

# Risk, Time, and Reversibility\*

by Peter L. Bernstein\*\*

## 1. Introduction

More months ago than I can remember, I gave Orio Giarini a title for this presentation: “The Stock Market as Risk Manager”. As what I have finally produced is, I hope, relevant to the analysis of risks beyond the risks of equity ownership, I now propose that the title should be “Risk, Time, and Reversibility”. Indeed, I have attempted to use this opportunity to take a fresh look at the nature of risk, with the stock market as only a guide to accompany us on this exploration.

In the process, I shall try to shed new light on the linkages between the concept of investment risk in the stock market and risk as seen from the perspective of insurance. Both the stock market and insurance are methods for managing risk. Their paths cross at the origin of the risks to be managed, namely, in the management decisions of the business sector of the economy. People in the world of finance have so many fascinating games to play among one another that they often forget that the whole purpose of finance is to promote economic growth in the real world.

I begin with some general statements about the nature of risk. Some of these introductory observations will be obvious, but they lead to a central notion that may not be so obvious and that provides the foundation for the analysis that follows. I then proceed to look at the stock market, business management, and insurance in terms of this central notion. Finally, as the paper sets forth its ideas in the first instance as abstract statements without much qualification, I conclude with some observations that give me the opportunity to apply my ideas to the current scene, in the process providing fresh perspectives on the changing character of risk.

## 2. The nature of risk

My opening observations on the nature of risk begins with what will appear to you at first as a digression but turns out to be at the core of what risk is all about.

I ask you think about what life was like long ago, when most people earned their livings in self-sufficient communities in agriculture, fishing, and hunting. Economic activity under those conditions was totally dependent on the weather, and we all know we cannot do anything about the weather. Forecasting in those days was a waste of time.

As small-scale commercial activities began to develop, people found themselves in precisely the opposite position: forecasting became essential because merchants would not accumulate inventory unless they had some expectation that the goods would find buyers. That is, commercial activity cannot exist unless merchants *can arrive at a judgment about the future*. Later, as the industrial revolution got under way, business firms began to invest not only

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in inventory but in long-lived capital goods – steam engines, textile machinery, railroads, steel plants – and that was just the beginning.

That development profoundly transformed the task of forecasting. With long-lived capital assets, judgments about the market had to cover the entire future economic life of the capital goods: the risks of obsolescence in both the capital goods and the product line because of inroads by competitors, forecasts of interest rates and other financing costs, the risks of possible losses from fire and theft, and, inevitably, the impact of government and fluctuations in general levels of business activity.

And so, in advanced economies with private ownership of the means of production, views about the future are at the very centre of economic activity. I mean that literally: nobody acts without a forecast. The most remarkable feature of our system is that it depends so entirely on the art of forecasting, but the reality is that *no one knows what the future holds*. We never know which forecast is going to turn out to be right and which is going to turn out to be wrong. As the great Chicago economist Frank Knight put it way back in 1921: “At the bottom of the uncertainty problem in economics is the forward-looking character of the economic process itself”. This is a dilemma from which there is no escape. As recently as autumn 1998, Alan Greenspan expressed the same concern: “[The] willingness to commit to long-term investment . . . is subject to wide variations [that] are the result of the sheer difficulty in making judgments and, therefore, commitments about, and to, the future”.<sup>1</sup>

Uncertainty would not matter if we could just eat, drink, be merry, and die tomorrow. That is, uncertainty would not matter if we viewed the future with a huge rate of discount, but then investing in capital goods would make no sense. In today’s world of business, we choose to live in a system that thrives on productivity, growth, and change, none of which would occur without a willingness to make long-run decisions with uncertain outcomes. We cherish the future rather than discounting it, because the rewards we expect for taking risks inevitably reside out in the future. Time and risk are inherently related to each other.

