Betting the Bank: How Derivatives Trading Under Conditions of Uncertainty Can Increase Risks and Erode Returns In Financial Markets

Lynn A. Stout
Cornell Law School, ls483@cornell.edu

Follow this and additional works at: http://scholarship.law.cornell.edu/facpub
Part of the Banking and Finance Commons, and the Securities Law Commons

Recommended Citation
http://scholarship.law.cornell.edu/facpub/445

This Article is brought to you for free and open access by the Faculty Scholarship at Scholarship@Cornell Law: A Digital Repository. It has been accepted for inclusion in Cornell Law Faculty Publications by an authorized administrator of Scholarship@Cornell Law: A Digital Repository. For more information, please contact jmp8@cornell.edu.
Betting the Bank: How Derivatives Trading Under Conditions of Uncertainty Can Increase Risks and Erode Returns In Financial Markets

Lynn A. Stout*

I. INTRODUCTION ........................................... 53
II. HEDGING AND ARBITRAGE AS REASONS FOR DERIVATIVES TRADING ...... 55
III. SPECULATION AS A REASON FOR DERIVATIVES TRADING .................. 57
IV. THE ROLES OF UNCERTAINTY AND HETEROGENOUS EXPECTATIONS IN SPECULATION ........................................... 59
V. HETEROGENOUS EXPECTATIONS SPECULATION AND TRADER RETURNS .... 60
VI. HETEROGENOUS EXPECTATIONS SPECULATION AND TRADER RISKS ........ 62
VII. ON THE PERSISTENCE OF HETEROGENOUS EXPECTATIONS SPECULATION ... 63
VIII. ON THE POSSIBLE SOCIAL BENEFITS OF HETEROGENOUS EXPECTATIONS SPECULATION IN DERIVATIVES ........................................... 64
IX. CONCLUSION ............................................ 67

I. INTRODUCTION

On April 12, 1994, Procter & Gamble Co. announced that it had incurred pre-tax losses of $157 million from trading in leveraged interest rate swaps,¹ a form of financial derivative.² At the time that figure seemed enormous. Yet within a year, Procter & Gamble’s misfortune had been overshadowed by that of Orange County, a wealthy California enclave that lost an estimated $2.5 billion of its investment fund as a result of dealings in reverse-repurchase agreements, inverse floaters, and other arcane instruments.³ Recent months have seen further losses by investment funds, government enti-

---

* Professor of Law, Georgetown University Law Center; Guest Scholar, The Brookings Institution. The author would like to thank Martin Mayer and George Martin for their comments, and Luisa Caro, Henry Smokier, and Myung Yi for their research assistance.

ties, and even colleges and Native American tribes. Perhaps the most notorious derivatives gymnastics to date, however, have been those performed by the 233-year-old British investment bank Barings PLC. In February 1995, the bank declared itself insolvent as a result of $1.5 billion in losses attributed to a twenty-seven-year-old futures trader who literally bet the bank on a rise in the Nikkei 225 stock index.

Academics and policymakers alike have praised financial derivatives as archetypes of financial progress and innovation. As the victim list grows longer, however, the notion that the burgeoning derivatives markets offer unmixed blessings seems increasingly implausible. Trading in these volatile instruments clearly can be hazardous to the health of the corporations, banks, municipalities, and pension and mutual funds that indulge in it. As the body count rises, it becomes difficult not to suspect that derivatives trading may also impose significant costs on society as a whole.

Federal regulators concerned about the potential downsides to derivatives have focused on the possibility that derivatives trading contributes to "systemic risk," meaning that a derivatives-induced failure of one of the large financial institutions involved in this concentrated market could trigger a chain of related firm failures, including failures of federally insured banks. Any increase in systemic risk certainly poses a serious public problem. This Article focuses, however, on a second, hitherto unrecognized, source of concern: the possibility that, even absent a system-wide crisis, derivatives trading reduces net social welfare by reducing the welfare of derivatives traders themselves: the banks, corporations, and retirement funds to which depositors, investors, and pensioners confide their savings.

Modern financial theory predicts that rational agents deciding where to invest their money should be influenced by only two considerations: expected return, and expected risk (meaning variation in return). The greater the return—or the lower the risk—the more attractive the investment. Because the market participants that deal in derivatives do so voluntarily, commentators generally assume that the derivatives markets serve the traders' interests either by increasing their returns, or by reducing their risks. In the tradition of Adam Smith's invisible hand, derivatives deals are presumed to further the welfare of those who participate in them.

4. See Cohen, supra note 2, at 1994-95 (describing cases).
6. See, e.g., GAO REPORT, supra note 2, at 123 (stating that derivatives serve an important function and reflect "innovative capacity" of financial sector to respond to market demands); Hu, Misunderstood Derivatives, supra note 2, at 1495-96 (stating that eliminating derivatives markets would be "Procrustean" and "destructive of social wealth"); Cohen, supra note 2, at 2004 (stating that derivatives are "sound tools" and "a necessity of business planning").
7. See GAO REPORT, supra note 2, at 7, 10; FEDERAL RESERVE REPORT, supra note 2, at xi, xii.
9. See, e.g., GAO REPORT, supra note 2, at 25 (suggesting that traders use derivatives to reduce their risks, earn trading profits, and obtain financing at a lower cost).
That assumption is defensible in a world where traders face mere risk. This Article will demonstrate, however, that when traders face uncertainty as well as risk, exactly the opposite pattern may hold true. Trading in derivatives under conditions of uncertainty may harm trader welfare by both reducing the returns of, and increasing the risks borne by, the average derivatives trader.10

