The Investor's Guide to Fidelity Kunds

Winning Strategies for Mutual Fund Investing

Peter G. Martin Byron B. McCann

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Peter G. Martin M.Sc. (Applied Physics), Durham, U.K.

and

Byron B. McCann M.B.A. (Finance), Stanford

Second Printing

Venture Catalyst Redmond, Washington To America, for fostering the best investment climate in the world; and Japan, for reminding us of the importance of saving.

To Fidelity Investments, for the mutual fund innovations that have revolutionized individual investing.

To our families, for putting up with so much for so long.

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WHY READ THIS BOOK?

From the explosive growth of the mutual fund industry in the 1980s, the giant Fidelity family has emerged as a clear market leader. With more than 100 funds under management, Fidelity offers a unique opportunity to focus your investments in almost any class of securities, domestic or international. Switching your assets among funds is quick and easy, and trading costs are essentially zero.

Focusing your investments on sectors of the global economy that have the greatest potential for profit is one way to beat the market averages. Combine this approach with the safety provided by each fund's inherent diversification, and you have an investment vehicle with all the advantages of trading individual securities, but none of the disadvantages.

Just as with any other investment, it is essential to develop a strategy for selecting which funds to buy and sell—and when. These decisions cannot be left to the emotions, or to chance.

In this independent guide we explain some of the methods used today for managing Fidelity fund investments. But most of all, we develop a straightforward money-making strategy you can use yourself. We also show how the strategy is tested so you can be confident it will continue making money for you in the future.

We clear up some of the common misconceptions about investing with Fidelity, and we show how to avoid the pitfalls that can prevent even the best strategy from working for you.

Using the techniques described in this book, you should be able to beat the market by an average of 10 to 15 percentage points per year, without assuming more than market levels of risk.

If you plan to develop an investment strategy of your own, you will find this book full of useful tools for design and testing. We have included historical price charts and statistics on Fidelity's retail funds.

Fidelity is a broadly diversified financial services company, and space does not permit in-depth coverage of all its products and services. Our goal is to deal comprehensively with matters of interest to mutual fund investors.

Statistical data in this book are current as of December 31, 1988. Information on Fidelity products and services has been updated through March 15, 1989.

As researchers into mutual fund investment strategies, we have first-hand experience of what Fidelity investors do right, and what they do wrong. By sharing these insights with you, we hope to put you on the path to financial security.

PETER G. MARTIN BYRON B. MCCANN

Seattle, Washington April 1989

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Note to Second Printing

The Diversified Portfolio of funds described in this book includes Fidelity's High Income Fund (since renamed Capital and Income Fund). Because of a change in this fund's fee structure, it should be replaced by the Investment Grade Bond Fund (formerly Flexible Bond Fund).

Fund names and price charts throughout the book have been updated through July 1992. We have also corrected minor typographical errors, but no other changes have been made for this printing.

Chapter 1 INTRODUCTION

In writing this book we assumed that many investors share our concerns: How do we make a substantial amount of money without exposing ourselves to unreasonable risk? How can we devise a decision-making approach that eliminates emotional reaction to random events in the marketplace? How do we construct a system that is easy to operate and absolutely clear in terms of what to do? Finally, how do we determine whether the system will continue to work in the future?

Although those goals are quite ambitious (modern investment theory says they are practically impossible) we shall show you that they are achievable. Extensive thinking and research advanced us toward our ambitions and the innovations of Fidelity Investments made them reality. The background on Fidelity and the chapters on investment practices are quite useful, but the power of this book lies in the details of a trading system that takes advantage of Fidelity's unique products and services, and some small but significant market inefficiencies.

The resolution of our concerns leads us ultimately to the creation of a practical and truly objective investment system that permits us to make reliable, routine decisions. Every other consideration is secondary and supportive of this goal. We actually provide line-by-line code that you can copy onto a personal computer spreadsheet program to run the system and determine what funds to invest in yourself. This gives you a weapon that is as effective as those the professionals use.

You should be asking yourself, "Why are they willing to share these great secrets?" First, human nature being what it is, few readers will actually implement the systems described. People procrastinate. This tendency, which is one of the causes of unsuccessful investing, will limit the use of the system. Second, and more important, the system's design permits many variations that still generate above-market returns with less risk. One of our criteria was to develop a statistically rigorous

investor needs to do is to rely upon objective data to determine whether a temporary market condition can be exploited for profit. The best preventative medicine for emotional investing is understanding risk.

We will show you what risk really means and how to manage it. There is no reason to accept a level of risk that you are uncomfortable with. Sleeping well at night is as important as building wealth. You simply need to know how to measure risk, adjust for it, and still reach your goals.

What may be gambling or speculation to one person is investing to another. The true nature of investing is to be able to understand the fundamentals to determine if what is perceived by others is truly reality or just a temporary, emotional extreme. Any investor who can get even a small handle on the difference between reality and perception can produce excellent results. An investor who can accurately predict the best fund to be in each week can produce better than a 500% return per year on average. Since we know that is an unrealistic target, we realize that only modest forecasting ability is needed to beat the market. The high efficiency of markets makes it difficult to forecast price behavior, but explaining just a bit of it yields excellent results.

Often people wonder how other approaches compare to each other. We address this issue by showing you tests of other more widely used mechanical strategies. You will discover that they do improve performance from a buy-and-hold strategy but do not approach what is possible. Don't forget, however, that a simple buy-and-hold strategy often beats an emotional, in-and-out strategy. If this book merely helps you avoid the latter, then consider your investment in reading it a success.

We encourge you to understand how the different funds behave and the meaning of return, risk, and performance. Try out the mechanical trading system provided before you commit actual funds. Practice some prudent investing principles, such as regular saving, and you will have an edge against other, less disciplined investors. We believe you will become more comfortable in your investment outlook and will find that investing can be done quite simply with less worry.

The world of investing is becoming more complex. Other countries' economies are shifting in influence. Business trends of increasing debt affect performance. We are confronted with bewildering economic statistics and a mind-boggling array of investment options. New types of securities are born each day. How does an amateur keep up with these developments? If the members of the Federal Reserve don't agree on the direction of interest rates, how can we expect to?

Our answer is to understand some common characteristics about investment behavior and to use in decision making a system that monitors results objectively. We cannot predict the future. We cannot be experts in every industry or each country's economy. We can, however, make timely trade-offs between risk and return according to statistically tested rules. We can discipline ourselves enough to limit emotional reactions and to act quickly. The evidence for systematically reaching your financial goals is powerful. As investors and researchers, we have not found a better approach than the one revealed in this book.

Chapter 2 WHY INVESTORS CHOOSE MUTUAL FUNDS

For individuals, mutual funds are the preeminent investment instruments of our time. More than 2,700 funds are listed daily in the financial pages, with combined assets of more than \$800 billion.

This popularity is easy to understand. Among the major advantages of mutual funds for individual investors are:

- Your portfolio is actively managed by an investment professional.
- The large number of securities held by each fund greatly reduces fluctuations in your portfolio's value.
- You can get at your money when you need it, without hassles or delays.
- You avoid the high commission costs incurred when individuals buy and sell stocks directly.

What is less widely understood is that the *diversity* of investment vehicles now found within the larger fund families creates new opportunities for achieving a total return well above that of the market, without assuming additional risk or incurring excessive trading costs. How you can achieve this is explained in chapters 9 through 12.

This chapter explains how mutual funds can offer all these advantages and points the way to choosing among the many fund families available.

What Is a Mutual Fund?

A mutual fund pools together the investments of many individuals, typically thousands. The fund's manager is charged with earning the highest possible return on their behalf, consistent with the fund's objection.

tives. For example, the manager of a "growth and income" fund will seek out the dividend-paying stocks and bonds that he or she believes offer the greatest return. The fund's portfolio usually contains dozens or hundreds of different securities; this **diversification** greatly reduces risk for investors.

There are two basic types of mutual fund. An **open-end fund** sells as many shares as investors want to buy, although occasionally a fund will close itself to new investors in order to avoid the loss of flexibility that comes with very large size. New money is invested as received. Open-end funds also guarantee to buy back investors' shares at any time, selling part of their portfolio on the open market if necessary to raise cash. **Closed-end funds** issue a fixed number of shares. These are traded on the stock exchange just like the shares of any public company, and the price is bid up or down in response to changes in supply and demand. This book is concerned only with the more popular open-end mutual funds.

Open-end funds can be further categorized by the sales charges they impose on investors. **No-load funds** have no sales charges at all; **low-load** funds have sales charges in the 1% to 4% range; and **full-load** funds have sales charges as high as 8.5%, although this is often reduced for large purchases. Generally speaking, no- and low-load funds are sold by fund management companies directly to the public, whereas full-load funds are sold through intermediaries such as stockbrokers and investment advisers. This book focuses on no-load and low-load funds, but most of the material covered is applicable to full-load funds as well.

Mutual funds have grown at a phenomenal rate. Over the last 15 years, the number of mutual fund investors grew 5 times, and total fund assets grew 20 times. Mutual funds now outnumber stocks on the New York Stock Exchange.

From the early days of a handful of broadly diversified stock and bond funds, the mutual fund industry has exploded into an alluring array of choices for the individual. Through mutual funds you can now focus your investments in Canadian stocks, foreign bonds, biotechnology companies, real estate, or any of dozens of other investment categories.

The barrage of new investment opportunities invites a reappraisal of conventional investment practices. As we shall show you, the mutual fund industry has made it possible to achieve the advantages of trading individual securities without the disadvantages.

Selecting a Fund Family

Most mutual fund companies offer a variety of funds with different investment objectives. The funds under one management company umbrella are known as a **fund family**. Within a single family it is relatively easy to move your money from one fund to another in response to changing market conditions. Moving money from one family to another is less easy, unless you are willing to pay brokerage commissions.

A perusal of the financial pages of your daily paper will reveal several mutual fund families with a broad range of products. But one group stands out from the crowd through its sheer size and diversity: Fidelity Investments.

As will be demonstrated later, the more funds you have to choose from, the higher the investment return you are able to achieve. For this reason alone, Fidelity would be the fund family of choice. Add to this Fidelity's market leadership in introducing new products and its first-rate investor services, and the choice is clear.

Most investors would prefer to avoid the sales charges imposed by Fidelity's low-load funds, but the increased profits resulting from the breadth of the family's product line far exceed the sales charges. We shall show you how to keep the impact of sales charges at an insignificant level.

Fidelity sales representatives are not paid commissions, so there is no pressure for you to invest. Representatives provide facts in a helpful and unbiased manner and are always willing to mail prospectuses and booklets to help you with your investment decisions. Many investors find this a pleasant contrast to dealing with a stockbroker.

In our comparisons of the Fidelity family with others—Merrill Lynch, Putnam, T. Rowe Price, and Vanguard, for instance—we've found that other families are less desirable for one or more of the following reasons:

Fewer funds to choose from Higher sales charges Less developed investor services Sales pressure from commissioned representatives

We therefore chose to develop our investment strategies around the Fidelity fund family.

Interpreting the Mutual Fund Listings

Mutual fund listings in the financial pages show the **net asset value** per share (NAV) for each fund. This is simply the total value of the secu-

rities held by the fund, divided by the number of fund shares held by investors. When you sell shares in the fund, you receive this price, less any applicable **redemption charges** (deferred sales charges). Funds imposing these charges are indicated by an **r** next to their listings.

Below is a partial listing of Fidelity funds in the format used by the *Wall Street Journal*.

	NAV	Offer Price	NAV Chg.				
Fidelity Investments:							
AgrTF r	11.25	N.L.					
Balanc r	10.58	10.80	-0.01				
BlueCh	10.43	10.64	-0.04				
CA Ins	9.40	N.L.					
CA TF	10.87	N.L.					
Canada	12.24	12.49	+0.06				
CapAp r	13.81	14.09					

For no-load funds—usually indicated by the code **N.L.**—the NAV is also the price you pay when you purchase shares. For load funds the purchase price is shown in a separate column, often labeled **Offer Price**. The Offer Price is simply the NAV plus the applicable front-end **sales charge**.

A fund goes **ex-dividend** when it distributes profits to shareholders. When this happens, the NAV drops by the amount of the distribution, but the total value of your portfolio doesn't change because you receive the distribution, either in cash or automatically reinvested in more shares of the same fund. Funds going ex-dividend are indicated by an \mathbf{x} . Barron's listings include complete details of the amount and type of distribution made.

A z code in place of a fund's NAV indicates that the closing price was not available by press time. A p next to a listing means that the fund charges 12b-1 fees (see page 14). A t means that both redemption charges and 12b-1 fees apply.

Most newspapers show the change in NAV since the previous edition. *Investor's Daily* provides additional fund statistics, including four-week change, year-to-date change, and three-year ranking among all funds.

Advantages of Mutual Funds

After a brief review of the more familiar advantages of investing in mutual funds, we shall move on to some important new benefits arising from innovations created by Fidelity and other industry leaders.

Diversification Means Lower Risk

Risk can be thought of as the chance that your investments will not achieve the results you expect from them.* One key way to lower risk is to put your money in multiple investments—to avoid having all your eggs in the proverbial one basket.

Mutual funds carry many different securities in their portfolios, often several hundred. Fidelity's giant Magellan Fund, with almost \$10 billion under management, was recently invested in 1,400 different companies. This diversification makes mutual funds attractive to individual investors because the exposure to any one security is small. Even if one of the fund's stocks becomes worthless, the impact on the value of your shares would be barely noticeable.

The alternatives for individuals with fairly small portfolios are unattractive. Either you bet everything on a couple of companies, or you suffer high trading costs and mountains of paperwork buying odd lots of stock in perhaps 10 different companies. Studies have shown that owning 1 stock is about 3 times riskier than owning 10 or more. The penalties of high risk exposure can be severe, so achieving diversification should be a primary objective for every investor.

Professional Management Helps

Mutual funds hire managers to identify the best securities to invest in. Although fund managers use a wide variety of selection techniques, they are professionals at the task and usually have many years' experience. Quite apart from their skills, managers have the time to commit to portfolio management. It is not difficult to conclude that most investors are better off with a manager for their portfolio than without.

Fund management is particularly valuable when the target securities are hard to analyze. For example, it is extremely difficult to obtain financial information on foreign companies, and differences in accounting standards make interpreting financial statements a job for experts. Professional management is just as important with securities you have no experience with, perhaps convertible bonds or gold stocks.

Of course, funds charge fees for management services, usually based on an annual percentage of fund assets. Fees vary with the type of fund

^{*} A full discussion of risk is found in Chapter 6.

and are typically in the range of 0.5% to 1.5% per year. For most people this is a bargain. Where else can you hire a group of full-time professional money managers for a \$10,000 portfolio for \$100 a year?

Unless you have a large portfolio and a long-term proven ability to make more profitable stock picks than the mutual fund managers, you'd be financially better off with a mutual fund, and you would save yourself a lot of time as well.

There are some other benefits to professional management. Mutual funds assume much of the responsibility for the paperwork associated with investing. You no longer have to wrestle with mailing stock certificates, studying annual reports, or voting on matters brought before shareholders. And mutual funds provide most of the information you need to report transactions on your tax return.

Professional management also makes it possible to invest in securities that are otherwise difficult to obtain. A good example of this is international funds, which have access to foreign markets not available to individual investors in the United States.

Funds Have Lower Trading Costs

When mutual funds buy and sell securities, the transactions are large. Broker commissions are negotiable and much lower than those paid by individuals making small trades. On common stocks a fund might average 0.5% commissions, whereas the small investor will often pay several percent. With mutual funds the impact of trading costs on investment return is greatly reduced, and the profits you have to earn to pay the broker—before you earn a dime—are much more reasonable.

Trading costs vary considerably from one fund to another. One way to estimate costs is from reported portfolio turnover figures. A fund with 200% annual turnover will pay roughly 5 times as much in commissions as a fund with 40% turnover.

Easy Access to Your Money

When you're selling, mutual funds provide instant liquidity through check writing and bank wire privileges. This avoids the five-day settlement period associated with brokerage transactions, which can be important if you need money in a hurry.

When you're buying, many Fidelity mutual funds accept initial investments as low as \$1,000. Almost all funds accept \$500 initial investments for retirement accounts. Repeat investments can be as low as \$250. With mutual funds it is practical to save small amounts each month—decidedly impractical with direct investing in stocks or bonds. What's more, mutual funds will gladly provide automatic reinvestment

of dividend and capital gain distributions, often small amounts that would be difficult to reinvest elsewhere.

Mutual Fund Innovations

Ten years ago, mutual funds offered only the most basic products and services to investors. You could invest in diversified stock or bond funds, but opportunities for more focused investing were almost nonexistent.

Broad Array of Investment Choices

Since that time, the choices available to the mutual fund investor have increased dramatically to include:

Money market funds International funds Industry sector funds Index funds Asset allocation funds Leveraged funds Variable insurance products

Money market funds are essentially risk-free, and they provide check-writing privileges. They are like an interest-bearing checking account, except that interest rates are considerably higher. They are a convenient place to park your assets when stock and bond market conditions are unattractive.

International funds and **industry sector funds** provide a rich diversity of investment choices. See Chapter 4. As you will see, access to these funds makes it possible to achieve very attractive returns.

Index funds construct a portfolio that exactly matches the performance of a popular market index, usually the Standard & Poor's 500 Stock Index (S&P 500). They are intended for investors who are satisfied with the broad market's rate of return or who believe that attempting to "beat the market" is futile. The Fidelity family does not include an index fund, but Fidelity Fund has almost exactly matched the S&P 500's performance since 1981. It has a similar growth rate, dividend yield, and risk.*

Asset allocation funds have the flexibility to change the mix of stocks, bonds, and money market instruments in their portfolios as market conditions change. For some investors, they are a convenient way to delegate active portfolio management to a professional.

^{*} Fidelity introduced the Spartan Market Index Fund in April 1990.

Leveraged funds specialize in "derivative securities" such as options and futures. These securities provide the risks and potential returns of investments effectively much larger than the amount you committed.

Variable insurance products combine the tax-shelter benefits of established insurance company products with the ability to manage the policy's investments yourself using mutual funds.

Full Line of Investor Services

Switching your assets from one fund to another used to be done by mail, with inevitable delays and the inconvenience of getting signature guarantees from your bank. Today, thanks to Fidelity's pioneering efforts, you can switch funds on the same day by telephone. This gives mutual fund investing the same flexibility as direct investing in stocks and bonds. The ability to switch funds quickly and painlessly is essential to many investment strategies, including those described in this book.

Fund switches are also called **exchanges**. Most Fidelity funds reserve the right to limit you to four exchanges out of the fund each year.

In addition to telephone switching, investor services provided by Fidelity have been expanded to include:

Check-writing privileges
Direct transfers between funds and your bank account
Automated quotes and fund switching
On-line services via your personal computer
Switching between funds and other investments
Hourly trading of fund shares
Buying fund shares on margin
Short-selling fund shares

All these services are discussed in detail later in this book.

Many of the newer services are important for retirees. In the old days, many invested in bonds because they found clipping interest coupons to be a convenient way to ensure a regular monthly income. With today's mutual funds you can invest in anything you want and arrange for a regular monthly redemption to be made and transferred into your checking account. Of course, if your withdrawals exceed the investment return of your portfolio, your principal will be eroded. On the other hand you have the opportunity to achieve higher income than bonds can provide.

While recent innovations have generally provided greater flexibility for investors and made dealing with mutual funds easier, they also offer some new investment opportunities that deserve careful consideration. For example:

- Can you achieve higher returns by investing in funds with an industry or country focus? It makes intuitive sense that the more choices there are, the greater the chance that one of the funds will outperform the market at any point in time.
- Who should use tax-advantaged plans such as variable insurance products? Deferring taxes increases after-tax returns.
- Can trading hourly-priced funds respond faster to market developments and increase overall returns?
- Should fund shares be purchased on margin to increase potential return (and risk)?
- Can profits be made in bear markets by short-selling fund shares?

With these innovations in mutual fund products and services, you can for the first time combine the inherent diversification and low transaction costs of mutual funds with the flexibility to trade actively in almost any type of security. This unique situation stands much of investing's conventional wisdom on its head and suggests the need for a thorough reappraisal of investment strategies.

Disadvantages of Mutual Fund Investing

Having read this far, you might be thinking that mutual fund investing is too good to be true. To balance the perspective, the following subsections present some of the complaints about funds raised by investors.

Funds Don't Save You from Bear Markets

Funds are required by their charter to be almost fully invested in the securities in which they specialize. With the exception of asset allocation funds, this means that very few equity fund managers make a major reduction in exposure to stocks when they see trouble ahead. This leads to complaints that funds don't avoid bear markets. Remember that a fund's responsibility is to achieve the best return possible using the investment approach specified in its prospectus. It is *your* responsibility to decide which approach will do best and when.

If funds *did* make major course corrections in response to market conditions, you would have a different problem to complain about.

Imagine investing in a growth stock fund during a bullish period, only to discover that the manager had invested in cash instead!

There Are Too Many Funds To Choose From

The mutual fund industry exploded during the 1980s. At one point new funds were being launched at a rate of one a day. There are now more mutual funds available to the public than stocks on the New York Stock Exchange. This abundance can potentially turn selecting a fund into a major research project, but we shall show you later how to quickly screen the list down to a manageable basket of serious contenders. We have already cut the list down from 2700 to about 100 by concentrating on Fidelity's retail funds.

Mutual Funds Increase Current Tax Liability

Mutual funds are required to distribute at least 98% of their realized capital gains to shareholders each year, and these distributions are taxed at the individual level. You can avoid this problem by investing directly in common stocks and holding them indefinitely.

This advantage of direct ownership is largely illusory because highperformance investment strategies usually involve frequent trading. Also many investors can shelter their mutual fund gains from current taxes in a retirement plan or variable insurance contract.

Fund Fees Reduce Profits

Although many funds are no-loads, with no sales or redemption charges, there are many low-load and full-load funds around. Several studies have found no evidence that full-load funds outperform no-load funds. This makes sense, because the load is used to compensate sales representatives, not to hire better fund managers.

Fidelity funds are a mixture of no-loads and low-loads. We'll show you later why sales and redemption charges have little effect on long-term investment performance.

12b-1 fees, named after the SEC regulation that authorizes them, provide a mechanism for funds to charge current investors for the marketing costs incurred in attracting new investors. They typically fall between 0.25% and 1.25% of fund assets per year, and are unpopular with investors because they feel that marketing costs should come out of management fees. Several Fidelity funds are permitted to charge these fees, but none has yet done so.

Fees used to be difficult to identify in prospectuses. This drawback was recently corrected by SEC regulations that require funds to use a standard format in reporting performance and fees on the first page of their prospectuses.

The mutual fund industry saw rapid growth in no-load funds up through the early 1980s. As the bull market got underway and funds were flooded with new cash, fees started to creep up. The 12b-1 fee was introduced, most new funds were low-loads rather than no-loads, and some no-loads converted to low-load. Since the Crash of October 1987, funds have had to work much harder for new business, and the trend has reversed. Some funds have dropped 12b-1 fees, and some full-loads have converted to low-loads. Mutual fund management companies are businesses seeking to maximize profits, so we must expect them to charge fees that the marketplace will permit.

Mutual fund fees can make the process of choosing a fund very complex. They are a key fundamental factor in evaluating different funds. We'll show you later that the whole problem can be avoided by concentrating on the performance of funds rather than their fundamentals, since the price of a fund already reflects all periodic fees charged to it. If a fund charges excessive fees, this will hold down its price gains, and your investment strategy will hopefully identify it as a dog.

On balance, the fees charged by no-load and low-load funds are reasonable in view of the advantages offered. If this wasn't the case, the industry would not have seen the phenomenal growth it enjoyed in the 1980s. Later in this book, you'll see that the effect of Fidelity fund fees on investment performance can be made very small indeed.

Conclusions

For most individual investors, the advantages of investing in mutual funds are convincing. Your portfolio is professionally managed, the risks associated with under-diversification are avoided, and fund fees are one of the great bargains in the world of investing.

Products and services introduced by mutual fund families over the past few years have created some unique opportunities. By taking an active interest in your mutual fund portfolio, you should be able to turn these opportunities into extra profits.

Achieving extraordinary returns requires the use of a carefully designed and tested investment *strategy*, compatible with your investment objectives. This book will describe and explain several such strategies for the dedicated reader.

Chapter 3 REALITIES OF INVESTING

So much has been written about the basics of investing—financial planning, investment theory, the behavior of markets, and moneymaking strategies—that it is often hard to sort through the welter of generalities to find concrete, practical advice.

In this chapter we attempt to extract from the clutter the essence of successful investing: the few key principles that really make a difference to your financial well-being. These include the overwhelming benefits of saving early and often; why you must consider investment risk as well as return; what advantages you as an individual have over an institutional money manager; and why a long-term perspective is important in a world of day-to-day fluctuations. These issues apply to all investments, but we shall explain how these principles are specifically applied to mutual fund investing.

Financial Planning Basics

In later discussions we often assume that your investment objective is to accumulate wealth for your eventual retirement. You might have something different in mind, such as saving for a college education, buying a house, or simply maximizing wealth, but in all cases the financial planning considerations are similar. You are seeking financial security and freedom of choice through portfolio growth. And you need an investment strategy that ensures that your goal will be reached without assuming needless risk.

Given a dollar amount you need to accumulate for a particular purpose, the key issues for planning are:

How long do you have to reach your goal? How much can you invest initially? How much additional can you save each month? How much risk are you willing to assume? How long can you defer taxes on profits? How much time can you commit to investing?

The larger your answers to these questions, the easier you will find it to achieve your objective. Here are some rules of thumb to help prioritize these issues:

- Higher returns are usually associated with higher risk. Your tolerance for risk will therefore limit the returns you can achieve. Short-term fluctuations in your portfolio's value must be managed within limits that you are comfortable with.
- As you approach your goal and time is running out, it is important to reduce risk. Unexpected losses at a late date could wipe out earlier gains when you have insufficient time to recover. In retirement planning, rapid portfolio growth should take place in the middle years, when you have a meaningful amount to invest, and when your risk tolerance is higher. If you are saving for next summer's European vacation, it doesn't make sense to assume any risk, because your time frame is so short.
- Don't assume more risk than you need to in order to achieve your financial objectives. If you're in the enviable position of already having accumulated enough wealth to meet your goals, there is no financial incentive to assume risk. Your objective should be conservation of capital, rather than risking your capital for additional unneeded growth. If, like most of us, you need to accumulate more wealth in the years ahead, the risk level of your portfolio should reflect your financial objectives.
- It is much easier to increase wealth by saving regularly than by seeking higher investment returns. It is also much easier if you can shelter your portfolio from current taxes in a retirement account or elsewhere.

Mutual Fund Math—What Return Do You Need?*

Let us illustrate these points with an example. Mr. Jones, 44, has a \$138,600 portfolio and plans to retire at age 65. He estimates that he will need a retirement income of \$3,200 per month (in today's dollars) to support his lifestyle. One way to accomplish this is to purchase an

^{*} This section provides information on mutual fund math. It explains calculations that will be useful for planning and executing your investment strategy, and, like similar sections in subsequent chapters, it is marked with a special symbol. These sections can easily be skipped on a first reading, and referred to as the need arises.

annuity on retirement that will guarantee this income for life. From insurance company tables, you can estimate the cost of an annuity at approximately

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$292 - (2.6 \times \text{age at time of purchase})
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for each dollar of monthly income. In Mr. Jones's case, this amounts to \$123 per dollar, for a total of $$123 \times 3,200 = $393,600$.

At this point a financial calculator is helpful. Given

 $\begin{array}{lll} \text{Present value} & \boxed{PV} & = \$393,600 \\ \text{Inflation rate} & \boxed{i} & = 4\% \text{ per year} \\ \text{Number of periods} & \boxed{n} & = 21 \text{ years} \end{array}$

and solving for future value FV shows that \$393,600 today is equivalent to \$896,923 at a time 21 years in the future. Now, given

 $\begin{array}{lll} Present \ value & \hline{PV} & = \$138,600 \\ Future \ value & \overline{FV} & = \$896,923 \\ Number \ of \ periods & \boxed{n} & = 21 \ years \end{array}$

and solving for the required interest rate $\hat{\mathbf{l}}$ shows that Mr. Jones needs an annual return of 9.30% to achieve his objective. Unless the portfolio is sheltered from current taxes in a retirement plan, this figure would rise to 9.30% / 0.72 = 12.92% for a 28% tax bracket. This is about 1% more than the long-term average return of the stock market indexes, assuming all dividends are reinvested. Mr. Jones must therefore make a major commitment to common stocks if he is to achieve his objective.

His situation can be improved greatly by saving an additional \$500 per month and sheltering earnings from taxes. Now

 $\begin{array}{lll} Present \ value & \hline{PV} & = \$138,600 \\ Future \ value & \overline{FV} & = \$896,923 \\ Savings \ per \ year & \overline{PMT} & = \$6,000 \\ Number \ of \ periods & \hline n & = 21 \ years \\ \end{array}$

and solving for $\hat{\mathbf{i}}$ yields a target return of 7.36% per year. This can be achieved with much less exposure to common stocks. Long-term interest rates are often higher than this, in which case a portfolio of 20-year bonds would *guarantee* that Mr. Jones' goal is achieved. Alternatively, he might invest in stock mutual funds for the first few years, then gradually reduce the risk level so that it reaches a low level at his retirement. Adjustments can be made if major market moves carry his portfolio value significantly above or below the target at any time.

Start Investing Early

It may seem obvious that one should start investing at an early age, but the majority of the population seems unaware of this. According to the Investment Company Institute, half the American workforce has *no* money put away for retirement. Many delay investing for the future until the big event appears over the horizon. This is simply too late, because accumulating enough wealth to ensure a comfortable retirement takes most of us many, many years.

Social Security—regardless of its financial condition—will not provide sufficient income for a comfortable retirement. It is up to the individual to provide a retirement income that will support the desired lifestyle when earned income ceases and health costs rise. Many financial planners figure that you will need 60% to 80% of your previous income once you retire.

Retirement aside, younger people would find it much easier to buy their first home if they began investing at an early age. Financial goals are much easier to reach given more time, and, as will be shown later, you'll also reduce your risks along the way.

Let's take a simple example. Assume you need to accumulate \$500,000 for retirement at age 65 (this could be used to provide you with a monthly \$4,000 income for life). Further assume that you can earn an average of 8% per year on your investments (after allowing for inflation), and that you will shelter the profits from current taxes in a retirement plan. You'd have to put away \$18,415 a year if you started at age 50, but only \$1,930 a year from age 25. This is within the allowable annual contributions to an Individual Retirement Account (IRA).

Life is full of events requiring major financial resources: buying a car, making the down payment on a house, paying for education, starting a new business, covering uninsured losses, or retiring. By starting early, you can ensure that the financial resources are available when needed.

There's another reason for starting early. It has been observed that there are on average only one or two major bull markets in a lifetime. If you start too late, you may miss these and find it difficult to impossible to reach your financial goals.

Pay Yourself First

By "pay yourself first," we mean put part of every paycheck into your savings *before* you spend it on anything else. Most of us lack the discipline to control our discretionary spending, so if the savings don't come first, they get short-changed. Set a fixed percentage of each paycheck—maybe 10 percent—that you will skim off the top every pay

period. It is much easier to meet your financial objectives by saving regularly than by seeking higher investment returns.

By paying yourself first, you're treating yourself like a business. Businesses have to earn profits to invest in the future and ensure their financial security. What you pay yourself is the profit from your employment activity: earned income minus living expenses. If you don't earn a profit, you have accomplished nothing more than another week's survival.

A common cause of business failure is spending money until it runs out. Don't let this happen to you!

Real Growth Comes from the Stock Market

Now that we have reviewed the essentials of financial planning, we turn to some of the realities of investing in the stock market.

Table 3–1 shows the annualized return provided by three different investments over the period 1946–1986. These figures are a real eye-opener. They reveal that only a major commitment to common stocks can yield significant growth in portfolio value after accounting for inflation.

With the exception of the "riskless" money market funds, all fund prices fluctuate in sympathy with the prices of the securities they hold. This creates the potential for capital gains, but it also means that you can lose money on your investment, especially in the short-term. Before investing in stock or bond funds, it is therefore important to understand how their prices behave.

Risk and Return Go Hand in Hand

When evaluating an investment opportunity, its expected total return—dividends plus capital gains—is an important factor. Used alone,

Table 3–1. Compound annual rate of return, before and after adjusting for 4.19% inflation, 1946–1986.

Security Class	Gross Return	Real Return		
Common stocks (S&P 500)	11.93%	7.44%		
Long-term corporate bonds	4.85%	0.64%		
Treasury Bills	4.75%	0.55%		
Source: Adapted from Mark A. Johnson (1988).				

however, total return is a potentially dangerous basis for comparing one investment with another.

The missing ingredient is risk. As a rational investor you will avoid investments with high risk unless two conditions are met. First, you expect to be compensated for greater risk by a higher return; otherwise you'd be better off with a lower-risk alternative. Second, you should be sure you can afford to be exposed to high risk. If things don't turn out as you expect, will you only lose money you can afford to lose?

If someone claims an investment strategy achieves a higher return than the market averages, it is up to you to find out what risk was assumed. With high-risk investments, chance alone ensures that some years will yield fabulous rewards. However, achieving a 200% return in commodity futures is not very useful if next year brings a 95% loss. Keep in mind the old saying: "If it sounds too good to be true, it probably is."

The market does reward the assumption of risk with higher returns over the long run, but the risk level determines the magnitude of the ups and downs you will have to stomach along the way. Sleeping at night depends on assuming a level of risk you are comfortable with.

Since the relationship between risk and return is critical to any investment strategy, all of Chapter 6 is devoted to this subject.

Random Events Trap the Unwary

The prices of all mutual funds (except money market funds) fluctuate. Most people know this, but the fluctuations generally have much more effect than the underlying price trends. In round numbers, the average weekly return of the stock market is 0.2% per week, but one week in three will see price changes more than 10 times larger. Short-term price changes are almost perfectly random. That is, the odds that prices will go up next week are almost exactly 50:50.

The randomness and large size of short-term price fluctuations together conspire to create situations that can lead you to switch funds unnecessarily, or worse yet to make money-losing investment decisions. Recognizing these situations when they arise can help focus your investment strategy on profitable actions.

Since short-term fluctuations are essentially random, today's price change says nothing about tomorrow's. It is irrational to sell everything at the end of a bad day in the stock market, because further declines are no more likely than a bounce-back in prices.

Since short-term fluctuations are often large, a whole year's average market return can be racked up in just a few weeks. This makes the cost of procrastination very high. If your strategy correctly calls a major market move, a delay in making the appropriate fund switch can miss the move entirely.

Another effect of the large fluctuations is that short-term measures of investment return can change dramatically if you move the measuring period just a few days. This is another way of saying that short-term performance is essentially meaningless.

There is no such thing as an investment strategy which makes money all the time, when you measure return over periods of less than a year. Likewise, there is no strategy which beats the market averages every period. This means that strategies which are very successful in the long run will always exhibit periods of disappointing performance.

When periods of disappointing performance occur, you will be tempted to either abandon your strategy for something else, or to second-guess your strategy and revert to intuition and emotional decisions. When you do this, all the care spent on selecting your strategy goes out of the window, along with the long-term performance it is capable of providing.

Not only is it impossible to evaluate a strategy in the short-run, it is equally futile to compare two different strategies. There is very little correlation between the best-performing strategy in one period and the next. As you'll see later, you can only be sure one strategy is better than another if its return is significantly higher over at least several years.

Investment strategies usually include an objective for how much trading activity will be involved. For example, if you plan to identify the peaks and valleys of the major business cycles, there will be a major turning point about every two years. If your strategy calls the turns accurately, you will achieve a long-run return much higher than the market averages. But between trades you will experience disconcerting price fluctuations which look (usually in hindsight) like missed opportunities. You will be tempted to make your strategy responsive to shorter-term fluctuations, in order to profit from similar events in the future.

Before you embark on this, be aware that you will *always* be tempted to shorten the time frame. You will always see missed opportunities between trades, *regardless of how often your trades occur*. Security prices fluctuate in essentially the same fashion whether you look at monthly, weekly, daily, hourly, or continuous data. If you don't control the urge to shorten your perspective, you will eventually abandon normal human activity and chain yourself to a Quotron terminal all day long. We show you later how to make a trade-off between time commitment and investment results.

More than just fund prices, *everything* to do with investing exhibits random fluctuations. The short run is therefore full of surprises. Short-term results cannot be used to predict long-term return, hence the common disclaimer on advertisements for investment opportunities.

Short-term fluctuations make it difficult to identify underlying price trends quickly and with certainty. Imagine a man with a yo-yo riding an escalator. You'd have to watch the motions of the yo-yo for quite a while to be absolutely sure whether the man was on the up or down escalator.

Psychology Drives the Market

Investor sentiment refers to the psychological undercurrents in the market: how people feel about the future—optimistic, pessimistic, or neutral. Understanding market sentiment is important for two reasons: It can help you understand how other investors are likely to behave, and it can help you gain control of your own emotions when making investment decisions.

It is human nature to feel optimistic when the stock market has been doing well and to feel pessimistic when prices have been falling. If you act on these emotions, you will buy at market tops and sell at market bottoms—exactly the opposite of what's required to make money. Of course, someone has to buy at the top and sell at the bottom; otherwise market activity would cease. Your responsibility is to make sure that someone is not you.

The time to buy is often when market conditions look really dismal. This is tough to do, because the financial press is full of gloomy forecasts of more price declines to come. The majority of investors will be bearish, so you have to bet against the crowd.

The same problem arises when it's time to sell. Prices will have experienced a major advance and sentiment will be strongly bullish. Most investors will be expecting the market advance to continue.

Some market strategies use the results of regular investor sentiment surveys to drive decisions on whether to get in or out of the market. When most investors are bullish—and have already moved into the market—there's nobody left to drive prices higher. This is the time to sell. Similarly, when sentiment is bearish, there's nobody left to sell. Prices have probably bottomed out and it's time to be buying.

Techniques such as these can help you understand the behavior of other investors, but we have found from personal experience that it is much more important to gain control of your *own* behavior. Many investors find it extremely difficult to ignore how they feel about the market. This leads to subjective investment decisions and procrastination ("let's see how things go for a while"). If you wait to see if your instincts were

"right" before you act, you are guaranteeing that you will not profit from their success!

A powerful method for removing the emotional content of investment decisions is to depend entirely on an objective system. By an objective system, we mean a strategy based on rigidly applied formulas that produce investment decisions from hard data such as recent prices or economic statistics. Subjective influences are avoided, and decisions are made independently of biases and prejudices lurking in the mind.

With an objective approach your emotions are not involved in the decision making itself, but you still need the discipline to act promptly on the system's conclusions. Second-guessing the system is out. Even professional money managers have trouble with this. In a *Wall Street Journal* interview, Elaine Garzarelli, the "Black Monday Guru" from Shearson Lehman Hutton Inc., explained why she was lagging the market in 1988. She didn't follow her own system after the Crash, even though she says it would have outperformed the market. "The indicators were right," she says. "I just didn't want to risk that money getting back in until we had more evidence on the economy. I just waited."

We also know from personal experience that objective systems eliminate most of the worry about what to do. You've probably experienced the mental anguish when a stock drops in price: Should you sell out because it's probably headed even lower, hold on and hope to recover the losses in a bounce-back, or buy more at the new, favorable price? Life is much easier when the responsibility for these decisions is transferred from yourself to a machine (calculator or computer).

In later chapters we shall show you how to develop an objective system for switching your assets among the Fidelity funds. You will also learn how to test the system, to gain confidence that the system will make money for you in the future. Thorough testing is critical to entrusting your investments to any strategy. Without it, your reliance on any system will be unfounded.

Beating the Market Is Difficult

Everyone dreams of "beating the market"—earning a higher return than the stock market averages—without assuming inordinate risk. Money managers, investment advisers, and newsletter publishers are expected to achieve this for their clients, in spite of the competitiveness of the markets in which they operate.

In reality very few reach this goal consistently, but exceptions such as Warren Buffet prove it can be done. Chance alone ensures that a few will beat the market each year, but the number of investors who achieve this over the long run is vanishingly small. *Hulbert's Financial Digest* reports that the best performing investment newsletters in 1988 were among the worst in 1987, and vice versa.

The approaches used to maximize returns usually fall into one of two groups:

- **Security selection** techniques, by which investment opportunities are carefully analyzed and assets are invested only in those expected to do better than average in the future. The equivalent technique for mutual fund investors would be to select those *funds* expected to do better than the average.
- **Market timing** techniques, by which assets are invested in stocks during bull markets and money market instruments during bear markets. The emphasis is more on *when* to invest in stocks, rather than *which* stocks to invest in. The problem, of course, is to predict whether the future will be bullish or bearish.

The Efficient Market Theory (long the bastion of theoretical finance) holds that both these approaches are an exercise in futility, because current market prices already reflect all investor expectations for the future. Any investment strategy which aims to beat the market has to address the validity of this theory.

Even though Efficient Market Theory may have some general validity, it is not perfect. This means that predicting future trends in fund prices is merely challenging, not impossible.

Why is beating the market so difficult? It is not possible for *everyone* to beat the market, because everyone combined *is* the market. With every transaction, two investors are betting that the price of a security will move in opposite directions; only one can be right. Beating the market is tough because you are competing with a large number of sophisticated investors. To win, you would need luck or superior judgment working for you year after year.

If professional money managers, with their MBA degrees, teams of analysts, full-time commitment, and banks of computers, can't beat the market, what are the chances for the average investor? To believe you can beat the professionals at their own game is naive. The secret lies in seeking out a different game where the playing field is tilted in your favor.

The rest of this book is devoted to showing you how to gain a competitive advantage over professional money managers, but there are several things already in your favor as an individual investor:

- Unlike an institutional investor, you are answerable to no one but yourself. You can invest anywhere you want. A gold stock fund is not going to invest in money markets, even if the fund's manager is convinced gold stocks will plummet, but you can sell gold and buy something else.
- You are more agile because your portfolio is much smaller. If you decide the bull market ended today, you can be out of stocks by the end of the day—or even the hour—without a second thought. By comparison, the hands of an institutional money manager are tied.
- You're not going to be fired if your investments don't perform consistently. You can enjoy the luxury of focusing on long-term performance. Money managers are under tremendous pressure to achieve results every quarter, because of the short-term orientation of their clients.

One technique for beating the market is not to invest in "the market" at all. For example, if you invested in foreign stock funds during the mid-1980s you would have handsomely outperformed the domestic market averages such as the S&P 500 index. Some would argue that the S&P 500 is the wrong benchmark for comparison; you should be using the Europe, Asia and Far East (EAFE) Index instead, since this more closely resembles the average performance of international stocks. But this argument misses the point. Our purpose in outperforming the S&P 500 is not to prove that markets are inefficient. We're simply trying to develop strategies that achieve better results than the benchmark most widely used for measuring investment performance.

With Fidelity's fund family, there are many opportunities to invest in sectors of the domestic or global economy in order to outperform the S&P 500. For example, if you accurately predict good times ahead for brokerage stocks, you can profit from this by investing in the **Select/Brokerage & Investment** fund. The S&P 500 does include brokerage stocks, but their stellar performance will be smothered by the many other industries represented in the index. The index is so broad that it reflects the *average* performance of all major industries. Hidden from view are industries whose stocks are rising because of favorable industry conditions, and others whose stocks are falling.

The ability to focus your fund investments is one of the beauties of the Fidelity family. No other fund family lets you invest in a basket of brokerage stocks. With other families, knowing that a particular sector of the economy is about to do well is often of no value, because you cannot profit from your knowledge. The more different types of mutual funds you have to choose from, the greater your chances of profiting from the fortunes of specific sectors of the economy, and the less you will be forced to accept the performance of the broad markets. Capturing these profits depends on your being able to predict which sectors will perform best, and when.

Conclusions

This chapter covered some investing concepts that can have a major impact on your portfolio growth. It is important to consider the risk of a potential investment as well as its expected return, and to ensure that your portfolio's risk level is consistent with your age and financial condition.

One way to tilt the playing field in your favor is the use of an objective trading system to remove the emotional content of investment decision making. However, short-term fluctuations in security prices make it essential to act promptly on the system's recommendations, and to take a long-term view of performance.

This book deals with objective systems built around Fidelity funds. The tremendous range of funds is covered in the next chapter.

Chapter 4 THE FIDELITY FUND FAMILY

Fidelity Investments manages \$60 billion in more than 100 funds marketed directly to the public. Retail funds are conveniently divided into the groups shown in Table 4–1. It is the diversity of groups—and the range of funds within each group—that creates opportunities to achieve returns above the broad market, if you choose the right fund at the right time.

This chapter discusses the purpose of each group, and the market conditions under which they perform best. We also compare the investment objectives and performance of the funds available in each group.

The tables in this chapter, like those throughout the book, show the **relative volatility** of each fund. This measure of investment risk is ex-

Table 4–1. Fidelity retail fund groups with total assets, December 1988.

Fund Group	Number of Funds	Assets (\$ mil)
Industry sector funds ¹	35	1,372
International equity funds	6	1,378
Capital growth funds	11	13,811
Growth and income funds	8	10,758
Taxable bond funds	10	4,663
Municipal bond funds	18	6,043
Money market funds ¹	12	21,408
TOTAL	100	59,433

Note: After adding in institutional, broker, and insurance products, total assets under management increase to \$77.1 billion.

¹ Select/Money Market fund is included in the money market group.

plained in detail in Chapter 6. A value of 1.00 in the "Rel. Vol." column means that a fund's return fluctuates as much as the stock market averages. Values close to 0 represent riskless, nonfluctuating investments such as money market funds.

Industry Sector Funds

In July 1981, Fidelity introduced the first six of its industry sector funds, known as the **Select funds**. After rapid expansion in the mid-1980s, the group now totals 35 funds.

Fidelity's Select funds are unique: They provide a wide choice of industries in which to invest, they are traded hourly rather than daily, you can switch as often as five times per month, and some funds can be sold short to profit from declining prices.

As Fidelity puts it, the purpose of these funds is to "re-invent the stock market." By combining the inherent diversification of mutual funds with the ability to invest in specific industries, investors can have the best of two worlds. It's rather like investing in individual stocks without their trading costs and high risks. In effect, the Select funds provide a new trade-off between risk and return. They offer higher potential return than a fully diversified equity fund; less than with individual stocks. There is less risk than with individual stocks, but usually more than a diversified fund. The hourly trading, flexible switching privileges, and short-selling opportunities of the Select funds reinforce the similarity with trading stocks directly.

Table 4–2 shows the industries represented in the Select group.

There is no simple rule for which sector funds do best under different market conditions. In Table 4–2 they are sorted by the industry groups often used by analysts. This separates, for example, the interest-sensitive utility sectors from the consumer cyclicals, which ride the ups and downs of economic expansion and contraction. The table reveals the wide variation in performance between sectors. In 1988, for example, consumer cyclical sectors achieved a total return of about 25%, whereas many of the technology sectors lost money. Compare this with the market's 16.55% return, and it is clear that sector funds provide an opportunity not found with more diversified funds.

As an example of the phenomenal profits available to Select fund investors, Fig. 4–1 shows the performance of **Select/Technology** in 1982–1983. This is the sort of performance you'd expect from a successful stock pick, not a diversified mutual fund!

(Fund charts throughout this book show two things. The solid line is the fund's price history [right scale], and the shaded line is its relative strength [left scale]. Rising relative strength means that the

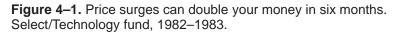
Table 4–2. Summary of Fidelity's 35 industry sector funds, as of December 1988, sorted into Dow Jones Industry Groups.

Industry	Fund Name	FAST	Assets	Rel.	Total
Group		Code	(\$ mil)	Vol.	Return
Basic Materials	American Gold	41	191.5	1.61	-12.45%
	Chemicals	69	79.4	0.99	20.96%
	Paper & Forest Products	506	14.2	1.31	6.77%
	Precious Metals	61	199.9	1.89	-23.86%
Energy	Energy	60	75.1	0.95	15.94%
	Energy Services	43	29.6	1.39	0.40%
Industrial	Automation & Machinery*	501	2.7	1.09	9.25%
	Industrial Equipment	510	3.4	1.03	4.89%
	Industrial Materials	509	26.6	1.25	10.84%
	Transportation	512	3.9	0.88	38.45%
Consumer (cyclical)	Air Transportation Automotive Broadcast & Media Construction & Housing Leisure Restaurant Industry*	34 502 503 511 62 508	5.3 2.4 11.3 1.6 66.6 1.9	0.91 0.93 1.01 1.03 1.01 0.71	29.07% 20.06% 26.85% 29.19% 26.01% 29.64%
Consumer (noncyclical)	Retailing Food & Agriculture Health Care Medical Delivery	46 9 63 505	14.3 21.1 181.1 3.5	1.02 0.78 1.10 0.92	38.71% 26.77% 8.83% 15.78%
Technology	Biotechnology	42	39.9	1.39	4.12%
	Computers	7	18.1	1.43	-5.05%
	Defense	67	1.8	0.85	4.32%
	Electronics	8	10.9	1.42	-8.47%
	Software	28	26.8	1.33	9.05%
	Technology	64	148.1	1.27	-2.70%
Financial services	Brokerage	68	3.5	1.17	18.55%
	Financial Services	66	26.2	0.92	12.01%
	Life Insurance*	44	0.8	0.59	16.34%
	Insurance	45	5.3	0.94	17.40%
	Regional Banks	507	8.8	0.80	25.71%
	Savings & Loan	98	5.2	1.07	18.50%
Utilities	Electric Utilities Telecommunications Utilities	504 96 65	14.3 44.3 82.1	0.70 0.82 0.74	20.08% 27.76% 16.46%
Other	Money Market	85	774.7	0.02	7.10%

Note: Total return figures are for 1988; asset figures are as of December 1988. Funds marked * have merged into other funds since 1988.

fund is outperforming the stock market averages, as represented by the S&P 500 index. The charts are explained in greater detail in Appendix B.)

For other examples of price surges, refer to the price charts in Appendix B for **American Gold** (1986–1987), **Financial Services** (1984–1986), **Leisure** (1985–1986), **Precious Metals** (1986–1987), and **Technology** (1982–1983). Most of these examples show price gains of 100% in just 12 to 18 months.





A trading system should be designed to profit from these surges while limiting the exposure to equally strong movements on the downside. We shall show you one such system later on.

The Select funds are intended to handle greater switching activity, but Fidelity reserves the right to limit your exchanges to five per month.

A \$25 switch fee is imposed on each transaction in which the funds being sold and purchased are *both* Select funds, except for exchanges out of **Select/Money Markets**.

Select funds impose a 2% sales charge and 1% redemption fee, but this only applies to money moving into or out of the Select group. Exchanges between Select funds do not incur these charges.

Hourly Trading

Fidelity's Select funds are unique in the mutual fund industry for their hourly trading. This can be valuable if you need to react quickly to changing market conditions, or if you are an active trader.

Suppose you study your investments over the weekend and decide to switch funds. It is much better to have your trade executed at 10 a.m. on Monday morning than to wait until the market's close. This can be important if you correctly call a major change in the market, because prices can swing 2% or more in a single day. Even if your strategy doesn't call for switching between sectors, you could switch a handful of Select funds as a substitute for a diversified equity fund if you had an urgent need for action.

Status of Select Funds

Although the Select funds have combined assets of just over \$2 billion, most of the funds remain quite small. Fourteen have assets under \$10 million as of this writing. In fact, the Money Market fund and two precious metals funds, **Precious Metals** and **American Gold**, account for 54% of the group's total assets. Much of the remainder is concentrated in the earlier Select funds: **Utilities**, **Health Care**, and **Technology**.

Because of their industry focus, sector funds are riskier than more diversified funds, so they do not suit everyone. They are popular with aggressive investors because of their potential for higher return.

Various studies have attempted to determine how Select fund investors as a group have performed relative to the market averages. Because of a shortage of data, this can only be computed approximately and indirectly, but the group apparently underperforms the market.

This might suggest that sector funds should be avoided, but in fact it demonstrates the importance of using a superior investment strategy. Markets are competitive; there are winners and losers, regardless of the performance of the group as a whole. Sector funds exhibit surges in prices not seen with diversified funds, and therefore provide a unique opportunity for rapid portfolio growth. The combination of industry

sector investing with the diversification of mutual funds can be a powerful tool when managed properly.

