Financial Regulation and Technology: An Opportunity for Innovation

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Abstract
Innovation is recognized as an important source of economic growth and of improvement in social welfare. Policy makers globally, consider innovation a vital lever for creation of employment and raising productivity. History shows that innovations differ hugely in terms of the nature and size of their effect, which may be profound or relatively trivial. Innovations also differ in terms of how revolutionary they are in relation to existing technologies or existing approaches to the relevant market. Like any other industry, there have been a plethora of innovations in financial industry over the years and there are distinctive characteristics of financial industry, many of which shape the nature and effects of financial innovation. The very reasons financial firms can be so beneficial to society – their links to the global economy, leverage and interconnectedness – magnify the social and economic effects of failures in risk management of innovation. It is not only certain institutions that will feel the effect of its failure but the wider economy through spillover effects. As people decisions and actions are driven by emotions, biases, judgments, and they are handicapped by both lack of complete information and inability or disinclination to process even available information into their decisions, the regulator, as a welfare maximiser, has to step in to nudge people towards making responsible choices. In addressing the challenges and the risks that financial innovation may create, it should also be kept in view the enormous economic and social benefits that flow from a healthy and innovative financial sector and so while proposing or implementing any regulation, it is important to ensure that it must seek to preserve the benefits of financial innovation even as it addresses the risks that may accompany that innovation. Financial regulations and financial innovations are tightly coupled together. They are the cause and effect of each other. As financial services are highly regulated along many dimensions, these restrictions create numerous opportunities for innovations that reduce or lower regulation cost. In harnessing the potential of opportunities created by the co-existence of regulation and innovation, technology has played a vital role throughout the history of financial markets. Technological advances relating to telecommunications and data processing in last couple of decades have spurred financial innovations that have altered bank products and services and production processes. Innovation has always been the key to growth and the future prospects for innovation in financial markets are very promising. Given the variety and volume of new regulations and technological advancements, banks and other financial service providers are being given considerable incentives to innovate and they should continue to do so.

Innovation
Innovation is recognized as an important source of economic growth and of improvement in social welfare. Policy makers globally, consider innovation a vital lever for creation of employment and raising productivity. Generally, innovation is often thought of in terms of revolutionary new physical products or a new technology. However, innovation is 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. Any process that translate an idea or invention into a good or service that creates value can be called an innovation. Innovation involves deliberate application of information, imagination and initiative in deriving greater or different values from available resources, and includes all processes by which new ideas are generated and converted into useful products. Many governments around the world encourage investment in research and development by allowing companies to claim tax credit for amount spent on it. History shows that innovations differ hugely in terms of the size and nature of their effect, which may be profound or relatively trivial. Innovations also differ 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. 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.

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 experience and control, and becomes very high if the innovation depends on an entirely new discovery. Likewise, an innovation that caters to a firm’s existing customerbase 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.

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

Financial Innovation
The financial industry has distinctive characteristics, many of which contribute to the nature and the effects of financial innovation. In particular, the industry:

- Plays an important role in capital allocation and thus enables social welfare and economic growth
- Is characterized by balance sheet leverage at unique levels 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 enable social welfare – interconnectedness, their links to the wider economy and leverage– magnify the economic and social effects of failures in risk management of innovation. It is not only certain institutions that will feel the effect of its failure but the wider economy entities through spillover effects.

Deriving from the definition of Lerner and Tufano, financial innovation is the act of creating and then promoting new financial instruments, technologies, institutions, markets, processes and business models – including the new application of existing ideas in a different market context. Another way to think about financial innovation is in terms of its function. The overall function of financial innovation can be said to reduce financial market imperfections. Some of the functions of financial innovations can be summarized as:

- Innovations might help to create new and/or refined products or services available to consumers.
- Correct the information asymmetry between contracting parties.
- They might also reduce market frictions, such as the high costs of transacting some products.
• Offer economies of scale to consumers by bringing them together or provide a new 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.

**Challenges created by Financial Innovation**

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.

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

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.

Moreover, 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 addition, the financial services industry is vulnerable to behavioral bias, or the frequent tendency for humans to make less than rational decisions (obviously not unique to financial services).

Two major complicating factors that act in concert with above mentioned characteristics to increase the risk of negative outcomes are: Knightian uncertainty and the dynamic innovation environment presented by the financial markets and financial services sector. “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. As knight wrote , ‘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’. So financial innovations are challenging for companies, policymakers and clients because they cannot fully assess ex ante the implications of the innovation.