People accept the risk of losing in the hope that they will win instead. In the process, they try to reduce both the probabilities and the consequences of loss. Reducing the *probability* of loss is always difficult when outcomes are uncertain. Frank Knight put it so well: “[I]t is meaningless and fatally misleading to speak of the probability, in an objective sense, that a judgment is correct”, but we can reduce the *consequences* of loss through what we call risk management.

Risk management is a set of techniques for surviving loss. Risk management comes in five forms. First, we can restrict our decisions to those over whose outcomes we have some control, that is, where we can manage the *probability* of loss. Second, we can diversify in order to reduce the *consequences* of loss. Third, we can insure, which is a collective method of diversification. Fourth, we can change our minds and walk away from a commitment before all is lost. The only other method is to refuse to play, which is precisely what happens when we cannot arrive at a positive forecast – that is, the risks are unacceptable.

### 3. Risk management

The interesting question is how we choose among these methods of risk management when making decisions. What factors determine these choices?

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<sup>1</sup> Address to Haas Annual Business Faculty Research Dialogue, University of California, Berkeley, 4 September 1998.

Under what conditions is it absolutely necessary that we have some control over the outcome of a decision? Control is essential when the risk is not reversible, or reversible only at high cost – for example, when companies build new facilities, decide to market new products, or acquire other companies. In other words, control is imperative when an investment is irreversible and illiquid – when nobody is likely to take an asset off our hands on demand and at a minimal transaction cost (both are important). Similar considerations apply to all decisions in life when we are unable to change our minds after the fact without great difficulty or expense, including buying a house and even getting married and having a child.

Business managers make such long-term investments all the time, fully aware that many will produce disappointing outcomes. As long as managers have some control over the outcome, however, they are not helpless before the fates. They can take steps to reduce the probability of loss, even after the fact, by varying the price of the product, changing its design, altering marketing strategies, or replacing the managers responsible for the project. Uglier forms of control, but methods to control outcomes nonetheless, include combinations in restraint of trade, corruption, and cronyism. One powerful control mechanism for long-term commitments is that wonderful device we call the contract, which limits the opportunities for surprise and reduces uncertainty.

This view of the matter yields another interesting insight. By definition, irreversible decisions are long-run decisions. We might even measure the long run as the period of time during which we are stuck with a decision, once we have made it. When managements refuse to make irreversible decisions without at least some control over the outcome, they are in essence converting the decision into a shorter-run decision. By making changes and variations in the original decision as they go along, managers break the long run into a series of short runs that make the original judgment less risky than if it were frozen in time. The more frequent the opportunities to change their minds along the way, and the lower the costs of effecting those changes, the more readily managers can evade the curse of long-run decisions.

Control is not the only way that we can face irreversible decisions: we may also choose the fourth method of risk management by refusing to play. Procrastination is risky, but it also has value. We always have the option not to act. The value of that option depends on precisely the same elements as any option: the value of the option of not acting will be higher the greater the uncertainty that surrounds the outcome if we do act, the longer the term of the commitment, and the nature of alternative opportunities.

Now let us go the other extreme – from having control to no control. Under what possible circumstances would we be willing to make a decision over whose outcome we have no control? Under conditions precisely the opposite of those under which we insist on control, namely, when the decision is reversible on demand and at low cost. We invest in liquid assets all the time without any ability to influence the outcome.

Liquidity means the opportunity to reverse a decision at the lowest possible transaction cost. The demand for liquidity is a function of uncertainty. Without uncertainty, we would never need or even want to reverse a decision: if we knew the whole future, we would have no difficulty in arriving at optimal decisions that would carry us for the rest of time.

This approach provides the framework for understanding why the stock market is so important for economic development and how the market functions as a risk manager. The stock market is an arena where the players act on the assumption that they are making decisions about the ownership of long-term and illiquid assets through a medium that allows those decisions to be reversible at low cost. The liquidity of the market-place for equities – low transaction costs, in other words – permits investors to shorten the time horizon of their decisions, even though the targets of those decisions are the illiquid, sunk-cost types of assets

that typify capitalist economies. Thus the great uncertainty unavoidably embedded in long-term assets is transformed into reduced uncertainty through the shortening of time horizons. Under these conditions, investors are willing to take more risk, at lower required returns, than they would if every investment were a direct investment without a public market.

