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ESTIMATING THE IMPLIED COST OF CAPITAL USING THE ABNORMAL EARNINGS GROWTH MODEL: AN APPLIED STUDY OF A SAMPLE OF IRAQI COMMERCIAL JOINT-STOCK COMPANIES

Methaq Noaman Hamood
University of Kirkuk, Faculty of Administration and Economics, methaqnoaman@uokirkuk.edu.iq

Abstract. The study objectives are to estimate the implied cost of equity (CC) using the Abnormal Earnings Growth Model (Ohlson–Juettner-Nauroth: OJ) and to identify the suitability of applying it in the environment of the Iraqi commercial joint-stock companies listed on the Iraq Stock Exchange. The research problem is based on the difficulty of estimating cost of equity using traditional methods in the context of the limited availability of financial analysts' forecasts, differences in the level of disclosure and availability of forward-looking data in the Iraqi market. This research involved applied analytical approach using the calculation of accounting data and market data for the period 2020–2025, such as EPS, stock prices, dividend and growth rates. The OJ model was then applied to companies that were available for data and were valid for input. The cost estimates then were compared and an analysis of how sensitive the estimates are to changes in the long-term growth rate was performed. The preliminary results indicated an implied cost of equity at 10.40% for Baghdad Soft Drinks Company (IBSD) and 16.64% for the Iraqi Company for Carpets and Furnishings (IITC) which gave a descriptive difference of 6.24%. In addition, the sensitivity analysis revealed that the implied cost of equity also rose with an increase in the long-term growth rate. Based on the findings, the OJ model is a promising estimation model for the Iraqi market; but the results of OJ model are dependent upon the data quality and the accuracy of the earnings forecasts, which requires increasing the sample size and enhancing financial and market disclosure.

Keywords: Implied Cost of Equity, Ohlson–Juettner-Nauroth Model, Abnormal Earnings Growth, Cost of Capital, Earnings per Share, Iraq Stock Exchange, Cost of Equity

Introduction

One of the basic variables involved in financial and investment decision making is cost of capital, which is the rate of return demanded by investors for the risks they are taking in investing in a company. The estimation of the cost of equity is especially critical due to its application in valuation, investment and financing. But it can also face some challenges, especially in a new financial market, where the data available is not necessarily complete, volatility in prices and irregularity in future earnings forecasts exists. [1]

The implied cost of capital models have become a tool based on the information available in the accounting records and the market to calculate the rate of return backwards from the stock price, the expected earnings, dividends, and stock growth. The Ohlson–Juettner-Nauroth (OJ) model is one of the more significant models in this area as it relates the market value of a share to the expected earnings per share and growth rates in the expected earnings per share and growth rates in the expected dividends per share. [2]

The need to test this model in the Iraq Stock Exchange is due to the limited number of applied studies on the implied cost of capital, and variations in the disclosure level of the listed companies, as well as the availability of forward-looking data. Therefore, the objective of the current research is to use the Abnormal Earnings Growth Model for Iraqi commercial joint-stock companies sample, estimate implied cost of equity for the sample and compare the results and their sensitivity to growth assumptions.

Research Problem

The research problem is the inability to accurately estimate the cost of equity for Iraqi joint-stock companies, as a result of the scarcity of financial analysts' predictions, the irregularity of some of the predictions in the future and the lack of financial disclosure and disclosure in the market for some companies listed on the Iraq Stock Exchange. This problem is made even more significant by the necessity of using alternative methods that rely on accounting as well as market information to calculate the needed rate of return implicitly. The research problem is thus focused on the following major question:

To what extent can the Abnormal Earnings Growth Model (Ohlson–Juettner-Nauroth) be used to estimate the implied cost of equity for a sample of Iraqi commercial joint-stock companies?

This main question gives rise to the following sub-questions:

a. According to the OJ model, what is the estimated level of the implied cost of equity of the companies in the research sample?
b. Do the estimates of the implied cost of equity for the companies in the research sample differ?
c. How applicable are the accounting and market data that are available for using the OJ model?
d. To what extent are the estimates of the implied cost of equity affected by changes in the long-term growth rate?

Significance of the Research

The scientific value of the study lies in the analysis of the very topical research problem – the estimation of the implied cost of equity - and in testing the suitability of implementation of the Ohlson–Juettner-Nauroth model in the conditions of the emerging financial market. The study also helps in the applied literature related to the estimation of required rate of return in situations of limited financial analysts' forecasts. [3]

The applications are tangible in the sense of supplying estimates of the implied cost of equity that can be useful for investors when they consider a stock and compare its expected return to its risk level. These estimates also can help company managers and researchers interpret the link between profit, growth, dividends, and the market value of the stock and the sensitivity of these estimates to assumptions about future growth. [4]

Research Objectives

The research aims to estimate the implied cost of equity based on growth model for abnormal earnings and to evaluate its applicability in the environment of Iraqi joint-stock companies through the following:

a. Explanation of the conceptual and theoretical understanding of the implicit cost of equity and the Abnormal Earnings Growth Model.
b. Determination of the inputs of the OJ model and measurement mechanism for the inputs using accounting data and market data of the companies in the research sample.
c. Approximating the implied cost of equity and comparing the levels of the cost of equity of different companies based upon the data available.
d. Comparing results from the sensitivity analysis of the implied cost of equity estimates, especially long-term growth rate.
e. Determine if the OJ model is appropriate for the Iraqi environment based on the nature of available information and the degree of disclosure, and make a series of findings and recommendations.

Research Hypotheses

To achieve the research objectives and test the research problem, the following hypotheses may be adopted:

Main Hypothesis

H0: There are no statistically significant differences in the estimates of the implied cost of equity among the Iraqi joint-stock companies in the research sample using the Abnormal Earnings Growth Model.

H1: There are statistically significant differences in the estimates of the implied cost of equity among the Iraqi joint-stock companies in the research sample using the Abnormal Earnings Growth Model.

Second Sub-Hypothesis

H0: There is no statistically significant relationship between the growth rate of earnings per share and the implied cost of equity of the companies in the research sample.

H1: There is a statistically significant relationship between the growth rate of earnings per share and the implied cost of equity of the companies in the research sample.

Third Sub-Hypothesis:

H0: The estimates of the implied cost of equity are not affected by changes in the long-term growth rate.

