

# Use of Regression and Triple Exponential Smoothing Models for Forecasting Share Prices of Saudi Companies

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**ABSTRACT.** Over the past few years, the local Saudi shares market witnessed a rising interest as more investors began investing their money in buying, shares of some of the local companies. The formation of new companies and corporations having great potential success, led even to more interest in the shares market. This paper provides a quantitative study of the Saudi shares market. The period of study, which covers all the 55 companies in the market is one year. The general trends associated with the shares prices changes during the year of study, have been investigated to enable the use of an appropriate time series model for forecasting. The ranking of the various sectors with respect to volume and value of shares traded, shows that banks industrial, services and cement companies are on top while electricity and agricultural companies are last. Also banks, services, industrial, and cement companies have the highest average percentage of share price increase of 61.8%, 50.64%, 39.7%, and 27.2 respectively, while the electricity and agricultural sectors showed a decrease of 9% and 0.96% for the same period. Based on the trends analysis investigation, the triple exponential smoothing method is used to forecast future share prices for some companies. Comparisons with regression models are also discussed.

## **1. Introduction**

Over the past few years, the local Saudi shares market witnessed a rising interest as more investors began investing their money in buying shares of some of the local companies. The formation of new companies and corporations with great potential success, such as: Sabic, Taiba, Makkah and AI-Rajhi led even to more interest in the shares market. Today there are about 55 companies in the local shares market. Since there is no official shares market, the trading of shares is done at the local banks and reports of shares transactions are summarized by SAMA, the Saudi Arabian Monetary Agency, and published in the press.

This paper provides a summary of a detailed study of the Saudi shares market<sup>[1]</sup>. The paper is presented in five sections. In section 2, a general preliminary analysis is given. Section 3 describes the use of triple exponential smoothing to predict futures share prices for some of the companies considered in the study. Section 4 presents the results of using linear regression in predicting shares prices of different companies. Finally, a conclusion is given in section 5.

The study covers all the 55 Saudi companies whose shares are owned by the public. The period of study is approximately one year starting from 15.5.1988/20.5.1409 up to 27.4.1989/1.5.1410 and covering 49 weeks. The data, used in the study is obtained from SAMA, The Saudi Arabian Monetary Agency. These data are collected and reported on a weekly basis.

A classification of the 55 companies considered in this study is found in Table 1.

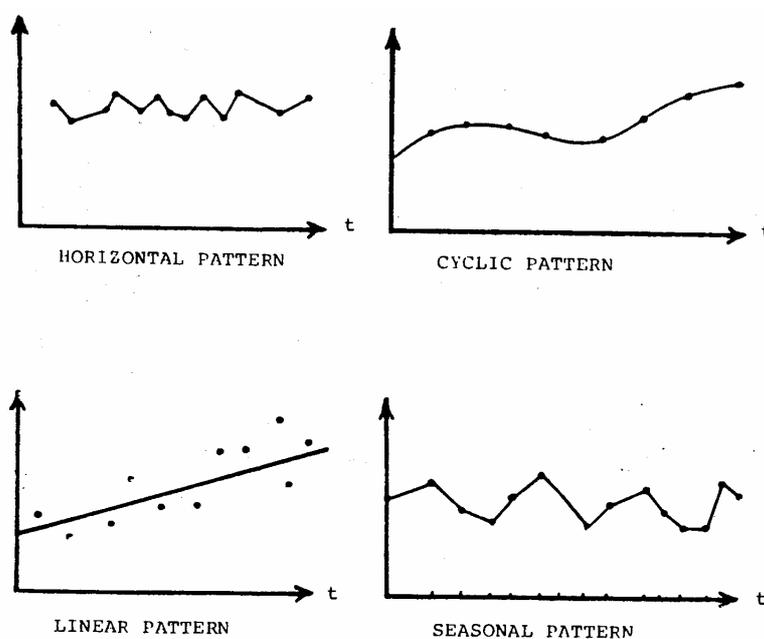
TABLE 1. Classification of companies considered in the study

Sector	Number of companies
Banking sector	11
Industrial sector	9
Cement sector	8
Services sector	11
Electricity sector	10
Agricultural sector	6
Total	55

## 2. General Preliminary Analysis

One objective of this study is to identify the general trends associated with the share prices changes during the year of the study. Before selecting the right trend for the various companies within each sector, it is useful to review the types of data pattern that exist in general. Four types of data pattern can be distinguished

1. Horizontal Pattern: exists when the data values fluctuate around a constant mean.
2. Cyclic Pattern: exists when the data are influenced by long term economic fluctuations such as those associated with business cycle.
3. Linear Pattern: exists when there is a long term increase or decrease in the data.
4. Seasonal Pattern: exists when a series of data is influenced by seasonal factors.



### 2.1 Shares Prices Pattern

An important step in selecting an appropriate time series method of forecasting is the identification of the types of data patterns. In order to identify the existing shares price patterns for each company, plots of the price of the share versus time (here, week number) are made for all the 55 companies<sup>[1]</sup>. Due to the large number of figures obtained, we present here only a sample of such figures (Figures 1-20). It is clear from these figures that the data series include combinations of at most 2 of the mentioned patterns for most of the companies. Thus, a smoothing time-series method is going to be used in short range forecasting of futures shares prices.

The shares prices pattern shown by these figures reflect the financial standing as well as the management efficiency of the various companies. For instance, Figures (1-4) reflect a good standing for the Saudi British Bank, Arab National Bank and Saudi American Bank, and clearly lower performance for the Saudi Cairo Bank during the same period. This is in agreement with the fact that the Saudi Cairo Bank had some serious problems which resulted in major losses for the bank that led to major changes at the bank's top management. Also, the prices pattern reflect the confidence of the public in the company and its potential success as in Figures 7-8 for Saudi Fertilizers and Saudi Pharmaceutical companies. Figure 12 clearly indicates the instability and risk associated with investments in real estate.

