On the Short-Term Stationarity of Beta Coefficients

by ROBERT A. LEVY

THE measurement of risk is currently one of the more prominent topics in the investment community. Perhaps the prominence is due to constant prodding from academic circles; perhaps it can be traced to investor concern over the deplorable performance of formerly favored go-go funds during the 1969-1970 bear market; or perhaps it can be attributed to the extended discussion of the subject in the recently released *Institutional Investor Study Report.*

No matter the reason. The investing public, the mutual funds, the Securities and Exchange Commission and others have now joined the academicians in devoting a great deal of attention to risk, in both its conceptual and quantitative aspects. Indeed, the S.E.C. in their transmittal letter to Congress accompanying the *Institutional Investor Study Report* expressly advocated risk adjustment for determining investment performance, and even went so far as to suggest that incentive management fees be premised upon comparative results between actual portfolios and hypothetical unmanaged portfolios displaying equivalent risk.

Given the necessity of some form of risk measurement, what are the proper methods to use? And will the resultant measures be stationary over time? The latter question has at least two corollaries: (1) Can the future "riskiness" of an investment selection be accurately estimated from its past riskiness? (2) Can an investor who bases his stock selection on forecasting overall market direction rely on the persistence of market-related volatility?

This paper examines one measure of risk that has had wide acceptance in the academic community—the coefficient of market-related risk, often called the volatility or beta coefficient. First, we present a brief justification for the use of this measure; then we analyze its distribution properties as well as its stationarity over periods of 13, 26 and 52 weeks.

Beta As a Measure of Risk

Risk may be defined in terms of the uncertainty of the rate of return. One characteristic which gauges uncertainty in quantitative terms is the variability of return. Available evidence indicates that common stock investors demand and receive a higher level of return with increased variability, thus suggesting that variability and risk are related if not synonymous. Surely, the rational investor would prefer to receive say a 12 per cent annual return at the rate of one per cent per month than at the rate of 20 per cent the first month, —13 per cent the second month, etc.

In measuring variability, the method most widely used to date has been to divide the measurement period into non-overlapping subperiods, and compute the standard deviation (or its square, the variance) of the subperiod rates of returns for each security.

It is of course the risk of the portfolio as a whole rather than of each asset individually that is important to the investor. To illustrate, consider Stock A and Stock B both of which have large return variances. If it is always the case that when Stock A has a high return Stock B has a low

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return, and vice versa, the return on a portfolio of these two securities would be relatively constant. Accordingly, the portfolio would be nearly risk free, even though both of the stocks have highly uncertain returns.

Our task then is to determine the risk of an individual security by ascertaining the extent to which the security is likely to contribute to the variance of the returns on an entire portfolio. Each stock's variance must be divided into two components — the portion due to market movements, and the portion due uniquely to the stock itself. For an investor who can hold only the shares of one company, it is the *total* variance that is most relevant. But for the more usual type of investor who can diversify by investing in other securities, the important risk measure is the portion of total variance which is due to the market. Any risk due uniquely to an individual security can be minimized by diversification.

Clearly, it is the market-related portion of a stock's total risk which determines that stock's impact on the variance of portfolio returns. The label "volatility" is usually employed to designate market-related risk. And volatility, in turn, is represented by the beta coefficient*—a measure of the percentage price change of the stock which has historically accompanied a one per cent move in the market. Securities that are about as volatile as the market will have coefficients around 1.00; securities less volatile will have lower coefficients, and so on.

For a well diversified portfolio with equal investment in each of a number of securities, the variance of portfolio return can be shown to approximate the variance of the market return times the square of the average beta coefficient of the component stocks. Since the market variance is constant for all securities, the average beta becomes a measure of portfolio risk. And thus the individual beta, as it contributes to this average, is a measure of risk for a security.

*Beta may be defined as the slope of the regression of a stock's subperiod returns (S) on the market's subperiod returns (M). Alternatively, it is: Covariance (S, M) / Variance (M).

