

## **Change Direction Effect on Earnings Momentum August 29, 2003**

### **Background**

Ford's Earnings Momentum (EMO) model measures the acceleration or deceleration of change in operating earnings per share for the trailing 12-month operating earnings per share for the past four quarters and the estimated value for the current quarter. It is based on Ford's original Earnings Trend model which uses the second derivative calculation to measure the curvature of the curve that is fitted to the five trailing twelve month operating earnings figures. Earnings Momentum adjusts the original earnings trend analysis for the volatility of earnings. EMO has proven useful in predicting near-term stock price performance, primarily because it gives an early indication of changing earnings patterns.

Because the model measures the change in the rate of change in earnings, it is not dependent on the underlying direction of that change. For example, a company with declining earnings and a company with rising earnings can each have positive or negative earnings trend values depending on the change in the rate of earnings decline or increase, respectively. This study will explore the notion that earnings momentum performance is independent of whether earnings are increasing or declining.

### **Creation of Earnings Change Direction Measure**

In order to test the impact on performance of earnings direction, we used the first derivative function of our HIPER back-testing program to create a growth rate in trailing 12-month operating earnings per share over the past four quarters and the estimated value for the current quarter. This is the same period on which Earnings Momentum is computed. The growth rate variable, which we have labeled GDR, is the first derivative of the earnings points converted to percentage using a company's normal earnings as derived by Ford. By using the first derivative function we get a measure of whether operating earnings are increasing or decreasing over the 5-quarter period, regardless of whether earnings are positive or negative.

To test the effectiveness of the newly created GDR variable in isolation, we ranked the companies in the Ford Universe by it in descending order and divided them into ten equal numbered sectors (deciles). The deciles were rebalanced monthly for the period December 1982 through December 2002 and total return was computed for each decile.

The table below shows that GDR has good predictive results. The average excess return over the Ford universe of stocks for the top decile was 4.7% annually and the variable performed well over time with positive excess returns in 14 of the 20 years studied. These results are nearly as good as those of the earnings momentum model.

**GDR (first derivative of 5 trailing 12-month operating earnings points) descending deciles**

<b>Total Returns (%)</b>											
	<u>Decile 1</u>	<u>Decile 2</u>	<u>Decile 3</u>	<u>Decile 4</u>	<u>Decile 5</u>	<u>Decile 6</u>	<u>Decile 7</u>	<u>Decile 8</u>	<u>Decile 9</u>	<u>Decile 10</u>	<u>Universe</u>
12/82-12/83	39.8	33.7	29.7	24.0	29.0	35.3	34.3	29.7	35.6	39.4	33.2
12/83-12/84	-9.7	-4.8	0.1	6.9	12.5	7.3	10.2	5.1	-0.1	-14.1	1.2
12/84-12/85	35.1	35.7	35.9	32.3	32.7	33.3	30.3	32.1	24.4	14.1	30.5
12/85-12/86	10.7	24.8	18.5	21.8	19.4	14.1	15.4	7.9	5.8	-6.0	13.1
12/86-12/87	2.5	7.4	-1.4	1.2	-4.1	3.8	-1.3	-8.7	-7.4	-17.5	-2.6
12/87-12/88	31.1	34.1	24.2	25.0	27.1	21.2	26.0	29.5	22.1	14.9	25.5
12/88-12/89	19.0	24.7	27.5	27.6	23.4	21.4	18.7	16.5	5.6	-7.3	17.3
12/89-12/90	-16.1	-9.5	-8.3	-6.3	-8.5	-14.5	-14.8	-20.3	-26.0	-38.8	-16.7
12/90-12/91	70.7	55.6	41.0	39.9	39.9	33.6	36.5	39.7	35.7	31.7	42.2
12/91-12/92	29.3	22.8	14.2	14.7	18.1	16.0	16.5	17.2	20.8	22.6	19.4
12/92-12/93	44.7	26.5	18.5	15.8	9.4	9.0	13.8	13.2	16.7	23.7	18.8
12/93-12/94	6.5	5.0	-0.1	0.5	1.4	-1.4	-2.7	0.8	-1.1	0.0	0.9
12/94-12/95	30.8	38.2	33.3	32.2	28.4	30.6	28.1	21.8	18.8	12.6	27.4
12/95-12/96	24.0	23.1	28.1	23.9	23.4	21.6	22.8	18.1	11.9	7.5	20.5
12/96-12/97	25.0	22.9	29.1	31.7	35.7	39.8	29.6	23.6	17.0	5.4	25.9
12/97-12/98	9.0	1.9	5.0	5.5	4.7	-2.0	-3.8	-4.0	-5.8	-7.9	0.4
12/98-12/99	71.5	22.9	11.4	9.2	1.5	2.6	3.5	15.7	33.0	56.7	21.4
12/99-12/00	-7.2	-1.1	7.5	13.5	20.9	16.4	14.6	0.6	-13.2	-47.9	-0.1
12/00-12/01	17.9	9.6	15.4	16.8	25.1	15.9	24.7	33.1	29.1	15.4	22.0
12/01-12/02	-25.2	-11.4	-6.8	-2.1	-3.1	-7.7	-11.3	-20.7	-26.8	-37.0	-15.2
<i>Avg. Annual</i>	<i>17.8</i>	<i>16.8</i>	<i>15.2</i>	<i>16.0</i>	<i>16.0</i>	<i>13.8</i>	<i>13.5</i>	<i>11.2</i>	<i>8.1</i>	<i>-0.2</i>	<i>13.1</i>
<i>Std. Deviation</i>	<i>27.0</i>	<i>21.7</i>	<i>17.7</i>	<i>15.5</i>	<i>14.6</i>	<i>14.1</i>	<i>14.5</i>	<i>16.8</i>	<i>21.0</i>	<i>29.7</i>	<i>18.1</i>

