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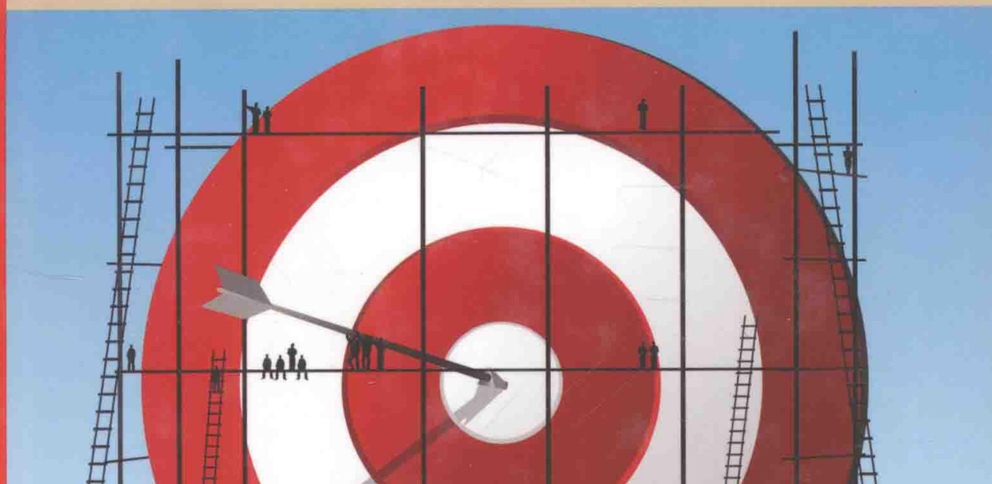
The Sortino Framework for Constructing Portfolios

Focusing on Desired Target Return™ to Optimize Upside Potential Relative to Downside Risk



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This book is dedicated to:

Dean James Reinmuth, without whose support and guidance I never would have completed the Ph.D. program

Jim Kaffen, who co-founded SIA, named the firm, and sacrificed much to make these advancements in portfolio construction available to investors

My long time colleague Hal Forsey, who breathed life into my ideas

My wife, Karen, who puts a song in my heart and a smile on my lips

Contributors

Hal Forsey earned a Ph.D. in mathematics at the University of Southern California and a Masters in operations research from the University of California–Berkley. He is a professor emeritus of mathematics at San Francisco State University and has worked closely with Dr. Sortino for over 25 years. Dr. Forsey wrote the source code for all of the models developed at the Pension Research Institute, including the software on the CD in the book *Managing Downside Risk in Financial Markets*, edited by Sortino and Satchell. He has co-authored many articles with Dr. Sortino, and his wide consulting experience in applied mathematics has been invaluable to the SIA executive team.

William David Hand has been the CEO of Hand Benefits & Trust since 1991 and is an executive vice president of Benefit Plan Administrators, Inc. David is a graduate of Auburn University with a Bachelor's degree in mechanical engineering. He is an Enrolled Actuary (EA), a member of the American Society of Pension Professionals and Actuaries (ASPPA), a member of the American Academy of Actuaries (AAA), a registered securities representative, and a registered general securities principal. An active member in his community and a recognized leader in the pension industry, David has served as past chairman of the ASPPA Business Owners Conference and currently serves on the ASPPA board of directors for the Counsel for Independent 401(k) Recordkeepers (CIKR). David frequently speaks before professional organizations on such timely topics as the impact of legislative and regulatory changes in the public and private pension and employee-benefit industry and the impact of technology on the delivery of benefit services. David has most recently been featured in an article with Dr. Sortino on 401(k) retirement income risk that has appeared in national publications.

David Hopelain has a degree in economics from Stanford and a Ph.D. in organizational studies from the University of California–Los Angeles. He spent a year as a postdoctoral fellow in Stanford's organizational studies program and 14 years as an adjunct professor of management at the Annenberg School for Communication at the University of Southern California. As a management consultant for over 20 years, he has a long successful record of advising clients on the interaction between changing markets and developing technologies. His clients have included American Airlines, AT&T, ICL (U.K.), Fujitsu, Ltd., U.S. Department of Defense, Citicorp, Pacbell, GTE, Baxter Corp., Babcock & Wilcox, U.S. Department of Energy, and several large professional groups adapting to changing business conditions. Dr. Hopelain also has technical management experience as a supervisor and project manager at the Jet Propulsion Laboratory, California Institute of Technology, and as a project manager at Lawrence Berkeley Laboratory, University of California. Dr. Hopelain is the founder of an early-stage company, Synergy Automotive Designs, Inc., that is heading into its technical development phase. He and his wife, Patricia, live in North Fork, California, where they raise Arabian horses.

