

## Price and Earnings Momentum

**Objectives:** The objective of this assignment is to introduce some of the more popular momentum indicators used in sales and trading. More specifically, this exercise is designed to have you learn how to:

- Use moving averages and relative strength, two price momentum indicators
- Test if technical trading systems are more profitable than a buy-and-hold strategy
- Determine whether earnings surprises are statistically significant

### I. Technical Trading Systems: Moving Averages and Relative Strength Indicators

Technical analysis assumes that past prices contain information about future prices. Thus, technicians try to discover trends and patterns in past prices, which can be related to an anticipated pattern in future prices.

#### A. Single Moving Average (MA) System

A moving average is used to smooth out erratic movements in past prices thereby revealing only more pronounced trends and patterns in prices. To implement this strategy, average the *closing* prices  $P$  over the past  $n$  (say  $n=200$ ) days. For example,

$$MA(200) = \frac{1}{200} (P_T + P_{T-1} + P_{T-2} + P_{T-3} + \dots + P_{T-200})$$

This 200-day moving average is updated each day, by eliminating the price 200 days back from the moving average calculation, and adding the current price.

Trading Strategy: Since the moving average lags the market, it will be above (below) the price in a bear (bull) market. Consequently, the decision strategy is to

- Buy when the *closing price* crosses above its moving average
- Sell when the *closing price* crosses below its moving average

Length(T) of the Moving Average: The larger  $T$  is, the more false starts are likely and sluggishness in reacting to developing trends increases. Traders typically use a 200-day moving average not only for individual stocks but also for the overall market. The smaller  $T$  is, the more sensitive it is to the start of new price trends but the greater the likelihood of giving false signals during non-directional but volatile price movements.

## Calculating Profits Using a Moving Average

To calculate profits using a moving average system, recall that the decision rule in a single moving average system is to buy if the price crosses above its moving average. Conversely, if the price falls below its moving average, then a sell is indicated. To determine when there is a “crossing”, we subtract the price from its moving average. When this difference changes from positive to negative then a **sell** is indicated while if the difference changes from negative to positive, then a **buy** is indicated. In excel, this can be modeled using an IF statement.

Profit Calculation Example using a Single Moving Average: We shall use the Microsoft data to illustrate our profit calculations.

Date	Microsoft Price	MA(6)	Price - MA(6)	MA(6) Decision	MvgAvg Profit
91.07	<b>24.50</b>			Initial Buy	
91.08	28.42				
91.09	29.67				
91.10	31.29				
91.11	32.42				
91.12	37.08	30.56	6.52		
92.01	40.00	33.15	6.85		
92.02	41.17	35.27	5.90		
92.03	39.50	36.91	2.59		
92.04	<b>36.75</b>	37.82	-1.07	Sell	12.25
92.05	<b>40.33</b>	39.14	1.19	Buy	
92.06	<b>35.00</b>	38.79	-3.79	Sell	-5.33
92.07	36.50	38.21	-1.71		
92.08	37.13	37.54	-.40		
92.09	<b>40.25</b>	37.66	2.59	Buy	
92.10	44.38	38.93	5.45		
92.11	46.56	39.97	6.59		
92.12	42.69	41.25	1.44		
93.01	43.25	42.38	.87		
93.02	<b>41.69</b>	43.14	-1.45	Sell	1.44
93.03	<b>46.25</b>	44.14	2.11	Buy	
93.04	<b>42.75</b>	43.87	-1.12	Sell	-3.50
93.05	<b>46.31</b>	43.82	2.49	Buy	
93.06	<b>44.00</b>	44.04	-.04	Sell	-2.31
93.07	37.00	43.00	-6.00		
93.08	37.56	42.31	-4.75		
93.09	41.25	41.48	-.23		
93.10	40.06	41.03	-.97		
93.11	<b>40.00</b>	39.98	.02	Buy	
93.12	40.31	39.36	.95		
94.01	42.56	40.29	2.27		

Date	Microsoft Price	MA(6)	Price - MA(6)	MA(6) Decision	MvgAvg Profit
94.02	41.25	40.91	.34		
94.03	42.38	41.09	1.29		
94.04	46.25	42.13	4.13		
94.05	53.75	44.42	9.33		
94.06	51.63	46.30	5.33		
94.07	51.50	47.79	3.71		
94.08	58.13	50.61	7.52		
94.09	56.13	52.90	3.23		
94.10	63.00	55.69	7.31		
94.11	62.88	57.21	5.67		
94.12	61.13	58.80	2.34		
95.01	59.38	60.11	-.73	Sell	19.38
95.02	63.00	60.92	2.08	Buy	
95.03	71.13	63.42	7.71		
95.04	81.75	66.55	15.21		
95.05	84.69	70.18	14.51		
95.06	90.38	75.06	15.33		
95.07	90.50	80.24	10.26		
95.08	92.50	85.16	7.34		
95.09	90.50	88.39	2.11		
95.10	100.00	91.43	8.57		
95.11	87.13	91.84	-4.71	Sell	24.13
95.12	87.75	91.40	-3.65		
96.01	92.50	91.73	.77	Buy	
96.02	98.69	92.76	5.93		
96.03	103.13	94.87	8.26		
96.04	113.25	97.08	16.18		
96.05	118.75	102.35	16.41		
96.06	120.13	107.74	12.39		
Total Profit					46.06

Column 1 - Gives the year and month e.g. 91.07 is July 1991

Column 2 - Reports the actual price of Microsoft

Column 3 - Is the 6 month moving average, MA(6), of Microsoft

Column 4 - Is the difference between Column 2 and Column 3 e.g. the extent to which Microsoft's price exceeds its 6-month moving average

Column 5 - Gives the decision as to when to buy and when to sell (or sell short). In this illustration, we will assume that we will purchase Microsoft at the beginning of our time series. Hence, the **Initial Buy** decision. If we look at Column 4 (Price - MA(6)), we obtain our first signal to sell on April 1992 since the difference is negative which means that Price - MA(6) < 0 which in

turn means that Price < MA(6) ..... Microsoft's price falls below its 6 month moving average. In the next month, Price - MA(6) reverses its sign, which indicates a buy, e.g. price exceeds or crosses above its 6 month moving average. Note: we only buy (+) or sell (-) when there is a sign change.