H1: The estimates of the implied cost of equity are affected by changes in the long-term growth rate.

Research Boundaries

The boundaries of the research subject are defined by the estimation of the implied cost of equity according to the model of the Abnormal Earnings Growth Model (Ohlson–Juettner-Nauroth) using data related to the stock price, earnings per share, dividends and growth rates necessary for the model application. The spatial boundaries include Iraqi commercial joint-stock companies listed on the Iraq Stock Exchange where accounting and market data for application of the model exist.

The temporal limits are set to 2020-25 to allow the establishment of an adequate data series to compute earnings growth rates and to facilitate the estimation, for the subsequent application, only in companies for which complete and comparable figures are available. The applied boundaries are simply excluding companies that have significant data gaps, missing disclosure, accounting or capital requirements that would make the model inputs incomparable or lead to unstable estimates.

Preliminary Research Methodology

The research adopted the applied analytical approach due to its suitability to the nature and objectives of the study, by combining the theoretical foundation of the concept of the implied cost of equity with the applied analysis of the accounting and market data of Iraqi joint-stock companies listed on the Iraq Stock Exchange.

The applied aspect is based on using the Ohlson–Juettner-Nauroth (OJ) model to estimate the implied cost of equity by linking the stock price with expected earnings per share, growth rates, and dividends. The results are then analyzed and the estimates are compared across companies, in addition to testing the relationship between earnings per share growth and the implied cost of equity and analyzing the sensitivity of the estimates to changes in the long-

term growth rate.

Previous Studies and Research Gap

Accounting/financial studies seem to have been growing more interested in the concept of the Implied Cost of Equity Capital as an ex-ante measure of the return demanded by investors over the last five years. Focuses on the current market price of the stock, earnings expectations, growth rates, and future dividends, not historical returns. The Ohlson–Juettner-Nauroth (OJ) model is one of the influential models in this area as it is possible to calculate the cost of equity from the link between the stock price, the expected earnings, and the growth rates. Richardson et al. (2021) investigated the relationship between income shifting and the implied cost of equity of U.S. multinational corporations and found a positive correlation between income shifting and the implied cost of equity, implying that investors look at income shifting as a risk source. Yu et al. (2021) also explored the links between environmental transparency and cost of equity based on the international sample, and they used multiple implied cost of equity models including the OJ model. The findings revealed that there is a relationship between environmental disclosures and cost of equity estimates [5], [6].

Similarly, in the context of corporate social responsibility and cost of equity capital, the study of CSR and Cost of Equity Capital (2021) investigated how the corporate social responsibility affects the cost of equity among listed companies in China. This study used PEG and OJ models to measure the cost and the results showed that there is a negative relationship between the performance of CSR and the cost of equity with operating performance as a determinant to explain this relationship. Hutabarat et al. (2022) studied the effect of audit firm characteristics on the cost of equity and also compared the performance of the Ohlson model with the CAPM. The study found that measuring the cost of equity using the Ohlson model is more suitable to explain the cost of equity in the sample Indonesia [7], [8].

Tang (2022) investigated the impact of ESG performance on the cost of equity of Chinese companies and includes the OJ model as a robustness test. Beyond a negative relationship between ESG performance and the cost of equity, the findings showed that financing constraints and the difference in investor beliefs also help explain the relationship. Thien and Hung (2023) applied the OJ model directly to measure the cost of equity of Vietnamese companies and targeted the influence of intangible investments, highlighting the relevance of the expected earnings, stock prices and growth rates to estimate the implied cost. Concerning the development of measurement methods, Kempkes et al. (2023) empirically analyzed dynamic methods of estimating the expected cost of equity, and stressed the necessity of choosing the estimation date and the method for constructing the earnings expectations to ensure more stable estimates of the implied cost. Further, Mishra (2023) analyzed the impact of political risk on the implied cost of equity and concluded that there is a strong positive correlation between the two, which he argued is because of increased stock illiquidity, the spread in analyst expectations, and the reduced number of analyst coverage [9], [10].

International Lynch and O'Hagan-Luff (2023/2024) looked at the association between corporate social and environmental performance and the cost of equity in a large, international sample. They used several implied cost of equity models, such as OJ model, and concluded that the lower cost of equity was related to a higher corporate social performance. Drobetz et al. (2024) explored the importance of institutional investors and corporate environmental costs, and used four models to estimate the implied cost of equity, which includes the OJ model. The findings indicated that there was a positive relationship between higher environmental costs and higher cost of equity. Abakah et al. (2024) studied how the U.S. Securities and Exchange Commission's regulatory review impacts the implied cost of equity in a different study. The study adopted the average of four models, such as OJ model, and focused on the importance of the regulatory environment and disclosure in the explanation of the cost of equity financing. [11], [12].

Li et al. (2025) studied the impact of the CES on the implied cost of equity of Chinese firms in 2025. The study used several models such as the OJ model and concluded that the entry of the emissions trading system led to an increase in the implied cost of equity of companies situated in the area covered by the emission trading system. A recent study of the ESG

performance in the energy, utilities and basic materials (EUBM) industry directly used the OJ model to estimate the implied cost of equity, while highlighting the role of stock price, expectations of earnings, dividends, and growth rates in determining the cost of equity. Last, Lim et al. (2026) showed that the use of implied cost of equity models—such as the OJ model—continues to be used in recent literature, and found that intensity of product market competition was negatively related to the cost of equity [13], [14].

Research Gap

From the review of previous studies, it is clear that one of the important models which is used to estimate the implied cost of equity was Ohlson–Juettner-Nauroth model. It has also been shown in other studies to be applicable to other environments and markets to explore the factors that affect the cost of equity financing. Most studies, however, have been conducted in more developed markets or in specific emerging markets and have been dependent on the forecasts of financial analysts' earnings and dividend streams. Empirical data on the use of the model in the Iraq Stock Exchange is still insufficient because the conditions of the Stock Exchange are different from other markets in the following aspects: the depth of the market, the availability of information, and the frequency of analyst reviews.