The Distribution of Beta Coefficients

In evaluating the distribution and stationarity of beta coefficients, we have used weekly returns for 500 common stocks over the period 12/30/60 through 12/18/70 (520 weeks). The stocks chosen were those available on our computer-readable files for the entire 10-year period. All the companies are traded on the N.Y.S.E.; they tend to be the more widely held and actively traded of N.Y.S.E. listings; and they are distributed by industry groups in about the same proportion as are the S&P 500 stocks. (A list of companies is available from the author.)

First, betas were developed for all non-overlapping 52-week periods. Fifty-two weekly returns for a particular security were regressed upon the corresponding returns for the S&P 500 (as a measure of the overall market). This process was repeated for each security and each non-overlapping period. As a result, 500 betas were computed per 52-week period, and a total of 10 periods were covered.

Table 1 summarizes the distribution of these betas in each of the 10 periods in terms of the high, low, mean, standard deviation, and decile points. In addition, the number of betas less than zero is tabulated. Over the entire 10-year period the average

Table 1. Distribution of 52-Week Beta Coefficients — 500 N.Y.S.E. Common Stocks (1961 through 1970)

52 Weeks Ended	Mean	Std. Dev.	No. Below Zero	Low	Deciles .10	.20	.30	.40	.50	.60	.70	.80	.90	High
12/29/61	.924	.520	15	− .541	.278	.507	.633	.749	.892	1.029	1.200	1.325	1.551	3.375
12/28/62	1.074	.408	4	− .405	.592	.739	.833	.943	1.029	1.145	1.242	1.410	1.614	2.289
12/27/63	1.060	.682	2	− .094	.355	.496	.635	.774	.901	1.083	1.286	1.568	1.933	4.034
12/25/64	.998	.679	24	− .638	.188	.425	.595	.780	.942	1.114	1.283	1.534	1.899	3.268
12/24/65	1.085	.586	7	−1.259	.354	.592	.766	.899	1.051	1.247	1.402	1.572	1.793	3.024
12/23/66	1.052	.517	0	.095	.429	.630	.731	.844	.944	1.112	1.279	1.491	1.824	2.812
12/22/67	1.026	.551	14	− .966	.362	.586	.751	.890	1.007	1.154	1.273	1.484	1.726	3.017
12/20/68	1.032	.603	8	−1.194	.355	.539	.687	.821	.961	1.120	1.301	1.479	1.767	3.155
12/19/69	1.113	.496	5	− .697	.567	.732	.849	.947	1.046	1.172	1.319	1.479	1.763	2.875
12/18/70	1.065	.475	4	− .705	.520	.674	.797	.884	.990	1.135	1.293	1.485	1.687	2.474
Average	1.043	.558	8	− .640	.400	.592	.728	.853	.976	1.131	1.288	1.483	1.756	3.032

beta was 1.043, the median was 0.976, and the first and ninth decile points respectively were 0.400 and 1.756. For investors searching for high beta stocks, it is worth noting that in no 52-week period were there as many as 10 per cent of the stocks with betas of 2.00 or greater. Conversely, for those investors seeking stocks which have moved counter to the market, only 1.7 per cent of the companies qualify. The lowest of the 10 mean betas was recorded during the most bullish of the 52-week periods (1961); and the highest of the 10 mean betas was recorded during the most bearish period (1969). But during each of these two periods, the standard deviation of the betas was below average.

In a March 1971 article in *The Journal of Finance,* entitled "On the Assessment of Risk," Marshall E. Blume summarized the distribution of 84-month beta coefficients for six non-overlapping 7-year periods from July 1926 through June 1968. Blume's distribution, not surprisingly, has tighter fractiles, smaller standard deviations and a smaller percentage of negative betas. Our much shorter-term betas, while subject to greater sampling error, are probably of more practical importance to portfolio managers whose time perspective is likely to be considerably shorter than seven years. Nevertheless, we have patterned our study after Blume's initial effort; and we will be comparing our evidence regarding stationarity with the evidence he has already introduced for longer computation periods.

The Stationarity of 52-Week Betas

Perfect assessments of future risk for individual securities could be obtained if betas were constant over time. Since betas are obviously not constant, the critical question is whether or not they are sufficiently stationary for us to act *as if* they were constant. More specifically, in appraising the risk of a well diversified portfolio, we need to determine if *averages* of groups of betas are reasonably stationary. (The errors in predicting the average will tend to be less than the errors in predicting individual securities, provided the latter are independent of each other).