The trade-off for liquidity is lack of control in two different areas. First, as equities are perpetuities, the liquidity that stock market investors require is available only by courtesy of some investors who are willing to bail out others. That is an uncomfortable issue to which I return at some length at the end of this paper. In addition, stock market investors have no control over the management of the companies in which they invest. They have some kind of legal control, but, as a practical matter and in most instances, minority investors have little influence over management decisions and strategies. Separation of ownership and control is what the stock market is all about.

This lack of control means that, for investors in the stock market, their “run”, long or short, begins with the purchase and ends with the sale, and they are helpless in between those two points. Dependence on average opinion is an inescapable consequence of the separation of ownership and control, and the separation of the irreversible from the reversible decision.

When we look at the structure from this vantage point, we can see why liquidity is the dominant element in the stock market investor’s willingness to take risk. Stock market investors, unable to determine in any way the consequences of their decisions, demand an exit strategy for the moments when they are dissatisfied with the way matters are developing. Without liquidity – without the ability to change your mind on short notice and at low cost – the risk of making an investment as a minority owner would be intolerable. I can put it even more strongly: *if there were no such thing as a capital market, there would be no such thing as separation of ownership and control.*

Seen in this light, the stock market is a vehicle for risk management as much as for risk taking. Indeed, the stock market offers investors two kinds of risk management simultaneously: diversification and the opportunity to reverse decisions at low cost. These features explain the great attraction of the institution of the stock market and its vital role in the process of economic development around the world – even in China.

#### 4. Insurance

Where does insurance fit into this line of analysis? Although we do not usually think about the stock market as managing the same kinds of risk as insurance managers, we shall see that the relationship is a close one.

People buy insurance policies to cover losses whose consequences would be intolerably damaging without insurance: the loss of a home through fire, the loss of the family breadwinner before normal life expectancy, losses due to fraud and theft, the liability that arises from negligence to life or property, and the terrible expense of serious illness. In the sophisticated environment in which modern insurance now operates, and thanks as well to our deepened understanding of the family resemblance between insurance and options, insurable losses no longer include only the damages caused by nature, crime, or negligence. New kinds of risks are now coming under the purview of insurance, notably as a result of the creative efforts of new members of the reinsurance industry. Insurance today can protect a business firm from the consequences of being wrong in many kinds of normal business decisions, such as the price paid for a raw material and a wide variety of interest rate risks.

All of these insured losses have one element in common: they are losses that do not lend themselves to being reversed by the individual or firm that suffers from them. The house is

burned to the ground, the breadwinner is dead, the hip operation is unavoidable, the manipulation of accounting data has hidden catastrophic losses, the price of oil went up instead of down – all of these events cause damage that cannot be recovered except at great expense, over long periods of time, or both.

These losses are obviously not decisions, but their impact is identical to decisions that are irreversible. Once they have happened, they have happened. Like the stock market, however, insurance makes risks reversible by reimbursing the insured for the losses incurred.

Nevertheless, although the resemblance between the stock market and insurance is striking at the essence, important differences remain. Insurance covers only things that go wrong, while stock ownership promises rewards if things go right: insurance is for pessimists, while the stock market is for optimists! Furthermore, insurance as a form of risk management involves less uncertainty than equity ownership, because the losses from insurance are covered exogenously – by an entity entirely separate from the entity buying the insurance – while the ability to avoid losses by reversing decisions in the stock market is totally dependent on the willingness of some investors to buy assets from other investors at prices that avoid those losses. Insurance itself contains no risk other than the solvency of the insurance company, whereas stock market investing is unquestionably a risky business on many levels.