Thus, the research gap is the few studies that have investigated the appropriateness of the Abnormal Earnings Growth Model for estimating the implied cost of equity in the Iraqi market, and the lack of evidence regarding the impact of the earnings growth rates on estimates of cost of equity. In view of this, the present study aims to fill this gap by estimating the implied cost of equity of a sample of companies listed on the Iraq Stock Exchange, testing the differences between companies, and testing the relationship between the growth rate of earnings and the cost of equity by using the Ohlson–Juettner-Nauroth model, and thus, getting empirical evidence about the appropriateness of the model for the Iraqi market.

Theoretical Framework

1. Concept of the Implied Cost of Equity

The rate of return that investors demand for investing in a company's shares and the risks they incur in doing so is known as the implied cost of equity. This rate is an inverse function of the relationship between the current market price on a share and the future cash flows or benefits that the investor expects to receive out of the investment, and it is equal to the discount rate that would make the difference between the future cash flows and the present value of the cash flows equal to the market price of the share [15].

The method is not the same as the traditional way of estimating the cost of equity because it does not rely on past returns, but rather on current information and expectations of future earnings, dividends and growth. So it has significance in the valuation studies and investment decision-making process as a forward-looking indicator of the cost of equity. In emerging markets, the importance of the implied cost increase if some of the traditional models may be restricted from use due to a lack of available accounting and market information that can be used to calculate the required rate of return. This aligns with the purpose of this paper which aims to estimate the cost of equity using parameters such as stock prices, Earnings Per Share, Dividends, and growth rate [16].

2. Ohlson–Juettner-Nauroth (2005) Model

One of the models used to estimate the implied cost of equity, is the Ohlson–Juettner-Nauroth model. It was meant to be used by Ohlson and Juettner-Nauroth to correlate the market price of a share with information about expected earnings per share, growth rates of earnings, and dividends. The model is based on the assumption that the price of a stock is the present value of all future benefits that can be obtained from the stock; however, this is reworked to incorporate the present value of expected future gains instead of dividends alone. The model is premised on the assumption that there is a sustainable long-term growth rate and that the growth rate in the short-term will converge toward the sustainable long-term growth rate [17]. The value of the model in the current research is that it can convert a set of available accounting and market information into an implied estimate of the cost of equity, which makes it applicable to test in the environment of Iraq and where the data is available and the quality of forecasts are constrained.

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3. Applied Formula of the OJ Model

In the applied aspect, the study relies on the simplified formula of the OJ model as follows:

$$\mathbf{KOJ} = \mathbf{A} + \sqrt{\boldsymbol{A^2} + \frac{\boldsymbol{EPS_{t+1}}}{\boldsymbol{P_t}}[\boldsymbol{g2} - (\boldsymbol{\gamma} - \mathbf{1})]}$$

Where:

$$\boldsymbol{A} = \frac{\mathbf{1}}{\mathbf{2}}\left[(\boldsymbol{\gamma} - \mathbf{1}) + \frac{\boldsymbol{EPS_{t+1}}}{\boldsymbol{P_t}}\right]$$

The symbols (r) represents the implied cost of equity, (P_0) the current price of the stock, (EPS_1) the expected earnings per share for the next year, (EPS_2) the expected earnings per share for the second year, (DPS_1) the expected dividend per share for the next year, (g_s) the short-term earnings growth rate, and (g_l) the long-term growth rate, with (A) being the intermediate coefficient of the model equation. Short-term growth and long-term growth rates have been calculated in the recent application of the Ohlson–Juettner-Nauroth (OJ) model from forecasts of future earnings and dividends.

4. OJ Model Inputs and Measurement Mechanism

The application of the model requires the identification of a set of accounting and market variables, which can be explained as follows [18]:

Stock Price (P_t): The price of the stock at the valuation date, and should be consistent in time with the other information in the financial model used to determine the remaining model variables. This variable is important because it is the market value on which the model is based for cost of equity.

Expected Earnings per Share (EPS_{t+1}): Is the forecasted earnings per share for the year after the date of valuation. It is one of the most significant inputs of the model since it is directly involved in the equation to estimate the implied cost. The research is based on the Iraqi environment where only companies that published analyst forecasts are found, and then the forecasts for these companies were constructed according to the method indicated in the methodology (Yu et al., 2021, 3975–4000).

Expected Earnings per Share (EPS_{t+2}): It is the expected earnings per share in the second year and is mostly used to determine the short-term growth rate. Thus, the precision of its estimation will be pertinent to the estimation of growth rate and, therefore, the implied cost estimate.

Expected Dividends per Share (DPS_{t+1}): This is the amount of cash dividends per share expected for next year. The cost of equity is one of the factors that are calculated from dividend policy; hence, any change in dividend policy can result in a change in the estimated COE.

Short-Term Growth Rate (STG): Indices the rate of earnings per share growth in the short term. Can be calculated based on the relationship between actual and expected earnings per share or based on the method outlined in the study in line with data available.

Long-Term Growth Rate (LTG): assumed sustainable growth rate of earnings over the long-term. The estimation of the implied cost is influenced by this variable and that is why it is of particular importance in the model. Thus, the sensitivity of the findings will be checked to see how robust they are to changes in this assumption. The research suggests that one should try some growth scenarios and compare the implied cost of these in each scenario.

5. Steps for Applying the OJ Model

The applied procedures of the model can be summarized in the following sequence:

Historical Earnings per Share Data
↓
Estimating EPS for the Following Year and the Second Year
↓
Calculating the Short-Term Growth Rate (STG)
↓
Determining the Long-Term Growth Rate (LTG)
↓
Determining the Stock Price (P_t) and Expected Dividends (DPS_{t+1})
↓
Calculating g_2 and A
↓
Applying the OJ Equation
↓
Deriving $K_{(OJ)}$
↓
Comparing the Implied Cost Across Companies
↓
Conducting Sensitivity Analysis of Long-Term Growth

This is consistent with the conceptual framework, which links the stock price, expected earnings per share, growth, and dividends to derive the implied cost of equity.

6. Advantages of Using the OJ Model in the Study

The importance of the model in the Iraqi environment can be highlighted through several aspects [19]:

a. Reliance on accounting and market information that can be obtained from financial reports and trading data.
b. Providing a forward-looking estimate of the cost of equity rather than relying entirely on historical returns.
c. Incorporating earnings growth expectations into the estimation of the cost of capital.
d. Enabling sensitivity analysis of the results with respect to the long-term growth rate.
e. Potentially serving as a complementary tool to traditional models for estimating the cost of equity.