International Equity Funds

International funds became extremely popular in the 1980s because of the huge profits created by the decline in the dollar against foreign currencies. As the dollar falls, assets denominated in foreign currencies become proportionately more valuable.

International investing is also gaining attention because of the globalization of manufacturing and trade and the rapid economic growth in the newly industrialized countries (NICs), especially around the Pacific Rim. International funds also provide an opportunity to diversify globally, so that if foreign stock markets perform better than U.S. markets, you can move ahead of the S&P 500 benchmark.

International funds are often the only practical way for individual investors to purchase foreign securities. For example, it is almost impossible for U.S. investors to invest directly in Korean securities.

Fidelity's international equity funds are summarized in Table 4–3.

The **Overseas Fund** was introduced in late 1984, and it returned a phenomenal 361% through mid-1987. Much of this gain is attributable to the decline of the dollar against foreign currencies over the past few years, but most foreign markets were experiencing a long-term bull market as in the United States. Under these conditions Overseas Fund can produce rapid portfolio growth, but if both conditions turn against you, share prices will erode just as quickly.

In late 1986, Fidelity introduced two regional funds: **Pacific Basin** and **Europe**. These also turned in stellar performances through

Table 4–3. Summary of Fidelity's six international equity funds.

Fund Name		Sales Charge	Redem. Charge	Assets (\$ mil)	Rel. Vol.	1988 Yield	Total Return
Canada	309	2%	1%	10.7	0.96	0.9%	19.47%
Europe	301	2%	1%	70.5	0.79	2.2%	5.84%
Int'l Growth & Income	305	1%	1%	30.9	0.62	1.7%	11.56%
Overseas	94	3%		1,114.5	1.17	2.3%	8.26%
Pacific Basin	302	2%	1%	149.3	0.98	0.6%	10.45%
United Kingdom ¹	310	2%	1%	1.6	0.88	0.0%	1.55%

Note: Total return figures are for 1988; asset figures are as of December 1988.

¹ Scheduled to be merged into Europe Fund in April 1989.

mid-1987. Late 1987 saw the introduction of two funds focusing on single countries: **Canada** and the **United Kingdom**. These funds provide an opportunity for more focused international investing.

These five international funds have a long-term capital growth objective. For less aggressive investors, Fidelity offers the **International Growth & Income** fund that invests in foreign bonds as well as stocks. There is also the **Global Bond** fund, discussed in the section on taxable bond funds.

Some of Fidelity's diversified domestic funds are also permitted to invest overseas, although their foreign holdings are typically a small percentage of the total. For example, **Magellan Fund** has invested 10% of its assets overseas in the recent past. Because of their predominantly domestic holdings, the impact of exchange rates on these funds is small.

International equity funds restrict you to two redemptions per year. Trading costs are higher overseas, so this rule is necessary to prevent excessive portfolio turnover. Each sale of these funds incurs a \$25 switch fee.

Capital Growth Funds

Fidelity offers 11 diversified common stock funds with investment objectives of maximizing capital growth. (The two Destiny funds have been excluded because of their special restrictions on purchases.) This group includes the extremely popular **Magellan Fund**, with almost \$10 billion in assets and 1 million shareholder accounts. The group is summarized in Table 4–4.

Capital growth funds are riskier than their less aggressive cousins, with relative volatility falling in the range 0.80 to 1.15. They are attractive investments during bull markets, when their relatively high volatility works in your favor. They should be deemphasized at market tops, because they suffer badly in bear markets. These are times to invest defensively through less volatile funds.

Even though funds in the capital growth group have quite different approaches to securities selection, their long-term performance can be very similar. In the short run, however, there can be substantial differences when market conditions favor a particular fund's strategy.

Fidelity Fund is the closest thing to an index fund in the Fidelity family. Its long-term return, dividend yield, and risk are very similar to the S&P 500 index. (Fidelity classifies this fund in the growth and income group, but its yield is much lower than most funds in that group, and its volatility is more typical of a capital growth fund.)

Table 4–4. Capital growth fund summary.

Fund Name		Sales Charge	Redem. Charge		Rel. Vol.	1988 Yield	Total Return
Blue Chip Growth	312	2%	1%	38.2	0.93	0.3%	5.91%
Capital Appreciation	307	2%	1%	1,573.9	0.82	0.9%	37.62%
Contrafund	22			105.0	0.81	2.5%	20.93%
Disciplined Equity ¹	315			n.a.	n.a.	n.a.	n.a.
Fidelity	3			895.2	0.86	3.6%	17.92%
Retirement Growth ²	73			1,219.9	1.00	1.7%	15.53%
Growth Company	25	3%		138.4	1.12	0.7%	16.06%
Magellan	21	3%		8,971.1	0.93	1.9%	22.76%
OTC Portfolio	93	3%		720.1	0.97	1.7%	22.85%
Trend	5			702.8	0.99	1.4%	24.33%
Value	39			124.8	0.89	1.8%	29.05%

Note: Total return figures are for 1988; asset figures are as of December 1988.

From 1981 to 1983, **Magellan Fund** significantly outperformed the market, rising to twice what its value would have been by matching the S&P 500. (See the relative strength line in Fig. 4–2.) Manager Peter Lynch was able to accomplish this feat in part because of the fund's small size at the time.

Past performance not only fails to guarantee future performance; it can be downright misleading. Magellan fund, for example, is consistently rated #1 of all equity funds for 10-year performance. This ranking was largely earned on pre-1984 performance, which has not been repeated since. Without a doubt, Magellan is a well-managed fund, but its future performance is likely to be very close to the market's.

More recently, **Capital Appreciation Fund** has shown signs of astute management and above-market performance. The fund's flexible approach achieved a 37.62% total return in 1988, compared to the average equity fund's 14.44%. However, fund assets have grown rapidly to over a billion dollars, and it may soon face the same predicament as Magellan.

OTC Portfolio provides an opportunity to invest in **secondary stocks**, the stocks of smaller companies traded in the over-the-counter market. Secondary stocks are more volatile than large-capitalization issues, so they provide higher returns under the right conditions, at the expense of greater risk.

¹ New fund; sales charges waived through 1989.

² Available to retirement accounts only.

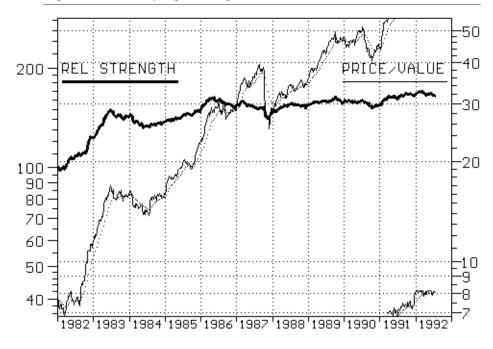


Figure 4–2. Fidelity's giant Magellan Fund, 1981–1988.

Disciplined Equity was introduced in late 1988. The fund is conservatively managed, because it invests only in securities shown to be undervalued by both technical analysis and fundamental research.

You are permitted to make four exchanges out of each capital growth fund per year. There is no switch fee. Sales and redemption charges vary (see Table 4-4).

The portfolio turnover, expense ratio, and investment focus for Fidelity's capital growth funds are shown in Table 4-5.

Growth and Income Funds

Growth and income funds seek both current income and capital growth, by investing in high-yield stocks, bonds, and convertible securities. Funds that combine stocks and bonds are also known as **balanced funds**. Prices of these funds fluctuate less than capital growth funds, because of the "cushion" provided by high yields. Their relative volatility is therefore lower, typically 0.40 to 0.80. These are popular all-weather funds, because they combine a degree of protection in bear

Table 4–5. Portfolio turnover, expense ratio, and investment focus for capital growth funds, December 1988.

Fund Name	Portfolio Turnover	Expense Ratio	Investment Focus
Blue Chip Growth	40%	2.74%	Well-known & established cos.
Capital Appreciation	140%	1.57%	Stocks & bonds world-wide
Contrafund	234%	1.09%	Stocks undervalued due to pessi- mistic appraisal
Retirement Growth	130%	1.18%	Stocks world-wide
Growth Company	275%	1.16%	Stocks of companies with above- average potential
Magellan	82%	1.13%	Stocks & convertibles world-wide
OTC Portfolio	195%	1.44%	Over-the-counter secuities
Trend	42%	0.46%	Securities expected to follow new growth trends
Value	513%	1.23%	Undervalued companies

markets with conservative participation in bull markets. This fund group is summarized in Table 4–6.

According to established investment theories, funds with lower risk should provide lower return, but two of the growth and income funds appear to disprove this. **Equity-Income Fund** and **Puritan** have significantly outperformed the market on both an absolute basis and after adjusting for risk. Much of this occurred in the early 1980s, but the funds have shown renewed strength since late 1987 as investors adopted more defensive strategies. The relative volatility of the two funds is 0.63 and 0.47, respectively. Investors clearly recognize their

Table 4–6. Growth and income fund summary.

Fund Name		Sales Charge	Redem. Charge	Assets (\$ mil)		1988 Yield	Total Return
Asset Manager	314			5.5	n.a.	n.a.	n.a.
Balanced	304	2%		123.2	0.39	6.4%	15.99%
Convertible Securities	308			40.0	0.33	7.3%	15.89%
Equity-Income	23	2%		4,064.9	0.63	6.0%	22.49%
Growth & Income	27	2%		1,145.1	0.78	4.2%	22.98%
Puritan	4	2%		4,295.5	0.47	7.1%	18.89%
Real Estate	303	2%		64.0	0.46	7.5%	10.36%
Utilities Income	311	2%		129.7	0.61	4.7%	14.77%

Note: Yield and total return figures are for 1988; asset figures are as of December 1988.

superior performance, since their assets have grown to about \$4 billion each. A graphic depiction of Puritan's performance is given in Fig. 4–3.

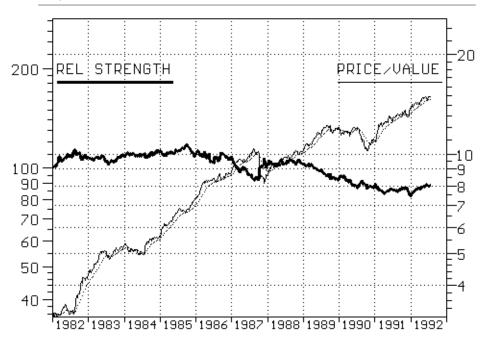
In late 1988, Fidelity introduced its first fund with an emphasis on asset allocation. **Asset Manager Fund** has broad flexibility to invest wherever the greatest advantage can be gained, including:

Allocating assets between money markets, bonds, and stocks Diversifying internationally

Trading futures and options as well as the underlying securities

Upper and lower limits are placed on the percentage of the fund's assets allocated to the three types of securities, and the fund's prospectus describes a long-term average allocation target. These figures are summarized in Table 4-7.

Figure 4–3. Puritan Fund has provided market returns at lower risk, 1981–1988.



The fund makes only gradual changes in asset allocation, depending on management's view of future market trends. It does not attempt to

Table 4–7. Asset allocation mix for Asset Manager Fund.

Asset Class	Allocation Limits	Long-Term Average	
Money markets	0–70%	30%	
Long-term bonds	20-60%	40%	
Equities	10-50%	30%	

"time the market" by switching large parts of the portfolio between asset classes in response to short-term market conditions.

Whether the fund's diversification and allocation strategies will provide incremental benefits to shareholders remains to be seen, but the fund provides an alternative for investors not interested in actively managing their fund accounts. Another attraction of the fund is the absence of sales and redemption charges.

Growth and income funds are limited to four switches per year, free of charge. Sales charges are mostly 2%, with no redemption charges. Dividends are paid quarterly. A summary of the portfolio turnover, expense ratio, and investment focus for Fidelity's growth and income funds is shown in Table 4–8.

Taxable Bond Funds

Taxable bond funds offer higher yields than money market funds, but introduce an element of risk because bond prices fluctuate in sympathy with interest rates. Prices of existing bonds fall when interest rates rise. This is the market mechanism which ensures that old bonds have

Table 4–8. Portfolio turnover, expense ratio, and investment focus for growth and income funds, December 1988.

Fund Name	Portfolio Turnover	Expense Ratio	Investment Focus
Asset Manager	n.a.	n.a.	Asset allocation
Balanced	213%	1.30%	High-yield securities
Convertible Securities	191%	1.78%	Convertible securities
Equity-Income	120%	0.66%	High-yield securities
Fidelity	212%	0.60%	High-yield stocks & convertibles
Growth & Income	159%	1.09%	High-yield securities
Puritan	101%	0.80%	Stocks, preferreds & bonds
Real Estate	89%	1.50%	Real estate cos. world-wide
Utilities Income	3%	1.81%	Public utility cos.

roughly the same yields as new bonds with higher coupon rates. Conversely, when interest rates fall, bond prices rise to create a capital gain in addition to the current yield. Changes in bond prices caused by fluctuating interest rates can have more effect on total return than the interest paid. Longer-term bonds show the greatest sensitivity to interest rates, because their effects are felt for much longer.

Taxable bond funds can be divided into three categories: corporate bond funds, mortgage security funds, and government bond funds.

Bond funds are differentiated by the quality and average maturity of their portfolios. Bonds are rated by Moody's (and others) and assigned code letters that reflect the credit worthiness of the issuer. Moody rating codes used by Fidelity are:

Aaa, Aa, A, Baa	Investment grade bonds (highest quality)
Ba, B	Speculative ("junk") bonds
Caa	May be in default (lowest quality)
NR	Not rated by Moody's

The Moody rating of bonds held by Fidelity's taxable bond group are included in the summary in Table 4–9.

Higher yields are associated with higher risk of default and/or longer maturity. In a special category are so-called **junk bonds**, often issued by companies as part of a leveraged buy-out. (Bond salespeople prefer to call them "high-yield bonds.") Junk bonds yield about 4% more per year

Table 4-9. Taxable bond fund summary.

Fund Name		Assets (\$ mil)		30-Day Yield	Total Return	Average Maturity	Moody Rating
Investment Grade Bond	26	308.0	0.36	8.99%	7.92%	10 yrs	Α
Ginnie Mae	15	678.1	0.21	9.01%	7.16%	24 yrs	Aaa
Global Bond	451	83.0	0.35	n.a. ¹	3.66%	n.a.	n.a.
Gov. Securities	54	567.0	0.27	8.52%	6.36%	6 yrs	Aaa
Capital & Income	38	1,689.2	0.27	12.72%	12.59%	10 yrs	NR
Intermediate Bond	32	499.7	0.25	8.60%	7.22%	7 yrs	Α
Mortgage Securities	40	442.8	0.16	8.77%	6.72%	25 yrs	Aaa
Short-Term Bond	450	287.6	0.08	8.82%	5.71%	2 yrs	Α
Short-Term Govt.	452	107.5	n.a.	8.94%	n.a.	2 yrs	Aaa
Spartan Govt. Fund	453	n.a.	n.a.	n.a.	n.a.	n.a. ²	Aaa

Note: Total return figures are for 1988; asset figures, yields, portfolio maturity, and Moody ratings (of lowest grade bonds held in significant quantities) are as of December 1988.

¹ Global Bond pays dividends annually; 30-day yield figures not available.

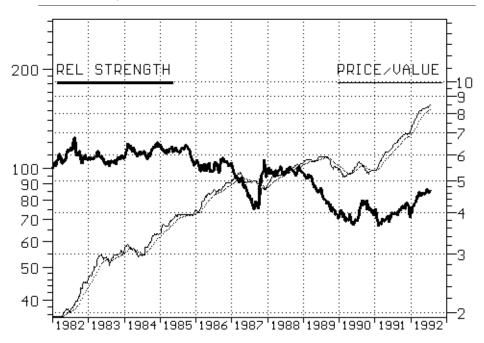
² New fund; invests in bonds of all maturities.

than Treasury instruments of the same maturity. Thus far, the higher yield of junk bonds has more than compensated for the higher risk of default by the issuer, but the situation is expected by many to deteriorate rapidly when the next recession arrives. When corporate profits shrink, over-leveraged companies have difficulty meeting interest payments on their debt.

Fund managers typically adjust the average maturity of their portfolios to reflect their expectations about future interest rates. If they expect rates to rise, they will shorten maturities to minimize capital losses. If lower rates are expected, longer maturities are used to "lock in" current yields and provide a capital gain as bond prices rise.

Fidelity's **Capital and Income Fund** holds \$1.8 billion of junk bonds. Its yield is the highest of the bond funds, but total return is strongly influenced by changes in interest rates. For example, total return was only 1.31% when rates were rising in 1987, but 35.68% when rates were falling in 1982 (exceeding the return of most common stock funds). The fund's performance is charted in Fig. 4–4.

Figure 4–4. High returns from high-yield bonds: Capital and Income Fund, 1982–1986.



At the conservative end of the scale is the **Short-Term Bond Fund**, with an 5.71% yield in 1988 and a relative volatility of 0.08. This fund might have an average maturity of 2 years, in contrast to Capital and Income Fund's 10 years. It invests primarily in bonds with Moody ratings of A or better.

At intermediate levels of risk, **Investment Grade Bond** focuses on high-grade bonds with longer maturities. **Intermediate Bond Fund** holds high-grade bonds with a typical maturity of 7 years.

Government Securities Fund invests in securities of the U.S. government. It has a typical 6-year average maturity. The fund is structured as a limited partnership so that state tax exempt income is passed through to investors. It is not available to retirement accounts. **Spartan Government Fund** was introduced in 1989, and searches for the highest yields in the government bond market, regardless of maturity. Futures and options are used to reduce the volatility normally associated with long-term bonds. Minimum investment is \$10,000 (including retirement accounts).

Fidelity offers two funds for investing in mortgage securities (baskets of mortgages sold by banks and pooled for investors). **Ginnie Mae Portfolio** and **Mortgage Securities Fund** have a lower relative volatility than corporate bond funds, but similar yields. Ginnie Mae Portfolio invests primarily in securities issued by the Government National Mortgage Association and guaranteed by the U.S. government. It has slightly lower risk and lower yield than Mortgage Securities Fund.

Mortgage security funds are often criticized because in periods of declining interest rates many home owners refinance and pay off current mortgages held by the fund. It is therefore difficult for the fund to lock in high yields if lower rates are expected. Large increases in mortgage rates will raise the risk of default. However, these risks are little different from corporate bonds, where lower rates result in bonds being "called" (paid off) by their issuers, and higher rates force weak or highly leveraged companies into bankruptcy.

Global Bond Fund invests internationally in debt securities, providing an interesting opportunity to profit from exchange rate fluctuations without exposure to the risks of common stocks. When the dollar falls against foreign currencies, the value of foreign securities rises in direct proportion. There are three components to this fund's performance: dividend yield, fluctuations in the local-currency market value of the bonds, and fluctuations in exchange rates. The yield and risk of Global Bond Fund are similar to intermediate-term domestic bond funds. The fund was one of the top performers of all mutual funds in 1987—with a total return of 19.16%—thanks to the declining dollar and the relative safety of a bond portfolio.

Taxable bond funds do not impose sales or redemption charges. Switches are limited to four per year but are free of charge, except for Spartan Government Fund's \$5 fee. Dividends are accrued daily and are paid to your account monthly.

Municipal Bond Funds

Municipal bond funds are similar in many respects to taxable bond funds, except that dividends are exempt from federal income taxes. The yields of these funds are lower than the equivalent taxable fund, but if your tax bracket is high enough the *after-tax* return of a tax-exempt fund will be higher.

As with corporate bonds, municipal bond funds are differentiated by the quality and maturity of their portfolios. The Fidelity funds in this group are summarized in Table 4-10.

At the higher-risk end of the spectrum is **Aggressive Tax-Free Fund**, with a portfolio dominated by lower-rated and unrated bonds with an average maturity of 23 years. For conservative investors, **Short-Term Tax-Free Portfolio** holds A-rated and better bonds with an average maturity of three years.

For investors residing in populous states with income taxes, Fidelity offers single-state municipal bond funds that provide exemption from both federal and state taxes. For California, New Jersey, and New York, multiple choices provide a trade-off between risk and return. See Appendix A for details.

Tax-exempt funds are not available to retirement accounts. Since dividends are sheltered from current taxes anyway, investing in a tax-exempt fund would make little sense.

Table 4-10. Municipal bond fund summary.

		Assets (\$ mil)		•		Average Maturity	•
Aggressive Tax-Free ¹	12	452.9	0.28	7.92%	13.40%	23 yrs	NR
High-Yield Tax-Free	37	1,614.7	0.38	7.16%	12.22%	25 yrs	NR
Insured Tax-Free	13	152.2	0.27	6.75%	11.19%	23 yrs	Aaa
Limited Term Municipals	36	438.7	0.28	6.29%	8.22%	10 yrs	Α
Municipal Bond	35	980.2	0.34	6.95%	12.30%	25 yrs	Α
Short-Term Tax-Free P'folio	404	76.0	0.15	6.01%	4.89%	3 yrs	Α

Note: Total return figures are for 1988; asset figures, yields, portfolio maturity, and Moody ratings (of lowest grade bonds held in significant quantities) are as of December 1988.

¹ Fund imposes 1% redemption charge on shares held less than 6 months.

Municipal bond funds typically offer returns 20% lower than taxable funds, so their after-tax yield will only be higher if your tax bracket is higher than about 20%. When figuring your tax bracket, add your federal and state brackets if you're considering a single-state fund. See the next section for a formula to adjust tax-free yield to the taxable equivalent.

Municipal bond funds do not impose sales or redemption charges, except that Aggressive Tax-Free imposes a 1% redemption fee on shares held less than six months. Switches are limited to four per year but are free of charge. Dividends are accrued daily and are paid to your account monthly.

Mutual Fund Math—Tax-Free Dividends

To convert the yield of a tax-exempt fund to the equivalent taxable yield, use this formula:

(equivalent taxable yield) = (tax-exempt yield) / (1 – bracket)

For example, if the tax-exempt yield is 7.06% and your tax bracket is 28%, the equivalent taxable yield is 7.06 / (1-0.28)=7.06 / 0.72=9.81%. A taxable fund would have to yield more than 9.81% to outperform the tax-exempt fund in this example.

Money Market Funds

Money market funds invest in short-term debt instruments such as U.S. Treasury Bills and corporate paper. By investing short-term, the risk of capital loss is essentially zero, so the funds have a fixed net asset value of \$1.00.

Money market funds are an excellent place to park your assets when no other investment looks attractive. They are a poor choice for longterm portfolio growth, because their real return after adjusting for inflation is normally very low. (In recent years, real interest rates have been much higher than the historical average, but this is unlikely to continue.)

Most Fidelity investors set up a money market fund account with check-writing and/or bank wire privileges. This fund then becomes the primary channel for adding to your fund investments or making redemptions. Although other funds offer the same privileges, the options you select are not automatically transferred from one fund to another when you make switches. Setting up a money market account for these purposes avoids extra paperwork. Chapter 5 provides more details of the logistics of dealing with Fidelity.

The funds in Fidelity's money market group are summarized in Table 4–11.

Cash Reserves is the most popular of the money market funds, with over \$10 billion in assets. Daily Income Trust is very similar, but it has higher minimum investment requirements and a \$3/month account charge. Spartan Money Market Fund—introduced in 1989—has a \$10,000 minimum and \$5 redemption fee. For the ultraconservative investor, U.S. Government Reserves and U.S. Treasury Money Market invest only in securities issued by the federal government.

Select/Money Market is a member of the sector fund group. It is intended as a parking place for assets normally invested in the industry sectors. The fund is not recommended for other purposes, because it carries 2% sales and 1% redemption charges.

Yield differences between taxable money market funds are a small fraction of 1%, and are unlikely to have much impact on your decision on which fund to use.

Money market funds (other than Select/Money Market) do not impose sales or redemption charges. Unlimited switching is permitted, free of charge except for Spartan Money Market's \$5 fee. Dividends are accrued daily and are paid to your account monthly. These funds provide free check-writing privileges, so they compete with bank checking accounts.

Table 4–11. Money market fund summary.

Fund Name	FAST Code	Assets (\$ mil)	30-Day Yield
Cash Reserves	55	10,550.6	8.1%
Daily Income Trust	31	3,002.0	8.0%
Select/Money Market ¹	85	774.7	8.6%
Spartan Money Market Fund ²	454	n.a.	n.a.
U.S. Govt. Reserves	50	1,540.0	7.8%
U.S. Treasury Money Mkt ³	415	88.1	7.8%
Tax-Exempt Money Mkt Trust ³	10	3,182.4	5.6%

Note: Asset and yield figures are for December 1988.

¹ Fund has 2% sales and 1% redemption charges.

² New fund; \$5 switch fee on redemptions.

³ Not available to retirement accounts.

Tax-Exempt Money Market Funds

For investors in high tax brackets, Fidelity offers the **Tax-Exempt Money Market Trust**. There are also single-state tax-exempt money market funds for California, Massachusetts, New Jersey, New York and Pennsylvania (see Appendix A).

As with tax-exempt bond funds, your tax bracket has to be high before the tax savings offset the lower yields of the funds in this group.

Conclusion

Every fund has its moment of glory when market conditions turn in its favor. Whether it's a junk bond fund profiting from declining interest rates or an energy fund exploding as OPEC gains control of oil prices, the opportunities are there. With the tremendous diversity of funds in the Fidelity family, a few of them usually manage to provide clear market leadership. If we could just find a way to identify the leaders soon enough to profit from their strength, we'd have a good chance of earning an attractive return. The rest of our book is devoted to the search for leadership and profit.

Chapter 5 DEALING WITH FIDELITY

This chapter explains how to use the wide range of mutual fund services offered by the Fidelity organization: how to buy and sell shares; how to use Fidelity's automated transaction system (FAST); and when to open a Fidelity brokerage account rather than dealing with the funds directly. It also provides a detailed analysis of trading costs and shows why the impact of low-load fund sales charges is much less than you might expect.

Connecting with the Organization

Fidelity's Representatives

Fidelity maintains a staff of several hundred telephone representatives to serve their customers. These individuals are highly trained on Fidelity's products and can be expected to provide prompt, accurate, and courteous service. Representatives do not earn commissions, so there is no pressure to purchase fund shares. They are on call 24 hours a day, 365 days a year.

Representatives' duties include: answering questions on investment topics; mailing you literature and fund prospectuses; providing prices or other statistics for Fidelity funds; handling sales, exchanges, and redemptions of fund shares; and resolving questions about your accounts.

Automated Transaction Processing

For routine inquiries and transactions, Fidelity has created an automated system called FAST (Fidelity Automated Service Telephone). This lets you bypass the representative and access Fidelity's computer databases directly. From any touch-tone telephone you can obtain price

quotations, make switches between funds, or review the status of your account. Using FAST is often faster than dealing with representatives, and helps Fidelity keep administrative costs down. FAST is described in detail later in this chapter.

Investor Centers

Fidelity operates Investor Centers in the major cities of the United States. It makes sense to visit one of the Centers if you live nearby and would like to review your investment situation face-to-face with an experienced Fidelity representative. A meeting can be especially helpful if your plans involve more than mutual funds—CDs or bullion, for example. Investor Center staff are familiar with all Fidelity products and services.

Each office is equipped with a library of investment periodicals, and video tapes which you can borrow. Investor Centers also run educational seminars throughout the year. Topics range from *Investing in a Volatile Market* to *Retirement Planning*.

Investor Centers are currently operating at the locations shown in Table 5–1.

Opening an Account

To open a Fidelity account, you simply invest in any of their mutual funds. We suggest you first open an account in a money market fund, since this is a convenient way to select options for moving money into and out of the Fidelity family when you need to. Fidelity's most popular money market fund is **Cash Reserves**. It offers the following options for repeat investments and withdrawals:

- **Check-writing privileges**, a convenient way to make with-drawals of at least \$500 from your money market fund account.
- **Money Line**, which provides for direct transfers between your Fidelity account and your bank account. Processing time is two to three days, but there is no charge for the service. Minimum withdrawal is \$2.500: minimum investment is \$250.
- **Automatic Account Builder**, for regular saving by transferring a fixed amount each month or quarter from your bank account to your Fidelity account. In most cases the minimum investment is \$250.
- **Bank wire**, which provides for next-day transfers from Fidelity to your bank account via the Federal Reserve system. Minimum withdrawal is \$5,000, and a \$5 fee is charged.

5 / DEALING WITH FIDELITY

Table 5–1. Fidelity Investor Center locations (December 1988).

State	City	Street Address
AZ	Scottsdale	7373 N. Scottsdale Road, Suite 182A
CA	Los Angeles	607 Wilshire Boulevard
CA	Los Angeles	1800 Avenue of the Stars, Suite 100
CA	Newport Beach	19200 Von Karman Avenue, Suite 180
CA	Sacramento	2101 Hurley Way
CA	San Diego	1115 Fifth Avenue
CA	San Francisco	455 Market Street, Suite 100
CA	San Jose	Pruneyard Towers, 1999 S. Bascom Ave., Suite 150
CA	Walnut Creek	1656 North California Boulevard, Suite P115
CO	Denver	1625 Broadway, Suite 110
CO	Englewood	5660 South Greenwood Plaza Boulevard, Suite 508
CT	Stamford	100 First Stamford Place
DC	Washington	1800 K Street NW, Suite 102
FL	Boca Raton	Crosswinds Center, 4400 North Federal Highway
FL	Orlando	The Empire Building, 32 West Central Boulevard
FL	St. Petersburg	2000 66th Street North
FL	Sarasota	8075 Beneva Road South, Suite 2
GA	Atlanta	235 Peachtree Street NE, Gaslight Tower, Suite C-22
GA	Atlanta	Eight Piedmont Center, Suite 215
IL 	Chicago	9 South LaSalle Street, Suite 800
IL.	Oak Brook	Oak Brook Regency Towers, 1415 West 22nd St., Suite 100
LA	New Orleans	201 St. Charles Avenue, Suite 132
MD	Baltimore	5 West Baltimore Street
MA	Boston	21 Congress Street 101 Combridge Street (Pouts 3A)
MA MA	Burlington Worcester	101 Cambridge Street (Route 3A) 44 Front Street, Suite 100
ME	Portland	107 Exchange Street
MI	Southfield	First Center Office Plaza, 26955 Northwestern Highway, Suite 175
MN	Minneapolis	Nicollet Centre, 38 South Sixth Street, Suite 240
MO	Kansas City	1150 Grand Avenue, Suite 100
MO	St. Louis	St. Louis Place, 200 North Broadway, Suite 120
NJ	Morristown	South Street Shop, 60B South Street
NJ	Paramus	66 Route 17 North
NY	Garden City	1050 Franklin Avenue, Suite 115
NY	Melville	999 Walt Whitman Highway, Suite 200
NY	New York City	71 Broadway, Main Level
NY	New York City	350 Park Avenue (Midtown)
NY	White Plains	White Plains Plaza, 1 North Broadway
ОН	Cincinnati	600 Vine Street, Suite 108
ОН	Cleveland	1903 East Ninth Street
OR	Portland	121 SW Morrison Street, Suite 100

continued...

Table 5-1, continued

State	City	Street Address
PA	Philadelphia	1900 Market Street, Suite 118
PA	Pittsburgh	535 Smithfield Street
TX	Austin	10000 Research Boulevard, Suite 214
TX	Dallas	400 North Akard Street
TX	Houston	1010 Lamar Street, Plaza Level
TX	Houston	2701 Drexel Drive (Highland Village)
TX	Las Colinas	400 East Las Colinas Boulevard, Suite 120
TX	San Antonio	2 RepublicBank Plaza, 175 East Houston Street, Suite 110
UT	Salt Lake City	175 East 400 South, Suite 110
VA	Tysons Corner	8300 Boone Boulevard, Suite 170
WA	Seattle	1001 Fourth Avenue Plaza, Suite 500
WI	Milwaukee	222 East Wisconsin Avenue, Suite 175

There are several ways to get your initial investment into the fund of your choice:

- **By mail.** Obtain the fund prospectus, fill out the forms provided, and mail them in with your check.
- **By bank wire.** Call Fidelity and open an account in the fund of your choice. Obtain bank wire instructions from the representative, and then arrange for your bank to send the money to Fidelity through the Federal Reserve system. Your bank will charge you a few dollars for this service.
- At an Investor Center. If you live near a Fidelity Investor Center, you can drop by and open your account with a personal or cashier's check.

If your initial investment is in a retirement plan or variable insurance contract, there is additional paperwork that must be completed and submitted when you open your account.

When investing by personal check, there is a subtle reason for placing it first with a money market fund. If you instead invested in a fund whose price fluctuates—that is, any other fund—unexpected market developments might lead you to switch funds shortly afterward. This would not be permitted until your check cleared 10 to 15 days later. Once the check has cleared, you can switch your money elsewhere without concern. By investing first in a money market fund, you cannot get stuck in a fund that is losing money.

Account Numbers

You will be assigned an account number in every fund in which you purchase shares. Your **security code** is the last four digits of your Social Security Number (Federal tax ID number for organizations). These numbers are needed to inquire about the status of your account or to initiate any transactions.

In 1987, Fidelity introduced the T-account, which combines all your fund accounts into a single statement. If you are invested in several funds or have a retirement account as well as a taxable account, this simplifies your record keeping and greatly reduces the amount of mail you receive from the Fidelity organization.

Purchasing Shares

You can purchase Fidelity fund shares from several sources:

Direct from Fidelity Investments (preferred method) Through a Fidelity brokerage account (see page 63) Through other brokerage firms (commissions must be paid)

Minimum and Maximum Investment

Most Fidelity funds require a minimum initial investment of \$1,000 or \$2,500, although all funds (except the new Spartan group) accept investments as low as \$500 for retirement accounts.

Funds also have maximum investment limits, which can affect wealthy investors. Typically an investment that exceeds \$50,000 or 1% of the fund's total assets (5% for Select funds), whichever is greater, will require the approval of the fund's manager. For example, if you want to invest \$250,000 in a single fund, you might be limited to funds with assets greater than \$25 million. Approvals can be requested over the phone, and a decision is usually made within a few minutes.

Purchase Price

When you purchase shares, you will pay the next available net asset value (NAV), plus any applicable sales charge. To get the same day's closing price, Fidelity must receive your order before the New York Stock Exchange closes (currently 4 p.m. Eastern Time). With the 35 Select funds, you get the next *hour's* price. Orders received after the market's close or on market holidays will be executed at the first available price on the next trading day.

Sales Charges

When you are buying new shares, the sales charge situation is very straightforward. You pay a premium over the fund's NAV equal to the fund's front-end sales charge. Sales charges range from 0 to 3%, with the higher figures associated with equity funds. Money market and bond funds generally have no sales charge.

Sales charges are waived for certain employer-sponsored retirement plans with 200 or more participants.

"Buying a Dividend"

When a fund makes a distribution, the payment is a taxable event. Unless you are sheltered from current taxes in a retirement or variable insurance account, the distribution is taxable income to you.

This fact of life can have unfortunate consequences if you invest in a fund just before it makes a major capital gain distribution, because you could be taxed on a return of your own capital. You did not benefit from the fund's profits, because they were earned before you became a shareholder.

This problem is avoided completely if you sell the fund's shares before the end of the year in which the capital gain distribution is made. The gain you report on the distribution is exactly offset by the loss created by the fund's price dropping as a result of the distribution. At worst, the gain will occur in one year and the loss in the next, in which case you will be making a one-year loan to Uncle Sam.

Stock and bond funds make capital gain distributions, if any, in December and one other month each year. See the fund prospectus or Fidelity's *Mutual Fund Guide* for details.

Mutual funds are reluctant to provide exact distribution dates or estimates of distribution amounts. Your best bet is to find out on what dates distributions were made in the past, although changes can arise from amendments to tax laws. Data on recent distributions are listed in *Barron's* and the *Mutual Fund Guide*. If a fund had large price gains in the past year, the distribution could be substantial, especially if the fund's portfolio turnover rate is high.

Here's what you can do about "buying a dividend:"

- If the fund you're about to buy has a capital gain distribution due in the next few months, place your money temporarily in another fund and switch into the fund of your choice after its distribution is made.
- Buy your fund, and then switch into a similar fund after the distribution. This creates a tax loss to offset the taxable "gain"

of the distribution. You can switch back into the original fund if you wait 30 days to avoid the tax code's "wash sale rule."

• Ignore the issue and make the occasional loan to Uncle Sam.

Repeat Investments

You can add to your fund account at any time, provided each repeat investment meets the fund's minimum requirement, usually \$250.

If your repeat investments are irregular, you can mail in a check from time to time or use the Money Line service to transfer money directly from your bank account to the fund. Money Line purchases can be activated via the FAST system.

If your repeat investments will be monthly or quarterly as part of a savings plan, the Automatic Account Builder service will make the transfers for you.

Monitoring Your Account

Fidelity mails you confirming statements every time you buy or sell fund shares, including the reinvestment of dividends or capital gains. For growth funds you will also receive an annual statement showing all the activity in your account. Other funds send monthly or quarterly statements.

In addition to account statements you will receive quarterly shareholder reports and an annual prospectus for each of your funds. In January of each year you will receive a tax statement that includes much of the information needed for your tax return.

You can call a representative at any time to get fund prices or details of your account activity and balances. This information is also available through the FAST system. Fund prices on the FAST system are usually updated before the representatives have them: another advantage of automation.

Switching Between Funds

Switching between funds is normally done by telephone, by calling either a Fidelity representative or the automatic FAST system. You can also make exchanges by mail, but this is not recommended because your transaction will be significantly delayed.

You will have to provide complete details of the transaction, including the number of shares to be exchanged, the funds and account numbers involved in the transaction, and, if you're using the FAST system, your security code.

Transaction Timing

Most switches are executed at the next available daily closing price. For example, if you request an exchange on Friday evening, it will be executed at 4:00 p.m. Eastern time on Monday.

Transactions involving the purchase or sale of a Select fund are more complicated, since these funds are priced and traded hourly on the hour during stock exchange hours (currently 9:30 a.m. through 4:00 p.m.).

An exchange between two Select funds is executed at the next available hourly price. When switching from a Select fund to a non-Select fund, your sale will be executed at the next hourly price, and the proceeds will hang in limbo until the purchase is executed at the end of the day. When switching from a non-Select fund to a Select fund, both purchase and sale are executed at the daily closing price, except at the next hourly price if you are exchanging out of a money market fund.

Switch Fees

Fidelity imposes a switch fee on certain types of exchange transactions. These fees are intended to cover administrative costs and to discourage excessive use of switching privileges. Currently, switch fees are incurred in three situations:

- Switching assets from one Select fund to another Select fund, except when exchanging out of Select/Money Market (\$25)
- Selling shares of an international equity fund (\$25)
- Selling shares of a Spartan fund (\$5).

The strategies described in this book involve very few switches with fees, so the effect on portfolio value is negligible.

Sales and Redemption Charges

A popular misconception is that sales charges are incurred every time you switch from one fund to another. With a 1% to 3% bite being taken out of your pocket with every switch, this would indeed be onerous! In fact, sales and redemption charges on your fund shares are capped at a *maximum* of 3%. Once you hit the limit, no additional charges are imposed. In effect, the 3% charge is a one-time fee, and its impact is very small if your assets stay in the Fidelity family for a few years.

Here's how it works. If the sales and redemption charges you have already paid on the shares you are selling are less than the charges would be on your latest transaction, you will be charged the difference. However, the total charges incurred by any of your shares will never exceed 3%.

Let's take an example. Suppose you purchased shares in Europe Fund and paid its 2% sales charge. If you switch into Capital Appreciation Fund, you will pay Europe Fund's 1% redemption charge on the sale. Since you have now paid a total of 3% in sales and redemption charges, you will not pay Capital Appreciation Fund's 3% sales charge. In fact, the shares will not incur sales or redemption charges on any subsequent transactions.

There is one exception to this otherwise straightforward situation. Shares acquired by *reinvesting no-load fund distributions* are regarded as "new money" and will incur sales and redemption charges when next switched through a load fund. You know when this has happened because your confirmation statement will show two purchase transactions: a large one at the NAV, and a much smaller one at the offer price. The effect of this on any practical investment strategy is so small that it can safely be ignored. For example, one active fund switching strategy we measured incurred total charges in this category of 0.5% over eight years, or just 0.06% per year.

Fidelity's computers are programmed to track the sales and redemption charges paid on every fund share you own. The 3% limit is applied automatically, and you need do nothing more than verify that your transactions are executed at the correct price.

If your money leaves the Fidelity fund family, then returns at a later date, sales and redemption charges start over again. To avoid this problem, you should where possible redeem fund shares on which no charges have been paid.

Redemption charges are similar to sales charges, except that they are paid when you sell shares rather than when you buy them. The highest redemption charge of any Fidelity fund is 1%, and no fund exceeds a total of 3% in sales plus redemption charges.

Many investors regard redemption charges as "worse" than sales charges, because if your portfolio grows you end up paying more money. While this is true, the effect on your portfolio value of a 1% redemption charge is exactly the same as a 1% sales charge, as the example in Table 5–2 shows. You could argue that redemption charges are preferable because they provide an incentive for the fund's manager to perform.

Tax Impact of Switches

Unless it takes place in a tax-deferred account, a fund switch is a taxable event, and profits and losses must be reported on your annual return.

Table 5–2. Comparison of 1% sales and redemption charges, for a \$10,000 portfolio growing by 100%.

	1% Sales Charge	1% Redemption Charge
Initial investment	\$10,000	\$10,000
Sales charge	\$100	
Net amount invested	\$9,900	\$10,000
Ending value with 100% growth	\$19,800	\$20,000
Redemption charge		\$200
Net value after redemption charge	\$19,800	\$19,800

Making Redemptions

When you set up your account, you select the options you would like to use for making redemptions. These include Money Line transfers, wire transfers, and simply writing a check.

The price you receive for your shares will be equal to the NAV at the time of the sale. Redemption charges of 1% are imposed by some funds, unless your shares have already incurred redemption charges (or total charges of 3%).

The timing of each redemption is determined in the same way as purchases of shares.

Using the FAST System

Fidelity's FAST system lets you carry out many transactions directly by accessing the main computers in Boston from any touch-tone telephone. If you still have one of the old-fashioned rotary dial phones, you can purchase a battery-powered tone generator for a few dollars from your local electronics store.

FAST is accessed by dialing (800) 544-6600. In order to use the system, you must have an account with Fidelity.

FAST System Basics

As you will see in the following examples, you use the \divideontimes button on your telephone to separate different pieces of information and the # button (pound sign) to indicate the end of each request. Each request is sent to Fidelity's main computer in Boston, where it is processed and an appropriate voice response sent back to you. FAST *is* fast, with most responses beginning within a second or so.

On FAST, each fund is identified by a unique numeric code. These are included in the fund tables throughout this book. Many FAST functions require you to enter your Fidelity account number and security code (last four digits of your Social Security Number or Federal tax ID number). Using a T-account number simplifies some transactions.

FAST will automatically hang up if you don't push any buttons for 12 seconds. You can avoid this by being well prepared before placing your call. It will also hang up if your call lasts more than 10 minutes, but you can immediately re-dial and continue with your transactions.

New services are often added to the FAST system, so you should obtain the current instructional brochure from Fidelity.

Obtaining Price and Yield Quotations

To obtain fund prices and yields, enter

|1| fund code *| account# *| security code #|

FAST will provide you with the latest closing price for the fund. For money market and bond funds, the system also gives you the annualized yield over the latest 7 and 30 days, respectively.

You only have to enter your account number once. This means that you can obtain prices for additional funds by entering only

fund code #

Prices are usually updated on FAST by 7:30 p.m. Eastern time, every day the New York Stock Exchange is open. Updating is occasionally delayed on days of abnormally high trading volume.

Hourly Prices

For the 35 Select funds, hourly prices are available on FAST, as well as the daily closing price. Simply add an **hour code** before the # key at the end of each price request. The hour codes are:

10:00 a.m.	*10
11:00 a.m.	*11
12:00 noon	*12
1:00 p.m.	*01
2:00 p.m.	*02
3:00 p.m.	*03
4:00 p.m.	*04
All hours	*00

Market Indexes and Stock and Options Quotes

The FAST system can also provide the latest on stocks, options, and market indexes. To access this information, you must have an active Fidelity brokerage account.

To obtain market indexes, enter

40 brokerage account* * security code #

Then select your index from the following list:

Standard & Poor's 500 Index (SPX)	737192#
Dow Jones Industrial Average (DJIA)	31514321#
Dow Jones Utilities Average (DJUA)	31518221#
Dow Jones Transportation Average (DJTA)	31518121#

Each letter of an index's ticker symbol is coded into two digits. The first digit is the touch-tone button on which the letter appears, and the second digit is the position of the letter on the button. "S" is the third letter on the 7 key, so it is encoded as 73.

The same coding scheme is used to obtain stock prices; thus IBM becomes 43261. The missing letters on your phone—"Q" and "Z"—are encoded as 77 and 99, respectively. A code list for options quotes is available from Fidelity Brokerage.

Account Balances and Activity

To obtain the current balance in any of your accounts via the FAST system, enter

2 fund code * account* * security code #

After receiving your account balance, you can obtain the most recent activity in your account:

Latest purchase*22#Latest dividend*23#Latest redemption*28#

Or you can also get the total value of all fund holdings in your master T-account by entering

01#

Switching on the FAST System

To exchange shares in one fund for shares of another, enter

4 from fund code fund account security code shares 4

where **from fund code** is the FAST number for the fund you are exchanging out of, and **shares** is the number of shares you wish to exchange. Enter 00 if you want to exchange all shares.

FAST will respond by identifying the fund by name and confirming the number of shares about to be exchanged. It will ask you to enter the fund to be exchanged into. Enter

* to fund code *N*#

where **to fund code** is the FAST number of the fund you are purchasing. Pressing $\mathbb{N}[*]$ tells FAST to open a new account for you in this fund. If you already have an account there, substitute your account number for the $\mathbb{N}[*]$.

FAST confirms the details of the transaction and then concludes by asking you to enter

1#

to confirm that the details are correct, or

0#

to cancel the transaction. You can cancel a switch transaction at any time prior to confirming it by pressing 88#.

With all the safeguards built into the system, it is virtually impossible to make a mistake.

Money Line Purchases

If you selected the Money Line option for your Fidelity account, you can initiate a Money Line purchase via the FAST system. Enter:

|*||5||*| fund code |*| account# |*| amount |*| security code |#|

where **amount** is the dollar amount to be transferred from your bank to the fund. Money Line purchases must be confirmed with 1 #, just like a fund exchange.

Opening a Brokerage Account

An account with Fidelity's brokerage operation combines access to Fidelity's mutual funds with the full range of services you'd expect from a major discount brokerage firm. Services of interest to mutual fund investors include:

- Purchasing fund shares on margin in order to increase your potential return (and risk)
- Selling certain Select funds short to make money in bear markets
- Transferring your assets among Fidelity funds and those in other fund families
- Switching your assets among mutual funds and other investments, including bullion, CDs, stocks, bonds, and other securities traded on any U.S. exchange
- Gaining the benefit of SIPC and other insurance on your portfolio, similar to the FDIC insurance on bank accounts.
- Using a Fidelity USA Account, a bundle of financial services that combines fund investing, brokerage transactions, cash management, and credit cards.

If you don't plan to take advantage of these opportunities, it is simpler to deal directly with Fidelity's fund management group.

Before opening a brokerage account, consider the following:

- Any money leaving the family of Fidelity funds for any reason will pay another round of sales and redemption charges if it later returns to the fold. This occurs when you invest temporarily in stocks or other securities; or if you reduce your portfolio's leverage temporarily by selling fund shares bought on margin.
- You will pay standard brokerage commissions on any transactions not involving Fidelity funds.

Buying Fund Shares on Margin

When you buy fund shares on margin, you borrow money through your broker in order to purchase more fund shares than you could otherwise afford. The current **margin requirement** is 50%, which means that you can borrow an amount equal to your investment and double the number of shares purchased.

Margin raises the potential return of your portfolio, but it also raises the potential losses and the risk level. Before using margin, you should consider:

- Can you accept the risk level of a margined portfolio? Could unexpected events cause you to lose more money than you can afford?
- Are you sure enough about your forecasts that the incremental gains will be sufficient to cover the sales charges on your additional purchases and the interest expense of the margin debt?
- Can you put up with the additional complexities of managing a brokerage margin account?
- Are you ready to face the margin calls (demands from your broker for more assets to be placed immediately into your account) that occur when the net value of your account falls too low?

Unless you are an experienced investor who understands the consequences, we suggest you avoid buying fund shares on margin. We can guarantee that you will sleep better. Events like the Crash of 1987 can completely wipe out your equity in a margin account.

Short-selling Fund Shares

Short-selling of common stocks has been practiced for many years. You borrow stock from another investor, through your broker, and then sell it on the open market, hoping to replace it later with identical stock that you purchase on the open market at a lower price. You're betting that the stock's price will decline, so that you can profit from the difference between the selling price and the replacement cost. Your goal is still to buy low and sell high, but with the order reversed.

Some of the larger Select funds can be sold short. This provides a unique way to profit from declining markets, not available to investors in other fund families. Although this sounds like an interesting opportunity to make money in bear markets, there are some problems to consider before launching yourself into a short-selling career:

- It is harder to make money selling short than buying long, because of the market's long-term upward price trend. Prices are statistically more likely to go up than go down.
- When you sell short, your losses are unlimited. If the fund rises more than 100% instead of losing value as you'd hoped, you will lose more than your original investment. This is much less likely to happen with a mutual fund than with a single stock,

but *all* of the shortable Select funds have exhibited gains of more than 100% in the past few years!

 It is even harder to profit from short-selling because you have to pay margin interest on the value of the shares you borrow for sale. Your profits have to cover the interest expense before you make a dime.

Short-selling of funds is subject to a number of restrictions imposed by the SEC or Fidelity itself to ensure orderly markets. These include:

- The so-called "up-tick" rule means that investors can only sell short on a price increase of \$0.02 or at the last price, if the last price change was up at least \$0.02. This introduces uncertainty about exactly when your transaction will be executed, and at what price. This is more of a problem with Select funds than with stocks, because the funds are traded hourly rather than continuously. You may have to wait longer for the up-tick.
- The maximum dollar amount of short-selling (short interest) in any Select fund is limited to \$2,000,000 *for all investors combined.*
- Short-selling is limited to 30% of the shares available to be borrowed, and no single investor may short more than 6% of the available shares.
- The market value of all outstanding short sales cannot exceed 75% of a Select fund's total assets.

The effect of these rules is to make your short sale transaction subject to execution delays, or to being "called in" prematurely if the prescribed limits are exceeded. A booklet is available from Fidelity Brokerage that describes the restrictions in detail.

Currently, eight of the largest Select funds are shortable. These are:

American Gold
Energy
Financial Services
Health Care
Leisure
Precious Metals
Technology
Utilities

We put short-selling in the same category as buying on margin: If you're not absolutely convinced that it's the right thing for you, you

should probably avoid it. Short-selling is for aggressive, experienced investors with cast-iron stomachs.

Fidelity Investor EXPRESS

Fidelity Investor EXPRESS (FIX) is an on-line computer service for investors with a Fidelity brokerage account. Originally set up for traders in stocks and options, FIX now lets you buy and sell mutual fund shares as well. From your personal computer you can initiate fund transactions, obtain current fund prices, and keep track of your Fidelity accounts. FIX does not support short-selling of Select fund shares, but you can purchase shares on margin. FIX is affiliated with the Dow Jones News/Retrieval service, through which you can obtain historical prices, data on individual companies, and the latest news stories.

The charge for the FIX service is \$12 per month, with no connecttime fees (except when accessing Dow Jones databases). A free fact kit is available from any Fidelity representative.

Fidelity Telephone Numbers

Table 5–3 lists the telephone numbers most often used to access the various Fidelity services. All calls are toll-free.

Table 5–3. Frequently used Fidelity telephone numbers.

Service	Toll-Free Number
Information and literature	(800) 544-8888
Purchases, exchanges, redemptions	(800) 544-7777
Service on existing accounts	(800) 544-6666
Fund prices and yields	(800) 544-8544
FAST system	(800) 544-6600
Telephone Device for the Hearing Impaired ¹	(800) 544-0118
Variable insurance products	(800) 544-2442
Fidelity Brokerage Services	(800) 544-8666

Note: Unless otherwise indicated, all services are available 24 hours a day, 365 days a year.