Column 6 - Reports the profits from using a 6-month single moving average. Recall that we initially purchased the stock on July 1991 at \$24.50 a share. The stock was sold on April 1992 at \$36.75 a share. The total profit on this trade from buying long was \$12.25 a share (\$36.75 - \$24.50). We next purchased the stock in the next month at \$40.33 and then according to our mechanical trading rule, sold it in the succeeding month for \$35 a share for a loss of -\$5.33 (\$35 - \$40.33). The same logic process is used in calculating all trades. If we sum up the profits from all of our trades, the total profit from using a 6-month single moving average from July 1991 until November 1995 (the date of our last sell signal) is \$46.06.

**Question:** How does the performance of the 6-month single moving average compare to a buy and hold strategy?

If we purchase Microsoft in July 1991 at \$24.50 a share, hold it until November 1995 the date of our last sell signal, this results in a total profit of \$62.63 a share (\$87.13 - \$24.50) for the buy and hold strategy. Consequently, in this example, the buy and hold strategy yields higher profits relative to using a 6-month single moving average even though the latter is a profitable strategy.

## II. Relative Strength

Technical analysts believe that if a stock or an industry group such as semiconductors is outperforming the market on a *relative performance* basis (e.g. either with respect to price, price-earnings, or returns), it will continue to do so until some major event causes a reversal. Thus, it is an indicator of continued momentum e.g. strong (weak) industries get stronger (weaker). Hence, technicians calculate weekly or monthly relative strength ratios and plot these ratios over time. Mathematically,

$$\text{Industry Relative Strength Ratio}_t = \frac{\text{S \& P Industry Index}_t}{\text{Stock Market Index}_t \text{ such as S \& P500}_t}$$

$$\text{Relative Strength Ratio for a Stock}_t = \frac{\text{Stock Price}_t}{\text{Stock Market Index}_t \text{ such as S \& P500}_t}$$

From a technical perspective,

1. The plotting indicates whether the industry has kept pace with, exceeded or lagged the overall market as proxied by the S&P Industrials.
2. A change in the relative price or relative price-earnings of an industry often will indicate that that industry requires new or additional basic research.
3. Technicians have observed that industries, which have high relative strength and earn high returns in bull markets tend to do the opposite in bear markets. During a general market decline therefore, any industry, which resists this decline, may indicate future leadership.

The following trading strategy is utilized in conjunction with a relative strength system:

- Buy when the relative strength ratio for a stock is increasing over time (relative wealth >1) since the stock is outperforming the market... is exhibiting “relative strength”.
- Sell when the relative strength ratio for a stock is decreasing over time (relative wealth <1) since the stock is underperforming the market.

**Example:** To calculate relative strength ratios based on prices, we use the following data for Microsoft. The market index used is the S&P500 and the industry index is the S&P Computer Software (SPCS). For illustrative purposes, we have chosen monthly data.

Date	MSFT Price	S&P500 Index	SPCS	RS Raw			RS Scaled		
				msft/ SP500	msft/ SPCS	SPCS/ SP500	msft/ SP500	msft/ SPCS	SPCS/ SP500
7/91	24.50	387.81	75.24	.0632	.3256	.1940	1.00	1.00	1.00
8/91	28.42	395.43	78.47	.0719	.3622	.1984	1.14	1.11	1.02
9/91	29.67	387.86	78.46	.0765	.3782	.2023	1.21	1.16	1.04
10/91	31.29	392.45	80.35	.0797	.3894	.2047	1.26	1.20	1.06
11/91	32.42	375.22	75.87	.0864	.4273	.2022	1.37	1.31	1.04
12/91	37.08	417.09	91.64	.0889	.4046	.2197	1.41	1.24	1.13
1/92	40.00	408.78	94.31	.0979	.4241	.2307	1.55	1.30	1.19
2/92	41.17	412.70	98.47	.0998	.4181	.2386	1.58	1.28	1.23
3/92	39.50	403.69	91.85	.0978	.4300	.2275	1.55	1.32	1.17
4/92	36.75	414.95	89.99	.0886	.4084	.2169	1.40	1.25	1.12
5/92	40.33	415.35	90.18	.0971	.4472	.2171	1.54	1.37	1.12
6/92	35.00	408.14	84.30	.0858	.4152	.2065	1.36	1.28	1.06
7/92	36.50	424.22	90.92	.0860	.4015	.2143	1.36	1.23	1.10
8/92	37.13	414.03	86.32	.0897	.4301	.2085	1.42	1.32	1.07
9/92	40.25	417.80	95.86	.0963	.4199	.2294	1.52	1.29	1.18

