchange rates, demographics and gross domestic product. Other strategies invest in distressed assets, or seek to benefit from arbitrage opportunities across markets.

The presence of hedge funds in a marketplace is beneficial for all market participants: hedge funds are significant contributors to market liquidity, thereby driving down spreads and transaction costs to the benefit of all investors. Also, the heavy investment that hedge funds make in research and their record as contrarian investors means that they contribute to more efficient price discovery. For example, there is evidence that short selling has a beneficial impact on market prices and efficiency. Short sellers act as market detectives, spotting overvalued assets early on and helping to smooth over-valuations or bubbles. This enhances the attractiveness of markets for all investors, in particular for long only and passive index investors.

Perhaps one of the key lessons to be drawn from the financial crisis is that we need less too-big-to-fail banking which is implicitly guaranteed by the taxpayer and more risk taking by diverse, entrepreneurial players with the capacity to absorb losses and small enough to fail, as some inevitably will, without causing systemic waves. The result would be better investment decisions, lower systemic risk and more innovation. The investment sector and hedge funds in particular cater for just this.

Thomas Deinet is Executive Director of the Hedge Fund Standards Board in London, United Kingdom.

10 A Systemic Perspective on Innovation in Insurance

By Daniel Hofmann

It has long been taken for granted that insurers would never be at the core of systemic crises and that innovation in insurance would consequently never become an issue of systemic relevance. But the current financial crisis has questioned this assumption of innocence. Financial innovation, perhaps also in insurance, is in the dock. Before focusing on innovation, however, it is useful to sketch briefly the context of insurance and financial stability.

Unlike banks, insurers do not offer maturity transformation that would expose them to sudden liquidity shortages. Insurance liabilities are typically long term in nature and funded through contractually agreed premium flows. And in case of insolvency, insurers do not face massive cash outflows. Instead they go into run-off, which depending on the nature of the business, may extend over decades.

Reflecting these stylized features of the industry, the literature on insurers causing systemic crises is scant to non-existent. But the financial crisis that started in 2007 and climaxed in the turmoil surrounding the collapse of Lehman Brothers seems to have questioned conventional beliefs, because at the core of the crisis was also a large insurance group. The US government's bailout of AIG has forced, and continues to force, supervisors around the world to re-examine previous assumptions about the systemic role of insurance.

To cut a long story short: it is still true that a narrowly defined insurance business is unlikely to cause systemic issues. Narrow or traditional insurance builds on the underwriting of large, diversified pools of idiosyncratic risks. The risks are generally not correlated with each other and, more importantly, they are not dependent on the economic business cycle and on financial market developments. Again, these stylized, but salient features set insurers distinctly apart from banks and other financial institutions.

But the analysis cannot stop here, and certainly not when considering the role of innovation. First, product innovation has introduced non-insurance elements into the industry, for example through the combination of savings and investment features with life insurance. The combined product may have a materially changed risk profile and make traditional insurers more sensitive to financial market developments.

Second, and in our context more important, is the emergence of new business models (in the interest of focus this box abstracts from other types of innovation, such as process or marketing innovation). Over the last decades, a number of insurance-based groups have engaged in activities with no direct connection to insurance. And the picture becomes even more complex, because certain activities look like insurance, but do not meet the criteria of traditional insurance.¹¹⁹ This should not surprise. Innovation will always transcend boundaries, with innovators tempted to explore and engage in adjacent fields. That is why the underwriting of credit default swaps, to pick one example, was alluring not only for AIG, but also for other players in the industry.

Consequently, a radical conclusion could be that to effectively scrutinize innovation, supervisors should not only examine products, but also business models. But this raises a number of murky issues. While in most cases products already require supervisory approval, approvals are concerned mainly with consumer protection. They do not address systemic risks, which – for the stylized reasons given above – may not even be associated with traditional insurance. Hence, making product approval subject to a test for systemic relevance would not really address the essence of the problem.

In contrast, it appears that an examination of business models could indeed reveal systemic issues. The scrutiny of earnings contributed by different units of AIG could have arguably alerted supervisors to the growing importance of the Financial Products subsidiary in London. Further questioning might have revealed the systemic

relevance of the transactions. Consequently, it appears to follow that supervisors should have either limited the volume of the CDS business or disallowed the transactions entirely.

But supervisory intervention into business practices is problematic on at least two counts. First, it requires of supervisors an omniscient forward-looking capability. But what in hindsight is easy to spot is difficult to ascertain in real time. Information is always incomplete and risk modelling can quite often be misleading, providing a false sense of security. Second, it would make supervisors the arbiters of entrepreneurial activities. Innovation is the driving force behind the productivity enhancements that assure economic prosperity. It cannot be the role of supervisors to stifle or block innovative business models.

Under these circumstances a humbler supervisory agenda is preferable. It should build on at least three key principles:

- First, borrowing from the guiding principle of medical ethics, supervisors should do no harm. Both innovation and the supervisory intervention to prevent a potentially negative social outcome of innovation may have unintended consequences. Credit default swaps are an innovative and efficient tool to spread risk. The reason why they and other structured products were seemingly at the heart of the financial crisis had little to do with inherent flaws. While no single factor caused the financial crisis, inadequate risk management (and that includes liquidity and capital management) by suppliers and buyers of structured products goes a long way towards explaining the violent downturn in financial asset prices. Tougher product controls would not have addressed weak risk management and asset prices would still have been poised for a sharp correction.
- A second principle builds on the insight that innovation is often driven by cross-sector pollination. Concepts developed in one sector are adapted and modified in another sector, and one should expect insurers and banks to continue to borrow from successful ideas spreading in the other sector. One example is the securitization of insurance liabilities. On the face of it such securitization is equivalent to the securitization of bank assets, but it differs in key features. That said, supervisors should guard against cross-sector pollination becoming a result of regulatory arbitrage. While competitive inequalities (or uneven playing fields) can create business opportunities, regulatory arbitrage-driven activities are also likely to give rise to systemic instability. It is one reason why supervisory frameworks must minimize the scope for regulatory arbitrage.
- The third principle calls for the application of a broad supervisory perimeter. Today's business models tend to be eclectic, combining activities from different sectors under one roof. Supervisors need to reflect on these developments and abandon previously inhabited silos to catch up with the developments on the industry front. One lesson of the financial crisis is that more weight should be given to comprehensive group-wide supervision that accounts for all risk activities undertaken in a group and its entities. Had such an integrated approach been in place, supervisors might have been able to spot emerging issues and nudge market players away from excessive risk taking. In central banking, that is called "leaning against the wind." It does not rule out risk taking, but it could mitigate the adverse social outcomes of certain business practices.

Daniel Hofmann is Economic Counsellor at the International Association of Insurance Supervisors (IAIS). This article was written in a personal capacity. It neither reflects an official position of the IAIS nor commits the Members of the Association.

11 How Might Patenting Trends Reshape Financial Services?

By Josh Lerner

The use of patent law to protect intellectual property has increased dramatically in US financial services over the last decade or so, in response to a general strengthening of patent protection as well as court rulings specific to the financial sector. The trend may increase the rate of innovation in financial services and change the shape of the industry.

The story begins with changes to the US patent system in the 1980s and 1990s that were meant to make the system more efficient. In 1982, the US Congress established a centralized court of appeals for patent cases, which had the unforeseen effect of broadening and bolstering patent holders' rights. Then, through the 1990s, the US Patent and Trademark Office changed in nature from a tax-revenue funded agency collecting nominal fees from patent applications into an agency funded by these fees.

This trend of strengthening intellectual property rights was also an important item on the international agenda: The Uruguay Round (1986-1994) of trade negotiations, as part of the General Agreement on Tariffs and Trade (GATT), focused on extending the trading system into several new areas, including intellectual property.

Unsurprisingly, the strengthening of patent protection together with a more applicant-friendly system led to a large increase in the amount of patent applications filed by US corporations of all kinds. Against this backdrop, in 1998 the appellate court made a decision with long-term implications for financial services. In a case concerning a software product used to fix the closing prices of mutual funds for reporting purposes (*State Street Bank & Trust versus Signature Financial Group*), the court signalled that it accepted that business methods could, in principle, be patented as well as more tangible kinds of innovation.

This ruling, together with an increase in patent applications connected to the Internet revolution, seems to have prompted the massive increase in financial services patent applications seen over the last decade or so (see Kirsten Apple's contribution). There has been a race to gain defensive and strategic patents, but also a more aggressive use of patenting and litigation as a pathway to profit. Worryingly, the rate of litigation of financial patents is extraordinarily high, at around two to three dozen times the rate of patents as a whole and much higher than rates seen in other emerging technology classes such as biotechnology.¹²⁰

It is uncertain whether the net effect of patenting trends will prove to be positive (i.e. encouraging of useful innovation) or negative for the industry over the longer term. On the negative side, both the process of gaining patents and patent litigation attract substantial direct and indirect costs. Apart from legal costs, the discovery process may require any alleged infringer to produce extensive documentation, time-consuming depositions from employees, and so on. A high level of litigation could act as a deterrent to the introduction and adoption of new products and services in key areas of the industry.

In an earlier paper,¹²¹ written soon after the patenting trends took root, I identified three broad-brush outcomes of patenting trends that seemed worth revisiting during interviews conducted for this report:

1. The biotech/pharma story. When the Supreme Court extended patent protection to biotechnology discoveries in 1980, it sparked the birth of a new industry. Numerous small companies started to be formed – and continue to be established to this day – to exploit these discoveries. Patent protection has allowed them to enter into licensing agreements or other collaborations with major pharmaceutical firms and other established players. Indeed, the smaller players now often act as outsourced R&D firms, with the larger corporations focusing on clinical trials,

licensing, production and getting the innovations to market (see also Bill Shew's contribution). Might financial patents usher in a new set of innovation-oriented players to the financial services industry?

2. The semiconductor scenario. Semiconductor firms have put more and more effort into seeking patent protection over the past two decades. The complex nature of semiconductor technology implies that firms must use rivals' technologies, so cross-licensing agreements are an economic necessity. Established firms build large portfolios of patents, which they then cross-license with rivals. However, new firms find it incredibly difficult to enter the industry, as they have few patents to offer in exchange for licenses from the established firms. In a similar vein, perhaps patent protection could reinforce the position of the largest firms in the financial services industry and raise further barriers to entry.
3. No impact. The strengthening of patent protection may have little net impact on innovation and profits in this industry.

During interviews conducted while researching this report in 2011, it emerged that industry participants (regulators and practitioners) accept that each of these three outcomes remains possible but they seem to favour the second or third scenario over the first.

In particular, US and European regulators tend to think there will be little impact on the industry from financial patents, while industry practitioners expect financial patents to have a considerable influence on financial institutions in the years to come and favour the second scenario.

There are a couple of reasons why practitioners favour the "semiconductor" scenario over the biotech/pharma scenario. Financial services is not a new industry, like biotech, in which patenting can play a key role in determining the initial industry structure. Instead, established financial institutions gain substantial benefits from their broad distribution networks. The creation of large patent portfolios may only reinforce this power.

Furthermore, the nature of distribution in the financial services sector tends to make smaller firms beholden to the larger ones that act as lead underwriters and syndicators. As a result, small firms are unlikely to risk taking on larger financial service firms using patenting as a weapon. Alternatively, entities that exist solely to litigate awards could exploit the uncertainties inherent in patent litigation (particularly, the huge costs associated with injunctive relief) and impose a substantial "litigation tax" on operating firms.

Of course, there is one final depressing possibility. This is that patenting trends will not reshape the industry but will slow down innovation through the additional costs of an uncertain and contested patenting environment – one that favours those skilled in making opportunistic patent applications over the industry's true innovators. A result of this kind would offer lasting benefits only to the legal profession.

Josh Lerner is the Jacob H. Schiff Professor of Investment Banking at Harvard Business School.

12 Disruptive Innovation: Are Stock Exchanges Under Threat?

By Alexander Ljungqvist

Stock exchanges such as the New York Stock Exchange (NYSE) and NASDAQ are among the most liquid marketplaces in the world, allowing shares to be traded at minimal cost and at close to the speed of light without moving prices too much in the process. Yet they now face competition from an unexpected source. Two new markets – SecondMarket and SharesPost – that are neither particularly liquid nor cheap to trade on are growing by leaps and bounds. How did this happen?

While the established US exchanges have invested in ever more sophisticated trading platforms that allow ever faster trade execution at ever lower cost, the supply of stocks available for trading has dwindled. By one estimate, the number of companies whose stocks are listed on the established US exchanges has dropped from a high of 7,423 in December 1997 to below 4,000 today – a drop of nearly 50%. In fact, there are now fewer listed US firms than at any point since 1972, when NASDAQ was launched.

The main driver of this trend is a long-term decline in initial public offerings (IPOs). US companies simply are not going public as much as they used to. Recent and upcoming high-profile IPOs such as those of LinkedIn, Zynga and Facebook notwithstanding, the annual number of US IPOs has fallen from an average of more than 400 a year in the 1990s to around 100 a year in the 2000s. Worldwide, the United States has ceded its pre-eminent role as the most attractive destination for high-growth companies to the Hong Kong Stock Exchange and to London.

Whatever the causes of the decline in IPO activity in the United States – some blame excessive regulation, in particular Sarbanes-Oxley, while others point to consolidation in the investment banking market – it has become less attractive for investors in fast-growing entrepreneurial companies to exit their investments through a traditional IPO. This affects not only venture capitalists, who provide the seed capital for the most innovative start-ups in the economy, but also the founders and employees of these start-ups who tend to hold company stock and stock options.

Enter SecondMarket and SharesPost. These new entrants provide marketplaces in which a shareholder can sell shares in a company without that company undergoing any of the regulatory scrutiny that an IPO would involve. Extraordinarily, companies whose shares are traded on SecondMarket and SharesPost are under no regulatory obligation to disclose the kind of information that investors on the NYSE and NASDAQ are used to receiving, such as annual and quarterly reports.

Essentially, SecondMarket and SharesPost operate outside the regulatory framework created through the 1933 Securities Act and the 1934 Securities Exchange Act. This is because they operate under a set of exemptions that apply as long as the seller is not the company itself and the buyer is either a “qualified institutional investor” (an institution with at least US\$ 100 million in assets under management) or an “accredited investor” (an individual with net investable worth of at least US\$ 1 million or income of at least US\$ 200,000 a year).

The new entrants therefore provide an alternative route to liquidity for companies that rely on employee stock options or obtain funding from angel investors and venture capitalists. Why obtain a listing on the NYSE or NASDAQ if doing so is costly (for example, in terms of listing fees, compliance, disclosure) and employees and shareholders can instead legitimately sell their stock via SecondMarket or SharesPost?

While providing a useful and valuable service, SecondMarket and SharesPost have the potential to affect the US financial landscape in quite fundamental ways:

- If enough companies take advantage of these new services, the long-term trend towards fewer companies being listed on US exchanges will surely continue. This will shrink the investment opportunities available to individual investors, mutual funds and pension plans and could lead to potential costs to society in terms of poorer diversification opportunities. Imagine, in the limit, an economy without a stock market to invest in.
- Allowing one's shares to be traded on SecondMarket or SharesPost is not free of risk to the companies concerned. Companies face the risk of losing control of their share registers. This matters because Section 12(g) of the 1934 Act requires that companies with 500 or more shareholders must register their securities with the Securities and Exchange Commission. In practice, this means that once a company passes the 500-person threshold, it must provide the same level of public disclosure as a listed company without enjoying any of the benefits of a stock exchange listing.
- As essentially unregulated markets, SecondMarket and SharesPost provide little, if any, investor protection. It seems only a matter of time before this will lead to problems. Imagine, for example, the scope for insider trading or the potential for companies to fold without any warning from credit rating agencies, Wall Street analysts or the media. Such events – which will surely happen sooner or later – might undermine confidence in the marketplace. In turn, this could even lead to onerous regulation that kills off this financial innovation altogether.

New private markets such as SecondMarket and SharesPost provide a welcome addition to the US financial landscape and fill an important gap by enabling employees and investors to gain liquidity for their shares in private companies. Private shares have always been traded, but the creation of marketplaces for such trading economizes on search costs and other frictions. Bringing buyers and sellers together in one place and standardizing the terms on which transactions are based is surely a good thing. What remains to be seen is whether the negative effects on the wider financial market – the externalities, in the language of economists – can be contained through thoughtful regulatory responses.

Alexander Ljungqvist is Ira Rennert Professor of Finance at NYU Stern School of Business.