In an effort to measure stationarity in empirical terms, we have correlated each period's 52-week betas with the 52-week betas in the succeeding period, thus performing nine correlation studies over the ten periods. (For ease of exposition, we shall hereafter refer to the independent variable of each correlation study as historical betas, and to the dependent variable as future betas. The historical betas can be regarded as representing predicted risk for the coming period; and the future betas can be regarded as the actual realized risk.)

Portfolios of n securities were constructed as follows: Historical betas were ranked in ascending sequence from 1 to 500. The first portfolio consisted of those securities with the n smallest historical betas; the second portfolio consisted of the next n securities in sequence, etc. The number of securities n was varied over a wide range, including 1, 5, 10, 25 and 50, producing a number of portfolios also varying over a wide range, including respectively 500, 100, 50, 20, and 10. This process was repeated for each of the nine correlation periods.

Blume's article referred to two measures of statistical association: product moment correlations and rank order correlations. If one set of numbers is correlated with another set, the closeness of the relationship can be expressed by the product moment correlation coefficient. Usually, the term

Table 2. 52-Week Forecasts — Product Moment and Rank Order Correlation Coefficients of Betas for Portfolios of N Securities (1962 through 1970)

Forecast for 52 Weeks Ended	Product Moment Correlations: N = 1	5	10	25	50	Rank Order Correlations: N = 1	5	10	25	50
12/28/62	.385	.711	.803	.933	.988	.349	.647	.784	.907	1.000
12/27/63	.492	.806	.866	.931	.963	.499	.820	.877	.944	.988
12/25/64	.430	.715	.825	.945	.970	.448	.749	.878	.956	1.000
12/24/65	.451	.730	.809	.936	.977	.457	.726	.828	.950	.964
12/23/66	.548	.803	.869	.952	.974	.544	.782	.846	.953	.927
12/22/67	.474	.759	.830	.900	.940	.425	.725	.831	.902	.988
12/20/68	.455	.732	.857	.945	.977	.428	.701	.842	.956	.988
12/19/69	.556	.844	.922	.965	.973	.501	.792	.887	.944	.976
12/18/70	.551	.804	.888	.943	.985	.509	.764	.863	.899	.988
Quadratic Mean	.486	.769	.853	.939	.972	.466	.747	.849	.935	.980

"product moment" is omitted, and the statistic is called simply the correlation coefficient. It is of course widely recognized that all correlation and regression studies are subject to errors of estimation; and the results of these studies are markedly influenced by outliers—that is, observations which significantly diverge from average. One method of counteracting the outlier problem is first to rank each of the two sets of numbers, and then to correlate the ranks instead of the numbers themselves. Accordingly, in the Blume article and in the material below, both the product moment and rank order coefficients are tabulated.

Table 2 presents the product moment and rank order correlation coefficients between average historical betas for portfolios of n securities (assuming an equal investment in each security) and average future betas for the same portfolios in the subsequent period. The rank order coefficients are reflective of the predictability of relative portfolio risk levels; and the product moment coefficients are reflective of the predictability of absolute risk levels.

Quadratic means of the nine product moment coefficients are 0.486, 0.769, 0.853, 0.939 and 0.972 for n equal to 1, 5, 10, and 50 respectively. Accordingly, the corresponding average percentages of explained variation are 23.6, 59.1, 72.8, 88.2 and 94.5. Much the same pattern is shown by the rank order coefficients. These results suggest that assessments of future risk are very reliable for large portfolios, somewhat less reliable for smaller portfolios, and quite unreliable for individual securities.

By comparison, the quadratic means of Blume's product moment coefficients (dealing with 84-month betas) were .618, .914 and .982 for portfolios of 1, 10 and 50 securities. His corresponding average percentages of explained variation were 38.2, 83.5 and 96.4 respectively. Clearly, the longer-term betas are more stationary; however, the differences in stationarity between 52-week betas and 84-month betas decrease with portfolio size and are minimal for portfolios of 50 stocks.