In many industries, innovations are introduced into or directed towards a relatively unchanging environment, aside from the effects of competitive innovation itself. The environment into which financial innovations are born is a constantly changing, complex, volatile, social environment 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 technology and economic 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.

This represents an opportunity as well as a challenge: a more explicit recognition by the industry of the role of uncertainty and market dynamism in producing negative outcomes may, in itself, represent a step forward.
Financial Regulation: Need and Challenges

One of the fundamental assumptions of economics is that human beings are rational. Rational people should be free, and they should be responsible for the choices they make. The regulator should not interfere with the individual’s right to choose unless those choices have a spillover impact and harm others. But in reality, people are “Humans”; their actions and choices are driven by biases, emotions, judgments, and they are handicapped by both lack of complete information and inability or disinclination to process even available information into their decisions. The regulator, as a welfare maximiser, has to step in to nudge people towards making responsible choices.

For regulatory policy makers, there are three principal objectives in the financial sphere, objectives that have remained essentially unchanged over many decades even as the pace of financial innovation has accelerated. These objectives are financial stability, investor protection, and market integrity. These goals are widely shared by policymakers around the world and thus provide a basis for international cooperation.

The rapid pace of financial innovation creates challenges for policymakers with respect to each of these policy objectives. In particular, financial stability depends on adequate risk measurement and risk management by market participants. Failures of risk management by large institutions, or by a sufficient number of smaller ones, would threaten not only the solvency of the institutions themselves but also the stability of the whole system.

Complexity, especially when combined with illiquidity, amplifies the difficulty of measuring risk, both market risk and counterparty credit risk. For example, some complex instruments can be valued only with the aid of sophisticated modeling techniques. The problems of valuation and of risk measurement faced by investors in tranches of bespoke collateralized debt obligations (CDOs) are a good example.

Illiquidity, or the potential for illiquidity under some conditions, is also a problem for managers of market risk and counterparty credit risk. Substantial market risk may be associated with holdings of illiquid instruments; again, tranches of bespoke CDOs illustrate this well. A pattern of crowded trades may lead to market illiquidity—sometimes in surprising locations—when risk aversion heightens.

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.

Complexity, illiquidity, and embedded leverage also create challenges for policymakers with respect to the objectives of protecting investors and maintaining market integrity.

In addressing the challenges and the risks that financial innovation may create, it should also be kept in view the enormous economic benefits that flow from a healthy and innovative financial sector. The increasing sophistication and depth of financial markets promote economic growth by allocating capital where it can be most productive. And the dispersion of risk more broadly across the financial system has, thus far, increased the resilience of the system and the economy to shocks. While proposing or implementing any regulation, it must seek to preserve the benefits of financial innovation even as it addresses the risks that may accompany that innovation.

Regulation as driver of Innovation

Regulation compliance raises the cost of financial transactions done by consumers and other users of financial services. As financial services are highly regulated along many dimensions, these restrictions create multiple opportunities for innovations that reduce or lower regulation cost.

In many cases innovations were used to avoid prudential regulation and allow banks to become more risky. For example, financial innovations have long been used by financial firms to engage in what is sometimes called capital arbitrage, for example, by creating the perception but not the actual transfer of risk from the bank to investors. An example is mortgage loan conduits, such as structured investment vehicles, where again the loans were also treated as being sold and, hence, did not need to
be backed by more capital. In reality, these conduits relied on "liquidity" guarantees that served as de facto credit guarantees when the default rate on the underlying mortgages increased beyond expectations (Viral V. Acharya, Philipp Schnabl, and Gustavo Suarez, 2013).

Although there are many recent forms of regulatory-driven innovation that have justifiably earned a bad name, in the past many economists viewed some forms of regulatory innovation as beneficial. A large part of this favorable view came from innovations that weakened and ultimately forced the repeal of a variety of laws that sought to restrict competition. Innovative firms developed ways of avoiding these limits on competition that both boosted their profits and benefited the users of financial services. An outstanding example of how limits on competition were overcome is that of money market mutual funds overcoming regulatory limits on interest paid to small investors. The Banking Acts of 1933 and 1935 gave the Federal Reserve the power to set interest rate limits on time and savings deposits, in part to raise bank profits and reduce their incentive to invest in riskier assets. These regulations were generally nonbinding for their first 30 years, but starting in the late 1960s there were prolonged periods where market interest rates were above Regulation Q ceilings. The Federal Reserve eliminated interest rate ceilings on large certificates of deposit and on some longer maturity certificates. However, small depositors continued to face limits on the interest rates that banks could pay.