**RS Raw**

**RS Scaled**

Date	MSFT Price	S&P500 Index	SPCS	msft/SP500	msft/SPCS	SPCS/SP500	msft/SP500	msft/SPCS	SPCS/SP500
10/92	44.38	418.68	102.11	.1060	.4346	.2439	1.68	1.33	1.26
11/92	46.56	431.35	105.78	.1079	.4402	.2452	1.71	1.35	1.26
12/92	42.69	435.71	107.87	.0980	.3958	.2476	1.55	1.22	1.28
1/93	43.25	438.78	117.00	.0986	.3697	.2666	1.56	1.14	1.37
2/93	41.69	443.38	116.59	.0940	.3576	.2630	1.49	1.10	1.36
3/93	46.25	451.67	120.82	.1024	.3828	.2675	1.62	1.18	1.38
4/93	42.75	440.19	113.31	.0971	.3773	.2574	1.54	1.16	1.33
5/93	46.31	450.19	120.39	.1029	.3847	.2674	1.63	1.18	1.38
6/93	44.00	450.53	123.72	.0977	.3556	.2746	1.55	1.09	1.42
7/93	37.00	448.13	117.27	.0826	.3155	.2617	1.31	.97	1.35
8/93	37.56	463.56	118.75	.0810	.3163	.2562	1.28	.97	1.32
9/93	41.25	458.93	126.87	.0899	.3251	.2764	1.42	1.00	1.42
10/93	40.06	467.83	134.81	.0856	.2972	.2882	1.36	.91	1.49
11/93	40.00	461.79	141.41	.0866	.2829	.3062	1.37	.87	1.58
12/93	40.31	466.45	137.15	.0864	.2939	.2940	1.37	.90	1.52
1/94	42.56	481.61	141.59	.0884	.3006	.2940	1.40	.92	1.52
2/94	41.25	467.14	148.77	.0883	.2773	.3185	1.40	.85	1.64
3/94	42.38	445.76	135.05	.0951	.3138	.3030	1.50	.96	1.56
4/94	46.25	450.91	132.75	.1026	.3484	.2944	1.62	1.07	1.52
5/94	53.75	456.51	143.86	.1177	.3736	.3151	1.86	1.15	1.62
6/94	51.63	444.27	139.59	.1162	.3699	.3142	1.84	1.14	1.62
7/94	51.50	458.26	138.72	.1124	.3713	.3027	1.78	1.14	1.56
8/94	58.13	475.50	151.61	.1223	.3834	.3188	1.94	1.18	1.64
9/94	56.13	462.71	150.30	.1213	.3735	.3248	1.92	1.15	1.67
10/94	63.00	472.35	165.40	.1334	.3809	.3502	2.11	1.17	1.80
11/94	62.88	453.69	161.96	.1386	.3882	.3570	2.19	1.19	1.84
12/94	61.13	459.27	161.72	.1331	.3780	.3521	2.11	1.16	1.81
1/95	59.38	470.42	160.35	.1262	.3703	.3409	2.00	1.14	1.76
2/95	63.00	487.39	173.33	.1293	.3635	.3556	2.05	1.12	1.83
3/95	71.13	500.71	181.79	.1421	.3913	.3631	2.25	1.20	1.87
4/95	81.75	514.71	196.55	.1588	.4159	.3819	2.51	1.28	1.97
5/95	84.69	533.40	201.59	.1588	.4201	.3779	2.51	1.29	1.95
6/95	90.38	544.75	217.34	.1659	.4158	.3990	2.63	1.28	2.06
7/95	90.50	562.06	222.66	.1610	.4064	.3961	2.55	1.25	2.04
8/95	92.50	561.88	222.56	.1646	.4156	.3961	2.61	1.28	2.04
9/95	90.50	584.41	219.95	.1549	.4115	.3764	2.45	1.26	1.94
10/95	100.00	581.50	240.07	.1720	.4165	.4128	2.72	1.28	2.13
11/95	87.13	605.37	238.40	.1439	.3655	.3938	2.28	1.12	2.03
12/95	87.75	615.93	226.89	.1425	.3868	.3684	2.26	1.19	1.90
1/96	92.50	636.02	243.80	.1454	.3794	.3833	2.30	1.17	1.98
2/96	98.69	640.43	252.50	.1541	.3909	.3943	2.44	1.20	2.03
3/96	103.13	645.50	256.71	.1598	.4017	.3977	2.53	1.23	2.05

Note: We have 2 sets of relative strength (RS) ratios - RS Raw and RS Scaled. RS raw = the appropriate price or index relative to the appropriate index. For example,

$$RS1_{11/30/94} = \text{Microsoft Price/S\&P500} = 62.88/453.69 = .1386$$

$$RS2_{11/30/94} = \text{Microsoft Price/S\&P Computer Software} = 62.88/161.96 = .3882$$

$$RS3_{11/30/94} = \text{S\&P Computer Software/S\&P500} = 161.96/453.69 = .3570$$

The RS Scaled simply normalizes the RS Raw by the initial ratio or first data point in the series. Since we are using 7/31/91 as our start date, the initial ratios are

$$RS1_{7/31/91} = \text{Microsoft Price/S\&P500} = 24.50/387.81 = .0632$$

$$RS2_{7/31/91} = \text{Microsoft Price/S\&P Computer Software} = 24.50/75.24 = .3256$$

