

Predicting the Stock Prices of Private Banks through Technical Analysis Indicators and Supply Chain Management

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Abstract- The aim of the research is identifying the extent of using the Iraqi investors from the stock exchange and the technical analysis by understanding the extent knowledge of the investor for dependence on taking investment decisions to enter or exit from the market. To prove the hypothesis of research, some companies in the bank sector listed in the Iraqi Stock Exchange were selected to be a research community, as a sample was selected composed of six banks to be a field of research. The research was based on a set of analysis indicator and supply chain management used in the forecasting process towards stock prices by (Simple average, rate of change, momentum, relative strength) in addition to some statistical tests such as Livens test, T test and F test according to the statistical program SPSS 20. The research reached that revolve around the existence of the statistical significance of the reliability of these indicators in the process of forecasting towards stock prices for the banking sector companies listed in the Iraq Stock Exchange to suit the Iraq environment conditions.

Keywords: Technical Analysis, investment, Rate of change, Momentum, Relative Strength.

1. Introduction

The investment in stocks is fraught with many risks, and making it more difficult to measure these risks diversity of options available to the investor, making the wrong investment decision to open losses that lead to the accumulation of bankruptcy. Therefore, investors resort to different approaches in order to try to predict the future of stock prices. The most important of these approaches is the technical analysis approach, which focuses on the study and analysis of the share price movement over time by adapting different statistical methods for this purpose. By processing historical data of the stock price in previous periods, the investor gets information about the future development of the price of this stock, technical analysis and supply chain management are important tools to support the investment decision, not only in stocks but also in terms of the values transferred in general, because it gives a scientific character to investment decisions taken by investors and is considered to be a less complex method

than basic analysis. The technical analyst and supply chain management are studying the impact of price action. The question that is always asked by everyone who is interested in the basic analysis of financial markets is "Why does the price move in a certain direction? "While technical analysts and supply chain management pose very different questions: What then? To where? Till when?" In other words, the technical analysis and supply chain management of securities focuses on the study of price movements in the market in an attempt to determine the times of entry into and exit from the market. It also aims to identify indicators that confirm the trend of price movement in the stock market, and these indicators or signals are reached through some methods that depend on a range of variables are the direction of price, and historical movement, and trading volumes accompanying this movement. For the purpose of briefing, the research was divided into four axes, the first of which included the methodology of research and some previous studies. Otherwise, the second axis focused on the theoretical framework of the research and dealt with the third aspect of the application, while the fourth and final axis was devoted to the most important conclusions reached by the research and some recommendations.

2. Research methodology

Research problem

The problem of research can be understood by the following questions:

1. Is there statistical significance in the possibility of relying on the index of the simple average in the process of forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities?
2. Is there statistical significance in the possibility of relying on the indicator of the Rate of Change in the process of forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities?
3. Is there statistical significance in the possibility of relying on the Momentum Index in the process of

forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities?

4. Is there statistical significance in the possibility of relying on the Relative Strength Index in the process of forecasting the price trend of the banking sector listed on the Iraqi Stock Exchange?

The importance of research

Since technical analysis and supply chain management are important tools to support investment decision, not only in stocks but also in terms of the values transferred in general, because it gives a scientific character to invest decisions taken by investors. It is also a less complex method compared to basic analysis, Therefore, the importance of the study is based on the following points

1. Recognize the importance of technical analysis and supply chain to investors that they seek to achieve the highest return using several methods that can guide their investment decision.
2. Increase investor confidence in technical analyst
3. Clarify the importance of the management of the financial market, as the Iraqi market for securities seeks to develop and revitalize the market itself through the support of investors technically and administratively and work to rationalize their decisions.

Research objectives

Research objectives are as follows:

1. Predicting the trends of the Iraqi market for securities using the technical analysis and supply chain management entrance and determining whether these trends are in the case of a rise or fall.
2. Provide the appropriate climate for investment in technical analysis techniques through the disclosure of the strengths and weaknesses in them.
3. Provide a pilot guide for investors looking for information on future market trends using technical analysis indicators.

Research hypotheses

Based on the problem of research and how to predict the prices of shares of the banking sector in the Iraqi market, and for securities using the indicators of technical analysis and supply chain management, so the research is based on the following assumptions:

1. There is a statistical significance in the possibility of relying on the index of the simple average in the process

of forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities.

2. There is statistical significance in the possibility of relying on the indicator of the Rate of Change in the process of forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities.

