

MANAGING FINANCIAL AND INSTITUTIONAL RISK AND ITS IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

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Summary

The severity of financial risks can be greater than most health and environmental risks. The relative stakes per percentage risk are much larger in financial risks than in many environmental risks. This article outlines how financial economists think about managing financial risks. Consideration is given to the origins of financial risk and risk aversion—a key part of choice under risk—and then to what strategies and institutions people have invented to manage financial risks. An examination is then made of how society could incorporate these lessons from financial risk management into how governments deal with environmental risk and sustainable development.

1. Introduction

Markets are a big part of everyday life; voluntary exchange regulated by competition is important in people's lives. Market prices provide information that allows the efficient coordination of decentralized economic decisions. Markets succeed when prices accurately define the trade-offs faced such that scarce resources are allocated to their highest valued use in society.

But when confronting complex risks to environmental and natural resources, markets often fail. Societies produce unacceptable health and safety risks when a market price fails to communicate social desires and natural constraints accurately. Prices might misstate the economic value of a reduction in health risk from an environmental threat, or there might not be any prices to signal the value. This may drive a wedge between what people want individually and what society wants as a collective. Left alone, a market might produce too few or too many goods or services.

But when missing or failing markets are a problem, creating markets can be part of the solution. Rather than turning to more government regulation or to collaborative decision-making processes, society can use the lessons learnt from how risk is managed in other situations, for instance by using financial markets. The fact that people have been creating and using markets to manage risks constructively for the last three centuries shows the ability of markets to manage risk in an effective way.

In fact, the severity of financial risks can be greater than most health and environmental risks. The relative stakes per percentage risk are much larger in financial risks than in many environmental risks even though this is not much considered. An equivalent percentage reduction in financial risk relative to environmental health risk may yield significantly more return in present value terms even if a statistical life is valued at \$5 million—and more financial wealth, some of which will be invested in health, might be more cost-effective than a direct reduction in the environmental risk. Strategies that promote more wealth and more health, human and environmental, can move society closer to the goal of sustainable development.

This article briefly outlines how financial economists think about managing financial risks. It starts by considering the origins of financial risk and risk aversion—a key part of choice under risk, and then goes on to consider what strategies and institutions people have invented to manage financial risks.

2. The Origins of Financial Risk

Financial securities provide a tool for saving; wealth today may be set aside by purchasing a security. This security specifies how the invested funds, with an additional return, will be repaid in the future. Many such securities are risky. Consider equity shares in a firm (company) as an example. A person who owns such shares is typically entitled to periodic repayments over time in the form of dividends, and also owns a part of the firm that can be resold. However, the payments from these shares are not guaranteed. The firm may decide to change its dividend payments and the resale value of the equity changes as the prospects and performance of the firm change. The effect on the investor's future wealth from the purchase of such shares is therefore uncertain, or in other words, risky.

Likewise, virtually any security issued by any institution carries some form of risk. Even so-called fixed-income securities that promise fixed payments carry risk—even if these securities are issued or backed by a financially sound institution. When this institution is the government of a country that may simply print the money required to make the payments, there may still be risk arising from uncertain inflation, the potential need to reinvest some payments, and the potential need to sell the securities before all the payments are made. Additional risks arise if the payments are promised in a currency different from the investor's domestic currency. There is then a risk that the exchange rate will change. Also, if a foreign government promises to pay in a currency other than its own, there is the risk that it might not be able to make the payments in full.

When a person buys correctly priced insurance or engages in strategies that are solely designed to reduce financial risk, this person reveals an aversion to risk. Since such behavior is common, it can be inferred that many people are averse to risk. The human tendency to be risk averse is confirmed by many other observations. Another important such observation is the risk-return relationship: riskier securities earn higher average returns. This relationship is commonly observed in financial markets around the world, and so provides evidence that most people are averse to financial risk.

The reason for this is as follows. If the preponderance of participants in financial markets were neutral (indifferent) to risk, or even risk loving, then these people would direct their investments entirely towards high-risk securities as long as these earn higher returns (as long as the risk-return relationship persists). This would then cause a persistent imbalance in the financial market, with there being more buyers than sellers for high-risk securities, and vice versa for low-risk securities.

But such a persistent imbalance in financial markets is not observed. On the contrary, the continual price adjustments in financial markets work to remove such imbalances, and in the process, these price adjustments have created a persistent risk-return relationship. Therefore, most financial market participants must be averse to risk. The risk-return relationship induces risk-averse investors to invest in risky securities for which they receive an additional return as a compensation for the additional risk.

Briefly, consider the nature of risk aversion a little more formally. It is said that an investment is an actuarially fair gamble if the expected monetary gain on the investment is exactly zero. An investor is defined to be risk averse if the investor always prefers not to take actuarially fair gambles. A risk-averse investor will make a risky investment only if this investment is expected to increase the investor's wealth.