Of our nine correlation studies, five covered forecast periods during which the market's performance was the reverse of the preceding period (1961-62, 1962-63, 1965-66, 1966-67 and 1968-69). Notably, the betas were approximately as predictable over these five reversal intervals as over the remaining four intervals.

Beta Predictability Over 26-Week and 13-Week Periods

Next, to test predictability over shorter intervals, we computed betas for all non-overlapping 26 and 13-week periods from 1962 through 1970. These measures were regarded as the dependent variable (i.e., future betas); and historical betas computed for the 52-week intervals immediately preceding each future period were again used as the independent variable.

Table 3. 26-Week Forecasts — Product Moment and Rank Order Correlation Coefficients of Betas for Portfolios of N Securities (1962 through 1970)

Forecast for 26 Weeks Ended	Product Moment Correlations: N =					Rank Order Correlations: N =				
	1	5	10	25	50	1	5	10	25	50
6/29/62	.330	.648	.725	.902	.967	.316	.568	.678	.907	.976
12/28/62	.573	.852	.906	.973	.978	.534	.822	.880	.958	.988
6/28/63	.298	.585	.724	.863	.940	.314	.603	.769	.887	.952
12/27/63	.513	.766	.851	.914	.959	.511	.752	.876	.940	.976
6/26/64	.385	.688	.830	.923	.961	.407	.715	.844	.923	.988
12/25/64	.297	.585	.678	.859	.951	.329	.605	.705	.838	.976
6/25/65	.362	.617	.739	.910	.955	.374	.620	.761	.929	.964
12/24/65	.374	.687	.778	.898	.965	.409	.700	.794	.940	.976
6/24/66	.514	.792	.855	.944	.966	.509	.770	.822	.944	.976
12/23/66	.641	.880	.929	.978	.990	.623	.862	.919	.979	.988
6/23/67	.390	.692	.825	.894	.949	.350	.646	.813	.875	.988
12/22/67	.332	.610	.719	.842	.910	.321	.579	.691	.829	.939
6/21/68	.438	.702	.848	.929	.959	.395	.656	.815	.937	.964
12/20/68	.414	.687	.833	.916	.950	.378	.609	.789	.908	.988
6/20/69	.363	.630	.739	.880	.902	.332	.609	.739	.893	.952
12/19/69	.439	.715	.868	.929	.963	.419	.651	.798	.908	.976
6/19/70	.478	.758	.856	.932	.989	.439	.699	.835	.880	.988
12/18/70	.551	.836	.911	.961	.978	.551	.841	.944	.967	1.000
Quadratic Mean	.438	.713	.815	.914	.958	.427	.690	.807	.914	.975

With respect to the 26-week forecasts, a total of 18 product moment and rank order coefficients were calculated for portfolios of 1, 5, 10, 25 and 50 securities. Twice this number, or 36 studies, were performed in forecasting 13-week betas. The procedures followed were the same as those described above, excepting only the identity of the dependent variable and the number of forecast periods.

Table 3 presents the results for the 26-week forecasts. The averages of 18 product moment coefficients of determination, from smallest portfolio to largest portfolio, show explained variation of 19.2, 50.8, 66.4, 83.5 and 91.8 per cent. The rank order coefficients display a similar pattern. Although these numbers are smaller than their counterparts for 52-week projections, we can still conclude that assessments of future risk are reliable for large portfolios. Interestingly, the differences in explained variation for portfolios of 50 securities are greater between 52-week and 26-week forecasts than between 84-month and 52-week forecasts. Except for portfolios of one security, the differences between 52-week and 26-week predictability narrow as the portfolio size increases.

Of the 18 correlation studies, half covered intervals during which the 52-week historical market performance was opposite in sign to the 26-week future market performance. Once again, the betas were about as predictable over these nine reversal intervals as over the remaining nine intervals.

