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Stock Market Returns to Financial Innovations Before and During the Financial Crisis in the United States and Europe*

Lisa Schöler, Bernd Skiera, and Gerard J. Tellis

Prior studies have focused on innovations in various contexts but largely excluded financial innovations, despite their notable importance. Not surprisingly, financial innovations account for a substantial portion of world economies and the huge market capitalization of banks. Therefore, the authors focus on studying the type, success, and causes of success of financial innovations. Using an event study and financial expert ratings, this study analyzes the types of and payoffs to 428 financial innovations by 39 major banks in North America and Western Europe between 2001 and 2010. The results indicate that security and credit instruments constitute the most common and insurance innovations the least common financial innovations, which vary substantially by economic cycles and location. The average cumulative abnormal stock market returns to a financial innovation are $146 million. They are twice as high in the United States as in Western Europe. Thus, the market considers financial innovations profitable, not harmful, despite their apparent responsibility for the financial crisis. Surprisingly, the cumulative abnormal stock market returns to financial innovations are higher in recessions than in expansions. The authors find that riskiness and radicalness of the innovation increases abnormal returns, while complexity decreases cumulative abnormal stock market returns. Two interaction effects stand out: Riskiness of financial innovations has higher cumulative abnormal stock market returns in the United States than in Western Europe. Radicalness has lower cumulative abnormal stock market returns in recessions than in expansions. The authors discuss important implications of the findings.

In 2008, the world economy plunged into a major recession, caused primarily by the crisis in financial markets. Much of this crisis could be attributed to high-risk and complex financial innovations introduced during 2000–2008 (e.g., Sommer, 2008), including those related to subprime mortgages and credit default swaps. In response, observers have called for more regulation over financial innovations (e.g., Stiglitz, 2009), as well as investigations into the kinds of financial innovations that exist, their effects (Frame and White, 2004), and the potential drivers of their financial success (e.g., financial risk, complexity).

Financial innovations are one of the most important service innovations because they have offered substantial benefits to consumers, fostered the growth of national economies, and may have sparked the recent financial crisis (e.g., Lerner and Tufano, 2011; Skiera, Bermes, and Horn, 2011; Sommer, 2008). For example, financial innovations are responsible for home mortgages, student loans, and auto loans, which empower lower and middle-class consumers; credit to entrepreneurs who have built successful enterprises; and credit to emerging markets, which has helped raise millions of people out of dire poverty. Not surprisingly, such innovations account for a substantial portion of world economies and the huge market capitalization of banks (Lerner and Tufano, 2011).

Although the literature on innovations contains extensive investigations of the drivers and financial success of innovations, most studies ignore service innovations (e.g., Papastathopoulou and Hultink, 2012; Soukhoroukova, Spann, and Skiera, 2012; Storey and Easingwood, 1998). The missing research on service innovations is especially surprising because they begin to dominate much economic activity (e.g., Ettlie and Rosenthal, 2011; Wooder and Baker, 2011). And in the existing service innovation literature financial innovations have been largely ignored (Sorescu, 2012). In the finance literature, despite the widely recognized rapid growth of financial innovations, research into them is relatively scarce, especially pertaining to various kinds of innovations, their financial success, and the drivers of their success. According to Frame and White (2004,

Address correspondence to: Bernd Skiera, Department of Marketing, Faculty of Business and Economics, Goethe University Frankfurt, Grueneburgplatz 1, 60629 Frankfurt, Germany. E-mail: skiera@skiera.de. Tel: +49-69-798-34649.

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p. 116), "Everybody talks about financial innovation, but (almost) nobody empirically tests hypotheses about it." This succinct statement is a clear indication of the need for more research that not only tests relevant hypotheses but also provides an overview of the different kinds of financial innovations and their distribution.

From the firm perspective, innovations (focusing specifically on service innovation, i.e., product innovation, not process innovation) in the financial sector differ from those in the manufacturing sector in several ways (Lerner and Tufano, 2011). First, financial innovations likely create a complex web of positive and negative externalities, because the financial system is highly interconnected. Thus, any evaluation of the consequences of innovations is challenging. Second, the regulation of financial innovations is complex and dynamic (i.e., regulation stimulates innovations; innovations stimulate regulation). When a new financial reform is passed, it exerts unknown influences on the pace and direction of financial innovations. Third, banks have earned limited patent protection over their financial innovations. So, competitors can quite easily copy them.

From the consumer perspective, another two aspects of financial innovations make them unique (Lerner and Tufano, 2011). First, their complexity makes consumers' embrace of financial innovations difficult, yet complexity may be necessary to produce consumer benefits. Second, though all innovations involve some financial risk, the returns to financial innovations are intimately tied to their riskiness (i.e., risk-return trade-off). Again, financial risk may be necessary to provide benefits but difficult for consumers to embrace (e.g., if a consumer buys a bond, the bond will have some risk otherwise it will not have a return above the risk-free rate). These variations from other types of innovations in other industries create the need to study financial innovations as phenomena in their own right (Lerner and Tufano, 2011).

Because the consumer perspective is highly relevant for marketing, this paper focuses on two specific drivers of financial innovations, complexity, and riskiness, in addition to the degree of radicalness, a feature common to all innovations (Chandy and Tellis, 1998, 2000). Given the importance of financial innovations and service innovations (de Brentani, 2001), the paucity of research on this topic, and the critical role they played in the recent financial crisis, this study seeks answers to the following questions:

1. How are various kinds of financial innovations distributed?
2. What are the stock market returns to these financial innovations?
3. How do the complexity, financial risk, and radicalness of financial innovations affect their stock market returns?
4. How do economic cycles and locations affect the distribution of and stock market returns to financial innovations?

To answer these questions, a unique data set, including ratings of three drivers of innovations by financial experts who adopt a consumer perspective, was assembled. Based on these data, the paper investigates how financial innovations vary during recessionary versus expansionary times in the United States versus Western Europe between 2001 and 2010. The inclusion of different countries in the data set follows the call in literature to analyze international data sets (Papastathopoulou and Hultink, 2012).