7. Limitations of Applying the OJ Model in the Iraqi Environment

Despite the importance of the model, its application in the Iraq Stock Exchange faces several challenges, the most important of which are:

a. Insufficient number of published financial analysts' forecasts.
b. Differences in the level of financial disclosure among companies.
c. Low liquidity and irregular stock trading of some stocks.
d. Variations in the distribution of dividends from one company to another.
e. The challenge to accurately predict future growth rates.
f. The likelihood of material changes in capital or the number of shares which could impact comparability of earnings per share.
g. Variability of the outcomes due to differences in the long-term growth assumptions.

Weak liquidity, irregular trading, and differences in dividend distribution policies have been identified as important limitations to applying the model in the Iraqi environment.

8. Conceptual Model of the Study

The conceptual framework of the research can be expressed as follows:

Current Stock Price
⬇
Expected Earnings per Share
⬇
Short-Term Growth + Long-Term Growth
⬇
Expected Dividends
⬇
Ohlson–Juettner-Nauroth Model
⬇
Implied Cost of Equity

Methods

1. Research Method

The applied analytical approach was chosen because it is appropriate for this study, and it is used for analysis of the theory of the implied cost of equity and applying Ohlson – Juettner – Nauroth (OJ) model for the financial and market data of the listed Iraqi joint-stock companies on the Iraq Stock Exchange.

The applied aspect is based on accounting data pertaining to earnings, earnings per share, and dividends, as well as data from the markets pertaining to stock price, with the intention of estimating the implied cost of equity by reversing the relationship between the stock price, expected earnings and growth rates. The application consist of identification of the research population and sample, data collection, calculating variables, growth estimation, applying OJ model, descriptive analysis and sensitivity analysis.

2. Research Population and Sample

The research population is all the Iraqi joint-stock companies that have been listed on the Iraq Stock Exchange and the sample was chosen purposively depending upon the availability of the financial and market information necessary to apply the OJ model. Only companies with reliable annual financial data could be chosen, as were prices of the markets, earnings per share, and dividend data, so that the model inputs could be built in a consistent manner. Companies were excluded where they had a significant amount of missing data or where their data properties were not suitable for the model to be applied. This method is in line with the applied boundaries of the study, where it is applied to companies where the required data to calculate the model variables exist.

From the preliminary analysis of the data, Baghdad Soft Drinks Company (IBSD) and Iraqi Company for Carpets and Furnishings (IITC) are considered two cases with relatively appropriate inputs for the first application. Evaluated but not included in final calculations because of data incompleteness or validity of the model inputs were some additional companies.

3. Criteria for Selecting and Excluding Companies

The research adopted a set of methodological criteria for selecting the companies included in the applied analysis, as follows:

a. Company Characteristics and Listing: The Company must be an Iraqi Joint Stock Company and be listed on the Iraq Stock Exchange.
b. Financial Data: Financial statements and financial data on which the study is based that were available for the annual period or periods during the study period: Net Income; Earnings Per Share; or data from which these are calculated.
c. Availability of Market Data: Market data including the valuation date stock price in a format that would enable determination of the stock price to be used in the OJ model.
d. Dividend and Growth Data: Availability of suitable data on dividend distributions and calculating consistent earnings per share and earnings growth rate.

e. Data Integrity and Model Applicability: The absence of significant gaps in the data or problems with the OJ model which would otherwise prevent the application of the OJ model; the inclusion/exclusion of companies based on methodological justifications and problems associated with data and the OJ model is valid.

Some companies were excluded from the final application when substantial problems existed in the data or when the conditions required by the OJ model could not be satisfied. Among the most prominent exclusion cases appearing in the original data are:

Table 1. Excluded Companies

Reason for Exclusion	Code	Company
Incomplete final accounts for 2025	IIDP	Iraqi Company for Date Processing and Marketing
Delayed final accounts and disclosure issues	IICM	Iraqi Company for Date Processing and Marketing
Final annual accounts for 2025 were not available at the time of examination	IKLV	Al-Kindi Company for Veterinary Vaccines
The published/available 2025 earnings do not provide a stable input for the model.	IMAP	Al-Mansour Company for Pharmaceutical Industries
A 100% increase in capital during 2025 requires careful treatment of the weighted average number of shares.	IMOS	Modern Sewing

Source: Prepared by the Researcher, 2026.

The original data show, for example, that the number of shares as of the end of 2025 would be incorrect to use for calculating the EPS, as the capital assets of the IMOS were increased from IQD 2 billion to IQD 4 billion during that year.

4. Data Collection Sources: (financial statements and annual closing accounts, net profit data, capital in the companies and number of the shares, earnings per share (EPS), dividend distributions, market closing prices, earnings growth rates and published data on capital increases and number of shares). The study indicated that the data available for the time frame 2020-2025 were to be used, and that the availability of a time series that permits a more consistent calculation of growth rates would be of special interest.

5. Study Variables: The application use of a set of variables, these variables are listed here:

Table 2. Study Variables

Definition	Variable	Symbol
Share price at the valuation date.	Current share price.	P_0
Expected future profitability.	Expected earnings per share for the following year.	EPS_1
Expected profitability for the following year.	Expected earnings per share for the second year.	EPS_2
Expected dividends for the following year.	Expected dividends per share.	DPS_1
EPS growth rate.	Short-term growth.	STG

Definition	Variable	Symbol
Assumed sustainable growth rate.	Long-term growth.	LTG
The rate derived from the OJ model.	Implied cost of equity.	r

Source: Prepared by the Researcher, 2026.

The model is based on linking the share price with expected earnings per share and short- and long-term growth rates, and then reversing the valuation relationship to derive the implied cost of equity.

6. Calculation of Earnings per Share: Earnings per share is calculated according to the following relationship ...

$$EPS_t = \frac{NI_t}{N_t}$$

where (NI_t) represents the company's net profit in year (t), (N_t) represents the number of shares used in the calculation, and (EPS_t) represents earnings per share. For companies that have not experienced significant changes in capital, the appropriate number of shares for the financial year may be used, whereas the weighted average number of shares must be used when increases or reductions in capital occur during the year. The preliminary data indicate that IBSD's earnings per share amounted to approximately 0.741 in 2024 and 0.815 in 2025, representing growth of approximately 9.99%.

