Investment Performance Over Bull and Bear Markets: Fabozzi and Francis Revisited

John M. Clinebell*
University of Northern Colorado

Jan R. Squires
Southwest Missouri State University

Jerry L. Stevens
University of Richmond

Fabozzi and Francis present strong evidence in a widely referenced paper that alpha and beta measures do not change over bull and bear markets. Test procedures used by Fabozzi and Francis are replicated in this paper for new samples and for more current periods. Unlike the findings of Fabozzi and Francis, stocks exhibiting statistically different beta measures over bull and bear markets are significantly greater than predicted by chance. This result was especially strong for the 1972 through 1977 market period.

INTRODUCTION

Investment houses regularly publish separate alpha and beta statistics over bull and bear markets for a wide range of stocks. This practice is based on the belief that stock selection is enhanced by taking advantage of different levels of downside protection and upside potential (kinked characteristic lines). A portfolio of such stocks should have more favorable risk/return performance than traditional risk-adjusted return measures indicate.

The classic study refuting the use of upside and downside risk measures was conducted by Fabozzi and Francis (1977). Using standard econometric tests for a large sample of stocks, Fabozzi and Francis found that the proportion of stocks with significant statistical differences in alpha and beta measures over bull and bear markets is no more than predicted by chance. Their finding is consistent over a wide range of alternative definitions of up and down market conditions, and they conclude: "The results above suggest that some investment analysts have fallen into the trap of misapplying econometric models and, as a result, are purveying erroneous information" (Fabozzi and Francis, 1977, p. 1098)

The purposes of this paper are to replicate the Fabozzi and Francis study and evaluate the sensitivity of statistical results to the chosen sample of firms. The analysis also is extended over more current periods to check the robustness of the Fabozzi and Francis findings. Test procedures and methods conform to the original Fabozzi and Francis study, allowing only data differences to affect the results. Stability of alpha measures across bull and bear markets is the only finding from the Fabozzi and Francis paper supported over

* Names of authors are listed in alphabetical order and are not arranged to convey information about relative contributions. This research was supported in part by a summer research grant from the University of Richmond.

0747-5535/93/1500-0014 $01.00

different time periods and different data samples. Beta stability is supported for only one of the three alternative definitions of bull and bear markets when the Fabozzi and Francis data sample is replicated; even then the finding of stability is sensitive to the period of analysis. When an alternative data sample is used, significant beta instability is found for all alternative definitions of bull and bear markets across all recent periods. Finally, beta instability is greatest for bull and bear market definitions and data samples from 1972 through 1977. The collective results of this study suggest that Fabozzi and Francis's results supporting a single factor market model cannot be generalized.

TEST PROCEDURES AND METHODS

THE TWO FACTOR MODEL

Significance tests for differences in systematic risk (beta) in bull and bear markets follow directly from the two factor model developments of Black (1972) and Levy (1974). The starting point for the analysis is the single index market model:

$$(1)\ r_{it} = \alpha_i + \beta_i\, RM_t + e_{it}$$

where:

r_{it} = Total rate of return for the ith common stock in the tth month;

RM = Pretax gain plus cash dividend calculated from the Standard & Poor's 500 Composite Index for the tth month;

e_{it} = Unsystematic residual return for the ith common stock in month t;

α = Intercept term for the ith common stock; and

β = Slope coefficient for the ith common stock that measures the stock's systematic risk.

