by Robert D. Arnott and James N. von Germeten

Systematic Asset Allocation

Asset allocation is a difficult process if only because the most effective way to add value to a balanced portfolio may be to focus on the least comfortable asset class. But simple calculations of market returns—the current yield for cash equivalents, the yield to maturity for bonds and the dividend discount model rate of return for equities—can provide valuable guidance for asset allocation by revealing the relative market outlook for various asset classes. The use of a disciplined approach for including other information, such as recent inflation and economic experience, can give still more insight into return prospects for each asset class.

Transforming this information into an asset deployment strategy is, of course, the critical step. If it is handled in an arbitrary or casual fashion, the temptation will be to ignore the opportunities at precisely the wrong time. A systematic approach to transforming outlook into deployment can direct the portfolio manager to asset classes with the highest returns, regardless of the prevailing consensus.

THE SOPHISTICATED pension plan sponsor and the active manager of balanced portfolios face a critical and ongoing asset allocation question: In the prevailing market environment, what asset class merits emphasis? The natural tendency is to choose the comfortable answer, the answer that minimizes anxiety. However, the comfortable answer is frequently not the profitable answer. How many managers were aggressively cutting equity holdings in late 1972 or early 1973? How many managers were doing the opposite two years later?

A systematic approach to asset allocation may provide the discipline needed to resist the comfortable consensus when pursuit of a contrarian strategy would be most rewarding. This article describes such an approach. It is based on the calculation of estimated returns. In essence, it involves letting the market tell us what future relative returns will be. That is, cash yield is the return for cash; bond yield to maturity is the long-term return for fixed income; the dividend discount model rate of return for equities is the long-term return for equities. Asset allocation is based on the relative attractiveness of returns from these various asset classes and changes only as their relative returns change; subjectivity and forecasting are kept to a minimum.

Using calculated relative return estimates to allocate assets is not a new idea.[1] Our approach, however, improves upon earlier uses of return estimates in several ways. First, it systematically incorporates, in addition to relative return estimates, other relevant data such as inflation rates, historical returns and certain proprietary indicators of economic and market outlook. Second, it employs a disciplined framework for transforming objective return estimates into portfolio structure. Finally, any modifications of asset allocation are triggered only by the available facts, as given by the market.

Unlocking Market Outlook

Our systematic approach to asset allocation rests on three assumptions. First, returns for various asset classes are readily and directly calculable. Second, these returns reflect the perceptions of all market participants regarding the relative attractiveness of asset classes (e.g., if calculated equity returns are high relative to bond returns, then the market is implicitly demanding a substantial equity risk premium, which suggests that investors are uneasy about equities). Third,

1. Footnotes appear at end of article.

Robert Arnott is Vice President and James von Germeten is President of The Boston Company.

calculated returns give an indication of future relative returns.

Let's examine these assumptions. Can we estimate asset class returns directly from the asset classes? Cash returns are readily available. Bond returns can be calculated on the basis of yield to maturity. Equity returns can be estimated from a variety of measures—earnings yield, dividend yield plus calculated sustainable growth, or the internal rate of return derived from the dividend discount model. We chose to use the dividend discount equity return measure because it is less sensitive to temporary fluctuations in profitability.[2] Thus, throughout this article, "calculated returns" refer to the expected returns implicit in market prices; they should not be confused with actual returns.

The returns are, arguably, not comparable, since the asset classes have different investment horizons. Cash yields are calculated over the short term, bond yields are calculated to maturity, and equity returns are calculated long term. If, however, the calculated return for, say, equities is high, and if equities fare poorly in the short term, then the market can be expected to price equities so as to provide even better returns in the future. Thus the market's self-correcting mechanism makes the comparison of relative return figures a valuable exercise. It should also be noted that investment managers' return horizons are often similar for all asset classes.

A second and more serious problem is the imprecision of the calculated equity return. Once again, however, there are mitigating factors. If the source of imprecision is systematic and predictable, it can be corrected. Even imprecise data (such as erroneous estimates of long-term economic growth or inflation) need not be a serious problem. If we use consensus estimates for equities, we will clearly be measuring the rate of return investors anticipate.

