

## Risk Avoidance and Market Fragility

Bruce I. Jacobs

Not only did the first few years of this decade wipe out more than 70 percent of the Nasdaq's value and more than 40 percent of the S&P 500 Index's value, they overturned the conventional wisdom of the 1990s with a vengeance. The era of "stocks for the long run"<sup>1</sup> has given way to one in which one might expect to see the following warning posted on the doors of the stock exchange: "Abandon all hope, ye who enter here." Risk, dormant through much of the 1990s, has been rediscovered, and there is no shortage of experts willing to share their wisdom on how to stomp it out.

This development is evident in articles such as Robert C. Merton's "Thoughts on the Future: Theory and Practice in Investment Management" (2003) and Zvi Bodie's "Thoughts on the Future: Life-Cycle Investing in Theory and Practice" (2003), books such as Robert Shiller's *The New Financial Order: Risk in the 21st Century* (2003) and Zvi Bodie and Michael J. Clowes' *Worry-Free Investing: A Safe Approach to Achieving Your Lifetime Financial Goals* (2003), conferences such as the Financial Research Associates' "Innovative Principal Protected Investment Products" (2003), and investment products such as ING's Principal Protection funds and Merrill Lynch's MITTS (Market Index Target-Term Securities).

Is there such a thing as being "too safe"? Consider, most obviously, the case of investors who eschew equity because of its risk. Such investors would have avoided large losses in 2000–2002, but they would also have avoided doubling their money over the 10-year 1993–2002 period. And, of course, if investors as a whole avoid equities, companies will find it increasingly difficult to raise capital and, perforce, economic growth will slow or even reverse, to the detriment of society as a whole.

In addition, and less obviously, the desire for risk avoidance can lead to the development of investment products that, while intended to reduce risk, can actually increase the volatility and fragility of financial markets as a whole. Such investment products may include the guaranteed structures

mentioned in Bodie and Clowes (and sold as MITTS), guaranteed annuities linked to equity market performance, and other "principal protected" instruments. They may also include insurance for home values, as described by Shiller (1993) and Merton (2003), and some of the complex insurance products discussed in Merton (2003) and Bodie.<sup>2</sup>

Complications can arise when such products, purporting to insure against declines in broad financial markets, attract large numbers of investors. The financial institutions (brokers, banks, or insurance companies) offering such products can then be exposed to significant amounts of systematic risk. Exposure to systematic risk is much more difficult to control than exposure to specific risks. Attempts at control can increase volatility in underlying markets. This increase in volatility can, in turn, increase the demand for insurance, leading to more unanticipated volatility, and so on. The end result can be catastrophic.

### Insuring Specific vs. Systematic Risk

Part of the problem becomes more evident if one considers how traditional insurance works. For example, a traditional insurance company is, in most cases, able to profit by insuring a home against fire because that risk is usually specific to a given policyholder. The likelihood of all or even most of the houses covered by an insurer burning down at the same time is virtually nil. If one house burns down, the insurance company can use the proceeds from other insurance premiums to pay off the loss. The risk the company assumes in selling fire insurance is diversified across all the households that have purchased fire insurance.

But the same is not likely true for housing values. Not infrequently, declines in home prices are widespread. Following the 1987 stock market crash, for example, home prices fell broadly throughout the New York metropolitan area. If housing values had been insured, insurers would have faced simultaneous claims from a large number of contract holders. When the risk being insured is systematic (home values), rather than specific (house fires), it is difficult for the insurer to diversify

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it.<sup>3</sup> This presents a problem for insuring home values (and, more broadly, for Merton's [2003] suggestion that financial institutions are well suited to selling options—a form of insurance—because they can diversify their risks across products).

Financial institutions that provide insurance against systematic risks, such as an overall market decline, are like the insurers of housing values. If the market declines, they will face payouts to large numbers of insured parties. Their ability to “net” such exposures across products is limited. They could diversify by investing in government bonds, which tend to attract capital flows when other markets decline, but government bond returns tend to be low and might not provide sufficient income to cover large payouts.