Bernardo Kuan received his B.S. in electrical engineering from the University of North Dakota, a graduate degree in engineering from Santa Clara University, and an M.B.A. in finance from San Francisco State University. He has been with DAL Investment Company (money management, *NoLoad FundX* newsletter publisher, and upgrader mutual fund advisors) since 1997, working in the technology, operations, data, research, and compliance departments.

Christian S. Pedersen was awarded a B.Sc. in economics with first-class honors and an M.Sc. in discrete and applicable mathematics from the London School of Economics and Political Science. He attended Trinity College and Cambridge University, where he was awarded a M.Phil. in economics and a Ph.D. for a thesis entitled "Four Essays on Risk in Finance." He has published articles in the fields of financial risk and decision theory, and he has acted as referee for the *Journal of Applied Econometrics*. His current research interests include relating decision theory and theoretical risk analysis to empirical finance, in particular asset pricing, risk measurement, and performance measurement. He is a member of the Decision Analysis Society, a subsidiary of the Institute for Operational Research and Management Science (InfORMS). In 1999, he joined the financial consulting firm Oliver, Wyman & Company in London as an associate consultant.

Auke Plantinga is an associate professor in finance. He is involved in research and teaching in the field of finance, in particular portfolio management. He specializes in methods of performance measurement of investment portfolios and has experience from past positions in ALM modeling and pension funds. He is also a partner in HEAP Consulting, a firm specializing in financial consulting and web-based solutions in finance.

James A. Pupillo, CIMA®, CIMC® is an Institutional Consulting Director for a major investment firm. These directors are recognized for providing extraordinary investment consulting services and being qualified to serve the firm's Institutional and ultra-high-net-worth private family office clients.

Jim was chosen as one of America's Top 100 out of 7000 Investment Management Consultants screened in 2006, 2007, and 2008 and ranked #1 in Arizona for 2009 by *Barron's Magazine*, selection related to ethical standards, professionalism and success. Jim earned the Certified Investment Management Analyst (CIMA) designation in 1997, and Investment Strategist Certification, both offered by the Investment Management Consultants Association (IMCA) through the Wharton

Business School, University of Pennsylvania. In 2006 he completed as valedictorian the Accredited Investment Fiduciary (AIF) Program conducted by the Center for Fiduciary Studies.

Jim earned the Certified Investment Management Consultant (CIMC) designation in 1994 from the Institute for Certified Investment Management Consultants. He has also obtained the Certified Investment Management Analyst (CIMA) designation and the Investment Strategist Certification, both offered by the Investment Management Consultants Association (IMCA) through the Wharton Business School, University of Pennsylvania. He successfully completed as valedictorian, the Accredited Investment Fiduciary (AIF) Program in 2006 conducted by the Center for Fiduciary Studies, an internationally recognized training organization for fiduciaries.

Jim was past President of the Association of Professional Investment Management Consultants (APIC) and the Certified Investment Management Consultants (ICIMC). Jim has written several published articles on portfolio construction and fiduciary responsibility. Additionally, he contributed a chapter to the book *Core Satellite Portfolio Management*, which addresses the topic of optimally blending active and passive investment strategies regarding portfolio construction for fiduciaries. Jim graduated with a Bachelor of Science degree in Management-Administration and Marketing from Indiana University, Bloomington.

Neil Riddles is the founder of Riddles Investment Consulting, a resource to the investment management industry that offers expertise in performance measurement, performance standards (GIPS), benchmarking, and risk modeling. Neil has served as director of performance measurement for a large money manager specializing in international investments. He has held the positions of chief operating officer and chief risk officer of a smaller investment advisory firm. In the past, Neil worked for a pension consulting firm and has worked on the floor of the American Stock Exchange with an options market-making firm. He has served on various committees and subcommittees of the Association for Investment Management and Research (AIMR) Performance Presentation Standards (PPS) and Global Investment Performance Standards (GIPS) continuously since 1993. Currently, he is chairman of the GIPS council and is a member of the GIPS executive committee. He is a chartered financial analyst and holds a certificate in Investment Performance Measurement. Neil is a frequent speaker and writer about investment performance and risk related topics.

Stephen Satchell is a fellow of Trinity College, reader in Financial Econometrics at the University of Cambridge, and visiting professor at Birkbeck College, City University Business School, and University of Technology, Sydney. He provides consultancy for a range of city institutions in the broad area of quantitative finance. He has published papers in many journals and has a particular interest in risk. Dr. Satchell was the editor of the first issue of *Journal of Asset Management* (July, 2000) and the series editor of the book series *Quantitative Finance* (Elsevier).