**Effect of GDR Sign on EMO**

In order to measure the effect that the direction of earnings change has on earnings momentum we ranked the Ford Universe in descending order and divided it into equal-numbered deciles. We then divided this top decile (companies with the highest earnings momentum) into those with a positive value of GDR and those with a negative value. Two-thirds of the companies had positive GDR and one-third had negative values. Monthly returns were computed over the 20 year time span ended December 2002 and the results are shown at the top of the next page. The effect of using the direction of change is easily seen. The average return of those top earnings momentum companies with positive earnings changes outperformed those with negative changes by over 10 percentage points annually. The outperformance is also very consistent with positive earnings changes outperforming the negative earnings change group in 18 of the 20 annual periods shown.

### Annual top decile EMO divided into positive and negative GDR

	<u>Positive</u>	<u>Negative</u>	<u>Universe</u>
12/82-12/83	45.4	42.0	43.7
12/83-12/84	6.9	-12.1	1.2
12/84-12/85	39.5	29.9	35.8
12/85-12/86	23.4	9.0	16.7
12/86-12/87	7.1	0.1	5.1
12/87-12/88	30.8	29.0	30.7
12/88-12/89	33.2	17.6	27.6
12/89-12/90	-7.3	-20.2	-12.8
12/90-12/91	67.3	34.2	49.3
12/91-12/92	30.0	20.7	26.2
12/92-12/93	35.8	32.9	35.1
12/93-12/94	6.4	6.1	6.3
12/94-12/95	40.8	29.3	37.2
12/95-12/96	30.2	8.7	22.0
12/96-12/97	33.7	4.3	22.7
12/97-12/98	16.0	2.5	11.1
12/98-12/99	23.1	39.2	29.1
12/99-12/00	18.1	-7.0	9.1
12/00-12/01	25.0	54.0	34.1
12/01-12/02	-9.6	-25.3	-18.9
<i>Avg. Annual</i>	23.5	12.7	19.1

### An Optimal Weighting Scheme

It is clear that direction of earnings change gives additional information to the earnings momentum variable. The next issue that arises is how to combine the GDR and EMO to get the best performance possible. To answer this question we used the regression analysis function of HIPER to run a multiple variable regression on the ranking of GDR and EMO as independent variables and future quarterly return (FRQ) as the dependent variable. The regression results indicated that both GDR and EMO have explanatory power in future return prediction. Also, the coefficients associated with these variables are about the same indicating that equal weighting would be the best combination of the two. As a further check, the information coefficient was calculated for EMO, GDR and the equally weighted combination of the two (we call this variable GEM). The information coefficient produces a correlation coefficient between the ranking of a given variable for a stock and the performance ranking for the stock. The results are shown below:

### Average information coefficients for monthly periods 12/82 to 12/02

<u>Variable</u>	<u>I.C.</u>
EMO	0.037
GDR	0.035
GEM	0.049

## Performance Test

The newly created combination variable, GEM, was used to rank the Ford Universe monthly in descending order and sector it into equal sized deciles for the period December 1982 through December 2002. The equally weighted performance of each of these sectors was computed and the annual results are shown below. The results are impressive. The top decile of GEM outperformed the universe of stocks in 19 of the 20 years presented. The average excess return for the top decile over the universe was 11.1%. The combined variable also compared very favorably against its components, outperforming the top deciles of each of them in 18 of the 20 years studied.

