# The Logical Index Of The Stock Market

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**(Received 5 /3 / 2025. Accepted 2 /6 / 2025)**

**□ ABSTRACT □**

This research introduces a novel stock market index that integrates both trading volume and price to calculate the market index value after each transaction. It proposes the use of a firm's weighted average stock price instead of the traditional closing price based on the last traded price. The study emphasizes the importance of market analysis in aiding investors to make informed decisions and anticipate risks [1].

The impetus for this research stems from the observed lack of objectivity in existing stock market indices, which inadequately reflect market conditions using conventional methods. Employing a comparative experimental methodology, the study simulates a market with five listed stocks and assesses various hypothetical scenarios that illustrate different market trends and price fluctuations.

Results indicate that traditional methods often fail to accurately depict market realities, while the proposed mechanism offers a more logical and objective representation of market trends. Initial findings were corroborated through application to actual markets, specifically the Damascus Securities Exchange and Amman Stock Exchange, demonstrating the efficacy of the new index in reflecting true market dynamics.

**Keywords**: Stock Market Index, Index Construction, Market Trends, Trading Volume.

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# المؤشر المنطقي لسوق الأوراق المالية

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**(تاريخ الإيداع 3/5 / 2025. قُبِل للنشر في 2 / 6/ 2025)**

## □ ملخّص □

يقدم هذا البحث مؤشراً جديداً لسوق الأسهم يدرج كلاً من حجم التداول والسعر في حساب قيمة مؤشر السوق بعد كل صفقة تداول. ويقترح استخدام متوسط سعر سهم الشركة المرجح بدلاً من سعر الإغلاق التقليدي المستند إلى آخر سعر تداول. وتؤكد الدراسة على أهمية تحليل السوق في مساعدة المستثمرين على اتخاذ قرارات مستنيرة والتنبؤ بالمخاطر[1].

ينبع الدافع وراء هذا البحث من الافتقار الملحوظ للموضوعية في المؤشرات الحالية لأسواق الأسهم، والتي لا تعكس ظروف السوق بشكل كافٍ عندما تُحسب باستخدام الطرق التقليدية. ومن خلال استخدام منهجية تجريبية مقارنة، حاكت الدراسة سوقاً بخمسة أسهم مدرجة، وقيّمت سيناريوهات افتراضية مختلفة توضح اتجاهات السوق المختلفة وتقلبات أسعار متباينة.

تشير النتائج إلى أن الطرق التقليدية غالباً ما تفشل في تمثيل واقع السوق بدقة، بينما تقدم الآلية المقترحة تمثيلاً أكثر منطقية وأكثر موضوعية لاتجاهات السوق. وتم تأكيد النتائج الأولية من خلال التطبيق على الأسواق الفعلية، وتحديداً سوق دمشق للأوراق المالية وبورصة عمان، مما يدل على فعالية المؤشر الجديد في عكس الديناميات الحقيقية للسوق.

**الكلمات المفتاحية:** مؤشر سوق الأوراق المالية، بناء المؤشر، اتجاهات السوق، حجم التداول.

**حقوق النشر** : **مجلة جامعة اللاذقية– سورية، يحتفظ المؤلفون بحقوق النشر بموجب الترخيص** CC BY–NC–SA **04**

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## 1. Introduction

A stock market index is expected to reflect the performance of the companies it includes, which in turn should represent the broader market and the economy. Sector indices further capture the performance of specific economic sectors (e.g., industrial, banking, etc.).

Index samples are selected based on criteria such as firm size, trading activity, and volume. Despite the diversity in index construction methods, sample sizes, and trading activities over time, skepticism remains regarding the extent to which these indices genuinely represent market conditions.

Investors often base decisions on index trends, and analysts rely on them to measure market returns, assess economic activity [2], and make appropriate forecasts. Yet, stock prices are shaped by supply and demand, influenced by investor behavior, preferences, and individual circumstances. As a result, prices may not reflect a firm's true performance or intrinsic value.

Motivated by these issues, the researcher proposes a new method for calculating market indices and market capitalization, seeking to validate this approach through comparative analysis of hypothetical market scenarios.

## 2. Research Issue

Market indices are updated after every executed transaction, culminating in the final index value and closing prices at the end of the trading session. However, traditional methods do not consider trading volume for each transaction, despite its significance in evaluating market activity and firm valuation.

The trading volume is very important because it explains the conditions of the sale or purchase stock in the market, investors hold their stocks when they do not get information about them, leading to low trading and volatility [3].

This led the researcher to question:

- Is there a specific relationship between trading volume and the objective value of a stock market index?
- Is there a specific relationship between trading volume and a firm's true market value?

## 3. Research objectives

This study aims to construct an objective market index that realistically and logically reflects the development of stock market conditions and the economic context it represents.

## 4. Significance of the Research

This research is significant as it attempts to develop a more objective market index that addresses the inherent flaws in traditional calculation methods. The proposed index better captures real economic activity driven by supply and demand, as investor behavior influences market volatility [3], offering a new framework for analysts and researchers in related fields.

## 5. Research hypotheses

The main hypotheses on which the research was based:

***H1.*** There is a direct relationship between stock trading volume and the objective value of the stock market index.

***H2.*** There is a direct relationship between stock trading prices and the objective value of the stock market index.

***H3.*** There is a direct relationship between the adjusted trading prices of trading volume-weighted stocks and the objective value of the stock market index.

*Objectivity* here refers to the index's accuracy in representing the actual direction and intensity of market movements and the general economic conditions.

## 6. Research Methodology

A comparative experimental approach was used. Several hypothetical market scenarios were developed, simulating different market trends and intensities. Index values were calculated using both conventional methods and the proposed approach that weights by transactions volume.

## 7. Population and Sample

The study focuses on hypothetical cases simulating different trends and intensities in a theoretical market consisting of five listed companies.

Initial results have been tested across three sectors in the Damascus Securities Exchange (Banking, Services, and Industrial) as well as in the banking sector of the Amman Stock Exchange.

## 8. Research Scope

The study is limited to hypothetical scenarios representing diverse market fluctuations in direction and intensity, the initial results were also tested on both the Damascus Securities Exchange and the Amman Stock Exchange.