Table 4. 13-Week Forecasts — Product Moment and Rank Order Correlation Coefficients of Betas for Portfolios of N Securities (1962 through 1970)

Forecast for 13 Weeks Ended	Product Moment Correlations: N =					Rank Order Correlations: N =				
	1	5	10	25	50	1	5	10	25	50
3/30/62	.133	.250	.356	.608	.692	.144	.277	.389	.565	.636
6/29/62	.329	.628	.738	.850	.887	.317	.577	.700	.836	.855
9/28/62	.522	.814	.892	.943	.953	.479	.761	.835	.890	.927
12/28/62	.498	.778	.887	.976	.985	.497	.758	.859	.976	.988
3/29/63	.216	.462	.567	.836	.875	.257	.496	.576	.814	.939
6/28/63	.256	.495	.598	.731	.820	.230	.460	.594	.779	.855
9/27/63	.407	.659	.760	.930	.948	.399	.649	.746	.902	.952
12/27/63	.506	.794	.882	.931	.961	.495	.780	.886	.950	.976
3/27/64	.105	.247	.355	.445	.629	.107	.241	.375	.513	.830
6/26/64	.371	.634	.730	.889	.949	.375	.647	.720	.896	.939
9/25/64	.272	.567	.691	.822	.925	.285	.525	.641	.761	.842
12/25/64	.177	.366	.447	.687	.843	.207	.433	.521	.759	.891
3/26/65	.205	.428	.541	.739	.866	.201	.476	.561	.791	.867
6/25/65	.276	.536	.659	.862	.966	.279	.526	.674	.910	.976
9/24/65	.362	.657	.735	.855	.943	.359	.684	.770	.916	.976
12/24/65	.091	.197	.238	.382	.430	.156	.212	.370	.411	.721
3/25/66	.114	.246	.366	.574	.786	.171	.314	.422	.617	.770
6/24/66	.537	.865	.931	.980	.989	.551	.836	.908	.971	.988
9/23/66	.489	.772	.854	.963	.992	.463	.745	.822	.931	.988
12/23/66	.583	.815	.892	.957	.979	.581	.812	.901	.950	.988
3/24/67	.236	.462	.583	.694	.809	.195	.343	.499	.508	.721
6/23/67	.391	.669	.830	.934	.952	.406	.670	.850	.940	.964
9/22/67	.246	.478	.583	.738	.796	.267	.465	.593	.728	.745
12/22/67	.221	.417	.523	.671	.849	.220	.379	.464	.638	.964
3/22/68	.348	.616	.723	.913	.953	.297	.568	.665	.920	.976
6/21/68	.388	.659	.747	.904	.919	.379	.601	.687	.875	.879
9/20/68	.377	.634	.777	.879	.932	.358	.553	.717	.854	.952
12/20/68	.258	.510	.653	.787	.941	.222	.408	.611	.759	.927
3/21/69	.372	.674	.796	.909	.940	.291	.561	.734	.854	.903
6/20/69	.295	.596	.719	.807	.840	.296	.579	.694	.798	.915
9/19/69	.409	.705	.848	.923	.955	.422	.676	.823	.913	.964
12/19/69	.350	.672	.772	.886	.921	.304	.575	.677	.883	.903
3/20/70	.331	.639	.788	.900	.944	.295	.537	.690	.862	.891
6/19/70	.444	.756	.868	.958	.972	.408	.702	.821	.946	.927
9/18/70	.468	.772	.866	.926	.952	.489	.787	.918	.958	.976
12/18/70	.423	.685	.776	.916	.956	.396	.668	.757	.937	.964
Quadratic Mean	.357	.613	.715	.838	.897	.349	.587	.697	.832	.906

Results for 13-week forecasts are summarized in Table 4. Conclusions to be drawn from Table 4 are in part the same as those stated above: (1) Average betas are reasonably predictable for large portfolios, less predictable for smaller portfolios, and quite unpredictable for individual securities; (2) Forecasts are clearly better over longer periods than over shorter periods; (3) Although predictability improves as the forecast period lengthens, the relative improvement tends to be less for larger portfolios; (4) Product moment and rank order coefficients display similar patterns and are of similar magnitude; and (5) Reversals in the market occurring near the forecast date do not diminish the degree of predictability.