The second assumption is fundamental to the nature of securities markets. Investors demand higher expected returns for higher perceived risk. In the late 1930s and early 1940s, equity yields actually exceeded bond yields by a wide margin, and calculated equity returns exceeded bond yields by an astonishing margin. The consensus being that a new depression was imminent, investors demanded a huge risk premium for the very high perceived risk of equities. In 1981, bond yields sometimes exceeded calculated returns for equities, reflecting the consensus that bonds were at least as risky as stocks, that inflation (and interest rates) might resurge to new highs, and that bond performance had been disappointing, to say the least, for over a decade. Thus calculated returns *do* give a clear indication of the perceived risk and expected return for an asset class.

The third assumption presupposes a link between calculated returns and subsequent actual returns. On the surface, this link might be open to question (particularly in the case of equities, whose calculated returns are imprecise). Over time, however, higher risk should reap higher returns. Furthermore, movement toward equilibrium conditions can introduce a correcting mechanism in relative returns. If bonds priced to yield 10 per cent produce zero return in a given year (dropping in price by 10 per cent to offset the 10 per cent earned yield), they will then be priced to yield 11 to 12 per cent. Since this process cannot continue indefinitely, returns are eventually vulnerable to correction. Likewise, divergences from calculated equity return estimates can persist if, and only if, the outlook implicit in the dividend discount model is wrong. Otherwise, equity returns are governed by the same self-correcting mechanism that governs bond returns.

The critical step, of course, is to transform a return outlook into an asset allocation strategy. Using the simplest form of the model, with deployment based solely on relative calculated returns, we find that equities virtually *always* have the best expected return. Does this suggest that investors hold only equities? Of course not. We need to respond to variations in implied relative return estimates, particularly as extremes are reached. In 1981, for example, equity return estimates approximately matched bond yields; far from being a neutral situation for equities, this represented an extraordinarily low return advantage for equities. By comparing the relative return estimates with "normal" relative returns, we can deduce which asset classes are particularly attractive in any market conditions.

Stage 1: Relative Returns as Predictors

The heart of the strategy is the calculation of estimated returns. Cash yield *is* the return for cash. Bond yield to maturity *is* the long-term return for fixed income. The dividend discount model rate of return for equities *is* the long-term return for equities (provided the estimates used in the model are legitimate). It is thus appropriate to use these market-implicit returns. Even if the markets remain in equilibrium (with calculated

Table I Calculated Returns vs. Subsequent Actual Returns (Stage 1)

	Realized Return per 1% Anticipated Return	
	One-Month	*One-Year*
Equities vs. Bonds	0.64%	5.4%
Equities vs. Cash	0.58%	2.4%
Bonds vs. Cash	0.35%	2.4%

returns remaining constant over time), their returns will be as expected.

Table I shows that the calculated relative returns for equities, cash and bonds are all correlated with the actual relative performance of these asset classes over a subsequent one-year or even a subsequent one-month span.[3] From January 1, 1973 through December 31, 1982, each one percentage point difference in calculated relative returns was worth anywhere from 2.4 to 5.4 per cent in actual return over a subsequent year![4] This should not be surprising. If the markets are in equilibrium (with calculated returns remaining constant over time), then each 1 per cent in calculated expected return will be worth exactly 1 per cent in subsequent return. One per cent of expected return is worth *more* than 1 per cent in subsequent return simply because relative returns tend to move toward "normal" from extremes.

We found that normal relative returns amounted to 2 per cent for long bonds *vis-a-vis* cash and 5 per cent for equities *vis-a-vis* bonds. This means that when long bond yields are more than 2 per cent above cash yields, bonds subsequently tend to do well. When the yield differential falls below 2 per cent (or, further, when the yield curve is "negative"), bonds tend to perform poorly.

This happens because long bond yields have a tendency to move toward a 2 per cent premium over cash yields. If the premium is greater than 2 per cent, the tendency toward falling yields produces good bond returns; if the premium is less than 2 per cent, the tendency toward rising yields produces poor bond returns. Similarly, when calculated equity returns exceed bond yields by more than 5 per cent, equities do well; when the equity risk premium falls below 5 per cent, they do poorly.