7. Short- and Long-Term Growth Rate: The initial application relied on the EPS growth rate, according to the following equation for the short-term growth rate.

$$* 100STG = EPS_t - \frac{EPS_{t-1}}{EPS_{t-1}}$$

For IBSD, earnings per share increased from approximately 0.741 to 0.815, resulting in a growth rate of approximately 9.99%. For IITC, the initial application showed a higher growth rate of approximately 26.40%, which was one of the factors explaining its higher estimated implied cost of equity compared with IBSD.

Regarding the long-term growth rate, the initial application adopted a long-term growth rate of (LTG = 3%) and then incorporated this rate into the calculation of the implied cost of equity, followed by a sensitivity analysis to examine the effect of changes in the long-term growth rate. Sensitivity analysis is essential because the implied cost of equity derived from the OJ model is affected by assumptions regarding future growth. Therefore, relying on a single value for LTGLTG without testing alternative values may result in an estimate that is highly dependent on the assumption employed.

8. Application of the OJ Model: The formula used for the practical application of the model can be expressed as follows:

$$\boldsymbol{ROJ = A + \sqrt{A^2 + \frac{EPS_{t+1}}{P_t}[g2 - (\gamma - 1)]}}$$

It can be seen that (r) is the implied cost of equity, (P_0) is the current price of a share, (EPS_1) is expected earnings per share of the next year, (EPS_2) is expected earnings per share of the second year, (DPS_1) is expected dividends per share of the next year, (g_s) is expected short-term earnings growth rate, (g_l) is expected long-term earnings growth rate, and (A) is the intermediate coefficient in the model equation. The following variables have been applied in recent Ohlson–Juettner-Nauroth (OJ) model applications, and short- and long-term growth rates have been determined by future expectations of earnings and dividends. The coefficient is determined by the following equation:

$$A = \frac{1}{2}\left[(\gamma - 1) + \frac{DPS_{t+1}}{P_t}\right]$$

This coefficient represents one of the key components in deriving the implied cost of equity, as it combines the long-term growth rate with the ratio of expected dividends per share to the share price.

Accordingly, an increase in expected dividends per share, holding the other variables constant, may affect the estimated value of the implied cost of equity. This formula is widely used in applications based on the OJ model. This rate reflects the expected growth in earnings per share between the first and second future periods. Some extended applications of the OJ model use an average of short-term and long-term growth:

$$g_2 = \frac{STG + LTG}{2}$$

where gsg_s represents short-term growth, and glg_l represents long-term growth. This approach has been adopted in a number of recent empirical applications of the model.

9. Application to Companies:

Application to Baghdad Soft Drinks Company (IBSD): The data used in the application showed that the company's net profit increased from approximately IQD 151.49 billion in 2024 to approximately IQD 166.53 billion in 2025, with estimated earnings per share of approximately 0.741 and 0.815, respectively. The closing share price at the end of December 2025 was approximately 5.700, while the initial application used dividends of approximately 0.130 per share. The short-term growth rate was approximately 9.99%, and the assumed long-term growth rate was 3%. Based on the inputs of the initial application, the estimated implied cost of equity according to the OJ model amounted to approximately:

$$\boxed{ROJ = \approx 10.40\%}$$

This is an initial estimate associated with the assumptions and inputs used and should not be interpreted as a realized return or as a required rate of return measured independently.

Application to the Iraqi Company for Carpets and Furnishings (IITC): The data available revealed that the company's capital was around IQD 500 million, and that its annual reports are available for the year 2020- 2025. The information also showed a net profit of around IQD 742.23 million for 2024, and earnings per share of around IQD 1.48 for the last ten years. The share price applied in the application was IQD 17.500 and a dividend of IQD 0.850 per share from 2024 profits was used as a fixed value in defining the forecast, specifying that the dividend value is a research value and not a published forecast by the market analysts. The long-term growth rate was 3% and the initial growth rate was around 26.40%. To get the implied cost of equity the model inputs yielded a result of:

$$\boxed{ROJ = \approx 16.64\%}$$

The original version indicated that this result was higher than the estimated cost for IBSD, with part of the difference being associated with the higher EPS growth rate of IITC.

10. Summary of Preliminary Results: These values are presented in the original application as preliminary comparative results, and the same file emphasized that the average derived from only two companies should not be treated as a final statistical result.

Table 3. Summary of the Preliminary Results for the Two Companies

IITC	IBSD	Indicator
1.876	0.815	EPS 2025
26.40%	9.99%	Short-Term EPS Growth
3%	3%	LTG
14.68%	6.50%	g_2 Used
17.500	5.700	Share Price

IITC	IBSD	Indicator
0.850	0.130	DPS
16.64%	**10.40%**	Implied OJ Cost of Equity

Source: Prepared by the researcher, 2026.

Results and Discussion

1. Presentation of the Applied Results

The implied cost of equity was estimated for the companies under application based on the available financial and market data, and using the Ohlson–Juettner-Nauroth (OJ) model that relates the share price to the expected earnings per share, the growth rates, and the expected dividends. The model basically uses the company and market information available to be used to reverse the valuation equation to calculate the cost of capital.

The initial findings showed a distinct difference in the cost of equity (k) that can be implied by the two companies being applied. The estimated cost for Baghdad Soft Drinks Company (IBSD) was approximately 10.40%, while it was approximately 16.64% for the Iraqi Company for Carpets and Furnishings (IITC), which is around 6.24 percentage points. The comparison is descriptive and preliminary as the application of the model could only be completed and documented for a limited number of companies.

Table 4. Results of Estimating the Implied Cost of Equity

K_OJ	DPS	Share Price	LTG	Short-Term Growth Rate	Earnings Per Share (EPS)	Symbol	Company
10.40%	0.130	5.700	3%	9.99%	0.815	IBSD	Baghdad Soft Drinks Company
16.64%	0.850	17.500	3%	26.40%	1.876	IITC	Iraqi Company for Carpets and Furnishings

Source: Prepared by the researcher based on the study data and applied calculations. The basic values are provided in the research file.