### GEM (EMO and GDR equally averaged) descending deciles

#### Total Returns (%)

	<u>Decile 1</u>	<u>Decile 2</u>	<u>Decile 3</u>	<u>Decile 4</u>	<u>Decile 5</u>	<u>Decile 6</u>	<u>Decile 7</u>	<u>Decile 8</u>	<u>Decile 9</u>	<u>Decile 10</u>	<u>Universe</u>
12/82-12/83	52.2	33.0	34.7	31.0	24.4	29.1	29.7	35.6	30.9	31.4	33.2
12/83-12/84	-4.3	1.1	3.2	7.7	-4.7	0.2	7.8	5.6	0.1	-4.6	1.2
12/84-12/85	41.3	42.0	37.5	32.7	30.5	30.9	32.0	23.4	24.5	12.6	30.5
12/85-12/86	20.8	26.5	20.6	16.4	15.1	8.2	11.5	9.2	4.7	-1.1	13.1
12/86-12/87	9.8	6.4	4.8	3.7	-1.0	-7.4	-4.6	-6.7	-11.0	-17.3	-2.6
12/87-12/88	33.1	30.2	26.8	29.6	25.8	22.1	26.5	20.0	20.8	20.1	25.5
12/88-12/89	31.7	27.1	24.4	25.3	20.8	17.6	18.1	12.9	9.3	-9.2	17.3
12/89-12/90	-7.6	-6.2	-8.6	-11.5	-13.1	-17.6	-17.8	-20.7	-23.8	-36.7	-16.7
12/90-12/91	71.3	54.4	44.6	35.5	47.0	41.5	29.7	27.3	32.2	42.3	42.2
12/91-12/92	31.7	21.5	21.2	20.2	13.3	19.3	20.0	11.9	15.5	19.4	19.4
12/92-12/93	41.0	24.5	18.0	18.3	19.7	18.3	11.0	10.6	14.4	14.5	18.8
12/93-12/94	11.2	4.0	2.3	4.3	1.3	-3.9	-1.9	0.2	-1.9	-6.0	0.9
12/94-12/95	40.7	33.8	37.4	30.2	30.1	28.2	23.9	21.8	18.1	11.6	27.4
12/95-12/96	30.7	28.5	22.8	23.5	19.0	17.2	21.2	16.9	15.5	10.2	20.5
12/96-12/97	30.4	28.8	32.2	23.7	28.5	26.6	29.3	24.4	21.3	13.7	25.9
12/97-12/98	14.4	7.7	5.2	5.4	0.9	-3.6	-3.2	-4.6	-7.3	-9.8	0.4
12/98-12/99	50.9	23.1	4.4	12.0	23.5	17.9	9.5	18.8	17.4	41.0	21.4
12/99-12/00	9.8	25.1	16.2	6.0	12.6	-9.2	-1.2	-2.1	-8.5	-39.7	-0.1
12/00-12/01	22.4	20.4	13.2	23.0	26.9	25.1	19.7	25.7	27.5	9.1	22.0
12/01-12/02	-12.5	-9.3	-6.3	-10.9	-11.6	-15.3	-15.7	-21.0	-19.1	-29.9	-15.2
<i>Avg. Annual</i>	<i>24.2</i>	<i>20.1</i>	<i>16.8</i>	<i>15.5</i>	<i>14.4</i>	<i>11.0</i>	<i>11.2</i>	<i>9.3</i>	<i>7.8</i>	<i>0.9</i>	<i>13.1</i>
<i>Std. Deviation</i>	<i>22.3</i>	<i>17.4</i>	<i>16.3</i>	<i>17.1</i>	<i>18.1</i>	<i>18.3</i>	<i>16.8</i>	<i>16.7</i>	<i>18.1</i>	<i>25.5</i>	<i>18.1</i>

## Conclusion

Earnings momentum performance is measurably dependent on whether earnings are increasing or decreasing. Among companies with the highest earnings momentum, those with increasing earnings perform substantially better than those with decreasing earnings. The study also shows that direction of change in earnings is a useful stand-alone predictor of stock price performance and, when combined equally with earnings momentum, produces substantial improvement in performance.