

Do Structured Products Increase Social Welfare?

by

Eric R. Langner

Submitted in partial fulfillment
of the requirements for
Honors in the Department of Economics

UNION COLLEGE

June, 2012

ABSTRACT

LANGNER, ERIC R. Do Structured Products Increase Social Welfare? Department of Economics, June 2012

ADVISOR: Tomas Dvorak

Structured products are a rapidly growing type of financial engineering which allow firms to design solutions to meet the individual needs of investors. A structured product is a contract between a financial firm and its client. It involves packaging together traditional and exotic securities, commodities, and options generating a defined payout structure for the client. I ask whether these products enhance social welfare. I argue that, on balance, structured products increase social welfare. I find that while the products are complicated, they are not designed to hide risks nor are they likely to be a source of financial fragility. Rather, structured products mobilize savings, channel savings towards productive investments and distribute risk to those most willing and able to bear them.

Table of Contents

1) Introduction	1
2) Financial Innovation	8
2.1) Systemic Risk/Credit Rating Difficulty	10
2.2) Information Asymmetry	11
2.3) Proposed Regulatory Solutions	13
2.4) Information Asymmetry for Structured Products	14
2.5) Credit Rating for Structured Products	16
2.6) Systemic Risk for Structured Products	16
2.7) Future Outlook and Summary	17
3) Reverse Exchangeable	19
3.1) Buyers	21
3.2) Sellers	23
3.3) Pricing	25
3.4) Intermediaries/Selling Points	26
3.5) Summary	29
4) Upturn Note	31
4.1) Buyers	33
4.2) Sellers	34
4.3) Pricing	36
4.4) Intermediaries/Selling Points	38
4.5) Summary	40
5) Social Welfare Effects and Conclusions	42
5.1) The Economic Functions of Financial Markets	43
5.2) Scoring the Net Impact of Structured Products	45
5.3) Summary	47
6) Works Cited	50

CHAPTER ONE

INTRODUCTION

Financial innovation has the potential to lower transaction costs and improve social welfare on a global scale. Unfortunately, financial innovation is also prone to asymmetric information, hidden risk, and inefficiency which have the potential to cause global economic downturns. Because the wounds of the recent financial crisis are so fresh, the popular press has been highly critical of financial engineering and the dangers it poses. That being said, many of the most valuable core aspects of today's developed financial markets were at one time risky financial innovation. Stock options, ATM machines, and credit cards were all novel ideas when they were introduced to investors and consumers. Only over time and experience have they proven their worth to financial markets. As much as investors are wary of financial innovation, it is difficult to discern whether a product will be as valuable as the advent of credit cards, or as destructive as the securitization of mortgages.

The niche of financial engineering known as structured products is a perfect example of financial innovation, and the field has been growing rapidly in recent years. Structured products are designed to meet investment needs which can't be met elsewhere in the market. Whether that need is principal protection, increased leverage, or another unique market outlook, financial engineers have a wide variety of tools at their disposal to create the product they need. The simplest products may involve only basic stock options, while the more complicated can involve exotic futures, swaps, and other derivatives. Much of the value added by financial engineers comes from taking these

complicated derivatives and wrapping them into a simple product with a defined payout structure. If structured products sound complicated and confusing, that's because they are. This intrinsic complexity is the subject of much of the criticism of the industry. For that reason, much of this paper will be devoted to exploring specific structured products by way of two case studies.

While the market for structured products is small when compared to overall financial markets, the industry has been growing exponentially and functions as a significant means of financing for issuing firms. According to *Structured Products Daily*, over \$50 billion worth of structured products were issued in the U.S. in the first nine months of 2011 alone. David Bergstresser's *The Retail Market for Structured Notes* (2008) claims that \$4.4 trillion Euros worth of structured products were outstanding in 2006, comparable to the amount of money traded in the foreign exchange market on a daily basis. Individual structured products sometimes bring in tens of millions of dollars to issuing firms, who use structured products as a financing alternative to traditional debt issuance. All structured products involve investors lending capital to the issuing firm, to be returned in some form at maturity based on the performance of any number of underlying stocks, commodities, or indices. This exchange of capital highlights one of the most important roles of highly developed financial markets. By lending capital to the issuer in exchange for periodic payments, investors are demonstrating that the issuer has a more productive use for the capital than they do. If the investors felt they could earn higher returns than the rate they expect to receive from the note in an equally risky investment, they would place their money elsewhere. On the scale of an entire economy, this increases growth in the long run.

A major barrier to the growth of the structured products market is the strategic complexity of the products, which leads to skepticism and market avoidance on the part of potential investors. It is important to note that while structured products are complex and potentially risky for the investor, the issuing firm typically faces little or no risk. The nature of these notes is not for financial firms to express market opinions. Rather, expert traders hedge the risk which accompanies notes on an ongoing basis in order to limit and ideally prevent market exposure. While this paper won't delve into hedging specifically, the process requires experienced and quantitative traders to monitor the status of notes on an ongoing basis. Accordingly, commissions for structured product deals are higher than for most other financial products or services.

Financial engineering, including structured products, has become a target in the wake of the financial crisis. Some of the biggest players in financial markets, notably former Fed chairman Paul Volcker, have criticized financial innovation as Wall Street creations which accomplish little or no good in financial markets or society at large. Gary Weiss's *Wall Street Versus America: The Rampant Greed and Dishonesty That Imperil Your Investments* (2006) is as scathingly critical of the industry as the title would suggest, depicting Wall Street as selfish, corrupt, and under-regulated. The highly publicized 'Occupy Wall Street' movement rallied around a belief in malevolent financial engineers, and the movement earned sympathy from those who lost significant wealth when the housing bubble burst. One particular accusation against financial engineering is that products deliberately cater towards investors irrational desires for risk, particularly an irrational desire to hold "riskless" products. In Gennaioli's "Financial Innovation and Financial Fragility" (2010), he focuses specifically on the neglect of unlikely "tail" risk,

and the high demand for products with safe cash flows. He goes on to highlight a pattern which has been all too common in financial history. First, new products are created to serve as improved, safer versions of traditional securities (i.e. AAA tranches of debt obligations). The new securities are issued in great volumes, until a market event or news story exposes previously misunderstood risk embedded in the new securities. A mass exodus from the new product ensues, and investors flood the market for more traditional safe securities. If the market for the product was allowed to grow to global proportions, a worldwide recession can ensue as was the case in 2008. Throughout history, financial innovation has posed a variety of threats to global markets. Regardless of the specific innovation, issues such information asymmetry, illiquidity, and misunderstood risk consistently cause problems. While information asymmetry can be problematic, I argue that it exists based on the quantitative nature of structured products rather than by deliberate design. Furthermore, research shows that it is in the best interest of the issuing firms to remove information problems in order to increase issuance.

While much of the recent literature regarding financial innovation has focused on mortgage backed securities and collateralized debt obligations, structured products have also been a target of many financial innovation opponents. Due to the complexity of the structuring process, there have been examples of structured products that were sold at a 6% commission, even though the note was designed to expire in a mere six months. Because commissions are frequently woven into the options structure of the product, the retail investor probably didn't realize the terms were so unfavorable. As discussed in Bergstresser (2008), the majority of the instances of excessive commissions occurred in the early 2000's when the market was small, illiquid, and opaque. Regardless, the

commissions for structured products are still frequently disguised in product structure to this day. While the market for these products has grown in both volume and number of participants, it is not impossible to imagine such a similar case arising in the future.

The other major criticism of structured products is that they are deliberately designed to be complex in order to generate large commissions for financial firms. Bergstresser (2008) makes the obvious statement that “extreme complexity can make it difficult for investors to understand the true price they are paying.” Retail investors, rather than institutions or hedge funds, are far more likely to fall victim to complexity because they are less likely to understand the mechanics behind a structured product. However, it is potentially in the best interest of financial engineers to remove or limit complexity. While problems with asymmetric information have indeed hurt investors in the past, there have also been examples of the asymmetry leading to market disappearance. Depending on the type of economic theory being applied to the problems of information, the argument can be approached logically by both sides. Overall, complexity is certainly a valid concern when dealing with structured products, whether it is intrinsic or fabricated.

Despite the pitfalls described above, structured products have the potential to significantly improve social welfare. The primary draw of the industry is that financial engineers can offer solutions to investors which don't exist in the traditional financial market. Of the two products which will be examined in this paper, one allows the investor to extract income from a neutral outlook on Alcoa's stock growth, while the other offers leveraged upside exposure to the S&P 500 without any type of leveraged downside. The demand for these products comes from investors who possess a

complicated, obscure, or specific market view but have been unable to find an appropriate solution in the traditional market. By packaging existing products together, structured product issuers are able to provide a single product which addresses their needs. This situation highlights the dual role of structured products issuers as both structurers and as a type of financial advisor who offers products designed to meet needs and fit into an existing portfolio. Robert Shiller's new book, *Finance and the Good Society* (2012), calls for more investment in financial innovation in order for society to achieve its goals. *Finance and the Good Society* illustrates how financial innovation has historically led to economic growth and increased social welfare, and how it should continue to do so in the future. Structured products could be the perfect channel to increase investment in financial innovation and accordingly benefit social welfare. This question of structured products providing social welfare benefits is the main topic of this paper, and will be analyzed at length in chapter 5.

The other major benefit of structured products is that they promote efficient allocation of capital. If the needs of an investor could be met in the giant, inexpensive, and liquid markets of stocks, bonds, or foreign exchange, he or she would undoubtedly go elsewhere. By approaching financial engineers for solutions, investors are implying that they feel structured products is the optimal way to spend their money. If the market for structured products didn't exist, that money would be either inefficiently allocated or removed from financial markets altogether. While the argument that the structured products market exists and is therefore valuable is hardly airtight, it is important to discuss that the market creates solutions which formerly did not exist.