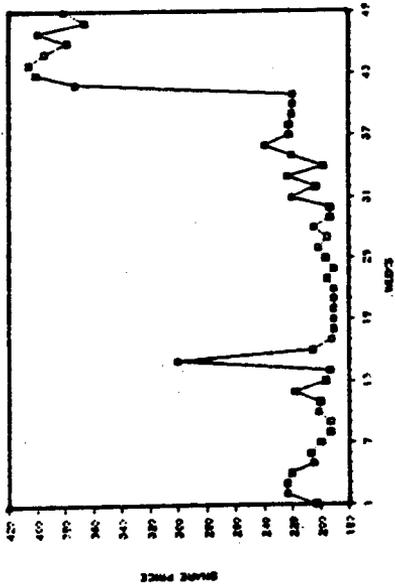


FIGURE 2: SAUDI CARD BANK PRICE CHANGE

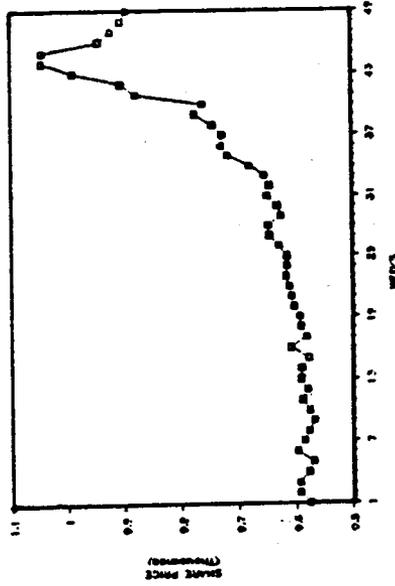


FIGURE 4: SAUDI NATIONAL BANK PRICE CHANGE

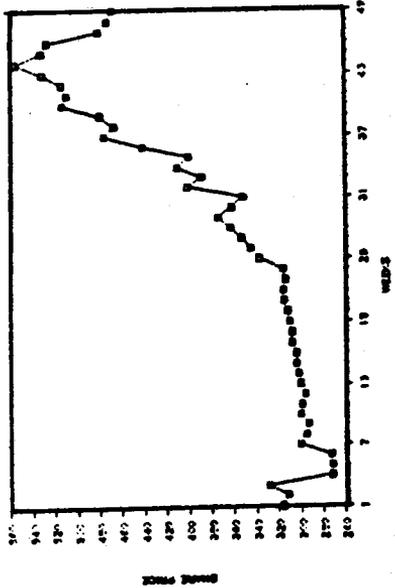


FIGURE 3: SAUDI BRITISH BANK PRICE CHANGE

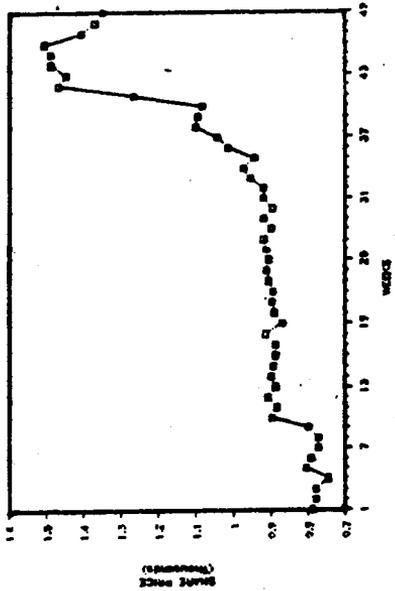


FIGURE 5: ARAB NATIONAL BANK PRICE CHANGE

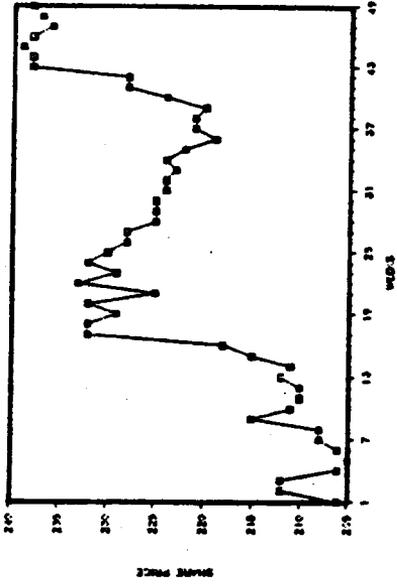


FIGURE 6: SAUDI CRUDE OIL PRICE CHANGE

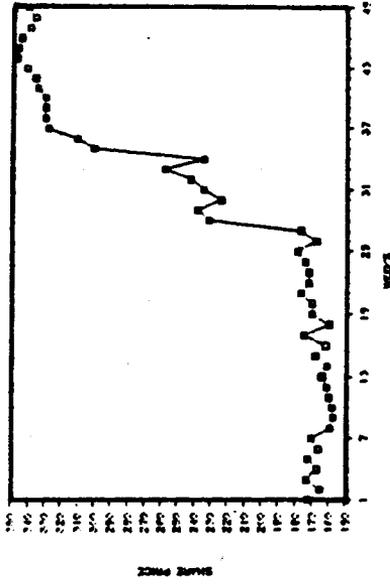


FIGURE 6: SAUDI PHARMACEUTICAL PRICE CHANGE

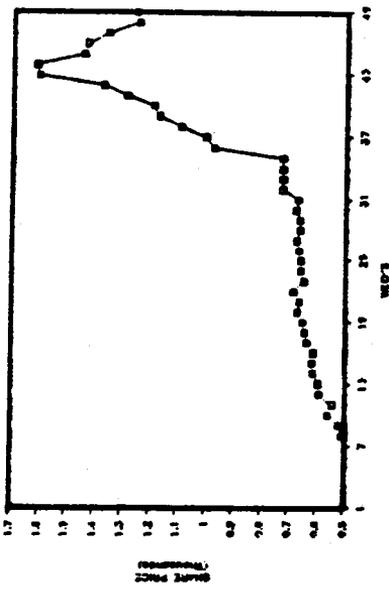


FIGURE 6: AL-RAM CHEMICAL PRICE CHANGE

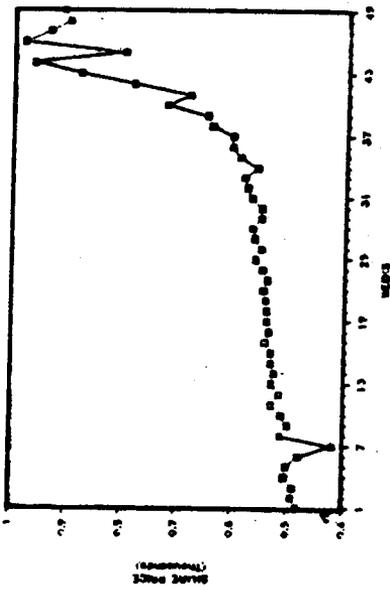


FIGURE 7: SAUDI FERTILIZERS PRICE CHANGE

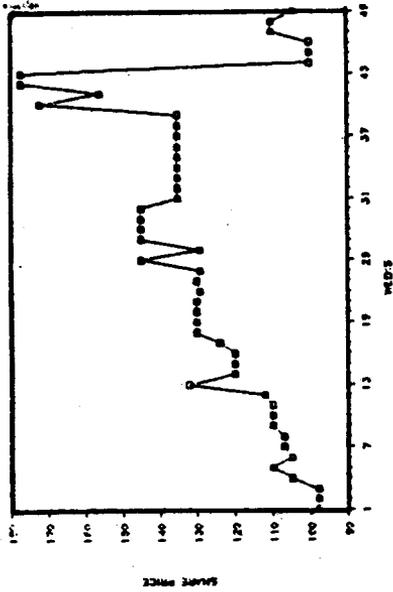


FIGURE 10: YAMANA CEMENT, PRICE CHANGE

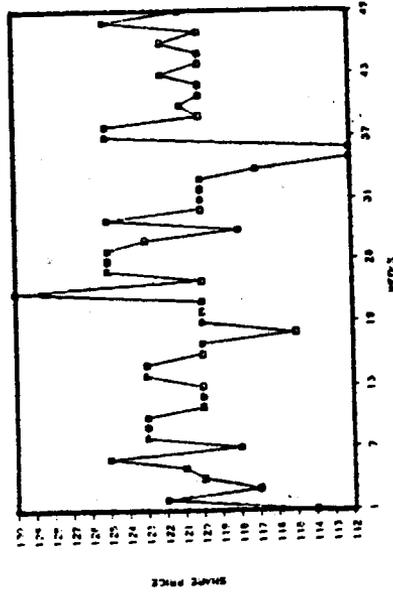


FIGURE 12: SAUDI REAL ESTATE, PRICE CHANGE