Available 8:30 a.m. to 5:00 p.m. Eastern time.

Conclusion

Fidelity goes to extraordinary lengths to make it easy for you to buy and sell shares in their funds. But it's up to you to decide which funds to hold and when. Your decisions will be based in part on the returns you seek and the risks you are comfortable with, the subject of our next chapter.

Chapter 6 RETURN, RISK, AND PERFORMANCE

This chapter begins by explaining how to figure a mutual fund's total return by accounting for dividends, capital gain distributions, and changes in net asset value.

Risk is just as important as return when designing or evaluating an investment strategy. It is generally true that assuming greater risk is rewarded by higher returns, but there are exceptions to this rule, and there are limits on how much risk it is prudent for you to assume. With the understanding of risk that this chapter provides, you should be able to make better investment decisions and sleep better at night.

The most commonly used measure of risk penalizes winning investments as well as losers, so we also present a less well-known measuring stick that we believe better addresses the real concerns of individual investors.

In conclusion, we show how risk and return can be combined into a realistic measure of **investment performance**, building up design goals for a new investment strategy.

Measuring Total Return

The investment return of a mutual fund has three components: the change in NAV, the **dividends** paid from interest and stock dividends earned by the fund, and the **capital gain distributions** made by the fund. When combined, the three factors yield the **total return**. It is *essential* to include all three when figuring a fund's return. For example, if you only look at the yield of a long-term bond fund, you will be ignoring the fact that capital gains and losses can have a much greater effect on performance.

The easiest way to determine a fund's total return is to look it up in Fidelity's monthly *Mutual Fund Guide*. Alternatively, you can figure it

from historical **adjusted prices** by simply dividing the ending price by the starting price for the period of interest. Formulas for adjusting prices to reflect dividends and capital gain distributions are provided on page 208.

Mutual Fund Math—Charting Fund Return

Charts of fund prices are most useful when you can make meaningful visual comparisons among different time periods or different funds. This is only possible if a particular slope in a graph always represents the same amount of total return. For example, all funds growing at 15% per year must plot as straight lines with the same slope. This is achieved by plotting prices on graph paper with a **logarithmic** scale on the vertical axis, like the price charts throughout this book. Regular linear graph paper distorts price trends so that you cannot compare different funds, or even the same fund over different time periods.

Another requirement for making visual comparisons is that all charts have the same scales on both the horizontal and vertical axis. The horizontal axis should cover the same amount of time per inch, and on the vertical axis the doubling of a fund's price must always occupy the same distance. The charts in this book follow this practice.

A third requirement is to plot adjusted prices, because unadjusted prices will show misleading price drops every time a fund makes a distribution.

If you take these precautions, the fund whose chart has the highest slope has the greatest percentage growth rate.

Charts with linear time scales and logarithmic price scales are known as **semi-logarithmic**; "semi-log" for short. Figure 6–1 compares linear and semi-log charts of the S&P 500 over 1967–1988. The linear chart at the top makes the 1987 Crash look much more severe than the 1974 bear market, but the opposite is true, as revealed by the semi-log chart.

Semi-log fund charts are published in Fidelity's monthly *Mutual Fund Guide*. To plot your own charts, you should obtain 2-cycle semi-log graph paper from any good office supply outlet or college bookstore. Special papers are available with calendars along the horizontal axis, but they are not essential. Be sure to use the same paper for all your price charts. Semi-log charts do not involve any additional calculations, and are just as easy to plot as linear charts.

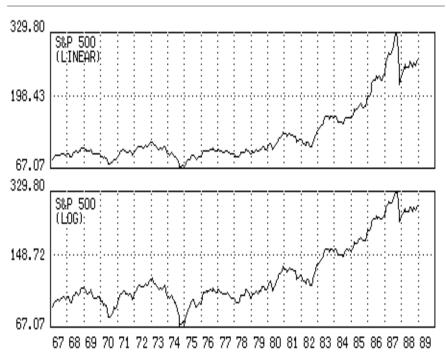


Figure 6–1. Linear and semi-logarithmic plots of the S&P 500, 1967–1988.

Causes of Risk

The risk of an investment represents the chance that its expected return will not be achieved, or worse yet, that you will lose money instead of making a profit. Risk manifests itself in the fluctuations in return exhibited by all securities, including mutual funds.

An example of an investment with essentially zero risk is a federally insured savings account at a bank. You will earn an annual return of 5% or so on your money, regardless of what happens to the stock market or the economy. The return of your investment is almost 100% predictable. We say "almost," because the interest rate changes from time to time. This introduces uncertainty to the return you will get from reinvested dividends.

Money market mutual funds also have extremely low risk. You have a greater exposure to the **interest rate risk**—and a miniscule exposure to default by the issuers of the short-term debt—but the overall level of risk is still vanishingly small. The relative volatility of a money market

fund is about 0.02, compared to the market's 1.00. Some experts have concluded that money market mutual funds are less risky than the average bank today.

Investing in common stocks brings with it considerably higher risk. Although the long-term total return of common stocks is much higher than that of risk-free investments, the everyday fluctuations in stock prices introduce a new element of risk: **market risk**. A broad market index such as the S&P 500 has a long-term average return of about 12% per year, or 0.2% per week. Short-term fluctuations will cause weekly returns to vary within about 5% of this figure, that is, from -4.8% to +5.2%. Occasionally you will experience weekly gains and losses more extreme than this.

Common stocks may seem risky, but some investments are much worse. Examples include options on stocks, stock index futures, and commodity futures. These investments can be 10 times riskier than stocks, and it is possible to lose your entire investment, or even more.

With such an enormous range of risk possibilities, an essential part of any investment strategy is to decide what level of risk you are comfortable with. If daily fluctuations in your portfolio's value give you ulcers or cause you to lose sleep at night, your risk exposure should be reduced. If, on the other hand, your portfolio isn't growing fast enough to meet your financial objectives, you may need to assume greater risk in order to achieve a higher return.

The risks associated with any single security are known as **security risk**. If you only hold stock in one company, you are exposed to the business risks unique to the company. An extreme case of this is to invest 100% in the stock of the company that employs you. If the company fails, you not only lose your entire investment, but you lose your job as well. The combination of zero assets and zero income is not a happy one!

Security risk is a form of **diversifiable risk**, because it can be largely eliminated by spreading your investments over several different securities. Studies have shown that the risk level of a stock portfolio is decreased about 3 times by holding 10 stocks instead of 1.

The concept of diversifiable risk is an important one, because investing in mutual funds is the ultimate way to eliminate it. Many investors cannot afford to purchase 10 securities at a time and would like to avoid the higher trading costs and the burden of research and record-keeping. By contrast, mutual funds often own hundreds of securities, and your exposure to any one security is minimal. Diversifiable risk is needless risk, and investing in mutual funds essentially eliminates it.

Another excellent reason for minimizing diversifiable risk in your portfolio is that the market doesn't reward diversifiable risk with higher returns. Only nondiversifiable risk brings higher potential returns. This makes sense; why should the market place a value on risk that is easily avoided?

Another form of risk is **liquidity risk**: the chance that you will not be able to liquidate an investment for a fair price when you need to. Although this problem rarely affects mutual fund investors, many purchasers of real estate and limited partnership interests have discovered this risk to their cost.

Conventional Risk Measures

Risk is commonly defined in terms of the **volatility** of an investment's total return. The more total return fluctuates above and below its long-term average the greater the risk.

If you plot a distribution of weekly gains and losses, you obtain a bell-shaped curve that statisticians call a **normal distribution** (see Fig. 6–2).

The width of the curve represents how much return fluctuates from week to week. This is usually expressed as the **standard deviation** (SD) of the fluctuations. By definition, 68% of fluctuations occur within one standard deviation of the average: 34% on each side of the peak. This means that you would expect your weekly return to fall within one standard deviation of its average 68% of the time, and to fall outside these limits 32% of the time (16% on each side).

Standard deviation is a measure of the **volatility** or unpredictability of an investment's return. It is often used as a measure of **risk**, since it represents the probability that an investment's expected return will not be achieved.

The standard deviation of the weekly return of a stock market index such as the S&P 500 is about 2.3%. In crude terms, this means that the market spends most of its time fluctuating within $\pm 2.3\%$ of its average weekly return of 0.2%, with occasional forays as large as $\pm 5\%$.

The shape of the curve tells you that the larger the fluctuations, the less often they occur. For example, fluctuations more than three SDs from the peak only occur 0.3% of the time (about one week every six years). Days like October 19, 1987, when the market dropped some 22%, should be rare indeed.

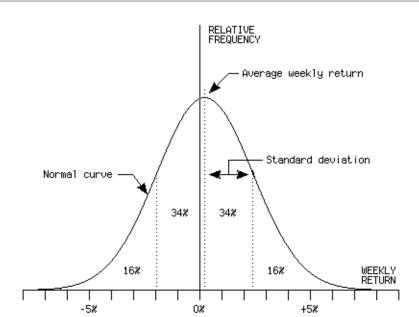


Figure 6–2. How stock market returns vary from week to week (idealized distribution).

Relative Volatility

The term **relative volatility** indicates how much an investment's return fluctuates *relative to the market*. For example, if a fund's standard deviation is only 60% of the market's, its relative volatility is 0.60. The fund is said to be 40% less risky than the market. The fund tables throughout this book show these figures in a column headed "Rel. Vol."

Figure 6–3 breaks the Fidelity family of funds down into groups to show the range of relative volatilities associated with different classes of securities. The left half of the table shows Fidelity's broadly diversified funds; the right half shows the industry sector funds. The relative volatility of Fidelity's funds varies from 0.02 for money market funds to about 2.00 for **Select/Precious Metals**. Broadly diversified stock funds are clustered around 1.00, as you'd expect.

Beta. Beta is similar to relative volatility, except that it measures how much a security's return varies *in sympathy with* the market. It measures how much exposure an investment has to the market's risk, while ignoring other risks unique to the investment. Beta is a poor

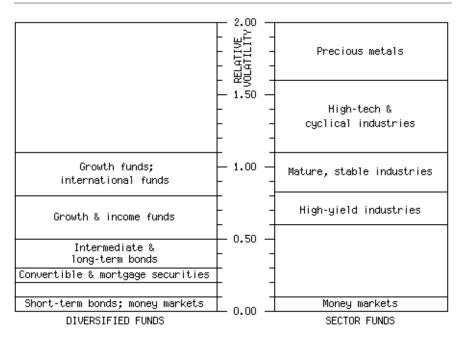


Figure 6–3. Relative volatility of Fidelity fund groups. Blank regions represent volatility values not exhibited by any fund.

measure of overall risk for investments whose returns fluctuate more independently of the market, such as gold stocks and international investments. For example, Overseas Fund's beta is 0.67, whereas its relative volatility is almost twice as high at 1.17.

Often associated with beta is $\mathbf{r^2}$ ("r-squared"). This tells you the degree of correlation between fluctuations in a fund's price and a market index such as the S&P 500. For example, if a fund's $\mathbf{r^2}$ is 0.96, this means that 96% of the fund's price movements are explained by movements in the broad market. Fidelity's *Monthly Fund Guide* lists beta and $\mathbf{r^2}$ figures for most equity funds.

Mutual Fund Math—Measuring Volatility

Table 6–1 shows how to calculate the weekly standard deviation (SD) of return from a sequence of closing prices. The formula used is:

$$SD = \sqrt{[(n \times \sum x^2) - (\sum x)^2] / n}$$

where n is the number of values (20), $\sum x$ is the sum of the weekly

returns, $\sum x^2$ is the sum of the returns squared, and $\sqrt{}$ means square root.

To convert a weekly SD into an annual SD, you *don't* multiply by 52. Instead you multiply by 7.21, the square root of 52. Similarly, to convert weekly SD into monthly SD, you'd multiply by 2.08 (there are 4.33 weeks in an average month).

In our example,

$$SD = \sqrt{[(20 \times 244.42) - 13.79^2] / 20}$$
$$= 3.43\%$$

The weekly SD of a broad market index such as the S&P 500 is about 2.3%, so the **relative volatility** of this fund is 3.43 / 2.3 = 1.49.

Table 6–1. Example showing how to calculate a fund's weekly SD of return.

Week	Closing Price	Return (%)	Return Squared	
1	20.65			
2	20.58	-0.34	0.11	
3	21.13	2.67	7.14	
4	20.41	-3.41	11.61	
5	20.56	0.73	0.54	
6	19.30	-6.13	37.56	
7	17.57	-8.96	80.35	
8	18.37	4.55	20.73	
9	18.57	1.09	1.19	
10	19.06	2.64	6.96	
11	18.99	-0.37	0.13	
12	20.11	5.90	34.78	
13	20.64	2.64	6.95	
14	20.61	-0.15	0.02	
15	20.56	-0.24	0.06	
16	21.03	2.29	5.23	
17	21.01	-0.10	0.01	
18	21.72	3.38	11.42	
19	22.31	2.72	7.38	
20	22.95	2.87	8.23	
21	23.41	2.00	4.02	
TOTALS		13.79	244.42	

Exposure and the Ulcer Index

Conventional risk measures based on the volatility of a security's return are a useful tool for developing theories that explain market behavior, but some experts view risk differently from **exposure**. They regard risk as the chance that your investment will not achieve its expected return, either on the upside or downside. Exposure, on the other hand, is concerned more with how much your portfolio's value might drop while you are holding an investment, even if you eventually sell at a profit. Real investors are probably more concerned with exposure than risk.

Problems with Conventional Risk Measures

Figure 6–4 shows three hypothetical funds A, B, and C, each having the same return and standard deviation of return over an eight-year period. Conventional measures of risk and return would rate the three opportunities equally, but a rational investor would show a clear preference for fund A over fund B, and for fund B over fund C. Fund A never loses money, even though its return alternates between periods of slow and rapid growth. Fund B has a consistent growth trend, but it shows short-term gains and losses typical of most funds. Fund C exhibits an initial period of long-term decline, but manages to recover by the end of the period. We need a risk measure that rates A much higher than C, because C is more likely to cause you grief.

Why do conventional risk measures fail to differentiate among these funds? First of all, standard deviation is increased by both gains and losses in portfolio value, yet a real investor is only disconcerted by the downside. Rapid increases in price create profits, not risk.

Secondly, standard deviation does not distinguish between randomly occurring gains and losses and long sequences of losses that create situations like fund C. Clearly, a risk measure is needed that addresses these problems.

The Retracement Alternative

Investors in highly leveraged securities such as futures and options pay more attention to **retracements** in portfolio value, also known as "equity drawdown." This measures the tendency for a portfolio value to fall from previous highs. This is critically important for leveraged investors, because a strategy with high retracements can wipe out your entire portfolio and prevent you from participating in the profits that the strategy achieves later. Even a margined mutual fund investor can experience this, because 50% drops in fund price are not unknown, and are sufficient to reduce your equity in a fully margined portfolio to zero. Retracement works very well for unmargined mutual fund investors too,

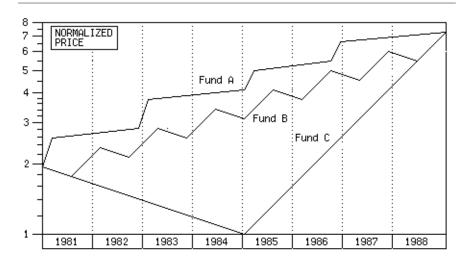


Figure 6–4. Three hypothetical funds with the same return and standard deviation.

because it directly addresses concerns about behavior like that of fund C.

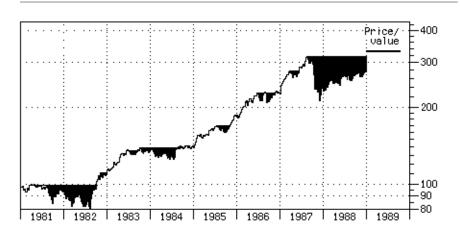
Figure 6–5 shows the periods of retracement for the S&P 500 index for 1981–1988. The shaded areas show when significant retracement occurred. The riskiness of the market is represented by the area of the shaded parts. Fig. 6–6 and Fig. 6–7 show the sharp contrast between the retracements of two Fidelity funds: **Government Securities Fund** and **Select/Precious Metals**. A quick glance at the darkness of the charts tells you how risky each investment is. As you can see, the market's risk lies between the two mutual fund examples.

Mutual Fund Math—Calculating Retracement

Just as with conventional risk measures, retracement should be calculated as an average over a period of at least five years. Assuming weekly data, it is computed by adding up (for each week) the percentage retracement (if any) from the highest earlier price. The total is then divided by the number of weeks in the sample. Table 6–2 shows an example.

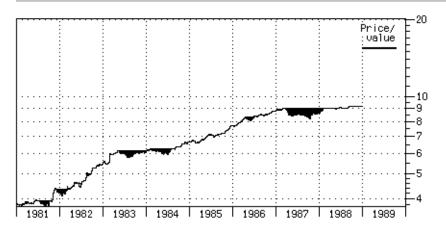
The calculations in column 4 give equal weight to all retracements. A better method is to add the squares of the retracements, in order to penalize large retracements proportionately more than small ones. The **root-mean-square retracement** is computed by dividing the sum of

Figure 6–5. Retracement history for the S&P 500 Index, 1981–1988.



the squared retracements by the number of weeks, then taking the square root (see column 5). (This is equivalent to the standard deviation of retracement.) Note how the large retracements in the example cause retracement risk to be higher with squaring (6.68%) than without (4.31%).

Figure 6–6. Retracement history for Government Securities Fund, 1981–1988.



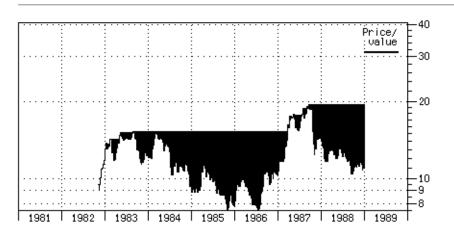


Figure 6–7. Retracement history for Select/Precious Metals, 1981–1988.

Some investors prefer to use the *maximum* retracement rather than an average. This reveals the worst experience over the test period, but it emphasizes a single event to the exclusion of all others. It is more useful to leveraged investors than to most mutual fund investors.

We will use the root-mean-square measure of retracement elsewhere in the book when computing the risk and performance of various strategies. Rather than referring constantly to its full name, we will call it the **Ulcer Index** (UI). The higher an investment's UI, the more likely investing in it will cause ulcers or sleepless nights.

The Ulcer Index indicates the "normal" retracements you can expect from an investment in the long run. The market's UI is about 10%, so you expect significant periods of time when the S&P 500 has fallen 10% below previous highs. On the other hand, it should not spend much time significantly lower than this.

Like conventional measures of risk, the UI varies greatly from one period to another. Most common stock funds will exhibit very high UI's during bear markets, and low figures in bull markets. The period over which you measure UI should therefore include both market conditions. It is particularly important to use the same measurement period when comparing alternative investments.

Table 6–2. Example showing how to calculate retracement measures of risk.

(1)	(2)	(3)	(4)	(5)
Week	Closing Price	Dollars	Retracement Percent	Squared
	20.65	0.00	0.00	0.00
<u>)</u>	20.58	0.07	0.34	0.12
}	21.13	0.00	0.00	0.00
1	20.41	0.72	3.41	11.63
5	20.56	0.57	2.70	7.29
,)	19.30	1.83	8.66	75.00
7	17.57	3.56	16.85	283.92
3	18.37	2.76	13.06	170.56
9	18.57	2.56	12.12	146.89
10	19.06	2.07	9.80	96.04
11	18.99	2.14	10.13	102.62
12	20.11	1.02	4.83	23.33
13	20.64	0.49	2.32	5.38
14	20.61	0.52	2.46	6.05
15	20.56	0.57	2.70	7.29
16	21.03	0.10	0.47	0.22
17	21.01	0.14	0.66	0.44
18	21.72	0.00	0.00	0.00
19	22.31	0.00	0.00	0.00
20	22.95	0.00	0.00	0.00
21	23.41	0.00	0.00	0.00
Total			90.51	936.78
Average			4.31	44.61
Square roo	t			6.68
Retraceme			4.31	6.68
Maximum e	exposure		16.85	

Risk and Reward

Now that we have convenient measures of return and risk, how can they be combined so that different investment opportunities can be evaluated?

Figure 6–8 shows a chart of relative volatility versus total return, often used for this purpose. This simple chart contains some very important investing concepts that can help you increase returns and accumulate wealth faster. It is based on a theoretical model known as the **Capital Asset Pricing Model (CAPM)**.

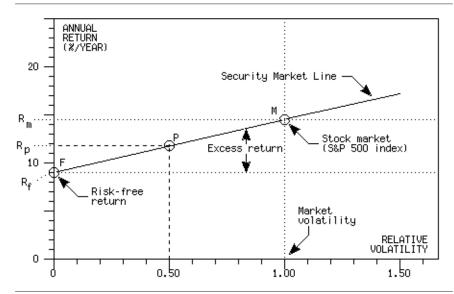


Figure 6–8. Relative volatility versus return, showing key investment concepts.

Note the points F and M representing risk-free and stock market investments, respectively. The corresponding returns on the vertical axis, $R_{\rm f}$ and $R_{\rm m}$, are the figures for the period 1981–1988. The additional 5.5% annual return earned by stocks over this period is the reward paid for accepting the market's volatility (1.00 on the horizontal scale).

The line joining the two points is known as the **Security Market Line**. Since this line slopes up from left to right, we know that investors in the aggregate expect a higher return for assuming greater risk.

Any desired trade-off between risk and potential return can be made by dividing a portfolio between a diversified stock fund and a money market fund in the appropriate proportions. Potential returns higher than the market can be achieved by purchasing fund shares on margin.

Suppose you want to invest in common stocks, but require a portfolio volatility less than 1.00. Point P of the chart shows a portfolio 50% invested in the stock market and 50% in money markets. It would have returned 12% per annum over the 1981–1988 period, with a portfolio relative volatility of 0.50.

You can compute the volatility and return of any portfolio divided between the stock market and money markets as follows:

```
\begin{split} \text{relative volatility} &= N_s \times 1.00 \\ \text{total return} &= R_f + (\text{relative volatility}) \times (R_m - R_f) \\ &= R_f + N_s \times (R_m - R_f) \end{split}
```

where N_s is the fraction of a portfolio in the stock market, and the remainder is in money markets. That is, the total return is the risk-free return R_f , plus relative volatility times the difference between the market return R_m and the risk-free return.

An important point here is that to build a portfolio with any desired volatility it is not necessary to identify a fund with exactly the right value. You can achieve the same result by mixing stock and money market funds of your choice in the correct proportions. It may seem to you that assets in a money market fund aren't "working" for you, but this technique often lets you create a portfolio with a higher investment performance than any other combination of investments.

What if you want to seek higher returns by accepting a portfolio volatility higher than 1.00? One way to achieve this is to purchase mutual fund shares on margin. For example, you could borrow an amount equal to your investment, and purchase twice as many shares in a stock fund. The net value of your investment (after providing for loan interest) will fluctuate twice as much as the market, for a relative volatility of 2.00. In actual practice, you'll do a little worse than doubling the gains and losses, because of the interest payments you make on your margin debt.

The CAPM explains that the performance expected by investors in the aggregate for all investments must lie on the Security Market Line. The Line represents the trade-off that they are prepared to make between volatility and return. If an investment lies above the Line, it would be providing a return higher than that demanded by investors in view of its volatility. Such an investment would quickly attract new investors who would bid up its market price. This would have the effect of reducing its expected return, because you would have to pay more to own it. This process would continue until the investment was properly priced. Similarly, an investment lying below the Line would attract selling by investors. Its price would drop until its expected return provided fair compensation for its volatility.

The CAPM is generally supported by the behavior of real investments. If you plot the long-run performance of many different investments on a risk-return chart, most would cluster around the Security Market Line. Investments lying above the line are said to be beating the market, because they earn a higher return than predicted by their volatility. Likewise, investments lying below the line are underperforming the market, after considering their volatility.

Why don't *all* investments lie very close to the line? The CAPM is strictly an expectational model. It explains how markets behave in response to investor *expectations* about the future, rather than how markets *actually* behave. Since actual behavior is affected by unpredictable events, divergences from the CAPM are inevitable.

While securities in general are efficiently priced, it is possible to "beat the market" by seeking out pockets of inefficiency which offer profits beyond those predicted by CAPM. We'll show you in later chapters how to develop a fund switching strategy which does just this.

The Real Meaning of Performance

As just described, there is more to investment performance than total return. Risk must be considered as well when comparing investment alternatives. A popular method for comparing investments with different risk and return is to calculate the excess return (above the risk-free rate) per unit of risk assumed. This is known as **investment performance**. One such measure is the **Traynor Index**,* given by:

Traynor Index =
$$(R_i - R_f) / RV_i$$

where R_f is the risk-free return, and R_i and RV_i are the total return and relative volatility of investment i, respectively. The Traynor Index is simply the slope of a line on the CAPM chart that joins the point representing the risk and return of an investment to the risk-free return on the vertical axis.

The Ulcer Index can also be used to calculate performance, by substituting the Ulcer Index for relative volatility in the Traynor Index formula. We'll call the result UI Performance. This tells you the extra profits you would have earned per ulcer inflicted.

UI Performance =
$$(R_i - R_f) / UI_i$$

where UI; is the Ulcer Index for investment i.

Table 6–3 compares Fidelity funds over the five-year period June 1983 to December 1988, ranked by UI Performance. Risk-based performance measures are not meaningful for investments that lose money, so the table shows these as having zero performance.

The table shows roughly a 7-to-1 range in volatility, but the same funds show a 17-to-1 range in Ulcer Index. If retracements in portfolio value are your primary concern, volatile funds are generally riskier

^{*} The Traynor Index is similar to the better-known Sharpe Index, except the latter divides excess return by standard deviation of return rather than by relative volatility.

Table 6–3. Return, risk, and performance for Fidelity funds, five years ending December 1988.

	Compound Annual Return	d Excess Annual Return	Ulcer Index (UI)	UI Perfor- mance	Rel. Vol.	Traynor Index
Municipal Bond	14.97%	7.61%	2.52%	3.03	0.43	17.77
Limited Term Municipals	12.70%	5.34%	1.93%	2.77	0.36	14.83
High-Yield Tax-Free	12.96%	5.60%	3.74%	1.50	0.40	13.97
Capital & Income	11.67%	4.32%	3.39%	1.27	0.34	12.74
Puritan	13.76%	6.41%	5.58%	1.15	0.55	11.65
Intermediate Bond	9.78%	2.43%	2.40%	1.01	0.31	7.79
Magellan	16.52%	9.17%	10.92%	0.84	1.04	8.85
Select/Utilities	13.86%	6.51%	7.89%	0.83	0.70	9.31
Equity-Income	12.78%	5.43%	6.63%	0.82	0.68	7.95
S&P 500 Index	14.68%	7.33%	10.29%	0.71	1.00	7.33
Investment Grade Bond	9.60%	2.25%	3.34%	0.67	0.38	5.96
Select/Health Care	14.39%	7.04%	14.76%	0.48	1.21	5.79
Fidelity	11.66%	4.31%	10.15%	0.42	1.00	4.30
Retirement Growth	11.90%	4.55%	11.45%	0.40	1.12	4.05
Gov. Securities	8.25%	0.90%	2.43%	0.37	0.30	2.99
Select/Financial Services	11.45%	4.10%	11.72%	0.35	0.91	4.52
Trend	10.40%	3.05%	11.50%	0.26	1.11	2.74
Contrafund	8.20%	0.85%	13.22%	0.06	1.02	0.83
Value	6.53%	-0.82%	11.92%	0.00	0.99	0.00
Select/Energy	5.81%	-1.54%	12.31%	0.00	1.04	0.00
Select/Technology	-7.74%	-15.09%	24.71%	0.00	1.60	0.00
Select/Precious Metals	-1.82%	-9.18%	32.11%	0.00	1.96	0.00

Note: Risk-free return over this period was 7.35% per year.

than they appear from their relative volatility figures.

Table 6–3 is interesting because it shows that most bond funds and growth and income funds offered higher performance than growth funds during a generally bullish period. You didn't have to sacrifice return either, because Municipal Bond Portfolio grew faster than the market and all funds except Magellan. It achieved essentially the same return for one-fourth the risk. (We assumed a 30% tax bracket when computing the equivalent taxable yield of municipal bond funds.) For completeness, the table also shows relative volatility and the Traynor Index of performance.

UI Performance and Traynor Index figures are not directly comparable. However, either can be used to compare different investments with each other.

There is little difference between the UI Performance and Traynor Index *rankings* of the funds. This is because the funds are essentially fully invested in their target securities, and their cyclical ups and downs that create periods of retracement are roughly in proportion to their volatility. Not surprisingly, aggressive stock funds have both high volatility and high retracement.

The UI Performance measure is most useful when comparing strategies that seek to avoid major market downturns. If your strategy avoids bear markets it will exhibit very low retracement, yet its volatility when "in the market" may be similar to any other stock fund portfolio. UI is therefore the preferred method for comparing the effectiveness of market timing strategies in reducing risk. Strategies that conventional risk measures show as having no clear advantage over a buy-and-hold approach can be revealed to have a major advantage after all. Later in this book, you will see examples of strategies with UI Performance much higher than the market.

A word of warning about the two performance measures: The results depend on the time period used in the calculations, because the excess return used in the formula depends on the length of time over which you measure it. Throughout this book, we use annualized returns when calculating investment performance.

UI Performance and the Traynor Index are useful tools for measuring the performance of investment strategies or individual securities. They can also be used as the basis for decision-making indicators, although this is not their primary purpose.

Several other performance measures have been described in the investment literature. **Profit per trade** is important for strategies with high trading costs, but this does not apply to fund switching activities. The **percentage of profitable trades** is not very useful, because winning strategies will often achieve less than 50%. They succeed by making more money on the profitable trades than they give back on the losing trades.

Maximizing Wealth

Investing in the fund with the highest Traynor Index or UI Performance doesn't necessarily result in the greatest wealth. Once again, the concerns of real investors diverge from convenient theoretical models of market behavior.

The CAPM teaches us that all funds should lie on the Security Market Line, because this represents the trade-off that investors are willing to make between risk and return. In order to "beat the market," our system must consistently select funds whose future performance will be plotted above the Line.

The trouble starts when we compare two funds with different risks and returns. Consider funds A and B in Fig. 6–9. Fund A has a higher expected return than B, but it also has higher volatility. If we draw lines from A and B to the risk-free return $R_{\rm f}$, we see that B's line has a higher slope. This means that B has a higher investment performance. However, suppose you are willing to accept A's higher volatility. Does this mean that A is a better investment for you? As an investor, you are more interested in maximizing wealth than in the abstract concept of excess return per unit of risk. Maximizing wealth isn't necessarily the same thing as maximizing investment performance.

Suppose your goal is to get the greatest possible return without exceeding a portfolio relative volatility of 0.60. The diagram compares four available options:

- (1) Invest 100% in fund B, for an expected return R₁. Your risk level would be lower than your limit.
- (2) Invest approximately 80% of your portfolio in fund A, and the remaining 20% in a money market fund. Your expected return is R_2 , higher than R_1 .
- (3) Invest approximately 60% of your portfolio in fund A, and the balance in fund B. Your expected return is R_3 , higher than R_2 .
- (4) Use margin to invest twice as much in fund B and achieve the highest return, R₄. Your return would be somewhat lower than shown because of the interest paid on your margin debt.

Alternatives (2) through (4) match your risk target. Option (4) has the highest expected return, and hence the greatest wealth accumulation potential. However, it involves buying funds on margin, so most investors would settle for option (3).

Evaluating alternatives this way takes account of differences in both the risk and return of available investments. It also shows how to apply investment performance to the business of maximizing wealth.

Implications for Investment Strategies

Many investors are comfortable with the normal weekly fluctuations of the market indexes but are distinctly uncomfortable during bear markets like 1973–1974, or after major surprises like the Crash of October 1987. Events like this don't have much effect on the weekly standard deviation of return, but they have a major impact on the Ulcer Index. A reasonable goal for an investment strategy might be an Ulcer Index of 3%, compared to the market's figure of about 10%.

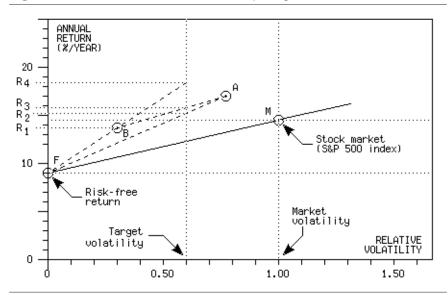


Figure 6–9. Risk versus return chart comparing funds A and B.

By conventional measures, the relative volatility of our strategy should not exceed the market's. This sets a goal of no more than 1.00. At the same time, the strategy should achieve a higher return than the market, to compensate for the time and effort involved in regular monitoring of investments. A goal of beating the market by an average of 10% to 15% per year might seem ambitious, but is worth striving for.

In conclusion, then, our Fidelity fund investment strategy should achieve the following:

Excess return over S&P 500 10-15%
Ulcer Index 3% maximum
SD of weekly return 2.3% maximum
Relative volatility 1.00 maximum

Chapter 7 PASSIVE INVESTMENT STRATEGIES

Over the years, many mutual fund investment strategies have been spread by newsletters, magazines, and radio talk shows. Strategies vary considerably in their complexity and level of switching activity. At one extreme we have the buy-and-hold approach, where fund shares are purchased and held until needed for some other purpose, often retirement. At the other extreme, there is the active trader using the hourly switching privileges in Fidelity's 35 Select funds: the mutual fund equivalent of watching the tape in your broker's office.

This chapter explains some "passive" approaches to investment that involve little or no effort on your part, and compares their performance over the past 22 years. The approaches described are:

Buy-and-hold Dollar cost averaging Market timing with moving averages

Buy-and-Hold

This approach is based on making investments today, and holding them until the money is needed for some other purpose. Short-term fluctuations in the value of the investments are ignored because the long-term return is expected to meet objectives.

The technique is scorned by many because no attempt is made to avoid the major downturns that occur in stock prices during bear markets. But if you believe that attempting to time the market is futile because of the market's high pricing efficiency, if you are satisfied with the fund's long-term growth rate, or if you don't have the time or inclination to become more involved in managing your investments, this approach should yield a long-term return close to historical rates.

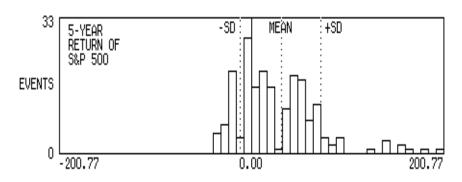
The key phrase here is "long-term." Only over periods of 20 years or more can you be reasonably sure your return will approximate the historical averages. A stock market example will illustrate this.

In early 1966, the Dow Jones Industrial Average (DJIA) peaked just short of 1000. It was not until 17 years later that the index made a significant advance above this level. If stocks had yielded their historical average return over this period, a portfolio would have grown more than five times in value. Instead the only return was the dividend paid by the Dow stocks, averaging about 4% per year. In reality, investors lost money because of severe inflation during the 17 years.

This example shows that with a buy-and-hold approach, you can be extremely unlucky. A negative real return over as long as 17 years will thwart the best-laid financial plans.

Figure 7–1 shows the distribution of five-year returns for the S&P 500 over 1967–1988, computed annually. As you can see, five-year periods with net losses are quite common.

Figure 7–1. Distribution of five-year returns for the S&P 500, 1967–1988.



This diagram is an example of a **histogram**. The vertical scale shows how many times the market's five-year return fell into each range of values along the bottom scale. The most common value, represented by the highest "peak," is a return slightly less than zero. The histogram also shows the mean (average) value (in this case about 30%) and the values one standard deviation either side. The highest value for any five-year period was +200%, and the lowest was -40%.

Dollar Cost Averaging

The idea behind dollar cost averaging is to invest the same dollar amount in the purchase of fund shares at regular intervals. For example, you might purchase \$500 worth every month. When prices are low, your \$500 will purchase more shares than when they are high, so your portfolio becomes overweighted with low-priced shares. If you had instead purchased all your shares at one time, you'd run the risk of paying the highest price for all of them, and losing money as prices returned to more normal levels.

Dollar cost averaging is popular because it fits nicely with the idea of adding to your savings each month. But at best, it only solves half the pricing problem. Suppose you retire and wish to purchase an annuity to provide for regular income. You may find your retirement delayed because prices are at a temporary low point at which you cannot afford to sell. Perhaps dollar cost averaging should be applied to selling as well as buying?

What if you have a large amount to invest today? Dollar cost averaging would urge you to invest it gradually over a period of years. What do you do with your uninvested assets while waiting their turn? If you place them with a money market fund, you will greatly reduce the profit potential of your portfolio, which may prevent you from reaching your financial objectives.

The greatest advantage of dollar cost averaging is that it encourages regular saving. Putting away quite modest amounts each month or quarter will have a major impact on portfolio growth.

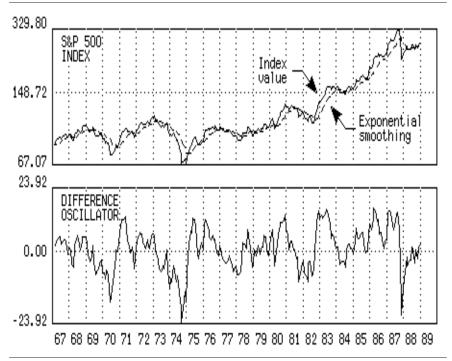
Like the buy-and-hold approach, dollar cost averaging requires very little effort or attention. Fidelity's Automatic Account Builder service is a convenient way to implement it. With this service, amounts of \$250 or more can be transferred automatically from your bank account to your Fidelity account at regular intervals.

Market Timing with Moving Averages

A popular method for avoiding major market downturns is the use of moving averages. These techniques use straightforward mathematical manipulation of market data to "smooth out" short-term fluctuations so that underlying trends can be seen more clearly. Details of how to do this are given in the next section.

Figure 7–2 shows the effect of **exponential smoothing** on the S&P 500 index over 1967–1988. Also shown is the **difference oscillator**, which reveals more clearly what percentage the index is above or below its smoothed trend.

Figure 7–2. S&P 500 (solid line), with exponential smoothing (dashed line), and difference oscillator (lower graph), 1967–1988 (alpha = 0.2).



When the market is above the trend, it is believed to be a good time to be in stocks. Conversely, if the market is below its moving average, it is best to be in money markets.

Sometimes secondary rules are added for timing the market. For example, you might switch into stocks when the index moves more than 3% above its moving average and switch out again when it falls more than 3% below. This is known as a 3% **filter**. A properly designed filter can help avoid unnecessary trading during trendless markets without affecting overall performance.

Moving averages are an example of **trend-following** techniques; They react to price changes that occurred in the recent past. There is an assumption that trends, once identified, will continue long enough to be profitable.

Mutual Fund Math—Smoothing Techniques

Anytime you examine changes in investment data over time, you will see short-term fluctuations (or "noise") that have little relevance to underlying trends. In order to separate the wheat from the chaff, various smoothing techniques have been devised to reduce the noise to acceptable levels. A good method will remove most of the noise without distorting the timing or appearance of important events. Unfortunately, these goals are in direct conflict: The more noise you remove, the more you delay and distort. Inevitably a trade-off must be made.

We shall describe three smoothing techniques, all loosely known as "moving averages": the simple moving average, exponential smoothing, and median smoothing.

Simple Moving Averages. With this technique, the smoothed value of each price is simply set equal to the average of the most recent k prices. k is known as the **smoothing period**, and some popular values are 10, 13, and 39 weeks. For example, with a 13-week moving average the latest 13 weeks' prices are added up, then divided by 13 to obtain the current smoothed price. Note that this method gives equal weight to the k prices used in the calculation.

Exponential Smoothing. Exponential smoothing is similar to moving averages, except that it gives greater weight to more recent prices and is simpler to calculate. The exponentially smoothed price at time t is given by:

$$E_t = (alpha \times P_t) + [(1 - alpha) \times E_{t-1}]$$

where E_t and P_t are the smoothed and unsmoothed price for the current period, E_{t-1} is the smoothed price from the previous period, and alpha is a **smoothing constant**, often in the range 0.05 to 0.50. Exponential smoothing with alpha = 2 / k will produce similar results to simple moving averages over k periods. For example, an alpha of 0.2 is equivalent to a 10-period simple moving average.

The calculation involves only the current price and the result of the previous calculation. The method is initialized by setting the first smoothed price E_1 equal to P_1 . The formula is easy to use with a programmable calculator or computer spreadsheet program.

Median Smoothing. This technique is not often found in investment strategies, probably because of the amount of computation involved. However, it does provide a high degree of smoothing without introducing major time delays, and without distorting major events at all.

Here, each smoothed price is equal to the **median** of the preceding n prices:

$$M_t = median(P_{t-n+1}...P_t)$$

where n is often an odd number such as 3 or 5.

The median is that value out of the n values with an equal number of other values above and below it. It involves sorting n prices for each smoothed price and selecting the middle value. For example, if the latest five prices are 13, 18, 15, 10, and 12, the median is 13.

The amount of smoothing determines how quickly the smoothed price responds to changes in trends. Lots of smoothing is appropriate for strategies that seek to identify long-term trends such as major business cycles; less is needed to profit from intermediate-term trends in the market. If you use too much smoothing, new trends will dissipate before you see them; if you use too little, you will find switching activity excessive.

In their exhaustive computer study of technical market indicators, Robert Colby and Thomas Myers concluded that the differences between smoothing techniques are minor. Many analysts choose exponential smoothing for its simplicity and increased weighting of recent prices.

Testing the Passive Strategies

Each of the three basic strategies we have described—buy-and-hold, dollar cost averaging, and moving averages—has a wide following among individual investors. Let's see how they compare for return, risk, and performance.

Given the monthly closing S&P 500 index for the period 1967 through 1988 (see Fig. 7–3), it is a relatively simple matter to program a computer to test the passive strategies.

For the moving average technique we used exponential smoothing with alpha values of 0.1 through 0.6, in steps of 0.1. When we switched out of the market, we assumed a risk-free return equal to the 90-day Treasury Bill rate. When in the market, the yield of the S&P 500 was reinvested monthly. With the dollar cost averaging method, we invested the same amount every month. No allowance was made for trading costs or taxes. Test results are summarized in Table 7–1.

Compared to a buy-and-hold strategy, dollar cost averaging added 1.8% to the annual return. This doesn't sound like much, but it translates into a 75% improvement in excess return and Traynor Index of performance. In many respects cost averaging is a buy-and-hold strategy, because investments are never sold. Thus it provides no improvement in risk. The Ulcer Index is not meaningful for the cost averaging approach. Even though regular additions to the portfolio offset investment losses, it would not be realistic to regard this offset as reducing

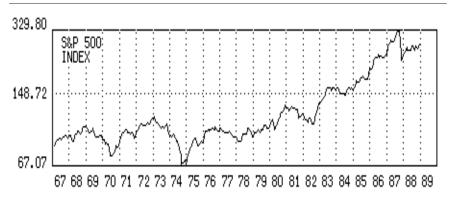


Figure 7–3. S&P 500 stock index, monthly prices, 1967–1988.

retracements.

Timing the market with moving averages offers a similar increase in return, but risk is lowered significantly. As a result, UI Performance is double or triple that of a buy-and-hold strategy. The best value for the smoothing constant was 0.4, corresponding roughly to a five-month simple moving average.

Figure 7–4 summarizes these results in a chart of risk (relative volatility) versus return. $\,$

Table 7–1. Return, risk, and performance of passive investment
strategies, with initial investment of \$1,000, 1967–1988.

Strategy	Alpha	Final Value	Annual Return	Excess Return	Ulcer Index	UI Perf.	Rel. Vol.	Traynor Index
Treasury Bills		\$4,792	7.47%	0.00%	0.00%	n.a.	0.02	n.a.
Buy-and-hold		\$7,808	9.91%	2.44%	10.30%	0.24	1.00	2.44
Cost averaging		n.a.	11.72%	4.25%	n.a.	n.a.	1.00	4.25
Moving averages	0.1	\$8,026	10.05%	2.58%	6.68%	0.39	0.82	3.15
	0.2	\$8,883	10.56%	3.09%	6.18%	0.50	0.79	3.91
	0.3	\$9,621	10.97%	3.50%	6.01%	0.58	0.80	4.38
	0.4	\$11,053	11.68%	4.21%	5.35%	0.79	0.79	5.33
	0.5	\$9,383	10.84%	3.37%	5.82%	0.58	0.80	4.21
	0.6	\$9,464	10.89%	3.42%	5.82%	0.59	0.82	4.17

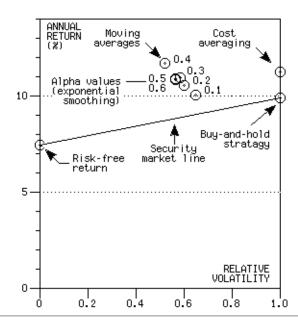


Figure 7–4. Risk versus return for passive investment strategies.

Conclusion

Even though dollar cost averaging and market timing through moving averages offer significant advantages over a buy-and-hold approach, it is obvious that neither of these strategies meets the performance objectives we are seeking. Also, none of the passive strategies avoided getting trapped in 1987's stock market Crash. In the next chapter we show how to improve this situation by making a serious attempt to forecast future prices.

Chapter 8 BOOSTING PERFORMANCE THROUGH ANALYSIS

Since we were unable to achieve our investment objectives with the passive strategies of the previous chapter, we must consider alternatives with a little more sophistication—those involving *analysis*.

In contrast to the passive investment strategies discussed so far, investment analysis makes a serious attempt to forecast the future direction of security prices. Obviously, success at forecasting will lead to higher profits. Figure 8–1 depicts the relationships among the popular methods of investment analysis and how the methods can be applied to mutual fund investing.

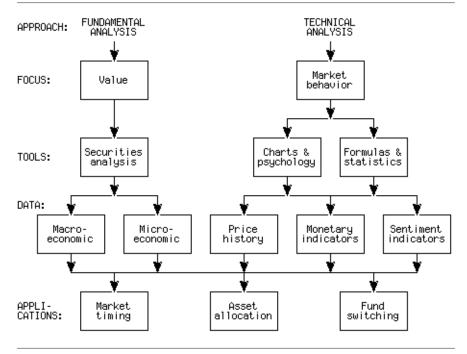
How good do your forecasts have to be for returns to be significantly increased? Because of normal statistical fluctuations in fund prices, every week sees funds with substantial gains and losses. If you could devise a method for investing in the best-performing Fidelity fund every week, you'd make a fortune. For example, investment based on perfect forecasting over the period 1981–1988 would have turned \$1,000 into \$2,919,278,280, for an annual return of 537%. The S&P 500 returned about 14% per year over the same period, so being able to forecast 100% of weekly fund price behavior would produce an incremental return of (537-14)%=523% per year.

No sane person expects to achieve such a return. But suppose your goal is to average 35% per year, or 21% per year more than a buy-and-hold approach. Most investors would regard even this as unachievable, but the model on which your strategy is based only needs to explain 21/523 = 4.0% of weekly fund price behavior. This does not seem outside the realm of possibility. Ironically most statisticians would regard a model that only explains 4% of observed behavior to be worthless, but for investors it would be extremely valuable!

We can draw two conclusions here. First, the high efficiency of markets will severely limit the amount of price behavior that can be forecast by any model. Second, the ability to explain just a tiny fraction of market behavior will yield fabulous rewards.

As Fig. 8–1 illustrates, forecasters are conveniently divided into two teams: fundamental analysts and technical analysts. The two sides hold each other in low regard and have been waging battle for many years on the floor of the exchanges. You can identify the antagonists by the way they talk. For example, when Adam Smith, host of his own economics program on PBS, refers to the "computer quants and other detritus of the financial world," you know he is a fundamentalist.

Figure 8–1. Popular methods for investment analysis, and their application to mutual fund investing.



Fundamental Analysis

Fundamental analysis is concerned with **value**. Analysts attempt to forecast future earnings and dividends for companies, industries, or the economy as a whole, given a set of expectations about economic conditions. On the *macro*economic scale, the fundamentalist will keep a close eye on such parameters as:

Inflation rates
Interest rates
Foreign currency exchange rates
Labor statistics
Industrial production
Economic growth rate (GNP)
Political developments
The weather
Changes in tax law

On the *micro*economic scale, fundamental analysis is concerned with evaluating specific industries or companies. Here the analyst is more concerned with:

Asset value
Market size and growth
Competitive conditions
Financial condition
Quality of management
Technological developments
New product introductions
Earnings and dividend projections
Recapitalization plans

How can fundamental analysis be applied to mutual fund investing? The mutual fund investor has delegated responsibility for the analysis of specific securities to the fund manager. However, a fundamental approach to fund investing would be incomplete without evaluating the fundamentals of the funds themselves. Factors to consider when evaluating mutual funds include:

- What are the quality and track record of fund management?
 Has there been a recent change in management that may affect fund performance?
- What are the fund's investment objectives? What is the expected performance of the securities in which the fund specializes?
- Are the fund's total assets growing or shrinking? Rapid growth can dilute a fund's performance, and rapid shrinking can force the sale of securities at unfavorable prices. In his book, *Successful Investing in No-Load Funds* (Wiley, 1983), Alan Pope reports a correlation between growth in fund size and fund price.
- What is the fund's fee structure, and is it likely to change? Will portfolio turnover rate increase expenses and reduce net returns?

 Is the fund permitted to take hedged positions? If so, the fund manager may take a position contrary to your predictions for the future.

Regardless of how fundamental analysis is applied, it has some serious drawbacks, especially for the individual investor.

- (1) Much essential information is difficult to obtain. It requires a large commitment of time and access to reliable sources. On-line computer databases offer limited access, but at a cost.
- (2) To analyze economic conditions requires specialized training that most individual investors lack.
- (3) Trained experts are notorious for their inability to agree on the future direction of the economy. Economists even have difficulty forecasting company earnings or interest rates three months ahead. Why become involved in methods where the experts' success is in doubt?
- (4) The direction of the economy is susceptible to unpredictable political decisions and events. Even in the capitalist United States, many aspects of the economy are *managed*. This interferes with natural economic forces which might otherwise be predictable. An example of this is the control of money supply and interest rates by the Federal Reserve Board.
- (5) The relationships between economic indicators and security prices are subject to change as the structure of the economy changes. Major trends such as the globalization of manufacturing and trade or the conversion of the U.S. economy from manufacturing to services have a profound effect. Fundamental analysts are constantly sailing into uncharted waters, discovering new economic relationships rather than profiting from the old ones.
- (6) Fundamental analysis is often intuitive rather than driven by formulas. For example, how do you express the quality of a new mutual fund manager in numbers? This dependence on intuition makes construction of an objective system for investment decision making exceedingly difficult. In effect, you are faced with developing an "expert system" that emulates the skills of a fundamental practitioner. Problems like this are challenging artificial intelligence experts today. Intuitive investment decisions are subjective and will be influenced by human emotions.
- (7) Because of their intuitive nature, fundamental strategies are extremely difficult to test. And without proper testing, a strategy

- should not be applied to money management.
- (8) It is common for a fundamental approach to yield the correct conclusions, but several months too early or late. For example, a company's financial condition might make it a likely takeover target, but there's no guarantee that it will be acquired anytime soon.

In view of these problems, we conclude that fundamental analysis is not the best choice for most individual investors. Alternatives are available that are much better suited to investors' skills and needs.

Technical Analysis

Technical analysts believe that fundamental analysis is doomed to failure because it is particularly susceptible to information being disseminated quickly and discounted in security prices. Markets are too efficient and competitive to allow a value-based analysis to "beat the market." They also point to the dismal forecasting record of most analysts.

Technical analysis is based on the premise that future trends in a security's price can be predicted from the recent movements of the same price, or from key indicators such as interest rates or measures of investor sentiment. The technical analyst is concerned with market behavior, investor expectations, and market psychology, rather than with underlying value.

Technical analysis can be conveniently divided into two categories: charting and trading systems. The merits of these techniques are discussed in the following sections.

Charting Techniques

The chartists believe that recent price behavior reveals the current sentiment of investors. Patterns in price charts are associated with different investor moods and can be used in an attempt to predict the future. One example is the classic three-humped "head and shoulders" pattern, widely regarded as indicating major turning points in prices.