As can be seen from the table, the higher cost of equity in IITC is accompanied by a higher short-term growth in earnings per share, apart from differences in share price and dividend distribution, in IITC vis-à-vis IBSD. This does not mean that any one of these variables is sufficient to explain the implied cost of equity; rather, the value of K_OJ is representative of the interplay between the set of variables that are included in the model.

2. Comparative Analysis of the Companies' Results: From the results, it could be seen that the cost of equity of the companies varied from one company to another due to the difference in market and financial characteristics of the companies. IBSD's implied cost of equity was 10.40% while IITC's was 16.64%. This means that, based on the model inputs used, investors require a higher implied return in the case of the latter company.

This separation is especially linked to the rates of growth of earnings per share. The growth rate of IBSD was around 9.99% in the short term while the growth rate of IITC was 26.40% in the short term. The results of the share price as well as the dividend and the share price used in the calculation were also different, thus the implied cost of equity should be viewed as a whole group, rather than one particular input. Theoretically this is in line with the basis used

within the OJ model which is based on expectations of future earnings per share, their growth rates, the share price, and dividends.

3. Sensitivity Analysis of the Implied Cost of Equity to the Long-Term Growth Rate:

A sensitivity analysis was performed of the implied cost of equity (ICE) to the long-term growth rate (LTG), where the other variables in the model were constant and the LTG was varied between 2% and 5%.

The assumed long-term growth rate, (LTG), was tested over a range of scenarios to determine how much the implied cost of equity changes for the assumed growth rate.

Table 5. Sensitivity Analysis

IITC Company		**IBSD Company**	
Implied Cost	**LTG**	**Implied Cost of Equity**	**LTG**
16.21%	2%	10.21%	2%
16.64%	3%	10.40%	3%
17.08%	4%	10.60%	4%
17.55%	5%	10.82%	5%

Source: Prepared by the researcher, 2026.

The results show that the growth rate in the long term (LTG) has a positive relationship with the estimated cost of equity. The original application showed this, and the order of the two companies did not change in the two growth scenarios used. The results also indicate that the assumptions used in estimating the implied cost of equity can be impacted by those used for long-term growth rates, which is relevant in markets where equity analysts' forecasts are not provided on a regular basis. Thus, it is essential to provide growth forecasts and perform sensitivity analysis as part of good model use.

The initial analysis of the data in IMAP and IMOS showed that the use of the available historical growth rates is problematic for the OJ model since the discriminant under the square root seemed to be negative. In this way, it is impossible to obtain a positive and valid implied cost of equity from these inputs. Thus the scientifically proper expression is:

The company was not included in the final estimation because its available inputs were not suitable for the mathematical application requirements of the OJ model, not with the intention to affect the direction of the results.

The inferential statistical analysis must be considered with caution, since at the preliminary level there were only two companies that met the application. Thus, the analysis will be limited to descriptive analysis of the implied cost of equity, comparisons of companies, analysis of the growth in EPS, sensitivity analysis and an examination of the direction of the relationship between the growth and the implied cost of equity. Finding a difference between 10.40% and 16.64% is not a statistically significant difference at this stage as the number of observations is not sufficient to adequately and reliably test the differences.

It is striking that in the preliminary application of the OJ model framework, the possibility of using accounting and market data of Iraqi listed companies was found to estimate the implied cost of equity. The total estimated cost for IBSD was about 10.40% and for IITC was about 16.64% respectively with substantial difference between both the companies in terms of growth rate of Earning per Share, Share Prices of both the companies, Dividend yield.

Also, the sensitivity analysis demonstrated that the changes in long term growth rate also have an effect on the implied cost of equity, which further highlights the significance of the forward-looking assumption in the application of the OJ model. On the other hand, the analysis of the other companies showed that data availability does not necessarily mean that the data are

applicable to the model – the companies' growth and changes in capital may cause instability in EPS, thereby making the data unsuitable for the model.

4. Testing the Research Hypotheses: Given that the number of companies for which the model application has been fully and adequately documented remains limited, hypothesis testing at this stage is conducted analytically and descriptively rather than through inferential tests such as the T-test or ANOVA. Accordingly, the results should be interpreted as providing preliminary support for the hypotheses rather than constituting general statistical evidence.

Main Hypothesis: Bibliographic screening also identified an original reference on nursing workforce turnover, which is outside the financial valuation scope and should not be used to substantiate the OJ model [20].

H0: The Abnormal Earnings Growth Model cannot be used to estimate the implied cost of equity for Iraqi listed companies.

H1: The Abnormal Earnings Growth Model can be used to estimate the implied cost of equity for Iraqi listed companies.

Test Result: The OJ model was successfully applied, and an estimate of the implied cost of equity was derived for both IBSD and IITC, amounting to 10.40% and 16.64%, respectively. Accordingly, the current empirical results provide preliminary support for the alternative hypothesis H1, while emphasizing that this conclusion does not constitute a general statistical test due to the limited sample size.

First Hypothesis:

H0: There are no differences in the implied cost of equity among the Iraqi listed companies under study.

H1: There are differences in the implied cost of equity among the Iraqi listed companies under study.

Test Result: The results revealed a clear difference between the two estimates of the implied cost of equity, amounting to 10.40% for IBSD compared with 16.64% for IITC, representing a difference of 6.24 percentage points. Accordingly, the results descriptively support hypothesis H1; however, it cannot be concluded that there is a statistically significant difference until the number of companies and observations is expanded and an appropriate statistical test is conducted.

Second Hypothesis:

H0: There is no relationship between earnings growth rates and the implied cost of equity of Iraqi listed companies.

H1: There is a relationship between earnings growth rates and the implied cost of equity of Iraqi listed companies.

Test Result: The current comparison indicates that the company with the higher short-term growth rate in earnings per share, namely IITC, also recorded a higher implied cost of equity. However, this result is insufficient to establish a general relationship between growth and the implied cost of equity because of the limited number of observations. Therefore, the hypothesis can be considered only preliminarily supported, subject to statistical testing after expanding the sample.

Third Hypothesis:

H0: Estimates of the implied cost of equity are not affected by changes in the long-term growth rate.

H1: Estimates of the implied cost of equity are affected by changes in the long-term growth rate.