II. HEDGING AND ARBITRAGE AS REASONS FOR DERIVATIVES TRADING

The key to understanding how derivatives trading can reduce trader welfare is understanding why, exactly, market participants engage in these transactions in the first place. Commentators generally believe that participants in derivatives markets trade for one of three general purposes: (1) to hedge against some risk; (2) to extract riskless profits through arbitrage; and (3) to speculate on predicted changes in interest rates, currencies, or securities and commodities prices.11

Market participants use derivatives for hedging when they seek to reduce or eliminate some risk (i.e., source of variation in earnings) inherent in doing business. Airline companies’ earnings, for example, tend to vary inversely with aircraft fuel prices, rising when fuel prices fall and falling when fuel prices increase. To counteract this risk an airline might purchase a fuel-related derivative, such as a fuel future, whose value rises when fuel prices rise and falls when fuel prices fall. Although the futures purchase would not increase the airline’s net earnings, it would reduce the variation in those earnings by offsetting a pre-existing business risk with a carefully selected, counterbalancing derivatives risk.

In contrast, market participants that use derivatives for arbitrage seek not to reduce risk but to increase return. Arbitragers profit by taking advantage of small price differences between markets. Swaps agreements, for example, frequently capitalize on the “quality spread differential” that allows small firms with weak credit ratings, which face highly unfavorable fixed rates in the long-term borrowing market, to borrow at relatively advantageous prices in the short-term market.12 A small firm that exchanges its relatively cheap, floating short-term interest obligations for a larger, more creditworthy firm’s long-term fixed rate obligation can, in effect, save money by borrowing long-term at a more advantageous rate without accepting any additional risk.

As the above discussion implies, hedging and arbitrage generally benefit traders by either reducing their risks (in the case of hedging), or by increasing their returns (in the case of arbitrage). In each case, reasons remain to question whether benefit to traders necessarily translates into benefit to society. In the case of hedging, whether derivatives provide a social benefit may depend on the kind of risk a trader seeks to hedge. Many

10. See infra notes 31-38 and accompanying text.
11. See GAO REPORT, supra note 2, at 25 (describing use for hedging, speculation, and arbitrage by “taking advantage of differences in rates”); Hu, Misunderstood Derivatives, supra note 2, at 1466 (describing derivatives as useful for hedging, for arbitrage, and as low-cost “alternatives to investing in the underlying”); Thomas C. Theobald, Derivatives Aren’t the Danger, WALL ST. J., May 23, 1994, at A14 (citing hedging and speculation as purposes for participating in derivatives markets).
of the sources of variation in earnings that derivatives users hedge against—such as changes in interest rates, commodities prices, or exchange rates—affect different firms differently. Oil companies welcome oil price increases that airlines dread. Similarly, a strong franc that reduces the sales of food retailers importing French delicacies also increases the revenues of entertainment companies selling into the French market. Modern portfolio theory predicts that investors should be indifferent to such firm-specific “alpha” risk, because alpha risk can be eliminated by holding a diversified investment portfolio. That observation in turn implies that publicly-held corporations, banks, and investment funds that use derivatives to hedge against alpha risk may not benefit their shareholders by doing so. Indeed, to the extent that transactions costs associated with derivatives deals reduce corporate wealth, alpha risk hedging actually leaves diversified shareholders worse off.

13. Modern portfolio theory divides the risk associated with any particular security into two broad categories. The first is firm-specific or “alpha” risk, meaning variation in return due to factors unique to the issuing firm, such as its management or competitors. The second form of risk is called market or “beta” risk, meaning variation resulting from the sort of shifting macroeconomic tides on which all firms rise or fall. Both cause variations in earnings. Investors, however, can eliminate alpha risk by holding a diversified portfolio, because differing firms’ alpha risks counteract and “cancel each other out.” See generally BREALEY & MYERS, supra note 8, at 125-44. Two possible circumstances where diversified shareholders might benefit from alpha hedging include the firm that can borrow at more favorable rates because its lenders believe derivatives hedges make insolvency less likely, and the firm that can hire managers at lower cost because hedges reduce managers’ perceived risk that they might lose their jobs in a bankruptcy. Of course, to the extent derivatives speculation induces firms to take on more risk, see infra part V1, the analysis works in reverse, and the firm must pay more to borrow and to hire.

14. See Hu, Hedging Expectations, supra note 2, at 1016-18 (arguing that alpha risk hedging with derivatives may not benefit diversified shareholders). The observation that many of the variables derivatives users hedge against—including commodities prices, currency exchange rates, and often interest rates—have differing effects on different firms suggests that much, if not most, derivatives hedging involves alpha risk. A second reason to suspect that alpha hedging is common is that beta hedging should be more expensive and, hence, more unattractive. Two companies with countervailing business risks can each reduce their alpha risk by trading derivatives with the other. Beta risk, however, is market-wide by definition, and cannot be counteracted. Any agent that wants to hedge against beta risk consequently must first find a counterparty willing to accept a higher overall risk level, and then pay that counterparty a premium to induce them to accept the increased risk. See infra text accompanying notes 24-25.

15. A second reason to question the hedging value of derivatives arises from the probability that selection bias leads derivatives users, as a group, to overestimate their hedging value. Measuring the risks associated with any particular derivative instrument is an extraordinarily difficult task requiring the use of complex computer models that predict future risk on the basis of past patterns of price volatility in the underlying asset, index, or rate. These models frequently are proprietary to the securities firms and banks that structure derivatives deals and, even when available to traders, fall within the ken only of those highly trained in financial economics. Moreover, because the models estimate future volatility from past price behavior during some selected period, their predictions are inherently subjective. See generally GAO REPORT, supra note 2, at 60-62 (delineating problems with modeling risk).