An alternative existed in the form of money market mutual funds, which first offered shares to the public in 1972. Money market funds invested in low-risk obligations that paid market rates, such as commercial paper and large CDs from banks. The higher rates paid on these investments were then passed on to the money funds' investors. As Regulation Q ceilings fell further behind market rates in the late 1970s, investor assets in money funds grew rapidly. The funds soon became too large and politically popular to eliminate. Congress instead passed the Depository Institutions Deregulation and Monetary Control Act in 1980, which phased out Regulation Q and allowed banks to pay market rates on deposits.

The regulatory limits on the location of bank offices and on competition between commercial and investment banks are other examples where innovation to sidestep regulatory broke down old rules and increased competition. At one time banks were not allowed to open or acquire new offices across state lines and even faced severe limits on intrastate branching in many states. These barriers fell as more aggressive banks used new technology in the 1970s to offer selected banking services outside their branching area, thereby partially overcoming the geographic restriction on the location of bank offices. Their success played an important role in changes to state and federal laws.

Another example where regulation acts as a catalyst for innovation could be “Volker Rule” under Dodd-Frank Act. As a result of the Dodd-Frank Act’s Volcker Rule, firms that once generated substantial income by trading for their own account can no longer count on this activity for much, if any, revenue. To offset this loss of income, firms are considering new business models that focus on opportunities in wealth management, emerging markets and other areas that offer growth potential and that could potentially result in more financial innovations.

**Technology as driver of Innovation**

Financial regulations and financial innovations are tightly coupled together. They are the cause and effect of each other. But in harnessing the potential of opportunities created by the co-existence of regulation and innovation, technology has played a vital role throughout the history of financial markets. Even the technological uncertainties characterize the innovation and hints at whether the effect of the innovation is likely to be incremental or radical. Advances in technology have long been an important driver of financial innovation. An early example of new information technology (IT) that has significantly changed retail banking is the automated teller machine (ATM), which was first introduced in the 1960s and, after some refinement, experienced rapid growth in the late 1970s and 1980s. As of 2010, almost 94 percent of all households used electronic forms of payments, including ATMs, debit cards, automatic bill paying, and smart cards. (Survey of Consumer finances, Loretta J. Mester)

Technological changes relating to telecommunications and data processing in last couple of decades have spurred financial innovations that have altered bank products and services and production
processes. An example of it is statistical models of credit risk that led to development of modern markets for consumer lending. Prior to their development, the lending officer's personal knowledge of the borrower was a critical input into the lending decision. While this personal approach to evaluating loans has some advantages, the process is not amenable to allowing geographically distant lenders to compete in local retail lending markets. Thus, the development of models that used readily verifiable information, such as past credit history, to estimate reasonably accurate models of future behavior opened the door for nationwide competition in a variety of markets like credit cards and mortgage lending. The verifiable measures of credit quality produced by these models were also critical to the securitization of credit cards and mortgages. More recently, the credit scoring technology has been applied to small business lending.

Another area where technological advancements have transformed financial markets is electronic trading. Trading has evolved from the days when brokers yelled to desk based trades, backed by powerful computers. Then came high-speed algorithmic trading, which replaced human traders with software that generates trading orders based on underlying algorithms. High frequency trading (HFT) has already captured around half of the trading volumes today and is set to rise further.

More recent infrastructure innovation that is made possible by technological advancement is Target2- Securities (T2S) platform which will reduce the cost and risk of cross border transactions in Europe.

**Conclusion**

Innovation is the key to growth and the future prospects for innovation in financial markets are very promising. Both Newer Regulation and advancement in technology will continue to drive innovation. However, regulation is likely to be the biggest source of innovation over the next few years complemented by technological advancement in data processing and telecommunication. Regulatory initiatives since the crisis have sought to reduce bank risk by forcing banks to operate differently from how they otherwise would, which has the effect of raising costs and restricting banks' ability to serve its customers profitably. A good case can be made that from a societal viewpoint, the benefits of reducing the probability of a future crisis more than offset these higher costs and restrictions on services. However, from a purely private cost/benefit perspective, banks that innovate to minimize the costs and restrictions imposed by regulation gain a competitive advantage. Given the variety and volume of new regulations and technological advancements, banks and other financial service providers are being given considerable incentives to innovate and they should continue to do so.

**References**

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