$$RS3_{7/31/91} = \text{S\&P Computer Software/S\&P500} = 75.24/387.81 = .1940$$

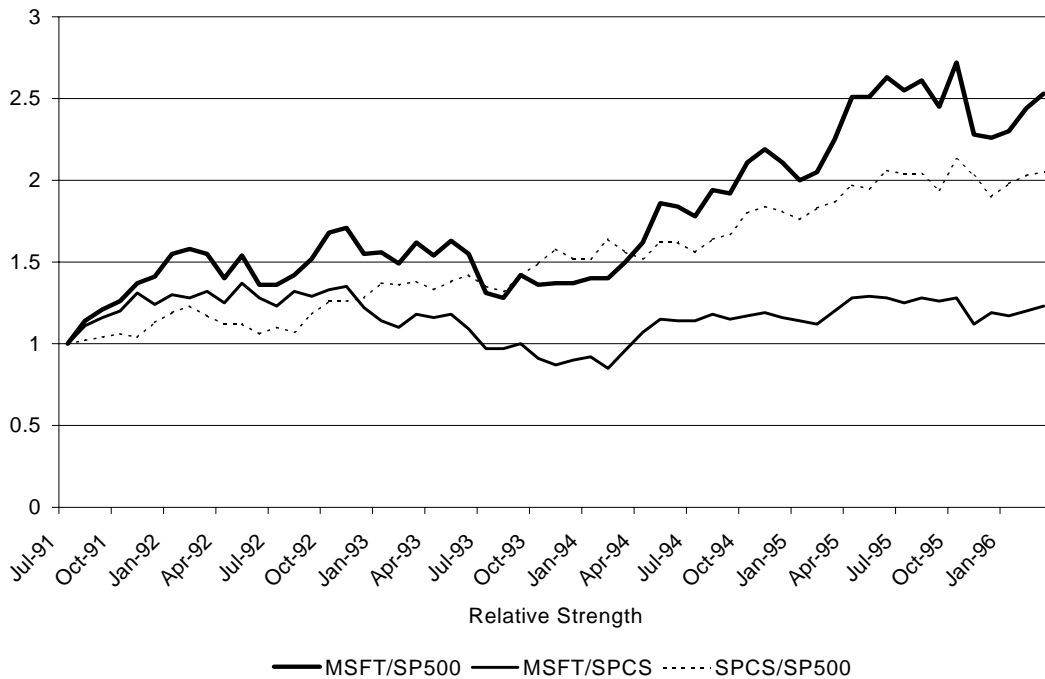
Every RS Raw ratio is divided by these initial ratios. For example,

$$RS1^*_{11/30/94} = RS1_{11/30/94} / RS1_{7/31/91} = .1386/.0632 = 2.19$$

$$RS2^*_{11/30/94} = RS2_{11/30/94} / RS2_{7/31/91} = .3882/.3256 = 1.19$$

$$RS3^*_{11/30/94} = RS3_{11/30/94} / RS3_{7/31/91} = .3570/.1940 = 1.84$$

To really see the relative strength of Microsoft, we graph the preceding numbers.



**Brief Analysis of Charts:** Over the 7/91 to 3/96 period, the relative price performance of Microsoft, exceeded the price performance of the computer software industry and the S&P500 as well. It appears that the stock is a continued hold (or buy) in the short run.

### III. Standardized Unexpected Earnings (Earnings Surprise Model)<sup>1</sup>

**Theory:** Efficient capital markets assume that security prices quickly adjust to new information such as earnings announcements as soon as it becomes publicly available. This rapid adjustment of prices to new information is predicated on frictionless trading, instantaneous availability of information to all investors, and all investors processing this information in a similar manner from a pricing standpoint. In the real world, however, where there are

- trading costs, and delays in (information) transmission and differences in interpretation and evaluation of information, the process of adjustment to new information is less clear-cut.
- New information can be described as unexpected information. If everyone expects a company to report \$1.00 per share earnings in the next quarter and it actually reports the \$1.00, little new information has been added. No major revision of expectations would be called for. On the other hand, if earnings of \$.50 or \$2.00 were reported this would be unexpected information and clearly would call for a revision of probability beliefs about the future.

Studies by Latane and Jones (1977), pp. 1457 among others suggest that favorable information contained in quarterly earning announcements is not instantaneously reflected in stock prices. In addition to this, these studies find that a significant relationship exists between the size of the unexpected earnings performance and the post-announcement stock price changes.

For example, Rendleman, Jones, and Latane (1982) find evidence that large SUEs (standardized unexpected earnings) are accompanied by significant abnormal stock price changes as revealed in Figure 1 of their study which is shown on the next page.

What Figure 1 Shows:

- adjustments occur both before and after the announcement dates of earnings
- ability of SUE to discriminate among over- and under-performing stocks
- adjustment of stock prices to unexpected earnings continues after the announcement of quarterly earnings

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<sup>1</sup>This discussion is based on the work of Henry Latane. These include Henry A. Latane and Charles Jones, December 1977, "Standardized Unexpected Earnings-A Progress Report," *Journal of Finance* 32(5): 1457-1465; Henry Latane and Charles Jones, June 1979, "Standardized Unexpected Earnings: 1971-1977," *Journal of Finance* 34(3): 717-724; and Richard Rendleman, Charles Jones, and Henry Latane, November 1982, "Empirical Anomalies Based on Unexpected Earnings and the Importance of Risk Adjustments," *Journal of Financial Economics* 10(3): 269-287.