Would-be hedgers trying to gauge the value of a derivative instrument in counteracting pre-existing business risk consequently are likely to both over- and underestimate that value. A potential end-user that underestimates a derivative’s ability to offset risk will tend not to purchase it. An end-user that overestimates a derivative’s risk management value, however, buys eagerly. As a result, market participants who hedge with derivatives will tend, as a group, to overestimate the extent to which they can control their risks. This is another example of the “winner’s curse” found in auction markets, where the procedure of selling an asset of uncertain value to the highest bidder produces prices that exceed the average bidder’s valuation. See generally
The use of derivatives to arbitrage between markets similarly may be of questionable social utility. Arbitrage techniques that temper market inefficiencies can contribute to allocative efficiency. Yet some price differentials between markets result not from inefficiencies, but from differing regulatory schemes. Derivatives can exploit such differentials, allowing market participants to circumvent tax, banking, and securities laws. “Equity swaps,” for example, are popular with corporate executives who want to change large amounts of stock into cash or other securities without triggering capital gains taxes. The Federal Reserve has similarly voiced fears that banks eagerly accepting risks in the derivatives markets are exploiting their unique access to deposit insurance and discounted Federal Reserve funds. While conservative commentators may believe that such opportunities to do an end run around regulators are cause for celebration, observers willing to assume that existing banking, securities, and tax laws serve a public function should find the notion of “regulatory arbitrage” far more troubling.

Despite such frequently-overlooked limitations, however, the argument that derivatives markets can provide a social benefit by allowing market participants to increase their returns through arbitrage and decrease their risks through hedging rests on a solid footing. Hedging and arbitrage generally leave the average hedger or arbitrageur better off. Thus, absent significant costs to third parties, a derivatives market dominated by hedging and arbitrage can, perhaps, be presumed to contribute to net social welfare.

III. SPECULATION AS A REASON FOR DERIVATIVES TRADING

There is more to derivatives, however, than risk-averse hedgers reducing the volatility of their earnings and arbitrageurs seeking to profit from small price differences between markets. Although commentators defending the social value of the derivatives markets have understandably tended to emphasize their use in hedging and arbitrage, the tendency towards overoptimism is not helped by the fact that securities firms and banks that create and sell derivatives tend to better understand the risks of their products than the corporations and funds that buy and use them.

Institutional managers who participate in derivatives markets over an extended period of time may learn through bitter experience to beware of overoptimism, and to appreciate the difficulties of predicting the future from the past. See infra text accompanying notes 39-45 (discussing learning).


18. Federal Reserve Report, supra note 2, at xii; GAO Report, supra note 2, at 43, 125. As another example of regulatory arbitrage, some commentators have suggested that swaps lower some firms’ cost of capital by giving them indirect access to the less-regulated Eurobond market, allowing them to avoid the registration process that accompanies the public issuance of long-term debt in the United States. See Wall & Pringle, supra note 12, at 70, 76.

19. See, e.g., GAO Report, supra note 2, at 123 (“Derivatives serve an important function in the global financial marketplace [by] providing end-users opportunities to better manage financial risks associated with their business transactions”); Cohen, supra note 2, at 2004-05 (suggesting that derivatives are “business neces-
derivatives are widely recognized to further a third purpose as well. That purpose is speculation.20

Speculation is the "attempt to profit from anticipating movements in market rates and prices."21 Speculation and arbitrage are sometimes treated as synonyms, perhaps because speculators and arbitrageurs both expect to increase their returns on investment by trading. There is a significant difference between the two, however. Arbitrageurs extract certain profits because they take advantage of existing price differentials.22 Speculators, in contrast, try to profit by predicting inherently uncertain future prices. Thus, speculators accept a hearty dose of risk in return for the opportunity to earn trading profits. For example, a financial firm not otherwise exposed to risk from changing oil prices might buy oil futures if its partners predict oil prices will rise in the near future. In doing so, the firm exposes itself to a new source of variation in earnings.

Because people tend to be risk-averse, the phenomenon of speculation naturally raises the question: Why do speculators accept risk?23 Perhaps the most popular theory holds that speculators are relatively risk-neutral traders who accept risk because more risk-averse hedgers pay them to do so.24 As noted earlier, a firm that wants to reduce firm-specific or "alpha" risk can seek out another company subject to an opposite, countervailing risk, and arrange a derivatives deal that reduces both firms' alpha risk levels (although that risk reduction may not benefit diversified shareholders). A firm that wants to hedge against market or "beta" risk, however, must find a counterparty willing to bear beta risk because beta risk by definition cannot be diversified away. According to the differential risk-aversion model, speculators are those counterparties. Because speculators are less risk-averse than hedgers, they are happy to earn trading profits dealing on favorable terms with hedgers eager to avoid riding the market's changing tides.

The differential risk aversion model has enjoyed a long and distinguished career in economic theory.25 Nevertheless, it fails to capture the common understanding of speculation. Some speculators may indeed see themselves as the financial markets' equivalent of insurance salesmen. The public perception, however, is that speculators view themselves not as insurers, but as better-than-average predictors of future prices for

---

20. See supra note 11 and accompanying text.
21. GAO REPORT, supra note 2, at 25.
22. In theory, arbitrageurs can buy and sell in different markets simultaneously and earn riskless trading profits.
23. At the theoretical level, risk aversion is the natural consequence of declining marginal utility for money. See generally LYNN A. STOUT & DAVID S. BARNES, CASES AND MATERIALS ON LAW AND ECONOMICS 142-45, 434-35 (1992). Empirical evidence of risk aversion can be found in the large, well-developed insurance industry.
25. The model has come under attack in recent years, however, on both the theoretical and the empirical level. See, e.g., Jack Hirshleifer, The Theory of Speculation Under Alternative Regimes of Markets, 32 J. FIN. 975 (1977) (arguing as a matter of theory that differences in risk aversion alone cannot motivate speculative trading); JEFFREY WILLIAMS, THE ECONOMIC FUNCTION OF FUTURES MARKETS 84-86 (1989) (suggesting that empirical evidence does not support the differential risk aversion model).
Betting the Bank

debt, equities, commodities, and currencies.