Charting techniques have a large following, but are also viewed with much skepticism. In his book *A Random Walk Down Wall Street*, Arthur Burton Malkiel describes an experiment in which an expert chartist is unknowingly presented with a graph of a randomly varying stock prices created by a computer. The chartist found no shortage of patterns "predicting" future price movements.

There are practical concerns about the techniques as well. Like fundamental analysis, chart interpretation is a subjective process, extremely difficult to simulate on a computer. What looks to you like a head-and-shoulders pattern may not look the same to anyone else. This means that charting strategies—like fundamental approaches—are very difficult to test, and interpretations are susceptible to emotional influences. For these reasons, we regard charting as a poor choice for the individual investor.

Trading Systems

A trading system is a set of **trading rules** or formulas that translates market data into investment decisions. The rules trigger buy and sell recommendations in response to the values of key **market indicators** such as interest rates and the prices of the same securities that the system is designed to trade. Trading rules include **parameters**, such as the alpha value described in connection with exponential smoothing. Parameter values determine the behavior of the system, and ultimately whether it is profitable.

By trading system, we mean any objective method of technical analysis that depends on precise trading rules or mathematical formulas. Market data are analyzed for the existence of trends or forecasts indicative of profit opportunities ahead. Unlike charting, these methods are easily implemented on a computer; in fact, a computer is often essential because of the number-crunching burden. This means that the systems can be properly tested for confidence in future performance, and human emotions can be isolated from the decision-making process. Some examples of trading systems are discussed below.

Moving Averages. We described moving averages earlier in connection with a basic approach to market timing. The same techniques can be used to identify which mutual funds are expected to perform best. Typically, funds whose prices are above their moving averages are expected to perform best in the future.

Figure 8–2 shows the effect of exponential smoothing on Fidelity's **Capital and Income Fund**. The difference oscillator, also shown, clearly shows the percentage that the fund's price is above or below its smoothed price. When the oscillator crosses zero, a buy (B) or sell (S) signal is created.

To reduce profitless switching in trendless markets, a **filter** can be used. For example, with a 1% filter, the fund would be bought when the oscillator moved above 1.0% and sold when it moved below -1.0%.

Momentum. The momentum of a price is simply the percentage it has changed in the last n periods. Typically, investments are made in the funds with the highest momentum (most rapidly increasing price). The results achieved are often similar to those with moving averages.

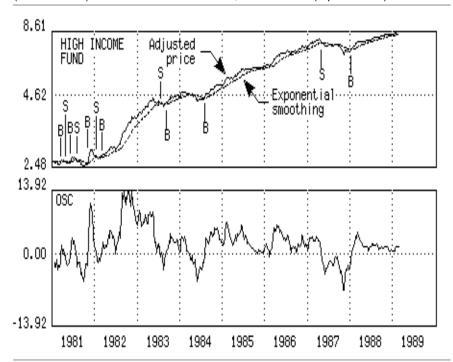


Figure 8–2. Capital & Income with its exponential smoothing (dashed line) and difference oscillator, 1981–1988 (alpha = 0.1).

Relative Strength. The relative strength (RS) of a fund reveals how well it is performing compared to a market index such as the S&P 500. If a fund's RS is increasing, it is outperforming the market; conversely, declining RS means it is lagging behind. Typically, a relative strength strategy will invest in securities with the most rapidly increasing RS.

Without an RS chart it is almost impossible to judge how a fund is performing relative to the market. When you put a fund's *price* chart next to the market's, RS is masked by market fluctuations on both charts.

Figure 8–3 shows how RS can reveal what is really happening to a fund. The first chart shows the S&P 500 from 1981 to 1988, and the second shows Fidelity's **Value Fund** over the same period. It is not easy to identify periods when Value Fund was outperforming the market by comparing these charts directly. In the third chart, Value Fund's RS shows three distinct periods. From 1981 through mid-1983 it was beating the market. In fact, by June 1983 the fund's shares were worth

about 40% more than they would have been if the fund had matched the market's performance (RS = 1.4). From mid-1983 through the fall of 1987 Value Fund's fortunes declined steadily, with the RS dipping as low as 0.85. At the bottom, a share was worth only 85% of an identical investment in the S&P 500. Since late 1987 the fund has showed renewed strength.

Time Series Forecasting

With time-series forecasting, statistical methods are used to project recent price movements into the future. Investments are made in the securities with the highest forecasted return. The choice of a forecasting technique depends on whether the prices contain trends, cyclical patterns, or seasonal factors.

Mutual fund prices usually include both trends and cyclical behavior, and suitable methods include linear exponential smoothing, and linear or polynomial regression. These techniques are beyond the scope of this book, but an excellent introduction can be found in Wheelwright and Makridakis' book *Forecasting Methods for Management* (Wiley, 1985).

Applying Trend-Following Systems

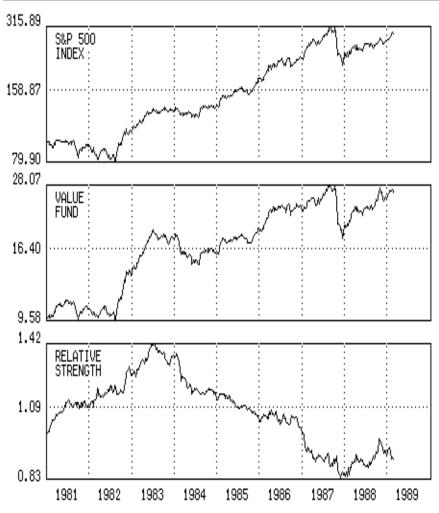
The trading systems described thus far depend on the existence of price trends; they are known as **trend-following** techniques. They assume that a trend, once identified, will continue long enough to profit from it.

Interestingly, these techniques are used in two contradictory ways. Some base their strategy on the assumption that trends are unsustainable: a sign of an over-bought or over-sold condition. Others believe that high values indicate profitable trends in prices that are likely to continue. These beliefs call for opposite reactions to the same data!

The best use of trend-following techniques depends on market conditions. In "trendless" markets, they are better used to identify overbought or over-sold conditions. In strong bull or bear markets extreme values can be supported for months on end, so you should assume the trends will continue and let your profits run. This is easier said than done, because it assumes that you can predict when the market will be trendless.

In spite of these problems, trend-following techniques have been used to develop strategies that significantly outperform the market. The next chapter shows you how to develop and test such a strategy for mutual fund switching.

Figure 8–3. S&P 500 index, Fidelity's Value and its relative strength, 1981–1988.



Market Indicators

Many trading systems use technical market indicators such as interest rates to predict future price trends. This reduces the emphasis on trend following, and depends instead on predictable relationships between prices and other market data.

Most of the indicator-based strategies in the literature make use of one or more of the following:

Advisory sentiment indicators
Call/put options ratios
Insider trading activity
Interest rates
Margin debt
Money supply
Moving averages
Number of stocks advancing/declining
Number of stocks reaching new highs/lows
Odd-lot (small investor) statistics
Relative strength
Short-selling statistics
Yields and P/E ratios

In their book *The Encyclopedia of Technical Market Indicators*, Colby and Meyers report the results of exhaustive computer studies of more than 110 different methods using these data. In several cases they reoptimized the formulas and achieved better results than the originators of the methods. In other cases popular methods were shown to have little predictive value. The book also summarizes conclusions reached by David Aronson's separate study of 284 different indicators. The four best indicators in his study were all based on interest rate analysis, consistent with the popularity of interest rates as a forecasting tool.

Combining Fundamental and Technical Analysis

Many analysts believe that success only comes from combining the best of both fundamental and technical analysis. Chapter 10 will show you how to combine a technical approach to mutual fund switching with a market timing model which rolls interest rates, stock yields, and P/E ratios into a single indicator of stock market value. As you will see, this is a winning combination.

Applying Results of Analysis

Whatever method you use to forecast prices, your insights into the future can be applied in a number of different ways to the business of making money. Our discussion focuses on the more popular alternatives for mutual funds. These include market timing, asset allocation, and mutual fund switching.

Market Timing

The objective of a market timing system is to be fully invested in a high-quality, broad-based stock fund during bull markets and to seek the safety of a reputable money market fund during bearish periods. Exposure to common stocks is either zero or 100%.

Typically, market timing systems attempt to predict market tops and bottoms in the major business cycles, although some strategies seek to profit from intermediate-term moves in the market. Switching activity is generally low, between once a month and once a year.

Asset Allocation

Asset allocation strategies divide a portfolio among different investments in an attempt to make investment returns more consistent from year to year. Investments are chosen whose prices move relatively independently, so that losses in one investment are offset by gains in the others. Unlike market timing strategies, asset allocation will assign any percentage of a portfolio to each investment. Allocation strategies can be either **static** or **dynamic**.

With a static strategy, a portfolio's composition is determined once, and is left alone for long periods of time. Such a strategy might allocate 40% to growth stock funds, 30% to growth and income funds, 20% to bond funds, and 10% to money market funds. Some strategies include hard assets such as real estate and gold.

Dynamic asset allocation involves adjusting a portfolio's investments in response to changing economic conditions. For example, when a bull market is underway, the portfolio should be heavily committed to aggressive growth funds. When the outlook is less bright, the portfolio should be positioned more defensively by investing in high-yield stock funds, bond funds, or money market funds.

Another approach to asset allocation is known as **sector rotation**. Money is moved from one industry sector to another as industry fortunes change. Select fund switching strategies are an example of sector rotation at work.

Regardless of market conditions, asset allocation can be used to reduce the risk of your portfolio as your financial goal approaches. For example, in the 10 years or so leading up to your retirement, you might reduce the relative volatility of your portfolio from 1.00 to 0.20, in order to prevent unexpected losses from delaying the big event or reducing your retirement income. You could achieve this each year by making partial transfers of assets from higher-risk funds to lower-risk funds.

Mutual Fund Switching

Fund switching strategies monitor as many different types of funds as possible, seeking to identify and profit from those funds that lead the market. Money market funds are used only as a last resort, when no other type of fund looks attractive.

The idea behind fund switching is that higher profits are achievable by identifying which sector of the economy will do best and investing heavily in that sector. An aggressive fund switching strategy will often commit 100% of assets to a single fund.

In many respects fund switching strategies are similar to the sector rotation approach, except that diversified stock and bond funds are usually considered as well as industry sector funds.

Investment Newsletter Strategies

Investment newsletters are a popular source of investment advice, and there are several available that concentrate on mutual fund investing. Many of them make market timing or fund switching recommendations based on technical analysis, using either well-known techniques or proprietary systems developed by their research staff. Others use fundamental analysis alone or as an adjunct to technical analysis.

There are several newsletters covering the Fidelity fund family, but the information they provide varies significantly. At one end of the spectrum are newsletters providing fund statistics so that you are fully informed when making *your own* investment decisions; at the other extreme are those providing *specific recommendations* on which funds to buy and sell. Others provide a combination of fund data and general advice that stops short of specific recommendations.

Most newsletters provide a "hot line" service for subscribers so that the latest tips and analyses can be obtained without mail delays. Hot line numbers are changed periodically to discourage unauthorized use.

Most newsletters use trend-following techniques to make fund switch recommendations. Obviously newsletter editors have come to the conclusion that these techniques work better than anything else. 10-and 39-week moving averages are popular, as is ranking by relative strength. A few combine these techniques with subjective assessments of market conditions, or technical methods for market timing.

Newsletters making specific fund recommendations usually have "model portfolios" to monitor the investment results achieved by acting on their recommendations. Performance figures should be interpreted with care, because not all newsletters account for various "slippage" factors that can prevent subscribers from achieving the same results

(see page 149).

In order to provide a yardstick for comparing newsletters, the results actually achievable from their recommendations are reported by *Hulbert's Financial Digest*. Although Mark Hulbert's methodology is sometimes criticized by newsletter publishers, he does provide a uniform and unbiased reporting of realistic results.

After seeing some of the advertisements for investment newsletters in the financial press, you might wonder how so many can claim to be "rated #1 by Hulbert." Hulbert rates newsletters every month, so chance alone ensures that most newsletters will hit the jackpot before too long. Another example of statistical fluctuations at work!

Successful newsletters face an interesting predicament. As their circulation grows, so does the total amount of money being managed by subscribers. This prevents the newsletter from recommending the smaller funds because subscribers can easily drown these funds in cash and directly affect their performance. One newsletter surveyed its subscribers in 1987 and found that they were managing \$3 billion in aggregate. Even if this newsletter limited its recommendations to Fidelity's largest funds, this is too much money to make specific recommendations to subscribers.

Before subscribing to a newsletter, you should carefully evaluate its investment strategy, using the techniques described in this book. Sample issues are available at little or no cost, but you will find many publishers unable or unwilling to provide results of rigorous testing of their methods.

Table 8–1 summarizes the characteristics of newsletters that include a model portfolio of Fidelity funds. Some cover all Fidelity funds, but others are limited to equity funds or the 35 Select funds. Several cover other fund families in addition to Fidelity.

Table 8–2 lists newsletters which cover Fidelity funds among others, but which do *not* include a model portfolio of Fidelity funds.

The tables also show which newsletter publishers offer money management services for Fidelity investors (see footnotes).

Table 8–1. Mutual fund newsletters with model portfolios dedicated to Fidelity funds (late-1988 survey).

Newsletter & Telephone	Fidelity Funds Only	Fidelity Funds Covered	Methods Used ¹	Issues Per Year			Weekly Hot Line Updates	Cost Per Issue	Publisher's Statement of Uniqueness
Fidelity Insight ^{3,4} (617) 449-8820	Yes	All	F	12	11/85	D	1+	\$12.42	Editor Eric Kobren (former Fidelity executive) clarifies which funds do what; covers Fidelity products/services, management changes.
Fidelity Monitor (503) 758-0304	Yes	All	M\$F	12	11/86	A	1	\$8.00	Focused on Fidelity only; more extensive graphics and data; technical and non-technica models.
Fund Kinetics (800) 634-6790	Yes	All	PR	52	03/87	n.a.	1	\$3.37	Specific fund recommendations; the only rigorously, statistically tested technical system.
Mannie Webb's Ser Fund Connection (916) 363-2055	ctorNo	Equity	С	16	1981	A	5	\$5.50	Primarily short-term trading service; average 1-week holding period; also suggest puts as hedge or for down market.
Margo's Market Monitor ³ (617) 861-1489	Yes	Select	MPSC	24	08/80	С	None	\$5.21	None provided.
Mutual Fund Strategist ^{3,4} (802) 658-3513	No	All	MPSC	12	n.a.	С	2	\$12.42	Ability to select the appropriate mutual fund to invest in; also the timing of buying and selling.

continued...

Table 8-1, continued

Newsletter & Telephone	Fidelity Funds Only	Fidelity Funds Covered	Methods Used ¹	Issues Per Year			Weekly Hot Line Updates	Cost Per Issue	Publisher's Statement of Uniqueness
Sector Fund Newsletter ^{3,4} (619) 748-0805	No	All	SC	24	07/85	С	1+	\$6.54	Specific sector fund buy/sell recommendations based on relative strength; tracks portfolio continuously; optimized moving average lines.
Time Your Switch ³	No	Equity	MS\$IC	26	03/84	n.a.	1	\$5.58	None provided.
(617) 470-3511									

Note: Most newsletters will send a sample issue at no charge.

1 M = moving average; P = price momentum; S = relative strength; R = risk adjustment; I = investor sentiment; \$ = monetary indicators; C = charting; F = fundamental analysis.

2 A = <1,000; B = 1-3,000; C = 3-10,000; D = 10-30,000.

3 Registered as an investment adviser.

4 Also provides money management services for Fidelity investors.

Table 8–2. Mutual fund newsletters without Fidelity model portfolio, but covering Fidelity funds among others (results of late-1988 survey).

Newsletter & Telephone	Methods, ¹ Funds & Cost/Year	Publisher's Statement of Uniqueness
Fund Exchange ^{2,3} (800) 423-4893	O Most \$99	Only market timing newsletter offering proprietary models of other timers; 10 different model portfolios meet objectives of all investors.
FundLine ² (818) 346-5637	PSC Equity \$127	Proprietary indicators provide buy/sell signals closer to actual highs/lows; most useful fund charts & moving averages in business.
Growth Fund Guide (605) 341-1971	MPS\$IFC Equity \$89	Nation's oldest no-load fund publication; analyzes market trends; charts/rates top performing funds; #1 asset allocation programs.
Income & Safety (305) 563-9000	O Bond+MM \$49	Nation's largest circulation and most compre- hensive source of advice on income and money funds.
The Independent Investor ² (617) 570-2972	None All \$72	Objective easy-to-understand thorough analysis of financial products and economic & political developments. We are not sensationalists.
InvesTech Mutual Fund Advisor ² (406) 862-7777	\$ All \$106	Unique blending of key technical and monetary indicators; widespread recognition for reliable market timing and no-load fund switching.
McKeever Strategy Letter ² (503) 826-9279	MFC All \$195	Covers virtually all investment arenas, including stocks, funds, futures, bonds, real estate, etc.
Muni Bond Fund Report ^{2,3} (714) 897-9511	MS\$F Bond \$95	First & only publication devoted to fixed-income no-load bond funds in U.S.
Mutual Fund Forecaster (800) 442-9000	O Equity \$100	The world's largest circulation investment newsletter.
Mutual Fund Guide ² (617) 570-2981	None All \$89	Complete monthly semi-log charts on all Fidelity funds; most complete data on portfolio composition & performance, straight from the source.

continued...

Investment Newsletter Strategies

Table 8-2, continued

Table 6 2, continued						
Newsletter & Telephone	Methods, ¹ Funds & Cost/Year	Publisher's Statement of Uniqueness				
The Mutual Fund Letter ² (312) 750-9295	\$IF All \$115	In-depth analysis of current fund industry trends; actively managed model portfolios.				
Mutual Fund Trends (605) 341-1971	MPS\$IFC Equity \$119	52 pages of statistics and charts with multiple moving average/relative strength lines for about 200 no-load funds, averages, indicators.				
The No-Load Fund Investor ² (914) 693-7420	O No-Loads \$82	None provided.				
**NOLOAD FUND*X ² (415) 986-7979	F All \$95	Provides unique combination of authoritative data and time-tested upgrading strategy; simple yet effective; exclusive fund distribution data.				
Jay Schabacker's Mutual Fund Investing (301) 424-3700	F All \$149	Reports/interprets fund performances for the prudent busy investor; gives fund advice with safety as prime objective.				
Switch Fund Advisory ² (301) 840-0301	MPIF All \$140	Prudent, low-risk investing; penetrates economic & sector analysis; best funds to buy; stock and gold forecasts; performance rankings of 500+ funds.				
United Mutual Fund Selector ² (617) 267-8855	SF All \$125	Performance figures on over 1500 funds in specific categories; general statistics, specific buy/hold/sell recommendations, discuss various investments.				
Weber's Fund Advisor ² (516) 466-1252	MP Most \$95	Easiest newsletter to use & understand; toll-free hot line; supervises long-term performance.				
Weekly Fund Advisory (301) 840-0301	M Most \$134	Mailed every Saturday; gives fast look at market conditions & crucial portfolio recommendations. Sector analysis; stock/gold forecasts; funds.				

Note: Most newsletters will send a sample issue at no charge.

1 M = moving average; P = price momentum; S = relative strength; R = risk adjustment; I = investor sentiment; \$ = monetary indicators; C = charting; F = fundamental analysis; O = other.

2 Registered as an investment adviser.

3 Also provides money management services for Fidelity investors.

Conclusions

In their *Encyclopedia of Technical Market Indicators*, Colby and Meyers come out strongly in support of objective trading systems: "We believe that an objective, disciplined, and properly tested trading plan is the necessary foundation for consistent investment success."

Technical trading systems can satisfy these requirements, and have many advantages for the individual investor:

- Investment decisions are made objectively through consistently applied formulas, isolated from subjective or emotional influences.
- Objective testing is easily done on a personal computer.
- No knowledge of economics or financial analysis is required.
- Fundamental factors can be ignored.
- The problem of gathering reliable information on a timely basis is minimized (current prices are readily available).
- There is no need to analyze fund expenses and fees, since prices already reflect these charges.
- The time commitment required to manage an investment strategy is reasonable.

For most individual investors, technical systems are a better fit to the available time and skills than alternatives involving fundamental analysis or chart interpretation. The remainder of this book therefore focuses on strategies of this type.

Our next chapter shows you how to build a trading system that meets your specific requirements.

Chapter 9 DESIGNING A FUND SWITCHING SYSTEM

Now things get exciting, as we use the conclusions reached in earlier chapters to design a strategy for managing Fidelity fund investments. We begin by refining our performance objectives for the system and identifying the assumptions on which its success will depend. Finally, we will build the system and test it to ensure that it meets our objectives.

Building a system may expose you to more algebra than you've seen since high school. This is necessary: If you're going to trust a system with your savings, its inner workings shouldn't be a mystery. Fortunately, *using* the system is straightforward, because the weekly calculations are easily delegated to calculator or personal computer. We show you exactly how in Chapter 14.

Design Goals

What objectives should we define for the system?

First, in order to justify the regular monitoring that any strategy requires, the system should have a *long-term return substantially higher than passive strategies* such as holding an index fund. Suppose we settle for a return 10 to 15 percentage points higher than the benchmark S&P 500 index. That is, in a year when the S&P 500 returns its average 10%, our system should return 20 to 25%. This is an ambitious objective, since few systems achieve it. Furthermore, this goal must be achieved *without exceeding the market's level of risk*. That is, the relative risk of the system must not exceed 1.00.

Second, in order to accommodate investors' different risk tolerances, it must be possible to *adjust the risk of a portfolio to any desired level*. That is, a user should be able to trade off risk and return, while still profiting from the system's high return per unit of risk.

As for the level of effort required to use the system, we believe that weekly systems offer the best compromise between performance and time commitment for ambitious investors. Daily and hourly systems simply interfere too much with other human activities, such as earning a living or taking vacations. Systems monitored monthly or less often are simply not capable of profiting from the intermediate-term moves in the markets. You also run a real risk of missing the explosive surges in prices that often occur when the market first changes direction. We shall therefore design a system that *needs your attention once a week*.

So that our system can be used by participants in employer-sponsored retirement plans with limited switching privileges, we shall set a goal of *switching on average not more than four times a year*. (This goal will be relaxed in a later chapter for investors willing to switch more often in the search for higher returns.)

The system must be straightforward to implement. While a computer is a major asset for any investment system, it should be practical to use the system using pencil, paper, and calculator. We shall set a goal of 10 to 30 minutes of your time for each session.

As explained in Chapter 8, fund switching strategies offer greater returns than market timing systems because you can focus on sectors of the global economy that are doing much better than the economy as a whole. To maximize our chances of meeting our performance objectives, we shall adopt a *fund switching approach*.

We have now defined the objectives of the system: weekly monitoring with switching once a quarter; beating the market by 10 to 15% per year without exceeding its risk; and easy implementation, with portfolio risk adjustable by the user.

Combining these latest goals with those from Chapter 6, we have the following design objectives for the system:

Compound annual return 20-25%

Beat the market by 10-15% per year Ulcer Index 3% maximum SD of weekly return 2.3% maximum Relative volatility 1.00 maximum

Monitoring frequency Weekly

Time commitment 10-30 minutes/week

Switches per year 4 average

Flexibility Adjustable portfolio risk

Underlying Assumptions

In order to build our system on solid foundations, we must develop a model that—if valid—will result in the superior performance we seek. The system will be based on two key assumptions:

- Mutual fund prices exhibit trends that can be identified early enough to profit from them. In Chapter 7 we showed that our objectives cannot be met by applying simplistic trendfollowing strategies to market timing. We will however assume that more sophisticated forecasting tools applied to Fidelity fund switching can meet our performance goals. Implicit in this assumption is the need for a wide diversity of funds to choose from.
- Market timing can be used to avoid losses and minimize switching when strong up-trends are lacking. There will always be times when markets behave trendlessly, or have a strong downward bias that few if any sectors of the economy can overcome. We assume that these periods can be identified, so that needless switches resulting in losses or only small gains can be avoided. In effect, our market timing assumption will provide regular "vacations" for the system.

We shall begin by designing an "experimental system" based on the first assumption, then move on to a "combined system" which aims to achieve higher performance by making use of both assumptions.

Selecting Funds to Be Monitored

Since we are building a weekly system, we must obtain weekly prices for the Fidelity funds. You will probably find it most convenient to use Friday's closing prices, since this gives you the whole weekend to find time to run the system. See page 204 for sources of fund prices.

The financial pages list about 90 of Fidelity's retail funds, but it is not essential that you track them all. Here are some alternatives to consider for cutting down your data entry burden:

Eliminate municipal bond funds. Taxable and tax-free bonds
with similar ratings and maturities tend to behave alike, so this
is a convenient way to avoid having to compute the taxable
equivalent yield of tax-free bond funds. For your retirement
plan accounts, you'd have to eliminate municipal bond funds
anyway.

- Eliminate funds having similar investment objectives and performance to others. For example, Fidelity offers several broad-based equity funds, and it should not be necessary to track them all. You might also eliminate some of the bond funds with similar portfolio quality and maturity.
- Eliminate all bond funds. Some investors shun bonds because they do not provide enough excitement (low volatility), or because stocks tend to do well under the same market conditions as bonds.
- Consider only the 35 sector funds. If broad-based equity funds are doing well, some sector funds will usually be doing even better.

For our experimental system we selected 10 of Fidelity's diversified funds that meet the criteria listed below. Later on, we show the effects of including a broader range of funds.

- Include funds that represent the classical mix of assets recommended by financial planners for a diversified portfolio: money markets, bonds, and common stocks.
- Exclude the Select funds to minimize switching and the time commitment required each week.
- Exclude municipal bond funds, for the reasons given.
- Include three funds from each of the diversified fund groups: a lower-quality aggressive fund for times when the market is in a speculative mood, a more conservative fund to profit from "flights to quality," and a fund for international diversification.
- Give funds with long histories preference over newer funds where choices exist, to maximize the value of testing.

The funds selected are shown in Table 9–1. We shall refer to this set of funds as the "Diversified Portfolio."

Table 9–1. Diversified Portfolio funds selected for experimental system.

Category	Conservative	Aggressive	International
Money markets	Cash Reserves		
Taxable bonds	Inv. Grade Bond	Capital & Income	Global Bond
Growth & income	Puritan	Equity Income	Intl. Growth & Inc.
Capital growth	Magellan Fund	Capital Appreciation	Overseas

Identifying Price Trends

One of the difficulties in identifying trends in security prices is the large amount of "noise" in the data caused by essentially random fluctuations. Most of the changes in a mutual fund's price are the effect of general market conditions. When the S&P 500 has a good day, most equity funds follow suit. Even bond funds will move generally in sympathy with the index, because of the universal influence of interest rate expectations.

When faced with a tough problem, it is often helpful to break it down into pieces which can be tackled individually. This prevents one part of the problem from concealing your progress in solving another part.

To identify trends in mutual fund prices, it is helpful to separate fund behavior from broad market behavior. With this approach, you could first decide which fund is going to perform best relative to the market, and then decide whether it is a good time to be invested in the market at all.

The price behavior unique to a specific fund is easily identified through the use of **relative strength** (RS). By analyzing RS it should be possible to make profitable decisions about which fund to invest in each week. The issue of how to time the market can be saved until later.

The separation of fund and market behavior results in a more flexible investment strategy, because you might not want to time the market at all. For example, you might decide that you want to remain fully invested at all times because you are investing for the long haul and can tolerate the ups and downs along the way. Or you might believe it is impossible to "time the market" successfully.

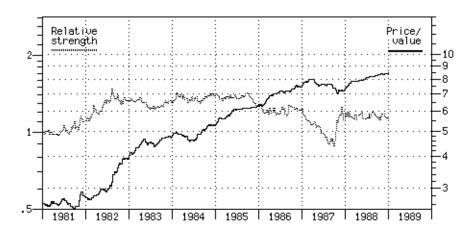
On the other hand, if you want to time the market as well, you simply solve the second piece of the problem: when to be in the market and when to sit in the sidelines. When you're in the market, you'll invest in the fund with the strongest relative strength. When you're out of the market, you'll park your assets in a money market fund. We cover the topic of market timing in the next chapter.

For forecasting purposes, the RS of the fund is much easier to deal with than its price. Noise levels are much lower, and trends unique to the fund are clearly revealed. The easier we make it to identify trends, the easier it will be to meet our performance objectives.

Figure 9–1 charts the price and RS history for the **Capital and Income Fund**. The fund had increasing RS in 1981 and 1982, so shareholders during this period "beat the market." The fund's price was 40% higher in mid-1982 than it would have been had the fund matched the market's return!

If a fund's relative strength chart is smooth (see, for example, **Fidelity Fund**'s chart in Fig. 9–2), its net asset value (NAV) fluctuates in sympathy with the broad market. The fund is said to be **highly correlated** with the market.

Figure 9–1. Price and relative strength for Capital and Income Fund, 1981–1988.



A "noisy" relative strength chart (such as that of **Select/Precious Metals** shown in Fig. 9–3) indicates a fund whose NAV moves more independently of the market. It is relatively **uncorrelated**.

Relative strength charts provide the clearest indication of market leadership by different industry sectors or classes of securities. Referring to **Select/Financial Services** (see Fig. 9–4), this sector of the economy was doing better than the market as a whole from mid-1984 through mid-1986. Investing in this fund would have resulted in a portfolio value about 40% higher than that achieved by investing in the market. That is, the fund beat the market by about 20% per year—an example of the excellent opportunities available if periods of market leadership can be predicted. For the next two years the fund was relatively weak, and it was a time to be invested elsewhere. Staying with the fund would have wiped out the 40% boost in just one year!

Figure 9–2. A fund whose price is highly correlated to the market: Fidelity Fund, 1981–1988.

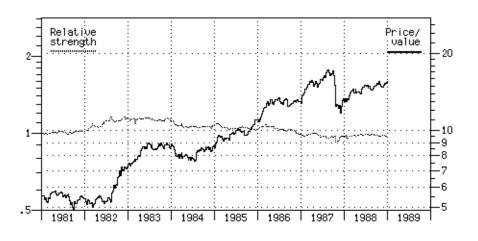
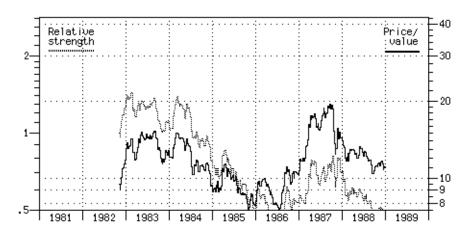


Figure 9–3. A fund whose price is poorly correlated to the market: Select/Precious Metals, 1981–1988.



Mutual Fund Math—Calculating Relative Strength

There are a number of simple ways to compute relative strength: One of them is shown in Table 9-2. Columns 1 and 2 show the S&P 500 and

Relative strength value 60 50 40

20

Figure 9–4. An industry sector showing clear market leadership: Select/Financial Services, 1984-86.

the NAV of the fund of interest. Column 3 is the ratio of column 2 divided by column 1. Column 4 shows the change in column 3 since the first calculation. For example, for the last row, 0.0502 / 0.0491 = 1.023. That is, the fund's shares are worth 2.3% more than if they had matched the market's performance.

1985

1986

1987

RS can also be expressed as a formula:

1984

$$RS_t = (P_t / M_t) / (P_0 / M_0)$$

where P_t is the fund's price, M_t is the market's value, and RS_t is the fund's relative strength, all at time t. P_0 and M_0 are the initial values of the same prices (t = 0).

Having calculated the relative strength for each fund included in our model portfolio, we now have to devise an indicator that will provide objective fund switching signals.

Relative Strength Oscillator

1981

1982

Relative strength tells you which funds have been performing best relative to the market. But just as you wouldn't invest in the fund with the highest price, you shouldn't invest in the fund with the highest relative strength. Success comes from identifying those funds whose RS will *increase the most in the future*. This is accomplished by spotting trends in RS early enough to profit from them.

Table 9–2. Calculating relative strength of a fund.

(1) Market (S&P 500)	(2) Fund NAV	(3) Ratio	(4) Relative Strength
154.0	7.56	0.0491	1.000
156.5	7.76	0.0496	1.010
158.2	7.79	0.0492	1.003
156.5	7.81	0.0499	1.017
158.5	8.06	0.0509	1.036
159.1	8.14	0.0512	1.042
160.1	8.04	0.0502	1.023

As with prices, there are many ways to identify trends in RS. Many of the same techniques can be used, including the use of momentum indicators or moving averages (MA). The differences among methods are minor, so for ease of computation we have adopted **exponential smoothing**, as described in Chapter 7. Smoothing accomplishes two things that help with trend identification: It flattens out short-term random fluctuations in RS, and it creates a time delay that helps identify changes in trends.

Column 5 of Table 9–3 shows how to exponentially smooth the RS of the fund in the previous example, using an alpha of 0.1 (explained on page 93).

A popular way of identifying the funds with the strongest trends in *prices* is to compare the price with the moving average. If the price is above the moving average, the fund has been in an up-trend and is a

Table 9–3. Calculating the exponential moving average of a fund's relative strength.

(1) Market (S&P 500)	(2) Fund NAV	(3) Ratio	(4) Relative Strength	(5) Slow MA	(6) Fast MA	(7) Oscil- lator
154.0	7.56	0.0491	1.000	1.0000	1.0000	0.00
156.5	7.76	0.0496	1.010	1.0010	1.0040	0.30
158.2	7.79	0.0492	1.003	1.0012	1.0036	0.24
156.5	7.81	0.0499	1.017	1.0028	1.0090	0.62
158.5	8.06	0.0509	1.036	1.0061	1.0199	1.37
159.1	8.14	0.0512	1.042	1.0097	1.0287	1.88
160.1	8.04	0.0502	1.023	1.0110	1.0264	1.52

candidate for purchase. Conversely, funds with prices below the moving average have been in a down-trend and should perhaps be sold. Some strategies are based on buying the fund whose price is *furthest* above the moving average, measured as a percentage.

The same techniques can be used with relative strength, but to minimize needless switching in trendless markets, we will use a slightly smoothed RS in place of the raw data. This will reduce the amount of residual noise in the RS and minimize switches caused by irrelevant transient events. The slightly smoothed RS is obtained simply by a second exponential smoothing with a higher alpha than the first. Column 6 of Table 9–3 shows the results for an alpha of 0.4. Let us refer to this as the "Fast MA" and to column 5 as the "Slow MA." The terms "fast" and "slow" correspond to smoothing the RS over shorter and longer time periods, respectively.

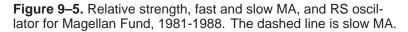
The final step is to compute which fund has its Fast MA the greatest percentage above its Slow MA. This is another example of a difference oscillator, in this case the **Relative Strength Oscillator** (RSO):

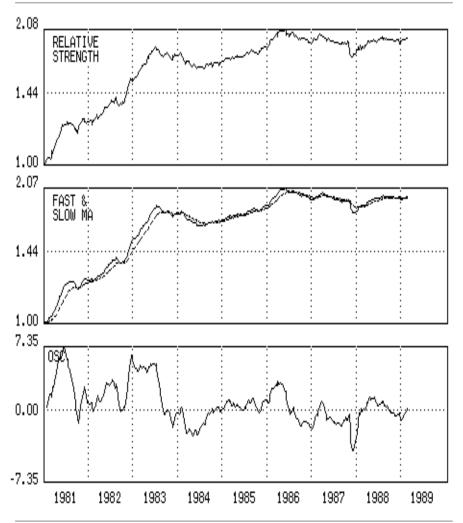
$$RSO_t = 100 \times [(Fast-MA_t / Slow-MA_t) - 1]$$

RSO figures are shown in Column 7 of Table 9–3. As an example, Fig. 9–5 shows the relative strength, fast and slow moving average, and RSO value for the **Magellan Fund** from 1981 to 1988. Periods of positive relative strength correspond well to oscillator values above zero. If you had invested in Magellan when its oscillator was above zero, and invested in an index fund at other times, you would have outperformed a buy-and-hold approach with either fund.

Since we are assuming the existence of trends in the prices of the funds we track, our fund switching strategy will be based on investing in the fund with the highest oscillator value each week. In other words, we will invest in the fund whose fast MA is furthest above its slow MA. Switches will not occur every week, of course, but only when there is a change in market leadership.

It should be noted that relative strength is normally used to analyze stocks and equity funds, not bond funds or money market funds. Its original purpose was to compare a specific investment with the broad index representing all investments *in the same class*. However, bond funds, especially those with longer portfolio maturities, have many of the same characteristics as stocks, so the use of relative strength is not so strange. In the case of money market funds, the relative strength charts will be more, rather than less, noisy than their price charts, but if money market funds show increasing relative strength, this is a valid indication that you should be avoiding equity funds.





Measuring Historical Performance

Our next step is to measure the historical performance of the experimental system. To do this, we must obtain fund prices for the period of interest. Testing should go back as far as practical, but there is little

point in going back before 1981, because most funds were introduced since then.

It is difficult to obtain historical yield figures for money market funds, so for testing purposes the 90-day Treasury Bill rate is substituted for the yield of Cash Reserves Fund.

To measure strategy performance, a computer must be used to step through your database of historical fund prices one week at a time. Calculations are carried out and investment decisions made, as if in real time. That is, each decision does not make use of any later prices that would have been unknown at the time. The computer program will collect performance statistics along the way, including the growth in the model portolio's value and data needed to measure the strategy's risk, switching activity, and so forth.

Table 9–4 lists the historical performance characteristics of the experimental system just described, for the period January 1, 1981 through December 31, 1988.

Over the eight-year period, the model portfolio grew more than 8 times, for an annualized return of 30.24%. This is 16.38 points higher

Table 9-4. Experimental system performance, 1981-1988.

Parameter	90-Day T-Bills	S&P 500	Experimental System
Weeks tested	418	418	418
Weeks in market	0	418	366
Weeks out of market	418	0	52
Initial investment	\$10,000	\$10,000	\$10,000
Final portfolio value	\$19,896	\$28,247	\$83,200
Bull market return	7.62%	40.15%	60.42%
Bear market return	10.81%	-13.62%	-1.28%
Compound annual return	8.98%	13.86%	30.24%
Excess return/year	0.00%	4.88%	21.26%
Beats market by (/year)			16.38%
Ulcer Index	0.00%	9.32%	7.59%
UI Performance		0.52	2.80
SD of weekly return	0.05%	2.30%	2.19%
Relative volatility	0.02	1.00	0.95
Traynor Index		4.88	22.38
Number of switches	0	0	41
Average switches/year	0	0	5.1
Avg. holding period (weeks)			11.0
Average profit per switch			5.30%

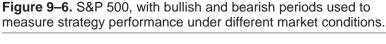
than the market's 13.86% return over the same period. These figures exceed our design goals by substantial margins.

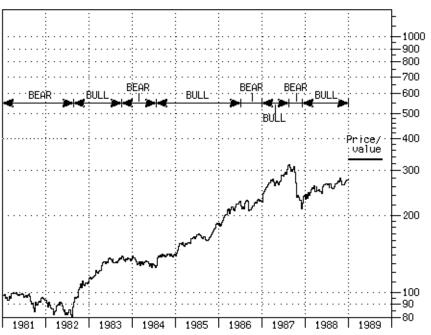
The relative volatility of the portfolio (0.95) was slightly lower than the market's, meeting our goal, but the Ulcer Index was 7.59% rather than below 3%. The switching frequency slightly exceeded our goal of 4 per year.

The two performance indicators—UI Performance and Traynor Index—each give the strategy an excess return per unit of risk about five times better than the market.

Performance in bull and bear markets was computed by breaking down the eight-year period retrospectively into the two categories (see Fig. 9–6). The strategy earns an annual return of 60.42% in bull markets, compared to the market's 40.15%. In bear markets the system reduces a 13.62% annual loss into a more palatable 1.28% loss.

Fig. 9–7 shows the growth in portfolio value and its relative strength.





The flat relative strength shown by the experimental system since the fall of 1986 is worthy of note. This flatness could be no more than an indication of normal statistical fluctuations at work, but its beginning coincided with the passage of the 1986 Tax Reform Act by the Senate in September of that year. We have seen similar behavior in the relative strength of totally different fund switching strategies. It could be argued that the act turned a nation of investors into short-term speculators, because the favorable tax treatment of long-term capital gains was abolished. With the penalties of short-term trading removed, there is a temptation to take any profits as they occur. Connecting flat RS with tax law changes is pure speculation on our part, but it is a plausible explanation for a change in market dynamics. Protecting a strategy against such changes is covered in more detail in Chapter 11 on testing.

Figure 9–7. Portfolio value (×100) and relative strength for experimental system, 1981-1988.

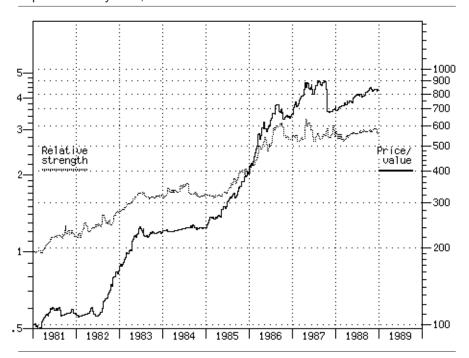


Figure 9–8 charts the oscillator value of the fund selected by the experimental system each week from 1981 to 1988. The top-ranked fund often has an RSO value of 4% or more, although there are periods when no fund is significantly outperforming the market.

16. 28 8. 17 0. 06 1981 1982 1983 1984 1985 1986 1987 1988 1989

Figure 9-8. Oscillator value for top-ranked fund, 1981-1988.

Conclusions

As the test results indicate, the experimental system just described meets or exceeds all our design objectives except for the Ulcer Index of risk (well above our limit of 3%) and the switching frequency (five times a year rather than four). The system also failed to anticipate 1987's stock market crash. Fortunately, we can add one more dimension to the system to counteract these problems. The next chapter shows you how the combined system achieves this.

Chapter 10 MARKET TIMING

In the previous chapter we developed an experimental fund switching system that meets most of our goals. There are, however, three areas in which some improvement is needed.

First, the system failed to meet our objective of an Ulcer Index no higher than 3%. This is an important discrepancy because it could affect your ability to sleep at night.

Second, the system's return generally alternates between powerful surges of growth and periods of relative stagnation. Stagnation occurs at times when none of the Diversified Portfolio funds is providing clear market leadership. These conditions are called "trendless." Switching activity increases, with generally small gains and losses. During such periods you would be better off parking your assets in a money market fund and taking a well-earned vacation.

Finally, the system was trapped by the Crash of October 1987, suffering a one-week loss of 18%.

All these problems suggest the need for a market timing model to indicate when conditions are conducive to making money, and when they are not. This chapter develops a timing model that achieves this and that can be meshed with the fund switching strategy from Chapter 9. We shall call this strategy the **combined system**.

Dividend Yields and P/E Ratios

One popular method for timing the market is to monitor the dividend yield and price/earnings (P/E) ratio of a broad market index such as the Dow Jones Industrial Average or the S&P 500 Stock Index. Historically, stocks have been cheap or undervalued when the yield rises above 6.3% or the P/E ratio falls below 11. Figures beyond these extremes have usually been followed by major gains in stock prices. Conversely, stocks

are regarded as expensive or overvalued when the yield falls below 3.3% or the P/E ratio rises above 18. These extremes are usually followed by bearish conditions. The yield and P/E tend to move in cycles between the high and low extremes in sympathy with the major business cycles.

These concepts have been used for many years, but they suffer from two important defects. First, the exact threshold that signals overvalued or undervalued conditions varies from one business cycle to another. If you wait for the yield to drop to 3%, you will often find the turning point happens at a slightly higher level. If you raise your 3% threshold, you'll often find yourself moving out of the market prematurely.

Second, extreme readings in these indicators can be sustained for several months before the expected trend reversal develops. This can also result in entering or leaving the market prematurely.

Monetary Indicators

Interest rates are another popular market timing tool, because changes in rates are often followed by predictable changes in stock market direction. Higher interest rates are bad for stocks; conversely, lower rates generally drive stock prices higher. Changes in interest rates usually precede the resulting changes in stock prices by a few weeks or months, so many investors find rates to be a useful forecasting tool.

Martin Zweig* has described indicators based on both monetary factors and technical factors. His "Super Model" includes two interest rate indicators, as well as technical indicators. Testing the model from 1966 to 1985, Zweig claims a 24.8% annualized return during the "buy" periods, and a 17.6% annualized loss avoided during the "sell" periods. A buy-and-hold strategy over the same period returned only 2.9%.

Another example is the well-known "Elves" of the *Wall Street Week* program on PBS television. They make use of 10 indicators, including monetary factors and investor sentiment. The Elves have been criticized for not calling the Crash of 1987, but their record from 1975 to 1987 was excellent.

Monetary indicators often suffer from the same problems as the market value indicators described in the previous section. What is regarded as a high interest rate in one business cycle may be acceptable in the next, because of changes in inflation expectations or demand for credit. Once again, it is difficult to define suitable decision points that will survive the test of time.

^{*} Martin E. Zweig, Winning on Wall Street, Warner (1986).

Combining Market Yields and Interest Rates

All securities compete with each other for investors' attention. If money markets have low yields and stocks are cheap by historical standards, investors will be drawn to stocks for higher return. Conversely, if money market yields are high and stocks seem expensive, assets will flow in the opposite direction.

The direction of flow depends on the relative "earnings" expected from available investment opportunities. Securities with the highest expected earnings will attract the most capital, and prices will rise. Those with the lowest will suffer a flight of capital and falling prices.

In the long run, all securities must offer similar performance, after accounting for differences in return, risk, and taxes. In the short run, changes in investor expectations and psychology can create major swings on either side of the equilibrium condition. A market timing model that identifies these swings could be extremely profitable.

When investing in short-term instruments such as money market funds or 90-day Treasury Bills, figuring the total return is easy. It is essentially equal to the yield on the debt, since short-term instruments carry little if any prospect for capital gains or losses.

When investors purchase common stocks, either directly or through a mutual fund, they are buying a share of the future stream of earnings and dividends. Even if a company doesn't pay dividends—and many do not—earnings are reinvested in the company to support continued growth and even higher earnings. This suggests two methods for figuring the stock market equivalent to the yield of a short-term debt instrument:

- (1) Take the reciprocal of the P/E ratio to obtain the **earnings yield**. For example, if the P/E of the S&P 500 is 12.5, the earnings yield is 8% per year.
- (2) Take the **dividend yield** and multiply it by 2 to offset the effects of double taxation, as suggested by Lawrence Stein in his book *Value Investing*.* For example, if the yield of the S&P 500 stocks is 3.42%, it is doubled to 6.84%.

We recommend using the earnings and dividend yields for the market value-weighted S&P 500 index. Yield and P/E are computed weekly by Standard and Poor's and are published in *Barron's*. As an alternative, you would do almost as well to use the equivalent figures for the DJIA, published in the *Wall Street Journal* and *Investor's Daily*.

^{*} Lawrence M. Stein, Value Investing: New Strategies for Stock Market Success, Wiley (1988).

When market yields are higher than current interest rates, stocks are relatively cheap and should move up in price. On the other hand, figures lower than interest rates will often result in lower stock prices.

To turn these figures into a market timing indicator, we first combine them into a single number by taking their average. With the examples given in the preceding list, the average is (8.00+6.84)/2=7.42%. We then divide the average by the 90-day T-Bill rate to obtain the ratio of stock "returns" to Treasury Bill returns. If the T-Bill rate is 7.15%, 7.42/7.15=1.038. Results above 1.00 should be bullish (stocks undervalued); below 1.00 is bearish. Let's call this market timing indicator the **Stock Value Indicator**, or SVI.

Figure 10–1 shows the 90-day Treasury Bill rate, the SVI indicator value, and the S&P 500 index for the 22 years 1967 to 1988. The Stock Value Indicator has done a magnificent job of identifying periods of major declines in stock prices. It has a tendency to call market bottoms early (as in 1970 and 1974) but this is of little consequence when combined with our fund switching system. When a bear market is going through its final panic sell-off, money market funds will have a very high relative strength and will keep you out of stocks until the market bottoms out. As added protection, you could wait for an up-tick of a few percent in the S&P 500 before moving back into stocks.

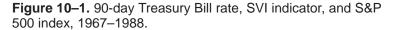
Testing the SVI Indicator

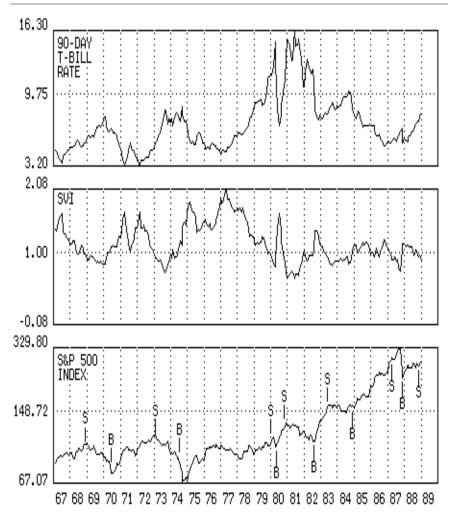
In order to test the SVI approach, a computer was programmed to step through the period 1967 to 1988 one month at a time. For each month, the program carried out two steps:

- (1) The value of a model portfolio was updated, depending on the previous month's decision about where to invest.
- (2) The value of SVI was updated to reflect the latest market data, and a new market timing decision was made. If the SVI was above a predefined threshold, the model was invested for the next month in the S&P 500 index; otherwise it was invested in 90-day T-Bills.

Figure 10–2 (bottom chart) shows the results achieved with a threshold value of 1.00. The ability of the SVI indicator to avoid major market downturns is clear.

The results summarized in Table 10–1 show that timing the market with the SVI indicator offers a substantial increase in returns and decrease in risk. The annual return figures include reinvestment of dividends, and the excess return is annual return minus the Treasury Bill

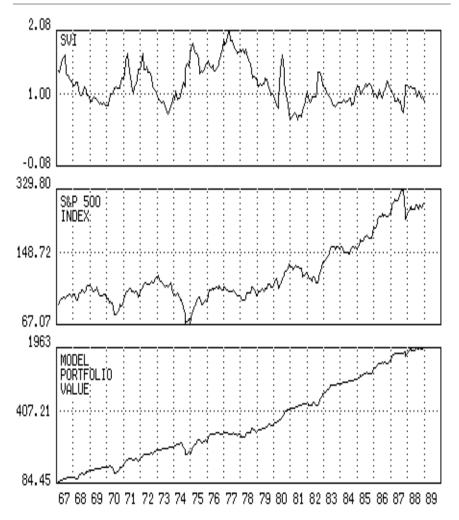




rate. The UI Performance column is obtained by dividing the excess return by the Ulcer Index. To show conventional measures of risk and performance, the Traynor Index is obtained by dividing excess return by relative volatility.

Figure 10–3 shows these test results in graphical form. It is reassuring that the peak in annual return occurs at the theoretically correct





SVI threshold of 1.00. It is also reassuring that high performance is achieved over a broad range of threshold values, because a narrow range would indicate a strategy less likely to work in the future. This topic is discussed at length in Chapter 11.

Table 10–1. Testing SVI as a market timing indicator for the S&P 500, compared to a buy-and-hold strategy.

Strategy	SVI Threshold		Annual Return	Excess Return	Ulcer Index	UI Perf.	Rel. Vol.	Traynor Index
T-Bills		0	7.51%	0.00%	0.00%			
Buy-and-hold	d	264	10.02%	2.51%	10.33%	0.24	1.00	2.51
SVI timing	0.70	259	10.81%	3.31%	10.18%	0.32	0.99	3.35
· ·	0.80	249	12.25%	4.74%	9.64%	0.49	0.91	5.19
	0.90	234	13.81%	6.30%	7.61%	0.83	0.88	7.19
	1.00	190	15.44%	7.93%	4.17%	1.90	0.80	9.88
	1.10	149	14.96%	7.45%	3.69%	2.02	0.73	10.25
	1.20	107	13.31%	5.80%	2.09%	2.77	0.59	9.75
	1.30	85	12.71%	5.20%	1.93%	2.69	0.54	9.56
	1.40	71	12.52%	5.01%	1.67%	3.00	0.50	9.94
	1.50	47	10.14%	2.63%	1.51%	1.74	0.39	6.75

Figure 10–3. Results achieved using SVI for market timing, 1967–1988.

