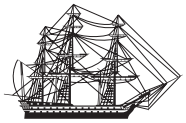
Defensive Equity Investing: Appealing Theory, Disappointing Reality

Vanguard Investment Counseling & Research



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Executive summary. Conventional wisdom maintains that investors can improve their portfolio's performance during bad times by shifting their equity exposure defensively toward less-cyclical, lower-beta sectors. This paper investigates the strengths and weaknesses of defensive equity investing by focusing on the historical performance of defensive sectors during two periods: U.S. equity bear markets and U.S. economic recessions.

Using several high-level, intuitive leading indicators of recessions and bear markets, we simulate real-time defensive portfolio decisions from January 1963 through December 2006. We show that implementing a defensive investment strategy based on the leading signals of bear markets and recessions (e.g., forward price/earnings ratios, momentum indicators, and the shape of the U.S. Treasury yield curve) would not have resulted in better results than following a buy-and-hold strategy.

The difficulties in converting historical patterns into real-time defensive portfolio outperformance include the low predictive power of even the best signals of bear markets and recessions, the strategies' potentially high transaction and tax costs, and the inconsistent performance of sectors over time. Indeed, equity market sectors once defined as "defensive" in the past do not always act defensively in the future (as was true with telecommunication services during the 2000–02 bear market). Moreover, defensive investing comes with a considerable and underappreciated cost—not being fully invested in the entire U.S. equity market when the bad times end.

Authors

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Introduction

Seminal empirical finance studies have long documented that changes in business conditions systematically influence expected stock and bond returns.[1] Some researchers suggest that it can be extremely profitable to exploit such changes in business conditions by tactically shifting the allocation of growth stocks and value stocks in a portfolio (e.g., Kao and Shumaker, 1999).

Frequently, market strategists and other investment professionals advocate that it's possible to shield a portfolio from the ravages of bear markets and recessions by using a *defensive equity strategy*. On the surface, this strategy of shifting defensively toward less-cyclical, lower-beta sectors is appealing; Stovall (1996), Bernstein (1995), and others document that different sectors have tended to thrive in different stages of the business cycle. Indeed, such strategies have become more accessible to many investors with the greater availability of exchange-traded funds (ETFs) that track specialized sector indexes.

In this paper, we show that the real-time execution of defensive equity strategies has produced mixed results, at best. We constructed monthly equity market sector indexes back to January 1963 that track the ten sector indexes currently maintained by Morgan Stanley Capital International (MSCI).[2] We then simulated real-time defensive portfolio decisions based on several popular and intuitive leading indicators of recessions and bear markets. Ultimately, we found that our simulated defensive equity strategies generally failed to deliver as intended during times of market duress.

Table 1. What is a "defensive" equity sector?

	Average risk profile of U.S. equity market sectors, 1963–2006					
U.S. equity market sector	Regression beta on total U.S. equity market*	Beta on HML *(+ beta ~ "value")*	*HML t-stat*	Beta on SMB *(+ beta ~ "small-cap")*	*SMB t-stat*	Regression-adjusted R-Squared
Utilities	0.778	0.59	12.25	–0.15	–3.53	56.1%
Health care	0.859	–0.30	–5.77	–0.22	–4.90	64.5
Consumer staples	0.872	0.17	3.98	–0.12	–3.21	68.9
Telecommunication services	0.874	–0.02	–0.48	–0.16	–3.57	62.4
Energy	0.954	0.33	5.16	–0.18	–3.40	52.6
Information technology	1.047	–0.71	–13.80	0.24	5.51	80.4
Consumer discretionary	1.104	0.27	6.40	0.20	5.57	79.2
Materials	1.114	0.45	10.06	0.11	2.91	76.5
Industrials	1.129	0.12	4.05	0.14	5.39	89.5
Financials	1.148	0.41	9.26	–0.09	–2.47	76.5

*For total U.S. equity market, Vanguard Quantitative Equity Group Equity Market Universe from January 1963 to November 2002, and MSCI US Investable Market 2500 Index thereafter.

Note: Ordinary Least Squares (OLS) equation regresses a sector's monthly total return (over the risk-free rate) on three risk factors: (1) total market return over the risk-free rate, (2) Fama-French HML (High-Minus-Low) value factor, and (3) Fama-French SMB (Small-Minus-Big) size factor.

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, and the Kenneth R. French data library.