The single index market model does not allow differences in systematic risk (β) or alpha (α) in bull and bear markets. To test whether beta and/or alpha are stable over bull and bear markets, a two factor model is constructed by introducing a binary dummy variable d_t that takes the value of 1 in bear markets and the value of 0 in bull markets. This modification allows an up and down market value of both alpha and beta. The empirical two factor model is specified as follows:

$$(2)\ r_{it} = \alpha_{1i}\,(1 - d_t) + \alpha_{2i}\, d_t + \beta_{1i}\,(1 - d_t)\, RM_t + \beta_{2i}\, d_t\, RM_t + e_{it}.$$

After simplification equation (2) is expressed as follows:

$$(3)\ r_{it} = \alpha_{1i} + [\alpha_{2i} - \alpha_{1i}]\, d_t + \beta_{1i}\, RM_t + [\beta_{2i} - \beta_{1i}]\, d_t\, RM_t + e_{it}.$$

Further simplification yields the final empirical model:

$$(4)\ r_{it} = \alpha_{1i} + A_{2i}\, d_t + \beta_{1i}\, RM_t + B_{2i}\, d_t\, RM_t + e_{it}$$

where:

A_{2i} = The difference between bear and bull market alpha measures $[\alpha_{2i} - \alpha_{1i}]$; and

B_{2i} = The difference between bear and bull market betas $[\beta_{2i} - \beta_{1i}]$.[1]

If A_{2i} is not statistically significantly different from zero, the stock's alpha is stable across bull and bear markets. By the same logic, the statistical significance of B_2 offers a test of difference in the stock's beta for bear and bull markets. If a stock offers downside protection, the bear market beta (β_2) should be less than the bull market beta (β_1), resulting in a statistically significant negative value for B_2. The characteristic line in Figure 1 illustrates traditional alpha and beta relationships in the single factor model. Superior risk-adjusted performance is measured by higher alpha (intercept) measures, and the slope of the characteristic line is the stock (or portfolio) beta. Figure 2 illustrates the characteristic line for the two factor model if bear and bull market differences in alpha and/or beta are significant.[2]

BULL AND BEAR MARKET DEFINITIONS

Several alternative definitions for bull and bear markets are found in the literature. This study employs the three definitions of bull and bear markets used by Fabozzi and Francis. Each market definition is discussed below.

- Bull and Bear Markets (BB): Dates published in Cohen, Zinbarg, and Zeikel (1987) are used to determine bull and bear markets. Months with market price increases are classified as bullish by Cohen *et al.* unless both adjacent months have market price decreases (bearish). The BB classification is sensitive to market trends.
- Up and Down Markets (UD): Months with negative market rates of return are classified as down markets. Up markets are months of nonnegative market rates of return. Unlike the BB classification, this approach ignores trends and treats every month independently.
- Substantial Up and Down Months (SUD): Three subsets are used to classify months into either substantial upward movement, substantial downward movement, or neither up nor down movement. A substantial movement is defined as larger than half of one standard deviation of market returns measured over the sample period. Only substantial up or down months are used in the empirical analysis when the SUD procedure is employed.

---

[1] See Johnston (1984, pp. 225-228) for a complete development of the dummy variable approach. Note that the t-test on coefficient A_{2i} represents a test that $\alpha_{2i} = \alpha_{1i}$, and the t-test on coefficient B_{2i} is a test that $\beta_{2i} = \beta_{1i}$.

[2] An empirical example of dummy variables applied to characteristic lines is provided in Stevens and Finn (1990).

Figure 1—Traditional Characteristic Line with a Constant Alpha and Beta in Bull and Bear Markets