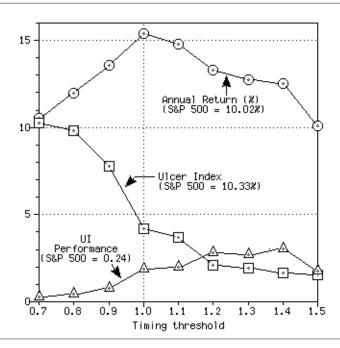


Figure 10–4 shows a risk versus return chart of the results, using the Ulcer Index as a measure of risk. The risk-free and market returns are shown, and the line joining the two is the Security Market Line of the Capital Asset Pricing Model (page 81). Also shown are the SVI results for various thresholds. The dashed line represents the excess return per unit of risk for the best-performing thresholds. Note that all threshold values beat the market, because they lie above the Security Market Line.

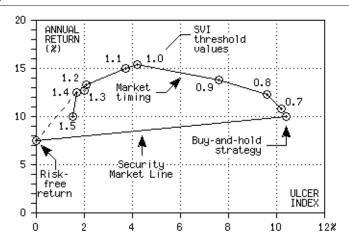
When values of SVI are compared to the actual return of the S&P 500 index over the next three months, a linear regression equation is obtained in the form:

3-month return =
$$(25.101 \times SVI) - 23.944$$

For example, if the SVI is 1.1, the expected return over the next three months is 3.67% (15.5% annualized). The equation has an $\rm r^2$ of 0.060, which means that today's SVI explains 6% of the S&P 500's return over the next three months. This figure is similar to the one derived on page 97 as a requirement for a useful trading system.

We do not recommend the use of switching thresholds higher than 1.1 or lower than 0.9. Recent market cycles have shown smaller swings in SVI than earlier, so extreme readings may occur less often in the future.

Figure 10–4. Risk versus return for SVI-based market timing strategies.



With thresholds in the range of 0.9 to 1.1, the SVI approach to market timing offers clear advantages over a buy-and-hold strategy. For example:

- Excess return is about three times higher.
- Risk (as measured by the Ulcer Index) is reduced by 45 to 75%.
- Performance (excess return per unit of risk assumed) is an amazing 5 to 12 times higher.
- The investor is exposed to market risk only about 70% of the time.

In order to verify that SVI has kept up its performance in recent years, results have been calculated for the periods 1981–1988 and 1987–1988. The results are summarized in Table 10–2. SVI timing outperforms a buy-and-hold strategy by 9 times over 1981–1988, and by no less than 24 times over 1987–1988.

Figure 10–5 shows the SVI and S&P 500 for the period 1981–1988, together with buy (B) and sell (S) signals occurring during the eight-year period. Signals occur on average once a year.

It is interesting to note that in the summer of 1987 the SVI dropped to an extreme low, indicating that stocks were dangerously overvalued. Anyone using SVI as a timing device would have been out of the market about 10 weeks before October's Crash. You're probably thinking that hindsight always provides 20/20 vision, but consider the following. SVI is based on well-known concepts of stock market valuation. In the summer of 1987 it was widely acknowledged that stocks were grossly overvalued on a historical basis, but many investors chose to ignore the flashing red lights and rationalized that further gains lay ahead. Avoiding the Crash was more a problem of controlling emotions than of using better indicators.

Table 10–2. Recent performance of SVI with a threshold of 1.00.

Period	Strategy	Annual Return	Excess Return	Ulcer Index	UI Perf.	Rel. Vol.	Traynor Index
1981-1988	3 T-Bills Buy-and-hold SVI timing	8.96% 14.50% 19.54%	5.54% 10.58%	8.33% 1.80%	0.67 5.88	1.00 0.70	5.54 15.11
1987-1988	3 T-Bills Buy-and-hold SVI timing	6.55% 9.66% 17.10%	3.11% 10.55%	14.59% 2.07%	0.21 5.11	1.00 0.61	3.11 17.30

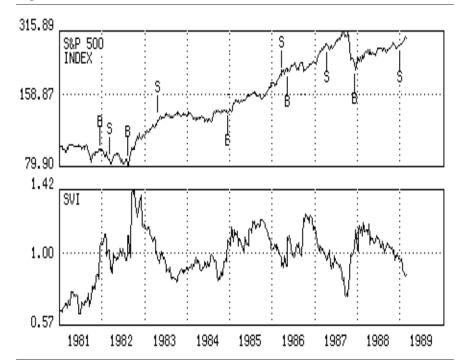


Figure 10-5. S&P 500 index and SVI indicator, 1981–1988.

Normally a timing signal incorporates some "backlash" to prevent frequent trading as the indicator wobbles on either side of the threshold level in directionless markets. For example, you might buy stocks when the SVI is above 0.99, and sell when it falls below 0.95. These figures correspond to a 2% filter. Small amounts of filtering have almost no effect on investment performance but can reduce trading activity significantly.

It is surprising that a market timing model based on such well-known concepts of stock market valuation can perform so well. One would expect models like this to be fully discounted in current prices, but this is clearly not the case. On the average the market is valued at the level you'd predict from yield and earnings, but in the short run psychological influences and investor expectations can apparently drive the value significantly above and below the average. The test results are convincing and suggest that SVI could be a useful adjunct to our fund switching system.

As this book was in preparation, the *Wall Street Journal* (November 9, 1988) published an article describing techniques very

similar to SVI timing. They quote Professor William Sharpe, creator of the Sharpe Index measure of investment performance: "It is easy when you get to formulate the rule in retrospect. Even so, these simple rules haven't been too shoddy in the last five years." We agree, but for "five" read "at least 20."

Combining SVI Timing with Fund Switching

It is straightforward to combine the fund switching system of Chapter 9 with the SVI market timing model. When the SVI is above its critical threshold, you would be 100% invested in the fund with the highest Relative Strength Oscillator. When SVI is below the threshold, you would switch your assets to a money market fund. Occasionally the combined system will rate money markets as #1 without SVI crossing below its threshold, which provides additional protection against short-term drops in stock prices.

Let us begin by testing the combined system which was tested with the 10 funds of the Diversified Portfolio and the following parameters:

Slow MA smoothing constant	0.10
Fast MA smoothing constant	0.40
SVI timing threshold	0.97
SVI timing filter	± 0.02

Figure 10-6 shows the growth in portfolio value and relative strength of this combined system. It is easy to see that the system avoids the 1987 Crash. In Table 10-3 the performance of the system is compared to that of T-Bills and the S&P 500.

As the table shows, using the SVI to avoid market declines—especially the Crash of 1987—has a favorable impact on many aspects of strategy performance:

- Bear market performance is improved from an annualized 1.28% loss to a 9.57% gain.
- Final portfolio value is 45% higher, with annual return increased from 30.24% to 36.42%.
- The Ulcer Index is reduced from 7.59% to 2.74%, exceeding our goal of below 3%.
- UI Performance is 10.01, compared to 2.80 for the experimental system and a puny 0.52 for the market.
- Switches for the eight-year period are reduced from 41 to 34, close to our goal of no more than 4 per year.

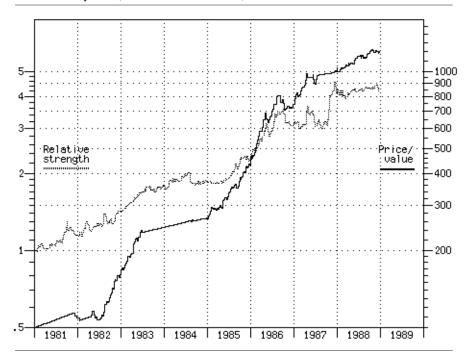


Figure 10–6. Portfolio growth (×100) and relative strength for the combined system, Diversified Portfolio, 1981–1988.

Table 10–4 shows the combined system's return for each year of the test period. The amount by which the strategies beat the market varies considerably from one year to another, but all results are in positive territory except for a fractional negative result for 1988.

(The alert reader may notice that the figures quoted in Table 10-4 for the S&P 500 differ slightly from data published elsewhere. This is due to our use of a weekly strategy. Rather than strict calendar year performance, our annual performance figures are based on prices at the end of the week in which each year ended.)

Interpreting the Test Results

The test results depicted in the previous section show how the combined system would have behaved under the market conditions experienced over the 1981–1988 test period. Some would argue that this period was unusual, encompassing one of the longest bull markets in

Table 10–3. Comparison of experimental and combined system performance, Diversified Portfolio, 1981–1988.

Parameter	90-Day T-Bills	S&P 500	Experimental System	Combined System
Weeks tested	418	418	418	418
Weeks in market	0	418	366	261
Weeks out of market	418	0	52	157
Initial investment	\$10,000	\$10,000	\$10,000	\$10,000
Final portfolio value	\$19,896	\$28,247	\$83,200	\$120,650
Bull market gain	7.62%	40.15%	60.42%	60.85%
Bear market gain	10.81%	-13.62%	-1.28%	9.57%
Compound annual return	8.98%	13.86%	30.24%	36.42%
Excess return/year	0.00%	4.88%	21.26%	27.44%
Beats market by (/year)			16.38%	22.56%
Ulcer Index	0.00%	9.32%	7.59%	2.74%
UI Performance		0.52	2.80	10.01
SD of weekly return	0.05%	2.30%	2.19%	1.73%
Relative volatility	0.02	1.00	0.95	0.75
Traynor Index		4.88	22.38	36.59
Number of switches	0	0	41	34
Average switches/year	0	0	5.1	4.2
Avg. holding period (wks)			11.0	12.3
Average profit per switch			5.30%	7.60%

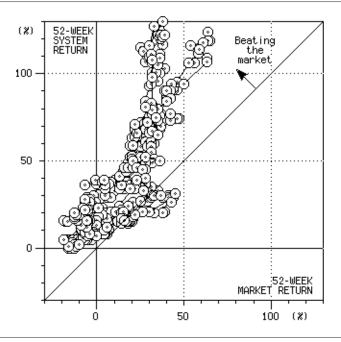
history with one of the worst stock market crashes. How would the strategy perform under other market conditions? What claims can be made for future returns that are most likely to be achieved?

Table 10–4. Performance of combined system by year, Diversified Portfolio, 1981–1988.

Year	90-Day T-Bills	S&P 500	Combined System	Beats Market by
1981	15.04%	-4.41%	8.56%	12.79%
1982	11.30%	18.78%	49.40%	30.63%
1983	9.02%	24.85%	51.12%	26.27%
1984	10.02%	0.50%	7.71%	7.21%
1985	7.75%	33.98%	74.92%	40.94%
1986	6.13%	21.40%	59.70%	38.30%
1987	5.96%	4.28%	39.52%	35.25%
1988	6.91%	16.69%	16.32%	-0.37%

Figure 10–7 shows a **scatter diagram** of the 52-week return for the combined system versus the S&P 500 index. The diagram shows how the combined system's return (vertical axis) varies with the market's return (horizontal axis). The diagonal line represents an investment whose return exactly matches the market's.

Figure 10–7. 52-week return for the combined system versus the S&P 500, Diversified Portfolio, 1981–1988.



Through the use of polynomial regression, we obtain the square-law equation that best fits these data points:

$$R_s \ = \ 18.991 + 1.0478 \times R_m + 0.01028 \times R_m^2$$

where R_s is the system's 52-week return and R_m is the market's. This formula can be used to calculate the *expected* system return under different market conditions, shown in Table 10–5.

From these calculations of expected return a number of predictions can be made about combined system behavior under different market conditions:

Table 10–5. Expected return of combined system under various market conditions.

Market Return	System Return	Difference	
-30%	-3.2%	26.8%	
-20%	2.2%	22.9%	
-10%	9.5%	19.5%	
0%	19.0%	19.0%	
10%	30.5%	20.5%	
20%	44.1%	24.1%	
30%	59.7%	29.7%	
40%	77.4%	37.4%	

- When the market is bullish, the system participates fully and achieves an above-market return.
- When the market is bearish, the system keeps out of trouble.
- The system averages a return at least 19% higher than the market under all market conditions.
- During the test period, the system never lost money over a 52-week period.
- During the test period, the system only rarely underperformed the S&P 500 over a 52-week period (points below the diagonal line in Fig. 10–7).
- At the market's long-term return of 12% per year, the system's average return is about 33% per year.

This type of analysis says much more about what return to expect in the future than the 36% average obtained over the test period.

Alternative Timing Indicators

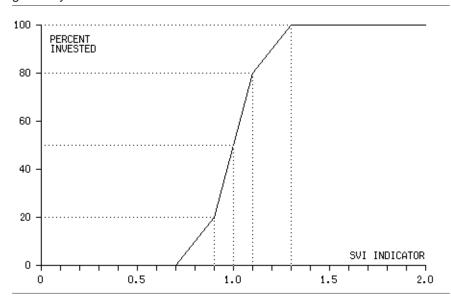
Compared to some of the market timing models in the literature, SVI is very straightforward—perhaps *too* straightforward. On the other hand, using it in combination with a fund switching strategy means that you are not totally dependent on SVI for your strategy's success. The combination is biased on the defensive side, because a failure by SVI to call a market downturn will often be covered by bond or money market funds having the highest relative strength oscillator value.

To avoid being over-committed to a single market timing indicator, you could use the SVI indicator to adjust the invested percentage of

your portfolio gradually, instead of the all-or-nothing approach. Figure 10–8 shows one example of how this could be done.

If you would like to consider more complex market timing models, we refer you to Martin Zweig's *Winning on Wall Street*, or Colby and Meyer's *Encyclopedia of Technical Market Indicators*.

Figure 10–8. Using the SVI indicator to adjust market exposure gradually.



Conclusions

As shown in Table 10–6, we now have an investment strategy that meets all the goals we established earlier. When back-tested with actual fund prices over 1981–1988, it achieves a very attractive return at a risk much lower than the market's. However, before the strategy is used to manage real money, it should be subjected to additional testing designed to ensure that it will continue to perform as expected in the future.

Combining SVI timing with our switching strategy exceeded our original design goals, but can historical performance be extrapolated into the future? The next chapter explains testing methods that help you decide how much confidence to place in future performance.

Conclusions

Table 10–6. Combined system performance (Diversified Portfolio), compared with design goals.

Parameter	Goal	Actual
Compound annual return	20-25%	36.42%
Beat market by (%/year)	10–15%	22.56%
Ulcer Index	3% maximum	2.74%
SD of weekly return	2.5% maximum	1.73%
Relative volatility	1.00 maximum	0.75
Switches per year	4 average	4.2

Chapter 11 HOW TO EVALUATE INVESTMENT STRATEGIES

There are three essential reasons for the thorough testing of an investment strategy. First, you need to characterize its behavior so that you know what performance to expect if the strategy continues to work the same way in the future. This leads to an understanding of risk, return, switching activity, and other parameters that will help you decide whether the strategy is right for you. We characterized our basic fund switching and combined switching and timing systems in the previous two chapters; they obtained superior results.

Second, you need to gain confidence that your system will yield the expected performance *in the future*. You can never be completely certain about future performance, but techniques exist for exposing strategies you can be sure will *not* work as expected in the future. You can learn a lot from other people's past mistakes.

Lastly, it is important to understand *why* your strategy works. You will feel much more comfortable committing your assets to a strategy based on a plausible model, rather than one born out of a "data mining" exercise (explained later).

In this chapter we address the criticisms most often directed at new investment strategies and assess their applicability to the systems developed in this book. This is where we "let it all hang out" and take a hard look at the future prospects for the strategies we have developed. If you have plans to develop a system of your own, you will find this chapter helpful in making a realistic appraisal of *its* future prospects.

Slippage Can Impact Real Returns

In the interest of simplicity, many theoretical systems do not account for trading costs and other forms of "slippage." This neglect can be critically important, because a number of trading rules have been published in the past that beat the market until you account for hidden costs. Common causes of slippage are described in the following sections, and you will see that most of these are less critical when you invest in mutual funds.

Impact of Fees and Taxes

Fund prices already reflect the impact of management fees and fund expenses, but there are trading costs which must be evaluated for their effect on real, achievable performance.

Brokerage Commissions. There are no brokerage commissions incurred for any of the strategies described in this book unless you trade Fidelity funds through a brokerage firm other than Fidelity Brokerage, in which case you will incur commissions of roughly 0.5% per switch. With an average of four switches per year for the combined system, this puts only a 2% dent in the high returns achieved.

Fund Sales and Redemption Charges. As explained on page 57, fund sales and redemption charges are negligible once you reach the 3% ceiling. In effect, the 3% load is a one-time charge whose impact depends on how long you invest with Fidelity. Over 10 years, for example, the impact is only 0.3% per year.

Fund Switching Fees. The Diversified Portfolio systems described earlier only incur Fidelity's \$25 switch fee when selling an international equity fund. This is unlikely to occur more than once or twice a year, so the effect is very small.

Taxes on Profits. Most active investment strategies will turn over your portfolio more than once a year. This would mean that taxes on net gains are paid earlier than with passive buy-and-hold strategies, although the impact is less than you might think because funds are required to distribute 98% of realized capital gains to shareholders by the end of each year.

With retirement plans and other tax-advantaged portfolios, there are no current taxes, so frequent switching has no tax impact.

Switching Delays

The performance measurements in this book assume that you can execute each fund exchange at the same prices as those used to make the switch decision. Specifically, we assumed that Monday's closing prices are the same as Friday's. Obviously this is not the case, because of the normal daily fluctuations in the prices of all securities, if nothing else. To obtain the *exact* historical performance would require accounting for the one-day price changes after each switch.

Fund prices may change between Friday and Monday, but if the fund you're buying changes the same percentage as the fund you're selling, there is no net effect on your portfolio value. What you gain on one fund you'll lose on the other. Your only concern is with switches where the two funds change by *different* percentages. We refer to these effects as **switching gains and losses**.

When you take the trouble to include switching gains and losses in performance calculations, you find that each actual switch made on Monday will have an average switching loss of about 0.3%, compared to the trading profit or loss you would compute from Friday's closing prices. Because of the statistical nature of investing, some individual switches will exhibit gains and losses quite different to the average.

With an average of four switches per year, the expected switching losses are 1.2% per year. This is a small number, but should be subtracted from the performance figures quoted earlier.

Is Friday the best day of the week to run your system? Does another day result in lower switching losses, or even switching gains? Our research has shown that day-of-week effects are very small, and therefore difficult to measure with any accuracy. To magnify the effects, we developed a special "hyperactive" system that identifies *short-term* trends and switches funds almost every week. We measured the return obtained by running the system once a week on each of the five trading days. The results of this experiment were dramatic! As you can see in Fig. 11–1, running the system on Tuesday or Wednesday produced returns of about 50% per year, whereas running the *same* system with the *same* mutual fund choices on Friday or Monday lowered the return to 30% or so. This is the first hard evidence we have seen for day-of-week effects in mutual fund prices. The net effect is that the worst days of the week—Friday and Monday—have switching losses about 0.3% per switch higher than Tuesdays and Wednesdays.

How do you explain this daily difference? Past studies into day-of-week effects have concentrated on the behavior of large groups of stocks on different days of the week, not on differences in behavior between small stock groups. Since so many investors are influenced by recent trends, you might expect stocks or funds in up-trends to behave differently from those in down-trends. Furthermore, many individual investors make their trading decisions over the weekend, when they have more time to review market conditions. This could lead to up-trending stocks getting a boost early in the week, and down-trending stocks getting knocked down further. This would create the divergence between funds needed to produce switching losses in trend-following technical systems run on Friday's closing prices.

The optimum day on which to run your system depends on how often it switches. For an active mutual fund switcher, there is a clear incentive to run your system on Tuesday or Wednesday and switch the follow-

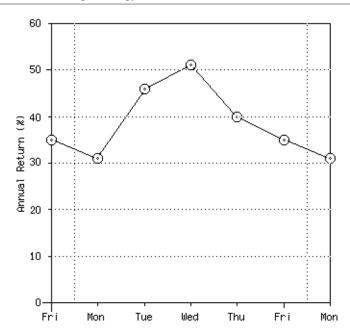


Figure 11–1. Return versus day-of-week for an experimental hyperactive switching strategy, 1981–1988.

ing day. However, at 4 switches a year, it makes little difference what day you use. You're probably better off with Friday, because of the convenience of running your system anytime between Friday evening and Monday afternoon.

Are Test Results Statistically Valid?

Statistical validity tests address an important question: Did you test your strategy with enough data to be confident in the results? If not, your results could simply be a statistical fluke. If the first four cards you drew from a shuffled pack were aces, you wouldn't conclude that the pack was *all* aces. Similarly, no trading rule should be based on just a few historical events.

Statistical validity tests will often reveal strategies that have been inadvertently or intentionally "tuned" to work with historical data but that will likely not work in the future.

The Data Mining Trap

A popular method for devising new trading systems is to put a computer to work analyzing masses of historical data and searching for relationships among prices and other parameters. Search long enough, of course, and you're bound to find indicators that "predict" future price trends. This approach, which we call **data mining**, is extremely dangerous, because a correlation between two variables doesn't guarantee a cause-and-effect relationship. Data mining creates models that fit—not explain—historical market behavior.

Many strategies resulting from a data mining exercise will fail the statistical tests described in the next few sections. Even if a strategy passes, you are much better off if it has a solid foundation in investment theory that explains the underlying model and assumptions.

The way to avoid falling into the data mining trap is to avoid using in strategy *development* the data you plan to use for strategy *testing*. In other words, break the available historical data into two parts: one for strategy development and one for testing.

Statistical Significance

The concept of **statistical significance** basically says that the more often an event (such as a profitable switch) occurs, the greater your confidence that the event will occur again in the future.

Louis Rukeyser, star of PBS's *Wall Street Week* program, has observed on several occasions that stocks go down whenever he leaves on vacation. Does this have any validity for the future? Instinctively you know that a few events like this can be due solely to chance, but if it happened often enough, you'd begin to suspect a cause-and-effect relationship between bear markets and Lou's vacations.

Appearances can be deceptive. For instance, stock prices have a tendency to rise on the days leading up to the major public holidays. In every one of the 17 years from 1961 to 1977, the DJIA showed a gain for the 3 days before Labor Day. Statistically significant? Not significant enough, because in three out of the next four years the index dropped during the same period.

You might think that if something happens 17 times in a row, it's a pretty safe bet. But a trading rule seeking to profit from this effect contains at least *three* implied parameters: which public holiday to choose out of the 9 or 10 each year, and how many days before the holiday to buy and sell stocks (4 and 1 respectively). In effect, the test period only provided 6 trades *per parameter*. This is too few to establish statistical significance.

As a rule of thumb, a trading rule should be evaluated over at least 30 transactions to give reasonable confidence in its "robustness." And a number of technical analysts have recommended that rules should not involve more than five parameters. The strategies in this book were tested over 30 to 80 switches and are based on two or four parameters.

One of our concerns about market timing systems that attempt to identify the peaks and valleys of the so-called business cycle is that you accumulate experience very slowly. This raises a number of problems:

- Business cycles tend to last about four years, so it takes several decades to collect a statistically meaningful number of events.
- There aren't many business cycles in the active investing phase of a human lifetime. This makes mistakes potentially hard to recover from.
- Over long time periods, structural changes take place in the economy that can affect the performance of a system before you have finished testing it.
- It is impossible to back-test mutual fund strategies more than about eight years because most of today's funds didn't exist earlier. Sector and international funds were almost unheard of before 1981.

One of the advantages of a short-term fund switching system of the type we have described is that experience is accumulated relatively quickly. Our combined system makes about four switches a year, rather than one every two years. Performance since 1981 can therefore have reasonable statistical significance. The SVI indicator can be tested back much further, because it does not make use of fund prices.

T-test for Significance

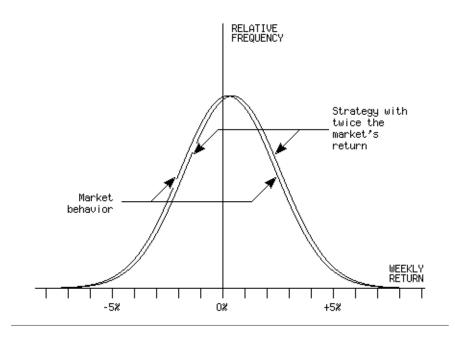
A technique often used to measure statistical significance is the socalled **T-test**. This test tells you the probability that the apparent difference between your strategy's performance and that of the market is due solely to chance. The less likely your strategy's past performance was due to chance, the more confident you will be in its future performance.

The need for a formal method is easily demonstrated with an example. Assume you have an investment strategy that yields twice the market's return without exceeding its risk. In round numbers, your portfolio will grow 0.4% per week, compared to the market's 0.2% per week. Figure 11–2 shows the idealized distribution of weekly returns for the market and for your system: The two curves almost overlap. Intuitively, you would look at this picture and conclude that your system and the market aren't really different—that the doubled return is a statis-

tical fluke, a coincidence.

The T-test tells you that if you achieve your doubled return long enough, you can indeed be confident that your system is distinct from the market. This would increase your confidence that superior performance will continue.

Figure 11–2. Idealized distribution of weekly returns for the market and an investment strategy with double the return but the same risk.



To conduct a T-test, you first calculate the value of T:

$$T = (R_p - R_m) / \sqrt{[(SD_p^2 + SD_m^2) / N]}$$

where R is the return, SD is the standard deviation, and N is the number of periods in the test; and the subscripts m and p refer to the market and your strategy's model portfolio, respectively. You can see that T increases as you increase N or the difference between the two returns, and decreases as you increase the standard deviation of the two returns (the risk).

Statistical tables convert T into the probability that the portfolio's return was achieved by chance. As a rough guide, you can use the figures in Table 11–1.

For the Diversified Portfolio described in Chapter 10,

$$T = (0.60 - 0.25) / \sqrt{[(2.99 + 5.29) / 418]}$$
$$= 2.49$$

so there is only a 1% probability that the results were achieved by chance alone. The standard used in most scientific and medical research is 5%, so this is an excellent result. You should aim for a low number, because managing your investments is important!

The T-test assumes that the returns you are comparing have a normal distribution (page 73). This is often not the case, especially when returns are measured over periods of a year or more. The tests described in the next section avoid this assumption and are valid for any distribution of returns.

Randomization Tests

There is another approach to significance testing that answers questions like: How will a strategy work under different market conditions?

It is very hard to generate future fund prices artificially. Prices appear to be almost random, but our system depends on the existence of trends whose exact characteristics are not understood. To create a series of prices that combines these two features in the correct manner is an impossible task.

Much easier than creating artificial prices is creating artificial trading systems. For example, you could use a computer to test your

Table 11–1. Probability that results were achieved by chance, for various values of T (N greater than 20).

If T is greater than	the probability is less than
0.7	25%
1.3	10%
1.7	5%
2.0	2.5%
2.4	1%
2.7	0.5%
3.0	0.25%
3.3	0.1%

strategy 200 times on the same historical prices. Before each test, you would have the computer randomize the formulas on which your system was based. If you plan to use a 10-week moving average, you could randomly vary the smoothing period between 7 and 13 weeks before each test. If your formulas involved more than one parameter, you would randomize them *all* before each test.

After running the 200 tests, you can plot a histogram showing the distribution of performance achieved. This would tell you what percentage of the tests achieved the performance you observed with your intended set of parameter values.

A good result would show that all 200 tests beat the market by a large amount. A bad result would show that many of the tests underperformed the market, or even lost money. In either case, you don't want to find that only a few tests did better than your real system, because in the future you are more likely to achieve the average performance of the tests, which might be much less. If your real system produces one of the best results, this is evidence that your system is "tuned" so that it only works on one set of historical prices. Your system is the victim of intentional or inadvertent data mining.

Should you change your system's parameters to match those which yielded the highest return? Certainly not, because this model is the one least likely to work in the future! On the other hand, if your system had lower performance than the average in the randomization test, you would be justified in selecting a set of "average" parameters.

For in-depth coverage of randomization test techniques, refer to Eric Noreen's book *Computer Intensive Methods for Testing Hypotheses* (Wiley, 1989).

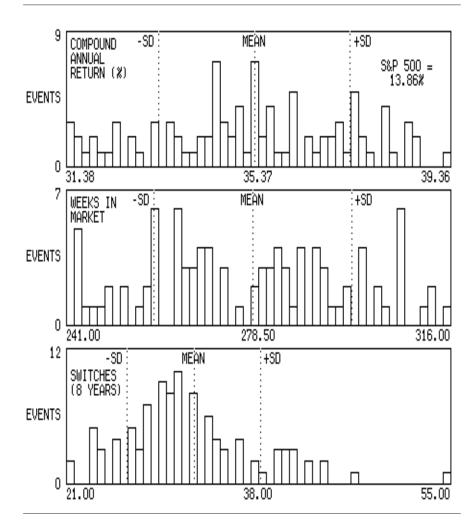
The trick to this type of testing lies in choosing the range of values to randomize each parameter over. The range must be large enough that the formulas in each test are meaningfully different, yet small enough that all formulas lie within the bounds of the model you are testing. We used the following ranges:

Smoothing constant for Slow MA of RS	0.07 - 0.13
Smoothing constant for Fast MA of RS	0.30 - 0.50
SVI threshold	0.94 - 1.00
SVI filter	$\pm 0.00 - 0.04$

The next three charts summarize the results achieved in histogram format (explained on page 90).

Figure 11–3 shows the compound annual return, the weeks invested in stocks or bonds rather than money markets, and the number of switches over the eight-year period.

Figure 11–3. Randomization test results: combined system behavior, Diversified Portfolio, 1981–1988.



Every test exceeded the market's return by at least 17% per year, exceeding our goal of 10 to 15% per year. Of the 418-week test period, all tests were invested in stocks or bonds for 241 to 316 weeks, with an average of 275. The investor was exposed to market risk about two-thirds of the time. Switching activity increases with the values of the two smoothing constants, so the range was quite wide: 21 to 55 switches over eight years.

Figure 11–4 shows the variations in two measures of risk: volatility (standard deviation of weekly return) and Ulcer Index. Interestingly, the Ulcer Index distribution reveals two distinct groups, the higher risk group having suffered from losses in Overseas Fund in late 1986. This shows how one event can significantly affect results, even with a test period as long as eight years. The lower-risk UI group beats our risk objective of UI less than 3%; the higher-risk group exceeds the goal slightly. The two groups are not seen in the volatility distribution in the upper part of the chart, and all tests resulted in a portfolio relative volatility less than 0.81. The lower part of the chart shows the distribution of UI Performance. Every test outperformed the S&P 500 by at least 10 times!

Figure 11–5 shows the return achieved in the two most recent years, 1987 and 1988. *All 200 tests avoided the 1987 Crash*, adding credibility to the SVI approach to market timing.

The measured behavior of the combined system was close to the average of all the randomization test distributions. There is therefore no need to optimize system parameters.

Exposure to Hidden Risks

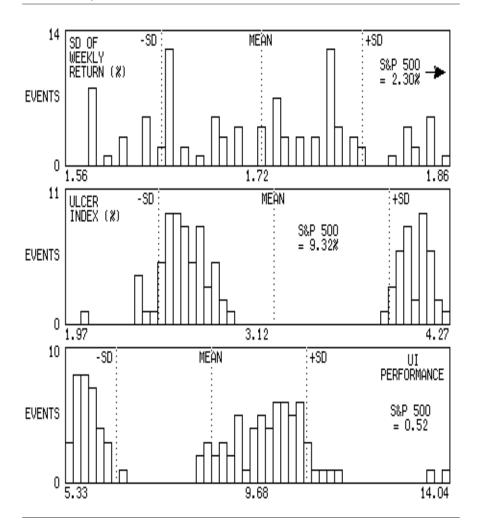
An investment strategy can be exposed to risks that are not readily apparent. For example, you might devise a strategy to profit from the health care industry, only to find the industry hit hard by unexpected passage of legislation creating a national health service. Events like this show that the consequences of under-diversification are not always predictable.

Under-Diversification

The strategies we have described are based on investing 100% in the top-rated fund, unless portfolio volatility is intentionally reduced by a partial commitment to money markets. Although all funds are highly diversified against security risk, some would argue that 100% commitment to one *class* of securities is insufficient diversification for a portfolio.

The argument for diversification has its origins in the buy-and-hold approach. If you are going to hang on for dear life as prices go through their ups and downs, it makes sense to spread your portfolio over different investments. For example, if you hold a mix of money markets, stocks, bonds, and hard assets (real estate or gold), it is unlikely that all of them will suffer declines at the same time.

Figure 11–4. Randomization test results: risk characteristics of combined system, Diversified Portfolio, 1981–1988.



This argument sounds good in theory, but most investors following this approach do no better than dividing a portfolio between stocks and cash. The main effect of either method is to move your portfolio down the Security Market Line of the Capital Asset Pricing Model (page 81). However you diversify, you are largely trading off risk for return.

If you are successful at avoiding major declines through market timing or sector rotation, the need for traditional diversification is

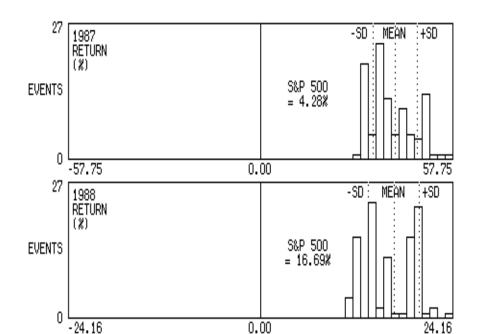


Figure 11–5. Randomization test results: recent returns, 1987 and 1988.

greatly diminished. In effect you are diversifying over time rather than continuously or simultaneously. You hold stocks when it makes sense and switch into other investments when they are expected to do better.

With fund switching it is more important to diversify against **strategy risk**: the chance that your strategy will let you down. To do this, you should divide your portfolio between two or more quite different strategies. At a first level, you could use two variants of the strategies described in this book, with different formula parameters and fund choices. Better diversification would be achieved by using another strategy based on totally different concepts and assumptions.

Dependence on Hidden Assumptions

Many investment strategies contain economic assumptions that may turn out to be invalid. As an example, several market timing systems were published in the 1970s and early 1980s that depended on the violent inflation rate cycles of the time. If you look at the very long-term behavior of inflation rates and economic growth, it is obvious that the conditions during this period cannot be counted on to continue. With the recent emphasis on slow but sustainable growth, it may be many years before we see 15% inflation rates again.

The fragility of economic assumptions can be quite subtle. A popular market timing indicator is the **mutual fund cash position**: the average percentage of equity fund portfolios parked in short-term debt instruments. High values are believed to be bullish, because they represent large amounts of cash available for investing in stocks. Until 1977 this statistic was a useful indicator of market extremes, but it has been stuck in bullish territory ever since. Something happened to cause fund managers to hold more cash, perhaps an increase in redemptions due to more active fund switching.

One of the beauties of the technical analysis of prices is that it does not depend explicitly on any economic factors. Trend-following techniques obviously depend on the existence of trends, but they are not concerned with their *causes*. Indeed, it is entirely possible that the reason for each trend is different. To the extent that trends have their origins in human psychology, we can be fairly confident that any changes will be glacially slow. You cannot eradicate fear and greed overnight!

The strategies in this book make the following assumptions:

- Mutual fund prices exhibit trends that can be identified soon enough to profit from them before they expire.
- Such trends occur often enough that an above-market return can be achieved.
- Stocks must compete with other investments, so in the long run their "earnings" must approximate those of the alternatives.
- Investor expectations and market psychology will drive security prices above and below their trend lines to create temporary undervalued and overvalued conditions.

A common criticism is that trend-following systems do not reap profits in trendless markets. In fact, during such periods you will often experience "whipsawing," with rapid switching and small gains or losses.

The strategies described here will suffer the same problem under the right conditions, but one reason for monitoring a wide diversity of funds is to increase the odds that at least one of them will be showing clear leadership most of the time. The proof is in the results, and the results achieved over the last eight years are certainly attractive. On the other hand, no strategy makes money every month, so periods of lackluster

performance are inevitable.

Market conditions are more often bullish than bearish, so if a strategy does extremely well during rising prices, most investors would be satisfied merely to have their capital conserved during bad times.

The Hidden Hindsight Trap

In Chapter 8 we showed how little of the stock market's behavior your strategy needs to explain in order to achieve attractive returns. This is encouraging, but there is a potential disaster lurking here.

If success doesn't require a system to predict very much, then it follows that just a little hindsight applied to the development of a system will ensure that it works well on historical prices. We have demonstrated this in computer studies which showed that a minute "leak" of knowledge about future prices into current fund switching decisions is sufficient to boost performance to untold heights.

Damaging hindsight can be totally inadvertent, but the effect is the same. Simply having *experienced* recent market behavior can be enough, because you have no idea what historical events are stored in your memory and are influencing your decisions about how to develop your system. This phenomenon probably explains why there is no shortage of trading rules which beat the market when back-tested, but a real dearth of systems which continue working in the future.

Suppose you decide to develop a strategy for trading precious metals funds. What led you to embark on the project? Probably some enticing behavior of these funds in the past. This is hindsight. A decision to include a particular indicator in your trading rules will often be based on seeing the indicator work well in the past. This is also hindsight. Regardless of the details, any system will inevitably depend on the behavior that influenced design decisions continuing in the future.

There is an interesting paradox here. How can you develop a strategy *without* making use of your knowledge and experience? There's no switch that shuts off human memory, and even if there were, where would the ideas for your strategy come from? You could hardly expect to beat the experts without applying any knowledge at all!

Until this paradox is resolved, there are a few things which can help to avoid disaster:

- Base your decisions on broad rather than narrow aspects of market behavior, and on economic relationships which are wellknown and have stood the test of time.
- Examine every decision—both explicit and implicit—that went into the design of your strategy. Explore how each decision was made, and assess how much potentially damaging hindsight

was involved. For example, if you included Overseas Fund in the funds to be monitored each week, throw it out if the decision was influenced by the fund's excellent track record.

- Test the robustness of your strategy by substituting different decisions and measuring the effect on performance. Try replacing each fund with other funds in the same group.
- Plan on the future performance of your strategy being lower than achieved during testing.

What of the strategies described in this book? The market timing rules based on the SVI indicator are derived from market valuation methods which have yielded good results for decades, and the effects of interest rates on security prices are well-known and understood. The fact that stocks and other securities are competing for investment dollars is unlikely to change.

The concept of relative strength has also been around for many years. The decision to use it was driven by the desire to manipulate less noisy data, rather than any hindsight of RS as a superior indicator. The use of two moving averages and their difference oscillator has been a popular investment tool for a long time.

The choice of the Fidelity fund family was driven by the diversity of funds available, not by any knowledge of the funds' performance. However, the selection of funds to be monitored by each of the model portfolios deserves careful review.

The Diversified Portfolio involved selecting representative funds from each fund group. In some cases, the shortage of choices limited the opportunities for hindsight. Overseas Fund is Fidelity's only diversified international growth fund. The choice of domestic bond and equity funds is more problematic, because several funds were available in each group back in 1981. When the combined system was retested with other funds in each group, there were variations of a few percent in average annual return, but no major disasters.

Over-Dependence on Theoretical Performance

There are basically two data sets that can be used to test an investment strategy: historical data and future data. The advantage of using historical data is that a system can be put to use immediately after its development. To test with future data, you would have to wait at least several years before you accumulate enough experience for a meaningful performance assessment. Testing with future data establishes a **track record** of results achieved under conditions that were unknown at the time the system was developed, but even a good track record is no

guarantee of future success. Changes in economic or market conditions can seriously affect future performance of a strategy, regardless of the length of its track record.

Whether you use historical or future data for testing, the same statistical methods should be used to expose defective strategies. A strategy with an excellent track record is often as susceptible to failure as a strategy tested on past prices. There is plenty of evidence for this: Money managers who achieve wonderful results in one year are rarely able to repeat their performance in subsequent years.

Testing with future data has a major disadvantage: opportunity cost. If you have a strategy that offers a potential return like that of strategies discussed in earlier chapters, waiting several years before you use it could severely limit your portfolio growth.

A further problem is that trading systems are frequently reoptimized to reflect changes in economic or market conditions. But, realistically, a modified system is a *new* system, and testing should begin all over again. Even after you start using the system to manage money, any modifications will invalidate the track record on which you are depending.

The trade-off boils down to this: With a track record, you *know* that results weren't achieved with the benefit of hindsight; with back-testing you depend more on the competence of the developer and the thoroughness of statistical testing, but you gain an opportunity to profit much sooner. It makes sense to begin using a new strategy if its expected incremental profits more than compensate for the improved peace of mind that a track record might bring.

Imagine that you have developed a strategy of your own. Would you wait five or ten years to see how it performs before putting it to use? We doubt it! What is needed is an alternative to dependence on track records. That alternative is thorough statistical testing.

Changing Market Behavior

Just as economic conditions change, so can market behavior. The dynamics of securities markets can be profoundly affected by:

- Changes in tax law. It is safe to assume that market behavior has been affected by the 1986 Tax Reform Act's repeal of preferential treatment of long-term capital gains. Short-term trading is encouraged, as confirmed by the increase in trading volume on the stock exchanges.
- The introduction of new financial products. The last decade has seen a proliferation of "derivative financial pro-

ducts"—securities that have no direct connection with the capital-formation purpose of the stock market. These include stock options and futures on stock indexes, currencies, and interest rates. These products have been blamed, at least in part, for an increase in stock price volatility and the 1987 stock market Crash.

Parameter Optimization

One way to protect a strategy against hidden changes in market behavior is to reoptimize the trading rule parameters periodically. This approach could lead you into the data mining trap, but you can minimize the risk by repeating the battery of statistical validity tests after each optimization.

By plotting strategy performance against changes in each parameter's value, it is straightforward to select an optimum set of parameters for use in the future. If high performance is achieved over a significant range of values, there is little risk of succumbing to data mining problems.

A strategy will perform best if the optimum values only change slowly over time, if they change at all. This means that periodic reoptimization can ensure that your strategy *adapts* to changing market conditions. If the optimum values change rapidly, this casts doubt on the robustness of the strategy and its future performance.

Parameter optimization is best carried out over time periods spanning an equal number of bull and bear markets. This avoids parameters being biased toward one market condition or the other.

Parameter Stability

The better strategies will have parameters whose optimum values change only slowly over time. Such parameters are said to be **stable**. You can measure the stability of your parameters in the past by carrying out parameter optimizations on historical data. For example, given prices for 1981–1988, you might proceed as follows:

- (1) Optimize the parameters on 1981–1984 prices.
- (2) Measure the performance for 1985 using the optimum parameters just obtained.
- (3) Repeat steps (1) and (2), adding one year to the end of the optimization period and to the measurement period each time, until you run out of data.

This process is tedious, because optimization is usually done graphi-

cally. However, it will tell you two important things: whether parameters optimized on the past will produce the expected returns in the future; and whether the optimum parameters experience wild shifts over time. Either of these situations would cast doubt on the usefulness of the strategy.

One way to examine parameter stability is to vary each trading rule parameter over a range of values, and evaluate the shape of the graph when you plot performance against the parameter value. Robust strategies will show a fairly smooth curve with an optimum parameter value corresponding to the peak performance. Fragile strategies will show large, random fluctuations in performance as the parameter value is changed.

Are Results Too Good to Be True?

The criticism that our results are "too good to be true" is a tough one to address, because if your strategy passes the statistical tests, it would be irrational to prefer a strategy with *lower* expected performance.

Results can indeed be too good to be true if they are misinterpreted. For example:

- Stock market returns in the 1980s were higher than historical averages, so even if our strategy beats the market by the same percentage in the future, actual returns are likely to be lower. It is safer to bet on beating the market by 20% per year than on achieving a 35% annual return.
- The randomization test results reported earlier show that the average performance of all tests was somewhat lower than the performance measured when the strategies were characterized. It would be more conservative to expect the average performance.

It is often pointed out that the 1980s were one of the greatest bull markets in history, but stocks returned only about 2% per year more than their 40-year average. The test period did include the worst recession (1981–1982) and the greatest stock market crash (1987) since the Great Depression.

Efficient Market Theory

Efficient Market Theory (EMT) holds that it is impossible to consistently beat the market, because today's security prices already take into account all available information—both technical and fundamental—that might affect them. Since new information is by definition

random in nature, the future direction of security prices cannot be predicted.

If EMT is valid, then very few money managers should be able to beat the market consistently. This is largely borne out in practice, since it is rare for a fund manager to hoist his portfolio much above the Security Market Line of the Capital Asset Pricing Model over a period of many years.

Efficient Market Theory also predicts what would happen if such a manager existed. Investors would flood the fund with new money, and it would grow so large and diversified that it would become "the market." This happened to Peter Lynch, manager of Fidelity's popular Magellan fund. After stellar performance in the early 1980s, the fund exploded into a \$10 billion giant that has almost exactly matched the S&P 500's performance since mid-1983. Lynch himself has many times cautioned that his fund is unlikely to repeat its early performance.

The theory is based on two assumptions: Information affecting security prices is disseminated quickly; and investors behave rationally. In today's electronic world, the first assumption is assuredly true, but many investment strategies recognize that prices are driven as much by investor psychology as by rational economic motives. One wag figured that 98% of market fluctuations have psychological origins, and only 2% reflect changes in company valuations. Few people believe that the combined value of American corporations dropped 22% on October 19, 1987, the day of the stock market Crash.

According to EMT, the system we have developed in this book *cannot* perform as expected. The markets are so competitive that we won't be allowed to get away with it—rather like being thrown out of the casino for counting cards.

The Efficient Market Theory was for many years the darling of academia, but more recently it has fallen into disrepute. Many theorists now ackowledge that EMT suffers from problems of validity. Even so, we know that beating the market is difficult, and our confidence in a system would be greatly enhanced if we could show that we have discovered a pocket of market inefficiency.

A pricing inefficiency doesn't *create* the trends in prices on which our system depends. However, inefficiencies must exist for our system to work. As the mathematicians would put it, pricing inefficiencies are necessary but not sufficient.

Let us explore some factors supporting the argument that open-end mutual funds are inefficiently priced.

Closed-End Fund Evidence

Most mutual funds—and all of those in the Fidelity family—are openend funds. The price of an open-end fund is set equal to the net asset value per share (NAV)—that is, the total assets of the fund divided by the number of shares issued.

By contrast, a closed-end fund brings to market a fixed number of shares which are traded in the auction environment of a stock exchange, often the American or New York exchange. Their shares exchange hands at whatever prices buyers and sellers agree on.

The interesting thing about closed-end funds is that their share prices are often far removed from the net asset value. They usually—though not always—sell at a discount from the NAV. The discount can vary over a wide range and often changes rapidly. This suggests that the "efficient" price of a mutual fund is not necessarily equal to its NAV.

In a recent study of the fluctuations in closed-end fund discounts, Seth Anderson and Jeffery Born* discovered four primary influences. On examination, it is obvious that all four factors apply equally to openend funds, so one would expect open-end fund prices also to fluctuate above and below the NAV, *if they could*. Since open-end fund prices are artificially pegged at the NAV, a pricing inefficiency exists.

Why do closed-end funds not sell for exactly their NAV? Investors don't purchase the funds in order to liquidate their share of the assets; rather, they are investing in the fund manager's ability to enhance the value of the shares in the future. There is no mechanism for open-end fund prices to reflect investors' assessment of fund management. You could have two open-end funds starting with identical portfolios yet totally different management abilities. Both funds would sell at the same price, clearly at odds with their true value.

Mutual Fund Liquidity

Compared to individual securities, mutual fund assets are relatively immobile or illiquid, either through choice or necessity. Consider:

- Many mutual fund shares are held by investors with a buy-and-hold philosophy. With this group, trading activity levels are low.
- Other shares are held in company-sponsored retirement plans that place severe limitations on switching activity. Many such plans limit switches to once a year or quarter.
- As explained earlier, most mutual funds are required to invest essentially all assets in the class of securities in which they

^{* &}quot;Closed-end funds: What causes the discounts?," AAII Journal (July 1987).

specialize. They cannot liquidate their portfolio if they see trouble ahead, and they cannot divert their portfolio into other classes of security.

 Many mutual funds have portfolios in the hundreds of millions or billions of dollars. Funds often own a significant part of companies they invest in, and major liquidations can directly affect stock prices if carried out too quickly. When this occurs, the value of the stock remaining in a fund's portfolio can drop precipitously.

The above factors combine to create an illiquid situation that contrasts strongly to the short-term orientation of many sophisticated investors. Illiquidity is another mechanism for creating pricing inefficiencies.

General Validity of the Efficient Market Theory

When you study the research carried out to prove the validity of the EMT, there is a consistent theme. The trading rules tested are simplistic and rather different from the trading rules you see used in actual practice. Real trading systems usually have secondary rules in addition to the primary rules that might be tested by academia. For example, our combined system uses a relative strength oscillator with a market value indicator. The secondary rules are there for a good reason, so it is not surprising that testing the primary rule alone often confirms EMT.

In some cases studies have shown that a strategy beats the market until you account for trading costs. These costs can wipe out the incremental profits and render the strategy worthless. Most of these studies predate the explosive growth in mutual funds, which offer the investor an opportunity to trade actively without the usual brokerage commissions. Some of the older strategies may deserve reappraisal in the context of mutual fund investing.

The Efficient Market Challenge

We would like to issue a challenge to those who believe in market efficiency. The challenge is this: In the spirit of the Turing Test for intelligence in computers, specify what a trading rule would have to achieve to prove that strategies exist which "beat the market" in spite of Efficient Market Theory.

Build Your Own Strategy—Painlessly

Security markets are very efficient, so it is generally believed that any new trading rule that makes money is immediately discounted by the market when it is made public. If this is true, any strategy revealed to the public is doomed to failure. Does this prophecy apply here?

There is literally no limit to the number of investment strategies that can be devised. There is an infinite supply of market data to analyze and an infinite variety of trading rules that can be applied to the data. It is hard to imagine a market so efficient that it can simultaneously reduce the excess returns of thousands of different strategies to zero.

Even if a single trading rule is exposed to large numbers of investors, the effect on the market can be surprisingly small. For example, the Elves of *Wall Street Week* issued their first sell signal in six years on February 10, 1989. The market's response to the actions of several *million* viewers was a yawn, with no perceptible change in market indexes or volume.

How can you design an investment strategy that no one else knows about, without duplicating all the work covered in this book? Very simply, it turns out, because the randomization test revealed 200 different trading rules that achieved similar performance but made different fund switches. You could take any combination of parameter values in the ranges used for the randomization test, knowing that no one else will be applying the same formulas to the same Fidelity funds.

You could further enhance the proprietary nature of your system by selecting different funds to represent the main groups. You will probably have your own ideas about which funds to monitor, anyway.

As a final step, you could throw a die to determine which day of the week to run your system.

If you figure that each parameter has 10 significantly different values within its range, that you will choose 10 funds out of the 100 available, and that there are five trading days per week, the number of different systems that can be built in this way is approximately 3,140,782,000,000,000,000,000,000. Admittedly many of these formulas will yield the same switches, but there are more than enough variants to go around among your fellow readers!

Conclusions

Our strategies have achieved remarkable results in back-testing with eight years' fund prices, and statistical tests indicate that we can be reasonably confident about future performance. Unfortunately, past performance doesn't guarantee future success, so diversifying your portfolio across two or more strategies would be a wise move.

Chapter 12 AGGRESSIVE FUND SWITCHING STRATEGIES

The systems described in the previous chapters were based on a model portfolio of 10 of Fidelity's diversified funds. The 35 Select funds were not used, to minimize switching activity and the time commitment required. However, as explained in Chapter 4, Fidelity's industry sector funds present a unique investment opportunity: a chance to earn even higher profits than the systems we have described so far. The Select funds also accept a much higher level of switching activity than the diversified funds.

In this chapter, we explore systems that seek higher returns through the use of the Select fund group.

Select Fund Strategies

Industry sector funds are more volatile than diversified equity funds. Although they are less volatile than individual stocks, trends develop and dissipate quickly. This suggests the use of higher smoothing constants in the relative strength moving averages, so that the system can respond faster to changing market conditions. We tested alphas of 0.15 and 0.60 for the Slow and Fast MA, respectively.

Table 12–1 summarizes the performance of a system—which we shall call the Select Portfolio—that switches exclusively among the 35 sector funds. The results for a No-Gold System that excludes the two precious metals funds are also shown.

Table 12–1. Comparison of Diversified, Select, and No-Gold Portfolios, combined system, 1981–1988.