The remainder of the paper is organized as follows: First, an overview of the theoretical background of financial innovations is provided and then hypotheses regarding their likely drivers are developed. Next, the method, sample, and findings are presented. The conclusion features a discussion of the implications and limitations of this study.

BIOGRAPHICAL SKETCHES

Dr. Lisa Schöler is a consultant and was a former doctoral student in marketing at the Goethe University, Frankfurt, Germany and a member of the E-Finance Lab. Her research interests include innovation management, viral marketing, and marketing-finance interface.

Dr. Bernd Skiera is a chaired professor of electronic commerce at the marketing department of the Faculty of Business and Economics at the Goethe University, Frankfurt, Germany, where he is also a cofounder and member of the board of the E-Finance Lab (www.skiera.de). His research interests include electronic commerce, online marketing, pricing, prediction markets, and customer management. His work has been published in *Management Science*, *Marketing Science*, *Journal of Marketing Research*, *Journal of Marketing*, *Journal of Product Innovation Management*, *Journal of Forecasting*, *Journal of Interactive Marketing*, *Journal of Retailing and Consumer Services*, *Journal of Service Research*, and *European Journal of Operational Research*.

Dr. Gerard J. Tellis (Ph.D. Michigan) is professor, Neely Chair of American Enterprise, and Director of the Center for Global Innovation, at the USC Marshall School of Business. He is an expert in innovation, advertising, new product growth, emerging markets, and global market entry. He has published five books and over 100 papers (http://www.gtellis.net) that have won over 20 awards, including the Long Term Marketing Science, Frank M. Bass, William F. Odell, Harold D. Maynard (twice), and Converse award for lifetime contributions to research. His new book, *Unrelenting Innovation,* explains how transforming culture can enable firms to stay relentlessly innovative. His book *Will and Vision* (coauthored with Peter Golder) was cited as one of the top 10 books by the *Harvard Business Review* and was the winner of the AMA-Berry Award.

Theoretical Background

This section provides a definition of financial innovations and a brief overview of the functions of financial innovations. It then briefly describes stock market return and develops hypotheses about the impact of complexity, financial risk, radicalness, and the moderating effect of economic cycles and location on stock market returns.

Financial Innovations

Following Tufano (2004), financial innovation is defined as the act of creating and then commercializing new financial instruments. As such, these innovations are all service innovations, even though some may be for "products" and some for "processes." This paper focuses on financial product innovations (not process innovations) because financial product innovations were responsible for the modern financial crisis and are the focus of calls for more regulation.

Financial innovations fulfill various functions. First, they might overcome moral hazard and information asymmetries (e.g., by forcing the issuer to release more information as is the case for income bonds). Second, financial innovations might lower transaction or search costs (e.g., buying an index certificate instead of stocks from the index to replicate it). Third, financial innovations can be a response to taxes (e.g., zero coupon bonds allowed for the deduction of a discount relative to their par value) and regulations (e.g., Eurodollar CDs allowed U.S. banks to circumvent reserve requirements to stem the painful disintermediation they were experiencing). When new regulations pass, financial innovations represent responses to them; then regulatory bodies adjust in reaction to the latest financial innovations. Fourth, financial innovations can help manage the risks and volatility created by globalization (e.g., foreign exchange futures help overcome the risk of increasing exchange rates) (Tufano, 2004).

Stock Market Return

The stock market return is the percentage change in stock price (after adjusting for stock splits and dividends) due to the arrival of new information. Thus, when new information becomes public, the market rapidly assimilates the new information's financial implications into the stock price. As such, events with a positive (negative) change in firm's future cash flows will have a positive (negative) impact on the stock price because investors will buy (sell) stocks.

Drivers of Returns to Financial Innovations

This paper considers three such drivers: complexity, financial risk, and radicalness.

Complexity. Rogers's (2003) classic work on the diffusion of innovations cites complexity as an important driver of innovation's success. This paper similarly defines complexity as the degree to which a financial innovation is difficult for the consumer to understand (Rogers, 2003). It drives financial innovations' effect on stock market returns—though reasons exist for a positive or negative effect.

On the one hand, financial innovations have negative impacts on stock market returns, through low adoptions and high costs, which in turn lower cash flows and therefore stock market returns. Complex financial innovations can have low adoptions (Rogers, 2003) for several reasons.

First, if a financial innovation is complex, many consumers may not understand its potential benefits (de Brentani, 2001). These consumers may refuse to acquire the necessary knowledge and simply reject the financial innovation (Mählmann, 2012). Especially for complex service innovations, consumers then have to rely on faith and trust (de Brentani, 2001). In contrast, the learning costs for simple financial innovations are low, so consumers may be more likely to adopt them.

Second, even if consumers are willing to acquire the required knowledge, complexity evokes negative emotional reactions, such as frustration, stress, or anxiety (Mick and Fournier, 1998). Many consumers are afraid of complex innovations because they fear the unknown (de Brentani, 2001). Such negative emotions may lead consumers to avoid complex financial innovations.

Third, complexity also makes it more difficult for consumers to compare financial innovations to evaluate which one fits their needs best. Therefore, consumers may simply refuse to adopt complex financial innovations (Campbell, Jackson, Madrian, and Tufano, 2011). Thus, complex financial innovations have the ability to decrease cash flows and stock market returns through low adoptions.

At the same time, complex financial innovations can increase costs, in that complex financial innovations demand more development, marketing, and distribution costs than do simple ones (e.g., Wuyts, Stremersch, Van Den Bulte, and Franses, 2004). In the financial industry, such costs take the form of costly financial, legal, and IT talent to design, scrutinize, implement, and debug innovations. Higher complexity leads to higher costs. Thus,

complex innovations can also decrease cash flows and stock market returns through higher costs. This line of reasoning suggests:

H1a: The more complex a financial innovation, the more negative is its impact on stock market returns.