1 See, for instance, Chen et al. (1986), Schwert (1990), and Fama and French (1992).

2 The ten MSCI equity sector indexes are based on the Global Industry Classification Standard (GICS). The official GICS sector assignments begin in December 2002. We have backfilled the ten MSCI GICS return series through January 1963 at the individual stock level using a mapping algorithm that incorporates 1994 classifications from GICS, the Institutional Brokers' Estimate System (I/B/E/S), and the Vanguard Quantitative Equity Group (QEG). On a market-cap-weighted basis, this algorithm allows us to classify approximately 96% of the individual stocks in the QEG universe in December 1984, 92% in December 1974, and 98% in December 1962. Further details on the construction of these series are available from the authors upon request.

What is defensive equity?

In the conventional definition, defensive equity sectors consist of firms that typically produce goods and services with relatively inelastic demand curves. Health care providers, water and electric utilities, and food processors are the archetypes.

Rather than qualitative ranking, we can also use a quantitative rule such as historical beta to identify defensive sectors. In general, this approach has identified the same "defensive" sectors as a qualitative analysis of sector characteristics. Table 1, on page 2, shows that since 1963, utilities, health care, and consumer staples have had the lowest betas relative to the market. However, there are some downsides to this approach as well, which we discuss in a subsequent section.

Table 1 also reveals that defensive sectors tend to be made up of large-capitalization stocks, as identified by a negative beta on the Fama-French Small-Minus-Big (SMB) factor.[3] The large-cap characteristic of defensive industries makes sense intuitively, as larger companies are believed to be in better position to weather market and economic downturns through their economies of scale.

More interesting, there is no clear pattern regarding growth or value characteristics among defensive (or offensive) sectors over the 1963–2006 sample. Indeed, while utilities and consumer staples performed in line with a value factor—identified by a positive beta in the Fama-French High-Minus-Low (HML) column—health care was more growth-oriented over this period. One explanation is that some of the ten equity sectors can actually represent a heterogeneous blend of growth and value industries. For instance, the growth "bias" in Table 1 for the health care sector index is heavily influenced by the performance of biotechnology stocks since the late 1990s. Other health care industries, such as hospitals, have a higher beta to value, although those beta estimates can vary significantly over time, too.

3 The Fama/French benchmark factors, SMB and HML, are constructed from six size/book-to-market benchmark portfolios (large growth, large blend, large value, small growth, small blend, and small value) that do not include hold ranges and do not incur transaction costs. SMB (Small Minus Big) is the average return on three small portfolios minus the average return on three big portfolios. HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios. See Fama and French (1993) for a complete description of the factor returns.

Table 2. Defensive sectors have tended to outperform during "bad times"

U.S. equity market sector	Trailing 3-year beta to total U.S. market (as of Dec. 31, 2006)	Summary of monthly relative performance statistics during "bad times" over 1963–2006 sample: U.S. equity bear markets (123 observations) Median monthly excess return	Mean monthly excess return	Standard deviation	Percentage of months with positive excess return	U.S. economic recessions (65 observations) Median monthly excess return	Mean monthly excess return	Standard deviation	Percentage of months with positive excess return
Utilities	0.352	***0.69***	***0.86***	4.27	61.0%	0.35	0.10	4.39	55.4%
Consumer staples	0.435	***0.65***	***0.89***	3.23	61.8	0.83	0.51	2.97	66.2
Health care	0.562	***0.48***	***0.64***	3.50	55.3	0.24	0.54	4.16	53.8
Telecommunication services	0.714	0.51	0.53	3.80	54.5	–0.12	0.33	3.71	49.2
Financials	0.778	0.03	0.28	2.90	52.0	0.47	0.11	3.77	50.8
Industrials	0.935	***–0.29***	–0.29	2.04	42.3	–0.40	–0.21	2.14	38.5
Energy	0.974	0.16	0.26	4.10	54.5	–0.85	–0.68	4.50	46.2
Consumer discretionary	1.229	0.12	0.24	2.91	52.8	***0.70***	0.74	4.00	60.0
Materials	1.410	–0.23	0.43	3.24	46.3	–0.22	0.03	2.52	47.7
Information technology	1.714	***–0.34***	***–0.78***	4.47	46.3	–1.09	–0.10	4.55	43.1

Note: Median and mean monthly excess returns in bold italics are statistically different from zero excess return at the 90% significance level using a Wilcoxon signed rank test and a t-test, respectively.