These normal relative returns are similar to long-term historical results.[5] The equity returns, however, are higher than historical returns alone would indicate. They have been adjusted upward to account for the fact that analysts frequently overstate future earnings and earnings growth, which results in overstated calculated returns.

Table II shows that the calculated risk premium for equities relative to bonds is highly correlated with the subsequent one-month and one-year relative performances of equities relative to bonds. The calculated risk premium for equities relative to bonds is also meaningfully related to the subsequent performance of equities relative to cash but not to subsequent bond returns relative to cash (exactly as might be expected). The calculated risk premium for bonds relative to cash (long bond yield to maturity less cash yields) is significant and positively related to subsequent results for equity relative to cash and for bonds relative to cash; it is not significantly

Table II Effectiveness of Stage 1 Predictors (correlations and t-statistics)

EX = Equity Excess Return (Expected Equity Return − Expected Bond Return)
BX = Bond Excess Return (Expected Bond Return − Expected Cash Return)

	Equity Return − Bond Return		*Equity Return − Cash Return*		*Bond Return − Cash Return*	
	One-Month	*One-Year*	*One-Month*	*One-Year*	*One-Month*	*One-Year*
Stage 1:						
EX	0.21^b	0.47^b	0.16^a	0.24^a	−0.08	-0.39^b
	(3.1)	(7.4)	(2.3)	(3.4)	(−1.2)	(−6.0)
BX	0.14^a	0.04	0.22^a	0.20^a	0.17^a	0.34^b
	(2.0)	(0.6)	(3.2)	(2.7)	(2.5)	(5.1)
Stage 1 Prediction:	0.25^b	0.48^b	0.27^b	0.31^b	0.20^b	0.53^b
	(3.6)	(7.4)	(3.9)	(4.4)	(2.8)	(8.5)

a. Significant at 95 per cent level.
b. Significant at 99.9 per cent level.

Table III Effectiveness of Stage 2 Predictors (correlations and t-statistics)

DEX = Equity Excess Return Trend (EX − 24-month moving average of EX)
DBX = Bond Excess Return Trend (BX − 24-month moving average of BX)
DCR = Real Return Trend (Real Cash Return − 24-month moving average of Real Cash Return)

	Equity Return − Bond Return		*Equity Return − Cash Return*		*Bond Return − Cash Return*	
	One-Month	*One-Year*	*One-Month*	*One-Year*	*One-Month*	*One-Year*
Stage 2:						
DEX	0.17[a]	0.33[b]	0.19[a]	0.23[b]	0.05	−0.13
	(2.4)	(4.7)	(2.6)	(3.1)	(0.7)	(−1.7)
DBX	0.17[a]	0.10	0.25[b]	0.36[b]	0.19[a]	0.53[b]
	(2.3)	(1.3)	(3.5)	(5.1)	(2.6)	(8.6)
DCR	−0.19[a]	−0.48[b]	−0.15[a]	−0.35[b]	0.06	0.23[b]
	(−2.7)	(−7.3)	(−2.1)	(−5.0)	(0.9)	(3.3)
Stage 2 Prediction:	0.31[b]	0.64[b]	0.34[b]	0.54[b]	0.27[b]	0.78[b]
	(4.5)	(11.0)	(4.9)	(8.5)	(3.8)	(16.8)

a. Significant at 95 per cent level.
b. Significant at 99.9 per cent level.

related to equity returns relative to bond results (although there appears to be a moderate positive relation, which was not expected).

This "Stage 1" approach is simple but effective. Table V shows that asset deployment conforming to these observed systematic effects would have produced superior portfolio returns, corresponding to the first quartile of the Becker universe, in two of the 10 years and results above the Becker median in nine of the 10 years (failing by a small margin in 1977). The compound results for 10, five and three-year periods all rank in the first quartile of the Becker universe. The anualized excess return, ranging from −140 to +900 basis points, averages 280 basis points. The worst shortfalls in performance (about 100 basis points) are dwarfed by the superior returns (over 900 basis points). Furthermore, this systematic approach to asset deployment adds the most value during periods of severe economic and market uncertainty.