3. There is statistical significance in the possibility of relying on the Momentum Index in the process of forecasting the direction of prices of shares of the banking sector listed in the Iraqi market for securities.

4. There is statistical significance in the possibility of relying on the relative strength Index in the process of forecasting the price trend of the banking sector listed in the Iraqi Stock Exchange.

Statistics methods

The practical side of the study was based on a number of statistical methods:

1. *Indicators:* including:

A. Simple Moving Average

This indicator is one of the most common indicators in the technical analysis, since the price path is determined by an easy and accurate mathematical equation. The Simple Moving Average can be calculated according to equation (1) [1], [2].

$$\text{Equation (1): } \text{SMA} = \frac{CP1+CP2+CP3.....+CPn}{n}$$

As follows:

SMA: Simple Moving Average

CP: Close price

n: Number of time periods

B. Change rate index

Another measure of price momentum is that the momentum and the rate of change are very similar oscillators under one interpretation, each measuring the amount of acceleration or slowing of the price movement or the speed of the prices trend. Both indicators are an early warning of changing the trend. It is calculated according to equation (2) [3], [4]:

The rate of change = 100 (last price / price for the number of days earlier)

$$\text{Equation (2): } \text{RC} = 100 (\text{LP}) / \text{Pe}$$

As follows:

RC: The rate of hang

LP: last price

Pe: price for the number of earlier

C. Momentum

The momentum can be calculated by recording each period and calculating the differences between prices for each period, according to equation (3) [5], [6]:

Momentum = last closing price-closing price prior to the number of days...

$$\text{Equation (3): } M=LCP- CPP$$

As follows:

M: Momentum

LCP: last closing price

CPP: Closing price prior to the number of days

D. Relative Strength Index

It is calculated in two steps as follows:

Step 1 - Calculate Relative Strength RS: is the average price of locks that rose divided by the average closing prices that landed for a certain period and as in Equation (4) [7], [8]:

$$\text{Equation (4): } RS = \frac{AG}{AL} = \frac{TG/N}{TL/N}$$

As follows:

AG: Average Gain

AL: Average Losses

TG: Total Gains

TL: Total Losses

n: The number of days

Step 2: RSI: Calculated according to equation (5):

$$\text{Equation (5): } RSI = 100 - \left(\frac{100}{1+RS} \right)$$

As follows:

RS = Relative Strength.

1. Livens test.
2. Test (T).
3. Test (F).

3. Data collection and analysis methods

The study included two aspects, the first of which is based on the theoretical side, which was based on a collection of Arabic and foreign books as well as studies, research and articles available in libraries and the Internet. The applied side of the study was based on the digital data of the selected sample obtained from the electronic market, monthly reports issued by the Iraqi market for securities and available statistics cornerstone in this study as well as the contribution of the Internet (Internet) in enriching the study in this regard.

Limitation of the research

Spatial boundaries: The study was conducted for some banks listed in the Iraqi market for securities. Time limits: The financial statements have been adopted for a period of two years for the period (1/1/2015 to 31/12/2016)

The research sample

The sample of the study was (6) banks, which constituted 28.57% of the total of the banking sector companies and the number of 21 banks.

4. The theoretical framework

The concept of technical analysis

A number of definitions have guided us to identify the concept of technical analysis. [9] States that technical analysis is based on the idea that prices move in directions and are determined according to the changing attitudes of investors towards different economic, political, and psychological forces.

[10] also mentioned that technical analysis relates to the study of price movements in the market using graphs and quantitative techniques for forecasting price trends, which is usually a method of recording (in the form of graphs) the trading date of a particular financial instrument (stocks, futures contracts, Currencies) and on this basis it anticipates possible future trends. [11] argues that technical analysis is the study of market movement mainly through the use of graphs, or the study of market movement based on historical stock price data to predict future price trends. The term price movement includes three basic sources of information available. In the technical analysis (price, Trading and open rights) that are used in option contracts or futures contracts, so it is the art of reading the market or the art of reading stock market shares and the art of predicting stock market trends by studying the behavior and movements of stocks during specific periods. [12] sees that the technical approach to investment is to study the development of the market, relying mainly on the base (curves, maps) in order to predict future trends, and see [13] that technical analysis is easy and fast. Once the technical method that the technical analyst will determine in the price prediction is determined. It becomes automatically applied to any number of shares and technical analysis are easily learned and applied by any investor regardless of the level of culture. That information needed by the analyst on the price and financial transactions is available daily regularly in the

daily reports appearing in specialized newspapers and the Internet.