13 Financial Literacy and Capability and Financial Innovation¹²²

By Margaret Miller

Financial capability refers to the combination of knowledge, understanding, skills, attitudes and especially behaviours that people need to make sound personal finance decisions suited to their social and financial circumstances. Some of the most important behaviours for financial capability include: 1) making ends meet; 2) keeping track of one's finances; 3) planning ahead; 4) choosing financial products wisely; and 5) staying informed about financial matters, often also termed "getting help".¹²³ In an environment of rapid financial innovation, these behaviours take on even more importance.

Consumers who plan ahead, monitor their finances and live within their means are less vulnerable to exploitation in financial markets (a potential negative outcome of financial innovation) and are more able to resist offers that sound "too good to be true". If they do have a problem, financially capable consumers are also more able to seek redress. Unfortunately, across countries, income and education levels, many people fail to practice sound financial decision-making or even act in their own self-interest. This includes instances where consumers have the information and opportunity to make a good financial decision but don't. The contribution by Piyush Tantia on Behavioural Economics and Consumer Protection discusses some of the biases that contribute to inaction or poor choices such as time bias or time inconsistency (undervaluing the future in favour of the present), which leads to under-saving, overspending and over-borrowing.

Is it possible to overcome the inherent biases and psychological factors that discourage good financial decisions? If so, how should this be done and is there a role for financial capability programmes?

Some suggest that it is unrealistic to expect consumers, especially low-income consumers who may have limited literacy and numeracy, to learn – much less practise – financial capability.¹²⁴ There are other ways to help consumers manage their money and deal with financial innovation, including consumer protection laws and regulations (to limit the introduction of intentionally misleading products and frauds and to create effective redress) and default mechanisms (such as automatic enrolment in pensions). However, default mechanisms have limited application and even the best regulators are challenged to keep up with today's rapidly changing financial markets. For those who can afford it, independent financial advisors may also help but this is not a scalable solution. When a financial decision must be made, the consumer is ultimately responsible.

Helping consumers to behave in financially capable ways and to make the right decisions in their financial lives is a key priority and challenge for financial regulators, whose interest in the topic has heightened since the financial crisis.¹²⁵ Increasingly there is acknowledgement that the traditional focus on providing consumers with information and then hoping or assuming this translates into better financial behaviours is unrealistic and underestimates the challenge of behaviour change. Fortunately, research on financial literacy and capability programmes has multiplied in recent years, providing insights into what may work. There are also opportunities to learn from other sectors, such as health, which have addressed behaviour change through awareness raising, communication outreach and social marketing campaigns for decades. Some emerging findings from research on what works in financial capability are presented below.

Understand Your Audience – Motivation Matters, Use Teachable Moments

Consumer research is fundamental for financial innovation. It is also the basis for creating successful financial literacy and capability programmes. Surveys provide broad, aggregate data on financial product use and knowledge, whereas focus groups and interviews offer nuanced information on consumer opinions and behaviours. The data provided by these tools can help to identify behaviour patterns and gaps in the market – useful for identifying new business opportunities as well as for understanding how best to approach financial education and consumer protection.¹²⁶

One relevant insight gained from consumers is that motivation matters – people who are more motivated to acquire financial skills are more likely to benefit from financial capability efforts. This common sense statement has also been backed up by research in the case of youth¹²⁷ and for retirement planning.^{128,129} Some motivation is intrinsic but often a specific need or situation can increase motivation to seek information, learn about financial products and make a decision. These instances are frequently referred to as "teachable moments". These opportunities may be caused by a life event (marriage or divorce, birth of a child, starting a new job, etc.), by a decision a consumer is facing in the financial marketplace (whether to take a loan, which mortgage to choose, etc.) or by a macroeconomic or financial shock.

In the United Kingdom, a popular financial capability programme was delivered to expectant mothers to help them plan for the increased expenditures and possible disruptions in income associated with the birth of a child.¹³⁰ In the United States, in the wake of the subprime mortgage crisis, lack of financial literacy has been tied to worse outcomes for homeowners.¹³¹ There is evidence that pre- and post-purchase financial education programmes can help reduce defaults and improve other outcomes such as negotiating modifications to loans.¹³² During Russia's 2008 financial crisis, consumers who showed higher levels of financial capability were more likely to use formal financial instruments and have unspent income at the end of the month.¹³³

Workplace financial education programmes are one of the most popular approaches for taking advantage of teachable moments, such as providing new employees relevant information to manage their financial lives.¹³⁴ In developed countries the focus is often on participation in pension plans and other retirement savings programmes while in developing countries the emphasis may be on shorter-term money management skills to help newly salaried workers avoid becoming over-indebted. In many instances the education is directly linked to opportunities to use the information and skills to make a decision, such as providing the paperwork required to join the pension plan or introducing workers to representatives of micro-finance institutions, banks or investment firms who can help to open accounts.

Keys to Effective Outreach – Simplify, Entertain, Repeat

Financial products and services can be complicated and confusing but financial literacy and capability programmes should not be. Simple messages presented in an entertaining way and repeated over time through various channels and sources are most likely to be effective. For example, research with small enterprises in Latin America found that simple rules of thumb related to financial management, such as separating business and personal expenses, were more effective at motivating behaviour change than traditional curriculum presenting concepts from financial accounting.¹³⁵

Further, using entertainment to prompt behaviour change, as has been done successfully to promote behaviour change in health, is a growing focus in financial literacy and capability programmes. Research is limited on the use of entertainment education for finance but early results show that the use of entertainment media can influence the knowledge and attitudes of listeners and be an effective instrument to include in broader programmes.¹³⁶ The Russia Trust Fund for Financial Literacy and Education at the World Bank and the Financial Education Fund supported by the Department for International Development (United Kingdom) are both producing new research insights on how entertainment and other innovative approaches can strengthen financial capability in developing countries.

However, even the most engaging financial capability initiatives may have difficulty competing for the attention of busy consumers. Keeping financial obligations or commitments at the “top of mind” using reminders, including SMS text messages, is one way of promoting and sustaining behaviour change. Research on reminders has documented success related to increasing timely repayments on loans and on meeting savings goals.¹³⁷

Final Thoughts

Financial literacy and capability initiatives can help to mitigate potential negative outcomes of rapid financial innovation and should be part of a more comprehensive strategy for responsible finance, which includes consumer protection and working with providers to raise the bar on product and service quality. Financial capability efforts may also be able to contribute to the adoption of new products and services as well as sustained positive behaviours, such as loan repayment, committing to savings, etc. But to be successful at these tasks, financial literacy and capability programmes themselves need to continue to innovate. This is happening as the focus is shifting from simply providing information to consumers to understanding the factors that influence their financial behaviours and then using new tools and technologies to support behaviour change.

Margaret Miller is Senior Economist in the Global Practice on Financial Inclusion of the World Bank.

14 Innovation in Pharma and Lessons for Financial Services

By Bill Shew

Innovation is the lifeblood of pharmaceutical companies, which typically spend in excess of 15% of sales on R&D annually. Pharmaceutical companies have to continually reinvest in R&D to replenish their product portfolios to remain competitive and sustain growth and profitability. This is especially true because product life-cycles typically now run 12 years or less before patents expire, at which point generic competitors enter and rapidly – and dramatically – diminish sales of branded products. However, innovation in the pharmaceutical industry is a lengthy, high-risk venture with fewer than 1 in 8 products that enter human trials ultimately reaching the market.

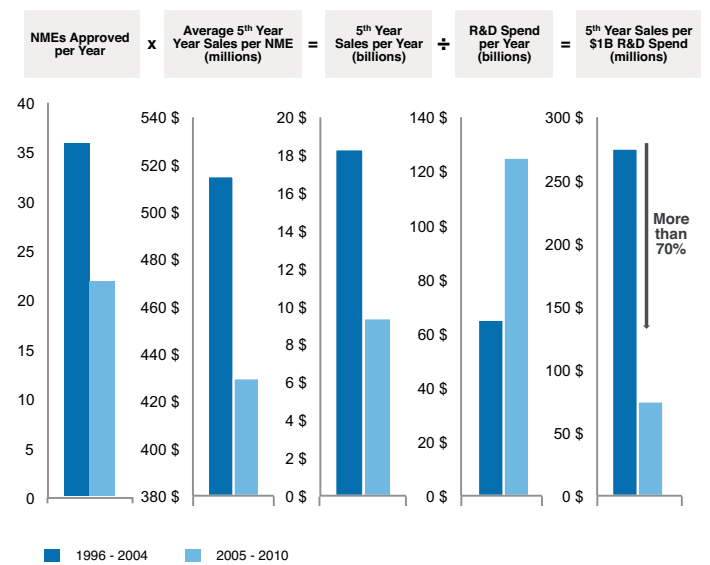
Moreover, for the few products that do survive, the cost to get there is very high: most estimates point towards a total R&D bill of more than one billion dollars per product brought successfully to market. Of course, for those products that do succeed, the payoff has historically been very large, with annual sales of blockbuster products running in the billions at profit margins that are the envy of almost every other industry. But after a long period of prosperity, the R&D productivity of the industry has fallen dramatically, by more than 70% based on a recent Oliver Wyman study of the 450 new drugs approved by the FDA between 1996 and 2010.

The 15-year study period fell into two segments: an Era of Abundance (1996-2004) characterized by robust approvals and high return on capital, and an “Era of Scarcity” (2005-2010) characterized by fewer approvals, weaker sales and low return on capital. Specifically, in comparing the two eras:

- Drug approvals fell by 40%. In the Era of Abundance, the Food and Drug Administration (FDA) approved an average of 36 new molecular entities (NMEs) per year, while in the Era of Scarcity, the number dropped to 22 NMEs per year (Figure 11).
- Each new drug generated less value. The average fifth-year sales (a common industry benchmark) for an individual drug fell 15% in constant dollar terms, from US\$ 515 million in the Era of Abundance to US\$ 430 million in the Era of Scarcity.
- R&D spending increased dramatically. Industry R&D spending has almost doubled between the two periods, from an average of US\$ 65 billion per year in the earlier era to US\$ 125 billion during the Era of Scarcity.

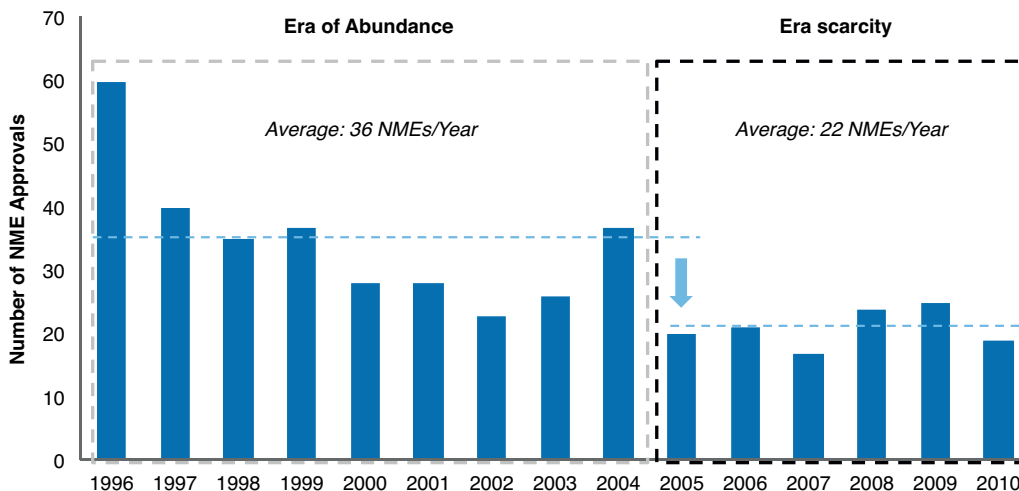
Combining the above factors into the value generated by the industry for every dollar spent on R&D – a strong proxy for industry R&D productivity – the result is a decline in R&D productivity of more than 70% between the two periods (Figure 12). In the Era of Abundance, drug companies produced an average of US\$ 275 million in fifth-year sales for every US\$ 1 billion spent on R&D. During the Era of Scarcity, the equivalent figure has dropped to US\$ 75 million. The change is dramatic – fewer, less valuable drugs that cost a lot more – and it points to a deeper concern: the economics of spending US\$ 1 billion on R&D and generating US\$ 75 million in fifth-year sales are not sustainable.

Figure 12: Industry R&D Productivity Has Dropped in Pharma¹³⁹



Source: Drugs@FDA database, Evaluate Pharma, Oliver Wyman Analysis

Figure 11: Two Eras of R&D Productivity in Pharma¹³⁸



Source: Drugs@FDA database, Oliver Wyman analysis

What went wrong? And what are companies doing to address this dramatic slowdown in innovation? Not surprisingly, given that pharmaceutical innovation is such a complex, high-risk venture, many factors have contributed to the fall in productivity.

- **The standard of care in many diseases has risen significantly.** To some extent, pharmaceutical companies are victims of their own success as in many disease categories safe and effective therapies are already available, raising the burden of proof for new drugs. Furthermore, increasing numbers of these therapies are now available as inexpensive generics (as an example, generic drugs now make up 78% of the prescriptions written in the United States).
- **Payers have found their voice and they are using it.** Rapidly rising healthcare costs are now a political and economic challenge in every mature economy. Payers, whether government or private insurers, are scrutinizing every category of expenditure, including drug spend, and they have become increasingly aggressive about using their purchasing power to push back on prices, promote the use of generics and create tougher barriers to the use of higher priced therapies. Where in the past “me too” drugs – new drugs with only minimal differentiation from already approved therapies – could still carve out substantial sales behind heavy sales and marketing investment, payers are now a key barrier. A “me too” drug might still make it to the market but, without meaningful product differentiation and positive impact on healthcare costs, its commercial prospects will be significantly dimmer.

The landscape today is littered with drugs that would likely have been blockbusters in the past, but struggle to breakeven in today's challenging environment. The potential for the “next Nexium”, a second-generation proton pump inhibitor (PPI) launched by AstraZeneca just prior to the patent expiry of its first generation PPI Prilosec that they have grown to over US\$ 5 billion in sales annually through savvy R&D and heavy commercial investment, is vastly diminished.

- **Finding new drugs is tougher than before.** The science being pursued in pharmaceutical R&D is simply more challenging. Recent advances in the understanding of disease biology have led to the realization that many of pharma's highest-priority targets are more complex than historical targets.
- **Regulatory scrutiny has increased.** While a subject of some debate, most industry observers believe that regulatory agencies worldwide have taken a stricter stance, particularly with regard to safety, in recent years. Many point to the 2004 withdrawal from the market of Merck's blockbuster anti-inflammatory drug Vioxx as the demarcation point for greater regulatory scrutiny. It was withdrawn due to cardiovascular safety concerns, after more than five years on the market and multibillion dollars in annual sales.

While 2004 is – not coincidentally – the boundary year between the Era of Abundance and the Era of Scarcity, greater regulatory scrutiny and higher hurdles were not simply a response to Vioxx, but an inevitable result of an increased standard of care across many disease areas and a reduced emphasis on, and awareness of, the potential for adverse effects that are inherent in almost every medication. This is a trend with many responsible parties, not simply pharmaceutical manufacturers.

- **Competitive requirements have increased.** Similarly, the industry's success, combined with the increasingly complex diseases the industry is seeking to address while the influence of payers grows, has increased competitive requirements. Where once leading companies were rightfully confident in their ability to succeed regardless of therapy area or market segment, now more specialized and differentiated capabilities are required for success.

With many factors, both internal and external to companies, at work, solutions to the innovation drought are not simple. But companies are hard at work on improving the return on investment on their R&D investments. Steps that many large pharma companies are taking include:

- Further rationalizing costs and decreasing overall R&D investment
- Streamlining decision-making processes
- Increasing outsourcing of non-core R&D activities
- Increasing reliance on external sources of innovation, particularly through licensing and acquisition activity with small biotechs and increased academic collaboration
- Narrowing R&D focus to the most promising areas and where firms believe they have – or can build - competitive advantage
- Reorganizing R&D activities, particularly at the earlier stages, to establish smaller, more nimble and autonomous R&D units, mimicking the success of biotech companies
- Embracing personalized healthcare, to develop drugs tailored to specific patient populations

While these changes are having a positive impact, the long timelines for R&D mean that it will be years before the impact is clear and quantifiable. Given the significant headwinds the industry faces, more fundamental shifts in mind-set may be required for R&D productivity to return to sustainable rates. These could include:

- **Raising the bar on innovation:** Focus on bringing meaningful improvements to even crowded drug markets, through identifying and targeting patients for whom the drug has the greatest benefit and making difficult, earlier decisions on when to stop the development of products without sufficient potential for meaningful improvements.
- **Solving the payer problem:** Embrace the payers' challenges by developing products with clear, defensible value propositions (backed by real world data) that address their challenges and enables their success: and limiting investment on those without sufficient potential.
- **Treating drugs as rare:** Break from the traditional industry emphasis on speed to market – critically important in a world in which many products make it to market and success can still be had without meaningful differentiation – and focus more on quality than throughput. But with a quality product, invest so that when it comes to market it is not lost in the noise, but has a compelling value proposition – even if it gets to market a little later.
- **Playing to win:** Simply narrowing R&D focus is not enough, especially as too many companies are choosing the same focus areas, particularly oncology and immunology – which are both broad, complex therapy areas with a wide range of interesting targets and mechanisms to investigate. Companies need to build meaningful and sustainable advantage that will help them better develop and commercialize their own innovation and also make them more attractive partners to the innovative companies and academics that are increasingly the source of innovation.