The remainder of this paper is devoted to the specific aspects of structured products which add value to society and financial markets, and the aspects which may be detrimental to those goals. By examining the problems associated with prior financial innovation, specifically the events leading up to 2008, I will address how similar problems could arise in the structured products market in the future. After examining the risks posed by structured products, the following two chapters will analyze the effects of unique structured products. By analyzing the buyers, sellers, pricing, risks, and intermediaries of the products, each stage of the structuring process will be examined and tested for potential benefits and problems. The last chapter will address whether structured products truly add value to the market, society, and economy, or if they exist merely to generate commissions.

CHAPTER TWO

FINANCIAL INNOVATION

In 2009 in the wake of the recent financial crisis, the former chairman of the Federal Reserve Paul Volcker made the following statement about recent financial innovation:

“[I have] found very little evidence that vast amounts of innovation in financial markets in recent years have had a visible effect on the productivity of the economy. Maybe you can show that I am wrong. All I know is that the economy was rising very nicely in the 1950s and 1960s without all of these innovations. Indeed, it was quite good in the 1980s without credit default swaps and without securitization and without CDOs”¹

Something Mr. Volcker may have forgotten to consider is that the elements of today’s financial markets are the result of hundreds of years of financial innovation. Concepts such as asset backed securitization, credit cards, and even issuing stock were at one time new types of financial innovation which have now become standard elements of a functioning financial market. In addition, it is not fair for Mr. Volcker to say that “the economy was rising very nicely in the 1950’s and 1960’s without all of these innovations.” There is an endless list of reasons why an economy can rise and fall, regardless of the presence of financial innovation. As Stephen Lumpkin wrote in “Regulatory Issues Related to Financial Innovation,” (2009) innovation is a natural aspect of the workings of any competitive system. By broadly condemning financial innovation,

¹ Quoted in “Paul Volcker: Think More Broadly,” *The Wall Street Journal*, December 14, 2009, p. R7.

rather than simply approaching it skeptically, Mr. Volker could be preventing the potential development of the next big breakthrough in the innovation of financial markets.

A consistent theme in financial literature is that innovation has led to some of the greatest advancements but also the worst economic crashes in history. The events and innovations that led to the financial crisis of 2008 undoubtedly fall on the extreme negative end of that spectrum, and have possibly tainted the public image on innovation because the wounds are so fresh. This paper will analyze the shortcomings which may have caused the recent financial crisis, and apply the same logic to the problems which could arise from the structured products market. It is important to note that while the recent financial crisis is the freshest in memory, crises have existed throughout the history of financial markets. That being said, the crisis of 2008 serves as an excellent case study which is easily applicable to the market of structured products which is the subject of this paper.

Before simply writing off the recent financial crisis as a wholesale failure of financial innovation, it is worth looking at other potential causes. In all likelihood, if mortgage securitization didn't exist the events of 2008 may have played out differently, but that fact alone does not incriminate financial innovation. The real estate bubble by itself could easily be held responsible. As described in Allen (2003), France and Sweden have both had fast rises in housing prices during their history without any significant securitization of mortgages. The U.S. housing market was probably somewhat stimulated by the issuance of subprime mortgages, but even at the peak of lending only 20% of mortgages were considered subprime. To simply write off the recent crisis as a result of

financial innovation would be lazy. This paper will instead take the analysis one step further by examining some of the common market problems associated with financial innovation. From the slew of potential problems outlined in Lumpkin (2009), I will focus on systemic risk, information asymmetry, and credit rating issues due to their frequency in historical economic downturns and their potential relevance to the structured products market. By analyzing the role those three risks played in the recent financial crisis, I will apply my findings to the field of structured products and determine the policy decisions which could minimize those recurrent risks.

2.1 Systemic Risk/Credit Rating Difficulty

The market for certain financially engineered products was allowed to grow rapidly to the point where it posed systemic risk to the market. The complicated and clearly misunderstood products were allowed to be used as risk-free capital to meet reserve requirements, and the market grew to a point where people who had never heard of a mortgage backed security or a credit default swap became victims of the decisions being made on Wall Street. When a product is in its infancy, the market does not know how to treat it. It is difficult to price, nearly impossible for credit rating agencies to rate, and the market can be illiquid or trade on something other than fundamental value. In retrospect, it seems absurd to consider rating mortgage backed securities on the same level as U.S. Treasuries. However, at the height of the housing bubble that's exactly what took place in the United States. Without years of market research and experience to draw upon, the credit agencies simply couldn't rate the securities accurately. Furthermore, Gennaioli (2010) cites the 'shortage' of available risk free assets at the time due to the

sharp reductions in debt under President Clinton. This call for risk free assets pushed the creation of AAA bonds by synthetic means.

It's important to note that the entity of mortgage backed securities is not specifically to blame for the recent crisis. If one replaced "mortgage backed securities" with any other product that was new to the market, was incorrectly rated by reputable credit rating agencies, and was held as risk free capital by banks that were too big to fail, the economy would probably meet a similar fate. The institution of mortgage backed securities and asset backed securitization has become a major part of financial markets despite the financial crisis, and exists today. The major difference is that the market has learned from past mistakes such that the products are more appropriately priced, rated, and traded.

2.2 Information Asymmetry

A recurring theme in economic downturns is the existence of information asymmetry. Information asymmetry occurs when one party in a transaction has more or better information than the counterparties in the transaction. Because all of the available information isn't factored into the price of a good or service, the market doesn't reflect true value and leads to adverse selection or moral hazard. As covered above in the discussion of credit rating agencies, not all the information regarding the riskiness of mortgage backed securities was reflected in the price or credit rating or the product. According to Gennaioli (2010), both the buyers and the intermediaries perceived the products to be as riskless as the AAA rating suggested, because they deemed the odds of a nationwide housing crash to be a nearly impossible. The information asymmetry, or more accurately the general lack of information or experience with the products, caused

the market to crumble when housing prices dropped. There is nothing wrong with issuing a product that has the possibility of default, failure, etc. However, that real risk needs to be reflected in the price. Just ask anyone who has invested in Greek sovereign debt since 2010. There is a legitimate risk that Greece will not be able to fulfill its sovereign debt obligations, but that reality is reflected in the high coupons on the bonds and would certainly never be described as risk free.

Information asymmetry does not only hurt the buyers who get sold a false bill of goods. As discussed in George Akerlof's "The Market for 'Lemons'" (1970), information asymmetry can cause markets to disappear as a result of quality uncertainty on the part of the potential buyers. Using the market for used cars as an example, Akerlof describes how used car salesmen are hurt by the existence of lemons in the market. Prospective used car buyers have the difficult (or impossible) task of distinguishing between good cars and lemons. The unfortunate results on the market are as follows:

“[T]here is incentive for sellers to market poor quality merchandise, since the returns for good quality accrue mainly to the entire group whose statistic is affected rather than to the individual seller. As a result there tends to be a reduction in the average quality of goods and also in the size of the market.”

(Akerlof p. 1)

Because used car salesmen have no way of demonstrating the quality of their products, the quality of the cars decreases due to lack of positive incentives and the overall market size shrinks. The same situation can arise with financial innovation. If a financial product is new and unproven, investors have reason to worry that they are being sold a financial 'lemon.' The financial engineers then face the difficult task of defending their product to

a skeptical public who are well aware of past financial innovation-fueled market failures. Just like with used cars, the presence of asymmetric information can cause the market for the new product to disappear.

2.3 Proposed Regulatory Solutions

The solution to the problems associated with financial innovation is not to broadly condemn the institution which has allowed financial markets to progress into the 21st century. Like any other industry, innovation drives competitiveness and success. Rather, the solution is to address those three major issues while avoiding stymieing potentially beneficial innovation. But before advocating broad financial liberalization, it is worthwhile to examine the history of liberalization and the problems it has caused throughout history. There is a cost/benefit ratio of financial liberalization vs. financial regulation, and governments need to walk a fine line to avoid disaster.

Robert Litan is clearly on the side of little regulation. In “In Defense of Much, But Not All Financial Innovation” (2010), he writes:

“If a skeptical view of financial innovation takes hold – either because the benefits of innovation are perceived to be presumptively small and/or the risks of catastrophic damage are feared to be non-trivial – then policymakers (and even voters) are likely to demand some sort of pre-emptive screening and possibly design mandates before financial innovations are permitted to be sold in the marketplace. This attitude very like would chill the development of financial innovations that would benefit consumers, homeowners and investors. (45)

Litan goes on to argue how pre-emptive regulation could have prevented the development of the airplane, automobile, and the internet. He states that pre-emptive regulation’s sole

purpose in the financial markets is regarding long term contracts, because consumers aren't always rational in those cases. Behavior finance has shown that consumers can be irrational in both short and long term investments, and require some level of protection from a government agency. I understand Mr. Litan's perspective, but levels of regulation higher than what he has prescribed are necessary to prevent crises. I believe that goal can be accomplished without quelling major financial innovations.