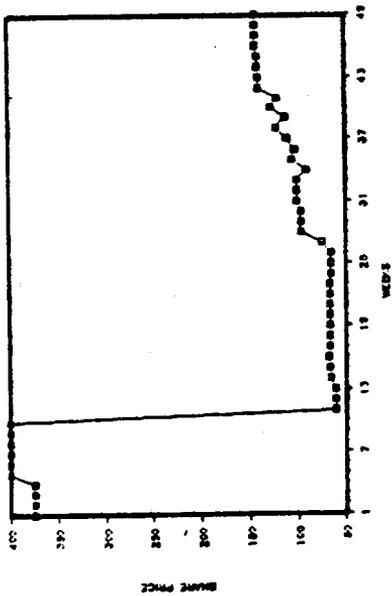


FIGURE 9: ARAB CEMENT, PRICE CHANGE

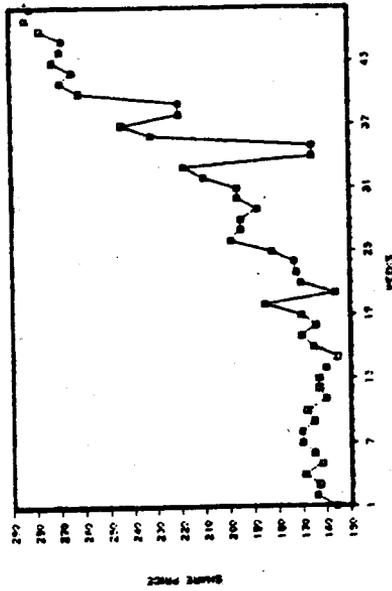


FIGURE 11: SOUTHERN CEMENT, PRICE CHANGE

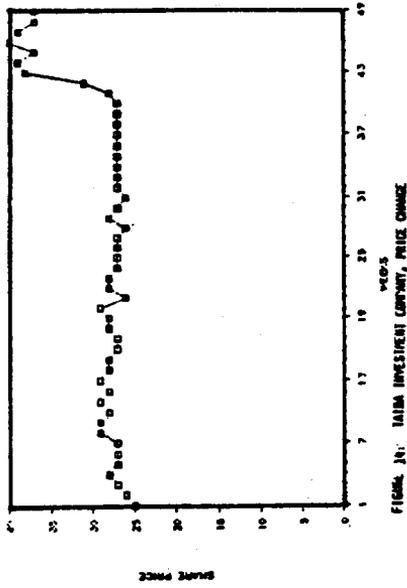


FIGURE 14: TATA INVESTMENT COMPANY, PRICE CHANGE

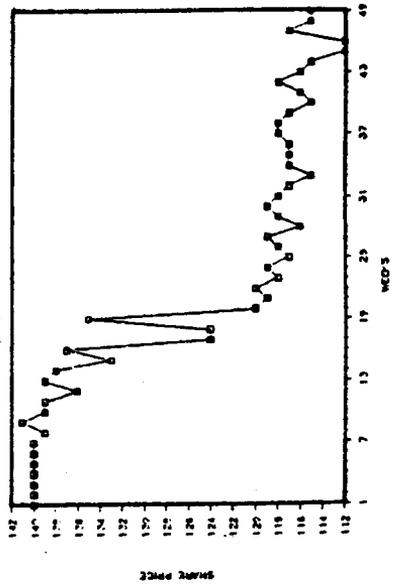


FIGURE 16: WESTERN ELECTRICITY, PRICE CHANGE

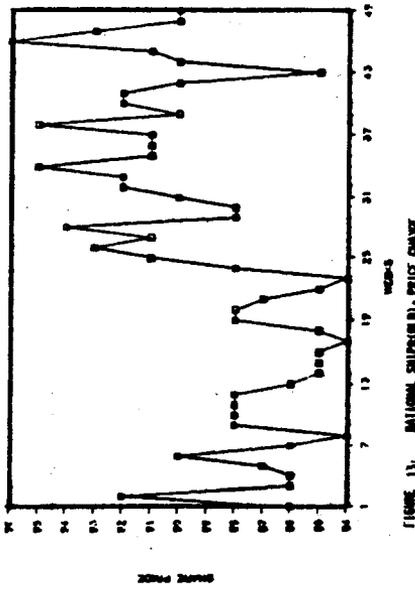


FIGURE 13: NATIONAL SHIPBUILDING, PRICE CHANGE

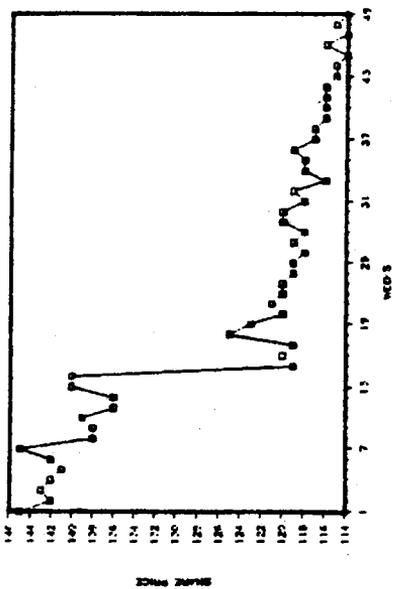


FIGURE 15: CENTRAL ELECTRICITY, PRICE CHANGE

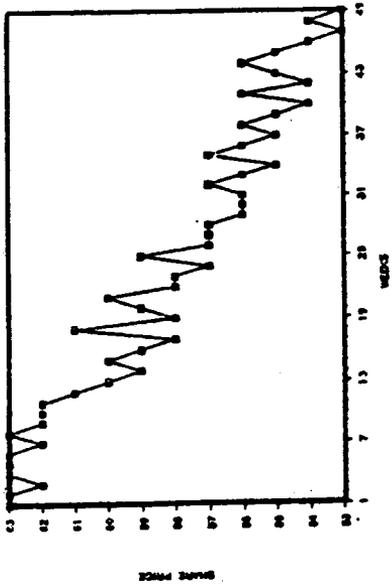


FIGURE 18: ORANGE AGRICULTURAL PRICE CHANGE

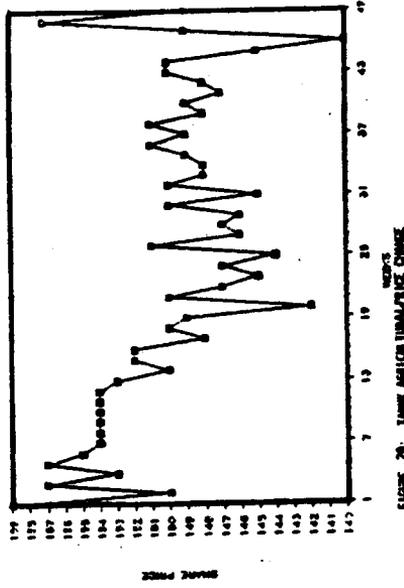


FIGURE 20: TANGERINE AGRICULTURAL PRICE CHANGE

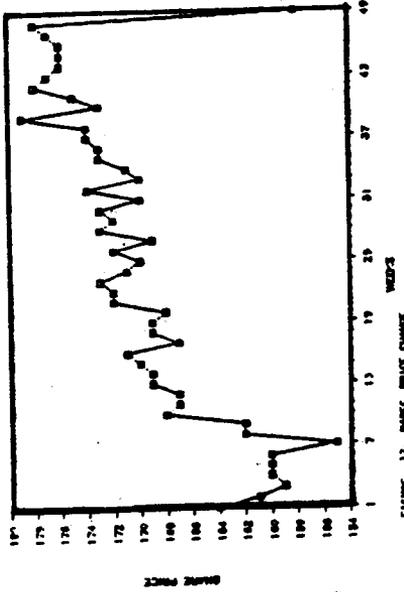


FIGURE 17: LIME, PRICE CHANGE

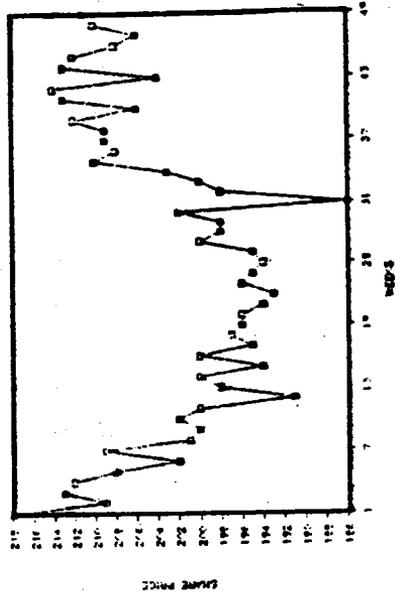


FIGURE 19: ALL AGRICULTURAL PRICE CHANGE

## 2.2 Volume and Value of Shares Traded

Figures (22-23) show pie-charts for both the number and value of shares traded in the year under consideration for all sectors. Based on this, a ranking of the various sectors with respect to the number and value of shares traded is summarized in Tables (2-8). Also, the average price change during the year for each sector is summarized in Table 9.

The results obtained here are consistent with results reported by other organizations for different periods of time, such as in Reports No.16, 33 and 36 of Riyadh Bank<sup>[2-4]</sup>, and Report No.4 of Jeddah Chamber of Commerce<sup>[5]</sup>. The general trend indicated by these results shows that banks, industrial, services and cement companies are on top, while electricity and agricultural companies are last with regard to volume and value of shares traded.