On the other hand, complex financial innovations could lead to higher sales or higher prices, and thus have a positive impact on stock market returns, for the following reasons. First, the probability of imitating a financial innovation decreases with increasing complexity, and the resulting lower competition yields higher sales and prices (Charupat and Prisman, 2004; Skreta and Veldkamp, 2009). Second, because consumers know that complex innovations often offer unique benefits to consumers, they are prepared to undertake the needed learning so they can adopt the complex innovation (de Brentani, 2001). In this case, complex financial innovations can increase cash flows and stock market returns. This line of reasoning suggests:

H1b: The more complex a financial innovation, the more positive is its impact on stock market returns.

Financial risk. Following prior research, financial risk is defined as the possible loss of cash or noncash benefits by a consumer (e.g., Sweeney, Soutar, and Johnson, 1999) and consider it central to consumers' evaluation, choice, and adoption of financial innovations (Dowling, 1999). In the interest of brevity, the authors use the term "risk" to mean financial risk hereafter. Extant research confirms that risk drives financial innovations' effect on firm stock market returns. Here again, there is no consensus on the direction of that effect.

On the one hand, several studies suggest that risky innovations lead to positive consumer reactions and high sales, with a positive impact on stock market returns. First, consumers may be risk seeking, and when firms cite the positive potential gains from financial innovations, the positive feelings associated with the anticipation of gains (e.g., excitement) promote risk-seeking behavior (Knutson, Taylor, Kaufman, Peterson, and Glover, 2005). Second, consumers also might invest more in high-risk financial innovations than in low-risk financial innovations because they are "myopic loss averse"—that is, loss averse only in the short term (Benartzi and Thaler, 1999). Thus, they seek more risk when they make investment decisions that should take longer to pay off. Third, the risk-return trade-off is fundamental in finance and states that higher risk must be rewarded with higher returns. Thus, risky innovations might be attractive for consumers who want to pursue greater returns so that more risky innovations may increase cash flows and stock market returns through higher sales. This line of reasoning suggests:

H2a: The more risky a financial innovation, the more positive is its impact on stock market returns.

On the other hand, consumers—and thus sales, cash flows, and stock market returns—may respond negatively to risk. First, consumers are generally risk averse if the outcome is uncertain. Therefore, financial innovations with higher risk are less likely to get adopted by consumers than financial innovations with lower risk (Hwang and Satchell, 2010). Additionally, service innovations such as financial innovations are generally perceived to possess more risk than other products, e.g., consumer durables (Storey and Easingwood, 1998). Second, in contrast with risk-return trade-off theory, some studies suggest a negative relation between risk and return (e.g., Campbell, 1987), such that consumers have no real incentive to buy riskier financial innovations. Therefore, the likelihood of adoption should decrease with higher risk. Thus, more risky innovations may decrease cash flows and stock market returns through low sales. This line of reasoning suggests:

H2b: The more risky a financial innovation, the more negative is its impact on stock market returns.

Radicalness. Radicalness accelerates consumer adoption (Holak and Lehmann, 1990) and drives new product success (Chandy and Tellis, 2000; Montoya-Weiss and Calantone, 1994). Here, radicalness is defined as the degree to which innovations are perceived as totally different and provide novel and substantial benefits (e.g., de Brentani, 2001). In contrast to radical financial innovations, incremental financial innovations only deliver marginally superior benefits to consumers and include me-too products (e.g., de Brentani, 2001).

Radical financial innovations should have a positive impact on stock market returns through high prices and high sales, which increase cash flows and stock market returns through two pathways: through high price or through high sales.

Radical financial innovations increase cash flows through high prices for the following reasons. First, firms can charge higher prices for radical financial innovations by targeting premium segments (e.g., innovators, early adopters) with higher willingness to pay (Tufano, 2004). Second, because radical financial innovations are more difficult to imitate, the firm can charge a premium price

above that charged by competitors (de Brentani, 1989, 2001).

Radical financial innovations can also increase cash flows through high sales in three ways: increasing the market share within an existing market, increasing the market size, or creating entirely new markets. First, the introducing bank can increase its market share because radical innovations make existing offerings obsolete (de Brentani, 1989, 2001). Second, radical financial innovations can increase the size of the market (de Brentani, 2001; Tufano, 1989). Third, radical innovations also have the ability to create entirely new markets with new choices for investing and consuming for new customers (Lerner and Tufano, 2011). Creating entirely new markets is likely because radical innovations provide new ways to solve customer problems and bring substantial new benefits to the customers (de Brentani, 2001; Tellis, 2013). Thus:

H3: The more radical a financial innovation, the more positive is its impact on stock market returns.

Economic conditions (recession versus expansion). Recession is defined as a decline in gross domestic product (GDP) for two or more consecutive quarters (Srinivasan, Lilien, and Sridhar, 2011). Recessions severely hinder the financial performance of financial innovations and also might moderate the impact of radicalness on stock market returns for several reasons. First, during a recession, consumers limit their spending for premium-priced radical financial innovations and wait for better times (i.e., expansions); their willingness to buy premium priced financial innovations likely decreases precipitously (Carow, 1999). Instead, they prefer incremental financial innovations that are competitively priced, especially in response to their substantial uncertainty about future economic conditions (Gale, 1996).

Second, even if the radical innovation is not premium priced, a recession causes a decline in consumers' disposable incomes, likely prompting consumers to stop adopting radical financial innovations, especially because radical financial innovations are less well known to consumers than incremental innovations or older products. Even if consumers still buy radical financial innovations, they may decrease the quantity bought because of their lower disposable incomes, relative to that in an expansion phase. That is, they still depend on financial innovations (e.g., a mortgage to buy a house), but their anticipation of future income increases is more conservative (Katona, 1975). Thus, it is anticipated that the positive impact of radical financial innovations on stock market returns gets mitigated during a recession. This line of reasoning suggests:

H4: The more radical a financial innovation in a recession, the more negative is its impact on stock market returns.