Test Result: The sensitivity analysis showed an increase in K_OJ in both companies as LTG increased. In IBSD, the implied cost of equity increased from 10.21% at LTG = 2% to 10.82% at LTG = 5%, while in IITC it increased from 16.21% to 17.55%. Thus, the results of the sensitivity analysis provide clear support for hypothesis H1.

5. Discussion of the Results in Light of the Research Objectives:

The empirical results show that the OJ model is suitable for the computation of the cost of equity, when the data concerning the share price, earnings per share, dividends and growth rates are available. It corroborates the theoretical basis of the model Ohlson and Juettner-

Nauroth developed, because it can be inverted and the cost of capital calculated from earnings and growth prospects instead of just from past returns.

It was also found that there is a difference in the cost of equity of companies to which the model was applied. The increase in K_OJ does not necessarily indicate that the company is performing worse as compared to the previous year, since the cost of equity for a company is a result of a number of factors such as the market price, forecasted EPS, dividend yield and growth rate.

This is especially relevant in the Iraqi situation, given the scarcity of published analyst forecasts, which implies one of the key factors of the quality of the estimation is the construction of future eps and the rate of growth. Thus, using only one year's historical data or the trend of growth in that same year might result in volatile forecasts, and if that is the case, it is important to test the appropriateness of the forecasting method before adding the values into the OJ model, and to use the longest time series possible when forecasting.

Originally, however, the exclusion of certain companies in the final estimation does not constitute one of the weaknesses of the model; the need to follow the requirements of the model's use is a requirement. For instance, the K_OJ value should not be reported when the data available is used to calculate a negative discriminant under the square root sign, such as for IMAP, but for IMOS usage of the weighted average number of shares before using EPS as a final input must be taken into account.

Table 6. Summary of Hypothesis Testing Results

Decision	Current Result	Hypothesis
Preliminary Support for H1	K_OJ was estimated for two companies.	Applicability of the OJ Model
Descriptive Support for H1	IBSD = 10.40% ₉ IITC = 16.64%	Differences Exist Among Companies
Preliminary Support Only	Positive Direction in the Current Observations	The Relationship Between Earnings Growth and the Implied Cost of Equity
Support for H1	Increase in K_OJ as LTG Increases	Effect of LTG on K_OJ

Source: Prepared by the Researcher, 2026.

Conclusions and Recommendations

1. Conclusions: In light of the theoretical framework and the empirical results reached by the study, a set of main conclusions can be drawn as follows:

a. Preliminary application of the OJ Model in the Iraqi environment: The example illustrates that the Ohlson–Juettner-Nauroth (OJ) Abnormal Earnings Growth Model is applicable in estimating the implied cost of equity of Iraqi listed companies that have complete accounting and market data, particularly when the data related to earnings per share, share price, dividends, and growth rates are available. This is a confirmation of the value of using models based on forward-looking information in the Iraq Stock Exchange.

b. The difference between the Implied Cost of Equity among the Companies: The result revealed that there was a significant difference in the estimates of the Implied Cost of Equity, which was about 10.40% for Baghdad Soft Drinks Company (IBSD) while it was 16.64% for Iraqi Company for Carpets and Furnishings (IITC), representing a difference of about 6.24 percentage points. This means that the cost of equity will not be the same for every company, the differences depending on the features of the company and what factors are incorporated into the model used for estimation.

c. Importance of Earnings per Share Growth in Determining the Implied Cost of Equity: The comparison revealed that differences in earnings per share growth is one of the important factors that is associated with differences in the implied cost of equity estimates. The short term growth rate was higher for IITC compared to IBSD, as was the K_OJ estimate. These data, however, do not provide evidence of a statistically significant general relationship, because of the restricted number of observations at present.
d. Sensitivity of Results to the Assumptions of Long-Term Growth: The sensitivity analysis exercise did not reveal any significant sensitivity except that changes in long-term growth rates resulted in changes in the estimates of implied cost of equity. For IBSD, K_OJ increased from 10.21% to 10.82% when LTG was increased from 2% to 5%, while for IITC it increased from 16.21% to 17.55%. This is to verify that more than one scenario should be tested when calculating long-term growth rate.
e. Data and Forecast quality as a fundamental condition for sound application: The application showed that the quality of the implied cost of equity estimation is highly dependent on the quality of the data and how they are used to build forecasts of future earnings. Documentation and reproducibility of the statistical methods used to create future EPSs and the lack of reliance on an unexamined one year growth rate should be used in the Iraqi market.
f. The Need to Adhere to Model Requirements When Excluding Companies: The Results indicated that they require to adhere to the model requirements when excluding the companies, since they are not able to include a company in the sample if the company financial data is not appropriate for the conditions of the OJ model. Companies that generate invalid model values or that make significant accounting adjustments should not be given forced estimates, therefore. In IMAP and IMOS, for instance, special treatment had to be applied to achieve final results.
g. Limitations of the Current Inferential Results: The results of the empirical analyses are important indicators which can be applied to the model, but the current number of companies for which the model application and the results are fully and adequately documented do not allow generalization of the results at this stage, nor can statistical confirmation of the relationships be carried out. Thus, the findings are considered to be initial empirical evidence and should be backed up with the expansion of the sample and increase in the number of observations.

2. Recommendations: In light of the foregoing conclusions, the study recommends the following:

a. Expansion of Sample: It is recommended that the number of the listed companies in the Iraq Stock Exchange be increased to cover more companies in the country under the Iraqi Listing Model (OJ), whenever possible so as to conduct more representative statistical tests and generalizable results.
b. Improving Financial and Market Disclosure: Recommendations with respect to listed companies is to enhance the level of disclosure of financial and market information including the following: information relating to earnings per share, dividends and forward-looking statements.
c. Implied Cost of Equity: It is recommended that future earnings forecasts be developed in the Iraqi market with the help of specialized entities as well as financial analysts, to facilitate researchers and investors in applying the implied cost of equity models in an accurate manner.
d. Use of Sensitivity Analysis in Estimation: It is recommended that one should not use only one long-term growth rate in estimating cost of equity. Rather, a variety of alternative growth models should be explored; these experiments show that the K_OJ is sensitive to the growth rate.

e. Comparing Cost of Equity Estimation Models: Future studies are recommended to compare the results obtained from the OJ model with the other models of the cost of equity in the implied cost of equity model such as Easton model and PEG model, and compare with the CAPM model to assess the stability of the results and suitability of each model to the characteristics of the Iraq Stock Exchange. The significance of employing more than one model to ensure the robustness of a measurement is supported by previous literature.
f. Construction of a Research Database for the Iraqi Market: A unified financial and market database should be established for listed companies to include the financial data such as shares prices, dividends, earning per share and growth rates for future research related to financial evaluation and cost of capital.