These changes are not easy. The continued strong financial performance of many pharmaceutical companies makes it harder to focus on R&D productivity deficits that diminish firms' long-term prospects and market capitalizations. Success will require strong leadership and carefully executed change efforts that embrace the new, more challenging environment that companies face while still articulating a compelling vision for the future, including a continued commitment to innovation.

Bill Shew is a Partner in Oliver Wyman's Health and Life Sciences unit, based in Boston, MA.

15 Behavioural Economics and Consumer Protection

By Piyush Tantia

The challenge of consumer protection is that it lags innovation. Often, harm may have already been done by the time regulators realize they must act. In order to be forward-looking, consumer protection regulation could impose wide-ranging restrictions, but may unintentionally thwart positive innovation. Ideally, consumer protection regulation would be able to define guard-rails within which financial providers can innovate freely and safely. Behavioural economics gives us the insights and frameworks we need to build these guard-rails. The following discussion begins with a very brief overview of key insights from behavioural economics and then presents a work-in-progress framework for consumer protection regulation of financial innovation.

Behavioural economics gives us a different representation of people, which allows us to see the same problems differently. Decades of research tell us that people are not always perfectly economically rational: their preferences are malleable, they don't always notice or use the information at hand and they don't always act in their own best interest. These insights do not seem very surprising, but how much they matter is very surprising. For example, would you have guessed that changing driver's license organ donation to be opt-out versus opt-in would increase participation to over 95% from 10% to 15%?

Behavioural economics is too wide a field to review fully here, but we will briefly describe three sets of concepts – limited attention, “human” evaluation and overconfidence – to provide some insight into its potential.

As with money and time, we only have a limited amount of attention. Research shows that we tend not to see what we are not looking for.¹⁴⁰ We also tend to focus only on a subset of information available to us.¹⁴¹ These and other forms of limited attention suggest that people are unlikely to consider the masses of complex information that comes with most financial decisions. Limited attention is what makes fine print so dangerous.

“Human” evaluation refers to a large body of research that shows how we calculate and evaluate in ways different from economists' assumptions. For example, we do not evaluate prices or benefits in a purely economic sense but usually relative to some kind of anchor or reference point. Often that anchor can be something totally unrelated to the thing we are trying to evaluate. We also tend to choose among competing offers when they are evaluated jointly versus one by one. We tend to ignore or exaggerate low probabilities depending on how available the event is to memory and attention.¹⁴² For example, consumers may underestimate the likelihood of a floating interest rate increasing while choosing a mortgage, especially when rates have been going down for a while.

The final set of insights relate to how we predict our own behaviour or capabilities. A number of amusing studies show that 90% of people believe they are above average drivers and more than half of MBA students expect to be in the top 20% of their class.¹⁴³ Delavigne and Malmendier show that overconfidence leads people to pay 70% more gym memberships because they choose monthly instead of pay-as-you-go contracts.¹⁴⁴ In financial services, consumers may be overconfident about their future self-discipline and therefore ignore even exorbitant late fees while choosing among credit products.

Once we understand how real people (as opposed to Mr Spock, the perfectly logical but fictitious science officer from Star Trek) make decisions, we can start to see where things may go wrong when they buy and use financial products. The safety of products can be evaluated at the design stage by simply examining the product dimensions and possibly doing some behaviourally informed

consumer testing. Broadly speaking, three types of problems can occur:

1. Not paying attention to product terms and associated risks
2. Paying attention, but misunderstanding the terms and risk
3. Understanding the terms, but making a poor choice:
 - Mis-forecasting future behaviour (e.g., being overconfident that you will remember to pay down your credit card balance before the teaser rate expires) or mis-forecasting the likelihood of future damaging events (e.g. underestimating the chance that your mortgage interest rate will go up, or that the value of your home will go down)
 - Mis-valuing some cost or benefit (e.g., ignoring high application fees when bundled with a large purchase like a mortgage)
 - Mis-forecasting the value the “future self” places on certain choices (e.g., undervaluing the benefit of having higher retirement savings)

More work needs to be done before we can fully harness the power of behavioural economics to enhance consumer protection, but its potential is already clear. As a first step, ideas42 has begun to develop a framework for conducting a behavioural audit of financial products that uses objective indicators of “good” versus “bad” products. It is important to note that the framework does not set out to create a list of product dimensions that should be banned. It simply documents the behavioural risks of certain types of features so that financial providers can either avoid the riskiest ones or add others that counteract these behavioural trapdoors.

We identify dimensions that increase the risk of triggering decision-making mistakes as well as those that can help reduce or avoid them. In some cases, providers design features precisely to exploit the error consumers are likely to make. However, in many cases harm is an unintended consequence. Teaser rates are a good example because they exhibit both characteristics in different contexts. In the case of credit cards, teaser rates were designed to attract customers, but when combined with balance transfers they can also earn high profits because many people forget (or are unable) to pay off their low-rate balance in time. The credit card company here relies on the fact that most people pay their outstanding balance and interest (or at least pay for long enough even when they do default) that the firm still makes a profit on the average client.

A teaser rate on a mortgage is a different matter. People have a tendency to focus on the short-term price, so would be likely to over-borrow when a mortgage starts out with low monthly payments. In this case, most mortgage lenders probably did not intend to cause over-borrowing, since potential default from having an excessive mortgage will create serious harm for the lender (as seen during the housing crisis). Other risky product features could be fees tied to uncertain events like prepayment penalties or very high credit lines. “Good” features may include the standardized disclosure of pricing elements so it is easy to compare across offers¹⁴⁵ or access to an unbiased advisor who can explain terms.

The framework being developed at ideas42 is not dissimilar to an engineer using selected rules of thumb, safety standards and testing practices to design safe cars or kitchen appliances. With the help of behavioural economics, perhaps financial innovators will adopt safe design practices as routine, just like engineers in other domains. Someday, we may even see a financial services ad showing off impressive “crash test” results and safety features, just like car manufacturers do today.

Piyush Tantia is Executive Director at ideas42, Harvard University.

16 Self-Regulation and Consumer Trust

By Jennifer Tescher

Trust is the currency of the financial services industry. One of the lasting consequences of the recent financial crisis is a lack of trust, which in turn creates an inhospitable environment for innovation. Despite a raft of new regulations and capital requirements designed to protect consumers and strengthen financial markets, consumer confidence in financial institutions continues to be low – 87% of consumers have little or no confidence in financial providers across all dimensions critical to trust, according to the early 2011 results of the Corporate Executive Board’s global survey of consumer financial sentiment. Some 55% say institutions do not offer clear and simple policies, while 53% don’t feel financial institutions share customer values. Nearly half lack confidence that banks live up to their promises and commitments.

This lack of confidence reduces product sales and exposes financial firms to instability. Formal regulation is critical to ensuring systemic stability, but alone it will not reverse the industry’s reputational slide among consumers and the media. In fact, the less trust the public has in banks, the more pressure there will be to regulate further; creating a self-reinforcing cycle that ultimately can stifle positive financial innovation.

How can the financial services industry regain consumer trust and restore credibility to the idea that financial innovation can be a net benefit for society? Meaningful self-regulation can be a powerful way for industry to articulate the value it provides and to demonstrate a commitment to consumer-friendly innovation.

Companies and industries engage in self-regulation for different reasons and in a variety of ways. Self-regulation can inspire trust among customers and the media, especially after a negative incident. Consider the 2007 fiasco when JetBlue Airways left passengers stranded on the runway for 11 hours during an ice storm at New York’s JFK airport. The incident dominated the media and caused outrage among both consumers and policy-makers, who began calling for added regulation. Less than a week later, JetBlue created its own Customer Bill of Rights, a policy “dedicated to bringing humanity back to air travel”.

In other cases, industries use self-regulation in an attempt to avoid, reduce or ameliorate future government regulation. Even when new regulations are created, regulators may not have sufficient capacity to meaningfully enforce them, and they sometimes turn to industry for cooperation. When the US cosmetics industry came under FDA regulation in 1938, for example, the agency had capacity to regulate cosmetics only after their introduction to the market. It relied on cosmetics companies to conduct pre-market product testing, on a voluntary basis. The cosmetics industry has strong incentives to self-regulate. Doing so successfully demonstrates to government that further regulation is unnecessary. Moreover, image is everything for the cosmetics industry, and consumers are less likely to buy beauty products unless they trust that they are safe.

The same can be said of financial products, particularly given the increased wariness of consumers as a result of the financial crisis. Yet the financial services industry has few examples of meaningful self-regulation – until now. Two separate efforts are under way – one focused on the global micro-finance industry, the other focused on US consumer financial services – to ensure that financial innovation and consumer protection are more tightly coupled. Both efforts are being instigated not by traditional trade groups, but by third-party organizations dedicated to using the power of markets to profitably reach consumers at the bottom of the pyramid.

The Smart Campaign is a global effort to implement a set of client protection principles throughout the micro-finance industry. While some individual micro-finance organizations had already created their own conduct codes, the rapid growth of the industry and the emergence of some questionable practices led industry leaders to agree on the need for a universal approach. These efforts coalesced around one statement, the **Client Protection Principles**, and an industry development campaign, the Smart Campaign, housed at the Center for Financial Inclusion at ACCION International, in cooperation with the Consultative Group to Assist the Poor (CGAP) at the World Bank and many other micro-finance industry participants.

The Smart Campaign moves from the broad principles to specific practice standards that clients should expect to receive when doing business with a microfinance institution. They address appropriate product design and delivery; prevention of over-indebtedness; transparency; responsible pricing; fair and respectful treatment of clients; privacy of client data; and mechanisms for complaint resolution. The campaign encourages micro-finance providers and investors to participate in a self-assessment or undergo a third-party assessment based on these principles and to upgrade their operations accordingly.

The **Compass Principles** represent a similar and more nascent effort by my organization, the Center for Financial Services Innovation (CFSI), to encourage the US financial services industry to commit to positive practices that actively contribute to improving people’s lives and deliver sustainable value to both consumers and providers. The principles are meant to guide the design and delivery of the financial products consumers use to transact, save and borrow. They are:

- Embrace Inclusion: Responsibly Expand Access
- Build Trust: Develop Mutually-Beneficial Products that Deliver Clear and Consistent Value
- Promote Success: Drive Positive Consumer Behaviour through Smart Design and Communication
- Create Opportunity: Provide Options for Upward Mobility

CFSI has begun convening advisory councils comprised of financial services providers, consumer advocates and other stakeholders to translate the principles into more granular best-practice guides for specific products and services.

These two efforts have important differences, largely driven by context and focus. The Smart Campaign is attempting to shift practice within an industry that is universally focused on the poor, in regions that often have little or no regulatory oversight. As such, the principles it espouses are minimum standards, and the goal is to get those serving the poor to do it responsibly. The Compass Principles are aimed at a much broader swath of financial providers and products, in a context of significant regulation. As a result, the principles and best practice guides are meant to be aspirational and encourage a competitive race to the top, building on the floor created by strong regulation. They are meant to demonstrate how companies, most of which are not explicitly or exclusively focused on the financial underserved, can serve this market responsibly and make money doing so.

What is most notable, however, is the shared vision that unites these two approaches to self-regulation. Financial services can and should be a force for good in people’s lives. By putting the needs of clients first, financial providers should be able to profit as a result of their clients’ success rather than at their clients’ expense.

Jennifer Tescher is President and CEO of the Center for Financial Services Innovation in the United States.

17 Leveraging Financial Innovation to Serve the Poor

Peter Tufano

Some observers have criticized financial innovation as harmful to consumers, calling attention to subprime adjustable mortgages, payday lending with high annual percentage rates (APRs), and debit cards with overdraft fee provisions. While one can find instances where individuals and families have not benefitted from financial innovation, this anecdotal evidence falls far short of proof that financial innovation is harmful to consumers. A broader review of the facts would likely reach a contrary conclusion.

In a recent paper with Andrea Ryan and Gunnar Trumbull, we characterize the post-war history of consumer finance in the United States.¹⁴⁶ We list over 40 post-war consumer finance innovations, a sampling of the innovations that have directly and indirectly affected the provision of consumer financial products. For example, we identify various innovations in the technology, processes and organizations that make possible card-based payment systems (credit and debit cards), which in turn facilitate safe and efficient consumer transactions.

New technologies that allow consumers to have a more complete understanding of their finances, such as data aggregators and online finance communities, give households better control over their money. Money market funds, which are held in more than 30 million accounts, give consumers options to invest short-term funds and create healthy competition for banks.

Even some of the more contentious financial innovations have less clear net impacts. In a recent paper with Josh Lerner, we suggest a research approach that has roots in historical analysis.¹⁴⁷ We apply counterfactual analysis to ask, “What would the financial landscape have looked like if this innovation had not emerged?” This method forces us to posit plausible alternative histories. In the case of consumer financial innovations, we might ask, “What would an alternative course have looked like without adjustable rate mortgages? Without payday loans?” Obviously there are no definitive answers to these questions, but this framing forces one to consider the counterfactuals.

Consider payday loans – short-term unsecured loans with typical two-week periods and rates of US\$ 15 for each US\$ 100 borrowed. Despite their high APRs, if they did not exist, it is likely that some alternative would satisfy the demand for short-term fast cash. Perhaps banks would extend small unsecured loans to low-income families, but it is even more likely that traditional unregulated loan sharks would meet the demand that is currently met by payday loans. Compared with the loan sharks, payday lenders might not look so problematic. For example, one study finds that households facing natural disasters in California were less likely to experience foreclosures and larcenies when payday loans were more available.¹⁴⁸ This result was replicated in a laboratory experiment with undergraduate subjects who had to manage a household budget over 30 periods, and found that the addition of these loans to a mix of credit products helped subjects absorb expenditure shocks.¹⁴⁹ While we can probably create even better ways of providing short-term credit to low-income families, any evaluation of an innovation must consider the alternatives that might otherwise have existed.

Rather than simply defend financial innovations, there is evidence that financial innovations can be designed for, and serve, the masses and especially the poor. Michael Sherradan’s pioneering work on Individual Development Accounts (IDAs), first discussed in his book *Assets and the Poor*, created a new asset-building vehicle for low-income families.¹⁵⁰ IDAs are matched savings accounts for poor individuals, combining financial education and matched funding for certain activities (typically housing purchases, education and small business). There is evidence that this innovation, which is patterned loosely after 401(k) programmes, has had beneficial impacts on low-income savers.¹⁵¹

A newer innovation, Children Savings Accounts, is showing promise in asset building for low-income families.¹⁵² One of the most effective innovations to positively affect the masses of households is the introduction of automatic enrolment and defaults in retirement plans. This set of innovations, based on solid empirical research, embodied in the US Pension Protection Act of 2006, and made real in pension programmes across America, boosts participation rates in pension plans and savings by workers.¹⁵³

My own research and social enterprise focuses specifically on financial innovations that can support low- to moderate-income individuals. A Boston-based non-profit, the Doorways to Dreams (D2D) Fund (www.d2dfund.org), of which I am co-founded and chair, is an R&D lab for new financial products to serve low-income families. In the US, low-income families have a unique savings opportunity at tax time, as US federal tax refunds in 2009 delivered US\$ 159 billion in refunds to 67 million filers who make under US\$ 40,000 per year.¹⁵⁴ Working with non-profits, financial institutions and federal bodies, D2D tested an innovation that would allow low-income refund recipients to “pay themselves first.”