2.4 Information asymmetry for structured products

In terms of regulating financial innovation, including structured products, regulators need to focus on the problems of information asymmetry, credit rating difficulty, and potential systemic risk. Information asymmetry poses problems for financial markets in general, but those problems tend to be concentrated on new products. Documents such as SEC filings and organizations such as the Better Business Bureau work to combat problems of asymmetric information by making information available to investors and the public. Agencies such as the Financial Industry Regulatory Authority and the Consumer Finance Protection Bureau advocate consumer awareness regarding structured products, and frequently post warnings regarding potential dangerous, confusing or misleading investment vehicles. The government and other agencies already do much to break down problems of information asymmetry to the point where the responsibility lies with the consumer to try and ascertain all available materials prior to making an investment. With structured products this is not simple, and poses the strongest counterargument to structured products advocates. Terms of a deal may be complicated, and the underlying options structure even more so. Furthermore, the learning curve is steepened by the fact that each product relies on a different basic

structure and accordingly has a unique payout structure. In short, the field of structured products is not for the inexperienced investor. I believe regulatory agencies have done as much as they can in terms of requiring information disclosure and SEC filings. If investors are still uncomfortable or confused about the product, they should probably put their money elsewhere.

The one major problem worth mentioning regarding information asymmetry in structured products markets is in regards to commissions. As discussed in Bergstresser (2008), many early structured products deals yielded unprecedented commissions of up to 6%. These high commissions are characteristic of a young, illiquid market where investors do not have the opportunity to compare prices. Because structured products are so complicated, oftentimes the commission is hidden in the options structure rather than take off the top of the sale. As a result, investors do not know how much of a premium they are paying for products. However, I don't think the answer to this problem is mandatory disclosure. If a customer goes to the supermarket to buy a loaf of bread, it is not the responsibility of the supermarket to post the profit they are making on the sale of the loaf of bread. Rather, it is the responsibility of the customer to shop around to see if they can find the same loaf of bread for a cheaper price. In basic economic theory (and assuming few barriers to market entry), if the first supermarket is charging too much for bread other market players will force prices down by undercutting the competition. By the same token, the market for structured products has grown to the point where investors can shop for products among dozens of issuers. In my research, there has been no recent evidence of the exorbitantly high commissions of a decade ago. The market has grown to a point where unfair commissions would not stand up to market competition.

Furthermore, financial engineers understand that it is also in their best interest to break down information asymmetry. As discussed in Akerlof (1970), problems with information can lead to market disappearance if consumers are unable to distinguish between good and bad products.

2.5 Credit rating for structured products

The issue of ‘credit rating’ is not a major problem for structured products. Viewing ‘credit rating’ as the risk of loss of principal, there are two scenarios which need to be appreciated by the investor. The first scenario is the risk of the bankruptcy of the issuing firm. As Bergstresser (2008) discusses, investors in Lehman products learned the hard way in the fall of 2008 that structured products are debt obligations of the issuer. If the issuer is unable to make the payments upon the maturity of the note, the investor suffers a loss regardless of the performance of the note. While it is not a perfect science, credit agencies do a sufficient job of rating the stability of banks to the point where investors understand the associated risks. The second matter to consider is the payout structure of the note, and the likelihood of each payout scenario. I do not view this as a major issue because the payout structure of even the most complicated structured product is usually the simplest aspect of the note. While the options structure may be more difficult to understand, the payout structure and the implications for the individual investor’s portfolio are not overly complicated. Of the three major financial innovation problems, ‘credit rating’ is the least problematic when dealing with structured products.

2.6 Systemic risk for structured products

The last of the three financial innovation problems deals with the issue of systemic risk. If the consequences of a market are isolated to only the investors involved,

there is little cause for concern. While the investors in the market need to be protected from issues such as false information, at a minimum the problems are isolated to the market participants. If the only people hurt in 2007 had been subprime mortgage backed security investors, the world would be a different place. As discussed earlier, the depth and breadth of the market left the entire developed world holding the bag when the United States' housing market collapsed. Financially engineered products, particularly in their infancy, should not be used to meet capital or collateral requirements. The uncertainty which surrounds a new product regardless of the specific situation is enough to warrant a significant level of skepticism. In regards to structured products, they should never be held as any type of risk-free collateral. The complicated nature combined with the credit risk of financial institutions makes even a principal protected note questionable to some extent. The market is currently small enough where this is a non-issue, but is regardless worth mentioning.

2.7 Future Outlook and Summary

Having now viewed structured products through the lens of the three major problems of financial innovation, it is prudent to make an important distinction. With a type of financial innovation such as asset backed securities or stock options, there comes a point where it is no longer viewed as new product. The product becomes liquid and investors become familiar with the structure, and it poses less of the potential problems financially engineered products face in their infancy primary due to increased information. Accordingly, regulation is still required but to a lesser degree of stringency. I don't foresee that type of standardization happening with structured products. Each structured product is unique in terms of structure, credit risk, and underlying components.

An infinite number of products could be structured and unique concerns associated with each one, and the products will always be illiquid. In the way stock options have assimilated into the portfolio and vernacular of average investors, I don't see how structured products could experience the same mainstream acceptance any time in the near future.

As covered throughout this chapter, financial innovation is a tricky class of products to regulate. Too much regulation stifles growth, and not enough regulation can wreak havoc on investors and the broader economy. That being said, structured products currently receive the ideal amount of regulation. Information asymmetry is minimized by SEC filings and similar publications. Credit risk of individual products is explained in relatively simple terms, and the credit risk of issuing banks is rated on an ongoing basis by the major rating agencies. The last problem, systemic risk, seems negligible based on the size of the market in relative terms. If the market was to increase drastically in proportional terms, or if banks started to use notes to meet capital requirements, these issues would be immediately relevant and call for regulatory intervention.

The fact that structured products seem to have avoided the common problems of financial innovation isn't enough to validate its existence in the market. In "In Defense of Much, But Not All Financial Innovation", Robert Litan lists the four economic functions of finance as follows: "Enabling parties to pay each other, mobilizing society's savings, channeling those savings towards productive investments, and allocating financial risks to those most willing and able to bear them." In examining the product structures in the next two chapters, please keep these four functions in mind in order to judge the contributions structured products may or may not make to finance.

CHAPTER THREE

REVERSE EXCHANGEABLE

Reverse exchangeable notes are one of the simpler types of structured products. The performance of the note is typically tied to a single underlying stock, and offers a way for an investor to receive relatively high short-term income compared to other investment opportunities by taking on the risk of the performance of the stock. In a reverse exchangeable, the investor receives a monthly coupon regardless of the performance of the stock. If the value of the stock drops below an established “knock-in barrier,” the investor receives shares of the stock at the maturity of the note. If the stock never breaks this barrier, the investor receives their principal back at maturity. Because reverse exchangeable owners make money if the underlying rises in value or drops a small amount, the investors generally have a bullish or neutral opinion of the equity. This chapter will study a specific reverse exchangeable issued by the Bank of Montreal, as reported by Susanna Moon in *Structured Products Daily*:

Chicago, Sept. 29 – Bank of Montreal priced \$14,000 of 13% annualized reverse exchangeable notes due Dec. 30, 2011 linked to Alcoa Inc. shares, according to a 424B2 filing with the Securities and Exchange Commission. Interest is payable monthly. The payout at maturity will be par unless Alcoa stock closes below the trigger price – 75% of the initial share price – during the life of the notes and the final share price is less than the initial share price, in which case the payout will be a number of shares of Alcoa stock equal to \$1,000 divided by the initial share

price or, at the issuer's option, a cash amount equal to the value of those shares.
*BMO Capital Markets Corp. is the agent.*²

In this case, the underlying equity behind the reverse exchangeable is Alcoa Common Stock (ticker AA). The “initial” price of the stock is \$10.48, because that was the last price the stock traded at when the deal was priced. Therefore, the 75% knock-in barrier (also known as trigger price) was simultaneously established at \$7.86. Using the terms described in the article above, the possible outcomes of the note can be separated into three categories.

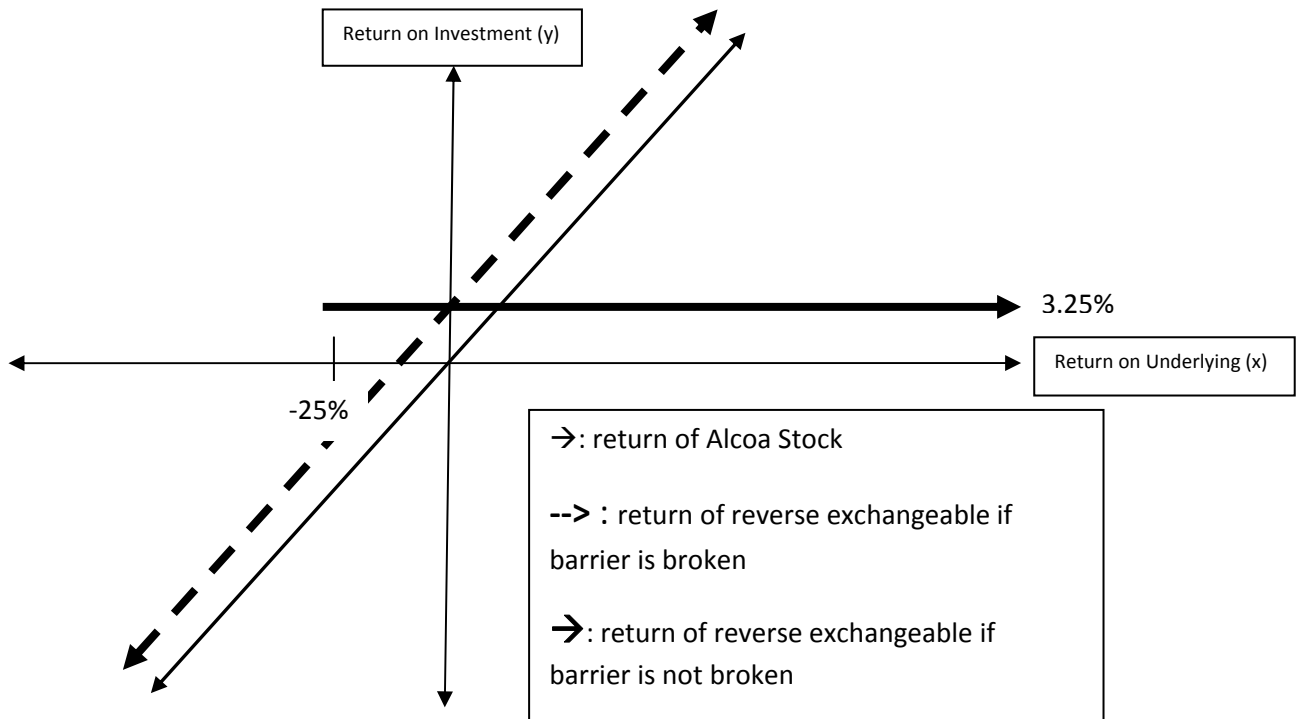
A: If over the life of the note (3 months), Alcoa's stock does not lose more than 25% of its value (observed at 4pm daily), the investor will receive his monthly payments of 13% annualized. His total return on the investment will be 3.25% in a mere three months.