Recessions also might moderate the impact of risk on stock market returns for several reasons. First, consumers often become more risk averse, pessimistic, and conservative in a recession (Rigby, 2001), because they are uncertain about future economic conditions and future incomes. Thus, they buy financial innovations with less risk (Lamey, Deleersnyder, Dekimpe, and Steenkamp, 2007). Second, financial literature shows that the positive relation between risk and return is less pronounced during recessions (Mayfield, 2004). Therefore, consumers are less willing to adopt riskier financial innovations in a recession. Thus, the negative effect of risk on stock market returns may be accentuated. This line of reasoning suggests:

H5: The more risky a financial innovation in a recession, the more negative is its impact on stock market returns.

Location (United States versus Western Europe). This paper considers location in broad terms (United States versus Western Europe) and predicts that it might moderate the impact of radicalness on stock market returns for the following reasons. First, there is a common belief that U.S. consumers are more innovative than those in Western Europe. So, many firms introduce innovations in the United States first (Lee, 1990). If this belief is true, location (United States versus Western Europe) should affect the likelihood of consumers adopting radical financial innovations. Second, their relatively high per capita income and low taxes may make U.S. consumers more willing to buy premium-priced radical financial innovations, compared with consumers in Western Europe (Bureau of Economic Analysis, 2011). Thus, the impact of radicalness on stock market returns will be accentuated in the United States relative to Western Europe. This line of reasoning suggests:

H6: The more radical a financial innovation in the United States, the more positive is its impact on stock market returns.

Finally, prior studies suggest that location also might moderate the impact of risk, though without any consensus about the direction of the moderating effect. On the one hand, because U.S. consumers appear more risk seeking than Western European consumers (e.g., Hofstede, 2003), adopters in Western Europe may be

more averse to riskier financial innovations. In addition, consumers save less in the United States than in Western Europe (Bureau of Economic Analysis, 2011; Eurostat, 2011), which is an indication of risky behavior. Such behavior suggests that the adoption of risky innovations may be more likely in the United States than in Western Europe. Thus, the impact of risk on stock market returns will be accentuated in the United States relative to Western Europe. This line of reasoning suggests:

H7a: The more risky a financial innovation in the United States, the more positive is its impact on stock market returns.

On the other hand, risk might not be valued differently; several studies indicate explicitly that average risk aversion for financial innovations does not differ significantly between the United States and Western Europe (Szpiro and Outreville, 1988). Therefore, there may be no difference in the adoption of risky financial innovations by countries. Second, the average risk premium for financial innovations is not different between the United States and Western Europe, which is an indication that risk is "valued" equally in both locations (Pastor, Sinha, and Swaminathan, 2008). Thus, the impact of risk on stock market returns does not depend on location. This line of reasoning suggests:

H7b: Stock market returns for risky financial innovations in the United States are similar to those for risky financial innovations in Western Europe.

Method

To test the hypotheses, the authors adopt an event study, which allows one to estimate the change in stock price in response to the arrival of new information. It rests upon the assumption that stock prices are efficient such that the market immediately assimilates into the stock price the financial value of new information. In this case, the new information involves announcements of various financial innovations by innovating institutions. Their financial value depends on the market's expectation of consumers' reactions to the financial innovation. So the change in the innovator's stock price serves as the measure of the value of these reactions.

In contrast with prior research, this paper utilizes a cross-national study to estimate the impact of major geographic regions. The authors turn to the market model (Fama and French, 1993) to estimate abnormal stock market returns (e.g., Sood and Tellis, 2009):

$$R_{ijt} - R_{ft} = \alpha_{ij} + \beta_{1ij} \cdot \left(R_{jt}^{m} - R_{ft}\right) + \varepsilon_{ijt}, \tag{1}$$

where t is the index for time, i is the index for the announcement, and j is the firm index; R_{ijt} represents the return of the respective stock of firm j for announcement i; R_{it}^{m} denotes the return on the portfolio representing a market m (i.e., index for U.S. banks, index for Western Europe banks) for firm j on day t; R_{ft} indicates the return on an investment with zero risk on day t.

Equation 1 is estimated for each announcement with an estimation period from 250 to 6 days prior to each announcement. The abnormal returns (AR_{ijt}) to the announcement are computed as the difference between the normal return that would have occurred if the announcement had not taken place and the actual return that occurred because of the announcement:

$$\begin{aligned} AR_{ijt} &= R_{ijt} - E\left[R_{ijt}\right] \\ &= R_{ijt} - R_{ft} - \left[\left(\hat{\alpha}_{ij} + \hat{\beta}_{1ij} \cdot \left(R_{jt}^{m} - R_{ft}\right)\right)\right], \end{aligned} \tag{2}$$

where R_{ijt} is the actual return, and $\mathrm{E}(R_{ijt})$ is the expected return without the announcement. Next, the cumulative abnormal returns (CAR_{ij}) is computed for several event windows

$$CAR_{ij} = \sum_{t=t_1}^{t=t_2} AR_{ijt}, \tag{3}$$

where t_1 is the beginning of the event window, and t_2 is its end. Thus, the cumulative average abnormal return for all n announcements is:

$$CAAR = \frac{1}{N} \cdot \sum_{i=1}^{n_j} \sum_{j=1}^{m} CAR_{ij}. \tag{4}$$

The authors estimate the following model to determine the effects on cumulative abnormal returns:

$$\begin{aligned} CAR_{ij} = {} & \alpha + \beta_1 \cdot Complexity_{ij} + \beta_2 \cdot Risk_{ij} \\ & + \beta_3 \cdot Radicalness_{ij} + \beta_4 \cdot Recession_{ij} \\ & + \beta_5 \cdot Country_{ij} + \beta_6 \cdot Security_{ij} + \beta_7 \cdot Fund_{ij} \\ & + \beta_8 \cdot Credit_{ij} + \beta_9 \cdot AccountManagement_{ij} \\ & + \beta_{10} \cdot Assets_{ij} + \beta_{11} \cdot Radicalness_{ij} \cdot Recession_{ij} \\ & + \beta_{12} \cdot Risk_{ij} \cdot Recession_{ij} \\ & + \beta_{13} \cdot Radicalness_{ij} \cdot Country_{ij} \\ & + \beta_{14} \cdot Risk_{ij} \cdot Country_{ij} + \eta_{ij} \end{aligned} \tag{5}$$

where the subscripts refer to announcement i and firm j.