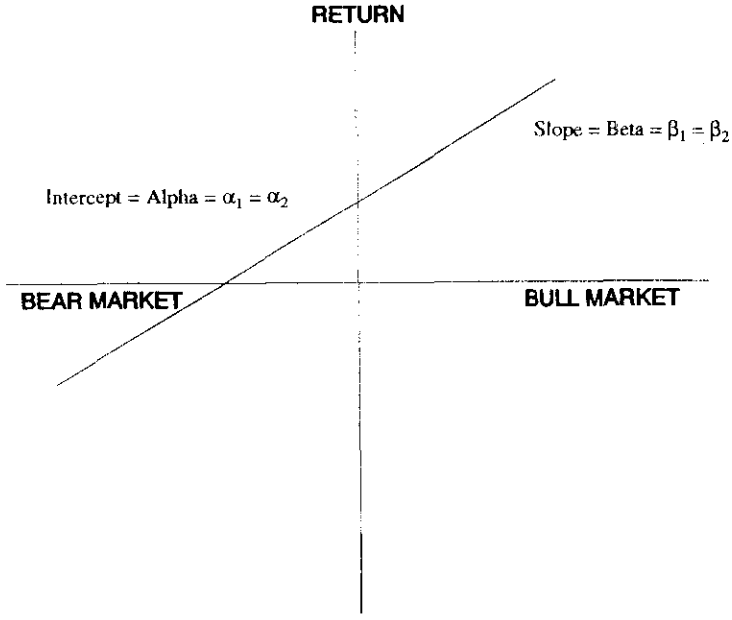
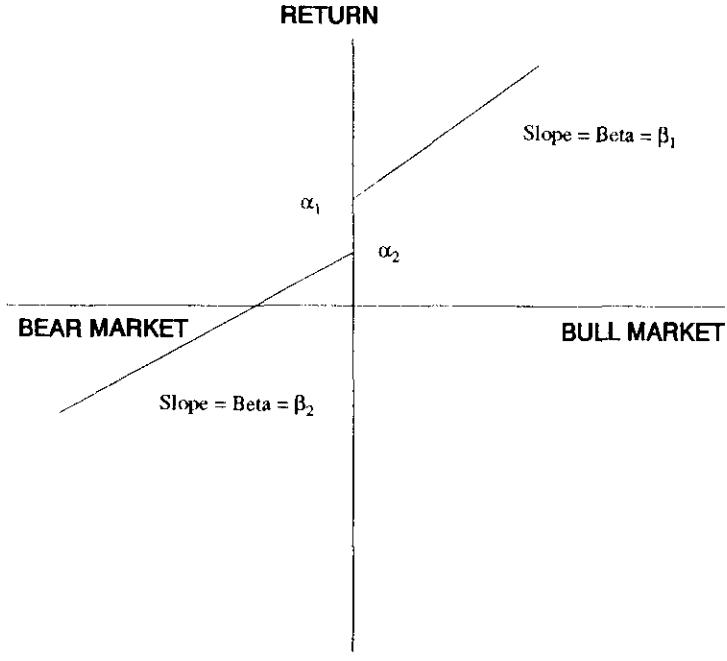


Figure 2—Characteristic Lines with Different Alphas and Betas in Bull and Bear Markets



DATA AND REPLICATION PROCEDURES

Two alternative data sources provide monthly security price information needed to test for stability of alpha and beta measures. Both data sources are used commonly in financial research. The Center for Research in Security Prices (CRSP tapes) and the Standard & Poor's Compustat tape have different advantages and disadvantages. CRSP includes only securities listed on the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX) while Compustat includes the NYSE stocks, AMEX stocks, and actively traded overthe-counter (OTC) stocks. The CRSP data files include securities existing at any time on the NYSE and AMEX, while Compustat drops securities that are not presently traded in the NYSE, AMEX, or OTC markets. Several studies have explored differences in the two data sets, but both services have been found to be equally reliable since 1975.[3]

Like Fabozzi and Francis, monthly returns for the first 700 stocks with continuous data from January 1966 through December 1971 are taken from CRSP tapes. The UD, BB, and SUD definitions explained in the previous section are used to classify bull and bear markets. Monthly S&P 500 returns are used as proxies for market returns. A comparison of empirical results from this first data set with results published in the Fabozzi and Francis paper makes it possible to check for consistency of replication procedures.

The Fabozzi and Francis sample of firms is based on the order of listing in the CRSP data file. To check the sensitivity of the Fabozzi and Francis results to their sample procedure, firms with continuous data from the Compustat data files for the 1966 through 1971 period are used as an alternative sample. A comparison of empirical results from the alternative sample provides a check for sensitivity of the Fabozzi and Francis findings to their sample choice, given the same six year period.