Despite these differences, the basic similarity between the two approaches reveals a fundamental feature of risk itself that receives too little attention. The fashion today is to define risk in terms of uncertainty, usually as measured by either historical or anticipated volatility. That approach is functionally attractive, but it focuses too little attention on the *sources* of uncertainty.

I begin with a first principle. Risk and time are so intimately related that they are almost the same thing. If life were always now, no risk would exist. The longer we look out into the future, however, the less we know. We know something about an hour from now, a good deal about what tomorrow will bring, something about next week and next month, but a rapidly diminishing amount about each day beyond. There comes a point out there when, as John Maynard Keynes put it so well, we simply do not know. The longer the time horizon, the greater the risk in a decision.

Time is also what reversibility is all about. The easier it is for us to change our minds, the less time matters. When we are locked in, we are caught up in the long run. That statement applies to many situations beyond those where we are truly locked in, because we often lock ourselves in. How many times have you bought a stock that went down right after you bought it and told yourself, “Oh, I don’t care, I bought it for the long term”? Or you refuse to sell a stock at a profit because of reluctance to pay capital gains taxes? Or you stay with a difficult situation because your peers would disapprove if you changed your mind? None of these decisions were literally locked in, but you choose to make them so. Then you are caught up in all the risks of the long run.

Now let us introduce control into this structure. Control and time are also closely related. Control makes the long run shorter. The greater the control we have over the outcome of our decisions, the easier it is to change our minds and the more effectively we can use the short run to shape the long run. Controllability and reversibility are only two different ways of looking at the same thing.

At the root of risk, therefore, and at the root of uncertainty, is the ease or difficulty with which we are able to change our minds and reverse a decision. At the root of risk and uncertainty, furthermore, is the degree of control we have over outcomes. Because the stock market is a *market*, it helps us manage risk by providing reversibility. Insurance comes to our rescue when an outcome is beyond our control. The similarities are more profound than the

differences, because the role of the stock market and insurance converge on the attribute of reversibility.

## 5. Risk today

So far, I have laid out my case point by point, without much in the way of qualification or elaboration. I would now like to choose a few aspects of the contemporary scene to which I believe my approach can add fresh insight and that will at the same time illuminate the central message.

We are so used to living in a free enterprise environment that we seldom stop to consider whether risk is unique to our system or whether it operates in other systems as well. For example, what happens to risk in a socialist system?

Back in the days before World War II, during the Great Depression, even many conservative people were compelled to take a favourable view of economic developments in the Soviet Union, because the Soviets managed to escape the terrible tragedy of mass unemployment that afflicted all of the capitalist countries. In the capitalist economies, unemployment rates as high as 25 per cent were the consequence of risks – especially in the credit markets – taken on the basis of forecasts that turned out to be wrong. In socialism, where everything was planned, all outcomes appeared to be under control. Thus, the planned society provided the illusion of a riskless society, clearly in theory and apparently in practice as well. Totally unaware of where the Soviet economy would end up 50 years later, economists made the contrast between the market economy and the planned economy in the 1930s an area of intense and serious study.

The difference between a planned society on paper and its ultimate reality was exposed by a force that no society can escape: the caprices of human nature. The public is always making decisions that may or may not work out as the planners expect. Even planners do not know the outcome of all decisions in advance. Although the Soviet state claimed to be able to control all outcomes, in fact many factors were out of control as functionaries eager to meet targets cheated on their reports to the planners, as consumers often had no taste for much of what was produced for them to buy, and as the leaders took on the terrible and enormous gamble of the Cold War. These kinds of problems were less serious in the early days of the Soviet system, but they became increasingly important as living standards advanced during the post-war years.

In the end, the contrast between the two systems was a lot smaller than it had originally appeared to be. Any investment that is irreversible – and investments in durable capital assets in particular – requires a forecast. Forecasts are often wrong. The managers of the Gosplan were taking risks that were just as real, and just as uncertain, as the managers of capitalist corporations like General Electric and Royal Dutch. Economic development is impossible without durable capital assets that embody irreversible decisions, but there is no such thing as an irreversible decision without risk.