Sample

In line with prior studies (e.g., Furst, Lang, and Nolle, 2002; Lerner, 2002), the banking industry was chosen as the focus of our study. Other than mutual funds, government bodies, and brokerage firms, banks are the main actors in the financial sector (Ryan, Trumbull, and Tufano, 2010) and introduce the most financial innovations (Tufano, 2004). Because banks can introduce any kind of (legal) financial innovations, they also represent a representative sample of financial innovations. In addition, because they are stock listed, banks provide financial data.

Five important countries were chosen for the banking industry: the United States, Germany, United Kingdom, Switzerland, and France. The sample contains the biggest banks in each country, as well as a random sample of other stock listed banks.

To investigate the effects of complexity, risk, and radicalness of an innovation on stock market returns to the announcement of an innovation, this paper relies on several types of information, including (1) information indicating the announcement date; (2) stock price information (i.e., stock market reactions) for the announcing bank; (3) judgments from financial experts on complexity, risk, and radicalness of each financial innovation; and (4) moderators (economic conditions and location) and control variables (total assets derived from Compustat).

Our dependent variable is the cumulative abnormal stock market return to a financial innovation, which is captured by analyzing abnormal changes in stock prices (the source for stock prices is Datastream) in response to announcements of innovations. These announcements may come from the banks themselves or be reported in the press. The authors sample all product announcements publicized as press releases on banks' websites and announcements from the Dow Jones Factiva and LexisNexis electronic databases. To eliminate potential omitted variable bias and noise, any events that might have been affected by other announcements are excluded, because they occurred in the same event window.

Our sample features both up and down markets (recession data from Census Bureaus) in both North America and Europe, which differ in their risk tolerance and innovativeness. For example, our study period includes the biggest boom and bust in the stock market since the Great Depression. Thus, the time period and location provide particularly suitable sampling frames for studying varying responses to the complexity, riskiness, and radicalness of financial innovations. In total, our final sample consists of 428 product announcements from 39 banks in the United States and Western Europe (Germany, United Kingdom, Switzerland, and France) from 2001 to 2010. Each bank made an average of 11 announcements. Banks or news sources announce their most important innovations, so our sample of announcements also should be representative of the most important financial innovations launched by anyone during this period.

Our data set is unique because the ratings of the complexity, risk, and radicalness were by three experts from the financial industry, who rated innovations from the consumer's point of view. Former studies do not contain ratings from experts. For the ratings, scales have been adapted from previous research. For radicalness, the authors adapted the scale from Moreau, Lehmann, and Markman (2001): How innovative do you think this product is? (minor variation = 1/completely new = 7). For complexity, we adapted the scale from Labay and Kinnear (1981): The product is (not complex = 1/very complex = 9). And for financial risk, a scale was adapted from Shimp and Bearden (1982): The investment associated with the purchase of a ___, how risky would you say purchasing the ___would be? (not risky at all = 1/very risky = 9). The interrater reliability for radicalness, complexity, and financial risk is quite high (see the Appendix).

Results

Descriptive Statistics

Financial innovations consist of five product groups: securities, funds, credit, account management, and insurances. For example, a security innovation would be the commercial mortgage-backed securitization launched by Deutsche Bank. The loans get secured on a wide range of commercial properties, including offices, retail, industrial, residential, hotels, and pubs. Goldman Sachs launched a U.S. equity fund for investors that seek equity growth opportunities and cash flow. To help low and moderate-income families buy homes, Citigroup introduced a lower income program. Bank of America introduced the "Keep the Change" program for customers with an account: The bank rounds up all debit card purchases to the nearest dollar amount, then transfers the difference from the customer's checking account to a savings account. Finally, as an example of an insurance innovation, the launch of "Proteski Pinjaman Mitra" by HSBC offers a new credit life protection product.

Table 1 depicts the distribution of financial innovations by product group and time periods. Security and

Table 1. Distribution of Financial Innovations by Product Group and Time Periods

Product Group	2001–2003	2004–2007	2008–2010	Total (2001–2010)
Securities	38%	43%	36%	40%
Funds	27%	13%	34%	23%
Credit	27%	30%	18%	25%
Account management	8%	13%	9%	11%
Insurances	0%	0%	3%	1%
	$n = 37$	$n = 223$	$n = 168$	$n = 428$

credit innovations are the most frequent innovations; insurance innovations are the rarest. A χ^2 test is used to test differences between periods for each product group. The percentage of security and account management innovations remained stable both before and during the financial crisis, whereas the percentage of credit innovations decreased during the financial crisis (2008–2010 versus 2004–2007; $p < .01$). This change might partly be due to the popularity of subprime mortgages and credit default swaps prior to 2008 and their vast unpopularity after the credit bubble burst. The percentages of fund and insurance innovations increased during the financial crisis compared with 2004–2007 ($p < .01$); the increase in fund innovations may reflect banks' increased efforts to introduce ways to spread risk.

Table 2 reveals the distribution of financial innovations by location and product group. A χ^2 test is used to test differences between periods for each product group. Western Europe introduced more security innovations in 2004–2007 ($p < .001$) and 2008–2010 ($p < .001$) and more fund innovations in 2004–2007 ($p < .05$) than the U.S. banks. The U.S. banks introduced more credit innovations in 2001–2003 ($p < .05$), 2004–2007 ($p < .05$), and 2008–2010 ($p < .001$), and more account management innovations in 2001–2003 ($p < .1$) than did those in Western Europe. There also were more U.S. credit innovations in 2004–2007, during the peak of the housing bubble than in other years.