After replicating the Fabozzi and Francis study for 1966 to 1971, successive six year intervals are used to update the study through 1989. Separate samples of firms from CRSP and Compustat are constructed using the same procedures employed for 1966 through 1971. Empirical results from these extended data update the Fabozzi and Francis paper using identical CRSP sampling procedures and also allow additional comparisons with results generated from the Compustat sample. Six year intervals are deemed to be sufficient to include a variety of up and down markets. The six year interval is also consistent with a replication of Fabozzi and Francis's analysis. Each six year period is analyzed separately to allow for potential sensitivity of the analysis to the period from which the sample is constructed. The BB market definition of bull and bear markets is not available for the 1984 through 1989 interval, however, due to the absence of a bear trend. The absence of trend does not affect the SUD or UD definitions over this period.

The net result of the data construction is two separate samples (CRSP and Compustat) over four different six year intervals from January 1966 through December 1989. By first replicating the Fabozzi and Francis paper and extending the analysis for different data sources and time periods, sensitivity of the Fabozzi and Francis conclusions to both sampling and time intervals is revealed.

---

[3] See Bennin's (1980) study of CRSP and Compustat reliability.

EMPIRICAL RESULTS

The empirical two factor model developed in equation (4) is used to test the null hypothesis that alphas and/or betas in bull markets are not statistically different from alphas and/or betas in bear markets ($A_2 = 0$ and/or $B_2 = 0$). Results are presented first for separate tests of alphas and betas followed by joint tests for differences in alpha and beta coefficients.

SEPARATE TESTS OF ALPHAS AND BETAS

Empirical results from replications of the Fabozzi and Francis study from 1966 to 1971 are provided in Table 1. For each definition of bull and bear markets the sample proportion with statistically different alphas ($A_2 \neq 0$) in bull and bear markets is presented along with the sample proportion of statistically different betas ($B_2 \neq 0$). An asterisk is used to identify proportions that are statistically greater than chance would predict. Fabozzi and Francis did not find statistically significant proportions of stocks with different alphas or betas from 1966 through 1971 for any of the definitions of bull and bear markets.

To illustrate the significance test procedure, consider the Fabozzi and Francis finding that only 4.7 percent of their CRSP sample securities have statistically different betas in bull and bear markets when the SUD market definition is used. The null hypothesis is that the observed proportion of stocks with statistically significant differences in bull and bear market betas is equal to the level of significance used to determine whether the dummy variable coefficient is significantly different from zero (5 percent). The appropriate t-test based on the binomial distribution in this case is:

$$t = [(.047) - (.05)] / [(.05)(.95)/700]^{.5} = -.364$$

which is not statistically different from zero, according to the t-test.[4]

The replication results are consistent with the Fabozzi and Francis findings when the same CRSP sampling procedure is used over the period, as the findings in Table 1 illustrate. While there are slight differences in proportions, none of the proportions are statistically significant when the binomial t-test is conducted. The last set of replication results based on the Compustat sample, however, offers a different conclusion. The proportions of stocks with statistically different alphas and betas in bull and bear markets are greater than chance would have predicted when the SUD or UD market definitions are used. The Fabozzi and Francis finding of insignificant differences in alpha or beta across bull and bear markets is supported for the Compustat sample only when the BB market definition is used. The results in Table 1 suggest that the Fabozzi and Francis findings are sensitive to the sample of firms used in the analysis and the definition of bull and bear markets.

Table 2 reports results from an extension of the analysis to successive six year intervals beyond the 1966 to 1971 period used in the Fabozzi and Francis study. First, the same CRSP sample procedure is used for each period so that the only difference from the

[4] The binomial t-test is explained in more detail by Yamane (1967).