He is also the editor of the journal *Derivatives, Use, Trading, and Regulation* and is a member of the editorial boards of *Applied Financial Economics*, *Journal of Financial Services Marketing*, *Journal of Financial Econometrics*, *Journal of Bond Trading and Management*, and *European Journal of Finance*.

Frank A. Sortino, chairman and chief investment officer of Sortino Investment Advisors, is professor emeritus of finance at San Francisco State University. He founded the Pension Research Institute (PRI) in 1980 as a nonprofit organization, focusing on problems facing fiduciaries. When Dr. Sortino retired from teaching in 1997, the University authorized PRI's privatization as a for-profit think tank. PRI has conducted research projects with firms such as Shell Oil Pension Funds, Netherlands; Fortis, Netherlands; Manulife, Toronto, Canada; Twentieth Century Fund; City and County of San Francisco Retirement System, Marin County Retirement System, and the California State Teachers' Retirement System. The results of this research have been published in many leading financial journals and magazines. Prior to teaching, Dr. Sortino was in the investment business for more than a decade and was a partner of a New York Stock Exchange firm and senior vice president of an investment advisory firm with over $1 billion in assets. He is known internationally for his published research on measuring and managing investment risk and the widely used Sortino ratio. Dr. Sortino serves on the board of directors of the Foundation for Fiduciary Studies and writes a quarterly analysis of mutual funds for *Pensions & Investments* magazine. Dr. Sortino earned an M.B.A. from the University of California–Berkeley and a Ph.D. in finance from the University of Oregon.

Ronald J. Surz is president of PPCA, Inc. (www.PPCA-Inc.com), an investment technology firm in San Clemente, California, that specializes in performance evaluation and attribution software, primarily for financial consultants and sophisticated institutional investors. Ron is a principal of Risk-Controlled Growth (RCG), LLP, a fund of hedge funds manager, and a principal of Target Date Analytics (TDA), LLC (www.TDBench.com), which provides benchmarks and research on target-date life-cycle funds. Ron has served on several boards and councils, including the Investment Management Consultant's Association (IMCA) board of directors, the CFA Institute's Investor/Consultant GIPS subcommittee, and the advisory boards of Capital Markets Research, Rockwater Hedge, RCG, and Sortino Investment Advisors. Mr. Surz earned an M.B.A. in finance at the University of Chicago and an M.S. in applied mathematics at the University of Illinois, and he holds a Certified Investment Management Analyst (CIMA) designation. He is published regularly in financial journals and books and co-edited the book *Hedge Funds: Definitive Strategies and Techniques* (2003, Wiley).

Robert van der Meer earned a degree in quantitative business economics and his Ph.D. in economics at Erasmus University, Rotterdam, and is a Dutch CPA (RA). Since 1989, Dr. van der Meer has been a professor of finance at the Rijksuniversiteit

Groningen. His business career started in 1972 with Pakhoed (international storage and transport company now known as VOPAK) in the Netherlands, and from 1976 until 1989 he worked with Royal Dutch/Shell in several positions in the Netherlands and abroad. During this period, he was also managing director of investments of the Shell Pension Fund. From 1989 until 1995, he was with AEGON as a member of the executive board, responsible for investments and treasury. From 1995 until 2002, he was with Fortis, first as a member of the executive board of Fortis Amev NV and then, beginning in 1999, as a member of the executive committee of Fortis Insurance Holding NV. On this board he was responsible for the investment policy of the Fortis Insurance companies. Since 2002, he has been an independent advisor and serves on a number of nonexecutive boards or in advisory positions with investment companies, pension funds, real estate management companies, insurance, and information and communications technology companies. In addition, he is a board member of several professional bodies and charity organizations and is a member of the Enterprise Chamber (*Ondernemingskamer*) at the Amsterdam Court of Appeal.

Prologue

This book is not about making money. It is about helping clients accomplish goals. Making money is how they accomplish the goal; it is not the goal itself. It is also not about how to time the market or pick winners in the stock market. *As the book cover suggests, it is a framework for constructing portfolios based on other people's theories that we tested at the Pension Research Institute*. The focal point of the construction process is the Desired Target Return™ (DTR™),[1] which links the cash inflows (assets) to the cash outflows (liabilities). The basic framework is to maximize the potential to exceed the DTR subject to the risk of falling below the DTR.

Again, the theories presented here are not mine. What I have done for over 25 years is to test theories that I thought might make an improvement in portfolio construction. What I present here are those few theories that passed years of testing. Of course, there is no guarantee it will work in the future, and nothing can be expected to work all of the time in the world of finance.