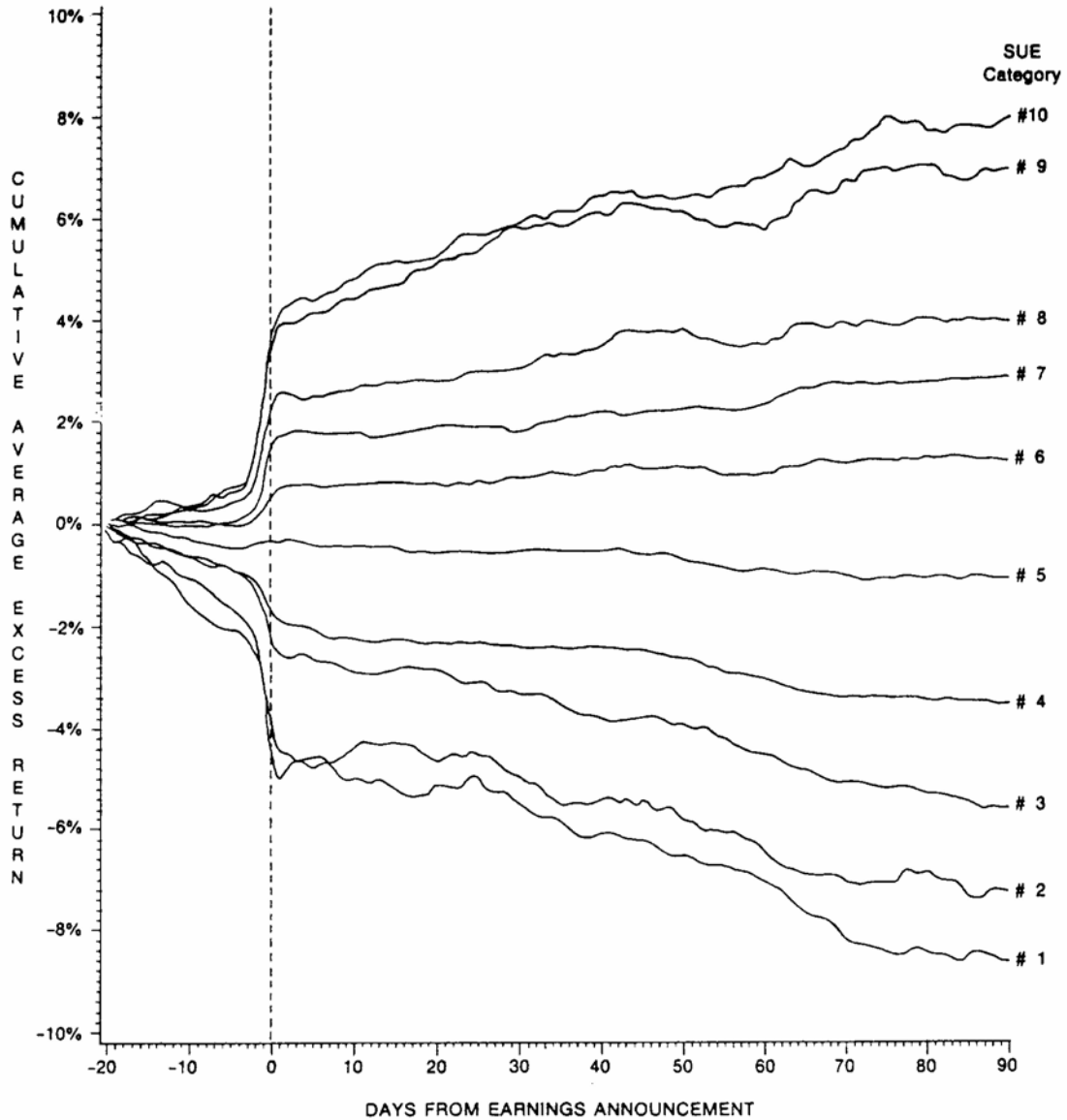


Fig. 1. Cumulative excess returns averaged over the 36 quarter period 1971. 3–1980.2 for 10 SUE categories ranging from the most negative SUE category (#1,  $SUE \leq -4.0$ ) to the most positive SUE category (#10,  $SUE > +4.0$ ). The sample size ranges from a minimum of 618 companies (1971.3) to a maximum of 1496 in 1980.1 (see table 1 for additional details on sample size). Day 0 on the horizontal axis is the announcement date of earnings.

All stocks in their sample are grouped into one of 10 SUE Categories:

Category	SUE	Category	SUE
1	$SUE < -4.0$	6	$0.0 < SUE < 1.0$
2	$-4.0 < SUE < -3.0$	7	$1.0 < SUE < 2.0$
3	$-3.0 < SUE < -2.0$	8	$2.0 < SUE < 3.0$
4	$-2.0 < SUE < -1.0$	9	$3.0 < SUE < 4.0$
5	$-1.0 < SUE < 0.0$	10	$+4.0 < SUE$

The authors found that for

Highest SUE categories 9 and 10: of the total response in stock returns over the period extending 20 days before the announcement of earnings to 90 days after the announcement,

Partition of Return	Time Period
31%	occurred before the day of the announcement
18%	occurred on the day of the announcement
51%	occurred after the day of announcement.

Lowest SUE categories (#1 and #2), the response averaged:

Partition of Return	Time Period
40%	prior to the day of the announcement
15%	on the day of the announcement
45%	after the day of announcement.

Latane and Jones (1979) found that the price adjustment process is much more rapid for stocks which analysts follow closely. Consequently, while the efficient market hypothesis may hold for stocks which many analysts follow, the market is not so efficient for other stocks.

**Technique:** Several ways exist to use earnings surprises to predict stock returns. The first set of ways involves *standardizing* unexpected earnings while the second method simply uses unexpected earnings. Both techniques are the most effective in the days preceding or on the actual announcement of quarterly earnings per share (EPS). We shall discuss the former method.

Standardized Unexpected Earnings: The difference between the actual and expected earnings for a particular quarter is normalized by the standard deviation of the earnings to obtain a z score known as the standardized unexpected earnings (SUE). Mathematically,

$$\text{SUE} = \frac{\text{Reported EPS}_t - \text{Expected EPS}_t}{\text{Standard Deviation of EPS}} = \frac{X - \bar{X}}{\sigma} = \text{Z Score}$$

Obtaining Earnings Estimates: There are several ways to obtain earnings estimates.