Table 2. Distribution of Financial Innovations by Location and Product Group

Product Group	2001–2003	2004–2007	2008–2010
Securities in the United States	36%	15%	16%
Securities in Western Europe	64%	85%	84%
Funds in the United States	30%	30%	49%
Funds in Western Europe	70%	70%	51%
Credits in the United States	90%	63%	83%
Credits in Western Europe	10%	37%	17%
Account management in the United States	100%	43%	40%
Account management in Western Europe	0%	57%	60%
Insurance in the United States	0%	0%	20%
Insurance in Western Europe	0%	0%	80%
	$n = 37$	$n = 223$	$n = 168$

Table 3 provides the cumulative abnormal returns during different event windows. For financial innovations, they are positive on the event day (0) and for the event window (−1, 0), reaching $146 million on average (event window −1, 0). Although financial innovations may have been the primary cause for the financial crisis, our findings indicate that not all financial innovations are bad or without merit. The cumulative abnormal returns to financial innovations are .16% in Western Europe and .30% in the United States. Our analysis uses the shortest significant event window to ensure that the abnormal returns are not related to other events (i.e., confounding effects), which is (−1, 0).

Table 4 provides the descriptive statistics of our sample. There was a relatively low mean level of radicalness, which is not surprising for financial innovations because their radicalness appears lower than that of innovations in the manufacturing sector. Many financial innovations are not radically new and instead represent adaptations of prior products (Tufano, 2004). Therefore, and because our sample includes a few very radical financial innovations, the mean is in line with prior studies.

Table 5 shows the correlations of the variables. A high correlation was found between complexity and risk. To further understand this high correlation, we asked the

Table 3. Cumulative Abnormal Stock Market Returns to Different Event Windows

Event Window	Returns	*p*-Value	Percentage of Positive
(0)	.16%	.017	53%
(−1, 0)	.21%	.007	52%
(−1,+1)	.13%	.271	51%
(−2,+2)	.09%	.571	48%

Notes: 0: announcement day. −1 (−2): one (two) day(s) prior the announcement.
+1 (+2): one (two) day(s) after the announcement.

Table 4. Descriptive Statistics of Key Variables

Variable	Observations	Mean	Minimum	Maximum
Cumulative abnormal stock market returns	428	.21%	−5.18%	6.40%
Complexity	428	4.75	1.00	9.00
Risk	428	5.08	1.00	9.00
Radicalness	428	1.70	1.00	7.00
Assets (in millions)	428	925,836	1,911	3,771,200
Recession versus expansion	148 versus 280			
United States versus Western Europe	168 versus 260			

three experts to give us their explanation for this finding. In general, the experts do not find this finding surprising. Their verbatim answers could attribute the correlation to three causes. First, banks might introduce complex financial innovations to "hide" high financial risk because so doing makes it difficult for consumers to realize that the innovations are risky. Second, complex innovations are associated with higher uncertainty. With higher uncertainty, investors' need for a higher return increases. According to risk-return trade-off, higher expected returns can only be accomplished through higher financial risk. Because investors fancy higher expected returns, banks might introduce innovations higher in complexity and risk, which in turn leads to higher expected returns. Third, risky and especially complex financial innovations normally incorporate higher development costs. Because investors expect that these innovations are more expensive to develop, banks can even get higher spreads for risky and complex financial innovations than for financial innovations lower in risk and complexity.

Hypotheses Tests

The results of the regressions are provided in Table 6 (Model 5). Because heteroscedasticity is present (White's test statistic = 91.74, $\chi^2[32]$, $p < .001$), robust standard errors (i.e., robust variance estimator; White, 1980) were used. Our results show that an increase in complexity ($b_1 = -.41$, $p < .01$) results in stronger negative cumulative abnormal returns, in support of H1a rather than H1b. Therefore, the more complex a financial innovation, the stronger its negative impact on cumulative abnormal returns. The probable explanation for this finding likely involves consumers, who will not adopt complex innovations when they demand high cognitive effort (Mählmann, 2012), evoke negative emotional reactions (Mick and Fournier, 1998), and make it difficult to compare various options. Thus, the negative effects outweigh the positive effects of complex innovations.

Contrary to H2b but in line with H2a, the authors find that risk ($b_2 = .30$, $p < .05$) has a positive impact on cumulative abnormal returns: The more risky a financial innovation, the stronger its cumulative abnormal returns, probably as a result of the positive relation between risk and return, because consumers are only myopic loss averse (Benartzi and Thaler, 1999), or because consumers seek risk when firms frame the positive gains of an innovation (Knutson et al., 2005). Thus, the positive effects outweigh the negative effects of risky innovations.

Table 5. Correlations among Variables ($n = 428$)

	1	2	3	4	5	6	7	8	9	10	11
1. CAR	1.00										
2. Complexity	−.06	1.00									
3. Risk	−.01	.92	1.00								
4. Radicalness	.04	.23	.21	1.00							
5. Recession	.09	.05	.04	−.12	1.00						
6. United States	.04	−.33	−.28	.01	.13	1.00					
7. Security	.05	.37	.37	−.06	−.08	−.37	1.00				
8. Fund	−.05	.52	.51	.17	.19	.02	−.44	1.00			
9. Credit	−.05	−.55	−.48	−.04	−.08	.38	−.47	−.31	1.00		
10. Account management	.08	−.49	−.57	−.08	−.06	.05	−.29	−.19	−.21	1.00	
11. Assets	−.05	.15	.13	.16	.08	−.29	.06	.07	−.09	−.08	1.00

Notes: Correlations >.1 are significant at the 5% level.

Table 6. Regression Results for Drivers of Cumulative Abnormal Stock Market Returns to Financial Innovations

	Dependent Variable: CAR						
Independent Variables	M 1	M 2	M 3	M 4	M 5	M 6	M 7
Complexity	−.11		−.40***	−.41***	−.41***	−.28***	−.29***
Risk		.11	.40***	.39***	.30**	.25***	.18*
Radicalness				.10**	.23***	.09*	.17***
Recession	.10*	.12**	.11**	.13**	.38**	.12**	.23**
United States	.04	.05	.03	.02	−.04	.03	−.03
Security	.40***	.31**	.29**	.30**	.31**	.13*	.13*
Fund	.27**	.15	.15	.16	.17	.02	.01
Credit	.21**	.24	.15	.15	.16	.01	.01
Account management	.23***	.30***	.25***	.24***	.25**	.12*	.12*
Assets	−.04	−.04	−.04	−.05	−.04	−.05	−.04
Radicalness × recession					−.30**		−.20**
Risk × recession					.01		.05
Radicalness × United States					−.15		−.11
Risk × United States					.20**		.15**
F-value	2.22**	2.23**	2.60***	2.62***	3.16***		
R^2	3.34%	2.46%	5.14%	6.00%	8.00%	5.53%	7.34%
N	428	428	428	428	428	428	428

Notes: * $p < .1$. ** $p < .05$. *** $p < .01$. CAR = cumulative abnormal stock market returns.