The results are particularly striking when one considers that they were achieved without either issue selection or sector selection within the asset classes. First quartile results are generally achieved only with very aggressive asset allocation or a strong bias towards a single asset class. Our approach, constrained to an equilibrium portfolio that tracks the Becker median, achieves these results while emphasizing moderation. The performance shown here is obviously only a starting point: Superior issue or sector selection within the asset classes should result in still better performance.

Stage 2: Incorporating Real Returns and Leading Indicators

While the approach described above is both effective and consistent, factors other than relative returns affect asset allocation. Trends in relative calculated returns are almost as significant as calculated relative returns *per se*. For example, if expected equity returns are 5 per cent above bond yields, the Stage 1 model would suggest that these two markets are in equilibrium. However, if relative returns have averaged 3 per cent over the last two years, then the 5 per cent risk premium for equities is above average. Table III suggests that each percentage point above or below the two-year average is every bit as important as the relative returns used in Stage 1.

Another relevant factor is real interest rates (simplistically defined as the difference between cash returns and the latest 12-month percentage change in the Consumer Price Index). Our research confirms the finding of other research that no statistically significant current relation exists between inflation and the level of interest rates.[6] We do, however, find a lagged relation: The level of real interest rates is related to subsequent changes in interest rates. When real interest rates are high, the nominal rate tends subsequently to drop; when real rates are low, nominal rates tend subsequently to rise. A more significant phenomenon is based on recent increases or decreases in real interest rates: If current real rates are above the two-year average of real rates, nominal rates will be under significant pressure to drop, and vice versa, as Table III

Table IV Effectiveness of Stage 3 Predictors (correlations and t-statistics)

LEAD = 12-month percentage change in Department of Commerce Leading Indicators
PEAK = Proprietary Economic Peak/Trough Indicator
CYCC = Proprietary Market Cycle Indicator
MONC = Proprietary Monetary Indicator

	Equity Return – Bond Return		*Equity Return – Cash Return*		*Bond Return – Cash Return*	
	One-Month	*One-Year*	*One-Month*	*One-Year*	*One-Month*	*One-Year*
Stage 3:						
LEAD	0.08	−0.11	0.06	−0.18[a]	−0.03	−0.21[b]
	(1.1)	(−1.5)	(0.8)	(−2.5)	(−0.4)	(−3.0)
PEAK	0.14	0.23[b]	0.16[a]	0.17[a]	0.04	−0.08
	(1.9)	(3.2)	(2.2)	(2.3)	(0.6)	(−1.1)
CYCC	−0.18[a]	0.02	−0.08	0.14	0.18[a]	0.29[b]
	(−2.5)	(0.3)	(+1.1)	(1.9)	(2.5)	(4.1)
MONC	−0.07	−0.04	−0.05	0.14	0.03	0.38[b]
	(−1.0)	(−0.5)	(−0.7)	(1.8)	(0.5)	(5.6)
Stage 3 Prediction:	0.40[b]	0.67[b]	0.39[b]	0.58[b]	0.37[b]	0.82[b]
	(6.1)	(12.2)	(5.8)	(9.5)	(5.5)	(19.7)

a. Significant at 95 per cent level.
b. Significant at 99.9 per cent level.

shows.

A rather startling finding is that trends in real interest rates are far more significant for equity performance than for bond performance. Real rates well above the two-year average hamper equity performance severely, as shown in the results for equities relative to bonds and for equities relative to cash.

Table V shows that incorporating this additional information produces better performance than the Stage 1 results in eight of the last 10 years, and results in three first-quartile years. The value added relative to the Becker median averages 330 basis points and ranges from −60 to +780 basis points. As with the Stage 1 model, the Stage 2 model underperforms the Becker median only in 1977.

Stage 3: The Value of Other Information

The 12-month trailing rate of change in the Department of Commerce's leading indicators has been found to be a valuable indicator for the relative returns of equities and bonds. A rising indicator favors equities over bonds; a falling indicator suggests the opposite.