Closer scrutiny suggests that the differential risk-aversion model fails to capture the common perception of speculation because it accounts for risk, but not uncertainty. Economists use the word “risk” to signify known variation in outcome. A coin toss is risky because a coin may come up either heads or tails. A coin toss is not “uncertain,” however, because we know, and can agree, that the probability of either event is fifty percent. Uncertainty means unknown variation in outcome, in the sense that the objective probabilities of possible future outcomes are not fully available. In an uncertain coin toss, we not only would not know whether the coin would come up heads or tails, we also would not know with surety the probability of either event occurring. As a result, reasonable people could disagree in their subjective estimates of the odds.

Because the presence of uncertainty enormously complicates rational decisionmaking, economic theorists often assume uncertainty away. If participants in derivatives markets faced only risk—if all traders knew the probability distributions of the rates and prices underlying derivative instruments—they would, in keeping with the conventional differential risk-aversion model, speculate in derivatives only if more risk-averse hedgers paid them premia to do so.

In the real world, however, corporate executives, fund managers, and municipal treasurers designing investment strategies often must deal with uncertainty as well as risk. Theorists accordingly have begun designing economic models that take into account the effects of uncertainty on rational decisionmaking. An economic analysis of speculation that incorporates uncertainty, as well as risk, suggests an alternative theory of speculative behavior that differs dramatically from conventional theory.

IV. THE ROLES OF UNCERTAINTY AND HETEROGENEOUS EXPECTATIONS IN SPECULATION

Uncertainty offers an alternate explanation for derivatives speculation because uncertainty permits disagreement. Rational agents trying to predict the fates of stocks, currencies, commodities, or interest rates under conditions of uncertainty may make differing subjective forecasts. Where one firm predicts interest rates are likely to rise, another thinks rates are stable; where one company believes the yen will decline, another forecasts the yen will strengthen.

Disagreeing forecasts can trigger speculation inspired not by differences in risk aversion, but by differences in expectations for an uncertain future. Moreover, such

26. For purposes of this discussion, the phrase “uncertainty” shall refer to any situation where individuals’ subjective perceptions of future probabilities may reasonably differ. The distinction between risk and uncertainty often is attributed to Frank Knight. See generally FRANK H. KNIGHT, RISK, UNCERTAINTY, AND PROFIT (1921).
27. For example, the standard Capital Asset Pricing Model that has dominated financial theory for over two decades is expressly premised on the assumption that agents in the market share identical expectations for securities’ future risks and returns. Lynn A. Stout, Are Stock Markets Costly Casinos? Disagreement, Market Failure, and Securities Regulation, 81 VA. L. REV. 611, 651 (1995).
29. See generally Lynn A. Stout, A Heterogeneous Expectations Model of Speculation and Speculative Bubbles (Aug. 25, 1995) (unpublished manuscript, on file with author) (examining speculation under condi-
heterogeneous expectations-based trades can involve not only speculators trading with hedgers, but speculators trading with other speculators.

Consider the simple example of two firms, neither of which is exposed initially to any risk from changing oil prices. The managers of Firm A predict that oil prices are likely to rise. Firm B's managers disagree, and expect oil prices to fall. Such differing expectations can lead Firm A to buy happily the oil futures Firm B sells. Firm A and Firm B trade not because one is more risk-averse than the other—but because heterogeneous expectations permit each side of the transaction to perceive an opportunity to reap trading profits by trading with the other.

As the above example suggests, recognizing the realities of uncertainty and disagreement permits an understanding of speculation in general, and derivatives speculation in particular, that far more closely parallels popular perception than the conventional differential-risk-aversion model does. Speculators may speculate not because they are relatively indifferent to risk, but because they believe they can anticipate future price movements and earn trading gains that outweigh the risks involved. Because derivative instruments permit traders to stake a position in an underlying market at a relatively low cost, they are particularly attractive vehicles for speculation.

In addition to its positive insights, however, the heterogeneous expectations model of derivatives speculation also offers important—and unsettling—normative implications. As noted earlier, derivatives trades motivated by the desire to hedge risk, or to exploit riskless opportunities for intermarket arbitrage, likely further traders' interests by either reducing their risks or increasing their returns on investment. In contrast, heterogeneous expectations trading in derivatives likely harms trader welfare both by reducing the returns of, and by increasing the risks borne by, the average trader.

V. HETEROGENEOUS EXPECTATIONS SPECULATION AND TRADER RETURNS

Heterogeneous expectations trading erodes traders' returns because transactions between parties hoping to earn speculative profits by outpredicting each other are, by their very nature, zero-sum games. Buyers of oil futures profit if oil prices go up, but only to the extent sellers lose. Similarly, firms that swapped floating interest obligations for fixed obligations celebrate if interest rates rise, while their counterparties mourn.

Speculative transactions of this sort would neither increase nor decrease the average derivative trader's wealth if dealing in derivatives were costless (although it might redistribute that wealth a fair bit). One trader's loss necessarily would be balanced by another's gain. Speculating in derivatives is not costless, however. The corporation or investment fund that attempts to earn trading profits in the derivatives markets by predicting future price shifts must first invest resources gathering data and making predictions. Having decided which way to place its bets, the would-be speculator must then invest resources to become familiar with, and select from, the wide range of complications of uncertainty and disagreement).