- *Earnings Estimate Services:* Services such as First Call which can be obtained from America Online, I/B/E/S, Nelson's, Standard & Poor's Outlook Report, and Zacks from Bloomberg or the Internet provide consensus earnings estimates through gathers the estimates of several investment analyst who follow each stock. These services also report the latest revisions in earnings expectations for each stock. Following are the earnings estimates for Coca-Cola obtained from First Call vis-a-vis America Online.

FIRST CALL EARNINGS ESTIMATES

KO Coca Cola Co. 06/10/96  
 Industry: Soft Drinks SIC: 2080  
 Latest Price: \$46.75 1996 P/E: 33.6  
 Analyst Recommendation: 2.5

	QTR Jun 96 ---	QTR Sep 96 ---	FY Dec 96 --	FY Dec 97 --
CURRENT MEAN EPS	0.42	0.38	1.39	1.63
Number of Brokers	18	16	19	20
Median	0.42	0.38	1.39	1.65
Standard Deviation	0.01	0.01	0.02	0.03
Current High	0.44	0.40	1.43	1.68
Current Low	0.41	0.37	1.35	1.55
Year Ago EPS	0.36A	0.32A	1.19A	1.39
Current vs. Year Ago Change	17%	19%	17%	17%
Report Date	wk/Jul 22	wk/Oct 21	wk/Jan 27	-

	EARNINGS ESTIMATE REVISION MOMENTUM			
Up Revisions last 7 days	0	0	0	0
Up Revisions last 30 days	0	0	0	0
Down Revisions last 7 days	0	0	0	0
Down Revisions last 30 days	1	1	1	0

	EARNINGS ESTIMATES CONSENSUS TRENDS			
Current Mean	0.42	0.38	1.39	1.63
7-days ago Mean	0.42	0.38	1.39	1.63
30-days ago Mean	0.42	0.38	1.39	1.63
60-days ago Mean	0.42	0.38	1.39	1.64
90-days ago Mean	0.42	0.38	1.39	1.64

The preceding information shows that the expected EPS for the second quarter of 1996 is \$.42 per share. We further observe that analysts in general (except for one analyst) have not revised earnings estimates either up or down.

Based on the deviation in expected analysts' estimates of EPS,  $\sigma^*_{EPS} = .01$

Thus, the formula that we use in conjunction with the EPS announcement for the 2nd quarter of 1996 for Coca-Cola (KO) is

$$SUE^* = \frac{.42 - .42}{.01} = 0$$

Since the reported EPS for the second quarter of 96 was \$.42 (announced on July 15, 1996), it follows that SUE = 0. Since SUE = 0, we would recommend a **hold**. There is no "surprise" since the actual quarterly EPS is equal to the expected quarterly EPS.

THE key issue: Whether the reported EPS is statistically different from the predicted EPS and also how statistically different is it e.g. what's the significance level?

**Our Focal Company: World Wrestling Entertainment (WWE).**

World Wrestling Entertainment<sup>2</sup> (<http://www.wwe.com/>, <http://corporate.wwe.com/> ) is an integrated media and entertainment company, principally engaged in the development, production and marketing of television programming, pay-per-view programming and live events, and the licensing and sale of branded consumer products featuring our highly successful World Wrestling Entertainment brand. WWE is headquartered in Stamford, Conn., with offices in London, Los Angeles, Toronto, and a sales office located in New York City. Founded by Vincent and Linda McMahon, World Wrestling Entertainment, Inc. has been involved in the sports entertainment business for more than 20 years. The company is organized around two principal activities:



- Live and Televised Entertainment, which consists of live events, television programming and pay-per-view programming. Revenues consist principally of attendance at live events, sale of television advertising time and sponsorships, domestic and international television rights fees, and pay-per-view buys.
- Branded Merchandise, which consists of licensing and direct sale of merchandise. Revenues include sales of consumer products through third party licensees and direct marketing, and sales of merchandise, magazines and home videos.

WWE's formula is straightforward; they develop compelling storylines anchored by their Superstars. This content drives television ratings, which, in turn, drive pay-per-view buys, live event attendance and branded merchandise sales. Their strategy is to capitalize on the significant operating leverage of their business model through the distribution of this intellectual property across existing platforms, as well as new and emerging distribution platforms. WWE is working to expand the mainstream potential of the World Wrestling Entertainment brand in domestic and international markets, develop extension businesses off the World Wrestling Entertainment brand, fully develop their internet programs as an entertainment and advertising platform, and develop new programming and sports entertainment brands that leverage WWE's core competencies.

8:10am 06/30/05

On July 30, 2005 at 8:10 a.m. in the morning, World Wrestling Entertainment Inc. (WWE) announced that fourth-quarter profit fell to \$16.1 million or 23 cents a share, from \$19.7 million, or 28 cents, a year ago. Revenue for the period ended April 30 slipped to \$118.3 million from \$126.7 million in last year's fourth quarter reflecting only three televised events compared with four events last year, sharply lower home-video sales and flat licensing revenues. Analysts surveyed by Thomson First Call were looking for earnings, on average, of 19 cents a share. For fiscal 2006, the Stamford, Conn., media and entertainment company forecast earnings from continuing operations of 44 cents to 48 cents a share, against analysts' view for 44 cents a share.

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<sup>2</sup>Taken verbatim from <http://corporate.wwe.com/company>

**Class Assignment:** Download the spreadsheet labeled Momentum\_Spr2006.xls from my website and do all your work on this spreadsheet. This is an **individual assignment**. Although you can discuss this case with your classmates, you are responsible for doing the case yourself. Students caught cheating will be given an F on this assignment.