TABLE 2. Ranking of Sectors with respect to no. of shares traded in the year

Sector	Ranking with respect to no. of shares traded in the year
Industrial (29%)	1
Services(23%)	2
Banks(18%)	3
Cement(17%)	4
Electricity (7%)	5
Agricultural (6%)	6

TABLE 3. Ranking of Sectors with respect to value of shares traded in the year

Sector	Ranking with respect to value of shares traded in the year
Banks(47%)	1
Industrial (30%)	2
Cement(10%)	3
Services(6%)	4
Electricity (4%)	5
Agricultural (3%)	6

Also figures (24-28) show pie charts for the number of shares traded in the year for each company within the different six sectors. A similar ranking of the companies within each sector is obtained a follows :

## 3. The Forecasting Model

In this section we will investigate the use of some forecasting technique to predict future shares prices for some of the companies considered in this study. The technique that will be used here is the triple exponential smoothing method.

TABLE 4. Ranking of Banks with respect to no. of shares traded in the year

Banks	Ranking with respect to no. of shares traded in the year
Al-Rajhi (35%)	1
S. British (15%)	2
S.American (13%)	3
S.Cairo (11%)	4
S. Al-Fransi (6%)	5
A. National (6%)	5
S.United (5%)	6
Aljazira (3%)	7
Investment (3%)	8
S. Al-Hollandi (2%)	9
Riyad (1%)	10

TABLE 5. Ranking of Industries with respect to no. of shares traded in the year

Industries	Ranking with respect to no. of shares traded in the year
Sabic (70%)	1
National (11%)	2
Pharmaceutical (8%)	3
Ceramics (4%)	4
Fertilizers (3%)	5
Gas & Indus. (3%)	6
Savola (1%)	7

TABLE 6. Ranking of Cement Companies with respect to no. of shares traded in the year

Cement	Ranking with respect to no. of shares traded in the year
Bahraini (50%)	1
Kuwaiti (15%)	2
Southern (12%)	3
Arab (7%)	4
Yamamah (5%)	5
Qaseem (5%)	5
Yanbu (4%)	6
Saudi (2%)	7

Let  $X_1, X_2, \dots, X_{t-1}, X_t$  be the past data available. In our case, they denote the share prices of week 1, and week 2, ..... etc.

And let  $F_{t+1}, F_{t+2}, F_{t+a}, \dots$  etc. be the future forecast required.

TABLE 7. Ranking of Services Companies with respect to no. of shares traded in the year

Services	Ranking with respect to no. of shares traded in the year
Shipping (New) (90%)	1
Taiba (4%)	2
Automatic (2%)	3
Hotels (2%)	3
Live stock (1%)	4
Saptco (1%)	4

TABLE 8. Ranking Electricity and Agricultural Companies with respect to no. of shares traded in the year

Electricity	Ranking with respect to no. of shares traded in the year
Central (62%)	1
Western (30%)	2
Eastern (7%)	3
Arar (1%)	4
Agricultures	Ranking
Qaseem (42%)	1
Nadec (18%)	2
Eastern (16%)	3
Hail (11%)	4
Tabuk (9%)	5
Fisheries (4%)	6

TABLE 9. Average of Share Prices Changes in various sectors (%)

Sector	Average of share prices change (%)	Ranking
Banks	+61.80	1
Services	+ 50.64	2
Industries	+ 39.7	3
Cement	+ 27.2	4
Agricultural	- 0.96	5
Electricity	- 9.0	6

For single exponential smoothing,  $F_{t+1} = \alpha X_t + (1-\alpha) F_{t-1}$ , and the forecast at period  $t+1$ ,  $F_{t+1}$  will be set to  $F_{t+1}$  where,  $0 < \alpha < 1$ , is the smoothing constant. The formula for double exponential smoothing is given by; Makridakis<sup>[6]</sup>

$F_{t+1} = \alpha F_{t+1} + (1-\alpha) F_t$ , and the forecast at period  $t+1$ ,  $F_{t+1}$  will be set to

$F_{t+1}$ .

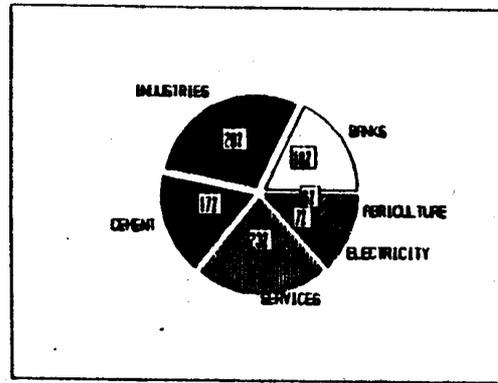


FIGURE 22 . NO. OF SHARES TRADED IN THE YEAR FOR THE VARIOUS SECTOR

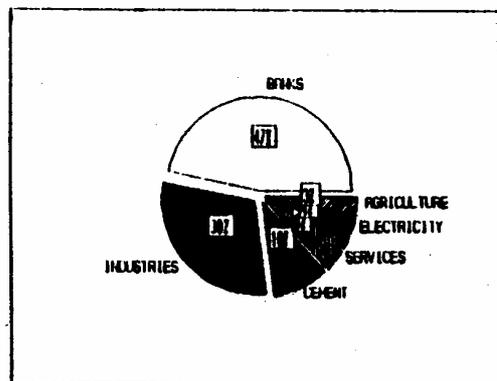


FIGURE 23. VALUE OF SHARES TRADED IN THE YEAR FOR THE VARIOUS SECTORS

when triple exponential smoothing is used, then  $F_{t+1} = \alpha F_{t+1} + (1-\alpha) F_t$  and the forecast at time  $t+1$ ,  $F_{t+1}$  will be set to  $F_{t+1}$ .

An important question in exponential smoothing is how to select the 'best' smoothing constant,  $\alpha$ , to best fit a model. In general, the smoothing constant is chosen in the range of 0.01 to 0.50. The higher the smoothing constant, the more emphasis is placed upon current series information and the quicker the reaction to changes in the series. High constants may overreact to the "noise" in a series. A small constant emphasizes the past history in the model; thus, the model may not be responsive to changes in the series. Alpha values greater than 0.5 may give erratic results and are not advised. In our investigation, we will use a 'computer' search for selecting the smoothing constant,  $\alpha$ , in such a way that the forecast error is minimized. The computer program used in this forecasting study is Program Expo of the Institute of Industrial Engineers IIE<sup>[7]</sup>.