Parameter	90-Day T-Bills	S&P 500	Select Portfolio	No-Gold Portfolio
Weeks tested	418	418	418	418
Weeks in market	0	418	239	239
Weeks out of market	418	0	179	179
Initial investment	\$10,000	\$10,000	\$10,000	\$10,000
Final portfolio value	\$19,896	\$28,247	\$100,570	\$117,180
Bull market return	7.62%	40.15%	56.92%	59.31%
Bear market return	10.81%	-13.62%	7.41%	10.05%
Compound annual return	8.98%	13.86%	33.45%	36.02%
Excess return/year	0.00%	4.88%	24.56%	27.04%
Beats market by (/year)			19.59%	22.16%
Ulcer Index	0.00%	9.32%	4.39%	2.82%
UI Performance		0.52	5.59	9.59
SD of weekly return	0.05%	2.30%	2.30%	1.85%
Relative volatility	0.02	1.00	1.00	0.80
Traynor Index		4.88	24.56	33.80
Number of switches	0	0	83	76
Average switches/year	0	0	10.4	9.5
Avg. holding period (wks)			5.0	5.5
Average profit per switch			2.82%	3.29%

Of the two portfolios, No-Gold looks better. When the precious metals funds are excluded, return is higher, risk is much lower, and switching activity is reduced. These results confirm the difficulty we have always had developing technical systems to profit from gold funds.

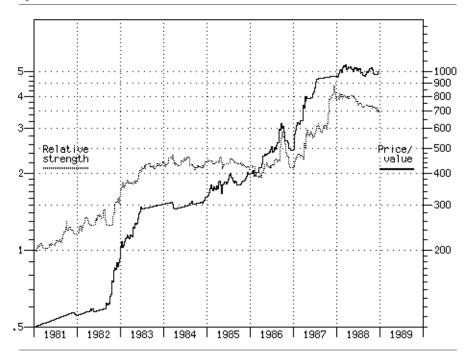
When compared to the Diversified Portfolio of Chapter 10, the No-Gold Portfolio has essentially the same performance, except that switching activity is doubled. On balance, therefore, the Diversified Portfolio is preferable.

Figure 12–1 shows the portfolio value growth and relative strength for the Select Portfolio strategy. Figure 12–2 shows the portfolio value growth and relative strength for the No-Gold Portfolio strategy.

All-Funds Portfolio

We turn next to the All-Funds Portfolio that includes all sector funds (except precious metals funds) and most diversified stock and taxable bond funds. Table 12–2 shows the results achieved with this combination. Figure 12–3 shows the same results in graphical form.

Figure 12–1. Growth of Select Portfolio (×100), combined system, 1981–1988.



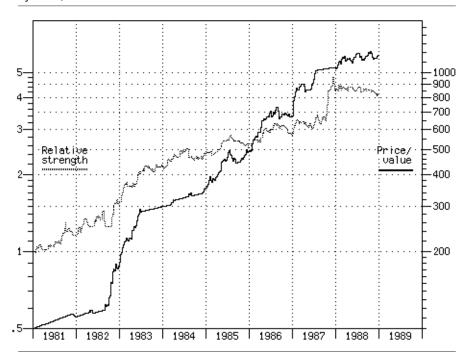


Figure 12–2. Growth of No-Gold Portfolio (×100), combined system, 1981–1988.

As you can see, the All-Funds Portfolio tacks on another 5% in annual return, for a phenomenal total of 41.76%. Ending portfolio value was increased 35%. At the same time, the Ulcer Index was reduced 5%, and UI Performance was improved 26%. The only penalty for this gain was a doubling of switching activity from 4 to 9 switches per year.

This is clear proof that the diversity of funds in the Fidelity family can provide higher investment returns than more limited choices.

Figure 12–4 shows the value of the top fund's Relative Strength Oscillator each week over the eight years. Periods when no fund provided market leadership are clearly seen: 1984 and the second half of 1988, for example.

Table 12–2. Comparison of Diversified and All-Funds Portfolios, combined system, 1981–1988.

Parameter	90-Day T-Bills	S&P 500	Diversified Portfolio	All-Funds Portfolio
Weeks tested	418	418	418	418
Weeks in market	0	418	261	266
Weeks out of market	418	0	157	152
Initial investment	\$10,000	\$10,000	\$10,000	\$10,000
Final portfolio value	\$19,896	\$28,247	\$120,650	\$163,080
Bull market return	7.62%	40.15%	60.85%	69.52%
Bear market return	10.81%	-13.62%	9.57%	11.54%
Compound annual return	8.98%	13.86%	36.42%	41.76%
Excess return/year	0.00%	4.88%	27.44%	32.78%
Beats market by (/year)			22.56%	27.90%
Ulcer Index	0.00%	9.32%	2.74%	2.60%
UI Performance		0.52	10.01	12.61
SD of weekly return	0.05%	2.30%	1.73%	1.96%
Relative volatility	0.02	1.00	0.75	0.85
Traynor Index		4.88	36.59	38.56
Number of switches	0	0	34	74
Average switches/year	0	0	4.2	9.2
Avg. holding period (wks)			12.3	5.7
Average profit per switch			7.60%	3.85%

Conclusions

For aggressive investors, the All-Funds Portfolio provides higher returns than the Diversified Portfolio of Chapter 10, at the expense of more frequent switching among funds. Transaction costs are very low, so making the extra five telephone calls each year increased final portfolio value by 35%.

The more aggressive strategies described in this chapter will incur roughly \$250 per year in Select fund switch fees. The expected return should be reduced accordingly, especially with smaller portfolios.

We leave it up to the reader to evaluate the strategic opportunities available by purchasing fund shares on margin, by short-selling Select fund shares, or by hourly trading of Select funds.

Figure 12–3. Growth of All-Funds Portfolio (×100), combined system, 1981–1988.

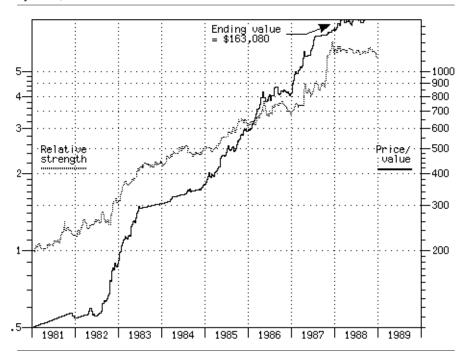
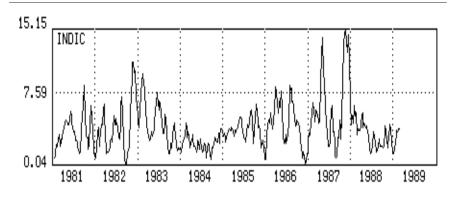


Figure 12–4. Top fund's Relative Strength Oscillator, All-Funds Portfolio, 1981–1988.



Chapter 13 TAX SHELTERING WITH MUTUAL FUNDS

The long-term return of the S&P 500 index averages about 12% per year (after accounting for the reinvestment of dividends). However, this figure is misleading because it doesn't account for inflation or taxes. After accounting for both, returns are reduced by two-thirds, to a **real after-tax return** of 4.25% per year (see Table 13–1). Small-company stocks typically have a long-run return 3 percentage points above the S&P 500, although this is achieved at the expense of greater risk. The after-tax real return of this group averages about 6% per year.

This is hardly the stuff that fortunes are made of; however, by investing in bonds or Teasury Bills your portfolio would have actually *lost* purchasing power over the last 40 years.

These figures show how quite small differences in performance become magnified after accounting for inflation or taxes. You can see that:

- The pre-tax real return of the S&P 500 is more than 10 times that of long-term bonds or T-Bills
- Sheltering the market's return from taxes almost doubles its real return
- Beating the S&P 500 by just a few percentage points has a magnified effect after accounting for inflation or taxes.

For many investors it is much easier to shelter investment profits from taxes than to find a strategy that achieves the same result through higher returns. Tax shelters therefore deserve the most serious consideration. This is especially true with high-return strategies, because compounding effects magnify the advantages of paying taxes later.

Table 13–1. Compound annual rate of return, before and after adjusting for 4.19% inflation and a 30% tax bracket, 1946-1986.

Security Class	Pre-Tax Gross Return	Pre-Tax Real Return	After-Tax Real Return
Common stocks (S&P 500)	11.93%	7.44%	4.25%
Long-term corporate bonds	4.85%	0.64%	-0.67%
Treasury Bills	4.75%	0.55%	-0.81%
Source: Adapted from Mark A. Johnson (1988)			

Definition of Terms

Several important terms are used in connection with tax-sheltered investments.

Your **tax bracket** is the percentage you will pay in income taxes on the next dollar you earn. If your income is subject to state or local taxes, you should add these rates to your Federal tax bracket.

Tax free means that you will never pay taxes on your investment return. Examples of tax-free investments include the dividends paid by municipal bonds and the death benefits of life insurance contracts. See page 45 for a formula to convert a tax-free yield into the taxable equivalent.

Tax deferral means that taxes are not paid on your investment profits until you withdraw them from the plan providing the shelter. On withdrawal, you will pay taxes at your then current tax rate. It makes sense to defer taxes for two reasons: First, there's a good chance your tax bracket will be lower later in life; and second, compounding effects ensure that the after-tax ending value of your portfolio will be higher. Examples of tax-deferred investments include retirement plans and variable annuities.

Contributions made by an employer or employee to a retirement plan are generally **tax deductible**. This means that contributions can be subtracted from income in order to reduce current taxes. In effect, the cost of your contributions is reduced by the taxes you would have otherwise paid on them.

The term **tax-advantaged investing** is used to include investments with any of the above tax reduction properties.

1986 Tax Reform Act

The Tax Reform Act of 1986 eliminated the distinction between long-term and short-term capital gains, so it is no longer advantageous to hold an investment longer than six months. In other words, investment strategies that involve frequent trading no longer carry an incremental tax burden. This is an invitation to achieve higher returns through more active fund switching strategies.

All capital gains are now taxed at earned income rates. In spite of major reductions in these rates, many investors face capital gain taxes of 28% to 33%. Tax sheltering therefore continues to be a critical part of financial planning, especially if you are using high-performance strategies that are expected to throw off large profits in most years.

Tax shelters are often affected by changes in tax laws. These changes invariably result in reduced tax benefits and add to the complexity of administering a plan. As an example, the 1986 Tax Reform Act prevents many employees from deducting IRA contributions and requires separate record keeping for deductible and nondeductible contributions. It also reduced the maximum annual contribution to 401(k) plans from \$30,000 to an inflation indexed \$7,000.

One benefit of tax reform was the dramatic reduction in the number of tax brackets. This makes it much easier to calculate whether tax shelters make sense for you, although there is always the risk (some would say certainty) that future changes in rates will affect your conclusions.

Tax Sheltering with Fidelity Funds

Mutual fund vehicles for sheltering profits from current taxes include:

Tax-exempt funds
Retirement accounts
Variable annuity contracts
Variable life insurance policies
Custodial accounts for children's education

Tax-exempt funds were discussed in Chapter 4, so this chapter is devoted to the remaining five tax shelter opportunities.

One of the most popular investment tools in recent years has been the tax-deferred retirement account. These plans allow profits to accumulate tax-free until withdrawal for retirement or other purposes. In most cases, contributions to retirement plans are deductible from current income, providing a major boost to the effective return.

The key to maximizing the growth of your tax-deferred investments is to structure the plan so that it is **self-directed**. This means that you make your own decisions about where your share of the plan is invested, rather than leaving this responsibility with a pension manager or insurance company. When switching funds, it is better to deal directly with Fidelity rather than filling in forms for your local plan administrator.

It is also important to have as many investment choices as possible, with the right to switch from one to another frequently enough for your investment strategy to pay off. These goals are easily achievable with any of Fidelity's individual plans, but employer-sponsored plans often throw up roadblocks that reduce your flexibility and potential returns. This makes it impractical for participants in many plans to profit from short-term trends in the markets. If you are in a position to influence your employer's plan, you might point out that Fidelity has qualified plans designed to provide flexibility to employees while reducing the administrative burden for the employer. Fidelity has a staff of pension plan specialists available to visit your company.

Effects of Deductibility and Deferral

Table 13–2 shows how deductibility, tax-free income, and tax-deferral affect the final value of an investment portfolio, for an employee allocating \$2,000 of annual pre-tax income to savings for retirement for 25 years. A 28% tax bracket is assumed, both currently and in retirement. The table shows the final portfolio value for average pre-tax annual returns of 5%, 10%, and 20%. The results are summarized graphically in Fig. 13–1.

If your expected annual return is only 5%, tax-deferral and current deductibility make little difference to the final after-tax value of your portfolio. As the expected return increases, however, the effect is dramatic.

If contributions are not deductible and profits are currently taxable—as would be the case outside a tax-advantaged account—the final after-tax portfolio value with a 20% return would be \$278,836. By sheltering the investment in a tax-deferred retirement account with deductibility of contributions, the final value is 144% higher at \$679,653, even after paying more than quarter of a million dollars in taxes at withdrawal. Retirement income would be almost two-and-one-half times higher. Even nondeductible contributions to a tax-deferred account result in a 67% increase in retirement income.

Table 13–2. Advantages of tax deferral and deductible contributions to retirement plans.

Plan Type:	Regular Taxable Accounts	Variable Annuities & Some IRAs	Variable Life Policies	Most Retirement Accounts
Contributions deductible?	No	No	No	Yes
Taxes on profits	Current	Deferred	None	Deferred
Pre-tax contributions	\$2,000	\$2,000	\$2,000	\$2,000
After-tax contributions	\$1,440	\$1,440	\$1,440	\$2,000
25-year contributions	\$36,000	\$36,000	\$36,000	\$50,000
Results with 5%				
pre-tax annual return:				
After-tax return	3.60%	5.00%	5.00%	5.00%
Ending value	\$56,840	\$68,727	\$68,727	\$95,454
Taxable part		\$32,727		\$95,454
Tax at 28%		\$9,164		\$26,727
After-tax value	\$56,840	\$59,563	\$68,727	\$68,727
Results with 10% pre-tax annual return:				
After-tax return	7.20%	10.00%	10.00%	10.00%
Ending value	\$93,736	\$141,620	\$141,620	\$196,694
Taxable part		\$105,620		\$196,694
Tax at 28%		\$29,574		\$55,074
After-tax value	\$93,736	\$112,046	\$141,620	\$141,620
Results with 20% pre-tax annual return:				
After-tax return	14.40%	20.00%	20.00%	20.00%
Ending value	\$278,836	\$679,653	\$679,653	\$943,962
Taxable part		\$643,653		\$943,962
Tax at 28%		\$180,223		\$264,309
After-tax value	\$278,836	\$463,430	\$679,653	\$679,653

These illustrations assume that the entire portfolio is liquidated at the same time, and taxes paid on the lump sum. In practice, liquidation would occur over a period of many years, while the portfolio continues to grow in value.

These results show that tax-deferral is a powerful tool for maximizing after-tax portfolio growth, even if plan contributions are not deductible from current income. Three conditions might arise in which

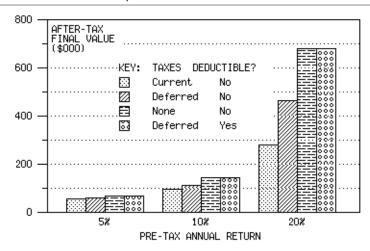


Figure 13–1. Effect of tax sheltering and deductibility of contributions on after-tax portfolio value.

this conclusion would be questionable: if your expected annual return is very low, if you expect to be in a much higher tax bracket at retirement than now, or if you might need to withdraw from your account before retirement (an event that triggers substantial tax penalties).

Incidentally, these results also drive home a point made earlier: that compounding effects make achieving a higher return more attractive than you'd think. Doubling the annual return from 10% to 20% results in a final after-tax portfolio value after 20 years not twice as high, but almost five times!

Conventional Wisdom Can Be Dangerous to Your Wealth

Conventional financial planning wisdom would have you invest your retirement funds conservatively and save your aggressive instincts for assets you can afford to lose, presumably in currently taxable accounts. With the recent increases in capital gain tax rates, and with the potentially high returns of the investment strategies described in this book, it may be time for a reappraisal.

Consider a situation in which your investments are divided equally between retirement accounts and taxable accounts, \$50,000 in each. You plan to invest one half using the Diversified Portfolio of Chapter 10, with the other half placed with a money market fund. Assume the Diversified Portfolio earns 13% more than the market's long-run return of 12%, for a total of 25% per year. Assume the money market fund

earns an average of 7% per year. Table 13–3 compares the results after 10 years under two alternative scenarios. With scenario A, you follow conventional wisdom. You invest your retirement portfolio conservatively, and your taxable account aggressively. With scenario B, you do the reverse. Once again we see the importance of deferring taxes, especially when expected returns are high or the investing period is many years. After-tax ending portfolio value is 21.5% higher with the aggressive retirement investment of scenario B.

What's wrong with the scenario B approach? It does require greater discipline. You can't afford to squander your taxable portfolio on conspicuous consumption at the same time as your retirement portfolio is vulnerable to unexpected losses. Retirement plans are tough to withdraw from before age 59½. If they are managed conservatively you are very likely to achieve your expected—though more modest—retirement nest egg, regardless of your spending habits.

Retirement Plans for Everyone

Many individuals overlook opportunities to shelter their investments from current taxes. Anyone with self-employment income can set up a retirement plan, regardless of whether the self-employment was full- or part-time, through a corporate structure or not.

It is beyond the scope of this book to discuss the intricacies of the many different types of retirement plans available under current law, but Table 13–4 summarizes the essential characteristics of the more popular plans.

Table 13–3. Two scenarios for dividing investments between taxable and tax-deferred accounts.

Scenario:	Α		B	
Account:	Retirement	Taxable	Retirement	Taxable
Initial investment	\$50,000	\$50,000	\$50,000	\$50,000
Pre-tax annual return	7.00%	25.00%	25.00%	7.00%
After-tax return	7.00%	17.50%	25.00%	4.90%
Value after 10 years	\$98,358	\$250,812	\$465,661	\$80,672
Taxes on withdrawal	\$14,507		\$139,698	
Ending value	\$83,851	\$250,812	\$325,963	\$80,672
Ending combined value	\$334,	\$334,663		535
Combined after-tax return	12.8	1%	15.1	%

Table 13–4. Comparison of popular retirement plans.

	Variable Annuity	IRA	SEP-IRA	Keogh (Profit Sharing)	Keogh (Money Purchase		401(k)
Complexity	Medium	Low	Low	Medium	Medium	High	High
Set up by:							
Self-employed	Yes	Yes	Yes	Yes	Yes	Yes	No
Employees	Yes	Yes	No	No	No	No	No
Employers	No	No	Yes	Yes	Yes	Yes	Yes
Contributions:							
Max % of income	No limit	100%	15% ¹	15% ¹	25% ²	Varies	15%
Deductible?	No	Varies ³	Yes	Yes	Yes	Yes	Yes
Max employer \$	n.a.	n.a.	\$30,000	\$30,000	\$30,000	Varies	\$30,000
discretionary?4	n.a.	n.a.	Yes	Yes	No	No	Varies
Max employee \$	No limit	\$2,000	\$7,0005	\$2,000	\$2,000	10%	\$7,0005
IRS regulations:							
Deadlines:							
Set-up	None	4/15	Filing deadline	Fiscal year-end	Fiscal year-end	Fiscal year-end	Fiscal year-end
Annual funding	None	4/15	Filing deadline	Filing deadline	Filing deadline	Filing deadline	Filing deadline
Annual filings?	No	Varies	No	Yes	Yes	Yes	Yes
Discrimination rules?6	No	No	Yes	Yes	Yes	Yes	Yes
5-year averaging?	No	No	No	Yes	Yes	Yes	Yes

¹ 13.04% for self-employed.

In all cases, investment profits accumulate tax-free until withdrawn. In most cases, contributions are also deductible from income in the year made. The primary differences among the plans are limits on contributions and the complexity of plan administration.

² 20% for self-employed.

³ See Table 13–5.

⁴ If discretionary, employer determines annual contribution.

⁵ Amount indexed to inflation.

⁶ Rules restrict preferential treatment of key employees.

Individual Retirement Account (IRA)

As the name implies, Individual Retirement Accounts (IRAs) are set up by individuals to provide for their own retirement. Annual contributions are limited to \$2,000 or 100% of earned income, whichever is less.

IRAs were extremely popular until the 1986 Tax Reform Act reduced or eliminated the deductibility of contributions for many employees. Table 13–5 summarizes current (1988) rules on deductibility. If your contribution is partially deductible, you can deduct 20% of the difference between \$35,000 (\$50,000 for joint filers) and your AGI.

Even if your IRA contribution is nondeductible, you should seriously consider the advantage of having your future profits accumulate on a tax-deferred basis.

Simplified Employee Pension Plans (SEP-IRA)

Simplified Employee Pension Plans (SEP-IRAs) are popular with the self-employed and small organizations providing for their employees. Like IRAs, they are easy to set up, and they can provide for both employee and employer contributions. Contribution limits are much higher than with IRAs.

Keogh (Defined Contribution) Plans

Keogh plans are often used by professionals such as doctors and lawyers. They are more complicated to set up than IRA accounts, but they often allow higher contributions. Taxes on lump-sum withdrawals can be reduced though a special five-year averaging method. With profitsharing plans the percentage of each participant's salary contributed to the plan can be varied from one year to another; with money purchase plans the percentage is fixed.

Table 13–5. IRA contribution deductibility depends on employer pension plan eligibility and adjusted gross income (AGI).

Pension Plan Coverage	AGI (Single)	AGI (Joint)	Contribution Deductibility
No	No limit	No limit	100%
Yes	Under \$25,000	Under \$40,000	100%
Yes	\$25-35,000	\$40-50,000	Partial
Yes	Over \$35,000	Over \$50,000	None

Defined Benefit Plans

With defined benefit plans the annual contribution is determined by factors such as your age, years to retirement, age expectancy, expected investment performance, and retirement benefit. Your benefit is limited to 100% of your average compensation in your highest-paid three consecutive years or \$90,000, whichever is less. Defined benefit plans are best suited to individuals with a high stable income, seeking a guaranteed retirement benefit, and over 45 years of age. You must hire an enrolled actuary each year to fill out special tax forms and compute the proper contributions for the current year. Under the right conditions, defined benefit plans allow much higher deductible contributions than other plans.

401(k) and 403(b) Plans

401(k) plans are set up by corporations to provide for employee retirement. These plans are complex to set up and administer, although several mutual fund families (including Fidelity) offer standardized plans and supporting services to simplify the process. Contributions typically combine employee salary deductions with partial matching employer funds. Employee contributions are deductible from current income and are subject to a maximum of \$7,000 per year (indexed to inflation). Because contributions are much larger than with an IRA—and are always deductible—401(k) plans are an excellent vehicle for tax-deferred investing. 403(b) plans provide a similar structure for nonprofit organizations such as government institutions.

Multiple Retirement Plans

Even if you are covered by an employer-sponsored retirement plan, you can contribute to an individual plan as well in order to increase the size of your tax-advantaged portfolio. For example:

- You can contribute to an IRA account. Contributions may not be deductible, but investment profits will accumulate on a taxdeferred basis.
- If you have net income from self-employment (from a sideline business or writing activities, for example), you can set up a SEP-IRA, Keogh, or defined benefit plan. Contributions are deductible.
- Anyone can purchase a variable annuity contract with after-tax dollars, in almost any amount (see later section on variable insurance products).

Transfers Between Plans

The tax laws are pretty liberal when it comes to transferring your savings between retirement plans. This is useful when you change jobs and receive a lump-sum distribution from your previous employer's plan, or if you decide to change the custodian of your IRA to take advantage of a new investment opportunity such as the Fidelity fund strategies described in this book. Leaving an employer's retirement plan has important tax considerations, so professional advice is strongly recommended.

There are two methods for transferring assets between retirement plans, known as **transfers** and **rollovers**. Either lets you transfer money between plans without paying taxes.

With a transfer, you direct your new custodian to collect your retirement money from your current custodian. You can make transfers between IRA custodians as often as you like.

With a rollover, you collect your money yourself, then pass it on to your new custodian. You can only do this once a year, and special tax rules apply. In particular, a rollover must be completed less than 60 days after you receive the proceeds; otherwise a taxable event is triggered with severe tax penalties. Be sure to tell the old custodian that you are rolling over your account, and not to withhold taxes.

The transfer approach is simpler, but a rollover can often be completed faster.

Fidelity as Custodian

Fidelity supports all the retirement plans described in this chapter. They have standardized prototype plans, which in most cases will let you avoid the legal fees involved in setting up a customized plan. You can obtain details of the plans and copies of prototype plan documents at no charge from any Fidelity representative. Specialists are readily available to assist you in setting up any of the plans described.

Retirement plans have access to all the funds described in this book except tax-exempt funds. Since retirement plans shelter dividends from current taxes, it wouldn't make sense to take the lower yields of a tax-exempt fund. For retirement plans, all funds—except the new Spartan funds—reduce their minimum initial investment requirement to \$500 instead of the more normal \$1,000 to \$2,500. This makes it much easier to diversify a small portfolio over several funds.

Many 401(k) and 403(b) plans offer only a handful of the available funds. Which funds are included in a plan is a matter for negotiation between Fidelity and the employer.

Variable Insurance Products

Variable insurance products combine traditional insurance company offerings with the opportunity for you to manage your own policy's investments. The term "variable" means that the value of your contract depends on the investment performance you achieve through mutual fund investing. If you succeed at this, the value of your policy will be higher than if it had been invested according to conventional insurance company practices (a "fixed" contract). Variable insurance products accumulate investment profits on a tax-free or tax-deferred basis (similar to a retirement plan) although contributions are not tax-deductible.

Fidelity offers two types of variable insurance products: variable life insurance and variable annuities. These programs have much in common:

- You self-direct your investments in the portfolios of Fidelity's special Variable Insurance Products (VIP) Fund: money market, high income, equity income, growth, and international.
- There are no sales or redemption charges. Switching among funds is currently unlimited, and there are no switching fees.
- Fees are charged for mortality risk, account maintenance, and fund management. Variable life policies also have a life insurance cost deducted.
- Dividends and capital gain distributions are automatically reinvested.
- Investing profits accumulate on a tax-advantaged basis, and increase policy value.
- Pay-out begins at some predefined event (death of the insured, a specific date such as retirement, or surrender of the policy) and can take many forms, including a lump sum or a regular monthly annuity. Payments are either income tax-free (variable life), or the profit component is taxed at earned income rates (variable annuity).

Table 13–6 compares Fidelity's variable life and variable annuity products in detail.

Note that Fidelity's variable insurance products are not yet available in all states. In those states where the Variable Life plan is not available, a similar plan in cooperation with the Monarch Life Insurance company is offered instead.

Table 13–6. Comparison of Fidelity variable insurance products.

	Variable L	ife Plans	Variable An	nuity Plans
Primary purpose	Estate pla	nning	Retirement	
Minimum investme	ent \$5,000	\$5,000		
Maximum investme	ent Age-deper	ndent	No limit	
Insurance cost	Age-deper	ndent	None	
Payment time	Death of ir	nsured(s)	Owner-defin	ed
Taxes on payment	s None		Profits taxed	at income rates
Taxes on withdraw	als None		Profits taxed	as income
Zero coupon option	ns Yes			
Plan Name	—Variable Li Future Reserves			nnuity Plans— Retirement Reserves
Insurer	Monarch	Fidelity	Pacific Fidelity	Fidelity
A.M. Best rating	A+	Not rated	Α	Not rated
Lives covered	2	1	1	1
Death benefit, greater of:	Market value Face value	Market value Face value	Market value	Market value Initial investment
Annual fees	1.50% ¹	0.85%	\$35+0.80%	1.00%
Max repeat investment	100% (year 1) 25% (yrs 2–5)	100% (year 1) 25% (later)	No limit	No limit
Surrender charge	6% through year 6	6% through year 6	Zero	5% less 1% /year
800 number	527-8885	634-9361	634-4672	634-9361
1 0.6% after tenth year.				

Financial planners recommend investing only in insurance companies with an A.M. Best safety rating of A or better. The Fidelity Investments Life Insurance Company is currently unrated because of its short history.

Variable Annuity Products

Variable annuities are technically Individual Variable Deferred Annuity Contracts. "Deferred annuity" means that the plan is intended to provide regular monthly payments, beginning on a specific date in the future (often your retirement date) and ending upon your death (or later). The primary insurance component of the plan is the annuity, with the insurance company carrying the risk that you will outlive the mortality table prediction. There are no tests for insurability, and no health restrictions.

The advantage of a variable annuity as a tax-deferral vehicle is that there is no upper limit to the amount you can invest. In many respects a variable annuity is like a nondeductible IRA with unlimited contributions. The disadvantages include higher fees and fewer investment choices.

Fidelity's two variable annuity products, Income Plus and Retirement Reserves, are very similar. Retirement Reserves has a 5% surrender charge (declining by 1% per year), so is less suitable for those expecting to withdraw funds within five years. Income Plus has no surrender charge. Retirement Reserves has a 0.25% per year administrative fee, compared to Income Plus's fixed \$35 fee (an advantage for portfolios worth more than \$14,000). Retirement Reserves has slightly lower mortality fees and guarantees that if you die before the annuity commencement date your beneficiary will receive at least your initial investment, even if the market value of your portfolio has declined.

Variable Life Products

Fidelity's variable life products are technically Single Premium Variable Life Policies. The term "single premium" means that annual life insurance premiums are replaced by charges against the amount you initially invested. Policies are issued to those meeting insurability requirements.

The 1988 Technical Corrections Bill discontinued the availability of tax-free borrowing of up to 90% of your contract's value. This essentially limits variable life contracts to use in estate planning. The plans allow your estate to grow sheltered from taxes and to pass to your heirs tax-free.

The advantage of variable life as a tax-deferral vehicle is that investment profits are not taxed, regardless of how they are withdrawn from the plan. Your profits are treated as the proceeds of an insurance policy, which are nontaxable. The disadvantages are limits on the amount you can invest, and the cost of the underlying life insurance (which may be more than you need).

Fidelity's two variable life products, Future Reserves and Variable Life, are also very similar. Variable Life insures one life and should be used if your spouse is to be beneficiary in the event of your death. Future Reserves insures two lives jointly and is best for providing for children or grandchildren. It can be structured so that your estate grows tax-free for many, many years.

Fidelity VIP Fund Portfolios

Table 13–7 shows the investment objectives of the Variable Insurance Products (VIP) Fund portfolios available under Fidelity's variable insurance plans. The three zero-coupon bond portfolios, with maturities in

1993, 1998, and 2003, are only available under variable life plans.

The VIP portfolios are listed weekly in a special section in *Barron's*. There is no source of daily closing NAVs other than Fidelity's VIP department.

The portfolios have too short a history for meaningful performance analysis, but they have similar investment objectives to the surrogate funds listed in the table. If you need to test an investment strategy for the VIP portfolios with historical prices, we suggest you use these instead. If your strategy depends on having many different mutual funds to choose from—for example, the aggressive strategies described in Chapter 12—its performance is likely to be lower with the limited range of VIP choices.

In order to estimate the performance of our strategy when used with the VIP portfolios, we used the surrogate funds shown in Table 13–7. The results are shown in Table 13–8.

As you would expect from the narrower range of fund choices, performance was lower than with the Diversified Portfolio, but still attractive. Annual return dropped from 36% to 31%, the Ulcer Index increased from 2.74% to 2.98%, and switching activity increased slightly. The strategy beat the S&P 500 by an average of 17.28 percentage points per year. Figure 13–2 shows the portfolio growth and relative strength in graphical form.

Table 13-7. Fidelity VIP Fund portfolios.

Fund Name	Assets (\$ mil)	Objective	Testing Surrogate
Money Market Portfolio	104.6	Current income; stability of principal	Cash Reserves
High Income Portfolio	30.0	Current income; possible growth	Capital & Income
Equity Income Portfolio	51.6	Reasonable income; growth potential	Equity-Income
Growth Portfolio	28.5	Capital appreciation	Ret. Growth
Overseas Portfolio	9.3	Long-term appreciation; diversification	Overseas
Zero Coupon Bonds: 1993	3 0.9		
Zero Coupon Bonds: 1998	3 0.7		
Zero Coupon Bonds: 2003	3 1.1		
Note: Asset figures are for De	cember 19	88.	

Table 13–8. Performance of combined system when applied to VIP portfolio surrogates, 1981-1988.

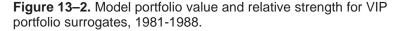
Parameter	90-Day T-Bills	S&P 500	VIP Surrogates
Weeks tested	418	418	418
Weeks in market	0	418	250
Weeks out of market	418	0	168
Initial investment	\$10,000	\$10,000	\$10,000
Final portfolio value	\$19,896	\$28,247	\$87,460
Bull market gain	7.62%	40.15%	48.70%
Bear market gain	10.81%	-13.62%	10.79%
Compound annual return	8.98%	13.86%	31.14%
Excess return/year	0.00%	4.88%	22.16%
Beats market by (/year)			17.28%
Ulcer Index	0.00%	9.32%	2.98%
UI Performance		0.52	7.44
SD of weekly return	0.05%	2.30%	1.68%
Relative volatility	0.02	1.00	0.73
Traynor Index		4.88	30.36
Number of switches	0	0	40
Average switches/year	0	0	5.0
Avg. holding period (wks)			10.5
Average profit per switch			5.57%

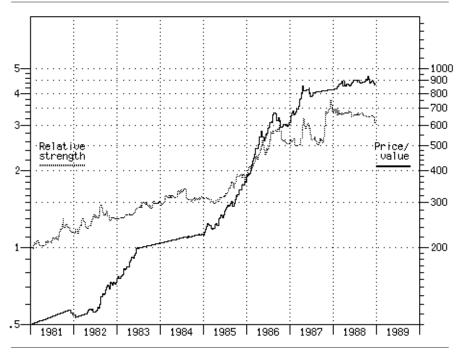
There is no guarantee that the VIP portfolios would have (or will in the future) performed as well as the surrogates used in the above test. In addition, the higher fees paid to cover insurance costs will result in annual returns being about 1% per year lower than indicated in the table. Investors in the VIP portfolios are strongly advised to monitor the portfolios themselves, using data published in *Barron's*.

Pay-Out Options

When the proceeds of a retirement plan or variable insurance contract are paid out to you or your beneficiary, there are several options available for the form of the payments. The more popular options include:

- **Lump sum payout.** A single cash payment, with special five-year averaging in some cases to reduce taxes.
- **IRA rollover.** Proceeds can be rolled over from a qualified plan into an IRA without creating a taxable event.





- **Single annuity.** Provides equal monthly payments until the death of the individual.
- **Joint annuity.** Equal monthly payments until death of two individuals. In some cases income is reduced after the death of the first individual.
- **Annuity with term certain.** Provides equal monthly payments until death of the individual or the end of a specified term (often 10 years), whichever is later.

Monthly income from an annuity will depend on such factors as the form of payment, the life expectancy of the named persons, and interest rate forecasts. You are buying the contract because you want to be assured of retirement income even if you live to over 100; the insurance company is able to provide this because its costs are averaged over the life expectancies of many policyholders.

Under Fidelity's plans, annuities can be either fixed or variable. With fixed annuities, monthly payments are based on your portfolio's

earning an assumed interest rate. With variable annuities, monthly payments will depend on the future investment performance of your portfolio.

There is no way for fixed annuity payments to be indexed to future inflation, but a variable annuity could be managed so that its return roughly keeps pace with inflation.

College Investment Plans

Fidelity offers several ways to set up a college investment program for your children or grandchildren. One tax-sheltered option is the use of a custodial account so that investment profits are taxed at the child's presumably lower rate. If a child is under 14, the first \$1,000 of unearned income is taxed at the child's rate, and anything over \$1,000 at the parent's rate. After age 14, the limit jumps to \$17,850.

Your state has laws that permit opening a custodian account under either the Uniform Gifts to Minors Act (UGMA) or Uniform Transfers to Minors Act (UTMA). There are important legal issues to consider with custodial accounts, so be sure to consult your tax advisor before taking action.

Conclusions

Tax-advantaged investment strategies have a number of important advantages:

- Deferral of taxes on fund distributions results in improved aftertax performance, especially with strategies having high expected returns. The higher your return and the longer you invest, the more the effects of compounding will make tax deferral pay off.
- All Fidelity funds except the Spartan funds have much lower minimum investment requirements for retirement plans: \$500 instead of \$1,000 to \$2,500 in most cases. Investment flexibility for smaller portfolios is greatly increased.
- Fidelity waives fund sales and redemption charges for company retirement plans with more than 200 eligible participants.
- Fidelity variable insurance plans currently have unlimited switching among portfolios.
- Tax-advantaged accounts need not be concerned with the tax consequences of fund distributions (especially buying a dividend) or rapid portfolio turnover.

 Your tax reporting burden is reduced. If you are an active fund switcher, completing Schedule D (Capital Gains and Losses) each year can be quite a chore. With tax deferral, your transactions no longer need to be reported.

The benefits of tax-deferral are offset by the reduced liquidity of your investment and the tax penalties for premature withdrawal.

Anyone with earned income is eligible to participate in either an employer-sponsored retirement plan or a privately funded plan such as an IRA. Some plans permit much larger deductible contributions than others, so the alternatives should be carefully evaluated.

Anyone with self-employment income can set up a retirement plan, even if already covered by an employer's plan.

If you are seeking tax sheltering beyond that provided by retirement plans, consider variable insurance products. They permit large contributions of after-tax dollars.

Fidelity has helpful kits that explain the various plans clearly and in detail. They are available on request at no charge.

Chapter 14 FUND SWITCHING IN PRACTICE

Having spent the last several chapters showing you how complicated investing *can* be, it's time to show you how simple it really is. This chapter shows you how to use readily available tools to implement the strategies described. It also shows you how to develop your own personal strategy without duplicating all the work that went before.

Matching Financial Objectives

After reading the chapters on investing realities and the risk/reward trade-off, you should have some idea about how much return you need to meet your objectives and how much risk you can tolerate.

Table 14–1 compares the four model portfolios of the combined system with the key design goals we established in Chapter 9.

Figure 14–1 plots risk versus return for the market and a risk-free investment, based on long-term averages. Also shown is the Diversified Portfolio of Chapter 10, assuming that in the future it beats the market

Table 14–1. Four model portfolios compared to initial design goals (combined system).

Parameter	Design Goal	Diver- sified Portfolio	Select Portfolio	No-Gold Portfolio	All-Funds Portfolio
Annual return	20-25%	36.42%	33.45%	36.02%	41.76%
Beats market by (%/yr)	10-15%	22.56%	19.59%	22.16%	27.90%
Ulcer Index	3% maximum	2.74%	4.39%	2.82%	2.60%
SD of weekly return	2.5% maximum	1.73%	2.30%	1.85%	1.96%
Relative volatility	1.00 maximum	0.75	1.00	0.80	0.85
Switches per year	4 average	4.2	10.4	9.5	9.2

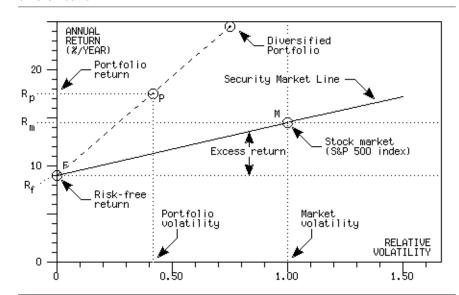


Figure 14–1. Risk versus return for long-range portfolio diversification.

by 10% per year and has a relative volatility of 0.75. You can construct a portfolio P anywhere on the dashed line joining the strategy with the risk-free investment by dividing your portfolio between the two in the appropriate proportions.

Suppose you need an annual return of 17.5% to meet your financial objectives. The figure shows that you should achieve this in the long run by investing 55% of your portfolio according to the Diversified Portfolio (combined system) and placing the remainder with a money market fund. The weekly fluctuations in portfolio value will be small, because the portfolio's relative volatility is only 0.41. The weekly standard deviation of return will be about 1%, with rare excursions of 3% or more.

Remember that the money fund part is not "idle" cash; it is an essential part of a multi-fund portfolio that meets your needs for risk and return. When you evaluate strategy performance, it is important to combine the two parts and assess them as a whole. For example, if the "risky" part of your portfolio loses 1% one quarter, and the money market part gains 1.5%, the overall performance is:

$$[0.53 \times (-1)] + [(1 - 0.53) \times 1.5] = 0.18\%$$
 gain

There is another way to manage your portfolio's risk. You could adjust the leverage of your portfolio each time you switch funds, to compensate for each fund's different relative volatility. Suppose your goal is a relative volatility of 0.40. When you switch into a new fund with a relative volatility of 1.20, you'd invest

$$0.40 / 1.20 = 33\%$$

of your portfolio in the fund, and 67% in money markets. If the next fund had a relative volatility of 0.35, you'd invest 100%. This involves a little more work, but it makes sense since fund volatilities vary over a wide range.

Mutual Fund Math—Portfolio Volatility

If your portfolio comprises several funds with different volatilities, it is easy to calculate the **weighted average** relative volatility of the combination. You multiply each fund's relative volatility by its fraction in your portfolio, and add up the results, as shown in the example in Table 14–2.

Monitoring Performance

One of the consequences of using a weekly system is that you will probably find yourself evaluating performance much more often than in the past. This can be discouraging on occasions because, as we mentioned earlier, all systems exhibit periods of lackluster performance. You will no doubt be tempted to abandon the strategy at times when you probably shouldn't.

When you decide the long-term performance of a system meets your goals, you have to accept the short-term fluctuations that come with it. But how can you determine whether a period of poor performance is a

Table 14–2.	Calculating	a portfolio's	weighted	average	relative
volatility.					

Fund	Relative Volatility	Fraction of Portfolio	Product
Growth	1.10	40%	0.44
Growth and income	0.70	30%	0.21
Bonds	0.40	20%	0.08
Money markets	0.02	10%	0.00
WEIGHTED AVERAGE ((sum)		0.73

sign of real trouble? The simplest test is to find out whether what you're concerned about happened before. For example, if the system lags behind the market for three months, there's not much to worry about because this happened several times during back-testing over 1981–1988.

Using an objective strategy protects you from the consequences of subjective or emotional investment decisions. But it can only work for you if you avoid subjective influences over when to use the strategy and when to ignore it. The whole idea of an objective system is to depend on it completely until you have proven *with equal objectivity* that it has ceased to perform as advertised. If you find yourself tempted to second-guess your system, it is best not to act on your hunches until you have translated them into a new trading rule and have had an opportunity to test it.

If you find yourself overly concerned about short-term fluctuations in portfolio value, this is a clear indication that you should reduce risk, using the methods outlined in the previous section.

Mutual Fund Math—Compounded Return

When you need to combine total return figures for multiple periods, it is important to *compound* the returns by multiplying them together. If you simply add them up, you will obtain a misleading result, especially when large gains or losses are involved. For example, if a fund loses 40% in one year, then gains 40% in the next, adding them up results in -40+40=0, i.e. no net change. In reality, the value of a \$10,000 portfolio fell to \$6,000 in the first year, then increased to \$8,400 in the second, for a net loss of 16%. In mathematical terms, the two-year return is obtained as follows:

- (1) Divide each percentage gain or loss by 100, and add 1 to the result. A 40% gain becomes 1 + 40 / 100 = 1.4, and a 40% loss becomes 1 40 / 100 = 0.6.
- (2) Multiply the resulting factors together. In this example, $1.4 \times 0.6 = 0.84$.
- (3) Subtract 1 and multiply the result by 100 to convert back to a percentage. That is, $0.84-1=-0.16\times100=-16\%$.

The compound annual return is that return which, if earned every year, would result in the same overall gain as the uneven returns actually experienced. If the total return over n years is x percent, the **compound annual return** is the n'th root of 1 + x / 100, that is, $(1 + x / 100)^{1/n}$. In our two-year example, this is 2nd (square) root of 0.84, or $0.84^{1/2} = 0.917$. 0.917 - 1 = -0.083, a 8.3% annual loss.

Compounding of returns works for periods other than years, even fractional periods. For example, if your portfolio grows to 2.4 times its initial value in 43 months, the compound annual return is $2.4^{12/43} = 2.4^{0.28} = 1.28 = 28\%$. The figure 12 is the number of months in a year.

Another example: you invest for four months in fund A for a total return of 6%, then five months in fund B for a return of 8%. What is the compound annual return? The combined total return is $1.06 \times 1.08 = 1.145 = 14.5\%$ over nine months. The annualized return is $1.145^{12/9} = 1.145^{1.333} = 1.198 = 19.8\%$.

Implementation Tools

The investment strategies we have developed will help you reach your goals, but putting them into place requires regular analysis. There are a number of ways to do this with a calculator or computer, and the time commitment needed each week is minimal.

For the implementation of any investment strategy based on statistical analysis, you have essentially five choices:

- Use a worksheet so that you can carry out the analysis by hand, preferably with the aid of a calculator. We recommend a programmable calculator such as those manufactured by Hewlett-Packard. Make sure it has built-in financial functions.
- Implement your strategy on a spreadsheet program that runs on your personal computer. Popular spreadsheet programs include VisiCalc, SuperCalc, Lotus 1-2-3, and Excel. Later in this chapter you will find a spreadsheet implementation for the fund switching strategies described in this book.
- Locate an off-the-shelf computer program designed to do the analysis you require. Investment software is available via online computer services, or you can purchase programs from suppliers listed in software directories and financial periodicals. Make sure you purchase software that allows you to test different strategies before you put them to use.
- Develop your own computer program to do the analysis exactly the way you want. This takes time and special skills, but it may be necessary if you plan to develop strategies of your own. This may be the excuse you were looking for to get involved with computer programming.
- Subscribe to an investment newsletter that uses your analytical methods, so that all the calculations are done for you, with results reported on a subscribers' "hot line" (see page 108).

Sources of Fund Prices

Regardless of the tools you use, you will need a dependable source of statistics for the mutual funds and market indicators involved in your trading system. Table 14–3 lists sources available for both current and historical data.

Our personal preference is to use Fidelity's automated FAST system for current data, since it is first to be updated, the most complete and accurate, and available at no cost. This service is described in detail in Chapter 5. For historical data, a computer database service is the only practical source. The Dial/Data service is recommended, or Fidelity Investor EXPRESS if you have a Fidelity brokerage account.

Some investment newsletters publish fund statistics in addition to investment recommendations (see the section "Investment Newsletter Strategies" in Chapter 8).

Information Services

Several on-line computer networks provide current security prices, including mutual fund NAVs. In some cases historical prices and distributions are also available, although how far back these go is highly variable. Use of these services requires a computer, a modem, and data communications software at your end. The services are most useful when you need to get large quantities of historical prices into your computer for analysis.

Our preference is Dial/Data, a division of Track Data Corporation (formerly Warner Computer Services), because their charges are much lower than anyone else and because their historical databases go back the furthest. With an inexpensive 1200-baud modem on your computer, the cost per quotation is very low, especially during off-peak hours at nights and on weekends. To open an account with Dial/Data, contact them at (718) 522-6886. Be sure to ask for their lists of mutual fund and market index ticker symbols.

Data Accuracy and Completeness

It goes without saying that mutual fund prices used for analysis or investment decision making should be accurate, but in reality total accuracy is out of reach. Some of the problems you are likely to run into—regardless of which information service you use—include:

(1) Missing capital gain distributions in newspapers and computer databases. These are best discovered by plotting relative strength charts and looking for uncharacteristic steps caused by

Sources of Fund Prices

prices not being adjusted for a distribution (see page 208).

Table 14–3. Sources of Fidelity fund and market statistics.

	FAST System ¹	Representa- tives	Infor- mation Services	Inves- tor's Daily	Wall St. Journal	Barron's Weekly	Mutual Fund Guide
Provider	Fidelity	Fidelity	Dial/Data ²	2 Investor's Daily	s Dow Jones	Dow Jones	Fidelity
Availability	7:30pm EST	8:30pm EST	7:30pm EST	Next morning	Next morning	Saturday- Monday	12th of month
Cost	None	None	60¢/min.3	35¢/day	50¢/day	\$2/wk.	\$89/yr.
Prices	Hourly Daily	Hourly Daily	Daily Weekly	Daily	Daily	Weekly	Monthly
Yields	Yes	Yes	No	No^4	No^4	No^4	Yes
Cap gains	Yes	Yes	Yes	No	No	Yes	Yes
Purch price	No	Yes	No	Yes	Yes	No	No
Latest change	Yes ⁵	Yes	No	Yes	Yes	Yes	Yes
4-wk change	No	Yes	No	Yes	No	No	Yes
YTD gain	No	Yes	No	Yes	No	No	Yes
3-yr rank	No	No	No	Yes	No	No	No
Risk data	No	No	No	No	No	No	Yes
Price charts	No	No	No	No	No	No	Yes
Holdings	No	No	No	No	No	No	Yes
Historical prices	No	No	Yes	Back issues	Back issues	Back issues	Charts
VIP funds	No	Yes	No	No	No	Yes	No
S&P 500	Yes ⁶	Yes	Yes	Yes	Yes	Yes	Yes
yield	No	No	No	No	No	Yes	No
P/E	No	No	No	No	No	Yes	No
DJIA	Yes ⁶	Yes	Yes	Yes	Yes	Yes	Yes
yield	No	No	No	Yes	Yes	Yes	No
P/E	No	No	No	Yes	Yes	Yes	No
T-Bill rate	No	No	Yes	Yes	Yes	Yes	Chart

Available to Fidelity fund shareholders only.
 Dial/Data, formerly Warner Computer Services, is used as an example of information services; other providers' services may differ.
 Off-peak rate; \$1.20/minute during business hours. Rates exclude local network access charges.
 Except for money market funds.
 Select funds only.
 Access requires active Fidelity brokerage account.

- (1) Wrongly dated capital gain distributions, which result in a clearly visible step up followed by a step down—or vice versa—in relative strength charts.
- (2) The previous day's price repeated because the current day's price wasn't available by the time the database was updated.
- (3) Preliminary prices—or no price at all—instead of final prices, due to final prices not being available by deadlines.
- (4) On days when the market was closed, the previous day's price repeated instead of the closure being indicated.
- (5) Missing monthly dividend payments by bond funds. Although individually small, missing dividends result in massive discrepancies over time.
- (6) Typographical errors, often in just one digit of a fund's price.
- (7) Prices reported in 1/64ths of a dollar instead of dollars and cents (not a problem with the Dial/Data databases). This results in small rounding errors that reduce the accuracy of technical analysis.
- (8) Prices adjusted to reflect sales charges. Dial/Data inexplicably adds *half* of the fund's sales charge to reported prices. This should be deducted again before making use of the data.
- (9) Historical prices not available for periods when a fund was too small to qualify for listing in the financial pages.

The first two problems occur quite frequently and can have a major impact, because fund distributions can be as high as 20% to 30% of the NAV. A missing distribution makes it appear that the fund's price dropped by the amount of the distribution because of market losses. Be alert for prices that don't make sense—for example, an equity fund that drops when the market has a good day.

The third problem usually occurs on days with very high trading volume. The best example is October 19, 1987, when some databases showed no changes in price for Fidelity funds. What could be further from the truth!

Regrettably, information services do not routinely update their databases when final prices are provided by the funds. The burden is on the user to check downloaded data for reasonableness and accuracy.

Mutual Fund Math—Adjusting for Fund Distributions

Whenever you use past prices to calculate total return—or to forecast future prices—it is essential to adjust them whenever a fund makes a distribution. Without this precaution, your data will contain misleading price changes. (This is identical to adjusting stock prices for a dividend or stock split.)

Fund distributions do not change a portfolio's value up or down. Let's prove this with an example. You have \$1,325 invested in 100 shares of fund X at \$13.25, and the fund declares a \$1.87 capital gain distribution. On the ex-dividend date, the share price drops to \$13.25 - \$1.87 = \$11.38, ignoring any normal fluctuations in the fund's price. The fund pays you a distribution of $100 \times \$1.87 = \187 . Assuming you elected to have distributions automatically reinvested in shares of the same fund, you will purchase \$187 / \$11.38 = 16.43 shares, for a new total of 116.43. The value of your shares is $116.43 \times \$11.38 = \$1,325$, the same as before.