B: If Alcoa's stock does break the knock-in barrier at any point during the three month period and the stock finishes below the initial share value, he will own the failing stock at the end of the three month period. He has the option to receive the shares of the stock, which is known as physical delivery, in the hopes that the stock will eventually recover. If the investor has a still negative view of the stock, he can opt for cash settlement which involves taking the losses immediately.

C: Alcoa's stock drops by more than 25% at some point over the life of the note, but then recovers all its losses for a net gain because the owner now owns stock which is trading higher than its initial value. Statistically, this is the most unlikely scenario and would typically only arise with the most volatile stocks.

² Structured Products Daily September 30, 2011

Figure 1: Payout Structure of Alcoa Reverse Exchangeable



3.1 Buyers

Now that the payout structure of the note has been explained, the next thing to consider is the target audience of the note. Due to the small size of the deal, the note was most likely designed for a single investor. However, many large deals will be marketed to multiple investors because the costs to the issuing firm are generally fixed.

With reverse exchangeables, the easiest customers to sell the product to are current owners of the underlying stock, in this case Alcoa. Because they are owners of the underlying, it is safe to assume that they have at least a neutral position on the stock, if not better. Also, the worst thing that can happen to a reverse exchangeable is that it takes on the form of the underlying. In this case, the former stock owner is no worse off than he would have been if he owned the stock, and he/she extracted some high short-term income from his investment, even though the underlying stock lost money. A typical

pitch to an investor would suggest putting 25% of their stock position into a reverse exchangeable, and keeping the remaining 75% as equity.

Reverse exchangeables are not appealing for stock owners who have an extremely bullish view of the stock. In the case of Alcoa, it's hard to believe that many investors are feeling that confident about the stock at the moment, due to the relatively high coupon. However, an important quality of these products is that there is a maximum return on investment, while there is no minimum. The most an investor could earn over the life of the notes is 3.25% (13% annualized), so an investor with positive convictions about Alcoa should probably be advised to simply invest in the underlying equity. On the other hand, reverse exchangeables aren't for extremely bearish clients, because the notes have the opportunity to return none of the original investment if Alcoa's price per share falls to \$0. The ideal candidate for a reverse exchangeable has a relatively neutral opinion on the future of the stock, and is willing to take a level of risk in return for the opportunity for high short-term income. Because of the payoff structure of the instrument illustrated in the graph on the previous page, the only way an investment in this reverse exchangeable won't outperform Alcoa's common stock is if Alcoa gains more than 3.25% (13% annualized) in the three months of the note. Furthermore, the customer receives complete downside protection down to the trigger price of \$7.86.

The obvious question right now is: Why doesn't the investor simply build the product himself? The biggest reason is that knock-in options cannot be traded by everyone. They are an exotic option which would need to be purchased through a financial engineering desk at a firm, which works in conjunction with structurers. In any case, the firm would most likely take a cut for putting together a knock-in option package

in the same way they would in putting together a reverse exchangeable. The second reason to invest in a reverse exchangeable rather than structuring the product on one's own is the complicated nature of structuring. Structuring requires a vast amount of knowledge and experience in financial engineering. Without a doubt, the customer pays a premium for this service, but there are enough firms which deal in structured products to prevent firms from taking commissions above an appropriate level. Otherwise, they would simply be undercut by their competition. Lastly, as mentioned above, the reverse exchangeable allows investors to make money on a neutral opinion of the underlying stock. Historically, if an investor didn't see a stock moving in the short term, the best investment decision they could make was simply not investing in the stock. Using structured products, and specifically reverse exchangeables, the same investor with a neutral outlook on Alcoa can receive high short-term income if his prediction becomes a reality.

3.2 Sellers

Up until this point, the information regarding Bank of Montreal's Alcoa reverse exchangeable has been from the perspective of the buyer and the information they are presented with by the Bank of Montreal. Behind the scenes, the traders at the bank are buying and selling exotic options in order to minimize or ideally eliminate the risk of the note. These transactions are likely taking place with exotic options traders at competing firms, because few individuals deal in exotic options. As in any market, a price for each exotic option has to be reached such that both parties are satisfied with the transaction.

In the case of a reverse exchangeable, there are two options involved: Bank of Montreal sells a knock-in put and buys a knock-in call, both with a strike price of \$10.48

(100% of the initial value). These knock-in options become vanilla options when the price of Alcoa closes at or below \$7.48 (75% of initial value). The combination of these two options makes the product behave the same way as the stock once the knock-in barrier has been breached. The combination of a put and call with the same strike price on the same stock make the payoff structure identical to the underlying. Through these options, all the possible outcomes of the product can be classified into three categories, and are illustrated in Figure 1 on page 22.

A: If the value of the Alcoa's common stock never breaches the knock-in barrier, neither options knocks-in, and the investor simply receives the coupon payments plus principal at maturity.

B: If the knock-in barrier is breached, and the stock never recovers to its initial level, only the knock-in put will be exercised. As soon as the barrier is breached, the knock-in put behaves as a vanilla put with a strike price of \$10.48. That option is "in-the-money" as long as the stock is trading below its initial value, and therefore the option will be executed by the option holder upon the maturity of the note. The investor in Alcoa's reverse exchangeable will either receive physical or cash settlement of the note.

C: If the knock-in barrier is breached, and the stock recovers to its initial level or higher, the knock-in call will be exercised. As soon as the barrier is breached, the knock-in call behaves as a vanilla call with a strike price of \$10.48. That option is "in-the-money" as long as the stock is trading above its initial value, and therefore the option will be executed by the option holder upon the maturity of the note. The

investor in Alcoa's reverse exchangeable will receive physical or cash settlement of the note at a profit.

3.3 Pricing

The pricing of the note is based on the credit risk of Bank of Montreal, and the cost of the embedded options. Because the note is unsecured debt issued by Bank of Montreal, a small part of the coupon paid to the investor will reflect the likelihood of the firm being unable to make the guaranteed coupon payments over the life of the note. The note has a term of merely three months, so this amount would be negligible for the Alcoa reverse exchangeable.

Another factor is the premium gained from selling the knock-in put vs. buying the knock-in call. The knock-in put, because it is statistically more likely than the knock-in call to occur, brings in much of the money which forms the guaranteed coupon payments.

One of the most important variables which affect option pricing is the anticipated dividend of the equity. When a company earns profits, they have the option to either reinvest the earnings or pay them out to shareholders as dividends. This is an important issue in general options investment, as well as reverse exchangeables. Because the investor in a reverse exchangeable does not own the stock, he does not gain anything from earnings being paid out as dividends. In fact, dividends paid out increase the chances that the share price will drop over the life of the note, holding all other variables constant. Historical dividends are not a guarantee of future dividends, but the fact the last three dividends paid by Alcoa were \$0.03 certainly helped the marketability of this note. If the historical dividends were higher, one could expect the knock-in barrier to be lower, the coupon to be higher, or some combination of both to subsidize the investor for the

higher anticipated dividends. Here are a few more generalities about the effect of different variables on reverse exchangeables.

- Holding other variables constant, the higher the volatility of the stock, the higher the coupon the note will pay. This is because the stock is more likely to “knock-in” if it is volatile.
- Holding other variables constant, the longer the term of the note, the higher the annualized coupon will be.
- Holding other variables constant, the lower the “knock-in barrier” of the note, the lower the coupon will be. The lower the barrier, the less likely the stock is to “knock-in.”

3.4 Intermediaries/Selling Points

Once the product has been priced, a member of Bank of Montreal’s sales team is charged with convincing clients that the reverse exchangeable is a worthwhile investment. In addition to explaining the pros and cons of the product, the sales person needs to convince the potential investor that the product is superior to similar alternatives.

Earlier in the chapter, the reverse exchangeable was compared simply to an investment in the underlying, Alcoa common stock. The reverse exchangeable outperforms the stock in all instances where the stock price drops, as well as in circumstances where the stock gains less than 3.25% over the three month life of the product. If the stock gains more than 3.25%, a simple investment in the stock would be the more profitable investment.

A major advantage of the reverse exchangeable is that it allows the investor to extract income from having a neutral opinion about the stock. While selling put options

has similar payout characteristics, selling puts is typically considered a bullish stock play. Through my research, I have found no better way to express a neutral stock opinion than through a reverse exchangeable. In the case of the Alcoa product, the investor receives his principal plus generous interest at the end of the note if the stock never goes below 75% of its initial value. In an environment where short term interest rates are miniscule, the opportunity to make an annualized 13% is impressive despite the added risk of loss.