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, and the National Bureau of Economic Research.

Past performance is no guarantee of future results. Investors cannot invest directly in an index.

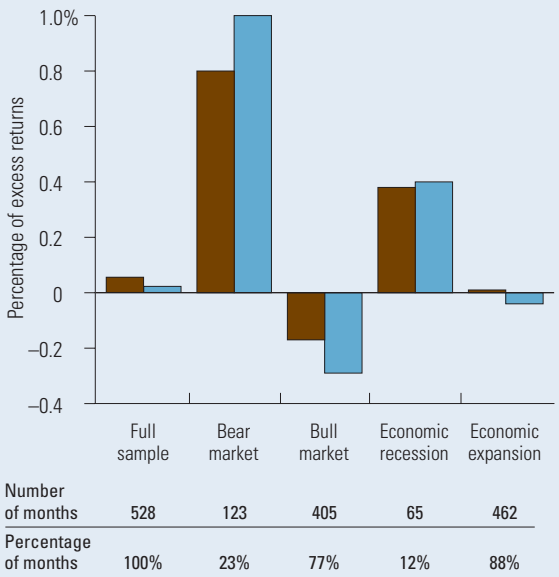
Over time, defensive equity sectors have generally performed as expected. On average since 1963, consumer staples, utilities, and health care stocks have outperformed the broad market during bear markets, as shown in Table 2. These sectors have also outperformed during recessions, though not by a statistically significant margin. Conversely, those sectors identified in Table 1 as having a high beta have tended to underperform in these adverse markets. While these results are not unexpected given our definition of a defensive sector, the data supports the conventional notion that defensive equity investing can help keep an equity portfolio's performance from deteriorating during bad times.

The outperformance of these three sectors during bear markets and recessions in Table 2 could be interpreted as a form of portfolio insurance. And as with any insurance, there is a premium, or cost, associated with that protection. Figure 1, on page 5, highlights this insurance cost in the form of underperformance during bull markets and, to a lesser degree, economic expansions.[4]

4 The average monthly excess returns of the defensive portfolios shown in Figure 1 are not statistically different from zero over the full 1963–2006 monthly sample.

Figure 1. The "insurance premium" of lower-beta sectors

Average monthly excess returns to U.S. stock market



	Full sample	Bear market	Bull market	Economic recession	Economic expansion
Number of months	528	123	405	65	462
Percentage of months	100%	23%	77%	12%	88%

Today's defensive sectors
Historical defensive sectors (real time)

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, and the National Bureau of Economic Research.

The astute observer will notice the asymmetry between the magnitude of outperformance during bad times and of underperformance during good times, and possibly argue that the benefit outweighs the cost. However, the asymmetry in magnitude is countered by asymmetry in the durations of both good and bad times. Bull markets and expansions have tended to be longer in duration than bear markets or recessions. The bottom axis of Figure 1 reveals that good times clearly outnumbered bad times by a wide margin from 1963 to 2006. So it's clear that timing is critical to success, an issue that is addressed in subsequent sections. Figure 1 also demonstrates one of the challenges that is discussed in more detail later—the difference between using today's definition of a defensive sector and using the real-time definition of a defensive sector.

Mechanics have improved, fundamental challenges remain

Until recently, implementing a defensive equity strategy could be cumbersome and costly. Investors could purchase actively managed sector funds, which often invest in multiple sectors, or a sample of stocks in the targeted sector. The recent proliferation of sector and industry exchange-traded funds (ETFs) simplifies the mechanics, allowing investors to move into and out of individual sectors with a single trade. The obvious implication of the sea change in accessibility is that the strategies outlined in this analysis probably would not have been possible to implement or would have been cost-prohibitive in the best case until the last several years.

However, even with low-cost, widely available sector ETFs, significant challenges remain. The most daunting: How does an investor know when it's time to shift from a neutral to a defensive stance? As with any tactical strategy, success depends on the reliability of the signals, in this case indicators of recessions and bear markets.

Real-time performance of defensive equity strategies

In this section, we evaluate the historical monthly performance of alternative defensive equity strategies with the information that an investor would have had available in real time. To identify the trading signals that would have triggered shifts in an investor's equity portfolio, we have chosen a set of indicators widely believed to be the most reliable in forecasting recessions and bear markets.