In order to eliminate the spurious price drop from \$13.25 to \$11.38, we must adjust \$13.25 down to \$11.38, and adjust all earlier prices down by the same factor. The old prices must be divided by a factor equal to:

1 + [distribution / (new price)]

In our example, the factor is 1 + (\$1.87 / \$11.38) = 1 + 0.164 = 1.164. \$13.25 / 1.164 = \$11.38, as expected. If the price on the previous day had been \$13.18, it would be adjusted down to \$13.18 / 1.164 = \$11.32; and so on. These adjustments are easily programmed on a computer.

Similar adjustments must be made for dividend distributions. Although bond funds pay these monthly, they are declared daily and reflected in the fund's price. We recommend adjusting prices weekly (unless you are collecting prices less often than this), because less frequent adjustments might affect investment decisions.

Let's take an example of a bond fund yielding 9.80%, with an NAV of \$9.55. The weekly yield is 9.80% / 52 = 0.19%. 0.19% of \$9.55 is 1.81 cents, and this is the amount per share accrued to your account each week. The required adjustment factor is 1 + (0.0181 / 9.55) = 1.00190. Each historical price must be divided by this factor. For example, \$9.55 / 1.00190 = \$9.532.

Once you have adjusted historical prices, it is a simple matter to calculate the total return over any time period. Just divide the ending adjusted price by the starting adjusted price, and convert it into a percentage.

Spreadsheet Model

This section describes in detail a spreadsheet model that implements the fund switching strategies described earlier. The model is based on the popular Lotus 1-2-3 spreadsheet program. Ready-to-use disks with the model installed are available (see page 228 for details). It is strongly suggested you call Fund Kinetics at (800) 634-6790 to purchase a disk, since it will save you many hours and will include the latest 13 weeks of data already keyed in.

With the information provided here, it would be straightforward to implement the strategies on almost any personal or home computer with spreadsheet software.

For convenience, the spreadsheet model uses a different formula for computing relative strength than that shown earlier:

$$RS_{t} = RS_{t-1} \times (P_{t} / P_{t-1}) / (M_{t} / M_{t-1})$$

where RS_t is the fund's relative strength, P_t is its price, and M_t is the market (S&P 500), all for time t.

The Lotus spreadsheet model is designed for easy weekly input of fund prices and yields to generate the rankings. The model maintains the most recent 14-week history of fund prices. Upon entering the most recent week's data, the fifteenth week is automatically eliminated.

To produce the fund ranking information, calculate the spreadsheet (press the "Alt" and "A" keys simultaneously) after you input the most current week's data in the unprotected columns or cells identified with an asterisk "*". The calculation must be done only once after each week's information is entered; otherwise the data will become meaningless and you will have to re-enter the latest week's data. You should make a back-up copy of your disk or model immediately after each calculation to be able to recover if you inadvertently calculate twice.

A sample screen is produced on the following page, divided into left and right parts. Most of the middle columns that store recent prices are omitted.

The columns and isolated cells which have an asterisk "*" indicate where new weekly information is required. The columns are identified as follows:

- A Left border
- B Fund name
- C FAST number for fund

FUND		YIELD %*	-	DISTRIB*	ADJUST
90-Day T-Bill					
S&P 500			276.28		1.0007
Magellan	21		47.60	0.90	1.0189
Cash Reserves	55	8.02	1.00		1.0015
Capital Apprec	307		14.05	0.13	1.0093
High Income	38	12.68	8.58		1.0024
Puritan	04		12.70	0.31	1.0244
Flexible Bond	26	8.95	6.66		1.0017
Equity Income	23		25.05	0.61	1.0244
Global Bond	451		11.57		1.0000
Intl Gr & Inc	305		11.80	0.03	1.0025
Overseas			24.60	0.58	1.0236
S&P 500 P/E:*					
MAJOR		ETERS:			
Fast Smoothing			, 		
Slow Smoothing		0.10			
Threshold		0.97			
Filter		0.02			
Initialize		0			

-1	0	13WK RETUR	RS	FAST RS	SLOW RS	OSCILLATOR
	276.28	0.00%				
46.97	47.60	0.00%	1.0154	1.0062	1.0015	0.4616%
	1.00	0.00%	1.0036	1.0014	1.0004	
14.04	14.05	0.00%	1.0027	1.0011		0.0815%
8.58	8.58	0.00%	1.0021	1.0008	1.0002	0.0635%
12.73	12.70	0.00%	0.9997	0.9999	1.0000	-0.0088%
6.68	6.66	0.00%	0.9992	0.9997	0.9999	-0.0230%
25.18	25.05	0.00%	0.9970	0.9988	0.9997	-0.0912%
11.64	11.57	0.00%	0.9960	0.9984	0.9996	-0.1205%
11.96	11.80	0.00%	0.9886	0.9955	0.9989	-0.3412%
25.14	24.60	0.00%	0.9806	0.9922	0.9981	-0.5834%
				mining ava	mmv.	+
				TIMING SYS	TEM:	
			Ť	DVI		0.915
			İ	EVI		1.011
				AVERAGE		0.963
				TIMER		1

- D* Current week's annualized percentage yield for S&P 500 (dividend), T-Bill (discount), and bond/money market funds
- E* Current week's net asset value
- F* Current week's capital gain distribution amount (if any)
- G Distribution adjustment factor to prices
- H-U Adjusted weekly price data for 14 weeks (12 not shown)
- V Thirteen-week percentage return
- W Fund relative strength (RS)
- X Exponentially smoothed relative strength (Slow MA)
- Y Exponentially smoothed relative strength (Fast MA)
- Z Relative Strength Oscillator

There are two macros which help you operate the spreadsheet automatically. The first (A) adjusts prices, performs the weekly calculation, and sorts the results according to the relative strength rankings. The calculation macro is located in cell C44. Do not change the contents of this cell. To run the macro, press "Alt" key and "A" simultaneously after you have entered the current week's information. Do not use the standard Lotus calculation procedure (F9) to run the model.

The second macro (I) performs the initialization process. This is used after you enter the test data provided later to insure that your model is operating properly. Your results should match the test results. After the test is complete, use this macro to reset everything to zero before entering current data. This macro is also used to reset the model if you mistakenly calculated twice and need to reenter data. The macro is located in cell D45. Do not change the contents of this cell. To run the macro, press "Alt" key and "I" simultaneously. Do not use this procedure unless you want to reset everything to zero and start over.

The formulas to be entered in the cells are as follows:

```
B1: [W14] 'MARTIN & McCANN F F7: '********
                                              J14: '----
    IDELITY TRADING SYSTEM B9: [W14] ' Enter latest we K14: '-----
   [W14] 'Copyright 1989 Al ek ending date: * L14: '-----
   l Rights Reserved F9: (D1)
                                              M14: '----
B3: [W14] 'Call 1-800-634-67 B12: [W14] 'FIDELITY FUNDS ST N14: '-----
   90 for information.
                                     014: '-----
                       ATISTICS:
                       B13: [W14] '(Insert data only P14: '-----
B5: [W14] \*
C5: [W6] \*
                           in columns or cells mar Q14: '-----
                           ked with "*".)
                                              R14: '----
D5: \*
                                              S14: '----
E5: '*******
                     A14: [W2] '+
F5: '*******
                       B14: [W14] '----- T14: '-----
B6: [W14] 'WARNING!!!! C14: [W6] '-----
                                              U14: '----
                                              V14: '----
C6: [W6] 'Calculate model on D14: '-----
   ly once per week. E14: '-----
                                              W14: '----
                       F14: '----
                                              X14: '----
B7: [W14] \*
C7: [W6] \*
                       G14: '-----
                                              Y14: '-----
                       H14: '----
                                              Z14: '-----
D7: \*
E7: /*******
                       I14: '----
                                              AA14: '+
```

14 / FUND SWITCHING IN PRACTICE

```
S19: (F2) +T19/$G19
A15: [W2] '
                             D17: (F2) U 7.98
B15: [W14] 'FUND
                             E17: (F2) U ^--
                                                         T19: (F2) +U19/$G19
                                                       U19: (F2) @IF(D$38=1,0,E19)
C15: [W6] ^FAST #
                            F17: (F2) U ^--
                                                        V19: (P2) @IF(H19=0,0,(U19-H1
D15: ^YIELD %*
                             G17: ^--
E15: ^NAV $*
                             AA17: '|
                                                             9)/H19)
                             A18: [W2] '|
F15: ^DISTRIB*
                                                       W19: (F4) @IF(T19=0,1,@IF(D$3
                                                         8=1,1,W19*((U19/T19)/(U$
G15: ^ADJUST
                             B18: [W14] 'S&P 500
                            C18: [W6] ^--
D18: (F2) U 3.65
H15: ^-13
                           בוע: (F2) U 3.65 X19: (F4) @IF(D$38=1,1,(W19*D F18: (F2) U 276.28 $34)+(1-D$34)*X19)

F18: (F2) U ^-- Y19: (אוע מייר)
                                                              18/T$18))))
I15: ^-12
J15: ^-11
                         F18: (F2) U ^--
G18: (F4) ^-
K15: ^-10
L15: ^-9
                            G18: (F4) @IF(E18=0,1,1+(D18/
                                                          $35)+(1-D$35)*Y19)
M15: ^-8
                              5200)+(F18/E18)) Z19: (P4) ((X19/Y19)-1)
                                                   A19: (P4) ((X19/Y19)-1)
AA19: '|
A20: [W2] '|
B20: [W14] 'Cash Reserves
C20: [W6] ^55
D20: (F2) U 8.02
E20: (F2) U 1
F20: (F2) U ^--
N15: ^-7
                           H18: (F2) +I18/$G18
015: ^-6
                            I18: (F2) +J18/$G18
                           J18: (F2) +K18/$G18
P15: ^-5
Q15: ^-4
                           K18: (F2) +L18/$G18
R15: ^-3
                            L18: (F2) +M18/$G18
S15: ^-2
                           M18: (F2) +N18/$G18
T15: ^-1
                           N18: (F2) +O18/$G18
                                                       G20: (F4) @IF(E20=0,1,1+(D20/
U15: ^0
                            O18: (F2) +P18/$G18
                     018: (FZ) +P10/7010
P18: (F2) +Q18/$G18
Q18: (F2) +R18/$G18
R18: (F2) +S18/$G18
S18: (F2) +T18/$G18
T18: (F2) +U18/$G18
V15: ^13WK RETURN
                                                           5200)+(F20/E20))
                                                      5200)+(F20/E20
H20: (F2) +I20/$G20
W15: ^RS
                                                       I20: (F2) +J20/$G20
X15: ^FAST RS
Y15: ^SLOW RS
                                                         J20: (F2) +K20/$G20
Z15: 'OSCILLATOR
                                                        K20: (F2) +L20/$G20
                            U18: (F2) @IF(D$38=1,0,E18) L20: (F2) +M20/$G20
AA15: '
A16: [W2] '|
                             V18: (P2) @IF(H18=0,0,(U18-H1 M20: (F2) +N20/$G20
B16: [W14] '-----
                             8)/H18)
                                                        N20: (F2) +O20/$G20
C16: [W6] '----- W18: (F4) @IF(T18=0,1,@IF(D$3 O20: (F2) +P20/$G20  
                           8=1,1,W18*((U18/T18)/(U$ P20: (F2) +Q20/$G20
D16: '----
E16: '----
                                 18/T$18))))
                                                        020: (F2) +R20/$G20
F16: '-----
                          X18: (F4) @IF(D$38=1,1,(W18*D R20: (F2) +S20/$G20
G16: '----
                             $34)+(1-D$34)*X18) S20: (F2) +T20/$G20
                          Y18: (F4) @IF(D$38=1,1,(W18*D T20: (F2) +U20/$G20
H16: '----
I16: '----
                              $35)+(1-D$35)*Y18) U20: (F2) @IF(D$38=1,0,E20)
                                                       V20: (P2) @IF(H20=0,0,(U20-H2
J16: '----
                            Z18: (P4) ((X18/Y18)-1)
K16: '----
                            AA18: '|
                                                            0)/H20)
L16: '----
                           A19: [W2] '
                                                          W20: (F4) @IF(T20=0,1,@IF(D$3
                            M16: '----
                            C19: [W6] ^21
N16: '-----
                                                              18/T$18))))
016: '-----
                           D19: (F2) U ^--
                                                       X20: (F4) @IF(D$38=1,1,(W20*D
                          E19: (F2) U 47.6
F19: (F2) U 0.9
P16: '-----
                                                            $34)+(1-D$34)*X20)
016: '-----
                                                          Y20: (F4) @IF(D$38=1,1,(W20*D
R16: '----
                           G19: (F4) @IF(E19=0,1,1+(D19/
                                                          $35)+(1-D$35)*Y20)
S16: '-----
                               5200)+(F19/E19)) Z20: (P4) ((X20/Y20)-1)
T16: '----
                            H19: (F2) +I19/$G19
                                                          AA20: '
                                                   A21: [W2] '|
B21: [W14] 'Capital Apprec
II16: '----
                           I19: (F2) +J19/$G19
V16: '-----
                          J19: (F2) +K19/$G19
W16: '----
                                                        C21: [W6] ^307
D21: (F2) U ^--
                            K19: (F2) +L19/$G19
X16: '----
                           L19: (F2) +M19/$G19
Y16: '-----
                          M19: (F2) +N19/$G19
                                                        E21: (F2) U 14.05
Z16: '----
                            N19: (F2) +O19/$G19
                                                         F21: (F2) U 0.13
AA16: '|
                            O19: (F2) +P19/$G19
                                                         G21: (F4) @IF(E21=0,1,1+(D21/
A17: [W2] '|
                           P19: (F2) +Q19/$G19
                                                               5200)+(F21/E21))
B17: [W14] '90-Day T-Bill Q19: (F2) +R19/$G19
                                                        H21: (F2) +I21/$G21
C17: [W6] ^--
                                                         I21: (F2) +J21/$G21
                            R19: (F2) +S19/$G19
```

Spreadsheet Model

```
J21: (F2) +K21/$G21
                               C23: [W6] ^04
                                                              X24: (F4) @IF(D$38=1,1,(W24*D
K21: (F2) +L21/$G21
                               D23: (F2) U ^--
                                                                   $34)+(1-D$34)*X24)
                               E23: (F2) U 12.7
                                                              Y24: (F4) @IF(D$38=1,1,(W24*D
L21: (F2) +M21/$G21
M21: (F2) +N21/$G21
                               F23: (F2) U 0.31
                                                                   $35)+(1-D$35)*Y24)
                               G23: (F4) @IF(E23=0,1,1+(D23/
N21: (F2) +021/$G21
                                                              Z24: (P4) ((X24/Y24)-1)
O21: (F2) +P21/$G21
                                    5200)+(F23/E23))
                                                              AA24: '
P21: (F2) +Q21/$G21
                               H23: (F2) +I23/$G23
                                                              A25: [W2] '|
                                                              B25: [W14] 'Equity Income
Q21: (F2) +R21/$G21
                               I23: (F2) +J23/$G23
R21: (F2) +S21/$G21
                               J23: (F2) +K23/$G23
                                                              C25: [W6] ^23
S21: (F2) +T21/$G21
                               K23: (F2) +L23/$G23
                                                              D25: (F2) U ^--
                                                              E25: (F2) U 25.05
T21: (F2) +U21/$G21
                               L23: (F2) +M23/$G23
U21: (F2) @IF(D$38=1,0,E21)
                               M23: (F2) +N23/$G23
                                                              F25: (F2) U 0.61
                                                              G25: (F4) @IF(E25=0,1,1+(D25/
V21: (P2) @IF(H21=0,0,(U21-H2 N23: (F2) +O23/$G23
     1)/H21)
                               O23: (F2) +P23/$G23
                                                                   5200)+(F25/E25))
W21: (F4) @IF(T21=0,1,@IF(D$3
                               P23: (F2) +Q23/$G23
                                                              H25: (F2) +I25/$G25
     8=1,1,W21*((U21/T21)/(U$ Q23: (F2) +R23/$G23
                                                              I25: (F2) +J25/$G25
     18/T$18))))
                               R23: (F2) +S23/$G23
                                                              J25: (F2) +K25/$G25
X21: (F4) @IF(D$38=1,1,(W21*D S23: (F2) +T23/$G23
                                                              K25: (F2) +L25/$G25
     $34)+(1-D$34)*X21)
                               T23: (F2) +U23/$G23
                                                              L25: (F2) +M25/$G25
Y21: (F4) @IF(D$38=1,1,(W21*D
                              U23: (F2) @IF(D$38=1,0,E23)
                                                              M25: (F2) +N25/$G25
     $35)+(1-D$35)*Y21)
                               V23: (P2) @IF(H23=0,0,(U23-H2 N25: (F2) +O25/$G25
Z21: (P4) ((X21/Y21)-1)
                                    3)/H23)
                                                              025: (F2) +P25/$G25
AA21: '
                               W23: (F4) @IF(T23=0,1,@IF(D$3
                                                              P25: (F2) +Q25/$G25
A22: [W2] '|
                                    8=1,1,W23*((U23/T23)/(U$
                                                              Q25: (F2) +R25/$G25
B22: [W14] 'High Income
                                    18/T$18))))
                                                              R25: (F2) +S25/$G25
C22: [W6] ^38
                               X23: (F4) @IF(D$38=1,1,(W23*D
                                                              S25: (F2) +T25/$G25
D22: (F2) U 12.68
                                    $34)+(1-D$34)*X23)
                                                              T25: (F2) +U25/$G25
E22: (F2) U 8.58
                               Y23: (F4) @IF(D$38=1,1,(W23*D
                                                              U25: (F2) @IF(D$38=1,0,E25)
G22: (F4) @IF(E22=0,1,1+(D22/
                                   $35)+(1-D$35)*Y23)
                                                              V25: (P2) @IF(H25=0,0,(U25-H2
     5200)+(F22/E22))
                               Z23: (P4) ((X23/Y23)-1)
                                                                   5)/H25)
H22: (F2) +I22/$G22
                               AA23: '
                                                              W25: (F4) @IF(T25=0,1,@IF(D$3
                               A24: [W2] '|
                                                                   8=1,1,W25*((U25/T25)/(U$
I22: (F2) +J22/$G22
J22: (F2) +K22/$G22
                               B24: [W14] 'Flexible Bond
                                                                   18/T$18))))
K22: (F2) +L22/$G22
                               C24: [W6] ^26
                                                              X25: (F4) @IF(D$38=1,1,(W25*D
L22: (F2) +M22/$G22
                               D24: (F2) U 8.95
                                                                   $34)+(1-D$34)*X25)
M22: (F2) +N22/$G22
                               E24: (F2) U 6.66
                                                              Y25: (F4) @IF(D$38=1,1,(W25*D
                               G24: (F4) @IF(E24=0,1,1+(D24/
                                                                  $35)+(1-D$35)*Y25)
N22: (F2) +022/$G22
O22: (F2) +P22/$G22
                                    5200)+(F24/E24))
                                                              Z25: (P4) ((X25/Y25)-1)
P22: (F2) +Q22/$G22
                               H24: (F2) +I24/$G24
                                                              AA25: '
                               I24: (F2) +J24/$G24
                                                              A26: [W2] '|
Q22: (F2) +R22/$G22
R22: (F2) +S22/$G22
                               J24: (F2) +K24/$G24
                                                              B26: [W14] 'Global Bond
S22: (F2) +T22/$G22
                               K24: (F2) +L24/$G24
                                                              C26: [W6] ^451
                                                              D26: (F2) U ^--
T22: (F2) +U22/$G22
                               L24: (F2) +M24/$G24
U22: (F2) @IF(D$38=1,0,E22)
                               M24: (F2) +N24/$G24
                                                              E26: (F2) U 11.57
V22: (P2) @IF(H22=0,0,(U22-H2 N24: (F2) +024/$G24
                                                              G26: (F4) @IF(E26=0,1,1+(D26/
     2)/H22)
                               024: (F2) +P24/$G24
                                                                   5200)+(F26/E26))
W22: (F4) @IF(T22=0,1,@IF(D$3
                               P24: (F2) +Q24/$G24
                                                              H26: (F2) +I26/$G26
     8=1,1,W22*((U22/T22)/(U$
                               Q24: (F2) +R24/$G24
                                                              I26: (F2) +J26/$G26
     18/T$18))))
                               R24: (F2) +S24/$G24
                                                              J26: (F2) +K26/$G26
X22: (F4) @IF(D$38=1,1,(W22*D S24: (F2) +T24/$G24
                                                              K26: (F2) +L26/$G26
                               T24: (F2) +U24/$G24
                                                              L26: (F2) +M26/$G26
     $34)+(1-D$34)*X22)
Y22: (F4) @IF(D$38=1,1,(W22*D U24: (F2) @IF(D$38=1,0,E24)
                                                              M26: (F2) +N26/$G26
                               V24: (P2) @IF(H24=0,0,(U24-H2
     $35)+(1-D$35)*Y22)
                                                              N26: (F2) +O26/$G26
Z22: (P4) ((X22/Y22)-1)
                                    4)/H24)
                                                              O26: (F2) +P26/$G26
                               W24: (F4) @IF(T24=0,1,@IF(D$3
                                                              P26: (F2) +Q26/$G26
                                    8=1,1,W24*((U24/T24)/(U$
A23: [W2] '
                                                              Q26: (F2) +R26/$G26
B23: [W14] 'Puritan
                                    18/T$18))))
                                                              R26: (F2) +S26/$G26
```

14 / FUND SWITCHING IN PRACTICE

```
S26: (F2) +T26/$G26
                         J28: (F2) +K28/$G28
T26: (F2) +U26/$G26
                         K28: (F2) +L28/$G28
                                                  E33: '+
U26: (F2) @IF(D$38=1,0,E26) L28: (F2) +M28/$G28
                                                   W33: '
                                                  X33: '-----
V26: (P2) @IF(H26=0,0,(U26-H2 M28: (F2) +N28/$G28
   6)/H26)
                          N28: (F2) +O28/$G28
W26: (F4) @IF(T26=0,1,@IF(D$3 O28: (F2) +P28/$G28
                                                   AA33: '+
    8=1,1,W26*((U26/T26)/(U$ P28: (F2) +Q28/$G28
                                                  A34: [W2] '
                                                  B34: [W14] 'Fast Smoothing
D34: (F2) U 0.4
                          Q28: (F2) +R28/$G28
    18/T$18))))
X26: (F4) @IF(D$38=1,1,(W26*D R28: (F2) +S28/$G28
                                                  E34: '
   $34)+(1-D$34)*X26) S28: (F2) +T28/$G28
                         T28: (F2) +U28/$G28 W34: '
U28: (F2) @IF(D$38=1,0,E28) X34: 'DVI
Y26: (F4) @IF(D$38=1,1,(W26*D T28: (F2) +U28/$G28
   $35)+(1-D$35)*Y26)
                          V28: (P2) @IF(H28=0,0,(U28-H2 Z34: (F3) U (2*D18)/D17
Z26: (P4) ((X26/Y26)-1)
AA26: '
                            8)/H28)
                                                    AA34: '
A27: [W2] '|
                          W28: (F4) @IF(T28=0,1,@IF(D$3 A35: [W2] '|
                         8=1,1,W28*((U28/T28)/(U$ B35: [W14] 'Slow Smoothing 18/T$18)))) D35: (F2) U 0.1
B27: [W14] 'Intl Gr & Inc
C27: [W6] ^305
D27: (F2) U ^--
                         X28: (F4) @IF(D$38=1,1,(W28*D E35: '
E27: (F2) U 11.8
F27: (F2) U 0.03
                           $34)+(1-D$34)*X28) W35: '
                          Y28: (F4) @IF(D$38=1,1,(W28*D X35: 'EVI
                          G27: (F4) @IF(E27=0,1,1+(D27/
   5200)+(F27/E27))
- /F2) +T27/$G27
                          Z28: (P4) ((X28/Y28)-1)
H27: (F2) +I27/$G27
                          AA28: '
                                                    A36: [W2] '
I27: (F2) +J27/$G27
                         A29: [W2] '+
                                                    B36: [W14] 'Threshold
                         B29: [W14] '----- D36: (F2) U 0.97
J27: (F2) +K27/$G27
                      K27: (F2) +L27/$G27
L27: (F2) +M27/$G27
M27: (F2) +N27/$G27
N27: (F2) +027/$G27
O27: (F2) +P27/$G27
P27: (F2) +Q27/$G27
027: (F2) +R27/$G27
                        Ј29: ′-----
R27: (F2) +S27/$G27
                                                  D37: (F2) U 0.02
S27: (F2) +T27/$G27
                         K29: '----
                                                  E37: '|
W37: '
                         L29: '----
T27: (F2) +U27/$G27
U27: (F2) @IF(D$38=1,0,E27) M29: '-----
                                                  X37: 'TIMER
                                                  Z37: (F0) U @IF(D38=1,1,@IF(Z
V27: (P2) @IF(H27=0,0,(U27-H2 N29: '-----
                          029: '----
                                                   36>(D36+D37),1,@IF(Z36<(
    7)/H27)
W27: (F4) @IF(T27=0,1,@IF(D$3 P29: '-----
                                                        D36-D37),0,Z37)))
    8=1,1,W27*((U27/T27)/(U$ Q29: '-----
                                                  AA37: '|
                          R29: '----
                                                   A38: [W2] '
    18/T$18))))
X27: (F4) @IF(D$38=1,1,(W27*D S29: '-----
                                                  B38: [W14] 'Initialize
                                                  D38: U 0
   $34)+(1-D$34)*X27)
                          T29: '----
Y27: (F4) @IF(D$38=1,1,(W27*D U29: '-----
                                                   E38: '
                          V29: '----
   $35)+(1-D$35)*Y27)
                                                   W38: '
                          W29: '----
                                                  AA38: '|
Z27: (P4) ((X27/Y27)-1)
                          X29: '----
AA27: '
                                                   A39: [W2] '+
                                                  B39: [W14] '-----
                         Y29: '----
A28: [W2] '|
                       Z29: '-----
B28: [W14] 'Overseas
                                                     -----
C28: [W6] ^94
                         AA29: '+
                                                   E39: (F2) '+
                 D28: (F2) U ^--
E28: (F2) U 24.6
                         B32: [W14] ' MAJOR PA RAMETERS:
F28: (F2) U 0.58
                                                    AA39: '+
G28: (F4) @IF(E28=0,1,1+(D28/ RAMETERS:
                         X32: ' TIMING SYSTEM: A42: [W2] 'CALCULATION MACROS A33: [W2] '+ :
   5200)+(F28/E28))
H28: (F2) +I28/$G28
                          B33: [W14] '----- A44: [W2] 'Adj/Sort(Alt A)
I28: (F2) +J28/$G28
```

Spreadsheet Model

To test your spreadsheet model after entering the cell formulas, run the system on the two weeks' prices shown in Table 14–4. The ending screen should match that shown earlier.

Two other macros automatically create and clear predefined windows to see the current data and final ranking results simultaneously. Press "Alt" and "W" to create the windows, or "Alt" and "C" to clear them.

If your ending screen does not match, review the contents of each cell to make sure they were entered properly from those shown in the book. Also be sure to enter the test data carefully to avoid mistakes. Once you are confident the model is working properly, you may initialize ("Alt" and "I") and enter the most recent 14 weeks of data. Calculate ("Alt" and "A") and you will see the top ranked fund.

Worksheets for Manual Calculation

If you don't have access to a computer, you can use the worksheets at the end of this chapter instead. The first sheet provides space for market timing calculations and the first five funds you will be monitoring. The second sheet records details of fund switches, and adds space for another four funds. The third sheet is needed if you are tracking more than nine funds.

To set up the worksheets, use a copier to create a set of sub-masters with your fund names filled in at the tops of the columns. Enlarge the

Table 14-4. Test data for spreadsheet model.

Fund/Index		 12/09/88 -			- 12/16/88	
	Yield	Price	Distrib.	Yield	Price	Distrib.
90-Day T-Bills	8.04%			7.98%		
S&P 500 Index	3.65%	277.03		3.65%	276.28	
Cash Reserves	7.98%	\$1.00		8.02%	\$1.00	
Investment Grade Bond	8.87%	\$6.69		8.95%	\$6.66	
Capital & Income	12.58%	\$8.60		12.68%	\$8.58	
Global Bond		\$11.64			\$11.57	
Puritan		\$13.04			\$12.70	\$0.31
Equity-Income		\$25.79			\$25.05	\$0.61
Intl Growth & Income		\$11.99			\$11.80	\$0.03
Magellan		\$47.86			\$47.60	\$0.90
Capital Appreciation		\$14.17			\$14.05	\$0.13
Overseas		\$25.73			\$24.60	\$0.58

originals if they are too small to work with. Finally, copy the submasters as needed (roughly one set per month).

Completing the worksheet each week involves three steps. The formulas provided below are equivalent to those described earlier, but have in some cases been rearranged to make calculation easier (see completed example on page 215). The abbreviation "Prev" in the equations means the previous week's value for the parameter specified.

Market Data

Obtain the closing **S&P 500** index and the latest 90-day **T-Bill Rate** (discount rate) from any convenient source. Get the index's latest weekly dividend yield (**DYield**) and **P/E** ratio figures from *Barron's*. Calculate the yield adjustment factor (**Adj Factor**), the "market base" (**Mkt Base**), **Base/S&P**, and **SVI** indicator values from the formulas provided below.

```
Adj Factor = 1 + (DYield / 52)

Mkt Base = (Prev Mkt Base) / (Adj Factor)

Base/S&P = (Mkt Base) / (S&P 500)

SVI = [DYield + 1 / (2 × P/E)] / (T-Bill Rate)
```

Note that the DYield and T-Bill Rate figures must be decimals, not percentages. For example, use 0.053 rather than 5.3%.

In the first week, the Mkt Base is set equal to the S&P 500, and Base/S&P is set equal to 1.00.

Make your **Buy/Sell** decision based on the SVI threshold and filter value you selected for market timing. If the outcome is "sell" you will invest in a money market fund regardless of the outcome of the remaining steps, but they must be completed anyway.

Fund Prices

For the funds of interest, obtain the current interest yield as a decimal (**IYield**), **NAV**, and capital gain or dividend distribution (**Dist**), if any. Fidelity's FAST system is recommended, although *Barron's* contains everything you need if you are using Friday's data.

Fund Calculations

For each fund, calculate the **Adj Factor**, **Fund Base**, relative strength (**RS**), fast and slow moving averages of RS (**Fast MA** and **Slow MA**), and the Relative Strength Oscillator (**RSO** %), based on the two alpha smoothing constants you selected for your system.

```
Adj Factor = 1 + [IYield / 52] + [Dist / NAV]

Fund Base = (Prev Fund Base) / (Adj Factor)

RS = NAV × (Base / S&P) / (Fund Base)

Fast MA = (Fast Alpha) × RS + [1 - (Fast Alpha)] × (Prev Fast MA)

Slow MA = (Slow Alpha) × RS + [1 - (Slow Alpha)] × (Prev Slow MA)

RSO % = 100 × [(Fast MA) / (Slow MA) - 1]
```

Calculate these figures to three or four decimal places. In the examples, the parameter values used were Fast Alpha = 0.4 and Slow Alpha = 0.1.

Most funds have zero IYield and Dist, in which case Adj Factor = 1.00 and Fund Base is unchanged from the previous week.

If your market timing decision was "buy" you will invest in the fund with the highest RSO % value. Check your figures for reasonableness before making fund switches.

In the first week, the worksheet is initialized for all funds by setting RS, Fast MA, and Slow MA equal to 1.00; RSO % equal to zero; and Fund Base equal to the NAV. The system will begin producing investment decisions in week 2.

With a little practice, the fund calculations should take you less than two minutes per fund. If you are tracking up to a dozen funds you should be able to meet our goal of 30 minutes of effort per week.

The following four pages contain a completed sample worksheet, and three forms suitable for your personal use.

Worksheets for Manual Calculation

Week	Market	Fund:
Ending	Timing	FAST#:
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %

FIRST WORKSHEET

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Week	Market	Fund:
Ending	Timing	FAST#:
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RS0 %
	S&P 500	Yield
	Yield	NAV
	Adj Factor	CG Dist
	Mkt Base	Adj Factor
	Base/S&P	Fund Base
	P/E	RS
	T-Bills	Fast MA
	SVI	Slow MA
	Buy/Sell B S	RSO %

FIRST WORKSHEET

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Week	Fund:	Switch Details
Ending	FAST#:	
	Yield	Sold
	NAV	FAST#
	CG Dist	Acct#
	Adj Factor	Price
	Fund Base	Bought
	RS	FAST#
	Fast MA	Acct#
	Slow MA	Price
	RSO %	Confirm#
	Yield	Sold
	NAV	FAST#
	CG Dist	Acct#
	Adj Factor	Price
	Fund Base	Bought
	RS	FAST#
	Fast MA	Acct#
	Slow MA	Price
	RSO %	Confirm#
	Yield	Sold
	NAV	FAST#
	CG Dist	Acct#
	Adj Factor	Price
	Fund Base	Bought
	RS	FAST#
	Fast MA	Acct#
	Slow MA	Price
	RSO %	Confirm#
	Yield	Sold
	NAV	FAST#
	CG Dist	Acct#
	Adj Factor	Price
	Fund Base	Bought
	RS	FAST#
	Fast MA	Acct#
	Slow MA	Price
	RSO %	Confirm#

ENDING WORKSHEET

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Week	Fund:				
Ending	FAST#:				
	Yield				
	NAV				
	CG Dist				
	Adj Factor				
	Fund Base				
	RS				
	Fast MA				
	Slow MA				
	RSO %				
	Yield				
	NAV				
	CG Dist				
	Adj Factor				
	Fund Base				
	RS				
	Fast MA				
	Slow MA				
	RSO %				
	Yield				
	NAV				
	CG Dist				
	Adj Factor				
	Fund Base				
	RS				
	Fast MA				
	Slow MA				
	RSO %				
	Yield				
	NAV				
	CG Dist				
	Adj Factor				
	Fund Base				
	RS				
	Fast MA				
	Slow MA				
	RSO %				

CONTINUATION WORKSHEET # ©1998 Venture Catalyst, Inc.

Chapter 15 CONCLUSIONS

This chapter takes a brief look at future prospects for mutual fund investing, and attempts to put in perspective the findings of the previous chapters.

What the Future Holds

The Stock Market

Stock market forecasting can be an exercise in futility, because unpredictable political developments at home or abroad can overwhelm the normal functioning of the economy. Furthermore, the future *must* be clouded in uncertainty, or it would already be reflected in market prices. There will always be plausible scenarios for both the bulls and the bears.

The bears have pointed to the record duration of the bull market which began in 1982, but the boom-and-bust cycles of the past may be extinct. The United States economy is now dominated by service industries rather than manufacturing, so inventory problems—a major driving force in the business cycle—have much less effect on the economy as a whole. Better inventory management techniques, including the use of computers and "just-in-time" strategies, have also helped. The bulls also point to the continuing globalization of the economy. This provides diversification that reduces the effects of domestic business cycles.

The bears have been concerned about the unprecedented debt burden of individuals, businesses, and the country. Although the figures are high in dollar terms, they have not set any records when expressed as a percentage of gross national product (GNP). The bulls point out that borrowing enhances growth and wealth if the money is invested in activities whose return exceeds the cost of borrowing.

The bears have also been concerned about rising interest rates and a resurgence of inflation. While trends in 1988 were definitely upward, economic forces are much better understood than in the past. This may allow us to avoid mismanaging the economy, and to orchestrate "soft landings" instead of recessions when the economy gets overheated. In an ideal world, it would be possible to have perpetual growth at a rate which the economy can sustain without running into capacity problems, roughly 2.5% per year.

The bullish case sounds plausible, but it is reminiscent of the summer of 1987, when many investors were rationalizing that earnings would drive stock prices higher in spite of record high valuations.

The difficulty in deciding whether the bullish or bearish case will prevail led to the development of the strategies in this book. Technical systems respond to market behavior rather than economic fundamentals, and react swiftly to unforeseen developments.

Technical Analysis

As for the future of technical analysis itself, we predict that the next few years will see the widespread application of computerized artificial intelligence techniques to investment decision making. Computer programs such as expert systems and neural nets are beginning to show promise in solving these types of problems.

Expert systems attempt to emulate the skills and experience of experts in a particular field. They have been used to solve complex problems such as diagnosing infectious diseases and analyzing oil field exploration data. Expert systems are adept at handling non-numeric information, so they could help with fundamental investment strategies which depend on the answers to "fuzzy" questions such as: "Is the Fed concerned about inflation?"

Neural nets are particularly attractive because they "learn" from experience. This means that trading rules can adapt themselves automatically to changes in the economic relationships which influence market behavior. It is also much easier to exclude hidden hindsights from strategy development, because a neural net can develop its own trading rules rather than being driven by separately acquired experience.

Taxes

Changes in tax laws can affect investment decisions, especially when capital gain rates are adjusted relative to income rates. Many believe that President Bush's goal of reducing capital gain rates will not be

accomplished because any tinkering with the tax code is going to open Pandora's box, which many in Congress would like to avoid.

Uncertainty about future tax rates is another incentive to use retirement plans and variable insurance contracts to shelter investments from their effects.

Fidelity Investments

The future at Fidelity looks bright. After a lull following the 1987 stock market crash, new funds and services are being introduced at a healthy clip. These will provide additional opportunities for investors to focus their investments on particular sectors of the economy, or on specific investment strategies.

Fidelity shows no sign of relinquishing its position as industry leader, and you can be sure that the company will continue to introduce innovative products which satisfy investor demands.

Pulling It All Together

We have covered a lot of ground in the last 14 chapters, so let's take a moment to summarize the main issues.

History has shown that stocks offer a significant real return after inflation, whereas bonds and short-term debt instruments do not. Equities are therefore an essential part of any portfolio if real growth is needed to meet financial goals.

Stock prices fluctuate, sometimes over a disconcerting range. Some of this volatility can be diversified away by investing in many different stocks at the same time. The easiest way to do this is through mutual funds. Avoiding major downturns in stock markets comes from successful market timing, and outperforming the market in good times comes from switching between funds to ride with the strongest.

Outperforming the market is difficult. It calls for rigid application of a sound and exhaustively tested investment strategy, based on precise formulas rather than subjective interpretations of market conditions. Decision making must be isolated from human emotions, because the correct course of action is often counter-intuitive. We have shown that theoretically logical, objective models can indeed "beat the market."

The more choices offered by a mutual fund family, the greater the potential returns. With the giant Fidelity family, choices include 35 industry sector funds and 6 international equity funds, as well as many others focusing on specific types of security. Fidelity also offers a tremendous range of customer services, including the automated FAST system for obtaining the latest prices and for switching between funds.

Trading costs are low, so active switching strategies are not penalized. Some Fidelity funds can be sold short to profit in bear markets.

We used the Relative Strength Oscillator in our fund switching system in order to analyze less "noisy" data. Our combined system, based on switching among 10 Fidelity funds, achieved a 30% annual return when tested from 1981 to 1988, compared to the market's 14% return over the same period. When we combined this approach with market timing based on an indicator of market valuation, the return increased to 36%. What's more, the risk level—as measured by our Ulcer Index—was less than one-third of the market's. Our aggressive strategy, monitoring most of the funds in the Fidelity family, achieved a 42% annual return and even lower risk.

We next showed you how to evaluate an investment strategy thoroughly, to judge how confident you are in its future performance. Everyone knows that past performance does not guarantee future success, but thorough testing of a strategy is an essential part of believing in it.

When the expected performance of your investments is high, it is doubly important to shelter your profits from current taxes. Compounding high returns over several years yields much higher after-tax profits if you pay the taxes later rather than as you go. Fidelity offers a wide variety of tax-advantaged investments, including all the popular individual and employer-sponsored retirement plans and the more recent variable insurance products.

Finally, we provide you detailed spreadsheet models so that with almost any personal or home computer you can apply the strategies to your own mutual fund investing.

As a service to our readers, data services and spreadsheet model disks have been made available to assist you in applying the strategies described. For further information please write to:

Venture Catalyst, Inc. 17525 NE 40th Street, Suite E123 Redmond, WA 98052

or call (800) 634-6790 between the hours of 9:00 a.m. and 5:00 p.m. Pacific Time.

Thanks to Fidelity's commitment to innovation and the accessibility of today's personal computers, new opportunities for increasing your investment performance are within reach. We hope that we have stimulated your interest in our methods and that they will contribute to your future investment success.

Appendix A FIDELITY FUND TABLES

This appendix contains basic data on Fidelity mutual funds. The table columns are explained below.

FAST Number Code used to access fund prices and other infor-

mation via Fidelity's automated system (see page

49).

Dial/Data Ticker Used to access fund data on Dial/Data's on-line

database (see page 204). Other systems may use different ticker symbols, because of a lack of standardization. Symbols for the Quotron system are listed in Fidelity's monthly *Mutual Fund*

Guide.

Start Date Date fund operations commenced.

Assets Total fund assets are as of December 31, 1988,

and are subject to significant change as funds fall in and out of favor, especially in the Select fund

group.

Rel. Vol. Fund's relative volatility (S&P 500 index = 1.00).

1988 Yield Yield of dividends paid by fund (interest and stock

dividends).

Total Return Total return is listed for each fund, for periods of

1, 3, and 5 years ending December 31, 1988.

Min. Init. Minimum initial investment requirement for tax-

able accounts. \$500 minimums apply to retirement accounts, except in the case of the Spartan funds. All funds except the Spartan group have a \$250 minimum for repeat investments, in any type of account.

Sales Chg.

Front-end sales charge imposed by fund. Waived for certain employer-sponsored retirement plans with more than 200 participants.

Red. Chg.

Redemption charge imposed by fund on sale of shares. Not imposed on switches between two Select funds. Sales and redemption charges are subject to a combined maximum of 3%.

Expense Ratio

1988 fund expenses as a percentage of total assets.

Turnover

Percentage of fund portfolio turned over in 1988.

Fidelity reserves the right to limit your switches to the frequency shown for each fund group, but will not necessarily do so. Switch fees are paid on (a) switches between two Select funds; and (b) redemptions from international equity and Spartan funds.

Unless otherwise indicated, all funds except tax-exempts are available for retirement accounts (IRAs, SEP-IRAs, and Keoghs).

Since tax reform, funds have usually made capital gain distributions in December. However, most funds have a second month in each year when such distributions might also be made. The timing of dividend distributions is listed in the heading for each fund group.

Fund objectives and Fidelity policies are subject to change. Before investing in a fund, be sure to read its prospectus carefully. For current information on fund performance and securities held, see Fidelity's monthly *Mutual Fund Guide*.

Note: Funds marked * in the table have merged into other funds since 1988.

FIDELITY INDUSTRY SECTOR FUNDS

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	1988 Yield	Tota 1-yr	al Returr 3-yr	<u>1 (%)</u> 5-yr	Min. Init.	Sales Chg.		Exp. Ratio	Turn- over
									3-yı	IIIIt.	City.	City.	Natio	OVEI
Industry Sector Funds (Ma	ax. 5 sw	itches/mor	ith @ \$25;	dividends	s paid a	annually	in Dece	ember)						
Select/Air Transportation	34	FSAI-X	12/16/85	5.3	0.91	0.0%	29.07	16.53		\$1,000	2%	1%	2.62%	340%
Select/American Gold	41	FSAG-X	12/16/85	191.5	1.61	0.0%	-12.45	45.22		\$1,000	2%	1%	2.33%	89%
Select/Automotive	502	FSAV-X	06/30/86	2.4	0.93	0.0%	20.06			\$1,000	2%	1%	2.49%	311%
Select/Biotechnology	42	FBIO-X	12/16/85	39.9	1.39	0.0%	4.12	4.14		\$1,000	2%	1%	2.51%	205%
Select/Broadcast & Media	503	FBMP-X	06/30/86	11.3	1.01	0.0%	26.85			\$1,000	2%	1%	2.48%	325%
Select/Brokerage & Investm	ent 68	FSLB-X	07/29/85	3.5	1.17	1.2%	18.55	-17.96		\$1,000	2%	1%	2.58%	447%
Select/Industrial Equipment	510	FSCG-X	09/29/86	3.4	1.03	0.0%	4.89			\$1,000	2%	1%	2.65%	407%
Select/Chemicals	69	FSCH-X	07/29/85	79.4	0.99	0.0%	20.96	76.24		\$1,000	2%	1%	1.93%	179%
Select/Computers	7	FDCP-X	07/29/85	18.1	1.43	0.0%	-5.05	-4.08		\$1,000	2%	1%	2.62%	284%
Select/Defense & Aerospac	e 67	FSDA-X	05/08/84	1.8	0.85	0.0%	4.32	-16.02		\$1,000	2%	1%	2.33%	162%
Select/Electric Utilities	504	FSEU-X	06/30/86	14.3	0.70	4.5%	20.08			\$1,000	2%	1%	2.49%	159%
Select/Electronics	8	FSEL-X	07/29/85	10.9	1.42	0.0%	-8.47	-39.69		\$1,000	2%	1%	2.54%	686%
Select/Energy	60	FSEN-X	07/14/81	75.1	0.95	2.6%	15.94	20.11	45.10	\$1,000	2%	1%	2.09%	183%
Select/Energy Service	43	FSES-X	12/16/85	29.6	1.39	0.0%	-0.40	-25.98		\$1,000	2%	1%	2.71%	461%
Select/Financial Services	66	FIDS-X	12/10/81	26.2	0.92	3.0%	12.01	7.53	79.19	\$1,000	2%	1%	2.47%	81%
Select/Food & Agriculture	9	FDFA-X	07/29/85	21.1	0.78	0.3%	26.77	66.97		\$1,000	2%	1%	2.45%	215%
Select/Health Care	63	FSPH-X	07/14/81	181.1	1.10	0.8%	8.83	31.90	108.05	\$1,000	2%	1%	1.64%	122%
Select/Construction & Hous	ing 511	FSHO-X	09/29/86	1.6	1.03	0.5%	29.19			\$1,000	2%	1%	2.70%	330%
Select/Industrial Materials	509	FSDP-X	09/29/86	26.6	1.25	1.6%	10.84			\$1,000	2%	1%	2.43%	455%
Select/Leisure	62	FDLS-X	05/08/84	66.6	1.01	0.0%	26.01	54.14		\$1,000	2%	1%	1.96%	229%

FIDELITY INDUSTRY SECTOR FUNDS (continued)

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	1988 Yield	Tota 1-yr	al Returr 3-yr	<u>1 (%)</u> 5-yr	Min. Init.			Exp. Ratio	Turn- over
Select/Medical Delivery	505		06/30/86	3.5	0.92	0.0%	15.78			\$1,000	2%	1%	2.48%	264%
Select/Paper & Forest	506	FSPF-X	06/30/86	14.2	1.31	0.2%	6.77			\$1,000	2%	1%	2.52%	209%
Select/Precious Metals	61	FDPM-X	07/14/81	199.9	1.89	4.2%	-23.86	39.15	-8.07	\$1,000	2%	1%	2.02%	86%
Select/Insurance	45	FSPC-X	12/16/85	5.3	0.94	0.8%	17.40	11.02		\$1,000	2%	1%	2.48%	174%
Select/Regional Banks	507	FSRB-X	06/30/86	8.8	0.80	2.0%	25.71			\$1,000	2%	1%	2.48%	291%
Select/Retailing	46	FSRP-X	12/16/85	14.3	1.02	0.2%	38.71	46.72		\$1,000	2%	1%	2.47%	294%
Select/Savings & Loan	98	FSVL-X	12/16/85	5.2	1.07	1.4%	18.50	39.10		\$1,000	2%	1%	2.57%	456%
Select/Software & Comp Se	rvices	28	FSCS-X()7/29/85	26.8	1.33	0.0%	9.05	35.89		\$1,000	2%	1%	2.51%134%
Select/Technology	64	FSPT-X	07/14/81	148.1	1.27	0.0%	-2.70	-20.57	-29.00	\$1,000	2%	1%	1.76%	140%
Select/Telecommunications	96	FSTC-X	07/29/85	44.3	0.82	0.6%	27.76	76.37		\$1,000	2%	1%	2.48%	162%
Select/Transportation	512	FSRF-X	09/29/86	3.9	0.88	0.0%	38.45			\$1,000	2%	1%	2.41%	255%
Select/Utilities	65	FSUT-X	12/10/81	82.1	0.74	2.6%	16.46	31.08	108.69	\$1,000	2%	1%	1.94%	143%

FIDELITY DIVERSIFIED EQUITY FUNDS

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	1988 Yield	Tota 1-yr	al Returr 3-yr	1 (%) 5-yr	Min. Init.	Sales Chg.		Exp. Ratio	Turn- over
International Equity Fund	International Equity Funds (Max. 2 switches/year @ \$25; dividends pa													
Canada	309	FICD-X	11/17/87	10.7	0.96	0.9%	19.47			\$2,500	2%	1%	2.02%	401%
Europe	301	FIEU-X	10/01/86	70.5	0.79	2.2%	5.84			\$2,500	2%	1%	2.66%	180%
Intl Growth & Income	305	FIGR-X	12/31/86	30.9	0.62	1.7%	11.56			\$2,500	1%	1%	2.58%	112%
Overseas	94	FOSF-X	12/04/84	1,114.5	1.17	2.3%	8.26	116.88		\$2,500	3%		1.38%	115%
Pacific Basin	302	FPBF-X	10/01/86	149.3	0.98	0.6%	10.45			\$2,500	2%	1%	1.80%	228%
United Kingdom Fund ¹	310	FTUK-X	11/17/87	1.6	0.88	0.0%	1.55			\$2,500	2%	1%	2.08%	167%
Capital Growth Funds (Ma	ax. 4 sw	itches/year	@ no cha	ırge; divid	ends p	aid annı	ually in [Decembe	r)					
Blue Chip Growth	312	FBGR-X	12/31/87	38.2	0.93	0.3%	5.91			\$2,500	2%	1%	2.74%	40%
Capital Appreciation	307	FDCA-X	11/26/86	1,573.9	0.82	0.9%	37.62			\$2,500	2%	1%	1.57%	140%
Contrafund	22	FCNT-X	05/17/67	105.0	0.81	2.5%	20.93	34.43	56.68	\$1,000			1.09%	234%
Disciplined Equity	315		02/10/89							\$2,500				
Fidelity ²	3	FFID-X	04/30/30	895.2	0.86	3.6%	17.92	40.99	82.75	\$1,000			0.60%	212%
Retirement Growth ³	73	FDFF-X	03/25/83	1,219.9	1.00	1.7%	15.53	44.15	91.88	\$500			1.18%	130%
Growth Company	25	FDGR-X	01/17/83	138.4	1.12	0.7%	16.06	28.96	70.50	\$1,000	3%		1.16%	275%
Magellan	21	FMAG-X	05/02/63	8,971.1	0.93	1.9%	22.76	53.43	124.03	\$1,000	3%		1.13%	82%
OTC Portfolio	93	FOCP-X	12/31/84	720.1	0.97	1.7%	22.85	39.04		\$2,500	3%		1.44%	195%
Trend	5	FTRN-X	03/19/58	702.8	0.99	1.4%	24.33	35.28	69.72	\$1,000			0.46%	42%

Scheduled to be merged into Europe Fund in April 1989.
 Classified by Fidelity as a growth and income fund.
 Retirement accounts only.