Insurers could try to hedge the risk by selling short futures on the insured asset (if such futures exist). If the market declined and they had to pay their insured customers, they could do so from the gains made on the short positions. If prices rose, however, insurers would face losses on the short futures positions. What insurers need is some way to arrive at a floor for asset values without creating losses if prices rise. Essentially, the insurers need insurance.

Insurers can obtain insurance by purchasing options that offset the option-like positions they have sold or by replicating such options via dynamic hedging. Dynamic hedging means trading in line with the dictates of option-pricing theory, buying the asset as its price rises and selling as its price falls (Black and Scholes 1973; Merton 1973). Of course, the dealers from whom options are purchased also need to mitigate their exposure, which they can do by either buying offsetting options or replicating them via dynamic hedging.

The ability of financial institutions to insure themselves against the insurance products they have sold depends on the presence of counterparties willing to sell them options or, equivalently, to take the other side of their dynamic hedging trades. Value-oriented investors, such as pension funds (as Merton 2003 suggested), might serve as natural counterparties for such trades. Given that long-term value investors tend to buy as prices fall and sell as prices rise, they are potentially trading in the opposite direction to the dynamic hedgers' option-replicating trades.<sup>4</sup> But if shareholders prefer guarantees for their own investments, they might demand that the pension plans of the companies whose stock they own also be insured. In such a case, pension funds would be “buyers,” not “suppliers,” of insurance.<sup>5</sup> As more and more investors join in the demand for insurance, it may become increasingly difficult (or expensive) for

insurers to find counterparties in the form of option sellers or traders willing to accommodate their dynamic hedging trades.<sup>6</sup>

Furthermore, with more insuring activity, there is likely to be more dynamic hedging. Its trend-following trading will exacerbate market moves, increasing market volatility. An increase in volatility may further increase the demand for insurance against downside moves, thus further increasing the demand for options and generating more option-replicating trades (and thus more market volatility). When market prices increase, trading underlying insurance products can inflate a bubble. When market prices fall, the selling required to replicate an option on the market can overwhelm the willingness of other market participants to buy, creating a liquidity crisis.<sup>7</sup>

In the event of a liquidity crisis, the trades needed to replicate options will not get off at the prices required to guarantee the insured value; they will have to be executed (if at all) at much lower prices. The insurance can fail. When that insurance underlies the insurance products sold by a financial institution, those products, along with the institution itself, can fail. What is more, the risk exists that because of the linkages between various counterparties, one institution's failure may lead to systemic failure and broad economic risk. Such a scenario has occurred before—as the next section describes.

## Insurance and Systemic Risk

Portfolio insurance provides one example of the desire for risk avoidance leading to a liquidity crisis and a market break. A dynamic hedging strategy popular with institutional investors in the early 1980s, portfolio insurance sought to replicate put options on the stock market. It required selling stocks as prices fell and buying stocks as prices rose in order to preserve a “guaranteed” rate of return on a portfolio over a given investment horizon (see Rubinstein and Leland 1981; Jacobs 1987, 1998; Rubinstein 1999; “2000 Hall of Fame Roundtable” 2000; Kolman 2000). Introduced after a decade-long market slump, a period when risk was perceived to have increased, portfolio insurance gained in popularity as the stock market rose in the 1980s, with pension plans seeking to lock in gains and avoid losses.<sup>8</sup>

On October 19, 1987, following market declines in the previous few days, a large number of insured plans needed to sell substantial amounts of stock simultaneously. Liquidity proved insufficient; not enough buyers were willing to take the other side of the insured trades. Market prices

dropped discontinuously. Portfolio insurance likely turned what might have been a correction into the most severe single-day U.S. stock market crash in history (see Jacobs 1999a).