The tax implications of the reverse exchangeable are not advantageous for the investor. For tax purposes, the benefits from the note are divided into interest payment and option premium, with option premium covering the vast majority of the taxable income. If the reverse exchangeable expires without the knock-in barrier having been breached, the option is not exercised and those proceeds are treated as short term capital gains. If the knock-in barrier is breached, the tax basis of the shares acquired is reduced by the premium paid of the put option. While this would be slightly advantageous for the investor, the situation would only arise following at least a 25% loss on the initial investment. For that reason, the reverse exchangeable is not particularly advantageous for tax planning.

The characteristics of the Alcoa reverse exchangeable are similar to those of selling a put option on the stock. Both methods provide the investor with some level of limited upside potential, but unlimited downside if the stock drops to zero. The major difference between the two methods comes from the knock-in options. Because the options embedded in the reverse exchangeable are knock-in options, the owner of the product has downside protection up until a drop of 25% in the stock's value. Another difference, although less likely to occur, is the situation which arises if the stock dips by

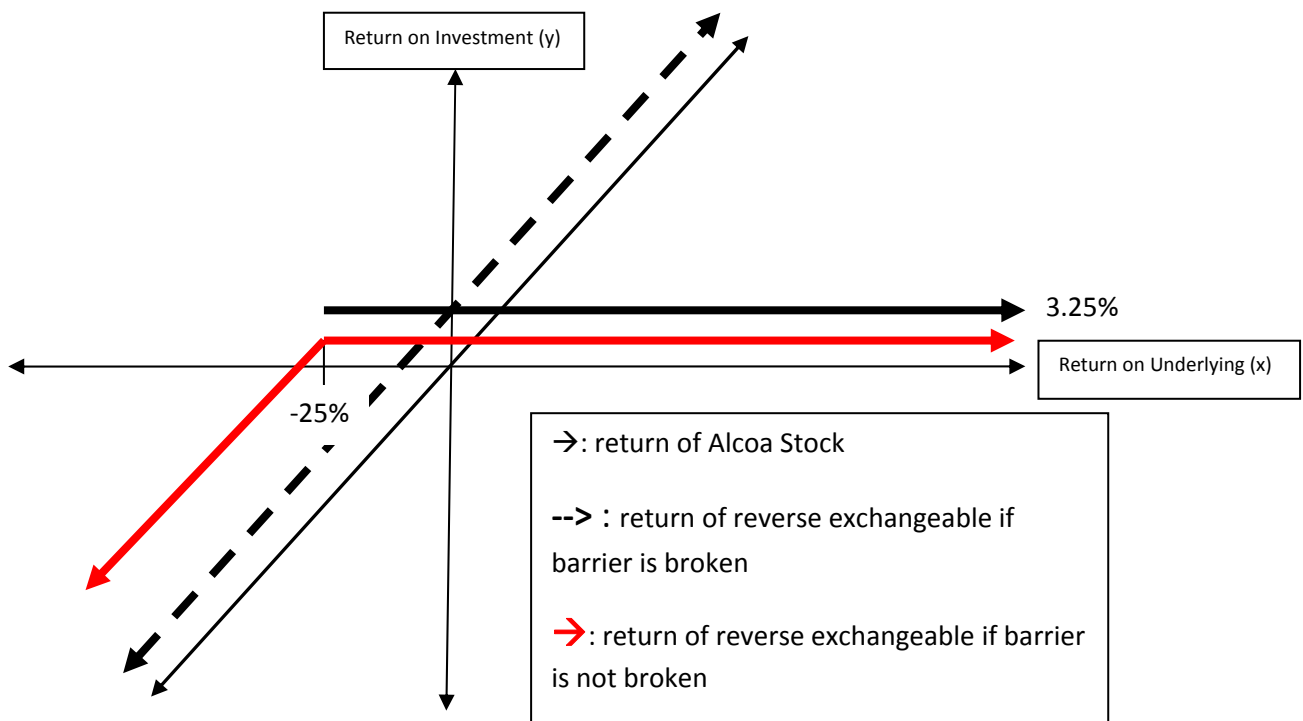
more than 25% but recovers to higher than its initial value. If the investor had simply sold a vanilla at-the-money put option on the stock, the person who bought the put option would simply not exercise it. The reverse exchangeable investor would keep his fixed premium, regardless of how high the stock went. If the investor had put their money into a reverse exchangeable, he would pocket any gains over the initial value because he now owns a call with a strike price equal to the initial value of the stock. The knock-in put which was sold would expire unexercised, and the knock-in call *would* be exercised at a profit to the investor.

As described above, the primary difference between the reverse exchangeable and a vanilla put option revolves around the behavior of the instruments if Alcoa's stock does drop by more than 25%. If such an event occurs, the owner of the reverse exchangeable immediately takes a loss of 25%, because the knock-in put starts to behave as a vanilla put. In the same scenario (Alcoa drops 25%), the owner of a plain vanilla put begins to lose money only beyond the strike price of the put. In other words: If Alcoa's stock price drops to \$7.34 (70% of the initial value) and stays there, an investor in the reverse exchangeable loses 30% of his principal. The seller of a put option with a strike price of 75% loses only 5% of his initial investment. Because of this major difference, the premium earned from investing in the reverse exchangeable are much higher than the premium gained from selling a 75% put. This situation is superimposed below in red on the graph from page 22, illustrating the lower risk and appropriately lower return on the put as compared to all of the reverse exchangeable's payout scenarios.

Selling a put is no better or worse of a strategy than investing in the reverse exchangeable. Rather, it just fits a different risk profile. Selling a put commits a relatively

small amount of capital, while investing in the reverse exchangeable involves lending the entire principal to the Bank of Montreal (much like buying a bond). Selling a put on an exchange does not involve the credit risk which is inherent in any structured product. Lastly, as mentioned above, the return on the reverse exchangeable is so high because it is a significantly riskier investment.

Figure 2: Payout Structure Comparison between Reverse Exchangeable and Put Option Sale

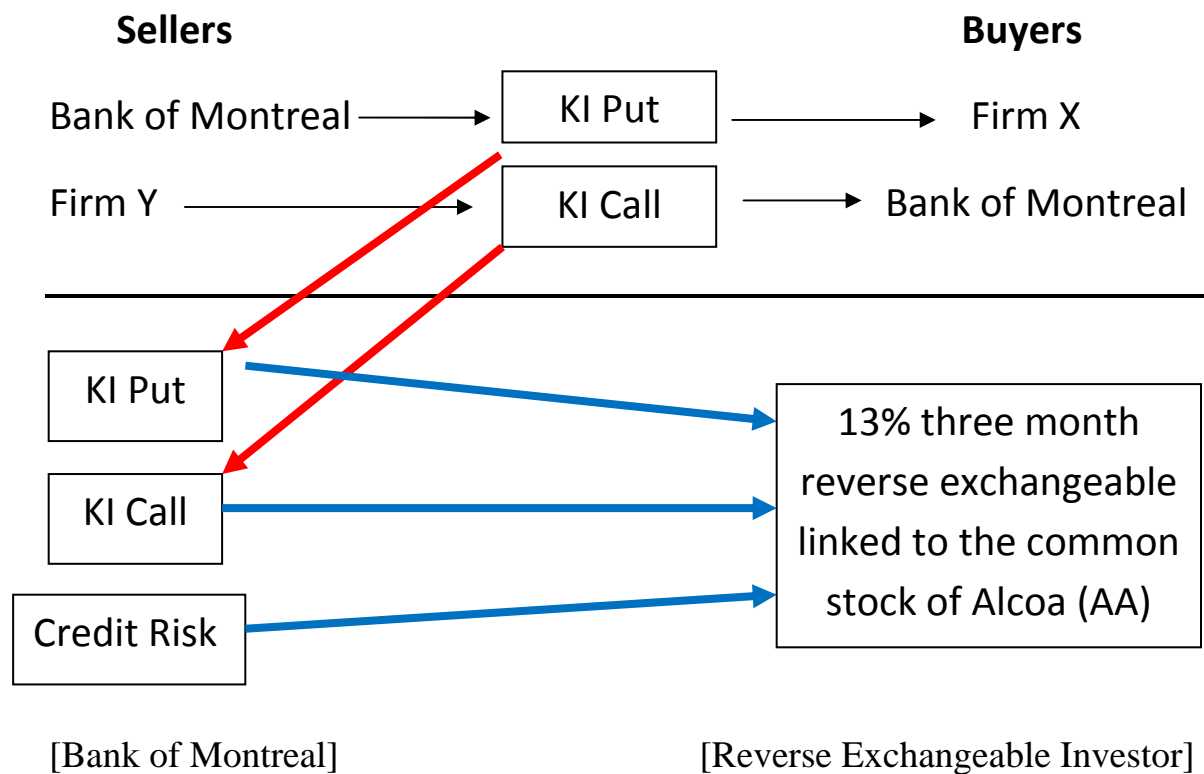


3.5 Summary

The figure on the next page summarizes all the transactions which took place in the structuring and ultimate sale of the Alcoa reverse exchangeable. First, the Bank of Montreal sold the knock-in put to Firm X. Second, the Bank of Montreal bought the

knock-in call from Firm Y. Third, the knock-in put, knock-in call were combined, along with the intrinsic credit risk of the Bank of Montreal into the clean, marketable reverse exchangeable (denoted by the blue arrows). This finished product was sold to the customer in exchange for lending money to the firm, to be returned in full on the condition that Alcoa did not drop below 75% of its initial value.³

Figure 3: Transactions Within The Structuring and Sale of Alcoa Reverse Exchangeable



³ The reverse exchangeable expired on December 30, 2011 without knocking in. Investors in the product earned a 3.25% return on investment in three months.