The concept of supply chain management

For all areas of business, there are suppliers and customers. Between them, there are many links, including activities and processes, which help to connect suppliers and customers together. For that purpose, companies develop the Supply Chain Management (SCM) system in order to maximize the value to the customer and at the same time reducing the cost. Supply Chain Management has been practically used in all businesses and operations: small family businesses or even big corporations like Dell, Zara or Wall Mart. Depending on the scale and characteristics of the company, the Supply Chain Management can be varied, but the main principle is the same. In developed countries, Supply Chain management has been used for years and it becomes a vital part of any business. In contrast, in developing countries, this system normally is overlooked [17].

5. The philosophy of technical analysis

In their decisions, technical analysts rely on the examination of previous price, volume and trading data to determine past market trends in which the future behavior of the market as a whole and individual security can be forecasted. Several key assumptions support this view of price movements, it summarized the following [14]:

1. The market value of the securities shall be determined in the light of the interaction of supply and demand forces only
2. Many factors control the supply and demand, including rational factors and other irrational factors Including rational factors (financial information on the stock), which is reflected in the behavior of investors in the market, and factors that are not rational (such as opinions, moods, guessing, etc.), and the market to balance these factors automatically and continuously to determine the appropriate prices
3. Securities prices tend to have relatively long periods of movement, although they may fluctuate slightly from time to time
4. The change in the supply-demand relationship leads to a change in the direction of prices, and changes can be observed, eventually in market movement without the need to know the reasons.

Strengths and weakness of technical analysis

A. Strengths in Technical Analysis:

The strengths of technical analysis can be distinguished by a set of points [15]:

Focus on the price: The policy of investment in stocks of buying and selling decisions depends on the share price forecast. If the expectation of the share price increase, the investment decision will be the purchase and vice versa, and the stock market is seen as a basic indicator of the economy, its indicators are ahead of the actual situation of the economy by six to nine months.

Determining the forces of supply and demand through price analysis: The use of data (opening price, highest price, lowest price and closing price) when analyzing the price direction of a stock may mean nothing if used separately, but together reflect the forces of supply and demand.

Support/ Resistance: The charts show the balance of the supply and demand forces of a stock. When prices affect this range down or break through it, it indicates that one of them overcomes the other, breaking the upper limit (resistance) means increasing demand and breaking the minimum limit (support) means increasing the supply.

Price History Illustrator: Price charts make it easy to read the previous date at certain time intervals and are much easier to read than the tables. In most stock charts, you find the columns of quantities at the bottom of the chart. Assistance in determining the time of entry and exit from the market: Technical analysis is used to determine the best time to enter or exit the market.

B. Weaknesses in technical analysis:

Some weaknesses in technical analysis can be identified [16]:

- **Analyst opinion:** Technical analysis is influenced by the analyst's impression of the stock, so you should note this point when you analyze the stock. If the analyst is optimistic that the stock will rise, he may not see the bearish signs and vice versa. That is when he is pessimistic, he may not see the signs of a rally
- Different. Reading the drawing itself:** Although there are general rules for technical analysis, but often if the same chart was given to two technical analysts may read each of the different way and draws a different scenario, both will support reading the points of support and logical resistance, Breakpoints and breakage as well.

- **Technical analysis signals are delayed:**

Technical analysis is too late; the direction of the movement of the stock is not determined until after a

significant portion of the movement has already occurred. Therefore, after this large move, the return to risk ratio has fallen significantly and lost part of the opportunity. It is also a catch on Dow's famous theory.

The applied side of the research

This focus focuses on the results of the test of the technical analysis indicators, in addition to discussing the results of the test of these indicators of the shares of banks sample study in order to test hypotheses of the study.

First: simple average index:

Table (1) presents the results of the monthly averages of the simple average index of the banking sector and for 2015 (2016), which confirms the validity of the hypothesis of relying on the simple average index in the future forecast of the trend of stock prices in the Iraqi market for securities. The table shows that the trend of the market movement of the banking sector was a downward trend. The sector started at an average price of 1.12 and ended at an average price of 0.94 in 2015. In 2016 it started with a price average of 1.12 and ended with an average price of (1.06).

Table (1) monthly averages of the simple average index of the banking sector

Sector	The banking sector For the year 2015	The banking sector For the year 2016
Month		
January	1.12	1.12
February	1.13	1.22
March	1.15	1.33
April	1.07	1.13
May	1.06	1.16
June	1.07	1.35
July	1.07	1.29
August	1.05	1.24
September	1.04	1.19
October	1.02	1.12
November	1.03	1.05
December	0.94	1.06

Figures 1 and 2 show the direction of the market movement of the banking sector and the two years of research.