## 9. Literature review

The study by Al-Hajj and Daas (2005) [4] aimed to determine the extent of the influence of quantitative trading factors represented by the value of stocks traded, the number of sessions in which trading occurs, the number of trading transactions, the quantity of stocks traded, and their market value on the value of the Al-Quds Index, as well as to ascertain the intensity of the influence of each of these factors. The study employed a methodology that sought factors that directly or indirectly affect the value of the Al-Quds Index of the Palestine Stock Exchange. The study concluded that the quantitative factors examined significantly impact the value of the Al-Quds Index.

The study by Qabalan (2011) [5] aimed to define the indices of the stock markets, identify their components, and clarify their role, importance, and significance, in addition to elucidating the mechanism of forming the Damascus Securities Exchange

index. The study relied on the descriptive approach, the inductive-deductive approach, and the deductive approach, along with quantitative analysis and historical analysis. The findings indicated that stock prices indices serve as a mirror reflecting the general economic situation of the country and are considered vital tools in the process of predicting the future economic conditions; they are also used by investors and other parties engaged in the market.

The study by Broby and Lochhead (2013) [6] also aimed to examine three methodologies for index creation through value-weighting, equal weighting, and basic weighting, in order to determine the most suitable indices for investment. The study concluded that the diversification process was not particularly beneficial according to the value-weighting methodology for creating the African index and that the characteristics of the relationship between return and risk can be determined through the alternative methodologies that were analyzed.

Khalil's study (2016) [7] aimed to develop a methodology for creating a general price index in the Egyptian stock market, based on analytical, comparative, and field studies. In its results the study proposed a methodology to develop the method of building the Egyptian Stock Exchange index (EGX-30), taking into account liquidity, profitability, market capital size and fair sectoral representation.

Metwally's study (2016) [8] aimed to analyze and review the most important methods related to forming stock market indices based on the descriptive analytical comparative approach. It concluded that several quantitative methods are used to determine the value of the stock market index. The study indicated that there are three main approaches to calculating indices in any country: the value approach, the price approach, and the relative weight approach. Furthermore, the study revealed that some indices are calculated using index numbers, while others are determined based on the average prices of the stocks they include.

The study by Farahi's (2022) [9] aimed to create a composite index to identify the performance of the Singapore Stock Exchange and measure its relationship with the inflation index, utilizing the basic analysis components method and the autoregressive model of distributed lags. The results of the study showed the possibility of combining the sub-indices of the general price index, listed firms, turnover rate, market value, and liquidity volume into a composite index for the Singapore Stock Exchange. It also indicated the existence of a long-term equilibrium relationship between the inflation rate and the composite index that was created.

After reviewing and analyzing the previous literature, the researcher found that the current study is completely different from previously reviewed studies in terms of objective, importance, and methodology, highlighting the originality of the current study. It aims to build an objective index for the stock market that logically reflects its economic status and enables investors and analysts to predict future developments in the market more accurately. Methodologically, the current study relies on extracting and comparing the actual results of testing a set of hypothetical cases that represent various expected market scenarios.

## 10. Research assumptions

To facilitate the analysis and research procedures, the researcher assumed the following:

1- The market includes stocks of five listed firms (A, B, C, D, E).

2- The number of issued stocks for each firm is 100.

3- The initial market prices of the stocks studied at the beginning of the study are:

| stock | A | B | C | D | E |
|---|---|---|---|---|---|
| Initial market price (in monetary units) | 50 | 70 | 30 | 60 | 40 |

4- The presence of a positive marketing gap (the volume of demand for the studied shares is greater than the volume of supply), i.e. the desire of investors to purchase the stocks offered for sale within the available price limits permitted by the regulations of the regulated stock market.

## 11. Theoretical framework of the research

**Stock market index:**

The stock market comprises a diverse array of firms, varying significantly in terms of their activities and business volumes. Consequently, it is essential to develop an index that accurately reflects market performance and facilitates the tracking of stock price movements, thereby serving as a reliable tool for predicting future market trends.

The history of financial market indices dates back to 1884, when Charles H. Dow and Edward D. Jones introduced their renowned index, now known as the Dow Jones Transportation Average (DJTA) [10 – 12].

A stock market index is defined as a numerical value calculated after each trading transaction executed in the market. Changes in this value, compared to the previous transaction's calculated value, indicate the market's direction and its overall movement, reflecting both investor sentiment and overall economic conditions [13].

**Building a stock market index:**

Stock market indices can be constructed at either the overall market level or within specific economic sectors. In both scenarios, an index may encompass all firms listed in the market or sector, thereby creating a general index. Alternatively, it may consist of a selected sample of firms chosen based on criteria such as size, value, activity level, or other relevant factors.

The effectiveness of an index and its ability to represent the market or a particular sector is closely tied to the appropriateness of the sample of stocks it includes, considering factors such as size, diversity, and source [14].

The degree of representation of the index correlates directly with the sample size, while its quality and representativeness are influenced by the breadth of the sample across sectors or types of firms, as well as the reliability of the sources used to determine stock prices and the appropriateness of the method employed to calculate the index value.

**Stock market index value calculation approaches:**

There are three commonly used approaches for weighting stocks within a stock market index: [14]

1. Price Weighting Approach: This method assigns weight to a stock based on its price relative to the total prices of all stocks included in the index. Consequently, a stock's influence on the index increases as its price rises.

2. Equally Weighting Approach: In this approach, all stocks included in the index are assigned equal weights, meaning each stock has the same impact on the index's movement.

3. Value Weighting Approach: Here, each stock's weight is determined by the total market capitalization of the firm it represents. This is calculated by multiplying the stock's price by the number of shares outstanding for that firm.

**Mechanism for calculating the market index value:**

The index value is initially calculated at a specific point in time known as the base point. Assuming the adoption of the most prevalent approach—value weighting—the total market capitalization of the firms included in the index is computed by summing the products of each stock's price and its respective number of outstanding shares. This total market value yields a point value that represents the index value for the base period. Thus, the value of one point of the index ($V_0$) can be expressed as follows:

$$V_0 = \frac{\sum_{i=1}^{n} NSi_{t0} \times CPi_{t0}}{IBV_{t0}} \quad (1)$$

Where:

$NSi_{t0}$ = represents the number of stocks issued by firm (i) that are included in the index during the base period ($_{t0}$).

$CPi_{t0}$ = denotes the closing price of firm (i) that is included in the index during the base period ($_{t0}$).