CHAPTER FOUR

UPTURN NOTE

Upturn notes are another popular structured product. The note can be tied to almost anything: stocks, commodities, or an index. The purpose of the note is to amplify small gains in the underlying, at the cost of giving up participation in abnormally high gains. Unlike the reverse exchangeable, no coupons are received during the life of the note, and all gains or losses are realized when the note expires. The typical upturn note investor is moderately bullish on the underlying because he only makes money if the price of the underlying rises. However, a more bullish play would be simply investing in the underlying to avoid being bound by the participation limit of an upturn note.

The specific upturn note to be examined in this chapter was priced by Citigroup on May 24, 2007. The information below was taken from Citigroup's official SEC filing.

On May 24, 2007, Citigroup priced \$35.2 million worth of \$10 upturn notes linked to the performance of the S&P 500 index, due December 4, 2008. The upside participation rate is 300%, subject to a cap of 16% overall return. Participation on the downside will be on a one-for-one basis. The agents' fee for this note is 2.25%, or \$0.225 for every \$10 note.

As stated above, the performance of the upturn note is dependent on the S&P 500, which is typically regarded as the standard metric for the performance of U.S. stocks. If the S&P 500 gains value, the investor profits from the upturn note. If the S&P 500 loses value, the investor loses money on his note. However, the payment structure is a bit more complicated than that. Like the reverse exchangeable, the possible payout scenarios can be grouped into three categories.

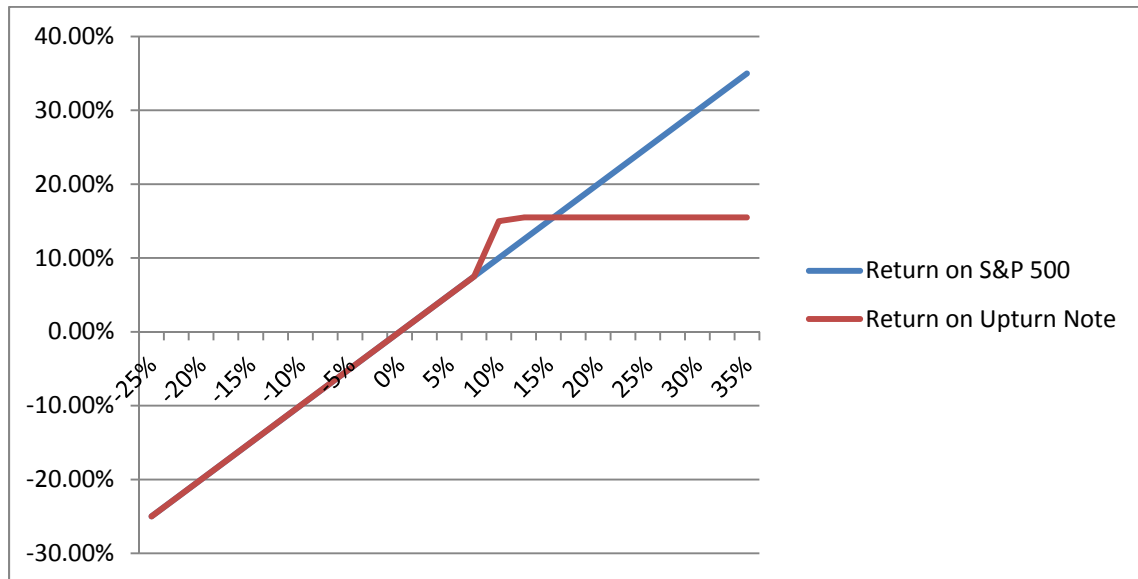
A: If over the life of the note, the S&P 500 gains between 0% and 5.33% then the return on the note equals the return of the S&P 500 multiplied by three. This is what is meant by the “300% participation rate.”

B: If over the life of the note, the S&P 500 gains more than 5.33% then the return on the note is equal to 16%. This is what is meant by the “cap of 16% overall return.” As a result of the options structure, the gain of amplifying small returns means that the investor gives up participation in extremely high returns.

C: If over the life of the note, the S&P 500 loses value, then the return of the note is equal to the loss of the S&P 500. This is what is meant by “one-for-one downside participation.”

IMPORTANT: Rather than embedding the commission into the options, Citigroup took their commission off the top (Agent’s Fee). The investor in the structured note gives Citigroup \$10, and the 2.25% is taken out of that. Thus, all increases and decreases begin at \$9.775, not \$10.

Figure 4: Performance of the Upturn Note vs. the Performance of the S&P 500 (excl. fees)



4.1 Buyers

This was an enormous deal by Citigroup (\$34.2 million), so there were undoubtedly multiple investors in the note. Oftentimes notes are sold to financial advisors who act as middle men by selling the product to more average investors. Due to economies of scale, this reduces the fees (in percentage terms) associated with structuring the note. While it is impossible to know for sure, this could likely have been the fate of this upturn note.

As touched upon in the earlier sections, the ideal investor in the S&P 500 upturn note is someone who is moderately bullish on the American Stock Market. Because the return on the notes is capped, someone who sees the S&P 500 rising considerably in the short term would probably not want to purchase the note. Their money would (probably)

be better spent invested in a mutual fund which mirrors the S&P 500. In the SEC filing, Citigroup lists potential buyers in the following three categories:

- *Investors possessing a moderate growth view on the S&P 500 Index who are looking for leveraged upside exposure subject to a maximum return, and who can withstand the risk of losing the principal amount of their investment.*

Investors who are confident that the S&P 500 is ready for enormous growth in the short to medium term would be better off investing in a fund which mirrored the performance of the broad stock market. In addition, investors looking for principal protection should shop elsewhere, as this note features full participation in the losses of the S&P 500.

- *Investors who seek to add an equity-index-linked investment to further diversify their portfolio.*

This simply means that the upturn note could be used to diversify a portfolio where equity-index-linked investment tools are underrepresented.

- *Current or prospective holders of exchange-traded funds benchmarked to the S&P 500 Index or similar underlying.*

If an investor already holds exchange-traded funds benchmarked to the S&P 500, it is safe to assume that the investor is at least somewhat bullish on the future of the index, and may want to leverage his position.

4.2 Sellers

The unique payout structure of an upturn note is due to three identical call spreads, and a put option. A call spread involves buying a call on the underlying, and

selling a call on the underlying at a higher strike price. In the case of Citigroup's S&P 500 upturn note, calls were bought at-the-money, and calls were sold at 105.33% of the strike price. The use of three of these call spreads in the upturn note gives its leveraged upside. To account for the payout structure when the underlying return is negative, a put option is sold at the money. Much like the reverse exchangeable, the payout possibilities can be put into three categories.

A: If the return of the S&P 500 is greater than 5.33% over the life of the note, the put option expires out of the money. However, both of the call options which make up the call spread are exercised because they are in-the-money. The three call options which Citigroup purchased at-the-money are exercised, capturing three times the returns of the S&P 500 over the life of the note. At the same time, the call options which Citigroup sold at 105.33% of the initial value of the S&P 500 are also exercised. By way of this second group of call options, Citigroup essentially gives away the returns of the S&P 500 above 5.33% to the owner of the call options.

B: If the return of the S&P 500 is between 0% and 5.33% over the life of the note, the put option expires out of the money. The call options which were sold at 105.33% of the initial value also expire out of the money. The only options which is in-the-money are the at the money call options which Citigroup bought on the open market. Citigroup exercises the three call options, capturing three times the return of the S&P 500 over the life of the note.

C: If the return of the S&P 500 is negative over the life of the note, the only option which is in the money is the at-the-money put which Citigroup sold. Both aspects of the call

spread expire out of the money. The firm or individual who bought the put option from Citigroup exercises the options, which forces the investor to take the losses of the S&P 500 over the life of the note.

4.3 Pricing

The pricing of the upturn note is based on the credit risk of Citigroup, and the embedded options. Like any structured product, the note is a debt of the issuing firm, and if Citigroup does not survive the life of the note the investor will most likely lose his principal regardless of the performance of the S&P 500. While the credit risk of the three month reverse exchangeable was a small aspect of the overall coupon, credit risk is more of a factor in the S&P 500 upturn note because of the longer term of the note.

Because the upturn note doesn't contain any exotic options, the payout structure is easier to visualize. The investor receives leveraged upside up to a point, at the cost of both the Agent's Fees and the limited upside participation. However, the calls which Citigroup buys at-the-money are more expensive than the premiums they receive from selling the calls at 105.33% of initial value because the higher prices call options are less likely to be profitable. However, this is counteracted by Citigroup selling an at-the-money put option which brings in premiums in exchange for taking on the risk that the value of the S&P 500 falls. A potential buyer of the at-the-money put most likely has a negative outlook on the index, or would like protection against such an event whether he considers it likely or not. For example, an elderly (or other risk-averse) person might not be able to afford taking the risk that the stock market will drop. They consider it worthwhile to pay a fixed premium to avoid downside participation in the U.S. stock

market. Buying the at-the-money put from Citigroup functions as insurance against such an event taking place.