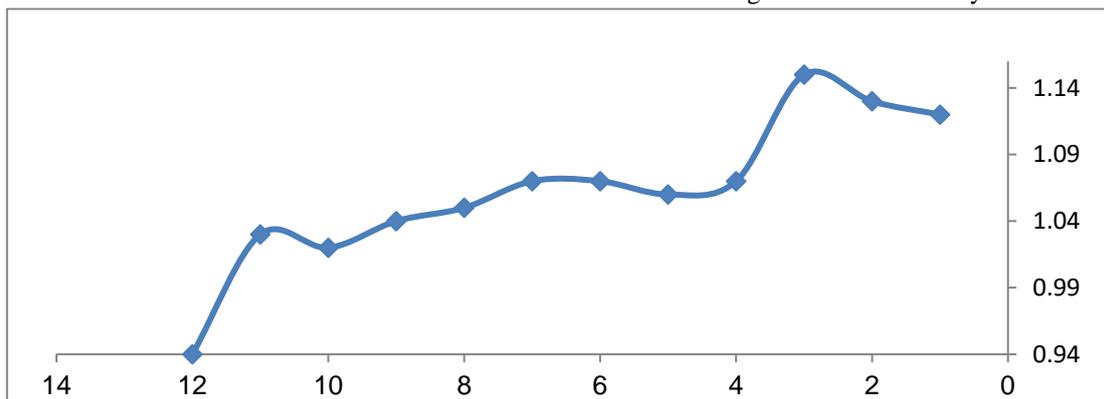


Figure (1) Market movements Trends of the Banking Sector for 2015

Figures (1) and (2) confirm Table (1) of the ascending and descending stock movements shown in the chart of the figure.

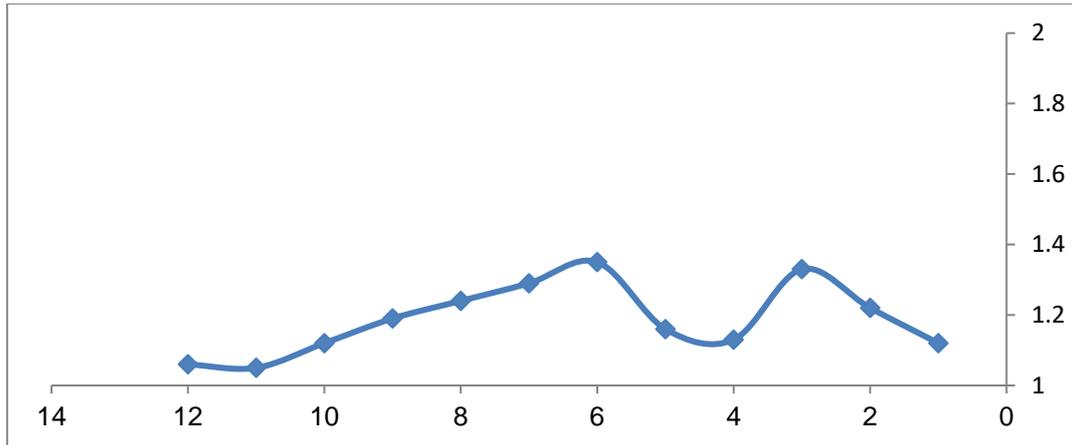


Figure (2) Market movements Trends of the Banking Sector for 2016 using the SPSS program to test results, the following results were obtained:

Table (2) Test the Simple Average index of the banking sector

Year	Data	Simple Average	Standard Deviation	T*	F*
2015	12	1.0625	05578	-3.815	5.281
2016	12	1.1883	09971	-3.815	

* Significant level 5%

The results of the statistical analysis in Table 2 show that the value of the significant value of the Levine test is (0.03), which is less than (0.05) indicating that there is great homogeneity between the sample data represented by the two research years 2015/2016. The calculated T value of the simple average index (-3.815) with a significant level of 5% acceptance of the hypothesis of the study that there is a statistical significance in the possibility of predicting the direction of stock prices using the simple average of the banking sector in the Iraqi market for securities), which confirms these results

F test its statistical acceptance; it was calculated (5.281) at a significant level (5%) and at freedom degree (22).