This work was ultimately embodied in IRS Form 8888, which permits refund recipients to direct their refunds to multiple destinations, permitting them to save some and spend some of their refund. Subsequent work tests whether giving refund recipients the ability to save for themselves – or for others – in the form of inflation indexed US Savings Bonds sold at tax time would assist low-income families to save. This research, forthcoming in the *American Economic Journal*, was embodied in the government’s decision to permit refund recipients to elect to purchase bonds by withholding monies from their refunds.¹⁵⁵ A third project tests the potential to leverage multi-media to create new methods of financial education for low- to moderate-income adults.¹⁵⁶ The results are a series of financial entertainment video games, including “Celebrity Calamity”, which has the player assume the role of a financial manager of a financially challenged celebrity, or a recent offering “Bite Club.” The latter, which is being distributed in multiple ways including in workplaces, teaches about retirement savings by having the player take on the challenge of managing the pension for a vampire who will live forever: “When you’re immortal, retirement is eternal.”¹⁵⁷ Preliminary results are promising in that players are absorbing simple financial lessons that will hopefully help them to make better decisions.

Finally, a multi-year project is taking an old innovation – the concept of marrying savings with lottery play, which has been around since at least 1694 – to modern practice. In the simplest form, these schemes have savers pool the interest on their savings and lottery off the pot of interest, giving the saver a small chance at a large amount of money (versus a large chance of a small amount of money). Research suggests that this long-lived technique is solidly grounded in behavioural principles, and empirical evidence suggests that it is particularly effective among low-income families who might otherwise use lottery play as a method of saving.¹⁵⁸ This work has led to the introduction of this savings vehicle in a number of US states.

Financial innovation – like any innovation – can be used for many purposes. There is an important role for regulation to ensure that financial products are offered responsibly to consumers.¹⁵⁹ It is just as important to ensure that we continue to discover, test and offer new products and services that will improve the everyday financial lives of families.

Peter Tufano is Peter Moores Dean and Professor of Finance at Saïd Business School, University of Oxford.

18 The Agency Problem in Consumer Financial Services

By Tim Wyles

In economics, the Principal-Agent problem refers to the difficulty of managing the different goals of the Principal (the firm) and the Agent (the employee or external broker) in the context of imperfect information. The Principal wishes to achieve certain business goals and he engages the Agent to help achieve those goals. The Agent acts under direction but frequently faces situations in which that direction is only a guide. He/she will need to use his/her own situational discretion. And besides, the Agent may have selected goals of his/her own. The dilemma is usually solved by a combination of incentives and controls imposed on the Agent by the Principal. In practice, the poor use of incentives can often lead to serious unintended consequences.

Two factors affect how complicated the problem is. The first is the degree of asymmetry in information held by the two parties. The second is in the degree of discretion of the agent. Put simply, where there is poor information and wide discretion, problems will tend to surface. This combination of poor information and wide local discretion makes managing the Principal-Agent problem fundamental in financial services. Many financial products are sold to customers through “agents”, whether literally (for example, through independent insurance agents or mortgage brokers) or, figuratively, through internal employees with different goals than their employer (for example, stockbrokers or derivatives salesmen).

In addition, the Principal-Agent problem is frequently complicated by the presence of the customer. In effect, it becomes a Principal-Agent-Customer problem. The added complications arise from the potentially conflicting goals of the Customer and the Principal, the existence of significant information asymmetries between the Agent and the Customer and the increased regulatory accountability imposed on banks and insurers to ensure that customers are not sold inappropriate products.

To pick an obvious and topical example: consider a mortgage lender, a mortgage broker and a mortgage borrower. In a lifetime, the typical customer will enter into perhaps three or four mortgage transactions. The mortgage lender and broker are both likely to be vastly more knowledgeable about everything to do with a mortgage product and the loan transaction than the borrower. Meanwhile, the economic goals of the lender and the agent may differ since the agent is frequently paid under an incentive arrangement that takes the form of a small percentage of the loan amount, and sometimes as a function of the loan’s value in the secondary market.

This is a situation rife with possibilities for the interests of the three parties to diverge. For example, when faced with a borrower who appears to lack product knowledge, a broker may attempt to maximize the combination of “points” and interest rate on the mortgage loan. This is precisely what some US mortgage brokers were accused of doing in the mid-to-late 2000s, and especially with subprime borrowers who very likely did lack product knowledge. In this example, the borrower is “gouged”, the lender sells the loan into the secondary market and books a significant gain-on-sale due to the higher-than-market interest rate, and this provides sufficient income to pay the generous incentives to the mortgage broker.

There are multiple examples of the Principal-Agent-Customer triangle, and they are by no means all in the consumer sector. Looking once more to recent history, there were instances in which the structured credit department of an investment bank (Principal) provided generous and immediate benefits in the form of high year-end bonuses to bankers (Agents) who energetically sold tranches of mortgage-backed securities to small and medium-sized banks and other investors (Customers). One of the more surprising features of the recent crisis was the realization that so many financial institutions that were investors in these products lacked the sophistication to assess the true value and risk of the securities they bought. Of course, this may have been partly the fault of yet another form of Principal-Agent problem – the securities were rated by a third party known as a “rating agency”. In effect, the ultimate purchasers relied upon these ratings, delivered by a party who was paid by the Principal.

The triangular face-off among a bank or insurer, its agent and its customer has attracted a lot of attention from academics, economists, politicians, regulators and the industry itself. It is not our purpose to review or repeat all of that here but to ask the question specific to this project: “Does innovation make any difference to the Principal-Agent-Customer triangle?”

As elsewhere, the answer is clearly “yes”. In the context of innovation, the one certainty is increased uncertainty. Whatever the challenges contained within a Principal-Agent-Customer triangle, they become more difficult in the context of added uncertainty.

Uncertainty is a defining element of the Principal-Agent problem in the first place. Increased uncertainty makes the problem harder by definition. And uncertainty is an element of the information asymmetry between the financial services firm and its customer. Whether an innovation takes the form of a new product or a new business process, the normal degree of difference in understanding between bank and borrower, or between insurer and insured, inevitably rises.

Offsetting these inherent difficulties, to some degree, recent social and technology changes have helped rebalance both the Principal-Agent and the Agent-Customer links:

- Customers increasingly have access to extensive reviews of products and of suppliers, which will act to reduce “mis-selling”.
- Better management information systems allow Principals to monitor the sales mix and pricing of Agents to identify outliers; for example, to identify an Agent for whom every single loan has added loan protection insurance.
- Technology provides mechanisms such as online chat and even high-definition video links that allow a Principal to provide Customers access to real experts (rather than just commissioned salesmen) in a way that was previously not cost effective.

From lessons learned in recent years, three significant guidelines have emerged, regarding the Principal-Agent problem:

1. Keep products simple: The more complex the product, the more likely it is to end up being sold inappropriately, whether accidentally or deliberately.
2. Manage time-horizons: Be particularly careful whenever the item being sold by the Agent has a term or effective maturity significantly longer than a year.
3. Practice moderation: Do not let incentives or aggressive sales management come between you and your customers.

Keep Products Simple

Product proliferation is a force of nature – there is a natural tendency to add new versions of existing products. Some banks may end up with literally hundreds of different checking accounts. Anyone who has ever reviewed the extensive pricing sheets of a mortgage broker, or the price matrix for an auto insurer, will also recognize this phenomenon. A case can always be made that each minute variant upon an original core product is ideally suited to some micro-segment of consumers; however, the increase in complexity simultaneously ensures that more mismatches are likely to occur across all consumer segments.

In the post-crisis world, there is already a move under way towards product simplification in the consumer financial services sector. This move is likely to be endorsed and even reinforced by regulators.

Manage Time-Horizons

If the cashflows associated with the thing being sold can unfold over multiple years, as is the case with many insurance policies, investments, loans (especially e.g. mortgage loans), or derivatives contracts with lengthy terms, then it is intrinsically difficult to assess the value of the “trade” – of the sale – at the time it is being made.

In this context, an incentive payment made in the short term, by the Principal to the Agent, can be significantly out of line with the eventual value of the transaction. On the other hand, a practical principle of incentive design is to credit an incentive close to the time when the effort is expended. Incentives that are paid promptly are simply more effective than incentives paid several quarters later. But the idea of making incentive payments in close-to-real-time, to enhance their effectiveness as incentives, cuts against the problem of imperfect information on the estimated net present value of the thing sold, especially when the item sold is innovative and intrinsically difficult to value.

One effect of the recent crisis has been to force a re-examination of the mechanisms of incentive design and pay-out between Principals and Agents to deal with these issues. While it is not realistic to spread incentive payments over the full term of, say, a mortgage, it does make sense to vest at least part of the payment over a period of time, with the option to clawback payments where it becomes clear that the product was not sold appropriately.

Practice Moderation

During the crisis, incentives have been held up as a major culprit. However, it is a myth that banks with no incentive plans serve their customers any better. Understanding customer needs and finding the right product for them is hard work and appropriate incentives can help drive appropriate behaviour. The trick is to avoid inappropriate incentives/sales management. For example:

- Avoid product-specific goals. If your agents are thinking about products, they are not thinking about customers.
- If the products are substitutional for the customer, pay the same incentive, regardless of the value to the bank, otherwise you encourage gouging.
- Avoid large rewards for a marginal sale:
 - Avoid large lump sums for hitting targets
 - Take care with prizes/recognition programmes for top performers

Tim Wyles is a Partner in Oliver Wyman's Financial Services unit, based in Madrid, Spain.

1 Historical Background to Selected Financial Innovations

1.1 MBS

During the Great Depression in the United States, the ability of banks to lend, and therefore to help restart the US economy, was severely hampered by the amount of debt on their balance sheets. In 1938, Congress created the Federal National Mortgage Association (FNMA), colloquially known as Fannie Mae, with the remit to buy mortgages¹⁶⁰ from banks and thereby greatly increase the availability of credit. In 1968, Congress converted Fannie Mae into a privately held corporation, with the aim of removing a significant amount of the resulting mortgage-related debt from the federal budget.

The portion of Fannie Mae that remained under government control became the Government National Mortgage Association (GNMA), known as Ginnie Mae. A competing private corporation, the Federal Home Loan Mortgage Corporation (FHLMC), known as Freddie Mac, was created a few years later to ensure a more robust secondary market for mortgages.

To increase the amount of available mortgage funding, the new government sponsored entities (GSEs) were permitted to transform pools of mortgages into securities and sell them to investors, rather than holding mortgages until maturity.¹⁶¹ Ginnie Mae guaranteed the first mortgage pass-through security in 1968; Freddie Mac issued its first mortgage pass-through in 1971; and Fannie Mae began the practice in 1981 after a rise in interest rates made transparent the level of interest rate risk generated by holding giant portfolios of long-term mortgages and funding them with short- and medium term borrowing.

The first non-GSE backed security was issued in 1977 by Bank of America.¹⁶² Over time, more participants issued and invested in mortgage backed securities (MBS), each enlarging the MBS market. Through the 1980s, investment banks and other participants began to securitize a range of loans (e.g. adjustable rate mortgages) that extended well beyond the fixed-rate mortgages that GSEs could buy. Meanwhile, regulations introduced in response to the US savings and loan crisis in the 1980s significantly increased bank capital requirements – encouraging the securitization of loans¹⁶³ and leading to growth in the market up to the millennium and beyond.

1.2 CDOs

The bonds underlying a CDO can vary in kind from corporate bonds to securitized loans and leases, including MBS, and the favoured collateral changed over time.¹⁶⁴ In the 1990s, CDO managers generally purchased corporate and emerging markets bonds and bank loans. However, after the liquidity crisis in the financial markets triggered by the Russian devaluation of August 1998, returns on asset-backed securities rose and CDO managers saw an opportunity to innovate by creating “multi-sector CDOs” backed by new collateral types, such as mobile home loans, aircraft leases and even mutual fund fees.

These securities performed poorly in the period after the dotcom bust and the economic slowdown following the Al Qaeda attack on the World Trade Center in New York in September 2001. The widely accepted explanation was that CDO managers could not become experts in such a wide array of underlying asset classes and industries. CDO managers, in a further innovation, therefore turned to the non-prime mortgage market, where they believed – wrongly, as it turned out – that the risk drivers were better understood. By 2004, MBS accounted for more than half the collateral in CDOs, making CDO managers key purchasers of lower rated (e.g., BBB) MBS tranches. In the same way that investor demand for MBS had funnelled money to the underlying mortgage market, the success of CDOs helped to further fuel the MBS market.

Figure 13 illustrates how a CDO can be created from the lower-rated tranches of multiple residential MBS. The CDO originator collects the scheduled payments from the bonds and redistributes them to the investors according to the seniority of the tranche. Many entities are only willing or able to invest in the most highly rated securities, so it became critical to gain very strong (AAA) credit ratings for certain tranches in order to sustain the demand for CDOs.

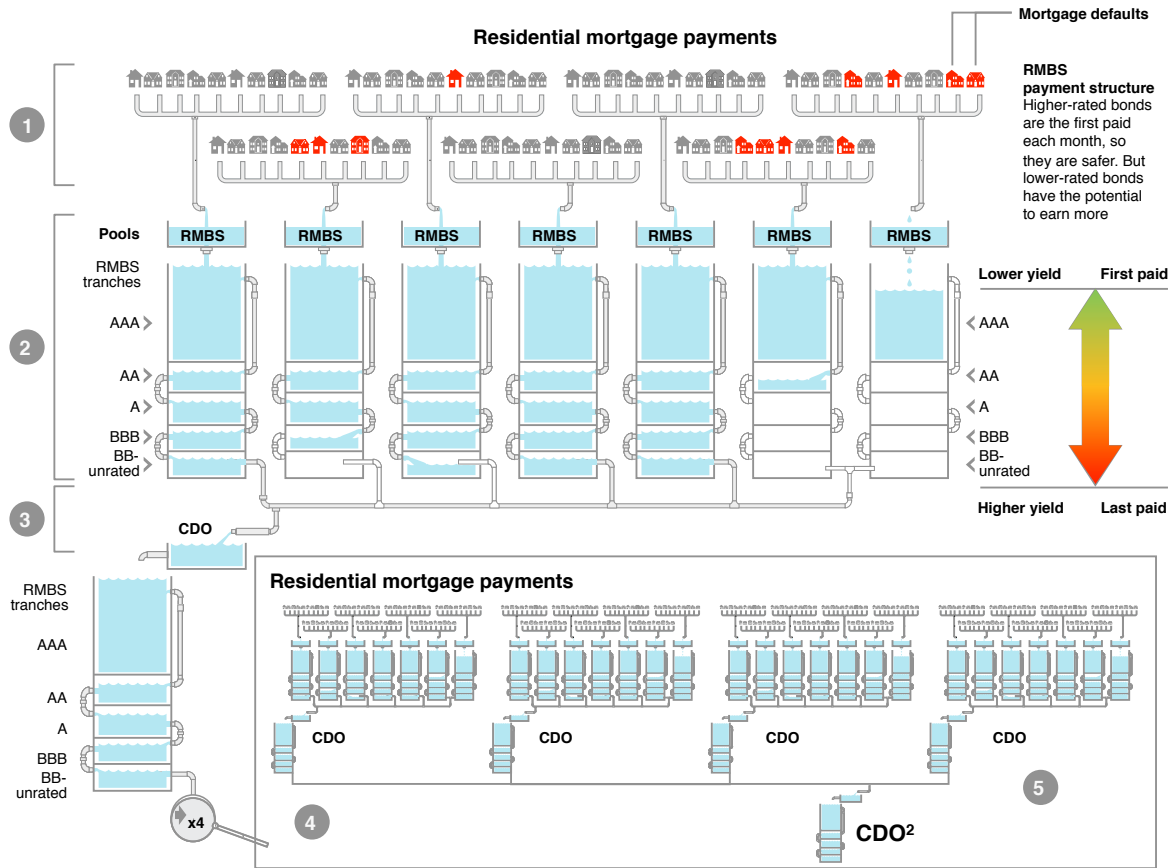
The process of creating and selling CDOs was relatively complex and involved a string of participants including¹⁶⁵ the securities firms that structured the notes into tranches and sold the securities to investors, CDO managers and ratings agencies (who received fees for each CDO deal they rated). Finally, financial guarantors and issuers of credit default swaps (notably AIG) wrote protection on CDOs, a crucial stage in the process that made CDOs seem virtually risk free and thus more attractive to investors.

The difficult-to-sell high-risk tranches of the CDO might then be reused as part of a further market innovation, the CDO squared.