30. See supra text accompanying notes 11-18.
31. See Stout, supra note 27, at 622-23 (describing why speculative trading in stocks is a zero-sum game); Stout, supra note 29, at 6 (discussing why speculation in common-value assets is generally zero-sum).
ed and difficult-to-understand derivative products available. Actually arranging the deal requires more time and money, especially if a fee must be paid to a dealer or other intermediary. Many of the billions of dollars in revenues banks and Wall Street firms dealing in derivatives have earned in recent years reflect such transactions costs. Finally, once a firm has taken a speculative position, it must continue to monitor the market, and the deal, with an eye to cutting its losses should the market move against it.

Derivatives speculators willingly incur such costs because they expect to reap profits from their trades. In effect, they expect their less-informed counterparties to pay for their efforts. But zero-sum games that involve playing costs become negative-sum games in which the average player loses money. Similarly, a derivatives market in which speculating firms incur costs hoping to outforecast their fellows is a market in which traders, on average, lose money. The divorce between speculators’ private benefits from acquiring information and trading, and the costs of such research and trading to derivatives traders as a whole, ensures that participants in derivatives markets lose as a group when some of their number squander valuable resources on speculative trading.\(^3\)

Speculators as a subclass of traders should still profit from their trades if they are correct in believing they can forecast future prices—in other words, if speculators actually are “information arbitrageurs” whose research unearths truly superior information. In that case, the costs of information-gathering and trading are shifted to nonspeculating traders, such as hedgers, who suffer systemic trading losses.\(^3\)

Under conditions of uncertainty and disagreement, however, it seems likely that at least some speculators are mistaken in believing they have superior forecasting ability. (Barings’s young trader certainly proved a fallible prognosticator). If so, speculative transactions can be arranged not only between speculators and hedgers, but between speculators and other speculators.\(^3\) That possibility may enormously compound the amount of speculative trading found in the market—and with it, traders’ losses.\(^3\)

How large might those losses be? The amount institutions actually spend each year on derivatives trading remains largely unknown. The notional value of derivatives con-

---


33. Under the differential risk-aversion model, hedgers are willing to trade at a slight price disadvantage because this is necessary to give their counterparties a risk premium. When less-informed hedgers trade against better-informed speculators, however, they pay an additional premium as a cost of their ignorance. See generally Sanford J. Grossman & Joseph E. Stiglitz, *On The Impossibility of Perfectly Efficient Markets*, 70 AM. ECON. REV. 393 (1980) (describing market where information arbitrage speculators who invest in available but costly information reap gains by dealing with less-informed traders). Thus, while hedgers need less risk-averse counterparties to offload risk, they would be better off if information arbitrageurs could be excluded from the market.

34. See supra text accompanying notes 29-30 (providing example of this sort of trade).

35. See Hirshleifer, supra note 32, at 569 (noting that disagreement “may enormously compound the speculative factor that . . . tends to promote excessive investment in information-generating activity.”)
tracts outstanding, however, has been estimated at something between $14 and $35 trillion. Assuming conservatively that the costs associated with derivatives trading average only one-tenth of one percent of notional value, participants in the derivatives markets are likely spending tens of billions of dollars on transactions costs alone. If any significant portion of derivatives transactions are based on disagreement in traders' subjective probability estimates, the result is substantial deadweight losses for both traders and society as a whole.

VI. HETEROGENEOUS EXPECTATIONS SPECULATION AND TRADER RISKS

The possibility that heterogeneous expectations trading in derivatives may be costing traders billions of dollars without providing them any compensating benefit should give even the most fervent fan of laissez faire reason to pause before concluding that all is well in the derivatives markets. If that prospect were not cause enough for concern, however, the heterogeneous expectations model of speculation also suggests that opportunities to speculate in derivatives may increase the level of risk borne by the average trader.

Speculation in derivatives can increase market participants' risks because just as the perceived opportunity to profit from predicting market moves leads speculators to incur transactions costs they would not otherwise, it can also lead them to accept risks they would not otherwise. An analogy can be drawn to the homeowner whose residence is located in an earthquake-prone area. If the homeowner is concerned merely with reducing risk, she will purchase earthquake insurance. If the homeowner believes she can predict earthquakes, however, and if she predicts none will occur, she may instead seek to augment her income by selling earthquake insurance. Such a strategy increases her risk because if a quake occurs, she must pay off others' claims as well as suffering the loss of her own home.

The opportunity to bet cheaply on one’s predictions through the derivatives markets similarly can tempt corporate executives, fund managers, and municipal treasurers who believe they can predict future changes in rates and prices to accept additional risk in their portfolios in the hope that they will be compensated for that risk by trading profits. (Orange County’s fund manager, Robert Citron, provides one classic example of

37. Dealers' fees alone usually consume more than this amount. See Hu, Hedging Expectations, supra note 2, at 1014 n.132 (offering as an example of the low transactions costs associated with derivatives estimates that dealers' spreads on "plain vanilla" swaps have fallen from 22 basis points to 12 basis points).
38. Because the zero-sum game of derivatives speculation leaves the average derivatives trader neither better nor worse off than before, any expense associated with disagreement-based trading is a cost to traders unbalanced (on average) by any commensurate benefit. Of course, the profits earned by speculators, and the revenues acquired by Wall Street firms and other intermediaries in the derivatives markets, provide income to the employees and owners of those firms. But hiring laborers to dig and then refill ditches also provides income to ditchdiggers. In either case, society would have benefited more if the funds had been spent on more productive services.