Consistent with H3, the authors find a positive impact of increasing radicalness ($b_3 = .23$, $p < .01$). Thus, the more radical a financial innovation, the stronger its cumulative abnormal returns, probably as a result of higher prices for radical financial innovations by targeting premium segments and because they are more difficult to imitate, and radical financial innovations can increase the market share within an existing market, increase the market size, or create entirely new markets.

Surprisingly, the recession ($b_4 = .38$, $p < .05$) also has a positive impact on cumulative abnormal returns. Security innovations ($b_6 = .31$, $p < .05$) and account management innovations ($b_9 = .25$, $p < .05$) also have a positive impact on cumulative abnormal returns.

Recession negatively moderates the impact of radicalness ($b_{11} = -.30$, $p < .05$) on cumulative abnormal returns, in support of H4, as depicted in Figure 1. In an expansion, higher radicalness leads to higher cumulative abnormal returns than lower radicalness. However, in a recession, increasing radicalness leads to lower cumulative abnormal returns. As stated in the theory, these results could occur either because of consumers' lower disposable income or their lower propensity to buy expensive radical innovations.

With regard to the impact of the moderator, U.S. location, on the impact of risk ($b_{14} = .20$, $p < .05$) on cumulative abnormal returns, the authors find a positive moderation, in support of H7a instead of H7b. Figure 2 reveals this moderation effect. In Europe, cumulative abnormal returns decline with the riskiness of the innovation, suggesting that Europeans are risk averse. In contrast, cumulative abnormal returns increase with riskiness of the innovation, suggesting that people in the United States are risk seeking. This dramatic difference in propensity to risk suggests that researchers and firms should treat investors differently in the United States versus Europe.

The impact of the interaction between risk and recession on cumulative abnormal returns is not significant though, so H5 must be rejected. The impact of the inter-

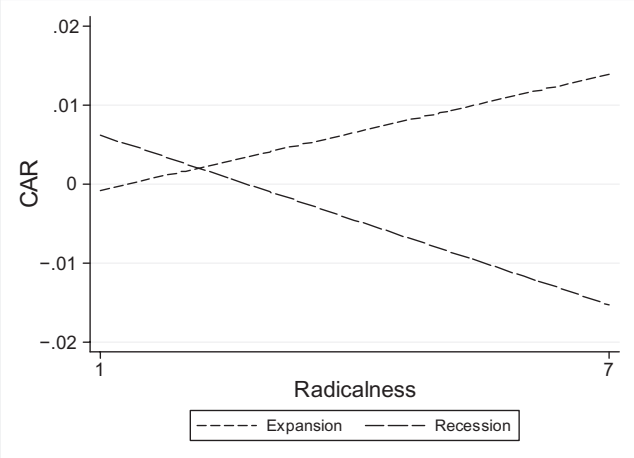

Figure 1. Impact of Radicalness x Recession on Cumulative Abnormal Stock Market Returns (CAR)

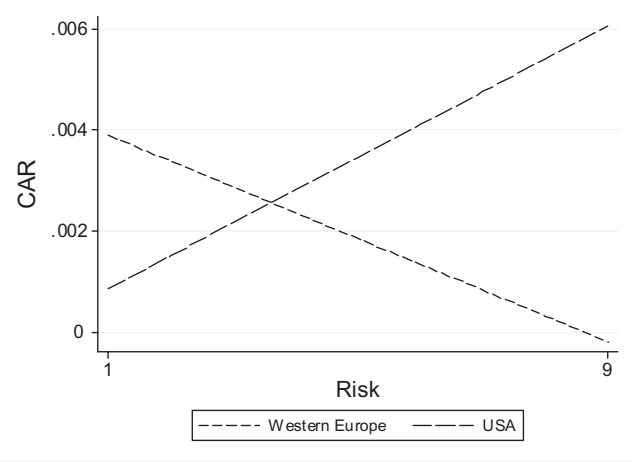

Figure 2. Impact of Risk x Location on Cumulative Abnormal Stock Market Returns (CAR)

action effect of radicalness and a U.S. location on cumulative abnormal returns is not significant, and so H6 cannot be confirmed, either.

Robustness Checks

Because of the high correlation between complexity and risk, checks for multicollinearity problems were performed by using different independent variables in the regression (see Table 6, Models 1–5). First, the authors include only complexity, economic conditions, locations, product groups, and assets as independent variables. The next column features risk instead of complexity. Afterward, the independent variables include complexity, risk, economic conditions, locations, product groups, and assets. Finally, radicalness is added. The signs of the coefficients do not change, so multicollinearity does not appear to compromise our results. A generalized ridge regression that accounts for multicollinearity (see models 6 and 7 in Table 6) was also performed and shows that our results remain robust.

As robustness checks, the authors also estimate cumulative abnormal returns using the Fama–French 3-factor model to verify that the results do not differ between the market model and the Fama–French 3-factor model.[1] The cumulative abnormal returns for the event window (−1; 0) are significantly positive (.24%; $p < .002$), and the hypothesis test results also remain stable.

As another robustness check, the authors estimate a model with another control variable (i.e., frequency of announcements; Sood and Tellis, 2009), but it is not significant and does not change our results.