Finally, our research suggests the value of incorporating additional information. We have developed and use proprietary models for predicting economic health, interest rates and market outlook. Tables IV and V suggest that including such additional information can add roughly as much value to the Stage 2 results as the Stage 2 information added to the Stage 1 results. This additional information adds value relative to Stage 2 results in nine of 10 years (failing to help only in 1981, but still resulting in returns that exceed the Becker median). Annualized performance relative to the Becker median ranges from −50 basis points (1977 again) to +1150 basis points, averaging 410 basis points above the median. Results for five of the 10 years fall in the first quartile.

Implementing an Optimal Allocation Strategy

It has been said that portfolio management is the management of risk, not returns. Any asset allocation strategy will, of course, be constrained by real-world considerations. Most importantly, the strategy's objective is to provide consistently superior performance relative to an established benchmark that reflects client risk-reward objectives. Second, long term, the risk (portfolio volatility) should be comparable to that of the benchmark. Furthermore, deployment shifts should be minimized except at key turning points.

Such constraints preclude certain simplistic strategies. For example, investment in only the most attractive asset class might yield superior results, but it will not do so consistently, or at least not consistently enough to satisfy the investment community. Also, focus on the most attrac-

Table V Systematic Asset Allocation Total Returns

	Asset Class[a]			*Becker*		*Test Results[b]*		
	Cash	*Bond*	*Equity*	*Balanced*	*Top Quartile*	*Stage 1*	*Stage 2*	*Stage 3*
1973	7.4	−3.8	−15.0	−13.3	−8.7	−7.4 (1)	−6.2 (1)	−5.8 (1)
1974	8.5	4.3	−26.4	−18.4	−13.6	−9.4 (1)	−10.6 (1)	−6.9 (1)
1975	6.5	7.4	37.3	21.7	26.3	24.8 (2)	27.2 (1)	27.8 (1)
1976	5.6	13.6	23.6	17.9	20.1	19.5 (2)	19.6 (2)	19.8 (2)
1977	5.8	2.5	−7.4	−2.3	−0.2	−3.7 (3)	−2.9 (3)	−2.8 (3)
1978	8.1	1.8	6.5	5.0	7.0	5.7 (2)	6.3 (2)	6.4 (2)
1979	10.9	1.7	18.5	11.8	14.8	12.0 (2)	12.3 (2)	12.5 (2)
1980	12.7	−0.3	32.5	19.3	24.1	20.9 (2)	23.7 (2)	25.3 (1)
1981	15.6	6.2	−4.9	1.7	5.1	3.8 (2)	2.5 (2)	2.1 (2)
1982	11.8	28.7	21.6	23.8	27.2	26.3 (2)	26.6 (2)	27.4 (1)
10-Year	9.2	5.9	6.6	5.7	6.9	8.5 (1)	9.0 (1)	9.8 (1)
5-Year	11.8	7.1	14.1	12.1	13.2	13.4 (1)	13.9 (1)	14.3 (1)
3-Year	13.4	10.9	15.3	14.2	15.7	16.6 (1)	17.1 (1)	17.7 (1)

a. For purposes of this research, we define the asset classes as follows:
Cash = Six-month Treasury bills
Bond = 10-year government bonds
Equity = S&P 500.

b. Becker quartile in parentheses.

tive asset class is unlikely to result in risk characteristics that match those of the benchmark, hence will violate the second constraint. Finally, focusing on one asset class might also result in unnecessarily high turnover when two asset classes are approximately equal in attractiveness and take turns on top; this violates the third constraint. Similar problems result from any strategy that systematically favors any single asset class. In short, overly simplistic or extreme strategies are a disservice to the client.

Clearly, a systematic set of rules is needed to transform return estimates into strategy. The results presented here are based on the following rules:

(1) An equilibrium benchmark establishes the "normal" risk tolerance for a portfolio. A baseline portfolio with 10 per cent cash, 30 per cent bonds and 60 per cent equities creates parallel returns to those achieved by the Becker median over the decade 1973–82. This ratio was selected as the best aggregate measure of institutional managers' asset exposure.