Derivatives speculation that produces net losses for derivatives traders many nevertheless be socially beneficial if it provides some other, greater benefit to third parties. See infra text accompanying notes 46-53 (arguing that derivatives markets are unlikely to produce significant third-party benefits).
such risk-taking behavior). Although the costs to derivatives traders of increased portfolio risk from speculation are difficult to quantify, they are just as great a potential source of loss as reduced returns from research and trading costs.

VII. ON THE PERSISTENCE OF HETEROGENEOUS EXPECTATIONS SPECULATION

As the above discussion suggests, an analysis of speculation that incorporates the realities of uncertainty and disagreement offers a disturbing conclusion: heterogeneous expectations speculation in derivatives likely reduces trader welfare by both reducing the returns and increasing the risks of the average derivatives trader.

This counterintuitive result may seem at first to conflict with the basic economic assumption that rational agents pursue courses of action that serve their self-interest. Trader welfare losses from speculation can, however, be explained as a result of the difference between the private and public value of speculative research and trading, compounded by \textit{ex post} trader error because of imperfect information (that is, uncertainty). In a world of certainty, market participants would know—and agree on—the future prices of equities, debt, commodities, and currencies. No disagreement-based trading would occur. But in a world of uncertainty, both parties to a derivatives trade may incur costs and take on risk in the \textit{ex ante} expectation that the market price of the underlying will shift in their favor. \textit{Ex post}, at least one party must be disappointed.

Traders who discover that their attempts to earn speculative profits through derivatives trading are in fact increasing their risks and reducing their returns should learn from their experience over time and stop trading. There is some evidence that the popularity of derivatives has already declined among many former users. There remain a number of reasons to expect, however, that speculative derivatives trading will persist in the face of trader learning.

First, although corporate executives and fund managers may understand that derivatives speculation is a negative-sum game from the \textit{average} trader’s perspective, until an executive or manager tries her hand at trading she cannot know with certainty whether her \textit{personal} forecasting skills fall above, or below, the average. Determining one’s own trading skill can take months or years. After all, given the natural volatility of financial markets, any single year’s trading losses easily could be dismissed as a result of simple bad luck.

39. A more familiar example of \textit{ex post} error due to imperfect information is the consumer who purchases a product with a hidden defect. Just as in heterogeneous expectations trading, lack of information leads the consumer to perceive as beneficial \textit{ex ante} a course of action that proves detrimental \textit{ex post}. See Stout, \textit{supra} note 27, at 625-29 (discussing speculation as response to lack of information).


41. An illuminating and entertaining example has been offered by Louis Chan and Josef Lakonishok, who sought to demonstrate “how difficult it is to make unambiguous inferences from the very noisy and ever-changing” financial markets. Louis K.C. Chan & Josef Lakonishok, \textit{Are the Reports of Beta’s Death Premature?}, 19 J. PORTFOLIO MGMT. 51 (1993). Using the example of a money manager who outperforms the stock market by an impressive 2% each year, Chan and Lakonishok determined that it would take 25 years of superior performance to establish at a 95% confidence level that the manager’s performance was the result of skill
A second obstacle to learning is the fact that experience gained in one financial instrument or strategy does not necessarily carry over to another. In 1987, many institutional managers learned the hard way that "portfolio insurance" strategies relying on stock index futures could not insure their equities portfolios against market declines.\footnote{See George Anders, Investors Rush for Portfolio Insurance, WALL ST. J., Oct. 14, 1986, at A6 (describing the increasingly popular practice of selling stock futures to hedge against losses in equities portfolios); George Anders, Portfolio Insurance Failed to Serve as Cushion in Crash, WALL ST. J., Oct. 28, 1987, at A6 (stating that fund managers found that portfolio insurance did not protect against losses in the 1987 market crash); Randall Smith, Use of Portfolio Insurance Fell After Crash, WALL ST. J., Jan. 12, 1988, at A4 (stating that use of portfolio insurance shrank by two-thirds or more following 1987 crash).} In the 1990s, however, many managers still appear to perceive opportunities to eliminate equities risk through "dynamic hedging" with "portfolio puts."\footnote{See Kevin G. Salwen & Craig Torres, Portfolio Insurance is Back for Stocks in New Guise, WALL ST. J., May 31, 1990, at C1 (stating that although portfolio insurance is "almost defunct," institutions are now attempting "dynamic hedging" against equities declines through "portfolio puts").}

Finally, and perhaps most importantly, speculation in derivatives can be expected to persist for demographic reasons. Individual investors' lives average only three score years and ten. Fund managers' careers are far shorter, averaging less than ten years.\footnote{See Stout, supra note 27, at 640 (noting that over 85% of mutual funds are managed by individuals with less than ten years' tenure).} As one generation of institutional managers learns through bitter experience that derivatives trading increases the risks and erodes the returns of their portfolios, they are replaced by members of a new generation eager to try their hand at forecasting. The notion that Darwinian selection eventually drives unsuccessful traders from speculative markets ignores the reality that the pool of individual investors and institutional managers is being constantly replenished.\footnote{Cf. Theobald, supra note 11, at A14 (arguing against derivatives regulation on the theory that "[m]angers who make informed decisions and have appropriate internal controls in place . . . will emerge as winners in the marketplace. Those that don't will be losers, subject to the discipline of the market").} To paraphrase P.T. Barnum, a new derivatives trader is born every minute. Welfare-reducing speculation in general, and derivatives speculation in particular, consequently can be expected to persist despite losing traders' tendency to exit the market.