To identify imminent recessions, we rely on an inversion of the U.S. Treasury yield curve. Although it's hardly infallible, an inverted yield curve, as measured by the difference between the yields of 10-year and 3-month Treasury securities, has significantly outperformed other financial and economic indicators in predicting recessions (Estrella and Mishkin, 1996; Dueker, 1997; and Estrella, 2005). Since the early 1950s, a yield-curve inversion has preceded all but one official recession, as defined by the National Bureau of Economic Research (Estrella and Mishkin, 1996, and Bordo and Haubrich, 2004). Resnick and Shoesmith (2002) and others argue that the shape of the yield curve generates short-term predictability in stock-market returns.

We use two signals to identify bear markets. To implement the strategy in real time, we focus on forward price/earnings multiples. Specifically, we evaluate the current forward P/E ratio relative to the historical forward P/E ratio. If the current forward P/E is greater than 2 standard deviations above the trailing average, we assume the market is overvalued and a bear market is imminent. For investors unable to access forward P/E data, bear markets can also be identified in the moment. (See the textbox for details.) We test two cases—trailing 12-month market returns of –10% and of –5%. The idea is that by confirming the onset of a bear market, investors can make the switch to a defensive portfolio to mitigate their losses for the remainder of the bear market.

Identifying Bull and Bear Markets

"Bull" markets are periods of a generalized uptrend in stock prices (with positive returns), while "bear" markets are periods of a generalized downtrend (with negative returns). Identifying bull and bear markets requires establishing the market's turning points—the peaks and troughs in a series of stock prices that signal a change in the market's trend. There is no widely accepted institution that dates bear and bull markets. For this analysis, we define a peak as a price index's highest level relative to the previous and subsequent 12 months (Pagan and Sossounov, 2003).

In other words, a peak is the highest level of a price index in a 24-month period, with 12 months of rising prices followed by 12 months of generally declining prices. A trough is defined as a price index's lowest level in a 24-month period, with 12 months of falling prices followed by 12 months of generally rising prices. The market is bullish if the price index is rising from its most recent trough to the nearest peak and bearish if the index is falling from the peak to the trough.

To ensure that we do not identify spurious peaks and troughs:

- We eliminate turns within nine months of the beginning or end of the series.
- We enforce alternations of peaks and troughs. A peak always follows a trough and vice versa. Alternation is achieved by taking the highest (lowest) of two consecutive peaks (troughs).

Simulation of defensive equity strategies

After identifying the core components of a defensive equity strategy—low-beta sectors and the signals that trigger defensive portfolio shifts—we created a set of implementation rules.

1. The strategic long-term equity allocation and benchmark for performance is a broad market index fund.
2. At every month end, if the yield curve inverts, or a bear market is forecast, the investor shifts to an allocation of 80% market index fund and 20% defensive equity in the following month.
3. When the signal ends or reverts to "normal," the investor shifts back to the benchmark portfolio in the following month.
4. Assumed transaction costs (commissions and bid-ask spreads) are equal to 1% of the transaction amount.[5] Tax costs are based on historical capital gains tax rates.
5. The success of the defensive strategy is measured relative to the return of the benchmark portfolio.

We also tested variations of the portfolio's defensive equity component: equally weighted exposure to the three lowest-beta sectors based on trailing 3- and 5-year betas, equally weighted exposure to the two lowest-beta sectors based on trailing 3- and 5-year betas, and exposure to the lowest-beta sector based on trailing 3- and 5-year betas.

Table 3 presents the results of defensive equity shifts triggered by an inversion of the yield curve, for the three-sector portfolio. This strategy produced modest excess returns, but the results are not statistically different from zero. The composition of the defensive component—one, two, or three sectors, trailing 3- or 5-year betas—had little impact on results.

Table 3. Real-time portfolio results: Yield-curve inversion

	"Bad times" signal	Beta definition	Tactical asset allocation sectors	Mean monthly excess returns	Tracking error	Excess returns/ tracking error	T-stat
December 1967–December 2006	Inverted yield curve*	5-year trailing beta	3 lowest-beta sectors	0.01%	0.61%	0.017	0.370
December 1967–December 2006	Inverted yield curve*	3-year trailing beta	3 lowest-beta sectors	0.01	0.62	0.017	0.366

*Yield curve measured by the difference between the yields of 10-year and 3-month U.S. Treasury securities at the end of the previous month. Portfolio transactions take place the month following the signal.