Table 4 does, however, reveal two new and important facts. First, there is a much greater deterioration in forecasting accuracy when moving from 26-week to 13-week projections than when moving from 52-week to 26-week projections. Even for portfolios of 50 securities, the average percentage of explained variation is only 80 per cent for the 13-week studies, comparing unfavorably with 92 and 94 per cent respectively for 26-week and 52-week forecasts. Second, there are several intervals when the explained variation falls

Table 5. 52-Week Forecasts — Actual Betas Minus Predicted Betas for Portfolios of 50 Securities (1962 through 1970)

Forecast for 52 Weeks Ended	Portfolio No. (1 = Lowest Predicted Beta; 10 = Highest Predicted Beta) 1	2	3	4	5	6	7	8	9	10
12/28/62	.75	.53	.36	.29	.28	.14	.01	−.10	−.23	−.53
12/27/63	.25	−.01	−.03	−.06	−.13	−.06	−.01	.02	.07	−.19
12/25/64	.37	.17	.18	.13	.09	.07	−.04	−.15	−.47	−.97
12/24/65	.77	.46	.27	.31	.13	.10	.05	−.22	−.27	−.74
12/23/66	.54	.32	.12	−.03	.05	−.14	−.09	−.26	−.32	−.54
12/22/67	.39	.07	.21	.13	.14	.05	−.06	−.25	−.50	−.45
12/20/68	.50	.27	.20	.15	.04	−.08	.06	−.23	−.30	−.54
12/19/69	.60	.46	.36	.16	.10	.06	.10	−.22	−.27	−.54
12/18/70	.36	.20	.08	.01	.03	−.05	−.07	−.15	−.39	−.49
Average	.50	.27	.19	.12	.08	.01	−.01	−.17	−.30	−.55

Table 6. 26-Week Forecasts — Actual Betas Minus Predicted Betas for Portfolios of 50 Securities (1962 through 1970)

Forecast for 26 Weeks Ended	Portfolio No. (1 = Lowest Predicted Beta; 10 = Highest Predicted Beta) 1	2	3	4	5	6	7	8	9	10
6/29/62	.67	.49	.34	.25	.24	.10	−.04	−.20	−.27	−.64
12/28/62	.40	.32	.20	.20	.05	.19	.18	.09	.02	.06
6/28/63	.33	.08	.09	.08	−.04	−.13	−.11	−.14	−.16	−.58
12/27/63	.26	−.10	−.02	−.24	−.17	−.13	−.16	−.10	−.07	.06
6/26/64	.38	.17	.18	−.00	.10	.17	.04	−.07	−.17	−.80
12/25/64	.40	.39	.29	.19	−.02	.09	−.18	−.37	−.70	−1.32
6/25/65	.87	.50	.28	.35	.17	.21	.10	−.14	−.26	−.78
12/24/65	.31	.10	.10	−.00	−.03	−.10	−.18	−.38	−.20	−.70
6/24/66	.52	.28	.15	−.05	.21	−.06	.07	−.00	−.11	−.04
12/23/66	.39	.30	.11	.02	−.04	−.14	−.17	−.25	−.49	−.83
6/23/67	.42	.02	.19	.16	.12	.08	−.05	−.23	−.39	−.44
12/22/67	.27	.07	.04	.17	.06	.01	.05	−.19	−.45	−.58
6/21/68	.36	.26	.08	.17	.00	−.05	.07	−.29	−.29	−.56
12/20/68	.68	.31	.32	.17	.12	.14	−.13	−.17	−.27	−.27
6/20/69	.62	.42	.39	.12	.22	.13	.00	−.21	−.35	−.91
12/19/69	.38	.18	.23	.13	−.01	−.02	.06	−.26	−.10	−.28
6/19/70	.35	.19	.04	.01	.03	−.09	−.10	−.24	−.35	−.51
12/18/70	.37	.07	.14	.05	−.02	.04	−.06	−.02	−.04	−.37
Average	.44	.23	.17	.10	.06	.02	−.03	−.18	−.26	−.53

below 50 per cent in predicting 13-week betas for even the largest portfolio. In one case (13 weeks ended 12/24/65), the coefficient of determination falls as low as 18.5 per cent. The lowest comparable number is 81.4 per cent for 26-week forecasts and 88.4 per cent for 52-week forecasts.