### VIII. On the Possible Social Benefits of Heterogeneous Expectations Speculation in Derivatives

The discussion thus far has examined each of the three commonly-cited uses of derivatives—hedging, arbitrage, and speculation—with an eye to understanding their likely effects on trader welfare. That examination suggests that derivatives deals designed to hedge against preexisting business risks, or to arbitrage between markets, probably benefit traders, although it may be questionable whether such trades benefit society as a whole.

Speculative trading in derivatives, however, is a very different matter. Trades driven by differential risk aversion can benefit hedger and speculator alike. Trading driven by heterogeneous expectations, in contrast, reduces the returns and possibly increases the risks of the average trader. That observation in turn suggests that the assumption rather than random luck. \textit{Id.} at 54.
that derivatives markets benefit market participants is far shakier than generally sup-
pposed.

If derivatives trading does not necessarily benefit traders—if it may harm them by
reducing their returns and increasing their risks—the most obvious basis for claiming
benefits from derivatives markets is destroyed. The question naturally arises: Might
derivatives speculation provide some other, compensating benefit, not to traders but to
the larger society?

The phenomenon of speculation is hardly confined to derivatives markets. Dis-
agreement-based speculation is common in the markets for many intangibles, and espe-
cially in the markets for corporate equities. Speculative trading in stocks often is de-
fended not as being advantageous to traders (after all, financial theory teaches that "you
can't beat the market") but as essential to a liquid and efficient secondary market.
Liquid and efficient secondary stock markets, in turn, are thought to provide a social
benefit by encouraging investors to purchase newly-issued corporate equity, promoting
capital formation and directing that new capital into the most productive investments.

There are reasons even in the case of stock markets to question whether the costs
of speculation to traders might not outweigh any auxiliary social benefit in the form of
improved capital formation and allocation. Corporations raise billions of dollars of
capital each year selling equity in the primary market. Investors trading in the second-
ary stock markets appear, however, to shell out even more for research, portfolio man-
agement, and brokers' and dealers' services. If most investor trading in secondary
stock markets is heterogeneous expectations speculation in the statistically unattainable
quest of beating the market, it appears that the annual cost of an efficient and liquid
stock market to investors likely outweighs the total amount of capital corporations raise
by issuing stock in the first place.

In the case of derivatives, the notion that speculative trading provides some ancil-
larly social benefit that outweighs the potentially huge returns foregone and risks in-
curred by speculating traders seems even more implausible. Derivatives transactions by
definition do not involve the purchase of an underlying asset, but rather amount to side
bets on the movement of some rate, price, or index. We may celebrate liquidity that
encourages investors to "put more" of their savings into stocks, but do we want to en-
courage them to "put more" into a particular interest rate, currency exchange rate, or
position on future commodities prices? As for market efficiency, derivatives trading
seems likely to move data into underlying markets only hours or minutes faster than it
would arrive in any case, a social benefit of debatable importance. Moreover, if most
derivatives speculators simply disagree in their subjective interpretations of the uncer-

---

46. Individuals and institutions also sometimes speculate in tangible assets such as real estate or vintage
automobiles. The relatively high cost associated with acquiring and holding physical assets, however, may
make speculation a relatively unimportant phenomenon in such markets when compared to consumption.
47. See generally Stout, supra note 27 at 682-91 (discussing the argument that speculation furthers stock
market liquidity and efficiency). In this context, market "efficiency" refers to the market's ability to rapidly
incorporate information so that prices accurately reflect values. Id. at 646-48.
48. Id. (arguing that social costs of speculative stock trading likely outweigh social benefits).
49. Id. at 683-86.
tain data available (as opposed to being information arbitrageurs with truly superior intelligence) it is unclear how their trading will make prices more accurate.

Speculative trading in derivatives consequently might be better analogized not to disagreement-based trading in stocks, but to disagreement-based "trading" on the outcomes of horse races, poker games, and athletic contests. In other words, from a social perspective, derivatives speculation may amount to simple gambling. The intent of the Barings trader who hazards his firm's fortunes on the Nikkei 225 stock index because he expects it to rise is essentially the same as the intent of the punter who puts his life savings on the number three horse because he expects it to win. The social effects of such "investment" also may be similar. Heterogeneous expectations trading in derivatives, like gambling, is a negative-sum game that erodes the wealth and increases the risks of the average player who indulges in it. And heterogeneous expectations trading in derivatives, like gambling, may actually draw capital away from more productive uses. Just as individuals who frequent casinos have less money left to invest in securities, the corporations, municipalities, and investment funds that devote scarce resources to trading stock index futures have less to invest in the stock market itself.

Careful inquiry consequently suggests that heterogeneous expectations trading in derivative instruments can no more be presumed to benefit society at large than it can be presumed to benefit the average derivatives trader. Indeed, by adding risk to the marketplace and by diverting scarce resources from more productive forms of investment, the opportunities to take large speculative positions at very small cost created by the development of derivatives may actually do much harm. The image of the derivatives market as Adam Smith's agora where the pursuit of self-interest leaves both traders and society better off is, under conditions of uncertainty, an illusion.

50. Heterogeneous expectations under conditions of uncertainty may provide an explanation for gambling games involving an element of skill or prediction, including most card games, racetrack gambling, and wagering on athletic contests. The heterogeneous expectations model thus supports lay condemnation of gambling by providing theoretical underpinning for the claim that gambling is nonproductive behavior that reduces the welfare of the average gambler.

Disagreement under conditions of uncertainty cannot, however, explain probabilistic gambling such as roulette or lottery gambling. Such games entail risk, but not uncertainty; the odds of winning or losing are well-known and certain. See generally Edward J. McCaffery, Why People Play Lotteries and Why It Matters, 1994 Wisc. L. Rev. 71 (1994) (discussing reasons why people play lotteries).