Table 1—Summary of Fabozzi and Francis Sample Proportions With Statistically Significant Differences in Alpha or Beta in Bull and Bear Markets Compared to Replications Over 1966 to 1971

Equation: $R_{it} = \alpha_{1i} + A_{2i}\, d_t + \beta_{1i}\, R_{mt} + B_{2i}\, d_t\, R_{mt} + e_{it}$

Study/ *Sample*	Market *Definition*	Coefficient *Tested*	Number of Stocks With Significant Coefficient at 5 Percent	Proportion of Sample With Significant Coefficient at 5 Percent
F&F/CRSP	SUD	$A_2 \neq 0$	32	(4.6%)
		$B_2 \neq 0$	33	(4.7%)
	BB	$A_2 \neq 0$	27	(3.9%)
		$B_2 \neq 0$	46	(6.5%)
	UD	$A_2 \neq 0$	34	(4.8%)
		$B_2 \neq 0$	35	(5.0%)
Replication/ CRSP	SUD	$A_2 \neq 0$	25	(3.6%)
		$B_2 \neq 0$	40	(5.7%)
	BB	$A_2 \neq 0$	23	(3.3%)
		$B_2 \neq 0$	33	(4.7%)
	UD	$A_2 \neq 0$	12	(1.7%)
		$B_2 \neq 0$	42	(6.0%)
Replication/ Compustat	SUD	$A_2 \neq 0$	28	(9.1%)*
		$B_2 \neq 0$	26	(8.4%)*
	BB	$A_2 \neq 0$	13	(4.2%)
		$B_2 \neq 0$	11	(3.6%)
	UD	$A_2 \neq 0$	26	(8.4%)*
		$B_2 \neq 0$	29	(9.4%)*

There were 72 observations per company for the BB and UD market definitions

There were 32 observations per company for the SUD market definition

Significantly higher proportions than sampling theory would predict at the 5 percent level are indicated by an asterisk ( )*

For the CRSP samples there are 700 firms. For the Compustat sample there are 309 firms

Fabozzi and Francis findings first could be attributed to the time period chosen for study. Again, the binomial t-test is used to identify sample proportions of statistically different alphas or betas that are greater than predicted by chance. Proportions of the CRSP samples with statistically significant differences in bull and bear market betas are significantly greater than chance would produce in almost every case. The only exceptions occur when the BB market definition is used. When alpha measures are considered, the Fabozzi and Francis findings are not sensitive to the period chosen for analysis. Alpha measures are more stable than beta measures over bull and bear markets for the CRSP sample of stocks.

Table 2—Summary of CRSP Sample Proportions With Statistically Significant Differences in Alpha or Beta in Bull and Bear Markets for Successive Six Year Periods From 1966 to 1989

Equation: $R_{it} = \alpha_{1i} + A_{2i}\, d_t + \beta_{1i} R_{mt} + B_{2i}\, d_t R_{mt} + e_{it}$

Market Definition	Coefficient Tested	1966 to 1971	1972 to 1977	1978 to 1983	1984 to 1989
SUD	$A_2 \neq 0$	25	25	19	42
	$B_2 \neq 0$	(3.6%)	(3.6%)	(2.7%)	(6.0%)
	$A_2 \neq 0$	40	52	48	59
	$B_2 \neq 0$	(5.7%)	(7.4%)*	(6.9%)*	(8.4%)*
BB	$A_2 \neq 0$	23	19	40	
	$B_2 \neq 0$	(3.3%)	(2.7%)	(5.7%)	n.a.
	$A_2 \neq 0$	33	85	43	
	$B_2 \neq 0$	(4.7%)	(12.1%)*	(6.1%)	n.a.
UD	$A_2 \neq 0$	12	37	28	15
	$B_2 \neq 0$	(1.7%)	(5.3%)	(4.0%)	(2.1%)
	$A_2 \neq 0$	42	56	51	53
	$B_2 \neq 0$	(6.0%)	(8.0%)*	(7.3%)*	(7.6%)*

Following the Fabozzi and Francis approach, the total number of companies in the sample during each period is constant (n = 700)