Magnitude and Direction of Forecast Errors

In Table 5, we have compiled the average forecast error (i.e., an average of the difference between actual and predicted betas) for each of ten portfolios of 50 securities over 52-week forecast periods. Portfolio number 1 contains the 50 securities with the lowest historical betas; portfolio number 2 contains the 50 securities with the next lowest historical betas, etc. Since we have used historical betas as our predictor of future betas, the portfolios are arranged in ascending sequence of risk levels expected to be realized over each 52-week forecast period.

For all nine forecast periods, the betas in the least risky portfolio are underestimated; and for eight of nine periods the betas in the second and third least risky portfolios are underestimated as well. Correspondingly, overestimation occurs without exception in the highest risk portfolio, and with but one exception in each of the next two high risk classes. On average, forecast errors are lowest in the middle risk groups; they grow nega-

Table 7. 13-Week Forecasts — Actual Betas Minus Predicted Betas for Portfolios of 50 Securities (1962 through 1970)

Forecast for 13 Weeks Ended	Portfolio No. (1 = Lowest Predicted Beta; 10 = Highest Predicted Beta)									
	1	2	3	4	5	6	7	8	9	10
3/30/62	.48	.25	.07	−.01	.05	.04	−.50	−.23	−.60	−.94
6/29/62	.78	.37	.53	.19	.20	.13	−.04	−.11	−.23	−.41
9/28/62	.38	.30	.16	.09	−.08	.20	.13	.10	.12	.25
12/28/62	.38	.31	.15	.13	.20	.12	.20	.11	.03	−.08
3/29/63	.57	.21	.20	.13	.02	−.01	−.09	−.05	−.01	−.45
6/28/63	−.17	−.12	−.14	.13	−.32	−.16	−.35	−.41	−.24	−.79
9/27/63	.37	.13	.19	−.05	−.08	−.02	−.24	−.18	−.03	−.22
12/27/63	.12	−.02	−.21	−.13	−.15	−.30	−.09	−.15	.04	.20
3/27/64	.36	.46	−.21	−.16	−.12	.02	−.17	.14	−.68	−1.43
6/26/64	.47	.16	.21	.42	.02	.22	.11	−.32	−.22	−.75
9/25/64	.50	.49	.32	.10	−.14	.18	−.23	−.38	−.59	−1.15
12/25/64	.32	.16	.33	.30	.24	−.04	−.20	−.50	−.64	−1.51
3/26/65	.43	.13	.14	.18	−.05	.08	−.14	−.36	−.70	−1.17
6/25/65	.98	.49	.48	.26	.30	.19	.12	−.07	−.24	−.52
9/24/65	.31	.09	.18	.10	.12	.04	.02	−.26	−.20	−.67
12/24/65	.61	−.32	−.17	−.37	−.70	−.39	.29	−.65	−.59	−1.37
3/25/66	.77	.29	.21	.22	.13	−.07	−.50	−.27	−.51	−.77
6/24/66	.28	.10	.20	.12	.14	−.02	.06	.19	.07	.19
9/23/66	.44	.27	.10	−.01	−.11	−.21	−.30	−.40	−.64	−1.01
12/23/66	.29	.20	.12	−.00	−.09	−.02	−.06	.04	.00	−.30
3/24/67	.91	.24	.47	.42	.48	.38	−.00	−.08	−.18	.06
6/23/67	−.14	−.15	−.21	.01	−.06	−.23	−.16	−.32	−.42	−.71
9/22/67	.22	−.07	−.02	.11	−.02	−.17	.11	−.29	−.66	−.66
12/22/67	.42	.30	.07	.21	.13	.08	−.10	−.15	−.20	−.90
3/22/68	.52	.43	.23	.26	.19	.11	.24	−.17	.05	−.35
6/21/68	−.10	−.10	.23	.04	−.19	−.26	−.21	−.34	−.24	−.72
9/20/68	.65	.26	.32	.16	.11	.20	−.15	−.17	−.25	−.14
12/20/68	.63	.26	.21	−.00	.21	.04	−.13	−.20	−.28	−.74
3/21/69	.61	.38	.45	.17	.25	.12	−.02	−.26	−.41	−.61
6/20/69	.40	.27	.29	.10	.22	.10	.03	−.18	−.30	−.87
9/19/69	.19	−.02	.11	.00	−.10	.01	.05	−.34	−.14	−.39
12/19/69	.67	.50	.26	.26	.07	.19	−.00	−.03	−.02	.01
3/20/70	.44	.31	.14	−.01	.14	−.05	−.03	−.27	−.36	−.46
6/19/70	.29	.04	.16	−.03	−.05	−.18	−.09	−.30	−.26	−.51
9/18/70	.33	−.01	.03	.03	−.07	−.04	−.16	−.06	−.10	−.56
12/18/70	.49	.32	.30	.17	.43	.18	.28	.16	.49	.10
Average	.42	.19	.16	.10	.04	.01	−.07	−.19	−.25	−.57