Second- Change rate index:

Table (3) presents the results of the monthly averages of the rates of change for the banking sector and for the years 2015-2016. The table shows that the rate of speed of the price trend of the banking sector in the year 2015 was (99%), which is very close to the rate of speed of the trend of prices for the banking sector for the year 2016 , amounting to (95%) and this confirms the validity of the hypothesis,

Table (3) monthly averages of change rates for the banking sector (%)

Sector Month	The banking sector For the year 2015	The banking sector For the year 2016
January	100	125
February	96	95
March	94	104
April	101	93
May	100	104
June	100	0
July	99	93

August	99	106
September	97	98
October	101	95
November	101	96
December	99	101
Annual average	99	95

Figures (3, 4) show the direction of the market movement of the banking sector and the two years of research.

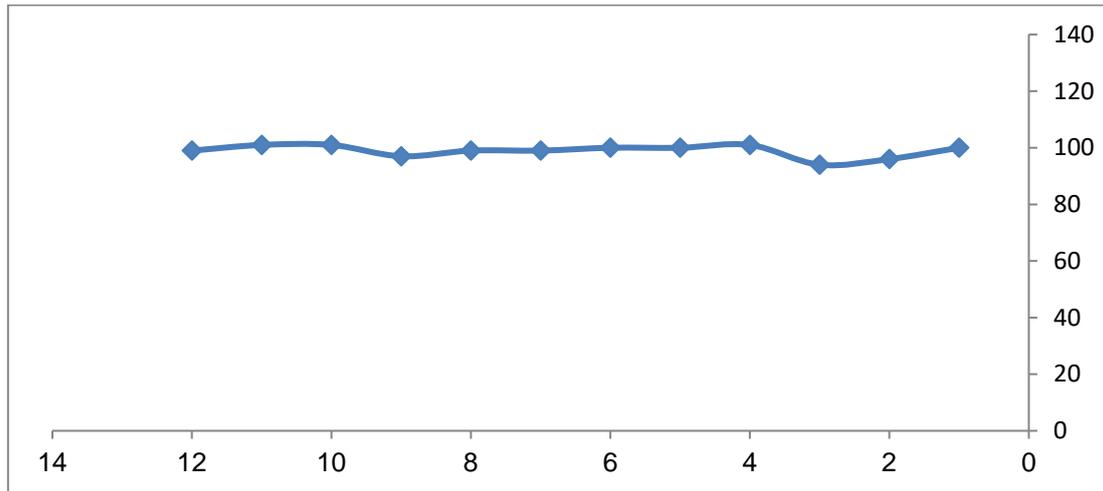


Figure (3)

Change in Banking Sector for 2015

Figures (3) and (4) confirm Table (3) of the ascending and descending stock movements shown in the chart of the figure.

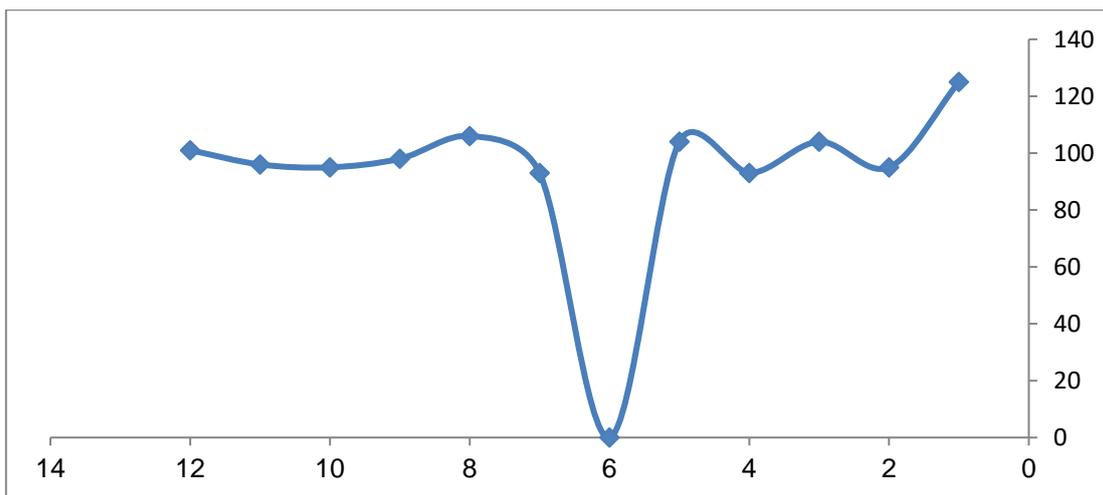


Figure (4)

Change Rate in Banking Sector for 2016

Using the SPSS program to test results, the following results were obtained:

Table (4) Test the Change Rate Index of the banking sector

Year	Data	Simple Average	Standard Deviation	T*	F*
2015	12	98.9167	2.19331	4.123	129
2016	12	94.5833	2.90637	4.123	

* Significant level 5%

The results of the statistical analysis in Table 4 show that the value of the significant value of the Levine test is (0.01), which is less than (0.05) indicating that there is great homogeneity between the sample data represented by the two research years 2015/2016. The calculated T value of the Change rate index (4.123) With a significant level of 5% acceptance of the hypothesis of the study that there is a statistical significance in the possibility of predicting the direction of stock prices using the Change rate of the banking sector in the Iraqi market for securities, which confirms these results F test

its statistical acceptance; it was calculated (5.281) at a significant level (5%) and at freedom degree (22).

Third- Momentum index:

Table 5 shows the monthly averages of momentum rates for the banking sector and for the years 2015-2016. Following the results, we note that the trend of change in banking sector prices for 2015 is a downward trend, starting with an average of 0.27 in January and ending with an average change rate of 0.02 in December. The banking sector for 2016 was also an extension of the previous year (a downward trend). The year started with a change rate of 0.09 in January and the year ended with a change rate of 0.01 in December.

Table (5) monthly averages of momentum rates for the banking sector

Sector Month	The banking sector For the year 2015	The banking sector For the year 2016
January	0.27	0.09
February	-0.04	-0.07
March	-0.04	0.10
April	0.01	-0.09
May	0.01	0.04
June	0	1.32
July	-0.21	-0.09
August	-0.01	0.84
September	-0.04	0.20
October	0.03	-0.06
November	0.22	0.04-
December	0.02	0.01

Figure (5) (6) confirms Table (5) of the ascending and descending stock movements shown in the chart of the figure.

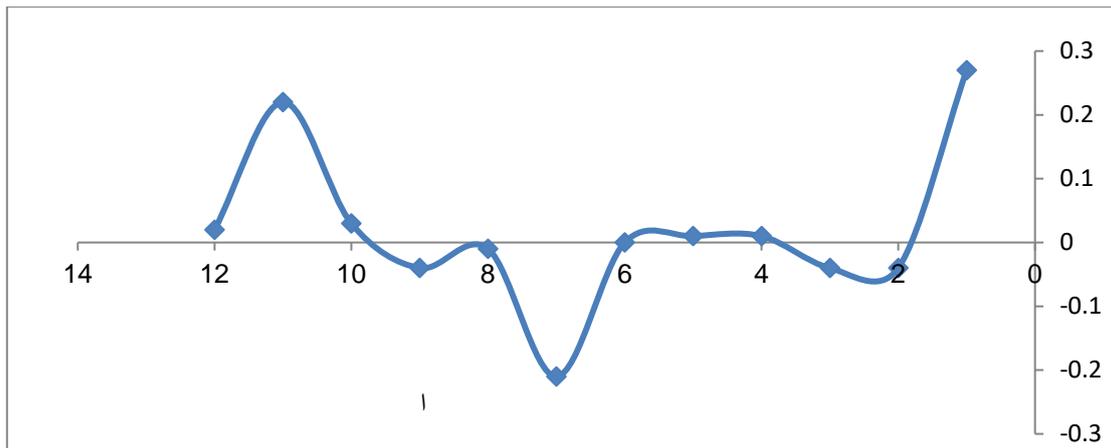


Figure (5) the momentum of the banking sector for the year 2015.