$IBV_{t0}$= stands for the index base value during the base period ($_{t0}$) expressed in points.

IBV represents the devisor that modified according to changes in the sample of the index by adding new stocks or removing listed ones. This adjustment is made to ensure that the value of the index remains unchanged as a result [15].

A point represents a one-unit change in the stock price, either upward or downward, or the percentage change from the starting point [16].

Assuming that the total market value of the firms included in the index during the base period was X0 , and this corresponded to P0 index points, then the value of one index point V0 is defined as:

$$V_0 = \frac{X_0}{P_0}$$

If the index later rises to a value of X1, this implies that the index has increased by:

$$\frac{X_1 - X_0}{X_0}$$

That is, the new value of the index has become:

$$P_1 = \frac{X_1}{V_0}$$

Thus, the index has increased by (P1 - P0) points.

## 12. Discussion and Results

The researcher developed an objective index to accurately represent the market and reflect its true and logical condition. This index is constructed by weighting the index value against both the trading volume and the selling price of stocks for each executed transaction in the market. The methodology is outlined as follows:

$$\text{Index Value } (IV_t) = \frac{\sum_{i=1}^{n} (TVi \times SPi) + (NSi - TVi) \times AP\,i}{\sum_{i=1}^{n} NSi_{t0} \times CPi_{t0}} \times IBV \qquad (2)$$

Where:
TV = denotes the traded volume (stocks).
SP = refer to the selling price of the stock in the executed trade (in monetary units).
NS = indicates the total number of issued stocks.
AP = represents the average stock price after the trade has been executed.

The researcher also calculated the average stock price of the firm following each executed trade using the following formula:

$$APi_t = \frac{Api_{,t-1}\,(NSi - TVi) + APi,t * TVi}{NSi} \qquad (3)$$

Where:
$APi_t$ = represents the average stock price of the firm (i) after execution the transaction.
$APi_{t-1}$ = denotes the average stock price of the same firm (i) prior to execution the transaction.

In the context of constructing a market index based on the methodology proposed by the researcher, it was essential to evaluate its objectivity and logical consistency in accurately reflecting the market conditions and their evolution. To achieve this, a comparative analysis was conducted between the proposed index and traditional indices, utilizing a series of hypothetical scenarios specifically developed by the researcher. These scenarios illustrate various market conditions and their changes in terms of both intensity and direction of stock price movements as represented in the index under study.

The researcher posited that the stock market in question consists of five publicly listed companies: A, B, C, D, and E. The initial number of shares and market prices for these companies at the commencement of the analysis (moment $_{t0}$) are detailed in Table I

**Table I.**

**Assumed stocks listed on the market, along with their respective prices and quantities**

| Stocks / Item | A | B | C | D | E |
|---|---|---|---|---|---|
| Initial stock price (monetary units) | 50 | 70 | 30 | 60 | 40 |
| Number of stocks | 100 | 100 | 100 | 100 | 100 |

**Source: Table prepared by the researcher.**

The researcher assumed twelve scenarios reflecting various market trends, each with differing intensities. These scenarios are defined based on specific trading prices—expressed as percentages of change from the initial stock price and distinct trading volumes per scenario (or deal), as illustrated in Table II.

**Table II.**

**The assumed cases**

| Case No. | Item / Stock | A | B | C | D | E |
|---|---|---|---|---|---|---|
| 1 | Price change% | +5% | +5% | +5% | +5% | +5% |
| | Trading volume (stock) | 1 | 1 | 1 | 1 | 1 |
| 2 | Price change% | +10% | +10% | +10% | +10% | +10% |
| | Trading volume (stock) | 5 | 5 | 5 | 5 | 5 |
| 3 | Price change% | +25% | +25% | +25% | +25% | +25% |
| | Trading volume (stock) | 10 | 10 | 10 | 10 | 10 |
| 4 | Price change% | +40% | +40% | +40% | +40% | +40% |
| | Trading volume (stock) | 8 | 8 | 8 | 8 | 8 |
| 5 | Price change% | -5% | -5% | -5% | -5% | -5% |
| | Trading volume (stock) | 1 | 1 | 1 | 1 | 1 |
| 6 | Price change% | -10% | -10% | -10% | -10% | -10% |
| | Trading volume (stock) | 5 | 5 | 5 | 5 | 5 |
| 7 | Price change% | -25% | -25% | -25% | -25% | -25% |
| | Trading volume (stock) | 10 | 10 | 10 | 10 | 10 |
| 8 | Price change% | -40% | -40% | -40% | -40% | -40% |
| | Trading volume (stock) | 8 | 8 | 8 | 8 | 8 |
| 9 | Price change% | +10% | +10% | -10% | -10% | -10% |
| | Trading volume (stock) | 1 | 1 | 1 | 1 | 1 |
| 10 | Price change% | -10% | -10% | +10% | +10% | +10% |
| | Trading volume (stock) | 25 | 25 | 25 | 25 | 25 |
| 11 | Price change% | -10% | -7% | 0% | +8% | +13% |
| | Trading volume (stock) | 25 | 25 | 25 | 25 | 25 |
| 12 | Price change% | -10% | -7% | 0 | +8% | +13% |
| | Trading volume (stock) | 1 | 1 | 1 | 77 | 75 |

**Source: Table prepared by the researcher.**

The market index value for each scenario was calculated using the traditional weighted approach based on market capitalization—one of the most commonly used methods for calculating capital market index values. This approach involves weighting by the firm's total market value:

$$\text{Index Value } (IVt_1) = \frac{\sum_{i=1}^{n} NSi_{t1} \times CPi_{t1}}{\sum_{i=1}^{n} NSi_{t0} \times CPi_{t0}} \text{ x IBV} \qquad (4)$$

The index value was also calculated for each scenario using the researcher's proposed method, as defined in Equation (2).

After performing the necessary calculations using both the traditional and proposed methods, the results were compiled in Table III.