Implementation case: Assumed transaction costs are equal to 1% of the transaction amount. Tax costs are based on historical capital gains tax rates.

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, and Lehmanlive.com.

5 Our 1% transaction-cost assumption probably understates the historical implementation costs of a defensive strategy in the period before the introduction of sector-specific mutual funds and ETFs. O'Neal (2000), for instance, notes that the average expense ratio for a sector-specific fund was 1.89% over the 1989–1998 period, in addition to an average front-load fee of 3%.

Table 4. Real-time portfolio results: Stock market forward P/E

	Portfolio case	Beta definition	Tactical asset allocation sectors	Mean monthly excess returns	Tracking error	Excess returns/ tracking error	T-stat
December 1967–December 2006	Transaction on each signal	5-year trailing beta	3 lowest-beta sectors	–0.02%	1.3993%	–0.0111	–0.2400
December 1967–December 2006	Hold for 12 months following a signal	5-year trailing beta	3 lowest-beta sectors	–0.01	0.5693	–0.0165	–0.3589

Implementation case: Assumed transaction costs are equal to 1% of the transaction amounts. Tax costs are based on historical capital gains tax rates.

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group and Thomson Financial Datastream.

Table 5. Real-time portfolio results: Stock market momentum

	"Bad times" signal	Beta definition	Tactical asset allocation sectors	Mean monthly excess returns	Tracking error	Excess returns/ tracking error	T-stat
December 1967–December 2006	Market down 10%	5-year trailing beta	3 lowest-beta sectors	–0.05%	1.11%	–0.0467	–1.0117
December 1967–December 2006	Market down 5%	5-year trailing beta	3 lowest-beta sectors	0.00	0.52	–0.0048	–0.1033

Implementation case: Assumed transaction costs are equal to 1% of the transaction amounts. Tax costs are based on historical capital gains tax rates.

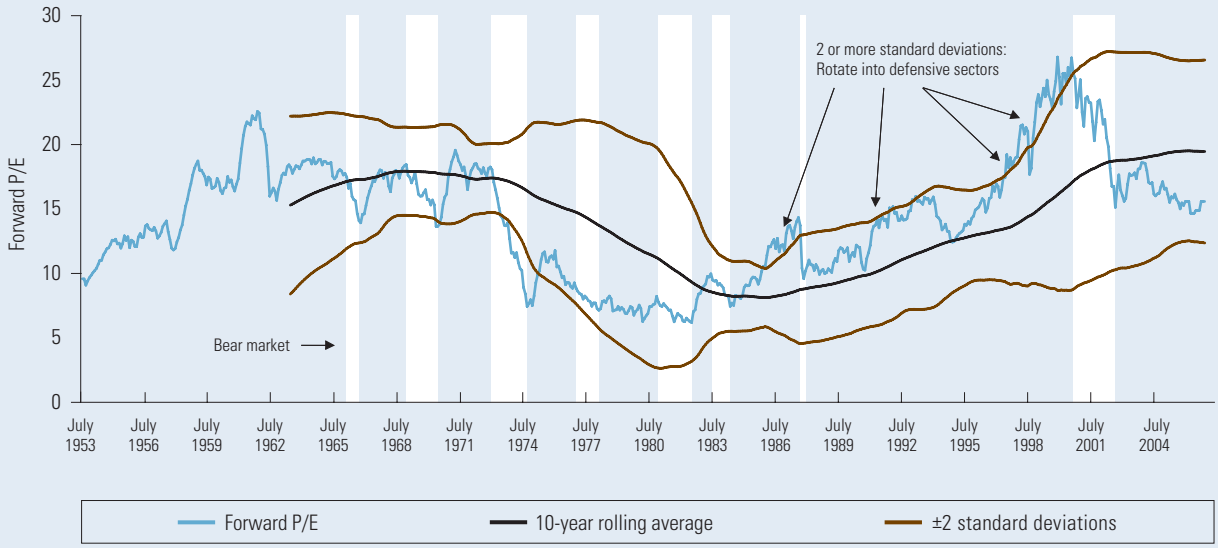
Source: Authors' calculations using data from Vanguard's Quantitative Equity Group and Thomson Financial Datastream.