3. Scientific Contribution of the Study: The first scientific contribution of the study is the preliminary empirical evidence given by the Iraq Stock Exchange for the feasibility of calculating the implied cost of equity using the Ohlson–Juettner-Nauroth model in the environment of emerging markets, which differs from the markets on which the most of the literature of the previous periods has been concentrated, and therefore share some differences in terms of information available and the expectations made in the future.

The contribution also is to pay attention to the sensitivity of the implied equity cost to assumptions about future earnings growth, instead of simply computing a single equity cost estimate, and thus provide a more comprehensive understanding of the robustness of the estimates. The study also shows that the suitability of the model is correlated with the quality of the input data but it is also associated with the possibility to build reasonable earnings forecasts, and not only with the availability of financial statements. All these aspects are aligned with the study's findings related to the scarcity of empirical evidence on the Iraqi market.

Finally, the results of the study show that the Abnormal Earnings Growth model is a good model to estimate the implied cost of equity in the Iraq Stock Exchange. But, the quality of the estimate is much dependent upon the availability of the data, the accuracy of earnings forecasts, and growth-related assumptions. The preliminary application showed that the estimate of cost of equity was different across companies, and that results were sensitive to the longer time horizon, suggesting the need for a larger sample size and more rigor in the data to draw any general conclusions. Thus, the construction of the information environment in the Iraqi market is an important factor in the enhancement of the use of implied cost of equity models in financial valuation and academic research.

References

[1] Applying the empirical average cost of capital: Estimating the cost of funds at the firm and industry levels., "Applied Economics," doi: 10.1080/00036846.2023.2266603, 2024.

[2] AlHares, A., Dominic, G., and Abu-Asi, T., "Institutional ownership and cost of capital: An international study," Theoretical Economics Letters, 10, 1031–1043. doi: 10.4236/tel.2020.105060, 2020.

[3] Aljughaiman, A. A., Albarrak, M., Cao, N. D., and Trinh, V. Q., "Cost of equity, debt financing policy, and the role of female directors," Cogent Economics and Finance, 10(1), 2109274. doi: 10.1080/23322039.2022.2109274, 2022.

[4] Cost of equity, debt financing policy, and the role of female directors., "Cogent Economics and Finance," doi: 10.1080/23322039.2022.2109274, 2022.

[5] Yu, E. P., Tanda, A., Luu, B. V., and Chai, D. H., "Environmental transparency and investors' risk perception: Cross-country evidence on multinational corporations' sustainability practices and cost of equity," Business Strategy and the Environment, 30(8), 3975–4000. doi: 10.1002/bse.2852, 2021.

[6] Trinh, H. T., and Nguyen, X. H., "Intangible investments and cost of equity capital: An empirical research on Vietnamese firms," Cogent Economics and Finance, 11(1), 2163075. doi: 10.1080/23322039.2022.2163075, 2023.

[7] Does doing good cost more? Poverty-alleviation corporate social responsibility and the cost of equity in India., "Journal of Accounting in Emerging Economies, 15(5), 1132–1160," doi: 10.1108/JAEE-08-2024-0362, 2025.

[8] Wadhwa, S., and Sahoo, S., "Does doing good cost more? Poverty-alleviation corporate social responsibility and the cost of equity in India," Journal of Accounting in Emerging Economies, 15(5), 1132–1160. doi: 10.1108/JAEE-08-2024-0362, 2025.

[9] Drobetz, W., El Ghoul, S., Fu, Z., and Guedhami, O., "Institutional investors and corporate environmental costs: The roles of investment horizon and investor origin," European Financial Management, 30, 727–769. doi: 10.1111/eufm.12444, 2024.

[10] Vitolla, F., Raimo, N., Rubino, M., and Garzoni, A., "The impact on the cost of equity capital in the effects of integrated reporting quality," Business Strategy and the Environment. doi: 10.1002/bse.2384, 2020.

[11] Abakah, A. A., and Somé, H. Y., "The effect of SEC regulatory oversight on implied cost of equity," Financial Review, 59, 875–896. doi: 10.1111/fire.12390, 2024.

[12] Abakah, E. J. A., et al., "The effect of SEC regulatory oversight on implied cost of equity," Financial Review. doi: 10.1111/FIRE.12390, 2024.

[13] Li, D., Zhang, Z., and Gao, X., "The impact of carbon emission trading system on the implied cost of equity capital," International Review of Economics and Finance, 101, 104157. doi: 10.1016/j.iref.2025.104157, 2025.

[14] The impact of carbon emission trading system on the implied cost of equity capital., "International Review of Economics and Finance," doi: 10.1016/j.iref.2025.104157, 2025.

[15] Intangible investments and cost of equity capital: An empirical research on Vietnamese firms., "Cogent Economics and Finance," doi: 10.1080/23322039.2022.2163075, 2023.

[16] To change or not to change: The informativeness of REIT annual reports., "Journal of Real Estate Literature," 2024.

[17] Wang, J., and Deng, J., "Research on the effect of executive incentive institutional innovation on the cost of equity—Evidence from Chinese listed companies," Frontiers in Psychology, 12, 686955. doi: 10.3389/fpsyg.2021.686955, 2021.

[18] Lim, S., Rhee, S. G., and Yu, K., "Product market threats, operating efficiency, and cost of equity capital," Review of Quantitative Finance and Accounting. doi: 10.1007/s11156-026-01523-8, 2026.

[19] Product market threats, operating efficiency, and cost of equity capital., "Review of Quantitative Finance and Accounting," doi: 10.1007/s11156-026-01523-8, 2026.

[20] Zhang, X., Huang, H., Zhao, S., Li, D., and Du, H., "Emotional exhaustion and turnover intentions among young ICU nurses: a model based on the job demands-resources theory," BMC nursing, 24(1), 136, 2025.