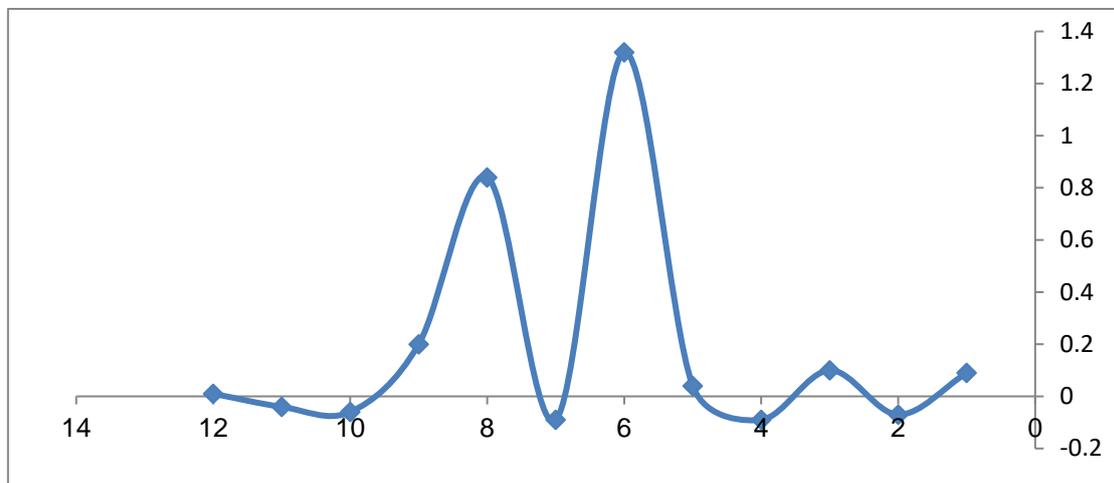


Figure (6)
The momentum of the banking sector for the year 2016
Using the SPSS program to test results, the following results were obtained:

Table (6) Test the of momentum rate index of the banking sector

Year	Data	Simple Average	Standard Deviation	T*	F*
2015	12	0.242	.04144	-2.379	9.636
2016	12	0.917	.08912	-2.379	

* Significant level 5%

The results of the statistical analysis in Table 6 show that the value of the significant value of the Levine test is (0.05), which is equal to (0.05) indicating that there is homogeneity between the sample data represented by the two research years 2015/2016. The calculated T value of the momentum rate index (-2.379) with a significant level of 5% acceptance of the hypothesis of the study that there is a statistical significance in the possibility of

predicting the direction of stock prices using the of momentum rate of the banking sector in the Iraqi market for securities , which confirms these results F test its statistical acceptance; it was calculated (9.636) at a significant level (5%) and at freedom degree (22).

Fourth- Relative Strength Index:

Table (7) shows the rates of the relative strength of the banking sector for the year 2015-2016. By observing the annual average rate of the banking sector for the year

2015 we note that it reached (50) which is very close to the year 2016 reached (52). It indicates that investment

in the sector during 2015-2016 requires a very cautious process, which confirms the validity of the hypothesis.

Table (7) Relative strengths of the banking sector

Sector Month	The banking sector For the year 2015	The banking sector For the year 2016
January	53.51	41.41
February	52.36	57.25
March	53.52	52.49
April	51.26	52.48
May	51.33	51.46
June	51.57	53.49
July	50.86	53.28
August	51.06	52.70
September	43.01	52.55
October	45.47	53.52
November	52.61	52.17
December	43.15	54.11
Annual average	50	52

This can be illustrated in Figures (7) and (8), and Figure (7) (8) confirms Table (7) of the rising and descending stock movements illustrated in the figure chart.