In regards to the calls, different stories can be told. For the investors that sell the at-the-money call to Citigroup, they are hoping for the S&P 500 to drop in value. At the time the upturn note was issued, the U.S. stock market was approaching record highs. The potential seller of the call could have recognized this fact, and used the sale of the call to extract income from their market outlook. The buyer of the 105.33% call has the opposite backstory. In order for the buyer of that call to make money, the stock market needed to rise 5.33% over the life of the options contract. This investor didn't think the market was done growing, and accordingly paid a premium to participate in high market gains. It is important to note that none of the options embedded in the upturn note are exotic or complicated, and as such the market players of the other side of the individual trades could be either firms or simple individual investors. The mechanics of each of these option transactions is summarized in the flowchart at the end of this chapter.

All the call and put options are straightforward, liquid, and regularly traded. Accordingly, this means that the S&P 500 note would not be difficult for investors to recreate, in principle. Before investing in any structured products, individual investors always need to consider whether the fees associated with the product are worth the benefits. Considering the number of mutual funds and indexes which replicate the S&P 500 is a variety of ways, some investors would not pay the 2.25% to invest in Citigroup's upturn note.

In the reverse exchangeable in the previous chapter, time value of money was negligible due to the low rates environment of 2011 and the short, three month term of the note. When this product was issued in May of 2007, investors could earn nearly 5% by investing in so-called “risk free” one year U.S. treasury notes. The rate environment undoubtedly affects the terms of structured products, because the money taken in from the note is a debt obligation of Citigroup. If they are able to earn higher returns on *their* investments on the open market, they are willing to pay higher rates to borrow that money. If a similar upturn note was issued in 2012, the cap would most likely be lower, as investors would be willing to cap their potential earnings at a lower rate. Short term rates in 2012 are essentially at zero, and the stock market outlook isn’t nearly as promising as it was in 2007. Investors in today’s market conditions would be far more willing to settle for lower return amplification, because they have no alternative options to earn high rates of return without taking on enormous risk.

4.4 Intermediaries/Selling Points

One of the major selling points of Citigroup’s 300% Upturn Note is that the terms are relatively simple when compared to other structured products. No exotic options are embedded, and no knock-in barriers affect the pay structure. Furthermore, the underlying equity risk is the S&P 500, the most commonly observed indicator of U.S. stock performance.

As mentioned in the “Buyers” section, investors in the note receive leverage on relatively small gains at the cost of not participating in what would be historically high growth. Although past performance of the S&P 500 would by no means be an indication of future growth, one must consider the state of the economy when this note was issued

in 2007. U.S. stocks were growing at upwards of 10% a year, and potential upturn note investors in 2007 would have worried about not participating fully if that growth continued. As you may have guessed, this particular upturn note cost investors much of their principal as a result of the crash in the fall of 2008. However, the downside participation of the note is exactly the same as a broad investment in the S&P 500. With the exception of agent's fees paid up front, the upturn investor would be no worse off if they were invested in the broader American economy. On the upside, the upturn note still outperforms the S&P 500 for any positive gains below 16%. Although the full 300% participation is not utilized above returns of 5.33%, the investor still earns a return which is amplified by the structure of the note. This would undoubtedly be a major selling point for the product.

There are few products in the market which offer leveraged upside participation without leveraged downside. ETFs will sometimes offer leverage linked to an index such as the S&P 500, but that leverage typically involves both positive and negative fluctuations in the underlying. That being said, the most comparable product to the upturn note would be a simple investment in the S&P 500. While such an investment doesn't involve leverage, in both cases the investor makes money when the index is up, and loses money when the index is down. In the case of the downside, the potential for loss is identical. While potential investors may have their own personal opinions on why the S&P 500 will grow slowly in the short or medium term, they share the same outlook as standard S&P 500 investors on the direction of the anticipated growth. As is frequently the case with structured products, the uniqueness of the upturn note is another major selling point.

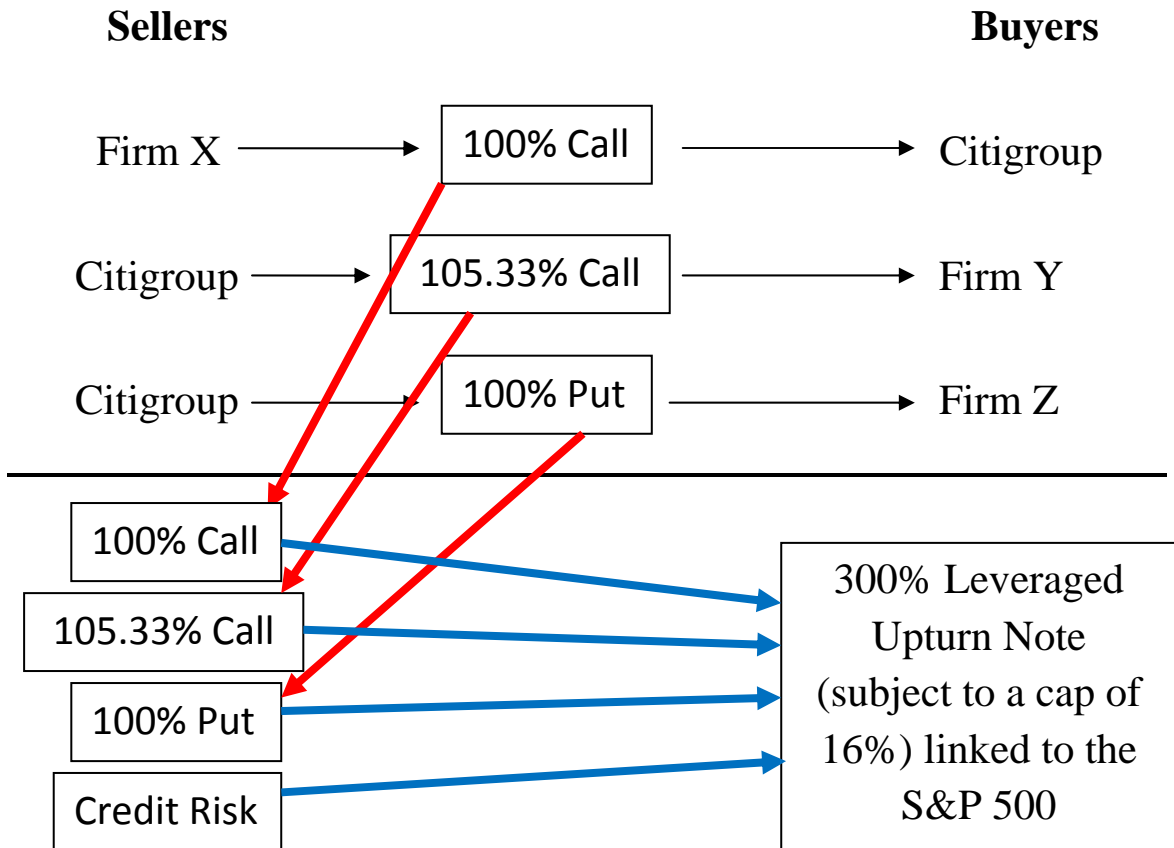
The tax implications of the upturn note could be advantageous for investors. As described in Citigroup's SEC filing, any proceeds from the upturn note should be treated as long term capital gains tax which is well below the short term capital gains rate and income tax rates. For investors in a 25% income tax bracket or above, they would pay a 15% tax on gains from the upturn note. For investors below the 25% income tax bracket, they would be obligated to pay between 0% and 10% of their upturn notes gain as a tax. Many retirees fall below the 25% income tax bracket, and therefore may find the upturn note attractive based on the ability to pay minimal tax on their upturn note income in the form of long term capital gains.

4.5 Summary

The figure on the next page summarizes all of the transactions which took place in the structuring and sale of Citigroup's S&P 500-linked upturn note. All the transactions, including the ultimate sale of the upturn note, allocated market players trade risk in exchange for insurance. First, Citigroup bought three calls at the money from Firm X. Next, Citigroup sold three calls at 105.33% of the initial value to Firm Y. Third, Citigroup sold an at-the-money put option to Firm Z. The options were bundled with the inherent credit risk of Citigroup into \$35.2 million worth of upturn notes, denoted by the blue arrows. The finished product was sold to customers in exchange for lending capital to the Citigroup, to be returned in an amount conditional to the performance of the S&P 500⁴.

⁴ The upturn note expired on December 4th 2008 on the heels of the crash of fall 2008. The S&P 500 (and the note) lost 44% of its initial value over the life of the note.

Figure 5: Transactions Within the Structuring and Sale of S&P 500 Upturn Note



CHAPTER FIVE

CONCLUSION

The first half of this paper addressed the issues surrounding the riskiness of structured products. Systemic risk, information asymmetry, and credit rating difficulty were highlighted as the three major risks associated with financial innovation throughout history, and notably during the crisis of 2008. After applying those three risks to structured products, I determined that structured products did not pose a great risk to financial markets. Systemic risk is currently nonexistent due to the relatively small size of the market, and credit rating difficulty only applies as it pertains to the risk of the financial institution which issued the note. The presence of information asymmetry is concerning due to the inherent complexity of the products, but is not enough to condemn the industry. Rather, firms should (and probably do) recognize that increased information could lead to growth of the market for structured products.

Now that the reverse exchangeable and the upturn note have been examined in detail, it is time to answer the primary question about the structured product market's effect on social welfare. It is not enough to simply say that structured products do not jeopardize the future of the financial system. Rather, a full justification of the market's existence needs to highlight specific ways it bolsters the health of the financial system and stimulates economic growth. By applying the information presented in the two structured product case studies to the four economic functions of financial markets presented in Chapter 2, I will highlight specific ways the market for structured products accomplishes that goal. In addition, I will place structured products on Robert Litan's

table entitled “Scoring Net Impacts of Recent Financial Innovations: A Summary.” This table is a major component of his paper entitled “In Defense of Some, But Not All, Financial Innovation,” and structured products are conspicuously absent from his ratings.