tively larger as historical risk increases; and positively larger as historical risk decreases.

Thus, there is a pronounced regression towards the means, with the tendency somewhat stronger for tne higner risk portfolios than the lower risk portfolios. This regression confirms Blume's observations respecting 84-month forecasts; however, his evidence indicated a stronger central tendency at the lowest end of the risk spectrum. In any event, forecasting accuracy is progressively worse as risk levels depart significantly from the average.

Forecast errors over 26-week forecast periods and 13-week forecast periods are presented in Tables 6 and 7 respectively. The very same tendencies are exhibited as those described above (although there is the expected widening of the dispersion of forecast errors as the prediction period is shortened). Particularly over 13-week periods, there are several intervals for which the forecast errors are unacceptably large. Average forecast errors appear no larger for shorter periods; but the correlation coefficients discussed earlier suggest that these averages conceal a great deal of dispersion.

Conclusions

This paper has examined the behavior of beta coefficients over time. Evidence indicates that this risk measure is remarkably stationary for large portfolios, less stationary for smaller portfolios and unpredictable for individual securities. Predictability improves materially as the forecast period lengthens, with much greater improvement when moving from 13 weeks to 26 weeks than when moving from 26 weeks to 52 weeks.

Over all three forecast intervals, a pronounced tendency exists for the betas to regress towards their means. This tendency appears stronger for high risk portfolios than for low risk portfolios.

In summary, for portfolios of 25 stocks and larger, over forecast intervals of 26 weeks and longer, past risk is an excellent proxy for future risk. Given these constraints as to portfolio size and forecast interval, investment managers who are singularly adept at market timing can probably rely for purposes of stock selection on the persistence of market related volatility. Importantly, this persistence is no less evident during reversals in the market than during other periods. ♦

BLUEPRINT FOR REFORM

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system would be imposition of uniform regulations for all markets within the system. Much of the growing competition among the different markets today stems from the different rules and regulations of those markets. The imposition of common standards would put this inter-market competition on a healthy footing.

"For competition to be beneficial, it must exist under similar rules," the Martin Report concludes.[3] In doing away with the disparate standards, the architects of the new industry structure must build with the key girders of the exchange system: public pricing, public disclosure and public protection.

The report outlines a reorganization plan giving "proper recognition" to the "quasi-public" nature of the exchanges and taking into account the many changes in the industry generally. A reorganized New York Stock Exchange could serve as a driving force and nucleus for a new national exchange market system, but, to play such a decisive role, the exchange community should come forward with its own plan for reorganization.

3. *Ibid.*, p. 3.

These three recommendations suggest the kind of organization that should emerge from the hearings now underway in Washington. It is premature to give a precise outline of that new structure but its builders should have certain fundamental objectives in mind:

First, the national interest will be best served by creation of a central agency market system.

Second, to function effectively, this new organization and its component markets must have some antitrust exemption. The new system must have the power to impose restraints and restrictions on the users of the central market where these curbs are clearly in the public interest. No such organization has a chance of getting that antitrust exemption unless it is subject to checks and balances to insure that its power is not abused.

Third, competition among securities markets should be preserved but subject to common standards.

The securities industry is on the threshold of a new and exciting era. The Martin Report has pointed the way. But it is up to the entire industry to follow those directions in building a new structure that will meet the Report's great purposes and objectives. ♦