Because each month represents an observation, there were 72 observations per company for each period when the BB and UD definitions were used. Because the SUD definition recognizes only substantial movements, there are less than 72 observations for each six year period. The periods 1966 to 1971, 1972 to 1977, 1978 to 1983 and 1984 to 1989 had 32, 41, 38 and 38 SUD observations, respectively

The proportion of the sample with statistically significant t-statistics is in parentheses ( )

Significantly higher proportions than sampling theory would predict at the 5 percent level are indicated by an asterisk ( )*

Bull and bear market definitions were not available (n.a.) for the 1984 to 1989 period

Results from the combined extension of the Fabozzi and Francis analysis to successive six year periods and use of the Compustat sample procedure are reported in Table 3. Now the support for statistically significant differences in bull and bear market betas is much stronger for all time intervals, but especially strong for the 1972 to 1977 period. When the Compustat sample procedure is used, statistical tests of sample proportions consistently offer evidence of instability in betas over bull and bear markets. The only exception occurs in the 1966 to 1971 period when the BB market definition is used. Except for the 1966 to 1971 period, alpha measures are stable over bull and bear markets when the Compustat sample procedure is used, just as they were with the CRSP sample.

The collective results from Tables 1, 2, and 3 suggest that the Fabozzi and Francis findings are sensitive to their sample procedure and period of analysis. When other periods are studied, the Fabozzi and Francis conclusion that betas are stable over bull and bear markets is not supported uniformly, especially when the market definition is not based on trends. When a viable alternative sample of firms is used, even stronger contradictions to

Table 3—Summary of Compustat Sample Proportions With Statistically Significant Differences in Alpha or Beta in Bull and Bear Markets for Successive Six Year Periods From 1966 to 1989.

Equation: $R_{it} = \alpha_{1i} + A_{2i}\, d_t + \beta_{1i} R_{mt} + B_{2i}\, d_t R_{mt} + e_{it}$

Market Definition	Coefficient Tested	1966-1971 n=309	1972-1977 n=851	1978-1983 n=951	1984-1989 n=1156
SUD	$A_2 \neq 0$	28 (9.1%)*	36 (4.2%)	41 (4.3%)	47 (4.1%)
	$B_2 \neq 0$	26 (8.4%)*	143 (16.8%)*	78 (8.2%)*	100 (8.7%)*
BB	$A_2 \neq 0$	13 (4.2%)	11 (1.3%)	16 (1.7%)	n.a.
	$B_2 \neq 0$	11 (3.6%)	131 (15.4%)*	60 (6.3%)*	n.a.
UD	$A_2 \neq 0$	26 (8.4%)*	38 (4.5%)	18 (1.9%)	47 (4.1%)
	$B_2 \neq 0$	29 (9.4%)*	167 (19.6%)*	73 (7.7%)*	105 (9.1%)*

When Compustat is used, the total number of companies in the sample changes for each period

Because each month represents an observation, there were 72 observations per company for each period when the BB and UD definitions were used. Because the SUD definition recognizes only substantial movements, there are less than 72 observations for each six year period. The periods 1966 to 1971, 1972 to 1977, 1978 to 1983, and 1984 to 1989 had 32, 41, 38 and 38 SUD observations, respectively

The proportion of the sample with statistically significant t-statistics is in parentheses ( )

Significantly higher proportions than sampling theory would predict at the 5 percent level are indicated by an asterisk ( )*

Bull and bear market definitions were not available (n.a.) for the 1984 to 1989 period

the Fabozzi and Francis findings of beta stability over bull and bear markets are found. The stability of alpha measures over bull and bear markets is the only Fabozzi and Francis finding that is not highly sensitive to the chosen time period and sample procedure.