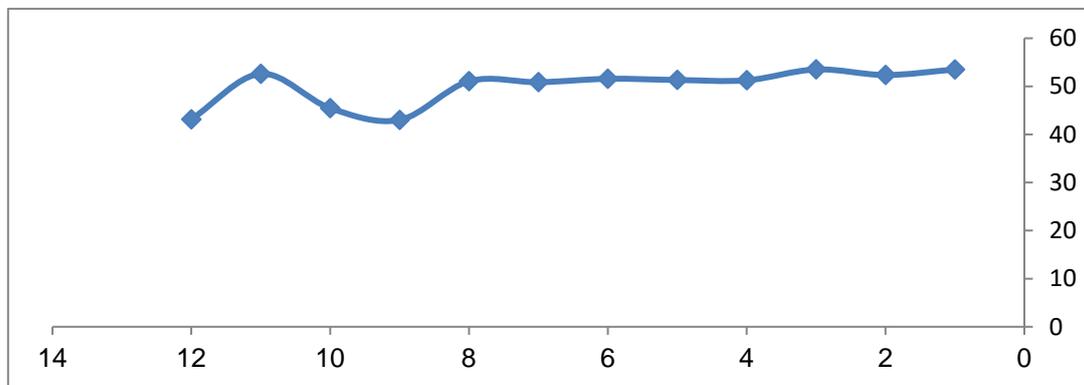


Figure (7) the relative strength of the banking sector in 2015

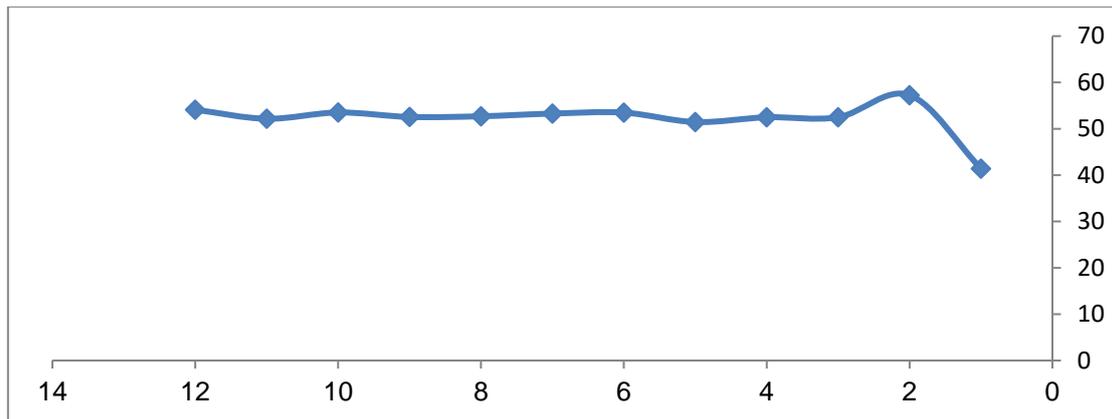


Figure (8) the relative strength of the banking sector in 2016 using the SPSS program to test results the following results were obtained:

Table (8) Test the relative strength index of the banking sector

Year	Data	Simple Average	Standard Deviation	T*	F*
2015	12	49.9758	3.82662	-2.461	7.211
2016	12	52.9583	1.72538	-2.461	

* Significant level 5%

The results of the statistical analysis in Table 8 show that the value of the significant value of the Levine test is (0.01), which is less than (0.05) indicating that there is homogeneity between by the two research years 2015/2016. The calculated T value of the relative strength index (-2.461) with a significant level of 5% acceptance of the hypothesis of the study that there is a statistical significance in the possibility of predicting. The direction of the banking sector in the Iraqi market for securities, which confirms these results F test its statistical acceptance; it was calculated (7.211) at a significant level (5%) and at freedom degree (22).

6. Conclusions and recommendations

Conclusions

1. Technical analysis and supply chain management are two important tools in the financial markets through its influence on investor decisions regarding the determination of stock prices and trends in the future, as well as the purchase decision, the sale decision or even the stop loss decision.
2. The technical analysis and supply chain management are clear and easy to use, besides understanding the importance and degree of dependence are not affected by the investor's personal data. For example, (the scientific qualification, the investment entity, the value of the invested capital), but is influenced by the number of

years of investment that increase the development of their predictive capabilities.

3. The results showed that technical analysis and supply chain management tools can be used to obtain the best outlook for ordinary shares based on historical data. The statistical test proved the existence of statistical significance in the possibility of relying on the indicators of the simple average and the rate of change and momentum and the relative strength in the prediction of share prices of banks listed in the Iraqi market Securities.
4. The index of the simple medium and the rate of change and momentum and relative strength of the most technical indicators used and most versatile in use and the best models that can be adopted in the future prediction in light of what reflected the results of tests for a period of (360) days. Although, the degree of accuracy in some, but their ability to take into consideration all possible market changes in the values of actual indicators within the market.

7. Recommendations

Guided by the analysis of the results and the conclusions that are consistent or separated partially or completely with the accumulation of knowledge in the process of analyzing. The behavior of ordinary stock prices using technical analysis tools can be identified with some recommendations that the investor, whether the

individual or institutions to be guided and benefit from them can be explained as the following:

1. The need for the Iraq Stock Exchange to strengthen the position of technical analysis as a qualitative tool used to improve the investor's decision and increase the ability to analyze and forecast. Furthermore, this can be done through the Commission's request to provide a technical analyst in the brokerage companies, and the work of seminars and courses and competitions to serve this goal.
2. Technical analysis and supply chain management, especially the index of moving averages and relative strength, have a good degree of credibility, as it enabled us to know the timing and signals that indicate the sale or purchase. These signals appear before the event in short periods, by knowing these signals; we will be able to track the operations accurately, thus maximizing the potential profit.
3. Urging academic institutions to increase the visibility of technical analysis by encouraging research and studies, and opening the specialization of financial markets.
4. The results of this research should be treated with caution because of the small size of the market and the relatively small size of the sample, in addition to the abnormal situation experienced by the Iraqi economy, not to mention the low efficiency of the market compared to developed financial markets.
5. Repeat the conduct of such a study on other companies to confirm the results reached, especially with companies that were not included in the research sample.

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