Risk aversion arises from the benefit or welfare that investors derive from monetary gains or losses. It can be shown mathematically that if an investor always derives a lower benefit from an additional dollar as the investor's wealth increases, i.e., the investor's utility from wealth is a concave function of wealth, then the investor is risk averse. In this situation, a dollar lost reduces welfare more than a dollar gained increases it. The investor, therefore, shuns risks that leave the position only even on average.

It can be proved mathematically that a risk averse investor will invest a positive proportion of available wealth in a risky portfolio, rather than investing only in a risk-free asset, if and only if the risky portfolio offers a compensation for its risk. This provides the formal motivation for inferring from the observed risk-return relationship that investors are, at least on average, risk averse.

Since people tend to be risk averse, the management of financial risk is important. Perhaps the most fundamental control of financial risk is to select carefully how much risk is taken in the first place. This means adopting a solid investment process, a routine for making financial decisions. Casual observation suggests that very poor investment outcomes often come as complete surprises, as something thought not possible. A thorough investment process, in which the risk of the investments as well as their

potential return is considered, can prevent such rude surprises. This process has also implications for how environmental risk may be managed.

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Bibliography

Fama E. F. (1970). Efficient capital markets: a review of theory and empirical work. *Journal of Finance* **25**, 383–417. [A seminal piece on efficient markets.]

Froot K. (1999). *The Evolving Market for Catastrophic Event Risk*. NBER Working Paper W7287, 54 pp. Cambridge, Massachusetts: National Bureau for Economic Research. [A discussion on how to use derivative securities to insure against catastrophic risk.]

Huang C.-F and Litzenberger R. H (1988). *Foundations for Financial Economics*. 364 pp. Amsterdam: North Holland. [A thorough introduction to the theory of finance.]

Leland H. (1992). Insider trading: should it be prohibited? *Journal of Political Economy* **100**, 859–87. [A theoretical discussion on the advantages and disadvantages of insider trading.]

Malkiel B. G. (1996). *A Random Walk Down Wall Street*. New York: Norton. [A popular introduction to finance.]

Samuelson P. (1965). Proof that properly anticipated prices fluctuate randomly. *Industrial Management Review* **6**, 41–49. [A seminal paper on efficient markets.]

Sharpe W. F. (1964). Capital asset prices: a theory of market equilibrium under conditions of risk. *Journal of Finance* **19**, 425–442. [A seminal paper on the theory of capital asset pricing.]

Sharpe W. F., Gordon J. A., and Bailey J. V. (1999). *Investments*, Sixth Edition, 962 pp. New York: Prentice Hall. [A classic text on investments.]

Biographical Sketches

Tommy Stamland is an assistant professor of finance at the University of Wyoming where he teaches corporate finance, investment management, and the theory of finance. He is from Norway and earned his business degree, Siviløkonom, at the Norwegian School of Economics and Business Administration. His PhD in finance was earned at the University of California, Berkeley, where he wrote his dissertation on partially informative signaling games. A part of this work was published in the *Journal of Economic Theory* in 1999. Stamland's current research continues on the theory of partially informative signaling and on empirical investigations of such phenomena. In addition, Stamland works on methodological issues in the estimation of the willingness to pay for mortality risk reduction. This work considers issues in the estimation of this willingness-to-pay from revealed preferences in which people trade-off wages and mortality risk in their choice of profession, or pleasure and mortality risk in their choice of food consumption.

Jason Shogren is the Stroock Distinguished Professor of Natural Resource Conservation and Management, and is a professor of economics at the University of Wyoming. His research focuses on the behavioral underpinnings of private choice and public policy, especially for environmental and natural resources. Before returning to his *alma mater*, he taught at Iowa State and Yale. In 1997, Shogren served as the senior economist for environmental and natural resource policy on the Council of Economic

Advisers in the White House. Currently, he serves on the Environmental Economics Science Advisory Board for the US Environmental Protection Agency, and the Intergovernmental Panel on Climate Change. Governor Geringer recently appointed him to Wyoming's Environmental Quality Council. Shogren is also on the advisory committee for *Enlibra*, the Western Governors Association's new doctrine for environmental management. He was an associate editor of the *Journal of Environmental Economics and Management*, and the *American Journal of Agricultural Economics*. Recent publications include *Environmental Economics* (Oxford University Press, 1997), *Private Property and the Endangered Species Act* (University of Texas Press, 1999); *Endangered Species Protection in the United States* (Cambridge University Press, 2001); and papers on risk, conflict, cooperation, valuation, environmental policy, and experimental economics. The American Association of Agricultural Economics selected his essay with J. Tschirhart on the Endangered Species Act at 25 as the Best Choices Article for 1999.

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