I now turn to the life expectancy of long-lived capital assets. Earlier in this paper I drew the distinction between the consequences of investing in an asset that has a rapid rate of turnover like inventory and an asset that is long-lived like a massive piece of durable capital equipment. That distinction is not as vivid as it was in the past.

The development of capitalism in the 19th Century was marked by a persistent lengthening in the economic life of capital goods and in the roundabout character of the productive process itself. Small steam engines became great turbines, little railroads became transcontinental giants, small steam-driven side-wheelers became heavy ocean-going

freighters, steel plants developed from local smelters to giant conglomerations of buildings and machinery, and all of that led to the towering electric power plants and ultimately to the huge capital investments spawned by the arrival of the automobile and then the airplane.

Over the past 50 years or so, this process has been going in reverse. The economic life of the capital stock as been slowly but surely shrinking. As Alan Greenspan put it recently, "The GDP doesn't weigh as much as it used to". Orio Giarini has placed great emphasis on the growing importance of services, which in effect weigh nothing. Since 1960, the share of structures, as opposed to equipment, in total real non-residential investment in the United States has fallen at a surprisingly steady annual rate of just about one percentage point a year, from 60 per cent – about the same as in 1950 and 1929 – to only 21 per cent today. On the average, I replace my computer more frequently than I replace my business suits.

This trend has significantly reduced the risk of investing in most capital equipment, despite the intensification of the global competitive environment. These decisions are still characterized by irreversibility, but the period before the investment is recouped in cash is now much shorter than in the past. This development makes the economy as a whole more stable and all decisions sensitive to business fluctuations are less risky as a result.

## 6. The stock market

I conclude with a few observations about the stock market. But first I had better briefly recapitulate my position about the role of the stock market.

The management of the real economy is concerned with illiquid and largely irreversible commitments. The stock market is a vehicle for sharing the rewards from those illiquid commitments while still enjoying the right to reverse decisions at will. I emphasized that liquidity – that is, a low-cost exit strategy – is essential if investors with small minority ownership positions are to participate in the whole process. Without liquidity, these investors would have no opportunity of disposing of their investments when they are dissatisfied with the progress of the companies they own. If they view voting with their proxies as a waste of time, they will not participate unless they can vote with their feet.

That is a stylized view of the situation. As we look back over the real world of the past 15 years, one of the most vivid and extraordinary developments has been the major revolution in corporate governance in the United States, a revolution that is beginning to rub off on corporations in Western Europe and Japan as well. Major institutional investors are no longer such passive owners of American corporations. They are holding managements accountable to a far greater degree than in the past. The heads of some famous chief executive officers have rolled right out of the boardroom and into oblivion. In other words, ownership and control for some shareowners are no longer as widely separated as they have been in the past.

One factor in this revolution was the dismal competitive performance of much of American industry during the 1970s and early 1980s, but that was by no means the only impulse for the upheavals in corporate governance. Institutional investors were discovering that many of their equity positions had grown so large that the stock market was no longer providing the easy exit strategy that it had supplied in the past: ownership shares of many companies had lost their liquidity, because the sheer size of the positions raised the transaction costs of reversing ownership decisions to prohibitive levels. And so indexing and related strategies became an unavoidable alternative to trading.

Indexing is an explicit policy of buy-and-hold, but even many stock positions chosen by active equity managers have grown to such a top-heavy size that their owners are essentially locked in for the long pull. The whole point of my paper is that decisions "locked in for the

long pull” are riskier decisions than those with a low-cost exit strategy. Increases in risk lead to a demand for greater control over outcomes. It was this shift in the nature of top-heavy stock positions that motivated the revolution in the boardrooms of US corporations, as so many stockholders discovered that they had no choice but to confront corporate managers in the process of control.

I turn finally to a more contentious and controversial issue on which I touched all too briefly earlier in this paper. As equities are perpetuities, the liquidity that stock market investors require is available only by courtesy of co-operative investors who are willing to bail out those who are seeking buyers for their shares. A market without buyers near the last transaction price is not a market.