Figure 13: CDO Structure Based on MBS

The theory of how the financial system created AAA-rated assets out of subprime mortgages

In the financial system, AAA-rated assets are the most valuable because they are the safest for investors and the easiest to sell. Financial institutions packaged and re-packaged securities built on high-risk subprime mortgages to create AAA-rated assets. The system worked as long as mortgages all over the country and of all different characteristics didn't default all at once. When homeowners all over the country defaulted, there was not enough money to pay off all the mortgage-related securities



- 1 People all over the country take out mortgages. Financial institutions group hundreds of subprime mortgages into Mortgage Backed Securities (MBSs)
- 2 The securities are grouped into tranches by levels of risk and earnings potential for bond holders. When everybody can pay their mortgage in full each month, each group of bond holders gets paid
- 3 The mortgage payments are collected by a financial institution and payments distributed to bond holders. Higher rated tranches are paid first. When monthly mortgage payments are not made, payments may not reach holders of lower-rated tranches
- 4 Collateralized Debt Obligations (CDOs) were created by taking the lower-rated tranches out of the MBSs and repackaging them. Most of this CDO is highly rated, even though it is built out of high-risk assets
- 5 Another financial institution does the same thing with high-risk tranches of CDOs, creating a CDO-squared

Source: IMF, Global Financial Stability Report: Containing Systemic Risks and Restoring Financial Soundness, April 2008

2 The FSB Principles for Sound Compensation Practices¹⁶⁶

Governance

1. Significant financial institutions should have a board remuneration committee as an integral part of their governance structure and organisation to oversee the compensation system's design and operation on behalf of the board of directors:
 - a. Judgement on compensation policies and practices and the incentives created for managing risk, capital and liquidity. In addition, it should carefully evaluate practices by which compensation is paid for potential future revenues whose timing and likelihood remain uncertain. In so doing, it should demonstrate that its decisions are consistent with an assessment of the firm's financial condition and future prospects.
 - b. To that end, work closely with the firm's risk committee in the evaluation of the incentives created by the compensation system.
 - c. Ensure that the firm's compensation policy is in compliance with the FSB Principles and standards as well as complementary guidance by the Basel Committee, IAIS and IOSCO, and the respective rules by national supervisory authorities.
 - d. Ensure that an annual compensation review, if appropriate externally commissioned, is conducted independently of management and submitted to the relevant national supervisory authorities or disclosed publicly. Such a review should assess compliance with the FSB Principles and standards or applicable standards promulgated by national supervisors.
2. For employees in the risk and compliance function:
 - a. Remuneration should be determined independently of other business areas and be adequate to attract qualified and experienced staff.
 - b. Performance measures should be based principally on the achievement of the objectives of their functions.

Compensation and Capital

3. Significant financial institutions should ensure that total variable compensation does not limit their ability to strengthen their capital base. The extent to which capital needs to be built up should be a function of a firm's current capital position. National supervisors should limit variable compensation as a percentage of total net revenues when it is inconsistent with the maintenance of a sound capital base.

Pay Structure and Risk Alignment

4. For significant financial institutions, the size of the variable compensation pool and its allocation within the firm should take into account the full range of current and potential risks:
 - a. The cost and quantity of capital required to support the risks taken
 - b. The cost and quantity of the liquidity risk assumed in the conduct of business
 - c. Consistency with the timing and likelihood of potential future revenues incorporated into current earnings
5. Subdued or negative financial performance of the firm should generally lead to a considerable contraction of the firm's total variable compensation, taking into account both current compensation and reductions in payouts of amounts previously earned, including through bonus-malus or clawback arrangements.
6. For senior executives as well as other employees whose actions have a material impact on the risk exposure of the firm:
 - a. A substantial proportion of compensation should be variable and paid on the basis of individual, business-unit and firm-wide measures that adequately measure performance.
 - b. A substantial portion of variable compensation, such as 40% to 60%, should be payable under deferral arrangements over a period of years.
 - c. These proportions should increase significantly along with the level of seniority and/or responsibility. For the most senior management and the most highly paid employees, the percentage of variable compensation that is deferred should be substantially higher, for instance above 60%.
7. The deferral period described above should not be less than three years, provided that the period is correctly aligned with the nature of the business, its risks and the activities of the employee in question. Compensation payable under deferral arrangements should generally vest no faster than on a pro rata basis.
8. A substantial proportion, such as more than 50%, of variable compensation should be awarded in shares or share-linked instruments (or, where appropriate, other non-cash instruments), as long as these instruments create incentives aligned with long-term value creation and the time-horizons of risk. Awards in shares or share-linked instruments should be subject to an appropriate share retention policy.
9. The remaining portion of the deferred compensation can be paid as cash compensation vesting gradually. In the event of negative contributions of the firm and/or the relevant line of business in any year during the vesting period, any unvested portions are to be clawed back, subject to the realised performance of the firm and the business line.

10. In the event of exceptional government intervention to stabilise or rescue the firm:
 - a. Supervisors should have the ability to restructure compensation in a manner aligned with sound risk management and long-term growth.
 - b. Compensation structures of the most highly compensated employees should be subject to independent review and approval.
11. Guaranteed bonuses are not consistent with sound risk management or the pay-for-performance principle and should not be a part of prospective compensation plans. Exceptional minimum bonuses should only occur in the context of hiring new staff and be limited to the first year.
12. Existing contractual payments related to a termination of employment should be re-examined, and kept in place only if there is a clear basis for concluding that they are aligned with long-term value creation and prudent risk-taking; prospectively, any such payments should be related to performance achieved over time and designed in a way that does not reward failure.
13. Significant financial institutions should take the steps necessary to ensure immediate, prospective compliance with the FSB compensation standards and relevant supervisory measures.
14. Significant financial institutions should demand from their employees that they commit themselves not to use personal hedging strategies or compensation- and liability-related insurance to undermine the risk alignment effects embedded in their compensation arrangements. To this end, firms should, where necessary, establish appropriate compliance arrangements.

Disclosure

15. An annual report on compensation should be disclosed to the public on a timely basis. In addition to any national requirements, it should include the following information:
 - a. The decision-making process used to determine the firm-wide compensation policy, including the composition and the mandate of the remuneration committee.
 - b. The most important design characteristics of the compensation system, including criteria used for performance measurement and risk adjustment, the linkage between pay and performance, deferral policy and vesting criteria, and the parameters used for allocating cash versus other forms of compensation.
 - c. Aggregate quantitative information on compensation, broken down by senior executive officers and by employees whose actions have a material impact on the risk exposure of the firm, indicating:
 - i. Amounts of remuneration for the financial year, split into fixed and variable compensation, and number of beneficiaries
 - ii. Amounts and form of variable compensation, split into cash, shares and share-linked instruments and other
 - iii. Amounts of outstanding deferred compensation, split into vested and unvested
 - iv. The amounts of deferred compensation awarded during the financial year, paid out and reduced through performance adjustments
 - v. New sign-on and severance payments made during the financial year, and number of beneficiaries of such payments
 - vi. The amounts of severance payments awarded during the financial year, number of beneficiaries, and highest such award to a single person.

Supervisory Oversight

16. Supervisors should ensure the effective implementation of the FSB Principles and standards in their respective jurisdiction.
17. In particular, they should require significant financial institutions to demonstrate that the incentives provided by compensation systems take into appropriate consideration risk, capital, liquidity and the likelihood and timeliness of earnings.
18. Failure by the firm to implement sound compensation policies and practices that are in line with these standards should result in prompt remedial action and, if necessary, appropriate corrective measures to offset any additional risk that may result from non-compliance or partial compliance, such as provided for under national supervisory frameworks or Pillar 2 of the Basel II capital framework.
19. Supervisors need to coordinate internationally to ensure that these standards are implemented consistently across jurisdictions.

Acknowledgements

In addition, the project team would like to thank all workshop and interview participants for contributing their insights and time. These individuals are (in alphabetical order):

- Adams, Justin; Founder and Head of the Venturing Business; BP
- Agarwal, Bhupesh; Chief Manager; ICICI
- Aggarwal, Anil; Founder and Chairman; Wickwood Development
- Akilan, Joiel; Chief Representative; BBVA India
- Assaf, Samir; Chief Executive, Global Banking and Markets; HSBC Bank Plc
- Aukrust, Lars Espen; Counsellor, Science and Innovation; Embassy of Norway
- Aversa, Stefano; President and Member of the Board; AlixPartners
- Ayers, Seth; Policy Specialist, ICT, Innovation, Entrepreneurship; The Information for Development Program (InfoDev)
- Babicz, James; Head of Risk SAS UK; SAS
- Bajaj, Sanjiv; Managing Director; Bajaj Finserv Ltd
- Belyaev, Vadim; Chief Executive Officer and Member of the Board; OTKRITIE Financial Corporation JSC
- Bennett, Tim; Partner; Oliver Wyman
- Benson, Carol; Founding Partner; Glenbrook
- Bergeron, David; Manager; Oliver Wyman
- Bernier, Michel; Partner; Oliver Wyman
- Beswick, Paul; Partner; Oliver Wyman
- Bly, Adam; Founder and CEO; Seed Media Group
- Bols, Thomas; Vice-President Health Policy and Market Access; Merck Serono Chair for the Healthcare Biotechnology Council
- Bossi, Giovanni; Chief Executive Officer; Banca IFIS S.p.A.
- Bralver, Charles; Massifpartners
- Buse, Ingo; Head Issue Management and Messages; Swiss Re
- Caballero-Sant, Francisco; Head of Unit, Economic Analysis of Financial Markets; European Commission
- Cacciotti, Jerry; Partner; Oliver Wyman
- Carney, Mark J.; Governor; Bank of Canada
- Chennell, Josephine; Director Communications: Senior Partnerships & Issue Manager; Swiss Re
- Chopard, Francois; Partner; Oliver Wyman
- Coffey, Phil; Chief Financial Officer; Westpac Banking Corporation
- Coggins, Wynn; Director of Technology Center 2800; USPTO
- Connelly, Thomas; Chief Innovation Officer; DuPont
- Coye, Dr. Molly; Chief Innovation Officer; UCLA
- Daisley, Michelle; Senior Manager; Oliver Wyman
- Danel, Carlos; Co CEO; Banco Compartamos SA
- Daruwala, Zarin; President Wholesale Banking; ICICI
- Date, Rajeev; Deputy Director; Consumer Finance Protection Bureau
- Demaré, Michel; Chief Financial Officer; ABB Ltd
- Dresner, Andrew; Partner; Oliver Wyman
- Drexler, Michael; Head of Investors; World Economic Forum
- EL-Ghandouri, Lotfi; Founder; Creative Society
- Forese, James A.; Chief Executive Officer, Securities and Banking, Institutional Clients Group; Citi
- Freeland, Chrystia; Digital Editor; Thomson Reuters
- Ganesh, NS; Associate Vice-President; HCL Technologies Limited
- Garrett-Cox, Katherine; Chief Executive Officer and Chief Investment Officer; Alliance Trust Plc
- Gellert, James H.; CEO; Rapid Rating
- Gopalakrishnan, Kris; Executive Co-Chairman; Infosys Ltd
- Gosin, Barry M.; Chief Executive Officer; Newmark Knight Frank
- Gros, Daniel; Director; CEPS
- Gubler, Zachary James; Climenko Fellow and Lecturer on Law; Harvard Law School
- Gupta, Rahul; Deputy Group Chief Executive Officer; Ambit
- Haben, Piers; Deputy Secretary-General of the Committee of European Banking Supervisors (CEBS); European Banking Authority
- Haberstick, Urs; Head P&C Risk Assessment & Governance, Swiss Re
- Haemmig, Martin; Adjunct Professor; CeTIM
- Heyvaert, Rob; Corporate Executive Vice-President; FIS
- Hindi, Rand; CEO; BioInformatica
- Hobart, Julia; Partner; Oliver Wyman
- Hook, Jacob; Partner; Oliver Wyman
- Joshi, Rajendra; Chief Executive Officer and Director; Empower Pragati Vocational and Staffing
- Jungerwirth, Steven; Head, Clinical Safety Evaluation Pharmaceuticals; Abbott
- Kannan, R.; Hinduja
- Khosla, Atul; Partner; Oliver Wyman
- Kissel, Aaron; Head of FS; Executive Conference Board
- Komaroff, Andrew; Chief Operating Officer; Neuberger Berman Group LLC
- Kon, Martin; Partner; Oliver Wyman
- Krishnamurthy, Pavithra; Marketing Manager; Infosys Ltd
- Kunreuther, Howard; James G. Dinan Professor; Professor of Decision Sciences and Public Policy; The Wharton School, University of Pennsylvania
- Lakshmanan, Usha; Vice-President BFSI; HCL Technologies Limited
- Lampe-Oenerund, Christina; Founder and Chief Executive Officer; Boston-Power Inc.
- Law, Linda; Medical Director; Lexicon Pharmaceuticals, Inc.
- Leimbacher, Urs; Director Communications and Manager Public Affairs; Swiss Re
- Litan, Robert; Vice-President for Research and Policy; Ewing Marion Kauffman Foundation
- Lobo, Lucius; Vice-President Security Services; Tech Mahindra
- Lustig, David; Head of US Government Relations & Public Affairs Function; Unilever
- Lyman, Timothy; Senior Policy Advisor, Government and Policy; CGAP
- Lynch, Kevin; Vice-Chair; BMO Financial Group
- Maclay, Colin; Managing Director; The Berkman Center - Harvard
- Magnani, Marco; Managing Director; Mediobanca
- Mallinckrodt, Philip; Director; Schroders Plc
- Manocha, Ian; Managing Director SAS UK and Ireland; SAS
- McGavick, Mike; Chief Executive Officer; XL Group Limited

- McKeown, Chris; Vice-Chairman; Guy Carpenter
- Misra, Devpriya; Vice-President, Global Partnerships; SwissRe
- Moody, James; Executive Director, Development; Commonwealth Scientific and Industrial Research Organisation
- Morris, Nigel; Co-Founder and Chairman; Capital One
- Moynihan, Edward; Partner; Oliver Wyman
- Mupita, Ralph; Chief Executive, Emerging Markets; Old Mutual Plc
- Naylor, Lindsey; Senior Manager; Oliver Wyman
- Nelson, John; Chairman; Lloyd's
- Oistamo, Dr Kai; Chief Technology Officer; Nokia
- Ortiz, Guillermo; Chairman of the Board of Directors; Grupo Financiero Banorte SA de CV
- Pain, Dureen Lee; Senior Economist, Economic Research & Consulting, Swiss Re
- Palmer, Andrew; Journalist; The Economist
- Perez, Javier; President; MasterCard Europe
- Peterson, Douglas L.; President; Standard & Poor's Financial Services LLC
- Pfeiffer, Alain; Chief Executive and Group Country Head, India; Société Générale
- Poulos, Michael; Partner; Oliver Wyman
- Profumo, Alessandro; Former CEO; UniCredit
- Reeder, Garry; Senior Advisor, Office of the Director; Consumer Financial Protection Bureau
- Rees, Mike; Group Executive Director and Chief Executive Officer, Wholesale Banking; Standard Chartered
- Rheinbaben, Constanze; E.ON AG
- Rodrigues, Harsha Thadhani; Director, Strategy and New Business Development; Women's World Banking
- Saffo, Paul; Author and Forecaster; Discern Analytics
- Sampat, Mehul Y.; Chief Executive Officer; Latwalla Investments
- Schnall, Peter; CRO; Capital One
- Schrage, Allison; Economist and Writer
- Scott, Hal; Nomura Professor of International Financial Systems; Harvard Business School
- Sebag-Montefiore, Matthew; Partner; Oliver Wyman
- Semenchuk, Jeff; Chief Innovation Officer; Hyatt Hotel Corporation
- Shah, Sameet; L&H Risk Management, Swiss Re
- Sheedy, William; Group President, Americas; Visa
- Shine, Dan; Senior Innovation Adviser, Office of Science and Technology; USAID - US Agency for International Development
- Shmeljov, Oleg; European Banking Authority
- Siegel, Seth; Managing Director; Citi Ventures
- Silva, Anderson Caputo; Lead Securities Market Specialist, Securities Market Group; World Bank
- Slywotzky, Adrian; Partner; Oliver Wyman
- Sridharan, Srinath; Senior Vice-President and Head, Strategic Alliances; Wadhawan Group
- Srinivasan, Shyam; Managing Director and Chief Executive Officer; The Federal Bank Ltd
- Stevens, Anthony; Partner; Oliver Wyman
- Studer, Nick; Partner; Oliver Wyman
- Taliente, Davide; Partner; Oliver Wyman
- Tarazi, Michael; Senior Regulatory Specialist, Government and Policy; CGAP
- Thompson, Nigel; Executive Director Economic and Development Strategy; Merck & Co
- Thornton, Richard; Partner; Oliver Wyman
- Torrens, Marc; Chief Innovation Officer; Strands Personal Finance
- Uggl, Lance; Chief Executive Officer; Markit Group Limited
- Uy, Marilou Jane D.; Director of Financial Sector Operations and Policy, Chair of Financial Sector Board; World Bank
- Varma, Vikas; Area Head South Asia; MasterCard
- Vidovich, Greg; Director of Technology Center 3600; USPTO
- Vigar, Andrew; Regional Manager, Asia; XL Insurance Company
- Vuleta, Geoff; Chief Executive Officer; Fahrenheit 212
- Weil, Mark; Partner; Oliver Wyman
- Weinhardt, Robert; Business Practice Specialist; USPTO
- Winters, Bill; Member; Independent Commission on Banking, UK
- Zeltkevic, Michael; Partner; Oliver Wyman
- Zennström, Niklas; Founder; Atomico
- Ziewer, Lukas; Partner; Oliver Wyman