(2) Deviations from the equilibrium are based *solely* on the relative attractiveness of the asset classes. For instance, if equities appear attractive relative to bonds, the baseline asset mix is shifted from bonds to equities by 5 per cent for each 1 per cent of excess relative return for equities. This ratio was selected because it leads to an acceptable degree of turnover.

(3) Deviations from the baseline portfolio are held to comfortable limits. For example, cash can range from zero to 35 per cent of the portfolio, bonds from 20 to 60 per cent, and equities from 40 to 80 per cent. Without constraints, these limits would have been exceeded in only 14 of the 120 months covered in the study. Such constraints may provide a margin of comfort for the client and manager.

Figures A, B and C are based on an asset allocation model that used regressions to project near-term asset class performance based on relative market returns, real returns, recent trends in these returns (differences from the two-year averages) and on economic indicators. Asset allocation was adjusted 5 per cent away from the equilibrium asset mix for each 1 per cent of expected relative return, subject to the constraints described above.

Figures A and B illustrate the potential for enhancing total return through deployment optimization techniques. Stage 1, 2 and 3 results are shown in the traditional Becker quartile displays. Figure A shows each of the last 10 one-year results, and Figure B shows the 10-year, five-year and three-year annualized results (also detailed in Table V).

Figure C illustrates the mix of bonds, cash and equities that achieved these results from a Stage 2 model. The noteworthy characteristic is the change in asset mix at key turning points. Note the high cash in 1973, the aggressive equity posi-