Another example is the Long-Term Capital Management (LTCM) debacle.<sup>9</sup> In 1997, believing that investors in the United States and Europe had unrealistically high expectations for volatility, LTCM provided “reinsurance” to many banks by selling options to offset the “guaranteed” products these banks had sold to (mostly) retail investors. In the summer of 1998, however, investors’ risk tolerance declined even more in the wake of Russia’s debt default, and volatility increased significantly in many markets. LTCM’s short option positions became substantial losers, even as the company faced overwhelming margin calls on its highly leveraged arbitrage positions. LTCM had to unwind its huge holdings—in effect, engaging in dynamic hedging. Its sales in declining markets exacerbated market moves (see Jacobs 1999b).

Both portfolio insurance in 1987 and LTCM in 1998 required a large amount of selling and left an even larger overhang of expected sales. Some investors, attempting to profit from the expected trades, traded ahead of portfolio insurers and LTCM. Many more investors, “stampeded” by the sheer volume of trading, followed. Thus, front running and herd behavior exacerbated the market impact of the trading by portfolio insurers and LTCM.

In both cases, the trading required to insure supposedly riskless products overwhelmed the market’s ability to accommodate it. Market prices gapped discontinuously. Insured investors could not get their trades off at the prices required to guarantee the insured values. Portfolio insurance failed to provide the promised protection. LTCM incurred substantial losses on trades that had been designed to be relatively riskless. Furthermore, virtually all investors in the market experienced losses. In 1987, the losses in the U.S. market spread to other countries (see Jacobs 1999a). In both 1987 and 1998, markets effectively had to be “bailed out” by the U.S. Federal Reserve Board, which provided liquidity in the wake of both crises and also orchestrated the rescue of Long-Term Capital Management in 1998.

It is not a mere coincidence that over the past two decades, investors have seen a substantial increase in the occurrence of multiple-sigma events. In theory, such phenomena should occur only once in a hundred years. Once a decade seems to have become the norm. The type of dynamic trading required to provide option-like guarantees of investment performance is inherently destabiliz-

ing. At the extremes, it can pose a systemic risk for the economy as a whole, as happened in 1998 when LTCM almost imploded and could have taken its counterparties (large financial institutions) down with it. Had the Fed not intervened, the impact on global markets might have been devastating (see Jacobs 1999a).

## Risk Sharing vs. Risk Shifting

Could option-replicating trades bring on future liquidity crises? New “guaranteed” products are being introduced on practically a daily basis. Already popular in Europe are products that combine a guarantee of principal with investment in funds of hedge funds. These products often require dynamic hedging—on the part of either the financial institution selling the product or the option seller or other entity from which the institution purchases the guarantee.

Compare the destabilizing, “buy as prices rise, sell as prices fall” trading required by the supposedly risk-minimizing insurance products with the trading required by mean-variance investing. Mean-variance investing is “environmentally friendly” (see Markowitz 1999). It calls for buying when prices fall and selling when prices rise<sup>10</sup> and thus tends to stabilize market prices.

Compare also risk sharing with risk shifting. In the case of traditional fire insurance, risk of loss is essentially shared by many policyholders, with the insurance provider acting as intermediary. If one insured house burns down, its owner will receive compensation, which the insurer is able to provide from the premiums collected from other insured homeowners, whose houses have not burned down. But policyholders who buy insurance against a stock market decline are not sharing the risk; rather, they are essentially shifting the risk onto the insurance provider. The insurer, in order to protect itself and the viability of its policies, can try using instruments such as options and trading strategies such as option replication to shift the risk to yet another party. Its ability to shift risk, however, requires counterparties willing to take the risk on.<sup>11</sup> And as demand for insurance increases, it tends to exhaust the supply of counterparties.

Who then becomes the risk bearer of last resort? It may be the taxpayer, if the government decides that the firms that offered these products are “too big to fail.” Often, it is investors in general, who must bear the risk in the form of the substantial declines in prices that are required to entice risk bearers back into the market. Ironically, products designed to reduce financial risk can end up creating even more risk.