JOINT ALPHA AND BETA TEST RESULTS

If the distribution of returns for a stock is different in bull and bear markets, both coefficients in equation (4) may change simultaneously. The analysis reported in Tables 1 through 3 is based on separate changes in either alpha or beta. A joint test that both alpha and beta change over bull and bear markets is provided by an F-test on the marginal sum-of-squared errors obtained by advancing from the single index model of equation (1) to the two factor model of equation (4).[5] A significant F-statistic indicates that the two factor

[5] See Johnston (1984, pp. 107-225) for a complete discussion of the F-test statistic used to evaluate the significance of the reduction in the sum-of-squared errors due to using equation (4) rather than equation (1).

model allowing a change in coefficients offers a significant reduction in the sum of squared errors. Again, the binomial t-test is used to determine if the proportion of stocks with statistically significant F-tests are higher than chance would predict.

The joint alpha and beta tests from the Fabozzi and Francis paper and results from extensions over more recent periods are provided in Table 4. Fabozzi and Francis found that the two factor model of equation (4) significantly reduces the residual sum of squares for a proportion of stocks that are no larger than predicted by chance. Fabozzi and Francis conclude that the single index market model of equation (1) is not significantly different in bull and bear markets. Again, the results in Table 4 suggest that this conclusion is sensitive to the sample procedure and period of analysis. When more recent periods are analyzed, there is value to the two factor model of equation (4) even when the same Fabozzi and Francis sample procedure is used. Differences in alpha and beta are most common for the 1972 to 1977 period. Stronger contradictions to the Fabozzi and Francis findings are found when the Compustat sample procedure is used. The proportion of stocks where the two factor model results in significantly lower sum-of-squared errors is greater than chance for almost every period and market definition, as indicated by the asterisks in Table 4. The only exception occurs during the 1966 to 1971 period when the BB market definition is employed

SUMMARY AND CONCLUSIONS

The Fabozzi and Francis paper is a popular reference in the finance literature and often is used to defend single index market model applications over periods of bull and bear markets. The Fabozzi and Francis paper, however, was conducted over a decade ago and has not been replicated to test for sensitivity to differences in time and sample procedures. This study replicates the Fabozzi and Francis analysis using the same time period (1966 to 1971) and extends the analysis to more recent six year periods (1972 to 1977, 1978 to 1983, and 1984 to 1989). As an alternative to the CRSP data source used by Fabozzi and Francis, the analysis also is replicated using Compustat data. For each six year period a sample of stocks is constructed from CRSP and an alternative sample of firms is constructed from Compustat. For both data sources, the sample of stocks consists of those stocks continuously listed in the data file for the six year period under consideration. The net result is two data samples, one based on firms selected from CRSP and one from Compustat, over four successive six year periods from 1966 through 1989. This approach allows comparisons of the Fabozzi and Francis findings with findings over different samples of firms over different markets, everything else equal.

Consistent with the Fabozzi and Francis finding, the intercept term of the single index market model (alpha) is found to be stable over different market periods for both alternative data sources. Because the alpha measure of excess risk-adjusted returns is stable across bull and bear markets, there is no evidence that subsets of stocks systematically do better in bull or bear markets given their risk. This finding casts doubt on investment strategies designed to rotate in or out of specific groups of stocks based on expectations of higher or lower alphas in bull and bear markets.

Unlike the Fabozzi and Francis finding of alpha stability, stability of beta over bull and bear markets is not supported uniformly over different market periods, different samples of stocks and different definitions of bull and bear markets. When the CRSP data

Table 4—Summary of Sample Proportions With Statistically Significant Differences in Alpha and Beta in Bull and Bear Markets for Successive Six Year Periods From 1966 to 1989

Equation: $R_{it} = \alpha_{1i} + A_{2i} d_t + \beta_{1i} R_{mt} + B_{2i} d_t R_{mt} + e_{it}$