51. Although some commentators defend gambling on the grounds that gamblers must find it in their own interests or they would not engage in the practice, every state in the Union nevertheless either outlaws gambling outright, or restricts and taxes it heavily. See generally U.S. Department of Justice, The Development of the Law of Gambling: 1776-1976 (1977) (discussing gambling restrictions). This uniformly hostile regulatory climate may reflect an intuitive understanding of the role of heterogeneous expectations in gambling. See supra note 50.

52. Indeed, derivatives trading is in many respects a more troubling activity than orthodox gambling. Gambling can be defended as providing entertainment to individuals who usually bet relatively small amounts of their own funds. Even so, the gambling industry is tightly regulated and heavily taxed. In contrast, the relatively-unregulated derivatives market is dominated by banks, corporations, pension funds, and municipalities. These institutions are run by managers who have been entrusted with the savings of depositions, employees, and citizens seeking reasonable returns at reasonable risks, rather than recreation.

53. See supra part VI and text accompanying note 7 (discussing risk).
IX. CONCLUSION

Thus far, defenders of derivatives trading—including banks, Wall Street firms, and conservative commentators—have largely succeeded in warding off attempts at significant government regulation of the burgeoning derivatives markets. The prevailing favorable climate for derivatives undoubtedly can be attributed in part to interest-group politics and other public choice obstacles to state action. But the continued triumph of laissez faire in the face of growing public unease also springs from a theoretical foundation. Champions of derivatives have been armored by the claim that derivatives trading presumably furthers the welfare of the sophisticated institutions that indulge in it either by reducing their risks, or by increasing their returns.

This Article argues that the presumption that derivatives trading necessarily furthers traders' welfare is a dangerously naive one. The claim that derivatives trading must benefit traders rests on a deeply flawed assumption: that traders face risk, but not uncertainty. In a world of mere risk, derivatives deals might indeed be presumed to reflect either profitable opportunities for riskless arbitrage, or mutually-beneficial risk-shifting between hedgers and premium-demanding speculators. In a world of uncertainty, however, all bets are off. Uncertainty permits disagreement. Disagreement, in turn, inspires heterogeneous expectations trading that can leave traders who wade into the derivatives markets significantly worse off, as a group, for their soaking. When conditions of uncertainty prevail, we simply cannot predict, at the level of theory, whether derivatives trading benefits either traders or society as a whole.

That observation does not imply that we should shut down all derivatives markets. Nor does the theoretical possibility that derivatives trading produces social deadweight losses necessarily support, alone, even less-extreme measures such as imposing rules of "suitability" on firms that sell derivatives, or increasing the favorable tax treatment already granted to hedging (as opposed to speculative) transactions. Rather, the point is that the observation that market participants trade derivatives voluntarily is not by itself sufficient evidence to conclude that derivatives trading benefits traders, much less society as a whole. Academics and policymakers who presume laissez faire is inherently preferable to government regulation in financial markets are just as guilty of extremism and naïveté as those who presume the opposite.

Policymakers seeking to decide whether and how to intervene in derivatives trading consequently cannot act wisely unless they first determine, as an empirical matter, ex-

54. See Hu, Hedging Expectations, supra note 2, at 991 (referring to derivatives' "relatively hospitable regulatory climate").
55. See generally Lynn A. Stout, Strict Scrutiny and Social Choice: An Economic Inquiry Into Fundamental Rights and Suspect Classifications, 80 GEO. L.J. 1787, 1805-06 (1992) (describing the interest group theory). Speculative trading under conditions of uncertainty raises a unique, and hitherto unrecognized, public choice problem because the ex post beneficiaries of such regulation are not likely to recognize themselves as such ex ante. Indeed, before they suffer reduced returns and increased risk from speculative trading, would-be derivatives speculators are likely to perceive any tax or limitation on speculation as against their interests.
56. See, e.g., GAO REPORT, supra note 2, at 6, 8 (stating that derivatives "serve an important function" and that their strengths should not be eroded by "excessive regulation").
57. See Hu, Hedging Expectations, supra note 2, at 1018-19 (discussing the importance to corporations of being able to classify transactions as hedges to secure favorable tax treatment).
actly what forces are driving this new market. Such an inquiry clearly presents significant obstacles, if only because of the wide variety of instruments classified as "derivatives" and the problems inherent in determining institutional managers' subjective, and often mixed, trading motives. Nevertheless, the stakes more than justify the effort. To the extent that the derivatives markets are dominated by hedging and arbitrage transactions, they may (as their champions claim) provide significant benefits to their users. If, however, most derivatives transactions involve an element of heterogeneous expectations speculation—and considerable evidence suggests they may—the burgeoning derivatives markets may be the source of huge, and growing, social deadweight losses.

The evidence supporting either assertion is far from conclusive. We simply do not know whether the trillion-dollar derivatives market provides socially valuable insurance and arbitrage opportunities—or constitutes the world's largest and most dangerous casino.

58. A GAO survey of government and private pension plans using derivatives attempted to determine the plan managers' motives by inquiring whether derivatives had been used "to reduce the cost of raising capital" (arbitrage), "as a hedge," or "to increase rate of return" (speculation). GAO REPORT, supra note 2, at 134. The survey found that while less than half of users claimed to be using derivatives for arbitrage, the vast majority used them for both speculation and hedging. Id. Speculation might be an even more important force than the survey suggests, however, because the phrasing of the question did not distinguish between using derivatives to hedge against a preexisting business risk, and hedging against risk associated with a speculative position. See id. The latter sort of trade is essentially also driven by speculation.