## Notes

1. This view is epitomized by Siegel (1994).
2. For example, Merton (2003) proposed a derivative whose payoff would be contingent not only on the value of the underlying portfolio but also on such factors as tax rates and the relative values of goods desired for purchase. Bodie described an escalating life annuity that guarantees a minimum benefit linked to the cost of living and payments that increase with inflation and with the performance of the market index, with increases in asset value locked in. With Merton and Bodie's involvement in a newly formed investment bank, Integrated Finance Limited (IFL), which intends to structure highly complex derivatives transactions, such hypothetical products may become realities in the not-too-distant future (Salmon 2003).
3. Providers of insurance on real estate values may be able to reduce the risk they have taken on by diversifying geographically and (as Merton 2003 suggests) temporally. Their ability to do so, however, may be limited. Consider the collapse of the Japanese real estate bubble, now in its second decade. Could Japan's financial institutions, already weakened by bad loans, stock market losses, and deep recession, really have been expected to pay out claims on depressed real estate values nationwide? Absent barriers, such as restrictions on ownership of real estate and other assets in certain countries, it is possible that large international financial institutions with globally diversified real estate policies could provide protection, but they still would be susceptible to a worldwide slump in real estate values. Shiller (1993) assumed companies insuring real estate values would hedge their risk by shorting in (not yet established) real estate futures markets. Even in this case, however, the ability to provide insurance assumes the presence of investors willing to buy real estate futures in declining markets.
4. While value investors may be trading in the opposite direction to dynamic hedgers, they typically trade deliberately and after large price changes have occurred. This contrasts with dynamic hedgers, who trade continuously as prices change and demand immediate execution. The trading needs of dynamic hedgers can thus overwhelm the trading desires of value investors, as happened during the crash on October 19, 1987 (see Jacobs 1999a).
5. In the 1980s, in fact, pension funds were encouraged to purchase so-called "portfolio insurance" (see Jacobs 1999a).
6. Another problem with dynamic hedging is that it reveals no price information about the option being replicated and offers no transparency with regard to the anticipated trading needs of insurers. As a result, dynamic hedgers do not know how expensive option replication will be and potential counterparties do not know how potentially rewarding it will be (see Jacobs 1999a).
7. Perfect replication (i.e., the creation of "complete" markets via dynamic trading strategies, such as option replication) rests on a bedrock of modern finance theory augmented by continuous-time theory, which Merton (1990) termed the "super perfect-market paradigm." In the real world, where such conditions are infrequently met, replication is prone to failure, which can at times be catastrophic.
8. This behavior is consistent with the notion, discussed in Merton (2003) and Bodie (2003), that habit formation will incline investors to seek out insurance products that can lock in market gains and enable them to meet prevailing consumption needs.
9. Two of the founding partners of LTCM were Robert Merton and Myron Scholes, co-creators (with Fischer Black) of option-pricing theory.
10. For example, investors often establish a policy portfolio consisting of an unleveraged mix of equity, fixed income, and other assets. If equities rise in price, the percentage of the portfolio held in equities will exceed the policy portfolio's percentage, and equities will be sold (absent a change in the investor's beliefs) to rebalance the portfolio.
11. According to his profile in "Risk Hall of Fame" (2002), William F. Sharpe is working on a product called "M-shares," in which the "M" stands for "market." Such shares would constitute stock and bond exposures with maturities and be divided into tranches. Some of the tranches would offer investors downside protection. Other tranches would bear the downside risk. A similar product, called "Super-Shares," was offered by Leland O'Brien Rubinstein Associates (the firm that originated portfolio insurance) after the 1987 crash (see Jacobs 1999a). It did not last beyond its initial three-year offering period. The feeling at the time seemed to be that the product was too complicated for most investors. M-shares may be simpler in concept, but whether they could attract sufficient liquidity, particularly from those willing to sell market insurance, remains to be seen. In any event, such a product would match buyers and sellers of protection (thereby providing counterparties), would reveal the price of protection, and could increase the transparency of shifting risk from one investor to another.

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