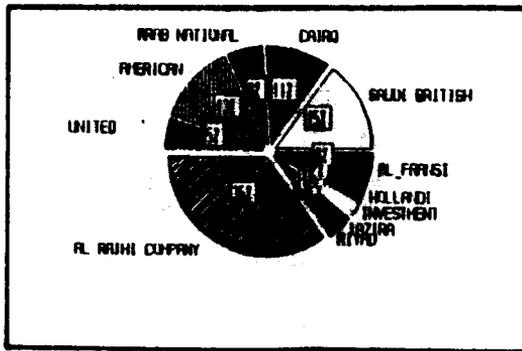


FIGURE 24. NO. OF SHARES TRADED IN THE YEAR FOR THE BANKS

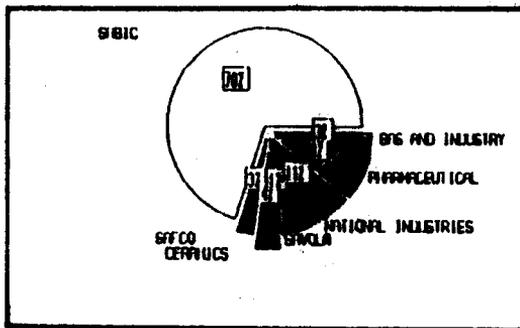


FIGURE 25. NO. OF SHARES TRADED IN THE YEAR FOR THE INDUSTRIES

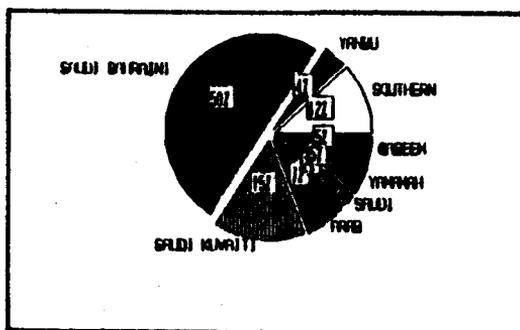


FIGURE 26 NO. OF SHARES TRADED IN THE YEAR FOR THE CURRENT COMPANIES

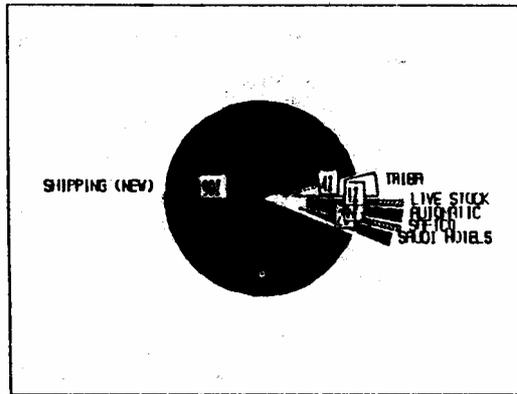


FIGURE 27. NO. OF SHARES TRADED IN THE YEAR FOR THE SERVICES COMPANIES

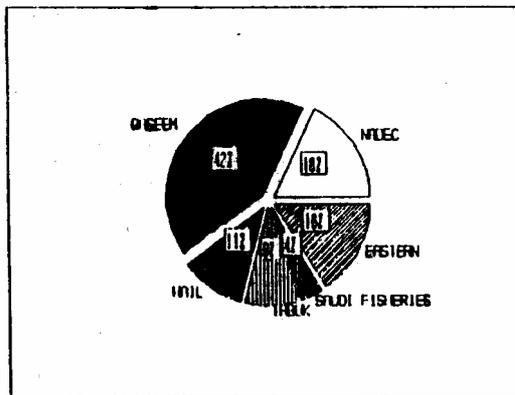


FIGURE 28. NO. OF SHARES TRADED IN THE YEAR FOR THE AGRICULTURAL COMPANIES

Exponential smoothing is one of the common mathematical techniques used in systems forecasting, Bedworth<sup>[8]</sup>. The method has the advantage of being simple and has all the attributes of a moving average and yet, no back data have to be held. Thus, if it is properly used, exponential smoothing is sufficiently accurate and at the same time quick and inexpensive to operate. For the mathematical development of the method and its extensions, the readers are referred to References such as Makridakis<sup>[6]</sup>, Bedworth<sup>[8]</sup> and Brown<sup>[9]</sup>. The method is being used more widely in short term forecasting as in Riggs<sup>[10]</sup>. The applications of exponential smoothing in Economics is reported by many researchers. In Smaller<sup>[11]</sup>, exponential smoothing is used in forecasting the demand for surgical gloves. One of the most significant developments of this decade has been the acceptance of time series forecasting in mainstream economic theory and econometric model building; Bails<sup>[12]</sup> and Granger<sup>[13]</sup>.

In our study the triple exponential smoothing model is tested for its applicability in forecasting future share prices. Testing will be done through entering the data for approximately 40 weeks and then, the program will be used to forecast the share prices for the following five weeks. Comparison with the actual prices will also be obtained. Tables 10-23 show a summary of our findings.

Table 10. Forecasting share price of Western Electricity

Week #	Forecasted share price	Actual share price	$\alpha$
41	115.55	116.00	
42	115.11	118.00	0.3
43	114.64	116.00	
44	114.13	115.00	
45	113.60	116.00	

Table 11. Forecasting share price of Central Electricity

Week #	Forecasted share price	Actual share price	$\alpha$
41	115.53	116.00	
42	115.06	116.00	0.3
43	114.57	115.00	
44	114.06	115.00	
45	113.52	114.00	

Table 12. Forecasting share price of Al-Bank Al-Saudi AI-Fransi

Week #	Forecasted share price	Actual share price	$\alpha$
41	464.47	457.00	
42	476.30	453.00	0.2
43	488.67	450.00	
44	501.60	560.00	
45	515.07	560.00	

Table 13. Forecasting share price of Saudi Bahraini Cement

Week #	Forecasted share price	Actual share price	$\alpha$
41	101.19	108.00	
42	104.53	103.00	0.1
43	105.91	108.00	
44	107.32	104.00	
45	108.76	105.00	

TABLE 14. Forecasting share price of Nadec.