**Table III.**

**Index values corresponding to the assumed cases based on the two analysed approaches**

| Case No. | Index value based on the traditional approach | | | Index value based on the proposed approach | | |
|---|---|---|---|---|---|---|
| | Value | Change rate | Change Direction | Value | Change rate | Change Direction |
| 1 | 1050 | 5.00% | ^ | 1000.5 | 0.05% | ^ |
| 2 | 1100 | 10.00% | ^ | 1005 | 0.50% | ^ |
| 3 | 1250 | 25.00% | ^ | 1025 | 2.50% | ^ |
| 4 | 1400 | 40.00% | ^ | 1032 | 3.20% | ^ |
| 5 | 950 | -5.00% | v | 999.5 | -0.05% | v |
| 6 | 900 | -10.00% | v | 995 | -0.50% | v |
| 7 | 750 | -25.00% | v | 975 | -2.50% | v |
| 8 | 600 | -40.00% | v | 968 | -3.20% | v |
| 9 | 996 | -0.40% | v | 999.96 | 0.00% | - |
| 10 | 1004 | 0.40% | ^ | 1001 | 0.10% | ^ |
| 11 | 1000 | 0.00% | - | 1000 | 0.00% | - |
| 12 | 1000 | 0.00% | - | 1030 | 3.00% | ^ |

**Source: Table prepared by the researcher.**

It is evident from Table III that the results of the two methods differ significantly in indicating market trends—particularly in Cases No. 9 and No. 12. Furthermore, there is a clear difference in the magnitude of change detected in the market index value.

By comparing each of the twelve scenarios in Table II with their outcomes in Table III, it becomes apparent that the researcher's proposed method offers a more objective and logical representation of market conditions, direction, and change intensity.

Additionally, the traditional method appears to overstate both the direction and the intensity of market movement, with notable exaggeration in Cases No. 9 and No. 12.

Unquestionably, the value of the index is influenced by the trading price of each executed transaction in terms of its direction (increase, stability, or decrease). However, the intensity of this influence is tied to the size of the executed transaction. It is illogical for an investor to relinquish a stock at any price offered, as doing so would distort the firm's value and misrepresent the market index movement.

To further compare both approaches, the researcher analyzed a hypothetical case in which a listed firm's stock (Firm A) is traded once per day at a volume of just one share, with a daily price increase of 5% for 30 consecutive trading days.

The index value and the percentage change were calculated using both approaches. The evolution of the market index was then tracked to evaluate the objectivity and logic of each method in reflecting actual market behavior and predicting future trends.

The results are displayed in Table IV.

**Table IV.**
**Market index development according to both the traditional and proposed approaches is based on the assumed case (trading volume of only one stock of firm A)**

| Trading day | Traditional approach | | Proposed approach | |
|---|---|---|---|---|
| | Index value | Change rate | Index value | Change rate |
| 1 | 1010.00 | 1.00% | 1000.10 | 0.01% |
| 2 | 1020.52 | 2.05% | 1000.21 | 0.02% |
| 3 | 1031.52 | 3.15% | 1000.32 | 0.03% |
| 4 | 1043.12 | 4.31% | 1000.43 | 0.04% |
| 5 | 1055.24 | 5.52% | 1000.55 | 0.06% |
| 6 | 1068.00 | 6.80% | 1000.68 | 0.07% |
| 7 | 1081.44 | 8.14% | 1000.81 | 0.08% |
| 8 | 1095.48 | 9.55% | 1000.96 | 0.10% |
| 9 | 1110.28 | 11.03% | 1001.10 | 0.11% |
| 10 | 1125.76 | 12.58% | 1001.26 | 0.13% |
| 11 | 1142.08 | 14.21% | 1001.42 | 0.14% |
| 12 | 1159.16 | 15.92% | 1001.59 | 0.16% |
| 13 | 1177.12 | 17.71% | 1001.77 | 0.18% |
| 14 | 1196.00 | 19.60% | 1001.96 | 0.20% |
| 15 | 1215.80 | 21.58% | 1002.16 | 0.22% |
| 16 | 1236.56 | 23.66% | 1002.37 | 0.24% |
| 17 | 1258.40 | 25.84% | 1002.58 | 0.26% |
| 18 | 1281.32 | 28.13% | 1002.81 | 0.28% |
| 19 | 1305.40 | 30.54% | 1003.05 | 0.31% |
| 20 | 1330.64 | 33.06% | 1003.31 | 0.33% |
| 21 | 1357.20 | 35.72% | 1003.57 | 0.36% |
| 22 | 1385.04 | 38.50% | 1003.85 | 0.39% |
| 23 | 1414.32 | 41.43% | 1004.14 | 0.41% |
| 24 | 1445.00 | 44.50% | 1004.45 | 0.45% |
| 25 | 1477.28 | 47.73% | 1004.77 | 0.48% |
| 26 | 1511.12 | 51.11% | 1005.11 | 0.51% |
| 27 | 1546.68 | 54.67% | 1005.47 | 0.55% |
| 28 | 1584.04 | 58.40% | 1005.84 | 0.58% |
| 29 | 1623.24 | 62.32% | 1006.23 | 0.62% |
| 30 | 1664.40 | 66.44% | 1006.64 | 0.66% |

**Source: Table prepared by the researcher.**

Figure I provides a graphical comparison of the index development under both the traditional and proposed approaches.

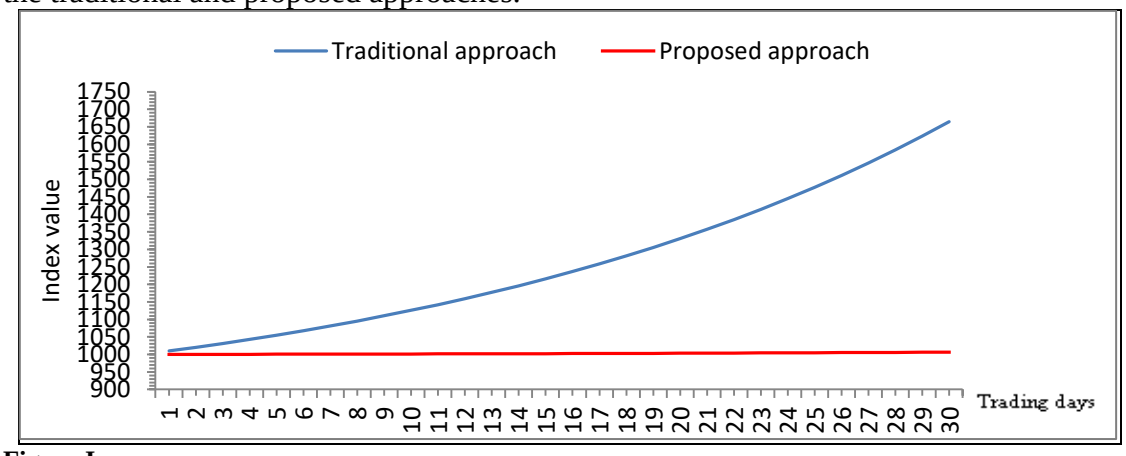


**Figure I.**
**Comparative graph illustrating the development of the market index under the assumed case (trading volume of only one stock of firm A)**
**Source: Figure prepared by the researcher.**

This comparison (via Table IV and Figure I) further highlights the proposed approach's objectivity in accurately reflecting market conditions, while the traditional method continues to demonstrate exaggeration and inaccuracy.