References

- Adrian, T. & Brunnermeier, K. (2009) CoVaR. Federal Reserve Bank of New York, Staff Report, 348. Available at: http://www.newyorkfed.org/research/staff_reports/sr348.pdf
- Allison, J., & Tiller, E. (2002) Internet Business Method Patents. Texas Business Review, October. Available at: <http://repositories.lib.utexas.edu/handle/2152/15239> pp. 1-3
- Bank for International Settlements (2011) OTC derivatives market activity in the first half of 2011. Press Release, November 16. Available at: <http://www.bis.org/press/p111116a.htm>
- Bank for International Settlements (2010) Principles for Enhancing Corporate Governance. Available at: <http://www.bis.org/publ/bcbs176.htm>
- Bernanke, B. S. (2007) Speech to Federal Reserve Bank of Atlanta's 2007 Financial Markets Conference. May 15. Available at: <http://www.federalreserve.gov/newsevents/speech/bernanke20070515a.htm>
- Bilski v. Kappos. 130 S. Ct. 3218, 561 US ___, 177 L. Ed. 2d 792 (2010)
- Blum, L. & DiAngelo, C. (1997) Structuring efficient asset-backed transactions. In: Bhattacharya, A.K. & Fabozzi, F.J. eds. (1997) Asset-backed securities. New Hope, PA: Frank J. Fabozzi Associates. pp. 237-268
- Borio, C., Drehmann, M. & Tsatsaronis, K. (2012) Stress-testing macro stress testing: does it live up to expectations? Bank for International Settlements, Working Paper No. 369. Available at: <http://www.bis.org/publ/work369.htm>
- Buck, T. (2011) Palestinian bond issue raises \$70m. Financial Times, May 11. Available at: <http://www.ft.com/intl/cms/s/0/5761aad6-7bea-11e0-9b16-00144feabdc0.html#axzz1kHaUxKJ>
- Buyukozkan, G. & Feyzioglu, O. (2004). A fuzzy-logic-based decision-making approach for new product development. International Journal of Production Economics, 90(1), pp. 27–45
- Campbell, C. M. (1983) U.S. Patent number 4,408,203. Washington, DC: U.S.
- Campbell, J. Y., Jackson, H.E., Madrian, B. & Tufano, P. (2011) Making financial markets work for consumers. Harvard Business Review, July Issue. Available at: <http://hbr.org/2011/07/making-financial-markets-work-for-consumers/ar/1>
- Cebula, R. J. & Hung, C.-S. (1992) The Savings and Loan Crisis. Dubuque, Iowa: Kendall/Hunt Pub. Co.
- Choudhry, M. & Fabozzi, F.J. (2004) The Handbook of European Structured Financial Products. Hoboken, NJ: John Wiley and Sons
- Christensen, C. M. (1997) The innovator's dilemma: When new technologies cause great firms to fail. Boston: Harvard Business School Press
- Collins, D., N. Jentsch & R. Mazer (2011) Incorporating Consumer Research Into Consumer Protection Policy Making. CGAP Focus Note No. 74, November. Available at: <http://www.cgap.org/p/site/c/template.rc/1.9.55701/>
- Competition Commission. (2012) About us. Available at: http://www.competition-commission.org.uk/about_us/index.htm
- Consultative Group to Assist the Poor, CGAP. (2012) FAQ: What Is Microfinance? Available at: <http://www.cgap.org/p/site/c/template.rc/1.26.1302/>
- Council of the European Union. (2012) Regulations adopted on short selling and credit default swaps. Press Release, February 21. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ecofin/128081.pdf
- Crane, D. B. et al. (1995) The global financial system: A functional perspective. Boston: Harvard Business Press
- DellaVigna, S. & Malmendier, U. (2006) Paying not to go to the gym. The American Economic Review, 96(3), pp. 694–719
- DeNavas-Walt, C., Proctor, B. D. & Smith, J. C. (2011) Income, Poverty, and Health Insurance Coverage in the United States: 2010. U.S. Census Bureau, Consumer Population Report. Available at: <http://www.census.gov/prod/2011pubs/p60-239.pdf>
- Diamond v. Chakrabarty. 447 U.S. 303, US Supreme Court (1980)
- Dizikes, P. (2010) Explained: Knightian uncertainty. MIT News Office, June 2. Available at: <http://web.mit.edu/newsoffice/2010/explained-knightian-0602.html>
- Dong, M. & Zhou, X-S. (2004) Can fuzzy logic make technical analysis 20/20? Financial Analyst Journal, 60(4), pp. 54–75.
- Doorways to Dream Fund. (2011) About Financial Entertainment. Available at: <http://financialentertainment.org/aboutus.html>
- Drexler, A., Fischer, G. & Schoar, A. (2010) Keeping it Simple: Financial Literacy and Rules of Thumb. London School of Economics, Working Paper. Available at: <http://personal.lse.ac.uk/fischer/Assets/KIS-DFS-Jan2011.pdf>
- European Banking Authority. (2011) EBA Guidelines on Internal Governance (GL 44). Available at: http://eba.europa.eu/cebs/media/Publications/Standards%20and%20Guidelines/2011/EBA-BS-2011-116-final-%28EBA-Guidelines-on-Internal-Governance%29-%282%29_1.pdf
- European Central Bank. (2007) The Role of Financial Markets and Innovation in Productivity and Growth in Europe. Occasional Paper Series, No 72. Available at: <http://www.ecb.int/pub/pdf/scpops/ecbocp72.pdf>
- FamiliesUSA. (2008) June Health Policy Memo: The Facts about Prior Approval of Health Insurance Premium Rates. Available at: <http://familiesusa.org/assets/pdfs/prior-approval.pdf>
- Federal Deposit Insurance Company. (2009) December FDIC survey of unbanked and underbanked households. Available at: http://www.fdic.gov/householdsurvey/full_report.pdf
- Federal Trade Commission. (2012) About the Federal Trade Commission. Available at: <http://www.ftc.gov/ftc/about.shtm>
- Financial Stability Board, FSB. (2009) Principles for Sound Compensation Practices: Implementation Standards. Available at: http://www.financialstabilityboard.org/publications/r_090925c.pdf
- Fitch Ratings. (2004) Global criteria for collateralised debt obligations. Credit Products Criteria Report. Available at: <http://pages.stern.nyu.edu/~igiddy/ABS/fitchcdorating.pdf>
- Garanti Bank. (2010) Loan via POS. Available at: http://www.garanti.com.tr/en/sme_banking/loans/loan_via_pos.page?
- Gerardi, K., L. Goette & Meier, S. (2010) Financial literacy and subprime mortgage delinquency: Evidence from a survey matched to administrative data. Federal Reserve Bank of Atlanta, Working Paper, No. 2010-10
- Gilbert, R. J. (2006) Competition and innovation: Issues in competition law and policy. California: Berkeley Electronic Press
- Gott, S. P. (1978) U.S. Patent number 4,088,981. Washington, DC: U.S.
- Grameen Bank. (2012) Homepage. Available at: <http://www.grameen-info.org/>

- Greenspan, A. (1995) Remarks at Conference on Risk Measurement and Systemic Risk. Board of Governors of the Federal Reserve System, Washington, DC
- Guryan, J. et al. (2011) Making savers winners: An overview of prize-linked saving products. In Mitchell, O.S. & Lusardi, A. eds. (2011) Financial literacy implications for retirement security and the financial marketplace. New York: Oxford University Press
- Hall, B. (2009) Business and financial method patents, innovation, and policy. The National Bureau of Economic Research, Working Paper No. 14868. Available at: <http://www.nber.org/papers/w14868>
- Hall, B. (2001) Tax incentives for innovation in the United States. Asesoria Industrial ZABALA-Spain, Report to the European Union. Available at: <http://elsa.berkeley.edu/~bhall/papers/BHH01%20EU%20Report%20USA%20rtax.pdf>
- Hershfield, H. et al. (2011) Increasing Saving Behavior Through Age-Progressed Renderings of the Future Self. *Journal of Marketing Research*, 48, pp. S23-S37
- HM Treasury. (2009) UK international financial services – the future. Available at: http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/uk_internationalfinancialservices070509.pdf pp.18
- Hunt, R. & Bessen, J. (2004) The software patent experiment. *Business Review—Federal Reserve Bank of Philadelphia*, Q3, pp. 22–32
- Hunt, R. (2010) Business method patents and U.S. financial service. *Contemporary Economic Policy*, 28(3), pp. 322–352
- Internal Revenue Service. (2012) SOI Tax Stats - Individual Statistical Tables by Size of Adjusted Gross Income. Available at: <http://www.irs.gov/taxstats/indtaxstats/article/0,,id=96981,00.html>
- International Swaps and Derivatives Association (2010) Mid-Year 2010 Survey. Available at: <http://www.isda.org/statistics/recent.html#2010mid>
- Jagger, S. & Hosking, P. (2009) 'Wake up, gentlemen', world's top bankers warned by former Fed chairman Volcker. *The Sunday Times*. December 9. Available at: http://business.timesonline.co.uk/tol/business/industry_sectors/banking_and_finance/article6949387.ece
- Jovanovic, B. & Rousseau, P. L. (2005) General purpose technologies. In: Aghion, P. & Durlauf, S. ed. (2005) *Handbook of Economic Growth*. Available at: <http://www.sciencedirect.com/science/handbooks/15740684>
- Kahneman, D. (2011) *Thinking fast and slow*. London: Allen Lane
- Karlan, D. et al. (2010) Getting to the Top of Mind: How Reminders Increase Saving. National Bureau of Economic Research, Working Paper No. 16205. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1636817
- Kiff, J. et al. (2009) Credit derivatives: Systemic risks and policy options. International Monetary Fund, Working Paper WP/09/254. Available at: <http://www.imf.org/external/pubs/ft/wp/2009/wp09254.pdf>
- Klapper, L., A. Lusardi & Panos, G. (2012) Financial Literacy and the Financial Crisis. World Bank, Working Paper No. 5980. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2012/02/29/000158349_20120229095430/Rendered/PDF/WPS5980.pdf
- Knight, F.H. (1921) *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx; Houghton Mifflin Company
- Kutler, J. (2010) Is financial innovation over? *Institutional Investor Magazine*, October 27. Available at: <http://www.institutionalinvestor.com/Article/2700198/Is-Financial-Innovation-Over.html>
- Latimore, D. (2002) Calculating value during uncertainty: Getting real with “real options.” IBM Institute for Business Value. Available at: http://www.er.ethz.ch/teaching/IBM_real_Options.pdf
- Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. *Annual Review of Financial Economics*, 3, pp. 41-85
- Lerner, J. (2002) Where does State Street lead? A first look at finance patents, 1971 to 2000. *The Journal of Finance*, 57(2), pp. 901–930
- Lerner, J. (2003) The two-edged sword: The competitive implications of financial patents. Harvard Business School. Available at: www.frbatlanta.org/news/conferen/fm2003/lerner.doc
- Lerner, J. (2010). The litigation of financial innovations. *Journal of Law and Economics*, 53, pp. 807–831
- Litan, R. (2010) In defense of much, but not all, financial innovation. Financial Institutions Center, The Wharton School of the University of Pennsylvania.
- Lumpkin, S. A. (2009) Regulatory Issues Related To Financial Innovation. OECD, Financial Market Trends, Vol. 2. Available at: <http://www.oecd.org/dataoecd/28/62/44362117.pdf>
- Lusardi, A. (2003). Planning and Saving for Retirement. Dartmouth College, Department of Economics, Working Paper. Available at: http://www.financialliteracyfocus.org/alusardi/Papers/Lusardi_.pdf
- Lusardi, A. et al. (2010) Promising Learning Strategies, Interventions, and Delivery Methods in Financial Literacy Education. NEFE Quarter Century Project, Working Paper. Available at: <http://www.nefe.org/LinkClick.aspx?fileticket=4x7s1YB3-V4%3D&tabid=934>
- Lynch, K. (2010) Avoiding the financial crisis: Lessons from Canada. *Policy Options*, May Issue. Available at: <http://www.irpp.org/po/archive/may10/lynch.pdf>
- Mandell, L. & Klein, L. S. (2007) Motivation and Financial Literacy. *Financial Services Review*, 16(2). Available at: http://www2.stetson.edu/fsr/abstracts/vol_16_num2_p105.PDF
- Mas, I. & Radcliffe, D. (2010) Mobile Payments go Viral: M.PESA in Kenya. Bill & Melinda Gates Foundation. Available at: http://siteresources.worldbank.org/AFRICAEXT/Resources/258643-1271798012256/M-PESA_Kenya.pdf
- McKernan, S.M. & Sherraden, M. eds. (2008) *Asset building and low-income families*. Washington, D.C.: Urban Institute Press
- McLean, B. (2007) The dangers of investing in subprime debt. *CNN Money*, March 19. Available at: http://money.cnn.com/magazines/fortune/fortune_archive/2007/04/02/8403416/index.htm
- Merton, R. & Bode, Z. (1995) The global financial system, a functional perspective, chapter one: a conceptual framework for analyzing the financial environment. Boston: Harvard Business School Press
- Merton, R. (1992) Financial innovation and economic performance. *Journal of Applied Corporate Finance*, 4, pp. 12–22
- Michalopoulos, S., Laeven, L. & Levine R. (in press) *Financial innovation and endogenous growth*. Providence, RI: Brown University