Week #	Forecasted share price	Actual share price	$\alpha$
41	175.64	175.00	
42	176.07	178.00	0.2
43	176.52	177.00	
44	176.98	176.00	
45	177.45	176.00	

TABLE 15. Forecasting share price of Saudi Pharmaceutical.

Week #	Forecasted share price	Actual share price	$\alpha$
41	356.96	334.00	
42	370.53	336.00	0.2
43	384.49	341.00	
44	398.83	347.00	
45	413.55	346.00	

TABLE 16. Forecasting share price of Saudi Cairo Bank

Week #	Forecasted share price	Actual share price	$\alpha$
45	426.70	394.00	
46	461.23	378.00	0.2
47	497.77	399.00	
48	536.31	365.00	
49	576.86	380.00	

TABLE 17. Forecasting share price of Live Stock Company

Week #	Forecasted share price	Actual share price	$\alpha$
41	54.12	56.00	
42	53.58	57.00	0.1
43	53.03	55.00	
44	52.47	55.00	
45	51.90	51.00	

TABLE 18. Forecasting share price of Taiba Investment Company

Week #	Forecasted share price	Actual share price	$\alpha$
45	39.10	37.00	
46	41.23	40.00	0.2
47	43.50	39.00	
48	45.90	37.00	
49	48.44	37.00	

TABLE 19. Forecasting share price of Qaseem Agricultural

Week #	Forecasted share price	Actual share price	$\alpha$
41	54.35	56.00	
42	54.11	54.00	0.1
43	53.87	55.00	
44	53.63	56.00	
45	53.38	55.00	

TABLE 20. Forecasting share price of Saudi American Bank

Week #	Forecasted share price	Actual share price	$\alpha$
41	789.35	878.00	
42	805.95	905.00	0.2
43	823.19	989.00	
44	841.07	1045.00	
45	859.58	1044.00	

TABLE 21. Forecasting share price of SABIC

Week #	Forecasted share price	Actual share price	$\alpha$
41	224.64	228.00	
42	226.48	228.00	0.4
43	228.64	238.00	
44	231.11	238.00	
45	233.91	239.00	

TABLE 22. Forecasting share price of Savola

Week #	Forecasted share price	Actual share price	$\alpha$
41	453.84	452.00	
42	457.19	452.00	0.1
43	460.62	451.00	
44	464.14	451.00	
45	467.75	450.00	

TABLE 23. Forecasting share price of Arab Cement

Week #	Forecasted share price	Actual share price	$\alpha$
41	131.25	120.00	
42	138.65	139.00	0.5
43	146.76	139.00	
44	155.59	140.00	
45	165.13	140.00	

#### 4. Correlation and Regression Analysis

In this section, we will investigate the existence of a linear relationship between the share prices of different companies using linear regression, Montgomery<sup>[14]</sup>.

Thus, the model used for investigation is :

$$y = ax + b$$

where

- y : The share price of company i at week k
- x : The share price for company j at week k
- a : Slope of the line
- b : The intercept

The degree of linear interrelation between two random variables is measured by the correlation coefficient r, defined as :

$$r = \frac{\text{cov}(x, y)}{\alpha_x \alpha_y} = \frac{E[(X - U_x)(y - U_y)]}{\alpha_x \alpha_y}$$

- where:  $U_x$  : Mean of X
- $U_y$  : Mean of y
- $\alpha_x$  : Standard deviation of X.
- $\alpha_y$  : Standard deviation of y

Based on a set of observed values of x and y, the correlation coefficient may be estimated by

$$\begin{aligned} \hat{r} &= \left( \frac{1}{n-1} \right) \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{S_x S_y} \\ &= \frac{1}{n-1} \cdot \frac{\sum_{i=1}^n x_i y_i - n\bar{x}\bar{y}}{S_x S_y} \end{aligned}$$

where:  $\bar{X}$ ,  $S_x$  and  $\bar{y}$  and  $S_y$  are the sample mean and sample standard deviation of x and y respectively.

r will have a positive sign if y increases as x increases, i.e. the slope  $a > 0$ .

When  $a < 0$ , r will have a negative sign.  $r = \pm 1$ , means that there is a perfect linear relation between the two variables.

### 4.1 Correlation and Regression Summary

Table 24 presents a summary of our investigation with regard to linear regression and correlation for some of the companies under study. Results are obtained using program: Multiple Regression of IIE<sup>[7]</sup>.

Tables (24-31) show a comparison between exponential smoothing method and linear regression method in forecasting share prices of selected companies. The summary indicates that linear regression seems to predict future share prices better only in situations when the correlation coefficient is close to 1.0. In situations when the correlation coefficient is not close to 1.0, exponential smoothing is better.

TABLE 24. Summary of Regression and Correlation Analysis.

No.	Independent variable (X)	Dependent Variable (Y)	Regression line $y = aX + b$	Correlation coefficient	Standard error of estimation
1	Eastern Electricity	Western Electricity	$Y = 1.09X - 8.532$	0.923	4.032
2	Western Electricity	Central Electricity	$Y = 0.947X + 6.156$	0.924	4.088
3	Saudi British Bank	Al-Bank Al-Saudi Al-Fransi	$Y = 0.663X + 143.192$	0.898	27.925
4	Saudi Kuwaiti Cement	Saudi Bahraini Cement	$Y = 1.245X - 14.926$	0.732	8.043
5	Sabic	Nadec	$Y = 0.337X + 245.552$	0.408	12.189
6	Qaseem Agriculture	Nadec	$Y = 1.402X + 251.125$	0.745	3.93
7	Sabic	Saudi Pharmaceutical	$Y = 4.182X - 703.437$	0.561	62.21
8	Sabic	Cairo Bank	$Y = 3.885X - 632.106$	0.575	55.721
9	Taiba Investment	Live Stock	$Y = 0.732X + 82.001$	0.548	4.427
10	Yamamah Cement	Saudi Cement	$Y = 0.392X + 24.478$	0.614	12.138
11	Yanbu Cement	Saudi Cement	$Y = 0.424X + 24.979$	0.716	10.717
12	Saudi Refineries	Sabic	$Y = 0.201X + 147.078$	0.492	8.79

TABLE 25. Comparison between exponential smoothing and regression in predicting the share price of Western Electricity based on Eastern Electricity.