To reinforce these findings, the researcher assumed another scenario involving greater market impact: trading 50 shares of Firm A per day with a 5% daily price increase for 30 consecutive days.

Again, the index values and changes were computed using both methods, and the results are presented in Table V.

**Table V.**
**Market index development according to both the traditional and proposed approaches is based on the assumed case (trading volume of 50 stocks of firm A)**

| Trading day | Traditional approach | | Proposed approach | |
|---|---|---|---|---|
| | Index value | Change rate | Index value | Change rate |
| 1 | 1010.00 | 1.00% | 1005.00 | 0.50% |
| 2 | 1020.52 | 2.05% | 1010.26 | 1.03% |
| 3 | 1031.52 | 3.15% | 1015.76 | 1.58% |
| 4 | 1043.12 | 4.31% | 1021.56 | 2.16% |
| 5 | 1055.24 | 5.52% | 1027.62 | 2.76% |
| 6 | 1068.00 | 6.80% | 1034.00 | 3.40% |
| 7 | 1081.44 | 8.14% | 1040.72 | 4.07% |
| 8 | 1095.48 | 9.55% | 1047.74 | 4.77% |
| 9 | 1110.28 | 11.03% | 1055.14 | 5.51% |
| 10 | 1125.76 | 12.58% | 1062.88 | 6.29% |
| 11 | 1142.08 | 14.21% | 1071.04 | 7.10% |
| 12 | 1159.16 | 15.92% | 1079.58 | 7.96% |
| 13 | 1177.12 | 17.71% | 1088.56 | 8.86% |
| 14 | 1196.00 | 19.60% | 1098.00 | 9.80% |
| 15 | 1215.80 | 21.58% | 1107.90 | 10.79% |
| 16 | 1236.56 | 23.66% | 1118.28 | 11.83% |
| 17 | 1258.40 | 25.84% | 1129.20 | 12.92% |
| 18 | 1281.32 | 28.13% | 1140.66 | 14.07% |
| 19 | 1305.40 | 30.54% | 1152.70 | 15.27% |
| 20 | 1330.64 | 33.06% | 1165.32 | 16.53% |
| 21 | 1357.20 | 35.72% | 1178.60 | 17.86% |
| 22 | 1385.04 | 38.50% | 1192.52 | 19.25% |
| 23 | 1414.32 | 41.43% | 1207.16 | 20.72% |
| 24 | 1445.00 | 44.50% | 1222.50 | 22.25% |
| 25 | 1477.28 | 47.73% | 1238.64 | 23.86% |
| 26 | 1511.12 | 51.11% | 1255.56 | 25.56% |
| 27 | 1546.68 | 54.67% | 1273.34 | 27.33% |
| 28 | 1584.04 | 58.40% | 1292.02 | 29.20% |
| 29 | 1623.24 | 62.32% | 1311.62 | 31.16% |
| 30 | 1664.40 | 66.44% | 1332.20 | 33.22% |

**Source: Table prepared by the researcher.**

Figure II provides a visual representation of the data in Table V, showing the progression of the index values under both approaches.

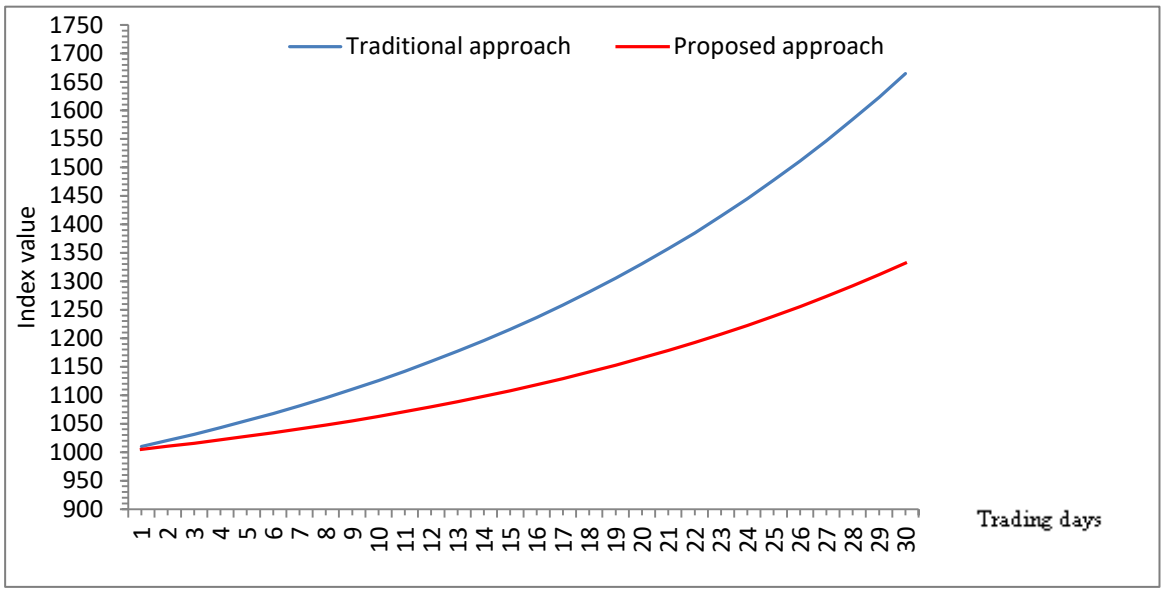


**Figure II.**
**Comparative graph illustrating the development of the market index under the assumed case (Trading volume of 50 stocks of Firm A)**
**Source: Figure prepared by the researcher.**

The results from Table V and Figure II reaffirm the objectivity and accuracy of the proposed method, while also emphasizing the distortions introduced by the traditional approach.