1. SP500 Moving Average Graphs (10 points):

- a. Graph the 150-day moving average (MA(150)) of the SP500 and the actual SP500 price on the same graph.
- b. Graph the 200-day moving average (MA(200)) of the SP500 and the actual SP500 price on the same graph.

2. Calculating SP500 Profits using Moving Averages: (20 points)

- a. Calculate the profits associated with using the MA(150) strategy starting from August 6, 2001 (date of your first sell decision) assuming that you purchased 100 shares of the SP500.
- b. Calculate the profits associated with using the MA(200) strategy starting from October 22, 2001 (date of your first sell decision) assuming that you purchased 100 shares of the SP500.

In calculating profits, assume that the investor buys the SP500 long for the MA(150) and also the MA(200). Assume that an investor buys or sells whenever the MA indicates a buy or sell. After a stock is sold, the investor sits on the sidelines until the next buy signal occurs. No short sales are allowed. Next, recalculate profits assuming that the investor shorts the SP500 (but doesn't buy the stock long) for the MA(150) and also the MA(200). An example of what your table should look like for the MA(150) strategy follows (I included this example to be sure that you are on the right track):

Date	SP500	150-Day Decision	Profit		Profit	
			Buy Long MA(150) Per Share	Buy Long MA(150) 100 Shares	Sell Short MA(150) Per Share	Sell Short MA(150) 100 Shares
8/6/01	1200.48	Sell				
12/5/01	1170.35	Buy			30.13	3013.00
12/6/01	1167.1	Sell	-3.25	-325.00		
12/27/01	1157.13	Buy			9.97	997.00
			*****			
5/10/05	1166.22	Sell	-12.62	-1,262.00		
5/18/05	1185.56	Buy			-19.34	-1934.00
		<b>Profits</b>				

**Hint:** To make your life easier, you should use a series of IF statements. The first IF statement sets up a dummy variable of 1 or 0 where 1 = buy and 0 = sell e.g., =IF(B152>C152,1,0). The next IF statement, set up in another column of your worksheet, use your first IF statement and assigns a BUY or SELL decision e.g., =IF(E153<E152,"Sell",IF(E153>E152,"Buy",""))).

3. WWE Moving Average Graphs: (10 points)

- a. Graph the 150-day moving average (MA(150)) of WWE and the actual WWE price on the same graph.
- b. Graph the 200-day moving average (MA(200)) of the WWE and the actual WWE price on the same graph.

4. Calculating WWE Profits using Moving Averages: (20 points)

- a. Calculate the profits associated with using the MA(150) strategy starting from August 6, 2001 (date of your first sell decision) assuming that you purchased 100 shares of WWE.
- b. Calculate the profits associated with using the MA(200) strategy starting from October 22, 2001 (date of your first sell decision) assuming that you purchased 100 shares of WWE.

In calculating profits, assume that the investor buys WWE long for the MA(150) and also the MA(200). Assume that an investor buys or sells whenever the MA indicates a buy or sell. After a stock is sold, the investor sits on the sidelines until the next buy signal occurs. No short sales are allowed. Next, recalculate profits assuming that the investor shorts WWE (but never buys the stock long) for the MA(150) and also the MA(200). Note: This is similar to question #2 above.

5. Relative Strength for WWE: (10 points)

- a. Calculate the relative strength index for WWE and then graph the relative strength index. Is there ever a time when WWE underperformed the SP500 (relative strength ratio is less than one)? Following is a portion of the table that I want you to construct:

Date	SP500	WWE	WWE/ SP500	RS (WWE) Scaled
2-Jan-01	1283.27	16.00	0.012	1.00
3-Jan-01	1347.56	17.25	0.013	1.03
4-Jan-01	1333.34	17.06	0.013	1.03
5-Jan-01	1298.35	17.75	0.014	1.10
8-Jan-01	1295.86	17.94	0.014	1.11

b. Some technical analysts use the relative strength index in conjunction with a moving average of the relative strength index. In essence, the relative strength index is analogous to the closing stock price. The decision criterion is to buy (sell) the stock when the stock's relative strength index crosses above (below) the moving average of the relative strength (RS) index. Using the relative strength index that you just calculated, calculate a 150-day moving average of this relative strength index. A portion of the moving average is shown on the right. Next, calculate the profits based on this strategy. In calculating profits, assume that the investor buys WWE long for the MA(RS). Assume that an investor buys or sells when the MA indicates a buy or sell. After a stock is sold, the investor sits on the sidelines until the next buy signal occurs. No short sales are allowed. Next, recalculate profits assuming that the investor shorts WWE (but never buys the stock long) for the MA(RS).

Date	WWE/ SP500	MA(150)
6-Aug-01	0.00967	0.01140
7-Aug-01	0.00964	0.01138
8-Aug-01	0.00984	0.01136
9-Aug-01	0.01000	0.01134
10-Aug-01	0.00997	0.01132

Date	Decision	WWE	Profits		Profits	
			Buy Long MA(RS) Per Share	Buy Long MA(RS) 100 Shares	Sell Short MA(RS) Per Share	Sell Short MA(RS) 100 Shares
9/18/01	Buy	11.59				
10/9/01	Sell	11.05	-0.54	-54.00		
11/14/01	Buy	12.19			-1.14	-114.00
.....						
2/2/05	Sell	12.83	xxxx	xxxx		
3/16/05	Buy	12.58			xxxx	xxxx
3/17/05	Sell	12.31	xxxx	xxxx		
		<b>Profits</b>	xxxx	xxxx	xxxx	xxxx

6. Comparison of Strategies: (10 points) Calculate the gross profits from each active strategy along with profits associated with a passive buy and hold strategy for both the SP500 and also WWE. Below is a table of what your results should look like.