Simulations based on bear market signals were less impressive, as shown in Tables 4 and 5. Excess returns were modestly negative, though again the results weren't statistically significant. In Table 4 we implemented two variants of the forward P/E analysis. In the first case we assumed the investor shifted the portfolio each time the forward P/E crossed the 2-standard-deviation threshold. In the second case, we assumed that because the forward P/E is a leading indicator, the investor would want to hold the defensive portfolio for a period of time following the trade signal (e.g., Shen, 2003). Focusing on forward P/E analysis did not lead to positive excess returns relative to the benchmark portfolio.

Similarly, we tested two momentum indicators for capitalizing on a bear market. Technical momentum signals have been used in certain studies on sector rotation strategies, including Sassetti and Tani (2006). Here, we assume that an investor could identify a bear market once the market started its decline and could implement the strategy with enough room to capitalize on the remainder of the bear market. We selected two criteria—a 10% drop in trailing 12-month returns for a conservative investor and a 5% drop for an aggressive investor. While the 5% trigger generated better results than the 10% trigger did, neither scenario resulted in positive excess returns relative to the benchmark portfolio.

Figure 2. Relying on P/E can lead to false positives and unanticipated bear markets

Targeting bear markets: 12-month forward P/E relative to 10-year average forward P/E



Source: Authors' calculations using data from Vanguard's Quantitative Equity Group and Thomson Financial Datastream.

Why has defensive equity failed to deliver?

Why do patterns that appear so prominent in the historical data fail to produce strategies that work in real time? Challenges include both the low predictive power of real-time signals—a problem that plagues any tactical strategy—and the inconsistent performance over time of the various defensive sectors.

Although yield-curve inversions have been the most reliable predictor of recessions, the signal is noisy, meaning the yield curve inverts more frequently than the U.S. economy contracts. Since 1952, there have been 19 distinct yield-curve inversions, but only nine U.S. recessions. Even if an investor's conclusion that defensive sectors will outperform the broad market in a recession is correct, the yield curve's "false positives" will prompt a number of mistimed portfolio decisions.

Similarly, using the forward P/E as an indicator in isolation can be unreliable. While **Figure 2** demonstrates that two of the three positive P/E signals led to bear markets, the two signals in 1991 and 1992 did not. In addition, a number of bear markets occurred in the late 1960s, 1970s, and 1980s that were not identified by significantly extended forward P/E ratios. An alternative would be to use a tighter signal, perhaps a 1-standard-deviation move away from the trailing mean P/E. Using a tighter band would probably result in a greater number of trading indicators, but in addition to correctly predicting more bear markets, this approach would result in an increased number of false positives as well as increased transaction costs associated with portfolio turnover.

Table 6. Sector excess returns during inverted yield curves can vary widely

Inverted yield curve start Inverted yield curve end	Regression beta on total U.S. equity market	Jan. 1966 Feb. 1967	Dec. 1968 Jan. 1970	Jun. 1973 Nov. 1974	Nov. 1978 Apr. 1980	Oct. 1980 Sep. 1981	Jun. 1989 Dec. 1989	Jul. 2000 Jan. 2001	Aug. 2006 Dec. 2006
Utilities	0.778	–0.32	–0.11	0.01	–0.69	0.74	1.24	3.91	–0.32
Health care	0.859	0.45	2.41	0.46	–0.19	0.57	1.29	0.84	–1.14
Consumer staples	0.872	1.03	0.96	–1.03	–1.11	0.65	0.8	2.97	–0.77
Telecommunication services	0.874	0.1	0.42	1.35	–1.24	1.58	0.47	–2.29	0.53
Energy	0.954	–0.17	–1.4	1.09	2.33	–0.7	1.44	2.07	–1.66
Information technology	1.047	1.83	0.98	–1.05	–0.81	–0.64	–2.55	–3.23	1.26
Consumer discretionary	1.104	–0.93	–0.16	–1.43	–1.27	0.47	–1.08	1.82	1.41
Materials	1.114	–0.82	–0.27	1.67	0.09	–0.57	–0.32	2.39	0.73
Industrials	1.129	0.07	–1.17	0.29	0	0.05	–0.42	0.81	–0.02
Financials	1.148	0.07	–0.2	0.12	–0.59	1.2	–0.8	4.68	0.09

Sectors in bold italics currently considered defensive industries.

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, and Lehmanlive.com.