- Tett, G. (2006) The dream machine: Invention of credit derivatives. *Financial Times*, March 24. Available at: http://www.ft.com/cms/s/2/7886e2a8-b967-11da-9d02-0000779e2340,dwp_uuid=10a38770-51d6-11da-9ca0-0000779e2340,print=yes.html">http://www.ft.com/cms/s/2/7886e2a8-b967-11da-9d02-
- Thadhani-Rodrigues, H. (n.d.) Conversation with Harsha Thadhani-Rodrigues from Manager Market Insight.
- Thaler, R. & Sunstein, C. (2008) *Improving decisions about health, wealth, and happiness*. Yale: Yale University Press
- The Climate Corporation. (2012) Homepage. Available at : <http://www.climate.com/>
- The Central Intelligence Agency. (2010) CIA World Factbook. Available at: <https://www.cia.gov/library/publications/the-world-factbook/index.html>
- The Economist. (2005) The Fall of a Corporate Queen. February, 3. Available at: http://www.economist.com/node/3632638?Story_ID=3632638
- The UK Financial Services Authority. (2012) Product design: Considerations for treating customers fairly. Available at: http://www.fsa.gov.uk/pages/doing/regulated/tcf/pdf/product_design.pdf
- The UK Financial Services Authority. (2012) Handbook of the UK Financial Services Authority: Glossary. Available at: <http://fsahandbook.info/FSA/html/handbook/Glossary/B>
- The UK Financial Services Authority. (2008) Parent's Guide to Money. IFF Research Ltd., Paper No. 63. Available at: <http://www.fsa.gov.uk/pubs/consumer-research/crpr63.pdf>
- The UK Financial Services Authority. (2006) Establishing Financial Capability in the UK: Establishing a baseline. Available at: http://www.fsa.gov.uk/pubs/other/fincap_baseline.pdf
- The United States Census Bureau. (2010) Income, poverty, and health insurance coverage in the United States. Available at: <http://www.census.gov/prod/2011pubs/p60-239.pdf>
- The U.S. Department of Justice, Antitrust Division. (2012) Mission Page. Available at: <http://www.justice.gov/atr/about/mission.html>
- Thibeault, A. E. & Vink, D. (2007) ABS, MBS and CDO compared: An empirical analysis. Social Science Research Network. Available at: <http://ssrn.com/abstract=1016854>
- Triantaphyllou, E. (2000) *Multi-criteria decision making methods: A comparative study*. London: Kluwer Academic Publishers.
- Tufano, P. & Schneider, D. (2008) Using Financial Innovation to Support Savers: From Coercion to Excitement. In: Blank, R. M. & Barr, M. S. eds. (2009) *Insufficient Funds: Savings, Assets, Credit and Banking Among Low-Income Households*. New York: Russell Sage Foundation
- Tufano, P. (in press). Just keep my money! Supporting tax-time savings with US savings bonds. *American Economic Journal*.
- Tufano, P. (2003) Financial innovation. In: Constantinides, G. M., Harris, M. & Stulz, R. M. eds. (2003) *The handbook of the economics of finance*. North Holland: Elsevier.
- U.S. Census Bureau. (2012) Archive: Current Population Survey Annual Social and Economic Supplement. Available at: <http://www.census.gov/hhes/www/poverty/publications/pubs-cps.html>
- United States Code. (1952) Title 35 §101: Inventions Patentable. Available at: <http://www.law.cornell.edu/uscode/text/35/101>
- Vanegas, L.V. & Labib, A.W. (2001) Application of new fuzzy weighted average method to engineering design evaluation. *International Journal of Production Research*, 39(6), 1147–1162
- Vink, D. & Thibeault, A. E. (2008) ABS, MBS and CDO Compared: An Empirical Analysis. Social Research Network. Available at: <http://ssrn.com/abstract=1016854>
- Wallack, T. (2012) Taking new approaches to money. *Boston Globe*, February 22. Available at: http://www.boston.com/business/personalfinance/articles/2012/02/22/taking_new_approaches_to_money_lessons/?page=1
- Willis, L. (2008) Against Financial Literacy Education. University of Pennsylvania Law School, Paper 208. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1105384
- Wilson, B. J. et al. (2008) An experimental analysis of the demand for payday loans. Social Science Research Network. Available at: <http://ssrn.com/abstract=1083796>
- Women's World Banking. (2012) Microinsurance. Available at: <http://www.swwb.org/expertise/microinsurance>
- World Bank Group. (2011) Final Report: Development of corporate bond markets in the emerging markets. Emerging Markets Committee of the International Organization of Securities Commissions. Available at: http://awareness.sca.ae/Arabic/IntReports/Report_2011-11.pdf

Endnotes

- Hall, B. (2001) Tax incentives for innovation in the United States. Asesoría Industrial ZABALA-Spain, Report to the European Union. Available at: <http://elsa.berkeley.edu/~bhhal/papers/BHH01%20EU%20Report%20USA%20tax.pdf>
- Schumpeter, J. A. (1942) Capitalism, socialism and democracy. London: Routledge
- Terwiesch, C. & Ulrich, K. (2009) Innovation Tournaments: Creating and Selecting Exceptional Opportunities. Boston: Harvard Business School Press
- Schumpeter, J. A. (1942) Capitalism, socialism and democracy. London: Routledge
- Christensen, C. M. (1997) The innovator's dilemma: When new technologies cause great firms to fail. Boston: Harvard Business School Press
- Terwiesch, C. & Ulrich, K. (2009) Innovation Tournaments: Creating and Selecting Exceptional Opportunities. Boston: Harvard Business School Press
- Rousseau, P. L. (2008) Biased and Unbiased Technological Change. In: Durlauf, S. N. & Blume, L. E. eds. (2008) The new Palgrave dictionary of economics. 2nd ed. Available at: http://www.dictionaryofeconomics.com/article?id=pde2008_B000125
- Adapted from: Terwiesch, C. & Ulrich, K. (2009) Innovation Tournaments: Creating and Selecting Exceptional Opportunities. Boston: Harvard Business School Press
- Gilbert, R. J. (2006) Competition and innovation: Issues in competition law and policy. California: Berkeley Electronic Press
- The Economist. (2005) The Fall of a Corporate Queen. February, 3. Available at: http://www.economist.com/node/3632638?Story_ID=3632638
- Scherer, F. M. (2005) Patents: Economics, policy, and measurement. Cheltenham: Edward Elgar Publishing
- Schacht, W. H. & Thomas, J. R. (2005) Patent law and its application to the pharmaceutical industry: An examination of the drug price competition and patent term restoration act of 1984. Congressional Research Service. Available at: <http://www.law.umaryland.edu/marshall/crsreports/crsdocuments/r3075601102005.pdf>
- See discussion in: Tufano, P. & Schneider, D. (2008) Using Financial Innovation to Support Savers: From Coercion to Excitement. In: Blank, R. M. & Barr, M. S., ed. (2009) Insufficient Funds: Savings, Assets, Credit and Banking Among Low-Income Households. New York: Russell Sage Foundation
- Examples are based on World Economic Forum research
- Merton, R. & Bode, Z. (1995) The global financial system, a functional perspective, chapter one: a conceptual framework for analyzing the financial environment. Boston: Harvard Business School Press
- Shakespeare, W. (2012) Hamlet. Act 1, scene 3, 75–77. Available at: <http://www.enotes.com/hamlet-text/act-i-scene-iii/ham-1-3-79>
- Oliver Wyman Research
- For example: "Financial innovations can be seen as playing a role akin to that of the 'general purpose technologies' delineated by Bresnahan and Trajtenberg (1995) and Helpman (1998): not only do these breakthroughs generate returns for the innovators, but they have the potential to affect the entire economic system and can lead to far-reaching changes. For instance, these innovations may have broad implications for households, enabling new choices for investment and consumption, and reducing the costs of raising and deploying funds. Similarly, financial innovations enable firms to raise capital in larger amounts and at a lower cost than they could otherwise and in some cases (for instance, biotechnology start-ups) to obtaining financing that they would otherwise simply be unable to raise. This latter idea is captured in a recent model of economic growth by Michalopoulos, Laeven, and Levine (2010), who argue that growth is driven not just by profit-maximizing entrepreneurs who spring up to commercialize new technologies, but also by the financial entrepreneurs who develop new ways to screen and fund the technologists." In: Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. Annual Review of Financial Economics, 3:41-85
- The examples are based on World Economic Forum
- Tufano, P. (2003) Financial innovation. In: Constantinides, G. M., Harris, M. & Stulz, R. M. eds. (2003) The handbook of the economics of finance. North Holland: Elsevier
- Michalopoulos, S., Laeven, L. & Levine, R. (in press) Financial innovation and endogenous growth. Providence, RI: Brown University
- Litan concluded that: "there is a mix between good and bad financial innovations, although on balance I find more good ones than bad ones. Individually and collectively, these innovations have improved access to credit, made life more convenient, and in some cases probably allowed the economy to grow faster." This conclusion came with some important caveats from the author concerning the misuse of financial innovation, particularly in the recent crisis. In: Litan, R. (2010) In Defense of Much, But Not All, Financial Innovation. Financial Institutions Center, The Wharton School of the University of Pennsylvania
- For example: Merton, R. & Bode, Z. (1995) The global financial system, a functional perspective, chapter one: a conceptual framework for analyzing the financial environment. Boston: Harvard Business School Press
- Bernanke, B. S. (2007) Speech to Federal Reserve Bank of Atlanta's 2007 Financial Markets Conference. May 15. Available at: <http://www.federalreserve.gov/newsevents/speech/bernanke20070515a.htm>
- Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. Annual Review of Financial Economics, 3: 41-85
- Merton, R. (1992) Financial innovation and economic performance. Journal of Applied Corporate Finance, 4, pp. 12–22
- Rogers, E. (1962) Diffusion of innovations. New York: Free Press
- For a discussion, see: Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. Annual Review of Financial Economics, 3: 41-85
- Dizikes, P. (2010) Explained: Knightian uncertainty. MIT News Office, June 2. Available at: <http://web.mit.edu/newsoffice/2010/explained-knightian-0602.html>
- Jagger, S. & Hosking, P. (2009) "Wake up, gentlemen", world's top bankers warned by former Fed chairman Volcker. The Sunday Times. December 9. Available at: http://business.timesonline.co.uk/tol/business/industry_sectors/banking_and_finance/article6949387.ece
- Stiglitz, J. (2008) The fruit of hypocrisy. The Guardian, September 16. Available at: <http://www.guardian.co.uk/commentisfree/2008/sep/16/economics.wallstreet>
- Published in the Bischoff Report: HM Treasury. (2009) UK international financial services – the future. Available at: http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/uk_internationalfinancialservices070509.pdf pp.18
- The examples below draw on insights from other sources and presented in: National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
- National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC> pp. 105
- US Federal Reserve and Oliver Wyman analysis
- National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
- National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
- Securities Industry and Financial Markets Association (SIFMA) and Oliver Wyman analysis
- Nocera, J. (2010) A Wall Street invention let the crisis mutate. The New York Times, April 16. Available at: <http://www.nytimes.com/2010/04/17/business/17nocera.html?pagewanted=all>
- Litan, R. (2010) In Defense of Much, But Not All, Financial Innovation. Financial Institutions Center, The Wharton School of the University of Pennsylvania
- McLean, B. (2007) The dangers of investing in subprime debt. CNN Money, March 19. Available at: http://money.cnn.com/magazines/fortune/fortune_archive/2007/04/02/8403416/index.htm
- Tett, G. (2006) The dream machine: Invention of credit derivatives. Financial Times, March 24. Available at: [http://www.ft.com/cms/s/2/7886e2a8-b967-11da-9d02-](http://www.ft.com/cms/s/2/7886e2a8-b967-11da-9d02-0000779e2340,dwp_uuid=10a38770-51d6-11da-9ca0-0000779e2340,print=yes.html">http://www.ft.com/cms/s/2/7886e2a8-b967-11da-9d02-)
- Kiff, J. et al. (2009) Credit derivatives: Systemic risks and policy options. International Monetary Fund, Working Paper WP/09/254. Available at: <http://www.imf.org/external/pubs/ft/wp/2009/wp09254.pdf>
- International Swaps and Derivatives Association (2010) Mid-Year 2010 Survey. Available at: <http://www.isda.org/statistics/recent.html#2010mid>
- Bank of International Settlements (2011) OTC derivatives market activity in the first half of 2011. Press Release, November 16. Available at: <http://www.bis.org/press/p111116a.htm>
- International Swaps and Derivatives Association (2010) Mid-Year 2010 Survey. Available at: <http://www.isda.org/statistics/recent.html#2010mid>
- Bank of International Settlements (2011) OTC derivatives market activity in the first half of 2011. Press Release, November 16. Available at: <http://www.bis.org/press/p111116a.htm>
- Total Derivatives Market includes total IR swaps, currency swaps, IR options and CDSs outstanding as per ISDA market survey
- National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
- Council of the European Union. (2012) Regulations adopted on short selling and credit default swaps. Press Release, February 21. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ecofin/128081.pdf
- Litan, R. (2010) In Defense of Much, But Not All, Financial Innovation. Financial Institutions Center, The Wharton School of the University of Pennsylvania.
- Litan, R. (2010) In Defense of Much, But Not All, Financial Innovation. Financial Institutions Center, The Wharton School of the University of Pennsylvania
- National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) The Financial Crisis Inquiry Report: Final Report. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
- This broad definition is derived from: European Central Bank. (2007) The Role of Financial Markets and Innovation in Productivity and Growth in Europe. Occasional Paper Series, No 72. Available at: <http://www.ecb.int/pub/pdf/scpops/ecbocp72.pdf>
- The exact quote is: "make markets more complete so that firms, households and governments can better finance, invest and share risk among each other."
- The report does not intend here to offer any comprehensive categorization, or an exhaustive list of potentially helpful financial innovations – a project that through its very nature might prove unrealistic. Instead, it seeks to use the categorization as a way of highlighting how some of the principal global economic needs relate to the need for innovation and to offer examples of how innovation is addressing these needs.
- Taylor, P. & Carrel, P. (2012) ECB's Draghi: credit crunch averted, bond spreads overshooting. Reuters, January 27. Available at: <http://www.reuters.com/article/2012/01/27/us-davos-draghi-idUSTRE80Q15K20120127>
- Surowiecki, J. (2008) What microloans miss. The New Yorker, March 17. Available at: http://www.newyorker.com/talk/financial/2008/03/17/080317ta_talk_surowiecki