To analyze market movement more precisely in terms of direction and intensity across the simulated days and deal sizes, the researcher computed the weighted percentages of changes in both prices and trading volumes. The cumulative values over the trading days were then compared to the index values derived from both methods.

These results are presented in Table VI (for trading one share per deal per day) and Table VII (for trading 50 shares per deal per day).

**Table VI.**
**A comparison of the weighted change ratios and corresponding index values according to both approaches, based on the assumption of trading one stock per transaction/ day.**

| Trading day | Trading volume (stock) | Market amount (stock) | Trading ratio* | Price change percentage** | Trading ratio x Price change percentage | Cumulative value of the two ratios multiplication | The difference between the cumulative value and the value of the traditional index | The difference between the cumulative value and the value of the proposed index |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 500 | 0.002 | 0.05 | 0.0001 | 0.0001 | 0.01 | 0 |
| 2 | 1 | 500 | 0.002 | 0.05 | 0.0001 | 0.0002 | 0.02 | 0 |
| 3 | 1 | 500 | 0.002 | 0.06 | 0.0001 | 0.0003 | 0.03 | 0 |
| 4 | 1 | 500 | 0.002 | 0.06 | 0.0001 | 0.0004 | 0.04 | 0 |
| 5 | 1 | 500 | 0.002 | 0.06 | 0.0001 | 0.0006 | 0.05 | 0 |
| 6 | 1 | 500 | 0.002 | 0.06 | 0.0001 | 0.0007 | 0.07 | 0 |
| 7 | 1 | 500 | 0.002 | 0.07 | 0.0001 | 0.0008 | 0.08 | 0 |
| 8 | 1 | 500 | 0.002 | 0.07 | 0.0001 | 0.001 | 0.09 | 0 |
| 9 | 1 | 500 | 0.002 | 0.07 | 0.0001 | 0.0011 | 0.11 | 0 |
| 10 | 1 | 500 | 0.002 | 0.08 | 0.0002 | 0.0013 | 0.12 | 0 |
| 11 | 1 | 500 | 0.002 | 0.08 | 0.0002 | 0.0014 | 0.14 | 0 |
| 12 | 1 | 500 | 0.002 | 0.09 | 0.0002 | 0.0016 | 0.16 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **13** | **1** | **500** | **0.002** | **0.09** | **0.0002** | **0.0018** | **0.18** | **0** |
| **14** | **1** | **500** | **0.002** | **0.09** | **0.0002** | **0.002** | **0.19** | **0** |
| **15** | **1** | **500** | **0.002** | **0.10** | **0.0002** | **0.0022** | **0.21** | **0** |
| **16** | **1** | **500** | **0.002** | **0.10** | **0.0002** | **0.0024** | **0.23** | **0** |
| **17** | **1** | **500** | **0.002** | **0.11** | **0.0002** | **0.0026** | **0.26** | **0** |
| **18** | **1** | **500** | **0.002** | **0.11** | **0.0002** | **0.0028** | **0.28** | **0** |
| **19** | **1** | **500** | **0.002** | **0.12** | **0.0002** | **0.0031** | **0.3** | **0** |
| **20** | **1** | **500** | **0.002** | **0.13** | **0.0003** | **0.0033** | **0.33** | **0** |
| **21** | **1** | **500** | **0.002** | **0.13** | **0.0003** | **0.0036** | **0.35** | **0** |
| **22** | **1** | **500** | **0.002** | **0.14** | **0.0003** | **0.0039** | **0.38** | **0** |
| **23** | **1** | **500** | **0.002** | **0.15** | **0.0003** | **0.0041** | **0.41** | **0** |
| **24** | **1** | **500** | **0.002** | **0.15** | **0.0003** | **0.0045** | **0.44** | **0** |
| **25** | **1** | **500** | **0.002** | **0.16** | **0.0003** | **0.0048** | **0.47** | **0** |
| **26** | **1** | **500** | **0.002** | **0.17** | **0.0003** | **0.0051** | **0.51** | **0** |
| **27** | **1** | **500** | **0.002** | **0.18** | **0.0004** | **0.0055** | **0.54** | **0** |
| **28** | **1** | **500** | **0.002** | **0.19** | **0.0004** | **0.0058** | **0.58** | **0** |
| **29** | **1** | **500** | **0.002** | **0.20** | **0.0004** | **0.0062** | **0.62** | **0** |
| **30** | **1** | **500** | **0.002** | **0.21** | **0.0004** | **0.0066** | **0.66** | **0** |

**Source: Table prepared by the researcher.**

Table VI clearly shows substantial discrepancies between the actual market values—calculated as the product of price change and trading volume ratios—and those computed using the traditional method. These discrepancies grow over time, suggesting the traditional index fails to represent true market conditions. In contrast, the researcher's proposed method shows no such deviation, closely tracking the cumulative product of the two ratios and accurately reflecting the market's evolution.

**Table VII.**

**A comparison of the weighted change ratios and corresponding index values according to both approaches, based on the assumption of 50 stocks per transaction/day**