Another challenge is that defensive equity sectors have performed inconsistently over time. Table 6 displays the excess returns of the ten stock market sectors during periods of yield-curve inversion. Since January 1966, there have been eight yield-curve inversions. Utilities—the lowest-beta sector—generated excess returns in only four of these periods (highlighted in white). In fact, the sector produced much of its historical excess returns in just one period, July 2000 to June 2001. Other low-beta sectors—health care and consumer staples—have also been inconsistently defensive. Defensive sectors are not the only sectors to perform inconsistently. Consumer discretionary, historically a high-beta sector, underperformed the market for the first four inversions, but since has outperformed in three of the last four (highlighted in tan). Interestingly, in the most recent period covered in this study, none of the defensive sectors outperformed the market.

Table 7. Sector excess returns during bear markets can vary widely

Bear market start Bear market end	Regression beta on total U.S. equity market	Feb. 1966 Sep. 1966	Dec. 1968 Jun. 1970	Jan. 1973 Sep. 1974	Jan. 1977 Feb. 1978	Dec. 1980 Jul. 1982	Jul. 1983 May 1984	Sep. 1987 Nov. 1987	Sep. 2000 Sep. 2002
Utilities	0.778	0.51	0.36	0.38	0.93	1.53	0.92	6.79	0.47
Health care	0.859	–0.17	1.65	0.05	0.15	1.44	–1.16	–0.07	1.21
Consumer staples	0.872	0.79	0.49	–1.04	–0.22	1.86	0.84	0.57	2.79
Telecommunication services	0.874	0.49	0.66	1.9	0.85	2.08	–0.25	2.28	–1.91
Energy	0.954	0.5	–0.42	1.24	0.16	–2.31	1.85	–0.16	1.41
Information technology	1.047	1.57	–0.28	–0.49	0.01	0.02	–1.3	–2.25	–2.94
Consumer discretionary	1.104	–0.43	–0.07	–1.05	–0.34	1.65	–0.8	–4.4	1.96
Materials	1.114	–1.57	0.25	1.85	–1.4	–0.84	0.12	0.76	2.19
Industrials	1.129	–0.62	–1.02	–0.3	0.37	–0.31	–0.25	–0.47	0.06
Financials	1.148	–1.62	0.12	–0.8	0.17	1.22	–0.52	–0.5	1.62

Sectors in bold italics currently considered defensive industries.

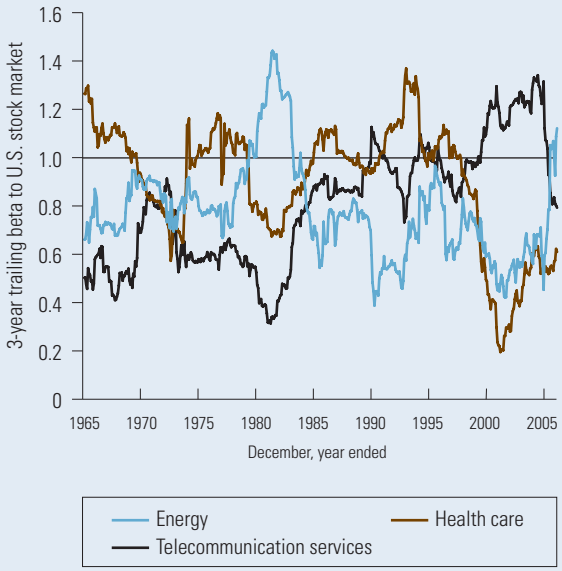
Source: Authors' calculations using data from Vanguard's Quantitative Equity Group and Thomson Financial Datastream.

Sector performance in bear markets (**Table 7**) yields similar, though less dramatic, observations. For example, health care underperformed in two of the last three bear markets (highlighted in white), while the bulk of excess returns attributed to utilities came in 1987 (highlighted in tan). During the most recent bear market, the only sectors to actually underperform the market were information technology and telecommunication services, albeit by a wide margin. And while utilities and health care each generated positive excess returns, other higher-beta sectors such as finance, materials, and consumer discretionary generated even higher excess returns.

The inconsistent performance of defensive sectors and the low predictive power of bear-market and recessionary signals create formidable challenges to successfully implementing a defensive equity strategy. Our simulations indicate that it's unlikely that even one component of a defensive equity model—that the economy will enter recession, for example—will perform as expected, and even less likely that both the signals and the sectors will perform as expected, simultaneously.

Figure 3. Estimated sector betas can change notably over time

Estimated trailing 3-year betas: 1963–2006



Source: Authors' calculations using data from Vanguard's Quantitative Equity Group and Thomson Financial Datastream.