5.1 The economic functions of financial markets

The four economic functions of financial markets are enabling parties to pay each other, mobilizing society’s savings, channeling those savings towards productive investments, and allocating financial risks to those most willing and able to bear them. The field of structured products accomplishes the latter three goals, and has a neutral effect on enabling parties to pay each other. An example of this type of financial innovation could be ATM machines or credit cards, which offer buyers easier methods of making payments or sellers easier methods of getting paid. The field of structured products does not contribute in any way to this goal.

As illustrated by the upturn note and the reverse exchangeable note, structured products is an extremely productive method of mobilizing society’s savings. By virtue of their purchasing of structured products, investors are expressing the belief that structured products are their preferred method of allocating a portion of their savings. In the case of the reverse exchangeable, an investor who had a neutral outlook on Alcoa would not be able to financially express that view. Before the advent of structured products, such an investor would have to place their money elsewhere or possibly hold onto their money in cash. The same can be said for the upturn note. While many ETFs, mutual funds, and indexes track the growth of the U.S. stock market in some form, no other investment opportunity carries the specific risk profile of Citigroup’s S&P 500 upturn note. Without

access to the structured product market, the upturn note investors would be stuck with an instrument which was a less precise reflection of their risk preference regarding the S&P 500.

A similar story can be told for the third economic mechanism of financial markets, which is channeling savings towards productive investments. In addition to providing notes based on anticipated need, structurers can design products based on the inquiries of investors. In other words, structured notes are frequently built to meet the *exact* needs of an investor. Depending on individual circumstances and current market conditions, those needs are infinite and constantly changing. While the term “productive investments” is open to interpretation, the reality is that the field of structure products enables investors to handpick the products and risk they desire. As the market grows and becomes more competitive, these products will undoubtedly become even more productive.

Structured products accomplish the fourth economic goal of financial markets perfectly. Every individual transaction within the structuring and ultimate sale of a note allocates financial risks to those most willing and able to bear them. In the case of the upturn note, Citigroup engaged in three separate transactions in the options market which allowed risk to be transferred between parties with different desires for risk and insurance, at a price which satisfied both parties in the transaction. In addition, Citigroup then bundled the options together into the S&P 500 upturn note and sold the product to investors who desired triple upside exposure to the U.S. stock market. As part of this transaction, the investors lent \$35.2 million to Citigroup which the company invested in unknown markets and projects. The reverse exchangeable accomplished the same goals.

Risk was traded via the options market, and the products were together into a note which allowed investors to take on the risk of a drop in Alcoa's stock in exchange for fixed coupon payments. Structured products are an excellent mechanism for allocating risks to those most willing and able to bear them, and overall an effective mechanism for increasing social welfare.

5.2 Scoring the net impact of structured products

Robert Litan's "In Defense of Much, But Not All, Financial Innovation" ranks recent financial innovation in terms of enhanced access and improved distributional welfare, user convenience, and impact on productivity/GDP. He highlights his findings in the table below, neglecting to address structured products. Each form of financial innovation is rated on a scale from double negative (--) to double positive (++), and my rating for structured products has been inserted in red.

Table 1: Scoring Net Impacts of Recent Financial Innovations			
	Access	Convenience	Productivity/GDP
Payments			
ATMs	++	++	+
Credit card expansion	++	++	+
Debit cards	++	++	+
Saving			
Money market funds	++	++	0
Indexed mutual funds	++	++	+
Exchange-traded funds	+	+	0/+
Limited partnerships			
Hedge Funds	0	0	0/+
Private Equity	0	0	+
TIPS	++	++	0/+
Investment			
Credit scoring	++	++	0
ARMs	++	N/A+	-/--
Home Equity Lines of Credit	++	++	-
Asset-backed securities	++	++	-/+

CDOs*	++	++	--
SIVs*	++	++	--
Rise of Venture (but future Capital not clear)	+	+	++
Risk-Bearing			
Options/Futures Exchanges			
And Pricing	+	+	+ / ++
Interest/Currency Swaps	++	++	+ / ++
Credit default swaps	+	+	+
Structured Products	+	0	++

**The positive scores here were temporary*

I assigned a “+” ranking to structured products in terms of access because the market increases the access to the options market, but the products themselves are not accessible to everyone due to the steep learning curve and market complexity. For example, the reverse exchangeable allowed investors indirect access to the exotic options market with the inclusion on the knock-in put and the knock-in call. Without structured products, these retail investors would probably never participate in any trading of exotic options. In that way, access to markets is improved. However, I chose not to give structured products a “++” because the market is not truly accessible to everyone. Structured products are not an avenue to make small investments, and the quantitative nature of the notes makes them almost unmarketable to untrained investors. One way this problem can be lessened is through financial advisors, but overall the market could be more accessible.

‘Convenient’ is not the word most associated with structured products. The notes are bulky and illiquid, and require individual attention and structuring. In addition, the industry would be difficult to standardize, so it is difficult to picture the market becoming any more convenient in the near future. Accordingly, I awarded a neutral “0” to structured products in terms of convenience.

As discussed earlier in this chapter, structured products are a driver of increased productivity and increased GDP. The industry mobilizes savings, channels the savings towards appropriate investments, and distributes risk to those most willing and able to bear it. All these aspects serve to raise investment levels, productivity, and GDP. For these reasons, I awarded structured products a “++” in terms of productivity.

5.3 Summary

Structured products increase social welfare. While the market contains similar risks to other forms of financial innovation, the net impact is decidedly positive based on the increased productivity. The market optimally mobilizes society’s savings based on specific needs, and allows average investors to gain access to traditional inaccessible markets via structured notes. The market should continue to be monitored as it grows, as standardization will prove difficult, if not impossible. However as discussed in Akerlof (1970), the market will benefit from increased growth and publicity which will remove some of the problems of information asymmetry. The more investors that are comfortable with structured products, the more the market will grow.

The two major complaints about structured products being overcomplicated and overpriced are outdated and irrelevant. While the market is indeed complicated and quantitative, the industry serves to benefit from breaking down problems of asymmetric information. Deliberate complication could discourage investors and lead to market disappearance. In regards to overpricing, Bergstresser (2008) states “there were very large premia between 2000 and 2004, and much smaller premia in the period since.” The

growth of the structured product market since 2008 would suggest that premia have only continued to decrease as the market has become more competitive.

As has been discussed heavily in this paper, structured products possess the inherent potential to cause harm mainly as a result of asymmetric information. However, current structured product regulation policies do an excellent job of promoting the flow of information without stifling the market for structured products. All products issued in the United States are registered with the SEC and contain legal disclaimers and descriptions of potential risk. Because the individual products are so different from one another, these filings solve many of the problems which arise from a lack of standardization. By having these regulatory and filing mandates in place, firms are protected from lawsuits and investors benefit from increased information. While the popular media has been calling for increased financial regulation particularly in regards to engineered products, such policies would not improve the structured products market. The quantitative nature of the products cannot be solved by regulation. Individual investors are responsible for making the decision on whether they are prepared to enter the structured product market. For this reason, many pension funds and the like choose not to invest in structured products.

I see the structured products market continuing to grow rapidly in the future, and continuing to benefit social welfare. The field is relatively immune to market swings, because products can be structured in any environment. While the field will struggle with becoming standardized, growth and widespread investment will increase understanding of structured products and decrease information issues. Having assessed both the risks

and the benefits of the market, I conclude that structured products increase social welfare by way of improved market access and economic growth.

Works Cited

- Akerlof, George. "The Market for "Lemons": Quality Uncertainty and the Market Mechanism." *The Quarterly Journal of Economics*. Vol. 84, No. 3, August 1970. *Oxford University Press*. <http://www.jstor.org/stable/1879431?seq=1>
- Allen, Franklin. "Trends in Financial Innovation and Their Welfare Impact: An Overview." *University of Pennsylvania*. November 14, 2011. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1959468
- Bernard, Carole and Boyle, Phelim. "Structured Investment Products and the Retail Investor." June 2008. http://www.eu-financial-system.org/fileadmin/content/Dokumente_Events/Prague_2008_11th_conference/Bernard.pdf
- Bergstresser, Daniel. "The retail market for structured notes: Issuance patterns and performance, 1995-2008" *Harvard Business School*. October 2008. http://www.people.hbs.edu/dbergstresser/Structured_Notes_20081023.pdf
- Gennaioli, Nicola; Shleifer, Andrei; and Vishny, Robert. "Financial Innovation and Financial Fragility." *National Bureau of Economic Research*. May 2010. http://www.nber.org/public_html/confer/2010/Risks10/Gennaioli_Shleifer_Vishny.pdf
- Litan, Robert. "In Defense of Much, But Not All, Financial Innovation." *Brookings Institute*. 2010. http://www.brookings.edu/~media/Files/rc/opinions/2010/0217_financial_innovation_litan/0217_financial_innovation_litan.pdf
- Lumpkin, Stephen. "Regulatory Issues Related To Financial Innovation." *OECD*. December 2009. <http://www.oecd.org/dataoecd/28/62/44362117.pdf>
- Natenberg, Sheldon. Option Volatility and Pricing. New York. *McGraw-Hill*. 1994.
- Shiller, Robert. Finance and the Good Society. Princeton, New Jersey. *Princeton University Press*. 2012.
- "Stock Market Upturn Note Pricing Supplement." SEC. April 2007. <http://www.investorscopes.com/Citigroup-Funding-Inc/424B2/6896109.aspx>
- Weiss, Gary. Wall Street Versus America: The Rampant Greed and Dishonesty That Imperil Your Investments. New York. *Penguin Books*. 2006.