| Trading day | Index value according to the traditional approach | | | Index value according to the proposed approach | | |
|---|---|---|---|---|---|---|
| | Trading one stock of one firm | Trading 50 stocks of one firm | The difference | Trading one stock of one firm | Trading 50 stocks of one firm | The difference |
| **1** | **1010.00** | **1010.00** | **0** | **1000.10** | **1005.00** | **4.90** |
| **2** | **1020.52** | **1020.52** | **0** | **1000.21** | **1010.26** | **10.05** |
| **3** | **1031.52** | **1031.52** | **0** | **1000.32** | **1015.76** | **15.44** |
| **4** | **1043.12** | **1043.12** | **0** | **1000.43** | **1021.56** | **21.13** |
| **5** | **1055.24** | **1055.24** | **0** | **1000.55** | **1027.62** | **27.07** |
| **6** | **1068.00** | **1068.00** | **0** | **1000.68** | **1034.00** | **33.32** |
| **7** | **1081.44** | **1081.44** | **0** | **1000.81** | **1040.72** | **39.91** |
| **8** | **1095.48** | **1095.48** | **0** | **1000.96** | **1047.74** | **46.79** |
| **9** | **1110.28** | **1110.28** | **0** | **1001.10** | **1055.14** | **54.04** |
| **10** | **1125.76** | **1125.76** | **0** | **1001.26** | **1062.88** | **61.62** |
| **11** | **1142.08** | **1142.08** | **0** | **1001.42** | **1071.04** | **69.62** |
| **12** | **1159.16** | **1159.16** | **0** | **1001.59** | **1079.58** | **77.99** |
| **13** | **1177.12** | **1177.12** | **0** | **1001.77** | **1088.56** | **86.79** |
| **14** | **1196.00** | **1196.00** | **0** | **1001.96** | **1098.00** | **96.04** |
| **15** | **1215.80** | **1215.80** | **0** | **1002.16** | **1107.90** | **105.74** |
| **16** | **1236.56** | **1236.56** | **0** | **1002.37** | **1118.28** | **115.91** |
| **17** | **1258.40** | **1258.40** | **0** | **1002.58** | **1129.20** | **126.62** |
| **18** | **1281.32** | **1281.32** | **0** | **1002.81** | **1140.66** | **137.85** |
| **19** | **1305.40** | **1305.40** | **0** | **1003.05** | **1152.70** | **149.65** |
| **20** | **1330.64** | **1330.64** | **0** | **1003.31** | **1165.32** | **162.01** |
| **21** | **1357.20** | **1357.20** | **0** | **1003.57** | **1178.60** | **175.03** |
| **22** | **1385.04** | **1385.04** | **0** | **1003.85** | **1192.52** | **188.67** |
| **23** | **1414.32** | **1414.32** | **0** | **1004.14** | **1207.16** | **203.02** |
| **24** | **1445.00** | **1445.00** | **0** | **1004.45** | **1222.50** | **218.05** |
| **25** | **1477.28** | **1477.28** | **0** | **1004.77** | **1238.64** | **233.87** |
| **26** | **1511.12** | **1511.12** | **0** | **1005.11** | **1255.56** | **250.45** |
| **27** | **1546.68** | **1546.68** | **0** | **1005.47** | **1273.34** | **267.87** |
| **28** | **1584.04** | **1584.04** | **0** | **1005.84** | **1292.02** | **286.18** |
| **29** | **1623.24** | **1623.24** | **0** | **1006.23** | **1311.62** | **305.39** |
| **30** | **1664.40** | **1664.40** | **0** | **1006.64** | **1332.20** | **325.56** |

**Source: Table prepared by the researcher.**

Table VII validates the same conclusion despite the change in trade volume. This consistency confirms the traditional approach's inadequacy and further affirms the accuracy of the researcher's proposed method in capturing the market's true state.

To evaluate each method's sensitivity to changes in trading volume, the researcher compared the index values when trading one share versus 50 shares under both methods. The findings are detailed in Table VIII.

**Table VIII.**

**Testing the sensitivity of each of the two compared approaches to change in the trading volume**

| Trading day | Index value based on the traditional approach | | | Index value based on the proposed approach | | |
|---|---|---|---|---|---|---|
| | Trading one stock of one firm | Trading 50 stocks of one firm | The difference | Trading one stock of one firm | Trading 50 stocks of one firm | The difference |
| 1 | 1010.00 | 1010.00 | 0 | 1000.10 | 1005.00 | 4.90 |
| 2 | 1020.52 | 1020.52 | 0 | 1000.21 | 1010.26 | 10.05 |
| 3 | 1031.52 | 1031.52 | 0 | 1000.32 | 1015.76 | 15.44 |
| 4 | 1043.12 | 1043.12 | 0 | 1000.43 | 1021.56 | 21.13 |
| 5 | 1055.24 | 1055.24 | 0 | 1000.55 | 1027.62 | 27.07 |
| 6 | 1068.00 | 1068.00 | 0 | 1000.68 | 1034.00 | 33.32 |
| 7 | 1081.44 | 1081.44 | 0 | 1000.81 | 1040.72 | 39.91 |
| 8 | 1095.48 | 1095.48 | 0 | 1000.96 | 1047.74 | 46.79 |
| 9 | 1110.28 | 1110.28 | 0 | 1001.10 | 1055.14 | 54.04 |
| 10 | 1125.76 | 1125.76 | 0 | 1001.26 | 1062.88 | 61.62 |
| 11 | 1142.08 | 1142.08 | 0 | 1001.42 | 1071.04 | 69.62 |
| 12 | 1159.16 | 1159.16 | 0 | 1001.59 | 1079.58 | 77.99 |
| 13 | 1177.12 | 1177.12 | 0 | 1001.77 | 1088.56 | 86.79 |
| 14 | 1196.00 | 1196.00 | 0 | 1001.96 | 1098.00 | 96.04 |
| 15 | 1215.80 | 1215.80 | 0 | 1002.16 | 1107.90 | 105.74 |
| 16 | 1236.56 | 1236.56 | 0 | 1002.37 | 1118.28 | 115.91 |
| 17 | 1258.40 | 1258.40 | 0 | 1002.58 | 1129.20 | 126.62 |
| 18 | 1281.32 | 1281.32 | 0 | 1002.81 | 1140.66 | 137.85 |
| 19 | 1305.40 | 1305.40 | 0 | 1003.05 | 1152.70 | 149.65 |
| 20 | 1330.64 | 1330.64 | 0 | 1003.31 | 1165.32 | 162.01 |
| 21 | 1357.20 | 1357.20 | 0 | 1003.57 | 1178.60 | 175.03 |
| 22 | 1385.04 | 1385.04 | 0 | 1003.85 | 1192.52 | 188.67 |
| 23 | 1414.32 | 1414.32 | 0 | 1004.14 | 1207.16 | 203.02 |
| 24 | 1445.00 | 1445.00 | 0 | 1004.45 | 1222.50 | 218.05 |
| 25 | 1477.28 | 1477.28 | 0 | 1004.77 | 1238.64 | 233.87 |
| 26 | 1511.12 | 1511.12 | 0 | 1005.11 | 1255.56 | 250.45 |
| 27 | 1546.68 | 1546.68 | 0 | 1005.47 | 1273.34 | 267.87 |
| 28 | 1584.04 | 1584.04 | 0 | 1005.84 | 1292.02 | 286.18 |
| 29 | 1623.24 | 1623.24 | 0 | 1006.23 | 1311.62 | 305.39 |
| 30 | 1664.40 | 1664.40 | 0 | 1006.64 | 1332.20 | 325.56 |

**Source: Table prepared by the researcher.**

Table VIII reveals that the traditional approach cannot differentiate between trading a single share or 50 shares for one firm within the index. Conversely, the proposed method demonstrates higher sensitivity and a more accurate representation of these differing scenarios. This once again highlights the traditional approach's bias and its lack of precision, which in turn affects the reliability of market predictions and investment decisions based on it.