Today's low beta may not be tomorrow's

There are countless reasons that sectors might perform differently from one bear market or recession to the next. Among the more obvious is that over time, industries can change dramatically.

Figure 3 charts three examples. Energy and telecommunication services are currently not considered defensive by the beta measure, while health care is. However, in the 1960s, both energy and telecom would have been considered defensive industries, while health care would have been considered a growth industry. In fact, until recently health care was more often than not considered a growth industry. Recent low beta has helped to bring down the long-term average, so that the sector is characterized as defensive. Energy's trailing beta has been volatile, alternating between periods characterized by low beta and high.

Telecommunication services is an interesting example. From 1966 to 1982, telecom stocks represented the quintessential defensive sector, providing above-average returns in all of the five bear markets. In the three bear markets since then, however, telecom stocks have outperformed only once. This pattern might be statistical noise, but the shift is consistent with dramatic changes in the telecom industry.

In the 1960s, 1970s, and early 1980s, telecom companies were heavily regulated monopolies. Opportunities and incentives to invest in new technologies and markets were limited. The stocks paid generous, stable dividends, and the sector's beta was well below average, as shown in Figure 3. In the mid-1980s, the sector changed. To settle the Department of Justice's antitrust suit, AT&T divested itself of its local phone-service providers. In the years since, the sector has been characterized by a previously unimaginable variety and number of competitors. The more numerous but less sturdy combatants are battling over existing services such as long-distance calling and newer services such as wireless communications and Internet-based opportunities. The sector's beta has risen sharply, hovering above 1 for much of the past decade.

Today's low-beta sectors may not be tomorrow's, another challenge in the real-time implementation of defensive portfolio strategies. The volatility in sector betas can also induce higher transaction and, where relevant, tax costs, an additional hurdle in outperforming the benchmark portfolio over the long term.

Table 8. Equity sectors are more highly correlated than U.S. bonds to the U.S. stock market

Correlation coefficients

	Full sample December 1963–January 2006	Bear markets	Bull markets	Economic recessions	Economic expansions
Defensive equity portfolio	0.81	0.79	0.80	0.91	0.77
Bonds	0.30	0.08	0.37	0.53	0.21

Source: Authors' calculations using data from Vanguard's Quantitative Equity Group, Thomson Financial Datastream, the National Bureau of Economic Research, and Lehmanlive.com.

Source for bonds: Standard & Poor's High Grade Corporate Index (1963–1968); Citigroup High Grade Index (1969–1972); Lehman Long Term AA Corporate Index (1973–1975); Lehman U.S. Aggregate Bond Index (1976–current).

Conclusion

The historical record shows that various stock market sectors tend to outperform during tough times. This observation is the basis for the widely held view that investors can protect their portfolios from the worst effects of bear markets and recessions with well-timed tactical shifts into defensive equity portfolios. As sector and industry ETFs have proliferated, such trades have become easier to execute.

We find that the clear historical patterns are difficult to translate into real-time outperformance. Challenges include the low predictive power of even the best signals of bear markets and recessions, the inconsistent performance and characteristics of sectors over time, and the strategies' potentially high transaction and tax costs.

Our research paints a discouraging picture of tactical defensive equity strategies. As a more prudent alternative, a *strategic* bond allocation can effectively mitigate the underperformance of an equity portfolio during the market's occasional downturns, freeing investors from worrying about correctly timing the onset of bad times. As revealed in **Table 8**, a U.S. bond portfolio is less correlated with the broad U.S. stock market than is a low-beta equity portfolio. U.S. Treasury bonds, in particular, provide significant diversification benefits in both good times and bad, and especially so when there is a "flight-to-quality" during bear markets.

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Some key terms

Beta. A measure of the volatility of a security or a portfolio relative to a market index.

Mean. The simple mathematical average of a set of two or more numbers.

Regression. Regression analysis may be used to explain the nature and strength of the relationship between one dependent variable (Y) and one or more other independent variables.

R-squared. A measure of how much of a portfolio's performance can be explained by the returns from the overall market (or a benchmark index).

Standard deviation. A measure of an investment's volatility risk.

T-stat. A measure of the statistical significance of a calculated result.

A note about risk: *Please remember that all investments involve some risk. Funds and ETFs that concentrate on a relatively narrow market sector face the risk of higher share-price volatility. Bond funds contain interest rate risk, the risk of issuer default, and inflation risk. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations.*

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