While I was the architect of this framework for constructing portfolios, the co-authors performed tasks necessary to actually build it and implement it.

Dr. Hal Forsey played the most important role. I learned enough math in 8 years of graduate school to explain to Hal what I was trying to do. Hal had the amazing quantitative skills to make my vision become a reality. For 5 years, every professor I talked to told me it was impossible to adapt Peter Fishburn's theory to an asset allocation model. Hal proved them wrong by utilizing an obscure optimizer he learned about at a University of California–Berkeley colloquium. This optimizer, called the *Forsey–Sortino optimizer*, will be available at no charge to anyone who purchases this book. To access the optimizer, go to http://booksite.elsevier.com/Sortino, password SOR3QA73QB72. No royalties of any kind apply. It is our hope that others will use the source code to build improved versions. To distinguish such improved versions from optimizers that are not based on our work we ask that a reference be made on the opening screen (e.g., "based on the original Forsey–Sortino optimizer").

Ron Surz was among the first to apply capital asset pricing model (CAPM) theory in the late 1970s when he was an executive with A.G. Becker. It took several years for me to convince Ron that downside risk was a superior way to look at risk compared to standard deviation or beta, but then it took several years for Ron to convince

[1] DTR and Desired Target Return are trademarks of Sortino Investment Advisors.

me that I should use his style indexes instead of the Russell indexes. I had tested a number of different indexes and always got very similar results. I came to believe all indexes were basically the same. When I finally gave in and tested Ron's indexes, I was very surprised to find it made a dramatic difference in determining which managers came into solution and improved the performance of my models.

Herr Dr. Professor Robert van der Meer was a senior executive with the Shell Oil pension fund management team in the late 1980s when I first met him. He invited me to spend the summer teaching a class with him at Erasmus University in Rotterdam and do some testing of the asset allocation model we had developed at the Pension Research Institute. That is where I first heard the term "Herr Doctor Professor," which is the highest sign of respect a student can show. The result was the first of many papers we wrote together about the application of downside risk and upside potential (see www.sortino.com for a partial list of publications). As Robert moved to top-level executive positions at Aegon and Fortis, he pioneered the wider use of these new concepts in Europe. Now he is writing a new textbook that will, for the first time, include chapters on downside risk and upside potential.

David Hopelain's first teaching job, after receiving his Ph.D. in organizational theory at UCLA, was at the University of Oregon, where I was in the Ph.D. program in finance. His classes were among the most enlightening I attended. Dave was one of the founding members of the Pension Research Institute in 1980. In the first research project at PRI he helped develop the relationship between goals and objectives expressed in this book. Dave is a very creative thinker, as you will see in the final chapter.

Jim Pupillo is described in *The Tipping Point* as the one who makes things happen. Even great innovations in finance are worthless until somebody uses them to benefit clients. After years of heroic effort, Jim was able to convince his firm's top management that the overlay process developed by Sortino Investment Advisors (SIA) would be a valuable service for his clients. It is no wonder that *Barron's* (February 9, 2009) referred to Jim as an innovator when they named him the "Top Advisor" in his state.

David Hand is following in the footsteps of his father and grandfather by developing an innovative service for 401(k) participants. David's father offered one of the first prototypes of the 401(k) plan to receive IRS approval in 1971. David and I wrote an article for the *ASPPA Journal* (Summer, 2008) that touches on some of the issues developed in Chapter 5.

Neil Riddles' expertise is in performance measurement. Neil first became interested in downside risk and upside potential to measure performance when he was senior vice president and director of performance measurement at Templeton. Neil contributed a chapter to *Managing Downside Risk in Financial Markets* (2001, Butterworth–Heinemann) and provided a spreadsheet that would enable consultants to calculate downside risk. This contributed to the widespread use of the Sortino ratio. Neil will point out the difficulties portfolio managers face when trying to implement the ideas presented in this book. Neil has to deal with the exigencies of the marketplace—the way the world is, as opposed to the way it ought to be. I have great respect for Neil, although I disagree with some of his points of view. I think dissenting views should be heard and welcome Neil's contribution to this book.

All of the co-authors in this book are people I worked closely with in the development of the material in their chapter. They were chosen for their expertise in specific aspects of this new approach, and I am deeply grateful to each of them for their contribution to this book and to this portfolio construction methodology.

A number of people have asked me to start a blog where those who are interested in post-modern portfolio theory (PMPT) can meet and exchange ideas. Interested parties may now go to http://pmpt.wordpress.com.

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