Discussion

Summary of Findings

This study contributes to the literature on the fruits and drivers of the success of service innovations. The data include up and down markets across five countries that differ in their risk tolerance and innovativeness. This unique data set offers several interesting findings:

- Security and credit innovations are the most frequent innovations; insurance innovations are the rarest.
- The share of credit innovations decreases during the financial crisis, but the percentage of fund innovations increases. Western Europe introduces more security innovations, whereas the United States introduces more credit innovations.
- Cumulative abnormal stock market returns to introductions of financial innovations are positive and average $146 million. They are twice as high in the United States as in Western Europe.
- On cumulative abnormal stock market returns, increasing risk has a positive impact (confirming H2a); increasing complexity has a negative impact (confirming H1a); and increasing radicalness has a positive impact (confirming H3).
- The recession has a positive impact on cumulative abnormal stock market returns.
- Economic condition moderates the returns to radicalness. Cumulative abnormal stock market returns increase with radicalness during an expansion but decrease with radicalness during a recession (confirming H4).
- Location moderates the returns to riskiness of the innovation. Cumulative abnormal stock market returns increase with risk in the United States but they decrease with risk in Western Europe (confirming H7a).

Implications

Banks introduce more fund innovations and fewer credit innovations during financial crises; perhaps consumers look more for financial innovations that help them spread risk when they face financial turbulence. Higher saving rates among European consumers and higher loans among U.S. consumers seem to have incentivized European banks to introduce more security innovations and U.S. banks to introduce more credit innovations. That is,

[1] We appreciate the support received from Professor Fama, Professor French, and Professor Elsas in collecting these data.

banks appear to react to the requirements of their local markets.

The average cumulative abnormal stock market return to a financial innovation announcement is significantly positive, equal to $146 million. Thus, the market considers financial innovations profitable, not harmful, despite their apparent responsibility for the financial crisis. This result should encourage banks to develop more financial innovations. In addition, the cumulative abnormal returns are higher for more radical innovations—a result consistent with findings in other industries that suggest more radical innovations allow firms to charge premium prices, which ultimately leads to high margins and cash flows (Srinivasan, Pauwels, Silva-Risso, and Hanssens, 2009).

Yet, the authors also find that the cumulative abnormal returns to an announcement of a financial innovation are higher in a recession than in an expansion. This result may suggest fewer announcements clutter or lower expectations in recessions, because most firms cut their R&D investments during recessions (Barlevy, 2005). In this sense, a recession may offer a chance for banks to stand out from the crowd and use financial innovations to increase their financial value: Banks should act contracyclically and introduce innovations during recessions.

Cumulative abnormal returns increase with riskiness of financial innovations. An implication of this finding is that banks need not avoid risky financial innovations. This knowledge may have prompted banks to introduce more risky products in the past 15 years. This practice appears poorly aligned with the goals of regulatory authorities though; risky products are not only dangerous to consumers that purchase them but to the financial system as a whole (Stiglitz, 2009). The positive impact of risk on cumulative abnormal returns shows that regulatory authorities cannot rely on self-motivation in financial markets to reduce risky innovations.

The complexity of financial innovations instead has a negative impact on cumulative abnormal returns. It is thus suggested that banks and firms in general should avoid complex innovations. Not only do financial markets provide banks with incentives to avoid complex innovations, but regulatory authorities prefer not to confront consumers with complex financial products, which often lead to confusion and potential exploitation. In the recent financial crisis, some new products were so complex that even the firms that created them did not fully understand all their implications (Stiglitz, 2009). The U.S. Consumer Protection Act has issued regulations to prevent complex innovations that feature long, detailed clauses in small print. The negative impact of complexity on cumulative abnormal returns suggests though that regulatory authorities might be able to rely on the market to punish such financial innovations.

In an expansion, higher radicalness leads to higher cumulative abnormal returns than lower radicalness. However, in a recession, increasing radicalness leads to lower cumulative abnormal returns. Therefore, banks should time their launch of radical financial innovations to coincide with periods of expansion rather than recessions; once a recession strikes, the negative interaction term for radicalness and recession suggests that they should consider whether waiting to launch might be preferable to an immediate launch of their radical financial innovations.

Finally, increasing risk among financial innovations increases cumulative abnormal returns in the United States but decreases the cumulative abnormal returns in Western Europe. This dramatic difference in propensity to risk suggests that researchers and firms should treat investors differently in the United States versus Europe. Therefore, the United States is a more suitable market for launching more risky innovations.

Limitations and Further Research

This study has several limitations that additional research might address. Our sample is limited to publicly traded banks in five countries; the authors hope that additional research expands this analysis to private banks and other countries. This paper's use of an event study methodology to determine the performance of financial innovations offers the advantage of covering a relatively large number of innovations across several countries, but it prevents us from disentangling innovation performance across different customer segments. Further studies might analyze publicly unavailable firm data to determine the effects for a few banks and in more detail. This paper also adopts the growing tradition in marketing of using stock market returns to ascertain market responses to marketing activities and phenomena. However, this application of an event study cannot reveal investors' mindsets, which actually drive returns (Bayus, Erickson, and Jacobson, 2003; Wiles and Danielova, 2009). Therefore, the authors call for research that can validate the assumptions underlying this method.

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Appendix

Interrater Reliability

Each financial expert received a detailed description of the financial innovation and product announcement, including the date. To check the interrater reliability, the authors calculate Cronbach's alpha values, the correlation between the ratings, and Fleiss's Kappa values. The Cronbach's alphas are .97 for complexity, .98 for risk, and .90 for radicalness. The correlations between the different raters are as follows: for complexity, .89 between rater 1 and 2, .93 between rater 2 and 3, and .95 between rater 1 and 3; for risk, .94 between rater 1 and 2, .94 between rater 2 and 3, and .94 between rater 1 and 3; for radicalness, .78 between rater 1 and 2, .74 between rater 2 and 3, and .84 between rater 1 and 3. Finally, Fleiss's Kappa is a statistical measure of the reliability of an exact agreement between a fixed number of raters, for which values greater than .4 are good (Landis and Koch, 1977). Fleiss's Kappa for complexity is .44, for risk is .46, and for radicalness is .43. Therefore, the interrater reliabilities for risk, complexity, and radicalness are fairly high.