Study/ Sample	Market Definition	Test	1966 to 1971	1972 to 1977	1978 to 1983	1984 to 1989
Fabozzi & Francis/ CRSP	SUD	$A_2 \neq B_2 \neq 0$	34 (4.8%)	n.a.	n.a.	n.a.
	BB	$A_2 \neq B_2 \neq 0$	43 (6.2%)	n.a.	n.a.	n.a.
	UD	$A_2 \neq B_2 \neq 0$	27 (3.9%)	n.a.	n.a.	n.a.
Replication/ CRSP	SUD	$A_2 \neq B_2 \neq 0$	40 (5.7%)	51 (7.3%)*	40 (5.7%)	44 (6.3%)*
	BB	$A_2 \neq B_2 \neq 0$	23 (3.3%)	53 (7.6%)*	49 (7.0%)*	n.a.
	UD	$A_2 \neq B_2 \neq 0$	30 (4.3%)	54 (7.7%)*	38 (5.4%)	37 (5.3%)
Replication/ Compustat	SUD	$A_2 \neq B_2 \neq 0$	23 (7.4%)*	168 (19.7%)*	85 (8.9%)*	81 (7.0%)*
	BB	$A_2 \neq B_2 \neq 0$	11 (3.6%)	136 (16.0%)*	60 (6.3%)*	n.a.
	UD	$A_2 \neq B_2 \neq 0$	29 (9.4%)*	164 (19.3%)*	73 (7.7%)*	90 (7.8%)*

The number of firms and observations for each period are noted in Table 2 and Table 3

Significantly higher proportions of $A_2 \neq B_2 \neq 0$ than sampling theory would predict at the 5 percent level are indicated by an asterisk ( )*

The Fabozzi and Francis analysis was not available (n.a.) for subperiods following 1966 to 1971

sample is used, beta stability is found only for the BB definition of bull and bear markets and only for the 1966 to 1971 and 1977 to 1983 market periods. When the Compustat data sample is used the support for beta stability is even weaker. Only when the BB market definition is used for the 1966 to 1971 period is the beta stability hypothesis accepted.

Several general patterns are found in the replication results. First, findings of beta instability are especially strong for the 1972 to 1977 market period for all data samples and all definitions of bull and bear markets. Second, the Fabozzi and Francis findings of beta stability tend to be sensitive to the definition of bull and bear markets. Beta stability is supported more often when bull and bear markets are defined as general upward or downward trends (BB definition), even though there are exceptions when the Compustat data are used. Third, stocks taken from the Compustat file consistently offer stronger support for beta instability than stocks taken from the CRSP data file. Although there are several differences in the Compustat and CRSP data files, support for beta stability

appears to be less likely when OTC stocks are included with NYSE and AMEX stocks for the analysis. Additional extensions of the Fabozzi and Francis study are beyond the scope of this paper, but the evidence presented here suggests that extensions of the single index market model are necessary for a significant subset of stocks.

REFERENCES

1. Bennin, Robert, "Error Rates in CRSP and Compustat: A Second Look," *Journal of Finance*, 35 (December 1980), pp. 1267-1271.

2. Black, Fisher, "Capital Market Equilibrium with Restricted Borrowing," *Journal of Business*, 45 (July 1972), pp. 444-455.

3. Cohen, J. B., E. D. Zinbarg, and A. Zeikel, *Investment Analysis and Portfolio Management*, 5th Edition (Homewood, IL: R. D. Irwin Co., 1987).

4. Fabozzi, Frank J., and Jack Clark-Francis, "Stability Tests for Alphas and Betas over Bull and Bear Market Conditions," *Journal of Finance*, 32 (September 1977), pp. 1093-1099.

5. Johnston, J., *Econometric Methods* (3rd Edition) (New York, NY: McGraw-Hill Co., 1984).

6. Levy, Robert A., "Beta Coefficients as Predictors of Returns," *Financial Analysts Journal*, 30 (January-February 1974), pp. 61-69.

7. Stevens, Jerry L., and Mark Finn, "Investment Performance of an 'Extreme Value' Market-Timing Approach," *Journal of Financial Planning*, 3 (January 1990), pp. 28-35.

8. Yamane, Taro, *Statistics*, 2nd edition (New York, NY: Harper and Row Publishers Inc., 1967), Chapter 18.