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Western Electricity	41	115.55	117.91	116.00
	42	115.11	120.09	118.00
	43	114.64	117.97	116.00
	44	114.13	116.82	115.00
	45	113.60	117.97	116.00

TABLE 26. Comparison between exponential smoothing and regression in predicting the share price of Central Electricity based on Western Electricity.

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Central Electricity	41	115.33	116.01	116.00
	42	115.06	116.01	116.00
	43	114.57	115.06	115.00
	44	114.06	115.06	115.00
	45	113.52	114.11	114.00

TABLE 27. Comparison between exponential smoothing and regression in predicting the share price of Al-Bank Al-Saudi AI-Fransi based on Saudi British Bank.

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Al-Bank Al-Saudi AI-Fransi	41	464.47	446.18	457.00
	42	476.30	443.53	453.00
	43	488.67	441.54	450.00
	44	501.60	514.47	560.00
	45	515.07	514.47	560.00

TABLE 28. Comparison between exponential smoothing and regression in predicting the share price of Saudi Bahraini Cement based on Saudi Kuwait Cement.

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Saudi Bahraini Cement	41	103.19	119.53	108.00
	42	104.53	113.31	103.00
	43	105.91	119.53	108.00
	44	107.32	114.55	104.00
	45	108.76	115.80	105.00

## 5. Conclusion

Based on the analysis and results summarized in the previous sections the following conclusions can be made

1. The banking sector had the highest percentage increase in share prices during the study period, followed by the services and industrial sectors.

TABLE 29. Comparison between exponential smoothing and regression in predicting the share price of Nadec based on Sabc

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Nadec	41	175.64	187.017	175.00
	42	176.07	186.006	178.00
	43	176.52	186.343	177.00
	44	176.98	186.680	176.00
	45	177.45	186.680	176.00

TABLE 30. Comparison between exponential smoothing and regression in predicting the share price of Saudi Pharmaceutical based on Sabc

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Saudi Pharmaceutical	41	356.96	693.351	334.00
	42	370.53	701.715	336.00
	43	384.49	722.625	341.00
	44	398.83	747.717	347.00
	45	413.55	746.535	346.00

TABLE 31. Comparison between exponential smoothing and regression in predicting the share price of Saudi Cairo Bank based on Sabc

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Cairo Bank	45	426.70	898.58	394.00
	46	461.23	836.42	378.00
	47	497.77	918.00	399.00
	48	536.31	785.92	365.00
	49	576.86	844.19	380.00

2. Also, the banking sector ranks first with respect to the value of shares traded in the year, followed by the industrial and cement sectors.

3. The industrial sector ranks first with respect to the number of shares traded in the year, followed by the services and banking sectors.

4. For situations linear trends, the third order exponential smoothing method can be used to forecast future share prices with a good degree of accuracy.

5. linear regression can also be used to predict future share prices of a company based on the share prices of another company in a situation where the coefficient of correlation between the two companies is close to 1.0.

TABLE 32. Comparison between exponential smoothing and regression in predicting the share price of Live Stock T. & Trans. based on Taiba Investment Company.

Company	Week #	Forecasted share price using exponential smoothing (Y exponential)	Forecasted share price using linear regression (Y regression)	Actual share price (Y actual)
Live Stock	41	54.12	41.01	56.00
	42	53.58	40.28	57.00
	43	53.03	41.74	55.00
	44	52.47	41.74	55.00
	45	51.90	44.67	51.00

What has been done in this study can be considered as a first step in studying the Saudi shares market. Future studies can consider a similar analysis for a longer period of time (say 3 years).

Also methods for forecasting under unstable conditions such as the one in Boas<sup>[15]</sup> can be used and compared with the results obtained here.

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## استخدام نماذج التوقعات الأسية من الدرجة الثالثة للتنبؤ بأسعار أسهم الشركات السعودية

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**المستخلص.** شهدت السنوات الأخيرة إقبالا ملموساً من قبل المستثمرين على الإستثمار في سوق الأسهم للشركات السعودية. وتعود أسباب ذلك لنشأة العديد من الشركات المساهمة التي يُتوقع لها مستقبل ناجح. ويقدم هذا البحث، الذي يشمل كافة الشركات المساهمة وعددها (٥٥) شركة، دراسة كمية لهذه السوق الهامة على مدى سنة. حيث يبدأ البحث بالتعرف على أنماط التغير في أسعار الأسهم للكثير من الشركات خلال سنة الدراسة. كما يقدم البحث ترتيباً للقطاعات والشركات المختلفة بناءً على كمية وقيمة الأسهم المتداولة خلال العام. وقد أظهر التوزيع النسبي لكمية وقيمة الأسهم المتداولة خلال سنة الدراسة تقدم قطاعات البنوك، الصناعة، الخدمات والأمن على قطاعي الزراعة والكهرباء بوضوح. كما تميزت هذه القطاعات بارتفاع في معدل تغير سعر السهم، حيث بلغ متوسط الارتفاع في السعر ٦١,٨٪، ٥٠,٦٤٪، ٣٩,٧٪، ٢٧,٢٪ لكل من قطاع البنوك، الخدمات، الصناعة والأمن على التوالي بينما شهد قطاعاً الكهرباء والزراعة انخفاضاً في معدل تغير سعر السهم بنسبة ٩٪، ٠,٩٦٪ على التوالي. وبناءً على دراسة أنماط التغير في أسعار الأسهم، تم استخدام نماذج التوقعات الأسية من الدرجة الثالثة للتنبؤ بأسعار أسهم بعض الشركات المساهمة. كما تمت مقارنتها مع بعض نماذج الانحسار المعروفة.