

FORD PRICE MOMENTUM MODEL - AUGUST 30, 1991

In order to provide clients with a more comprehensive research data base, Ford has developed and will add to the Ford Data Base (i.e. Data Base Report, EPIC Diskette, and HIPER) a price momentum model. This report describes the development of the model and some tests of its utility in predicting equity performance.

The first step in developing the model was to use regression analysis (from our HIPER software) to examine the correlation between future return and the four price gain descriptors in our data base: PGN (past month price gain), PGQ (3-month price gain), PGH (6-month price gain), and PGY (12-month price gain). We did separate regressions for four time periods (12/71 - 12/75, 1/76 - 12/80, 1/81 - 12/85, 1/86 - 9/90), and for the four market capitalization quartiles of the Ford universe, in order to determine whether there were any significant trends in the results over time or company size. The only such effect observed was a modest decrease in R-squared, the coefficient of determination (which measures the degree of correlation) in the later time periods. Since price momentum was expected to be a short-term performance predictor, we used one-month future return and 3-month future return as independent variables in two sets of regressions.

After several preliminary regression runs, the final regressions involved relative future returns (i.e. relative to the universe mean) versus relative PGN, relative PGQ minus PGN, relative PGH minus PGQ, and relative PGY minus PGH. These differences were used to isolate the price gain effects. The resulting regressions showed significance in the correlations (as measured by T-ratios) for PGN and PGY-PGH in essentially all time periods and CAP quartiles, and for PGQ-PGN and PGH-PGQ in about half the cases. The coefficients were uniformly negative for PGN, mixed positive and negative for PGQ-PGN, primarily positive for PGH-PGQ, and uniformly positive for PGY-PGH. Based on these results, it was decided to try a correlation of the form:

$$\text{PRM} = \text{PGY} - \text{PGQ} - A * \text{PGN}$$

PRM is the new price momentum variable and A was a constant to be determined. The correlation was tested with A values of 2 to 6 by computing PRM, deciling the universe by PRM, and then checking the performance (1-month, 3-month, and 6-month future returns) for each decile. The best compromise among these three return periods was judged to be an A value of 3.0. The cumulative decile returns in percent over the time range 12/71 to 12/90 with A = 3.0, and with the universe limited to companies with quality ratings of B- or better, were as follows:

Decile:	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
1-month return	6367	4081	2701	1737	1605	1063	714	454	153	-36
3-month return	2457	1700	1775	1327	1420	1149	754	467	377	62
6-month return	1704	1215	1572	1232	1332	986	751	590	448	181

As can be seen from the above figures, PRM appears to be an excellent predictor of near-term future performance, with higher-ranked deciles consistently performing better than lower-ranked ones. The performance discrimination is less pronounced for 3-month and 6-month rebalancing, as one might expect.

The price momentum (PRM) figure which will appear in the Ford Data Base will be a relative figure, i.e. it will first be computed from the following equation:

$$\text{PRM} = \text{PGY} - \text{PGQ} - 3 * \text{PGN}$$

and then the mean value of PRM for the entire data base will be subtracted from all PRM values. In this way the average PRM will always be zero, and roughly half the companies in the data base will have positive PRM and roughly half negative. A value of -999.9 will be assigned to companies for which PGY is not available.

Consider as an example a stock with a one-year price gain of 12.7, a 3-month price gain of 3.2, and a past month price gain of 5.5. The unadjusted price momentum would be:

$$\text{PRM} = 12.7 - 3.2 * 5.5 = 12.7 - 3.2 - 16.5 = -7.0$$

If the average of the unadjusted PRM values for all 2,000 stocks were 3.7, then the final relative value will be:

$$\text{PRM} = -7.0 - 3.7 = -10.7$$

A special circumstance arises in the case of mid-month data bases, where PGN is defined as the price gain for the month to date. Since this would correspond to only a one-week gain for the first week of the month, we have substituted the price gain for the past four weeks in place of PGN in the above equation, for all mid-month runs.

It should be noted that, although PRM appears to be an excellent performance predictor, it is primarily a short-term indicator. In order to use it effectively in an investment program, the investor must have a willingness to accept high turnover and be able to execute trades at low transaction costs.