Figure A Annual Performance, 1973–1982

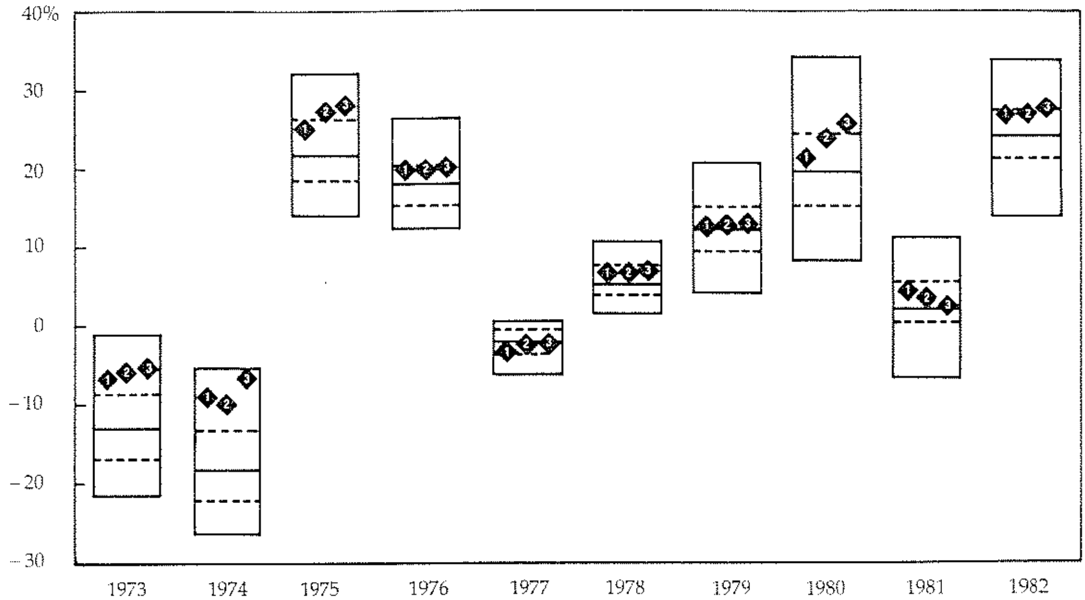

Figure B Compound Performance

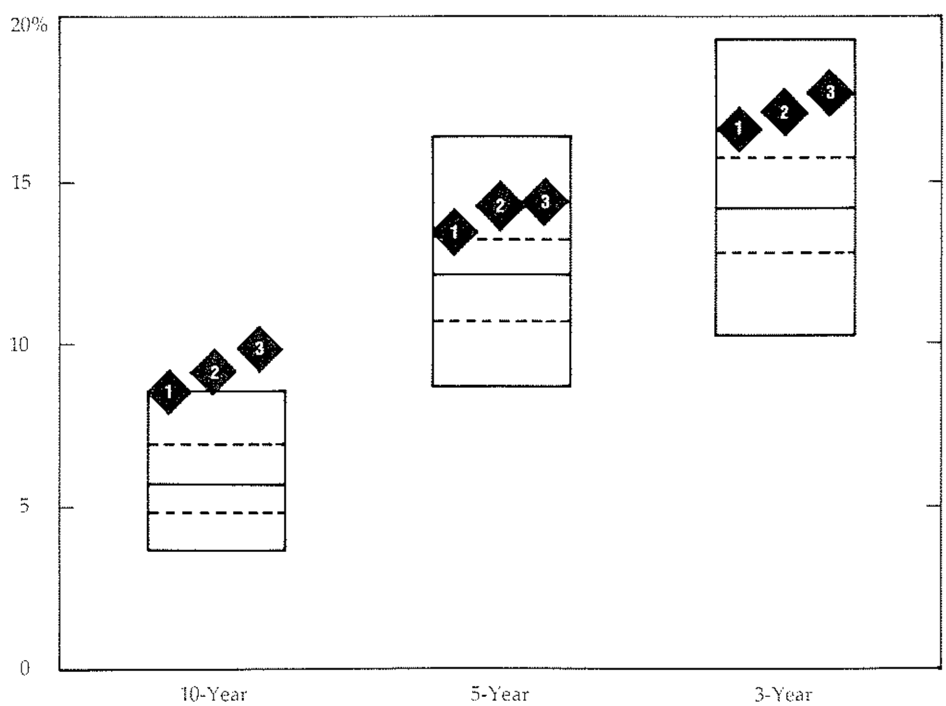

Figure C Asset Allocation, 1973–1982

tion in late 1974, the timely (and rapid) shifts during the turbulent 1979–80 period, the boost in bond holdings in 1981–82, and the aggressive zero-cash position beginning in mid-1982.

Obviously, this systematic approach to asset allocation points the way for the balanced manager to make the uncomfortable bets at key turning points. The strategy pays off impressively during turbulent markets (1973–75, 1979–82), in periods when asset deployment can have a major impact on balanced performance. During less turbulent years, asset allocation is less critical, hence it is not surprising that only modest value is added during such times. ■

Footnotes

1. See, for example, Kathleen Condon, William Fouse and Mark Kritzman, "Asset Mix Model," in *Asset Allocation Decisions in Portfolio Management* (Charlottesville, VA: Institute of Chartered Financial Analysts, 1982).
2. To estimate the market return, we create a dividend discount model rate of return for each stock in the S&P 500 and compute a capitalization-weighted average.
3. The t-statistic shows that these results are all statistically significant.
4. An expected return difference of 1 per cent could become an actual difference of more than 1 per cent in the subsequent year because the expected returns for bonds and equities are long term. If the expected return premium for equities relative to bonds is 10 per cent, and stocks beat bonds by 20 per cent, that return premium will only narrow to roughly 9 per cent. In essence, the investor has collected the 10 per cent expected return difference plus some of the expected difference for future years. The market is awarding the return difference sooner, rather than later. This is a common phenomenon when markets get out of balance.
5. See Roger G. Ibbotson and Rex A. Sinquefield, *Stocks, Bonds, Bills, and Inflation: The Past and The Future* (Charlottesville, VA: The Financial Analysts Research Foundation, 1982).
6. See Peter Bernstein, "Capital Market Expectations: The Macro Factors," in *Managing Investment Portfolios: A Dynamic Process* (Boston: Warren, Gorham, and Lamont, 1983); David A. Levine and Neal Kaplan, *Interest Rates and Inflation* (New York: Sanford C. Bernstein & Co., Inc., 1981); Lawrence H. Summers, "The Non-Adjustment of Nominal Interest Rates: A Study of the Fisher Effect" (Paper presented at the Arther Okun Memorial Conference, Columbia University, New York, September 25, 1981); and Steven C. Leuthold, *The Myths of Inflation and Investing* (Chicago: Crain Books, 1980).