Technique	Stock	Gross Profits	Comments
MA(150): Buy Long	SP500	xxxx	
MA(150): Sell Short	SP500	xxxx	
MA(200): Buy Long	SP500	xxxx	
MA(200): Sell Short	SP500	xxxx	
Buy and Hold	SP500	xxxx	Buy on 1/2/2001 and sell on 6/29/2005
MA(150): Buy Long	WWE	xxxx	
MA(150): Sell Short	WWE	xxxx	
MA(200): Buy Long	WWE	xxxx	
MA(200): Sell Short	WWE	xxxx	
MA(RS): Buy Long	WWE	xxxx	
MA(RS): Sell Short	WWE	xxxx	
Buy and Hold	WWE	xxxx	Buy on 1/2/2001 and sell on 6/29/2005

Which method results in the highest profits being achieved for the SP500 and also for WWE? Is the method which results in the highest profits the same for both the SP500 and WWE? Do the active strategies beat the passive buy and hold strategy? Please discuss. Do you have any intuition as to why the method, which yields the highest profits, is effective?

7. Consensus Estimates, Whisper Numbers, and Earnings Surprises: (20 points)

**Research in Motion** (Ticker: RIMM, <http://www.rim.net/>): is a leading designer, manufacturer and marketer of innovative wireless solutions for the worldwide mobile communications market. RIM's portfolio of award-winning products, used by thousands of organizations around the world, include the BlackBerry® wireless platform, software development tools, and software/hardware licensing agreements. On Wednesday, June 29, 2005 at 6:44 pm ET, RIMM reported that it had more than doubled its first-quarter profit. The Waterloo, Ontario-based company earned \$132.5 million, or 67 cents per share, in the three months ended May 28, up from \$55 million, or 28 cents per share, a year ago. Excluding litigation charges and certain tax adjustments items, RIM said it would have earned \$110.1 million, or 56 cents per share. Analysts surveyed by Thomson Financial expected earnings of 55 cents per share and sales of \$452.2 million -- the high end of the company's April guidance for earnings of 51 cents to 56 cents per share on sales ranging from \$430 million to \$455 million.



- a. Price reaction to RIMM's EPS announcement: Graph the price of RIMM located in the "Prices for EPS Announcement" worksheet from June 15, 2005 onwards on a daily basis and indicate on the graph the day of the announcement and the day after the announcement using a marker (your choice of a star, square, etc.) under graph options.
- b. Calculating the SUE: Calculate the Standardized Unexpected Earnings for RIMM using the data provided in the "EPS Estimate (RIMM)" worksheet in conjunction with the "7b. SUE(RIMM)" template. To calculate the Standardized Unexpected Earnings based on consensus EPS and alternatively Earnings Whispers, use the standard deviation of analyst estimates in calculating both SUEs. To determine whether these Z-scores (SUEs) are statistically significant, use the NORMDIST function in Excel. NORMDIST returns the normal cumulative distribution for the specified mean and standard deviation. The significance level is  $1 - \text{NORMDIST}$ .

Syntax

NORMDIST(x,mean,standard\_dev,cumulative)

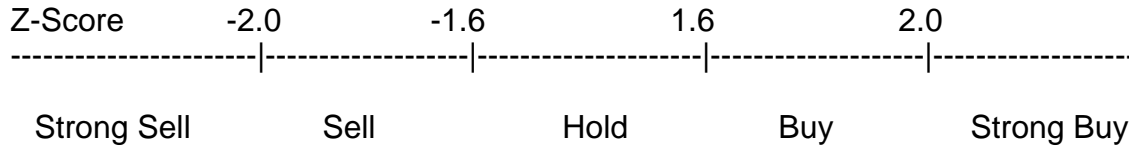
Where x = actual earnings per share for the quarter

Mean = either the analyst estimate of EPS or the earnings whisper

Standard deviation = standard deviation of analyst estimate of EPS

Cumulative = set this to TRUE

Based on either SUE, was the EPS announced expected or unexpected? Use a 5% level of significance. Using the following decision rule:



Based on SUE, is Research in Motion (RIMM) a strong sell, sell, hold/neutral, buy, or a strong buy? Which number appears to be the most important number that the market responds to for RIMM (price reaction) based on the news about RIMM on June 29, 2005 released after the bell (market closed) at 6:44 pm ET? Is it consensus eps, earnings whispers, or consensus revenues/sales? Please discuss.

**World Wrestling Entertainment** (Ticker: WWE): On Thursday, June 30, 2005 at 8:10 a.m. in the morning before the stock market opened, WWE said that fourth-quarter profit fell to \$16.1 million, or 23 cents a share, from \$19.7 million, or 28 cents, a year ago. Revenue for the period ended April 30 slipped to \$118.3 million from \$126.7 million in last year's fourth quarter. Analysts surveyed by Thomson First Call were looking for earnings, on average, of 19 cents a share.



- c. Price reaction to EPS announcement: Graph the price of WWE from June 15, 2005 onwards on a daily basis and indicate on the graph the day of the announcement and the day after the announcement using a marker (your choice of a star, square, etc.) under graph options. The prices for WWE are located in the “Prices for EPS Announcement” worksheet.
- d. Calculating the SUE: Calculate the Standardized Unexpected Earnings using the data provided in the “EPS Estimate (WWE)” worksheet in conjunction with the SUE template labeled “7d. SUE(WWE)”. To determine whether these Z-scores (SUEs) are statistically significant, use the NORMDIST function in Excel. NORMDIST returns the normal cumulative distribution for the specified mean and standard deviation. The significance level is 1 – NORMDIST.

Please turn in a hard copy of the spreadsheet. Remember that this is an **individual assignment**.