FIDELITY DIVERSIFIED EQUITY FUNDS (continued)

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	1988 Yield	Tota 1-yr	al Returr 3-yr	1 (%) 5-yr	Min. Init.	Sales Chg.	Exp. Ratio	Turn- over
Value	39	FDVL-X	12/01/78	124.8	0.89	1.8%	29.05	35.36	51.08	\$1,000		 1.23%	513%
Growth and Income Fund	s (Max.	4 switches	/year @ n	o charge;	divider	nds paid	quarterl	y)					
Asset Manager	314		12/28/88							\$2,500		 	
Balanced	304	FBAL-X	11/06/86	123.2	0.39	6.4%	15.99			\$2,500	2%	 1.30%	213%
Convertible Securities	308	FCVS-X	01/05/87	40.0	0.33	7.3%	15.89			\$2,500		 1.78%	191%
Equity-Income	23	FEQI-X	05/16/66	4,064.9	0.63	6.0%	22.49	41.05	94.98	\$1,000	2%	 0.66%	120%
Growth & Income	27	FGRI-X	12/30/85	1,145.1	0.78	4.2%	22.98			\$2,500	2%	 1.09%	159%
Puritan	4	FPUR-X	04/16/47	4,295.5	0.47	7.1%	18.89	40.99	100.74	\$1,000	2%	 0.80%	101%
Real Estate	303	FRES-X	11/17/86	64.0	0.46	7.5%	10.36			\$2,500	2%	 1.50%	89%
Utilities Income	311	FIUI-X	11/27/87	129.7	0.61	4.7%	14.77			\$2,500	2%	 1.81%	3%

FIDELITY BOND FUNDS

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	30-Day Yield	/ <u>Tota</u> 1-yr	I Return 3-yr	<u>(%)</u> 5-yr	Min. Init.	Sales Chg.	Exp. Ratio	Turn- over
Taxable Bond Funds (Max. 4 switches/year @ no charge; dividends declared daily, paid monthly ¹)													
Investment Grade Bond	26	FBND-X	08/06/71	308.0	0.36	8.99%	7.92	22.76	66.17	\$2,500		 0.75%	45%
Ginnie Mae	15	FGMN-X	11/08/85	678.1	0.21	9.01%	7.16	22.44		\$1,000		 0.93%	244%
Global Bond	451	FGBD-X	12/30/86	83.0	0.35	1	3.66			\$2,500		 1.14%	227%
Gov. Securities ²	54	FGOV-X	04/04/79	567.0	0.27	8.52%	6.36	23.21	61.44	\$1,000		 0.87%	253%
Capital & Income	38	FAGI-X	11/01/77	1,689.2	0.27	12.72%	12.59	34.58	86.70	\$2,500		 0.77%	59%
Intermediate Bond ³	32	FTHR-X	05/23/75	499.7	0.25	8.60%	7.22	23.89	69.64	\$1,000		 0.98%	76%
Mortgage Securities	40	FMSF-X	12/31/84	442.8	0.16	8.77%	6.72	21.93		\$1,000		 0.92%	159%
Short-Term Bond	450	FSHB-X	09/15/86	287.6	0.08	8.82%	5.71			\$1,000		 0.88%	251%
Short-Term Govt.	452		05/02/88	107.5		8.94%				\$1,000		 0.21%	471%
Spartan Govt. Fund ⁴	453		12/30/88						;	\$10,000		 	
¹ Global Bond Fund pays dividen		,											
 Structured as a limited partners Formerly Thrift Trust 	nıp; not av	allable to retire	ement plans.										
4 \$1,000 minimum repeat investm	nent; \$5 sv	vitch fee on sal	le.										

FIDELITY BOND FUNDS (continued)

Fund Name	FAST Code	Dial/Data Ticker	a Start Date	Assets (\$ mil)	Rel. Vol.	30-Day Yield	y <u>Tota</u> 1-yr	al Return 3-yr	5-yr	Min. Init.	Sales Chg.		Exp. Ratio	Turn- over
Municipal Bond Funds ¹ (Max. 4 switches/year @ no charge; dividends declared daily, paid monthly)														
Aggressive Tax-Free	12	FATF-X	09/13/85	452.9	0.28	7.92%	13.40	35.41		\$2,500		2	0.74%	49%
High-Yield Tax-Free	37	FHIG-X	12/01/77	1,614.7	0.38	7.16%	12.22	29.65	72.99	\$2,500			0.62%	60%
Insured Tax-Free	13	FMUI-X	11/13/85	152.2		6.75%	11.19	28.82		\$2,500			0.69%	36%
Limited Term Municipals	36	FLTM-X	04/15/77	438.7	0.28	6.29%	8.22	26.08	62.52	\$2,500			0.74%	59%
Municipal Bond	35	FMBD-X	08/19/76	980.2	0.34	6.95%	12.30	32.15	73.01	\$2,500			0.57%	72%
Short-Term Tax-Free Portfo	olio 404	FSTF-X	12/24/86	76.0		6.01%	4.89			\$2,500			0.60%	149%
Single-State Municipal Bond Funds ⁵ (Max. 4 switches/year @ no charge; dividends declared daily, paid monthly)														
California High-Yield	91	FCTF-X	07/07/84	460.9		7.00%	11.78	26.56		\$2,500			0.60%	
California Insured	403	FCXI-X	09/18/86	58.2		6.69%	11.61			\$2,500			0.65%	54%
Connecticut Tax-Free	407	FICN-X	10/29/87	80.2		7.44%	10.11			\$2,500			0.65%	
Massachusetts Tax-Free	70	FDMX-X	11/10/83	602.5		7.10%	10.67	27.73	65.78	\$2,500			0.62%	8%
Michigan Tax-Free	81	FMHT-X	11/12/85	169.2		7.27%	13.01	30.75		\$2,500			0.81%	31%
Minnesota Tax-Free	82	FIMI-X	11/21/85	99.0		7.24%	12.61	26.75		\$2,500			0.90%	48%
New Jersey High Yield	416	FNJH-X	01/01/88	95.6		7.60%				\$2,500				176%
New York High Yield	71	FTFM-X	07/10/84	343.7		6.80%	11.92	27.60		\$2,500			0.67%	64%
New York Insured	95	FNTI-X	10/11/85	173.0		6.61%	11.25	26.34		\$2,500			0.67%	29%
Ohio Tax-Free	88	FOHF-X	11/15/85	152.3		7.14%	12.93	28.38		\$2,500			0.72%	34%
Pennsylvania Tax-Free	402	FPXT-X	08/06/86	61.6		7.13%	14.21			\$2,500			0.48%	0.87%
Texas Tax-Free	78	FETA-X	01/31/86	31.7		7.29%	12.19			\$2,500			1.23%	51%

Not available to retirement accounts.
 1% redemption charge on shares held less than 6 months.

FIDELITY MONEY MARKET FUNDS

Fund Name	FAST Code	Dial/Data Ticker	Start Date	Assets (\$ mil)	Rel. Vol.	30-Day Yield		al Return 3-yr	(%) 5-yr	Min. Init.	Sales Chg.	Red. Chg.
Money Market Funds (unlimited switching @ no charge; dividends declared daily, paid monthly)												
Cash Reserves	55	FDRX-X	05/10/79	10,550.6		8.1%	7.26	21.6	44.58	\$1,000		
Daily Income Trust ¹	31	FDTX-X	05/31/74	3,002.0		8.0%	7.26	21.46	44.57	\$5,000		
Select/Money Market	85		08/30/85	774.7		8.6%	7.10	20.98		\$1,000	2%	1%
Spartan Money Market ²	454		12/30/88							\$10,000		
U.S. Gov't Reserves	50	FGRX-X	11/03/81	1,540.0		7.8%	7.03	20.75	42.93	\$1,000		
U.S. Treasury Money Mkt ³	415	FMGX	01/05/88	88.1		7.8%				\$2,500		
Tax-Exempt Money Market Funds ⁴ (unlimited switching @ no charge; dividends declared daily, paid monthly)												
Tax-Exempt Money Mkt Tru	st ¹ 10	FTAX	01/02/80	3,182.4		5.6%	4.89	14.32	27.22	\$5,000		
California Free Money Mkt	97		07/07/84	663.0		5.6%	4.78	14.00		\$2,500		
Mass. Free Money Mkt	74		11/11/83	628.9		5.4%	4.64	13.34	24.91	\$2,500		
New Jersey Free Money Mi	ct 417	FNJX-X	03/17/88	163.1		6.3%				\$2,500		
New York Free Money Mkt	92		07/06/84	701.0		5.1%	4.54	13.07		\$2,500		
Penn. Free Money Mkt	401		08/06/86	114.0		6.1%	5.05			\$2,500		

 ^{1 \$500} minimum repeat investment.
 2 \$1,000 minimum repeat investment; \$5 switch fee on sale.
 3 Limited partnership; not available to retirement plans.
 4 Not available to retirement plans.

Appendix B PRICE AND RELATIVE STRENGTH CHARTS

This appendix provides price and relative strength (RS) charts for Fidelity funds, based on weekly closing prices for the period 1981-1988. Charts for the Select industry sector funds are shown first, followed by those for international equity funds, capital growth funds, growth and income funds, taxable bond funds, municipal bond funds, and—for comparison—market indexes. Within each category, charts are are ordered alphabetically by fund name. Funds introduced after 1988 are excluded.

How to Read the Charts

Each chart shows both price (right scale and light black line) and relative strength (left scale and heavy black line). The dashed price line is the exponential moving average described earlier. Fund prices are adjusted for distributions, as explained on page 208. RS charts compare the fund's performance with the S&P 500 index.

So that direct comparisons can be made between funds, all charts have the same scales. The horizontal scale covers the same time period, regardless of the fund's introduction date.

Price Charts

The right-hand price scale on each chart in this appendix covers a 8-to-1 range of net asset value (NAV). The price scale is logarithmic so that a fund with the same total return percentage every year will show a straight line rising from left to right. For example, a fund starting in the lower left corner and ending at the top of the chart 11 years later has an annualized total return equal to the 11th root of 8. That is, $8^{1/11} = 1.21 = 21\%$.

Some funds have price charts that intuitively suggest unpredictability, with a predominance of large random events rather than nice clean trends. The best example of this is **Select/Precious Metals**. We have yet to find trading rules that earn consistent profits from this fund. Other funds exhibit trending in some years and randomness in others. For an example, compare the price chart of **Select/Financial Services** for the two years before and after mid-1986.

Relative Strength Charts

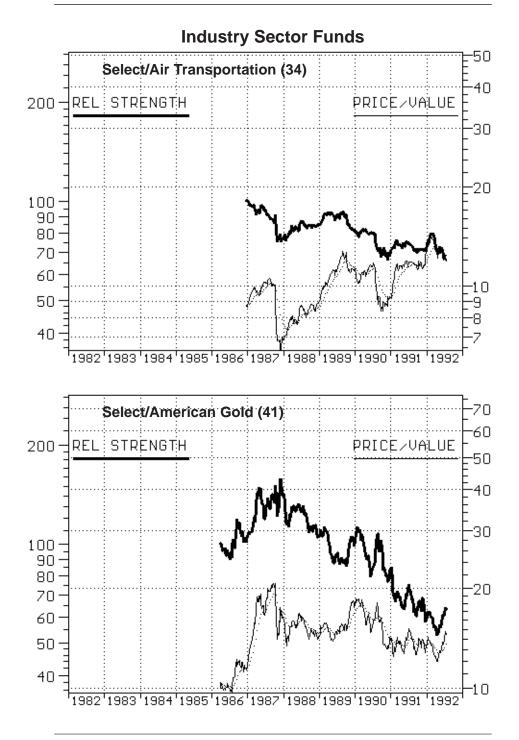
A relative strength chart shows how a fund is performing *relative to the market*. A rising relative strength graph indicates a fund beating the market; conversely, a falling graph shows underperforming the market.

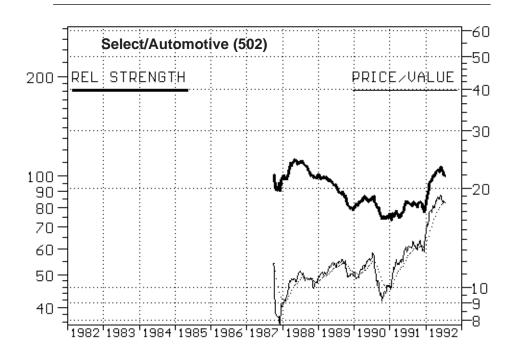
The RS scale on the left of each chart is logarithmic so that a fund beating the market by the same percentage every year appears as a straight line sloping up from left to right.

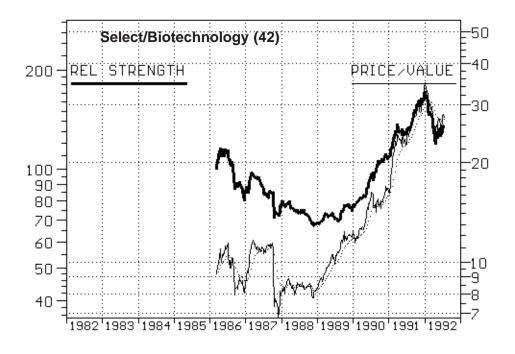
Taking Magellan Fund as an example (page 264), the upward slope in 1981-1983 shows that the fund was beating the market. By mid-1983 its NAV was twice what it would have been if it had matched the market's performance. Since that time, the slope has been essentially flat, indicating that the fund has approximately equalled the market's performance for five years.

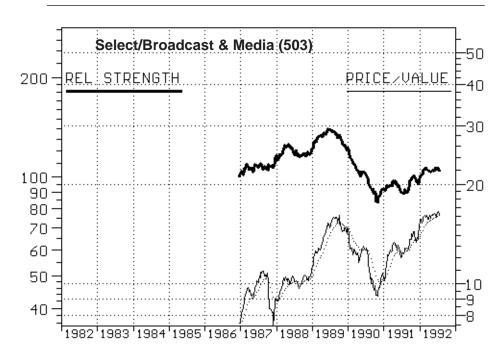
Relative strength charts show that most diversified stock funds have similar performance to the market averages. If the averages are efficiently priced, then it follows that these funds are also. In order to find significant divergence from market performance, we must turn to either industry sector funds or international funds. The relative strength charts of these funds show major divergences from the S&P 500. It follows that any strategy attempting to beat the market significantly must invest in funds in these groups, at the right times.

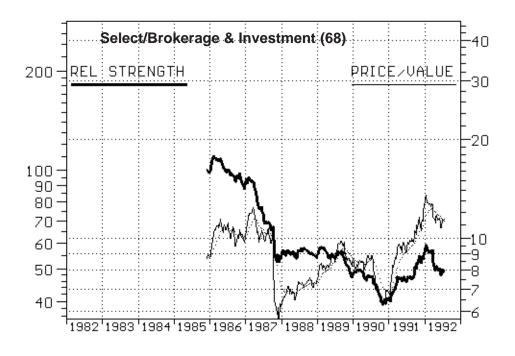
The same charts show that most diversified stock and bond funds had similar performance from 1981-1988. A buy-and-hold strategy during this period would have resulted in your portfolio value gaining roughly 150%, almost regardless of which diversified fund you invested in. In hindsight, bond funds would have been a better choice, because of the lower risk exposure. However, over other time periods the performance of stock and bond funds is quite different, and the Capital Asset Pricing Model predicts that in the long run common stock funds will have a higher return than bond funds.

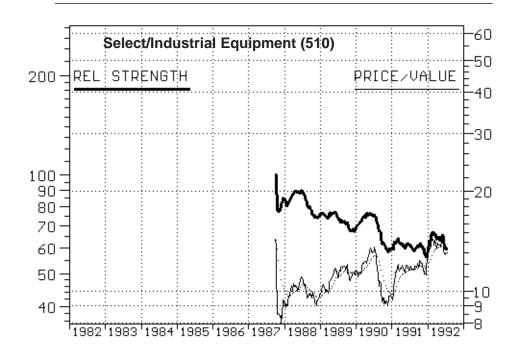


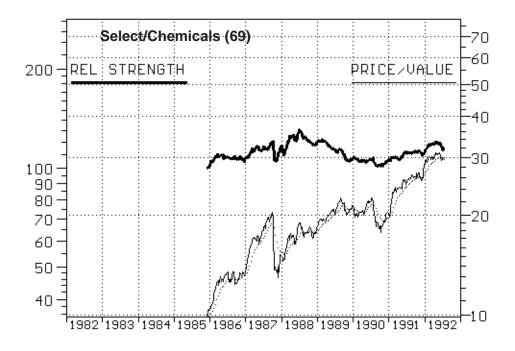


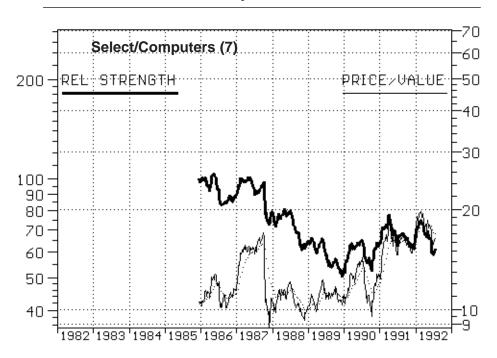




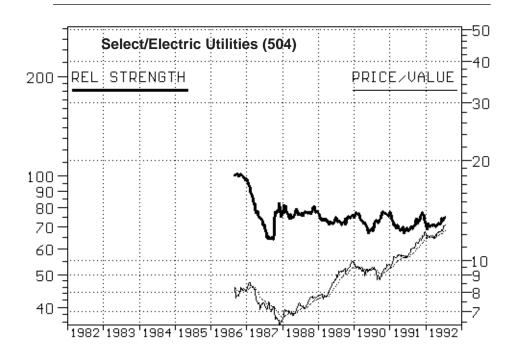


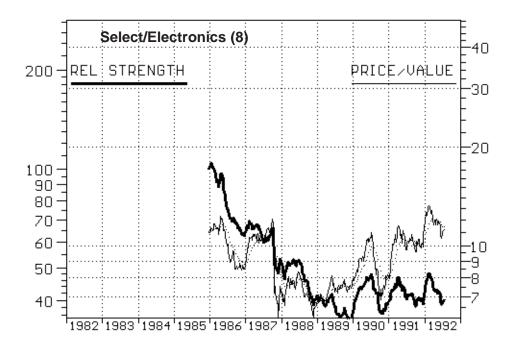


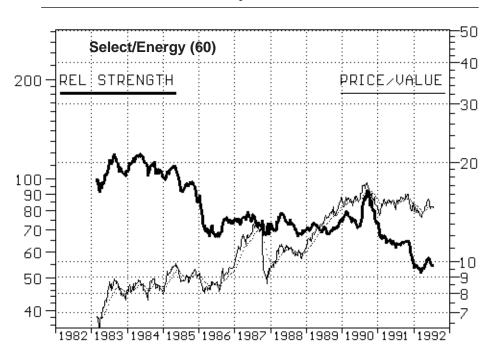


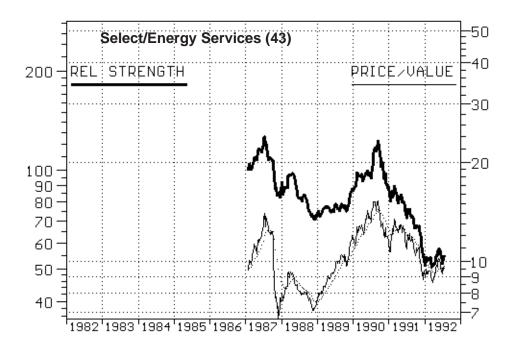


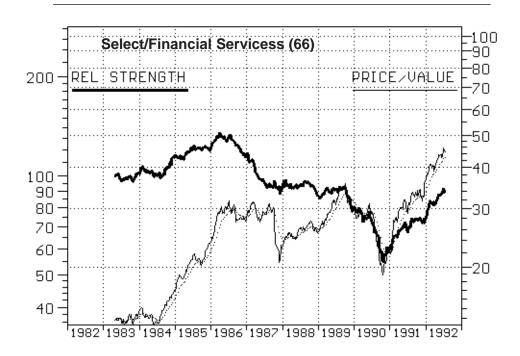


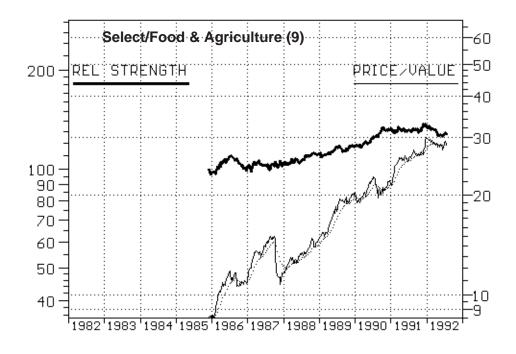


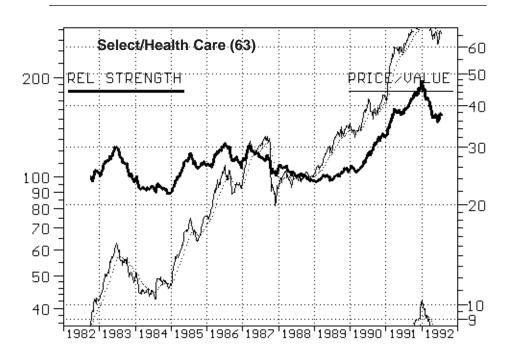


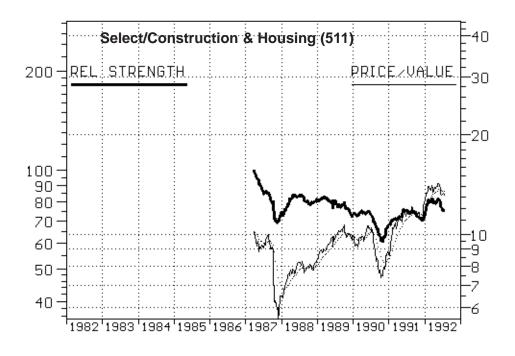




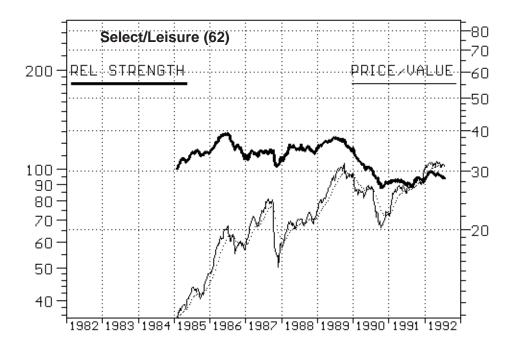


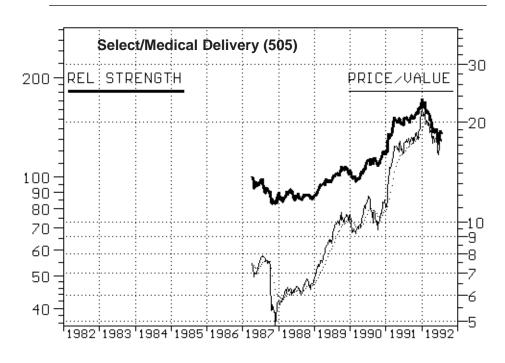


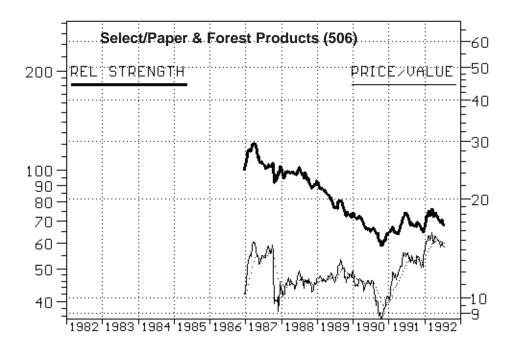


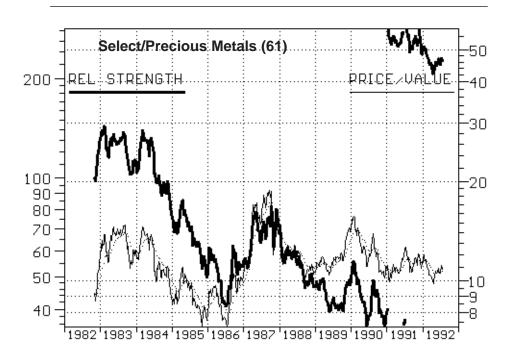


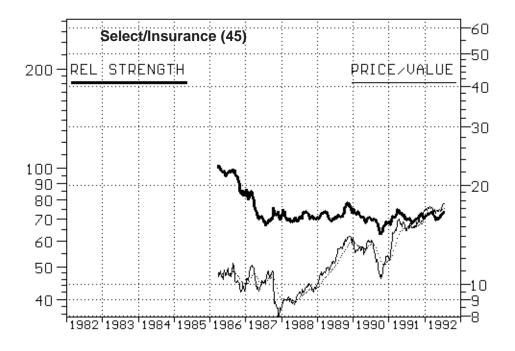


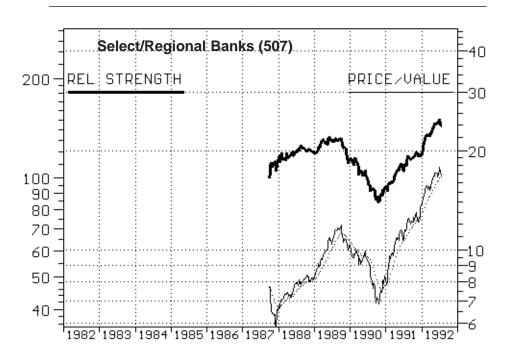


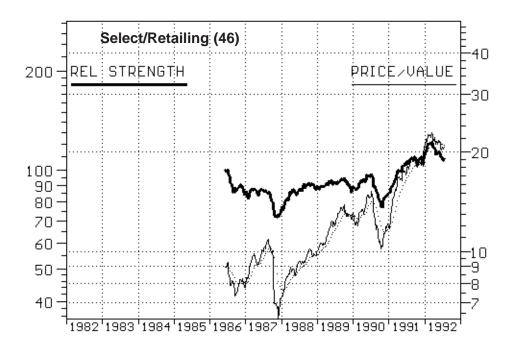


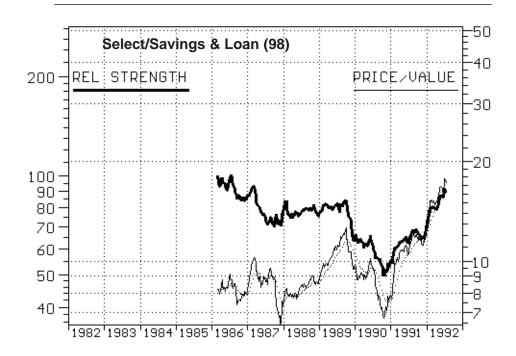


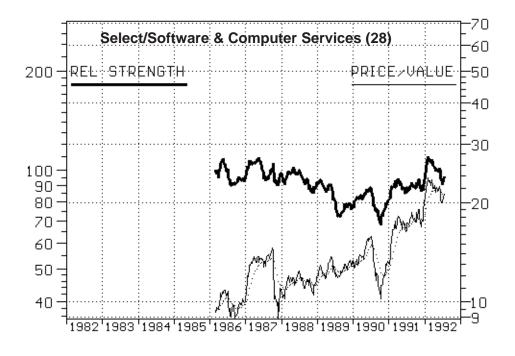


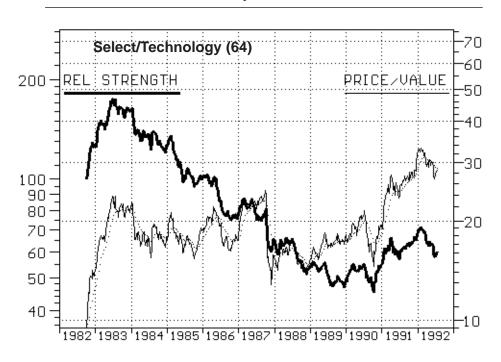


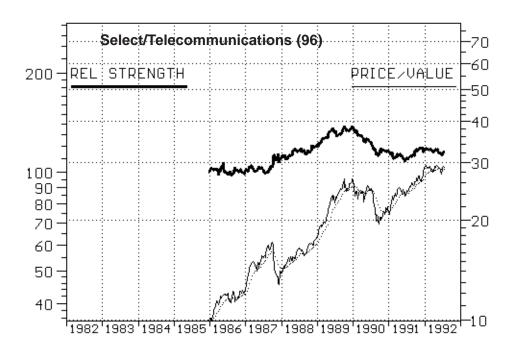


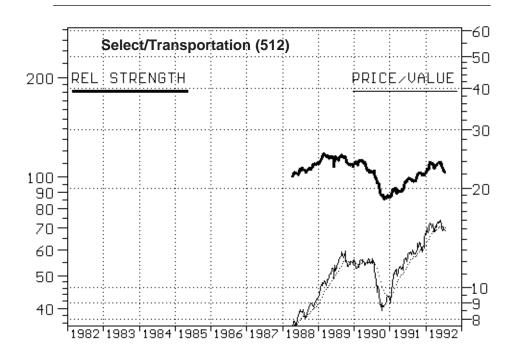


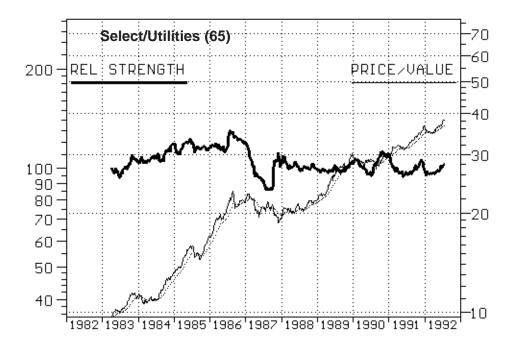


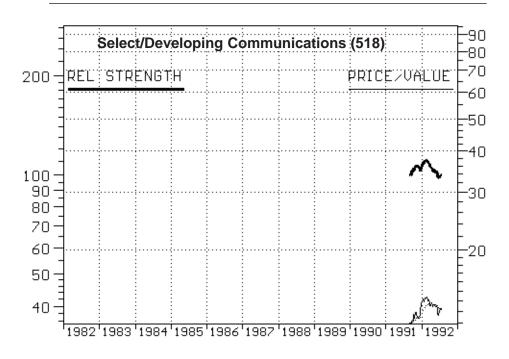


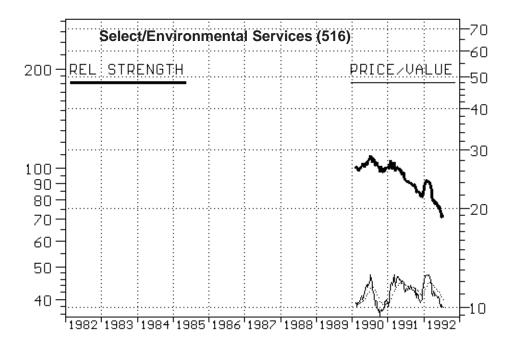


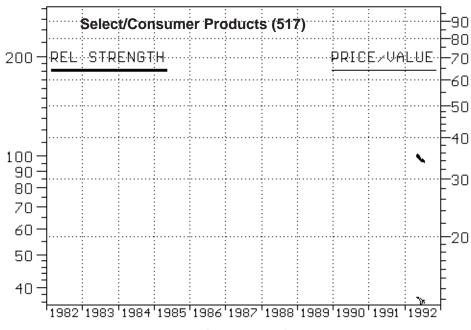




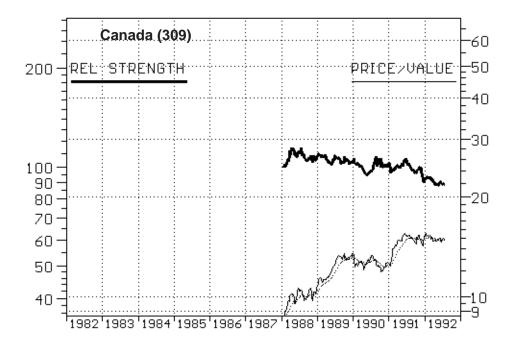






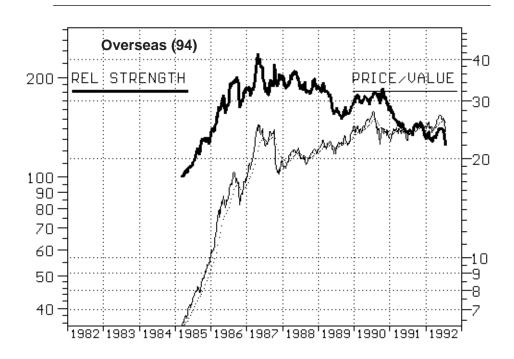


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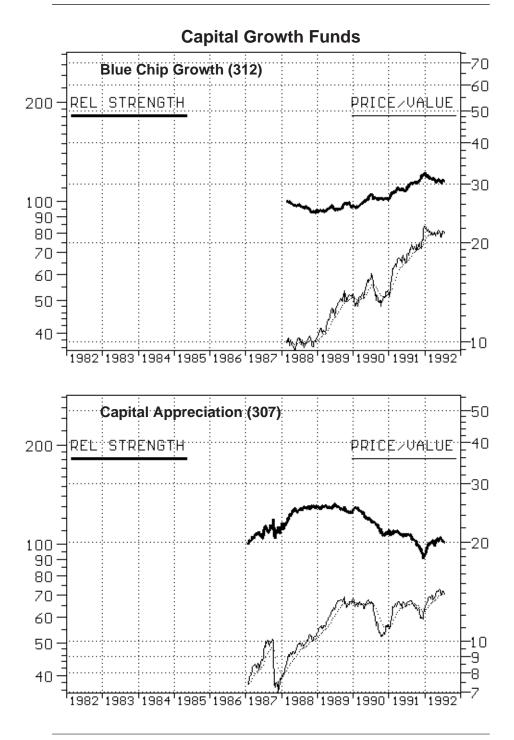


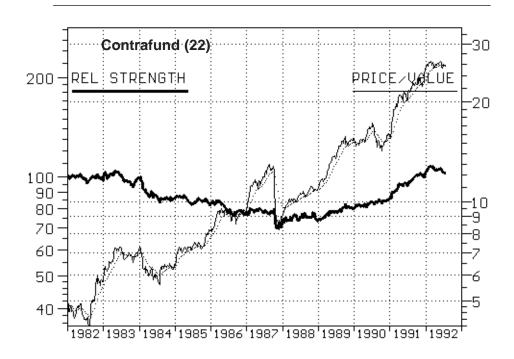


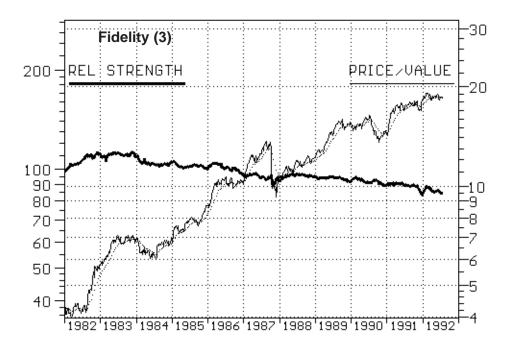


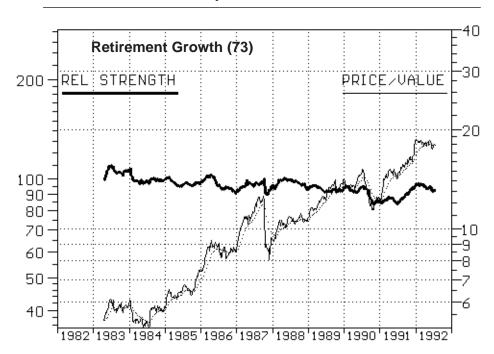


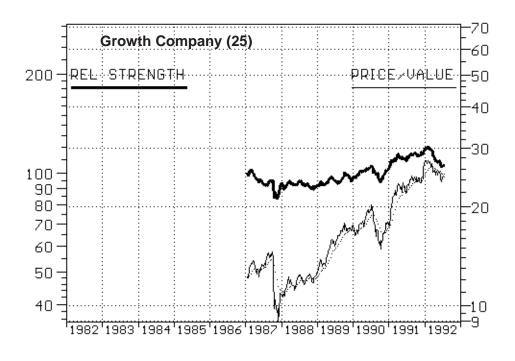


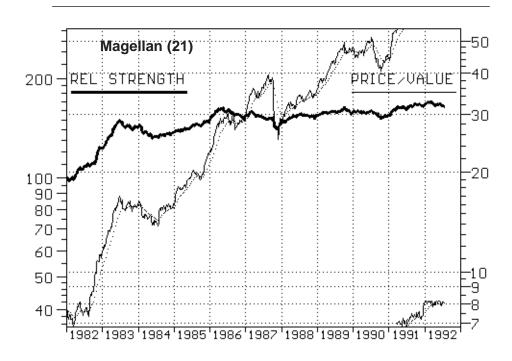


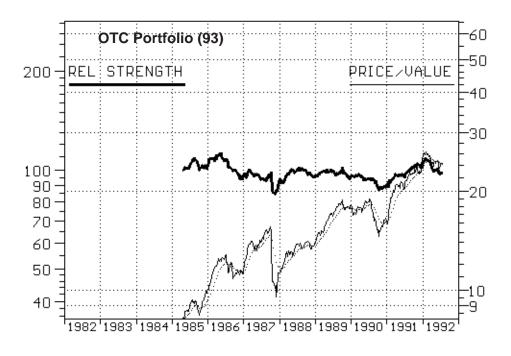


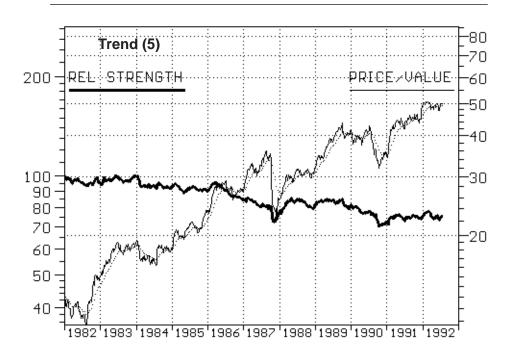


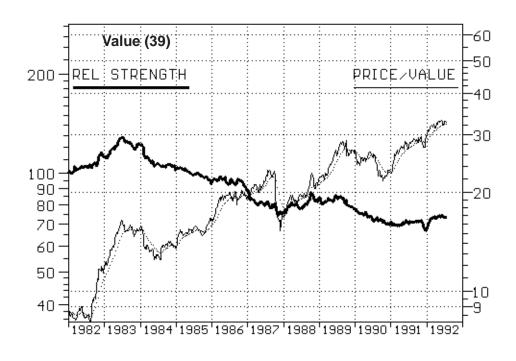


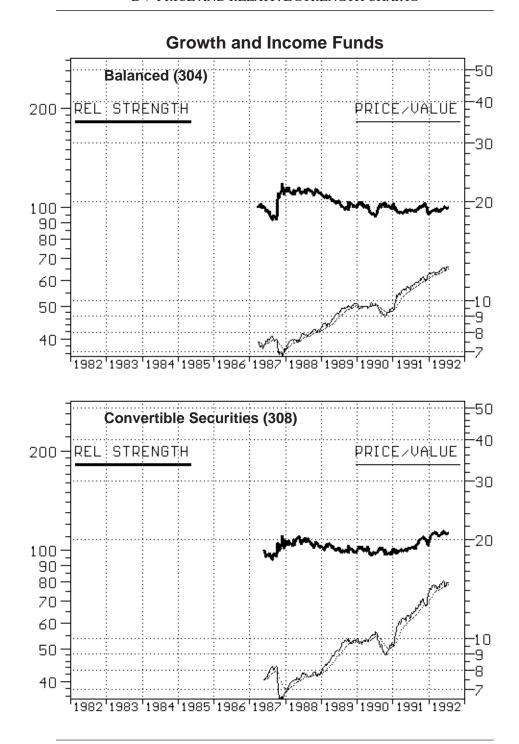


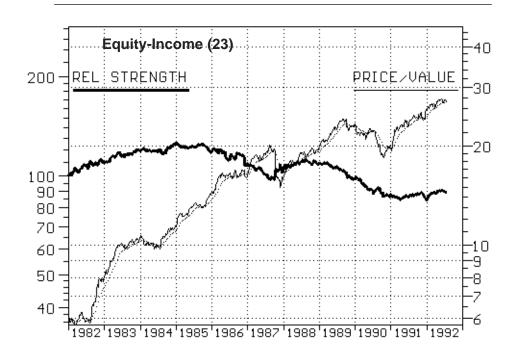


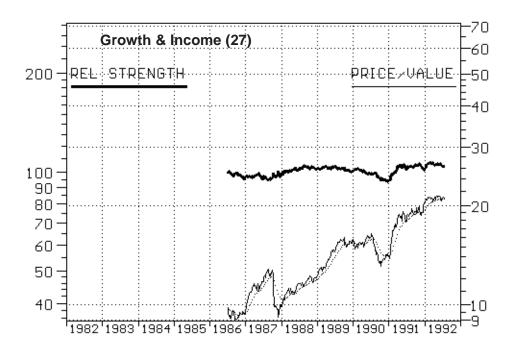


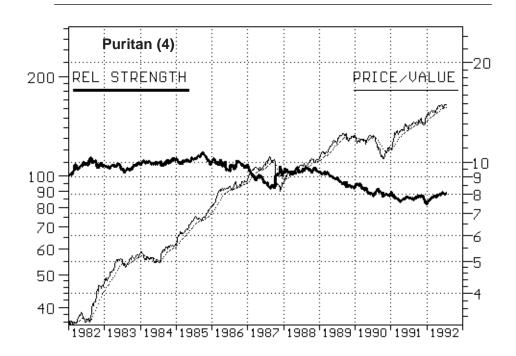


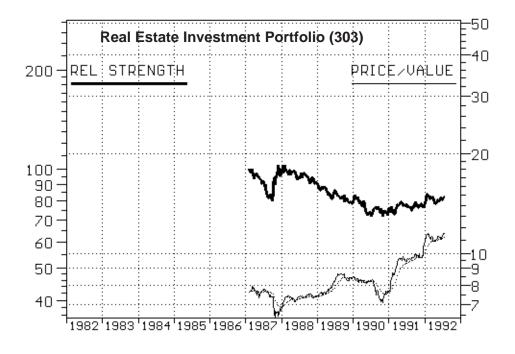


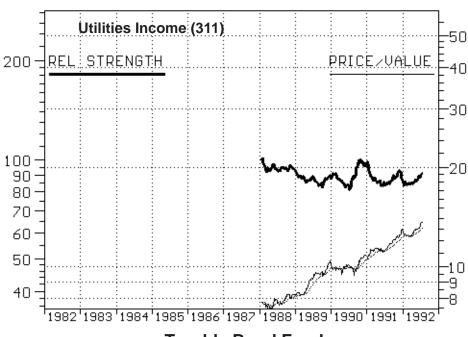




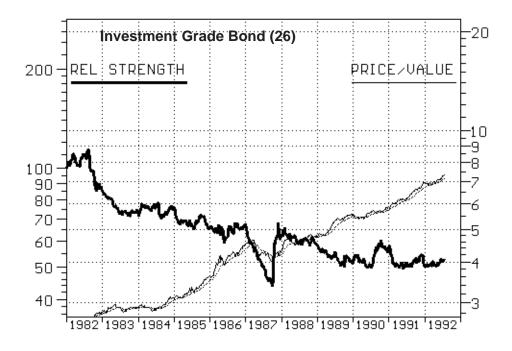


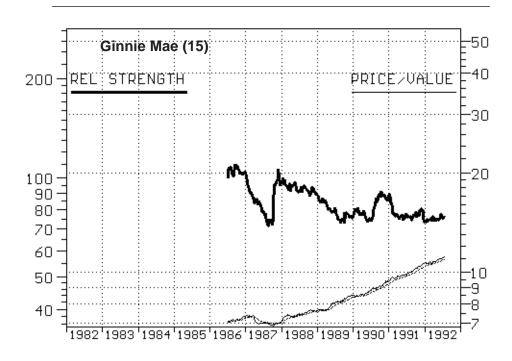


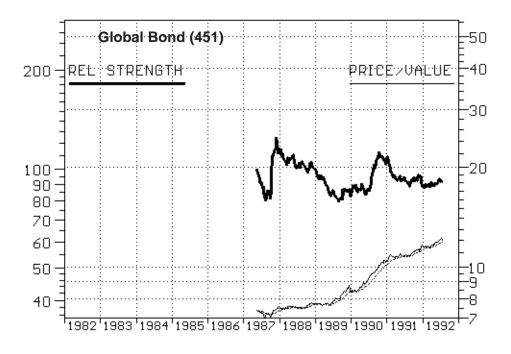


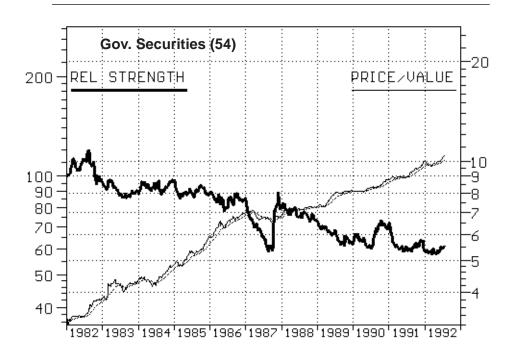


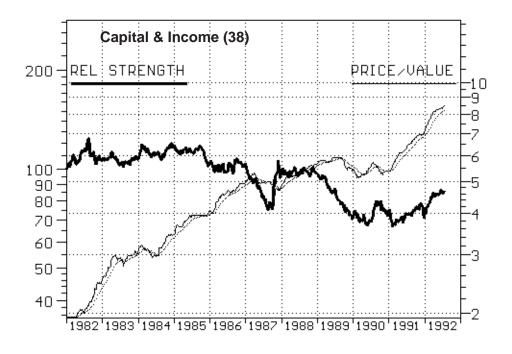
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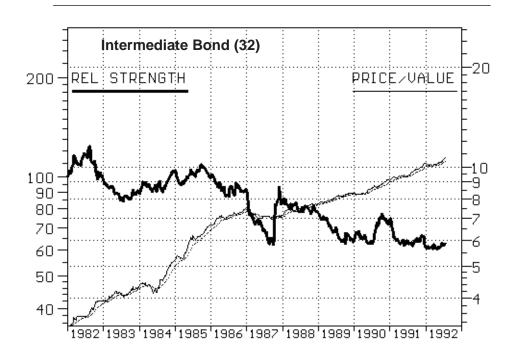


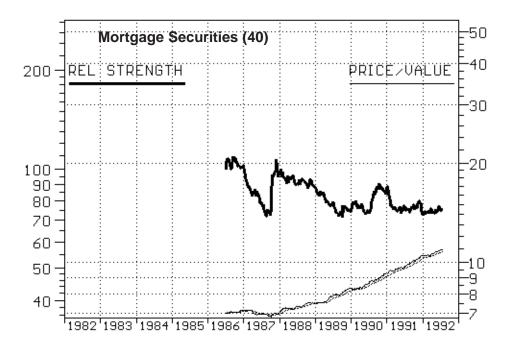


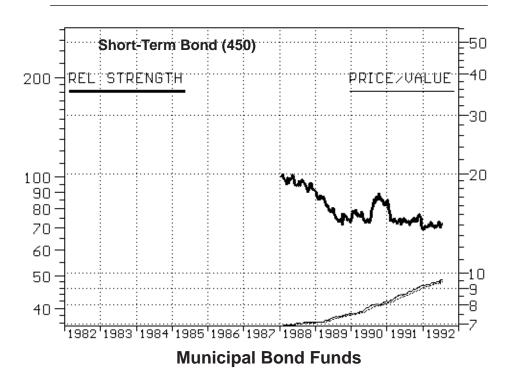


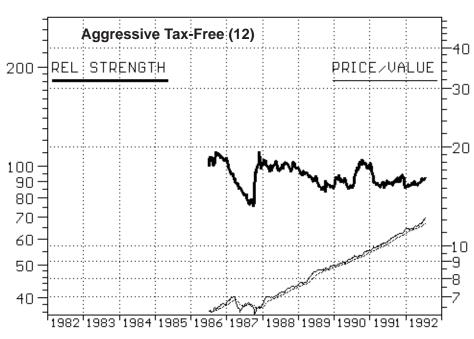


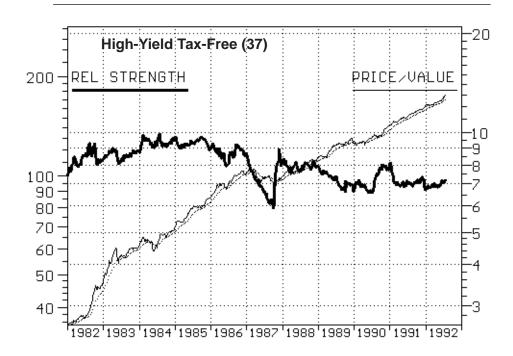


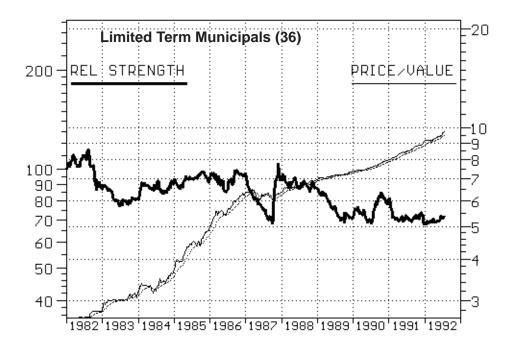


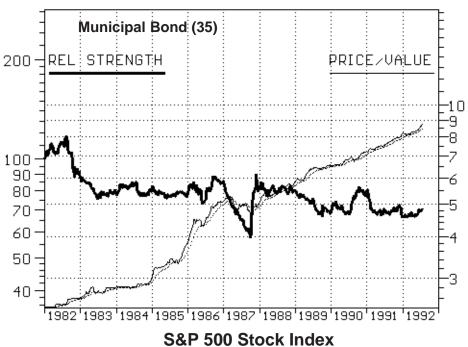




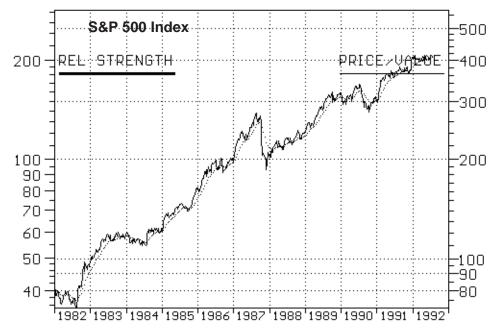












RECOMMENDED READING

Books for Further Study

Donna Carpenter, with Coopers & Lybrand, *1989 Mutual Fund Tax Guide*, Fidelity Investments (1988). Detailed compilation of tax topics affecting mutual fund investors.

James E. Cheeks, *The Dow-Jones Irwin Guide to Keoghs*, Dow-Jones Irwin (1989). Complete details of Keogh plans and how to set one up. Compares Keoghs with other retirement plans.

Robert W. Colby and Thomas A. Meyers, *The Encyclopedia of Technical Market Indicators*, Dow Jones-Irwin (1988). Exhaustive computer study of more than 100 indicators used for market timing.

Richard C. Dorf, *The New Mutual Fund Investment Advisor*, Probus Publishing (1986). Introduction to mutual fund investing.

Edwin J. Elton and Martin J. Gruber, *Modern Portfolio Theory and Investment Analysis*, Wiley (1987). Excellent investment theory textbook for the serious student.

Mark A. Johnson, *The Random Walk and Beyond*, Wiley (1988). Highly readable review of risk, market efficiency, and investment strategies.

Arthur Burton G. Malkiel, *A Random Walk Down Wall Street*, Norton (1985). A well-known academic explores why neither technical nor fundamental analysis will yield trading rules that beat the market.

Jack D. Schwager, *A Complete Guide to the Futures Market*, Wiley (1984). In-depth coverage of market statistics, and fundamental and technical analysis. Of much broader applicability than futures trading.

Martin E. Zweig, *Winning on Wall Street*, Warner Books (1986). Describes market timing systems based on monetary, momentum, and sentiment indicators.

Periodicals for Fidelity Investors

Barron's, Dow Jones & Co. (weekly). Lists weekly closing mutual fund prices, dividends, and capital gain distributions, including VIP portfolio prices. Publishes quarterly review of mutual fund performance.

Hulbert's Financial Digest, Hulbert's Financial Digest, Inc. (monthly). Monitors results achieved by acting on recommendations of many investment newsletters.

Investment Vision, Fidelity Investments (six issues a year). Investment ideas and news with a Fidelity slant. Mailed free to Fidelity investors.

Investor's Daily, Investor's Daily Inc. (daily). Lists mutual fund prices, recent performance, and rank. Less news and editorial content than *Wall Street Journal*; more statistical data.

Mutual Fund Guide, Fidelity Investments (monthly). Month-end fund statistics, including price charts, historical performance, current fund holdings, and management commentary. Published about 12th of following month.

Sector Outlook, Fidelity Investments (monthly). Review of latest industry sector developments. Sent free to Select fund shareholders.

Wall Street Journal, Dow Jones & Co. (daily). Leading financial daily; includes mutual fund prices. More news and editorial content than *Investor's Daily*; less statistical data.

See page 108 for details of independent investment newsletters covering Fidelity funds.

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