Under these circumstances, the wisest strategy for even the most dedicated of professional investors is to be concerned, not with the intrinsic value of the underlying assets, but to “beat the gun”, as Keynes described it, by outguessing the valuation decisions that average opinion will be making. A single-minded focus on intrinsic value can get you nowhere unless other investors are at some time point going to agree with your appraisal. In this environment, however, the valuation of real productive assets in the market-place readily becomes the victim of mass psychology.

All of this is the consequence of the demand for liquidity in the market-place that permits investors to change their minds at low cost. This condition was considered highly dangerous by Keynes, who carried on at length about it in his masterwork, *The General Theory of Employment, Interest and Money*, published in 1936. “Of all the maxims of orthodox finance”, Keynes argues, “none, surely, is more anti-social than the fetish of liquidity”. With liquidity, “Investment based on genuine long-term expectation is so difficult . . . as to be scarcely practicable”. By providing the arena where investors can change their minds at short notice, Keynes contended, liquidity makes the game too easy: too easy to begin and too easy to stop. The process becomes, literally, a game: a game of Snap, Old Maid, of Musical Chairs, a distorted form of beauty contest. Intrinsic valuation has nothing to do with it. The process sets the stage for enterprise to become “the bubble on a whirlpool of speculation”. The consequences for the economy can be unfortunate: “When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done”. Although Keynes wrote those words over 60 years ago, his warning resonates in the world as we see it at this very moment.

Are we to conclude, then, that our society and economic system are taking excessive risks by permitting the critically important task of valuing capital assets to be determined by the outcome of a beauty contest based on what average opinion expects average opinion to be? We can answer that question only by returning once again to first principles.

Valuation is the discounted present value of a stream of future cash flows. All other methods of valuation like price/earnings ratios and dividend yields may reveal whether transaction prices are high or low, but they do not produce a *value*. The key word in that definition of valuation is “future”. Valuation is nothing more than a forecast of the future. As we can never know the future, *all* valuations are uncertain. If I may repeat the quotation from Frank Knight, “At the bottom of the uncertainty problems in economics is the forward-looking character of the economic process itself”. This is a dilemma from which there is no escape.

The dogma of efficient markets, which depends on the existence of an equilibrium price, gives the impression that valuation is a hard number. Efficient market theory belittles those investors who approach valuation in any setting other than rationally-determined equilibrium or who tolerate speculative trading. Nevertheless, once we accept the notion that the future is uncertain, *all* investment activity, in all forms, is revealed as speculative.



To expect that we could create conditions in which stock markets continuously arrive at rational valuations is as useless and romantic as expecting that the managers of the Gosplan in the Soviet Union – no matter how well intentioned – could have consistently produced the optimal result for the economy as a whole. In the same vein, it would be naive to expect bank-based systems of financing economic growth, in contrast to stock market systems, to arrive at more optimal capital allocations. I need only cite Japan to clinch the argument. All long-term decisions, one way or the other, are vulnerable to unexpected and disagreeable outcomes.

A final word links this conclusion back to the similarities between the stock market and insurance. Insurance also provides liquidity when it pays off on a loss. Note what I just said: insurance transfers cash to policyholders with losses. But insurance companies do not do business by limiting their assets to 100 per cent cash. They own stocks, bonds, mortgages, and real assets. This means that they can meet their obligations only if the cash flows from their non-cash assets are sufficient for the purpose. Although a significant portion of those non-cash assets are in debt instruments so that they are not perpetuities, the riskiness of the cash flows from those instruments depend on the credit quality of those instruments, which in turn depends on the health of the economy as a whole.

Ultimately, then, people who expect insurance companies to make good on losses on irreversible decisions are facing the same kinds of risks as investors seeking liquidity in the stock market. Without a vigorous economy and buoyant capital markets the whole game comes to an end, and all risks pay off as losses.

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