57. Garanti Bank. (2010) Loan via POS. Available at: http://www.garanti.com.tr/en/sme_banking/loans/loan_via_pos.page?
58. HM Treasury. (2009) UK international financial services – the future. Available at: http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/uk_internationalfinancialservices070509.pdf pp.18
59. World Bank Group. (2011) November Final Report: Development of corporate bond markets in the emerging markets. Emerging Markets Committee of the International Organization of Securities Commissions. Available at: http://awareness.sca.ae/Arabic/IntReports/Report_2011-11.pdf
60. World Bank Group. (2011) November Final Report: Development of corporate bond markets in the emerging markets. Emerging Markets Committee of the International Organization of Securities Commissions. Available at: http://awareness.sca.ae/Arabic/IntReports/Report_2011-11.pdf
61. Buck, T. (2011) Palestinian bond issue raises \$70m. Financial Times, May 11. Available at: <http://www.ft.com/intl/cms/s/0/5761aad6-7bea-11e0-9b16-00144feabdc0.html#axzz1kHaUxKj>
62. Federal Deposit Insurance Company. (2009) December FDIC survey of unbanked and underbanked households. Available at: http://www.fdic.gov/householdsurvey/full_report.pdf
63. Federal Deposit Insurance Company. (2009) December FDIC survey of unbanked and underbanked households. Available at: http://www.fdic.gov/householdsurvey/full_report.pdf
64. DeNavas-Walt, C., Proctor, B. D. & Smith, J. C. (2011) Income, Poverty, and Health Insurance Coverage in the United States: 2010. U.S. Census Bureau, Consumer Population Report. Available at: <http://www.census.gov/prod/2011pubs/p60-239.pdf>
65. 1. The data for 1996 through 1999 were revised using an approximation method for consistency with the revision to the 2004 and 2005 estimates.
2. Implementation of Census 2000-based population controls occurred for the 2000 ASEC, which collected data for 1999. These estimates also reflect the results of follow-up verification questions, which were asked of people who responded “no” to all questions about specific types of health insurance coverage by health insurance, bringing the CPS more in line with estimates from other national surveys.
3. The data for 1999 through 2009 were revised to reflect the results of enhancement to the editing process.
Source: U.S. Census Bureau, Current Population Survey, 1988 to 2011 Annual Social and Economic Supplements.
U.S. Census Bureau. (2012) Archive: Current Population Survey Annual Social and Economic Supplement. Available at: <http://www.census.gov/hhes/www/poverty/publications/pubs-cps.html>
66. Consultative Group to Assist the Poor, CGAP. (2012) FAQ: What Is Microfinance? Available at: <http://www.cgap.org/p/site/c/template.rc/1.26.1302/>
67. Micro Insurance Network. (2012) Microinsurance in Keywords. Available at: <http://www.microinsurancenetwork.org/keywords.php>
68. MIX Market. (2012) Crossmarket analysis report. Available at: <http://www.mixmarket.org/profiles-reports/crossmarket-analysis-report>
69. Grameen Bank. (2012) Homepage. Available at: <http://www.grameen-info.org/>
70. The following quotes are based on the homepage of Women’s World Banking and a personal conversation
Women’s World Banking. (2012) Microinsurance. Available at: <http://www.swwb.org/expertise/microinsurance>
Thadhani-Rodrigues, H. (n.d.) Conversation with Harsha Thadhani-Rodrigues from Manager Market Insight
71. The US Central Intelligence Agency. (2010) CIA World Factbook. Available at: <https://www.cia.gov/library/publications/the-world-factbook/index.html>
72. For example: The Climate Corporation. (2012) Homepage. Available at : <http://www.climate.com/>
73. “Previous financial crises suggest that high levels of leverage significantly increase systemic fragility” from Oliver Wyman Point of View: Sir Andrew Large on Proposal for a Systemic Policy Framework, June 2010
74. Alan Greenspan said in 1995: “It would be useful to central banks to be able to measure systemic risk accurately, but its very definition is still somewhat unsettled. It is generally agreed that systemic risk represents a propensity for some sort of significant financial system disruption, ... (but) until we have a common theoretical paradigm for the causes of systemic stress, any consensus of how to measure systemic risk will be difficult to achieve.”
Greenspan, A. (1995) Remarks at Conference on Risk Measurement and Systemic Risk. Board of Governors of the Federal Reserve System, Washington, DC
75. World Economic Forum and Oliver Wyman research
76. World Economic Forum and Oliver Wyman research
77. There are a number of ways in which banking can be defined, for example in:
The UK Financial Services Authority. (2012) Handbook of the UK Financial Services Authority: Glossary B. Available at: <http://fsahandbook.info/FSA/html/handbook/Glossary/B>
78. The UK Financial Services Authority. (2012) Handbook of the UK Financial Services Authority: Glossary B. Available at: <http://fsahandbook.info/FSA/html/handbook/Glossary/I>
79. The UK Financial Services Authority. (2012) Handbook of the UK Financial Services Authority: Glossary B. Available at: <http://fsahandbook.info/FSA/html/handbook/Glossary/I>
80. Borio, C., Drehmann, M. & Tsatsaronis, K. (2012) Stress-testing macro stress testing: does it live up to expectations? Bank for International Settlements, Working Paper No. 369. Available at: <http://www.bis.org/publ/work369.htm> pp. 17, Box 2
81. See also: Lumpkin, S. A. (2009) Regulatory Issues Related to Financial Innovation. OECD, Financial Market Trends, Vol. 2. Available at: <http://www.oecd.org/dataoecd/28/62/44362117.pdf>
82. Myers, S. (1977) Determinants of corporate borrowing. *Journal of Financial Economics*, 5, pp. 147–175
83. Pettit, J. (1966) Applications in real options and value-based strategy. In: Trigeorgis, L. ed. (1999) Real options and business strategy—Applications to decision making. Risk Books. pp. 59–84
84. Latimore, D. (2002) Calculating value during uncertainty: Getting real with “real options.” IBM Institute for Business Value. Available at: http://www.er.ethz.ch/teaching/IBM_real_Options.pdf
85. Dong, M. & Zhou, X-S. (2004) Can fuzzy logic make technical analysis 20/20? *Financial Analyst Journal*, 60(4), 54–75
86. Buyukozkan, G. & Feyzioğlu, O. (2004). A fuzzy-logic-based decision-making approach for new product development. *International Journal of Production Economics*, 90(1), pp. 27–45
87. Roy, B. & Vincke, P.H. (1984) Relational systems of preference with one or more pseudo-criteria: Some new concepts and results. *Management Science*, 30, pp. 1323–1335
88. Vanegas, L.V. & Labib, A.W. (2001) Application of new fuzzy weighted average method to engineering design evaluation. *International Journal of Production Research*, 39(6), 1147–1162
89. Triantaphyllou, E. (2000) Multi-criteria decision-making methods: A comparative study. London: Kluwer Academic Publishers
90. For example: Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. *Annual Review of Financial Economics*, 3, pp. 41–85
91. Post, J. (2002) Redefining the corporation: Stakeholder management and organizational wealth. Stanford: Stanford University Press
92. Oliver Wyman, New Year’s Resolutions for the Board Risk Committee, 2011
93. See for example: FamiliesUSA. (2008) June Health Policy Memo: The Facts about Prior Approval of Health Insurance Premium Rates. Available at: <http://familiesusa.org/assets/pdfs/prior-approval.pdf>
94. The UK Financial Services Authority. (2012) Product Design: Considerations for Treating Customers Fairly. Available at: http://www.fsa.gov.uk/pages/doing/regulated/tcf/pdf/product_design.pdf
95. Terwiesch, C. & Ulrich, K. (2009) Innovation tournaments: Creating and Selecting Exceptional Opportunities. Boston: Harvard Business School Press
96. Lumpkin, S. A. (2009) Regulatory Issues Related to Financial Innovation. OECD, Financial Market Trends, Vol. 2. Available at: <http://www.oecd.org/dataoecd/28/62/44362117.pdf>
97. Financial Stability Board, FSB. (2009) Principles for Sound Compensation Practices: Implementation Standards. Available at: http://www.financialstabilityboard.org/publications/r_090925c.pdf
98. “Caveat emptor” means “Let the buyer beware” and describes a market in which the onus is on the buyer to be sure he/she is acting in his/her own best interest, with limited post-sale recourse to the seller. “Caveat venditor” means “Let the seller beware”. It can be argued that the legal, regulatory and even social environment for consumer financial services is leading the industry in this direction inasmuch as there may increasingly be negative consequences for any firm that systematically fails to provide products and services that are well-matched to consumers’ needs, at reasonable prices.
99. See: Competition Commission. (2012) About us. Available at: http://www.competition-commission.org.uk/about_us/index.htm
100. See: The U.S. Department of Justice, Antitrust Division. (2012) Mission Page. Available at: <http://www.justice.gov/atr/about/mission.html>
101. See: Federal Trade Commission. (2012) About the Federal Trade Commission. Available at: <http://www.ftc.gov/ftc/about.shtm>
102. Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. *Annual Review of Financial Economics*, 3, pp. 41–85
103. CoVaR: the value at risk (VaR) of the financial system conditional on institutions being under distress. One may use CoVaR to measure a given institution’s contribution to overall systemic risk.
See: Adrian, T. & Brunnermeier, K. (2009) CoVaR. Federal Reserve Bank of New York, Staff Report, 348. Available at: http://www.newyorkfed.org/research/staff_reports/sr348.pdf
104. State Street Bank & Trust Company v. Signature Financial Group, Inc. 149F.3d 1368, 1375-77. (U.S. Court of Appeals for the Federal Circuit, 1998)
105. *Diamond v. Chakrabarty*, 447 U.S. 303, U.S. Supreme Court (1980)
106. Allison, J., & Tiller, E. (2002) Internet Business Method Patents. *Texas Business Review*, October. Available at: <http://repositories.lib.utexas.edu/handle/2152/15239> pp. 1-3
107. Schwartz, J. (2010) Justices take broad view of business method patents. *The New York Times*, June 28. Available at: <http://www.nytimes.com/2010/06/29/business/29patent.html>
108. United States Code. (1952) Title 35 §101: Inventions Patentable. Available at: <http://www.law.cornell.edu/uscode/text/35/101>
109. Lerner, J. (2002) Where does State Street lead? A first look at finance patents, 1971 to 2000. *The Journal of Finance*, 57(2), pp. 901–930
110. Hall, B. (2009) Business and financial method patents, innovation, and policy. The National Bureau of Economic Research, Working Paper No. 14868. Available at: <http://www.nber.org/papers/w14868>
111. Hunt, R. (2010) Business method patents and U.S. financial service. *Contemporary Economic Policy*, 28(3), pp. 322–352

112. Lerner, J. (2002) Where does State Street lead? A first look at finance patents, 1971 to 2000. *The Journal of Finance*, 57(2), pp. 901–930
113. Hall, B. (2009) Business and financial method patents, innovation, and policy. The National Bureau of Economic Research, Working Paper No. 14868. Available at: <http://www.nber.org/papers/w14868>
114. Gott, S. P. (1978) U.S. Patent number 4,088,981. Washington, DC: U.S.
115. Campbell, C. M. (1983) U.S. Patent number 4,408,203. Washington, DC: U.S.
116. Hunt, R. & Bessen, J. (2004) The software patent experiment. *Business Review—Federal Reserve Bank of Philadelphia*, Q3, pp. 22–32
117. *Bilski v. Kappos*. 130 S. Ct. 3218, 561 US ___, 177 L. Ed. 2d 792 (2010)
118. IMF Global Financial Stability Report 09/2011 (Selected indicators on the size of the capital markets, 2010), Definitions: Capital markets = stock market + Debt securities; Banking sector = Bank assets
119. This is true for the credit default swaps (CDSs), which were underwritten by the Financial Products (FP) subsidiary of AIG in London. CDSs are financial products not subject to insurance regulation. It explains why FP was supervised not by an insurance supervisor, but by the Office of Thrift Supervision, which evidently failed to penetrate the complexities of the products. It remains hypothetical, however, whether an insurance supervisor with group-wide oversight capability could have spotted the systemic threat.
120. Lerner, J. (2010). The litigation of financial innovations. *Journal of Law and Economics*, 53, pp. 807–831
121. Lerner, J. (2003) The two-edged sword: The competitive implications of financial patents. Harvard Business School. Available at: www.frbatlanta.org/news/conferen/fm2003/lerner.doc
122. © World Bank
123. The UK Financial Services Authority. (2006) Establishing Financial Capability in the UK: Establishing a baseline. Available at: http://www.fsa.gov.uk/pubs/other/fincap_baseline.pdf
124. Willis, L. (2008) Against Financial Literacy Education. University of Pennsylvania Law School, Paper 208. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1105384
125. For example, the International Network on Financial Education (INFE) which was founded by the OECD in 2008 now includes 170 institutions from 86 countries including many regulatory agencies
126. Collins, D., N. Jentsch & R. Mazer (2011) Incorporating Consumer Research Into Consumer Protection Policy Making. CGAP Focus Note No. 74, November. Available at: <http://www.cgap.org/p/site/c/template.rc/1.9.55701/>
127. Mandell, L. & Klein, L. S. (2007) Motivation and Financial Literacy. *Financial Services Review*, 16(2). Available at: http://www2.stetson.edu/fsr/abstracts/vol_16_num_2_p105.PDF
128. Hershfield, H. et al. (2011) Increasing Saving Behavior Through Age-Progressed Renderings of the Future Self. *Journal of Marketing Research*, 48, pp. S23–S37
129. Lusardi, A. (2003). Planning and Saving for Retirement. Dartmouth College, Department of Economics, Working Paper. Available at: http://www.financialliteracyfocus.org/alusardi/Papers/Lusardi_pdf.pdf
130. The UK Financial Services Authority. (2008) Parent's Guide to Money. IFF Research Ltd., Paper No. 63. Available at: <http://www.fsa.gov.uk/pubs/consumer-research/crpr63.pdf>
131. Gerardi, K., L. Goette & Meier, S. (2010) Financial literacy and subprime mortgage delinquency: Evidence from a survey matched to administrative data. Federal Reserve Bank of Atlanta, Working Paper, No. 2010-10
132. Quercia, R. & Spader, J. (2008) Does Homeownership Counseling Affect the Prepayment and Default Behavior of Affordable Mortgage Borrowers? *Journal of Policy Analysis and Management*, 27(2): 304–325
133. Klapper, L., A. Lusardi & Panos, G. (2012) Financial Literacy and the Financial Crisis. World Bank, Working Paper No. 5980. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WWP/IB/2012/02/29/000158349_20120229095430/Rendered/PDF/WPS5980.pdf
134. Lusardi, A. et al. (2010) Promising Learning Strategies, Interventions, and Delivery Methods in Financial Literacy Education. NEFE Quarter Century Project, Working Paper. Available at: <http://www.nefe.org/LinkClick.aspx?fileticket=4x7s1YB3-V4%3D&tabid=934>
135. Drexler, A., Fischer, G. & Schoar, A. (2010) Keeping it Simple: Financial Literacy and Rules of Thumb. London School of Economics, Working Paper. Available at: <http://personal.lse.ac.uk/fischer/Assets/KIS-DFS-Jan2011.pdf>
136. Spader, J. et al. (2009) The Bold and the Bankable: How the Nuestro Barrio Telenovela Reaches Latino Immigrants with Financial Education. *The Journal of Consumer Affairs*, 43(1)
137. Karlan, D. et al. (2010) Getting to the Top of Mind: How Reminders Increase Saving. National Bureau of Economic Research, Working Paper No. 16205. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1636817
138. Drugs@FDA database, Oliver Wyman analysis
139. Drugs@FDA database, Evaluate Pharma, Oliver Wyman analysis
140. Watch the following video to test your own attention: http://youtube/IGQmdoK_ZfY
For a review of this literature, see:
Simons, D. J. & Rensink, R. A. (2005) Change blindness: Past, present, and future. *Trends in Cognitive Sciences*, 9(1), pp. 16–20
141. Schkade, D. A. & Kahneman, D. (1998). Does living in California make people happy? A focusing illusion in judgments of life satisfaction. *Psychological Science*, 9(5): 340–346
142. For a comprehensive review of the judgment and decision-making literature see: Kahneman, D. (2011) *Thinking fast and slow*. London: Allen Lane
143. See: Thaler, R. & Sunstein, C. (2008) *Improving decisions about health, wealth, and happiness*. Yale: Yale University Press
144. DellaVigna, S. & Malmendier, U. (2006) Paying not to go to the gym. *The American Economic Review*, 96(3), pp. 694–719
145. See www.billsrink.com cell phone plan comparison service for an early example
146. Ryan, A., Trumbull, G. & Tufano, P. (2011) A brief postwar history of U.S. consumer finance. *Business History Review*, 85, pp. 461–498
147. Lerner, J. & Tufano, P. (2011) The Consequences of Financial Innovation: A Counterfactual Research Agenda. *Annual Review of Financial Economics*, 3, pp. 41–85
148. Morse, A. (2009). Payday lenders: Heroes or villains? Social Science Research Network. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1344397
149. Wilson, B. J. et al. (2008) An experimental analysis of the demand for payday loans. Social Science Research Network. Available at: <http://ssrn.com/abstract=1083796>
150. Sherraden, M. (1991) *Assets and the Poor: A New American Welfare Policy*. New York: M. E. Sharpe
151. See: McKernan, S.M. & Sherraden, M. eds. (2008) *Asset building and low-income families*. Washington, D.C.: Urban Institute Press
152. For a discussion of this and other innovations, see: Tufano, P. & Schneider, D. (2008) Using Financial Innovation to Support Savers: From Coercion to Excitement. In: Blank, R. M. & Barr, M. S., eds. (2009) *Insufficient Funds: Savings, Assets, Credit and Banking Among Low-Income Households*. New York: Russell Sage Foundation
153. For summary information on some of this work, see: Tufano, P. & Schneider, D. (2008) Using Financial Innovation to Support Savers: From Coercion to Excitement. In: Blank, R. M. & Barr, M. S., eds. (2009) *Insufficient Funds: Savings, Assets, Credit and Banking Among Low-Income Households*. New York: Russell Sage Foundation
154. Internal Revenue Service. (2012) SOI Tax Stats - Individual Statistical Tables by Size of Adjusted Gross Income. Available at: <http://www.irs.gov/taxstats/indtaxstats/article/0,,id=96981,00.html>
155. Tufano, P. (in press). Just keep my money! Supporting tax-time savings with US savings bonds. *American Economic Journal*.
156. See: Doorways to Dream Fund. (2011) About Financial Entertainment. Available at: <http://financialentertainment.org/aboutus.html>
157. See: Wallack, T. (2012) Taking new approaches to money. *Boston Globe*, February 22. Available at: http://www.boston.com/business/personalfinance/articles/2012/02/22/taking_new_approaches_to_money_lessons/?page=1
158. For a summary, see: Guryan, J. et al. (2011) Making savers winners: An overview of prize-linked saving products. In: Mitchell, O.S. & Lusardi, A. eds. (2011) *Financial literacy implications for retirement security and the financial marketplace*. New York: Oxford University Press
159. Campbell, J. Y., Jackson, H.E., Madrian, B. & Tufano, P. (2011) Making financial markets work for consumers. *Harvard Business Review*, July Issue. Available at: <http://hbr.org/2011/07/making-financial-markets-work-for-consumers/ar/1>
160. So long as these were insured by the Federal Housing Administration
161. Pickert, K. (2008) A brief history of Fannie Mae and Freddie Mac. *Time*, July 14. Available at: <http://www.time.com/time/business/article/0,8599,1822766,00.html>
162. Modigliani, F. & Fabozzi, F. J. (1992) *Mortgage and mortgage-backed securities markets*. Boston: Harvard Business School Press
163. Cebula, R. J. & Hung, C.-S. (1992) *The Savings and Loan Crisis*. Dubuque, Iowa: Kendall/Hunt Pub. Co. pp. 57
164. National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) *The Financial Crisis Inquiry Report: Final Report*. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
165. National Commission on the Causes of the Financial and Economic Crisis in the United States. (2011) *The Financial Crisis Inquiry Report: Final Report*. Available at: <http://www.gpo.gov/fdsys/search/pagedetails.action?packageId=GPO-FCIC>
166. Financial Stability Board, FSB. (2009) *Principles for Sound Compensation Practices: Implementation Standards*. Available at: http://www.financialstabilityboard.org/publications/r_090925c.pdf



**COMMITTED TO
IMPROVING THE STATE
OF THE WORLD**

The World Economic Forum is an independent international organization committed to improving the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas.

Incorporated as a not-for-profit foundation in 1971 and headquartered in Geneva, Switzerland, the Forum is tied to no political, partisan or national interests

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel +41 (0) 22 869 1212
Fax +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org