The approach proposed by the researcher proves to be logical and objective in representing the simulated market scenarios. Therefore, it can be reliably used to calculate the actual market index value and to forecast real market trends with greater accuracy and objectivity.

The initial results were validated by applying them to real markets, specifically the Damascus Securities Exchange and Amman Stock Exchange. Due to the removal of

a firm and its data from the Damascus Stock Exchange (NAMA), the researcher could not recalculate the overall market index and instead focused on sector-specific indicators using both traditional and proposed methodologies. The analysis covered: (1) the Syrian banking sector, (2) the Syrian services sector, (3) the Syrian industrial sector, and (4) the Jordanian banking sector. For each sector, indices and trading rates (the number of stocks traded / the number of total stocks) were calculated for the specified periods, the factor value considered = 1000 points, initial prices of the studied period are considered as base prices (Divisor). with results summarized in the corresponding figures.

First: the Syrian banking sector, which includes 15 banks, the banks whose data were available since the date of the list of the latest banks from them (Baraka) was chosen in 10/11/2014 until 5/12/2024, the Islamic National Bank (NIB) was excluded due to the modernity of its inclusion in the market 26/2/2024.
The number of observations was 2280 observations, the average trading rate during the period was 0.006%.

The following figure III shows a comparison between the daily development of the traditional index and the proposed index, combined with the daily trading rates.

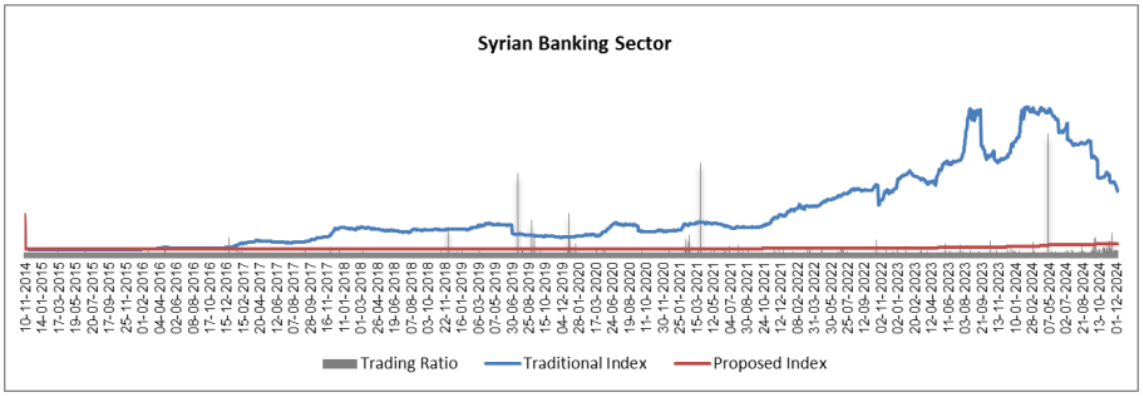


**Figure III.**
**comparative graph illustrating the development of the banking sector index and the trading ratio in the Damascus Securities Exchange during the period (10/11/2014 - 5/12/2024).**
**Source: Figure prepared by the researcher.**

The figure III shows relative stability of the proposed index due to the low trading ratio and consequently a small relative change in the adjusted stock prices used in calculating the index value, while the traditional index values were volatile driven by price changes despite the relatively low level of trading ratio.

Second: the Syrian services sector (1195 observations), which consists of two firms during the period (15/10/2019 - 5/12/2024), the average trading rate during the period was 0.003%.

The following figure IV shows a comparison between the daily development of the traditional index and the proposed index, combined with the daily trading rates.

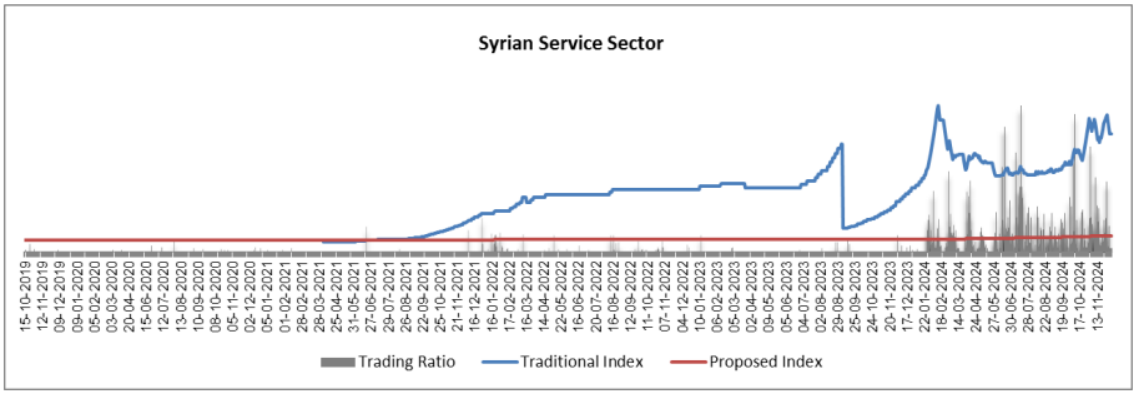


**Figure IV.**
**comparative graph illustrating the development of the service sector index and the trading ratio in the Damascus Securities Exchange during the period (15/10/2019 - 5/12/2024).**
**Source: Figure prepared by the researcher.**

The figure IV also shows relative stability of the proposed index, while the traditional index values were volatile, this due to the same reasons mentioned above.

Third: the Syrian industrial sector (1195 observations), which consists of two firms during the period (15/10/2019 - 5/12/2024), the average trading rate during the period was 0.026%.

The following figure V shows a comparison between the daily development of the traditional index and the proposed index, combined with the daily trading rates.

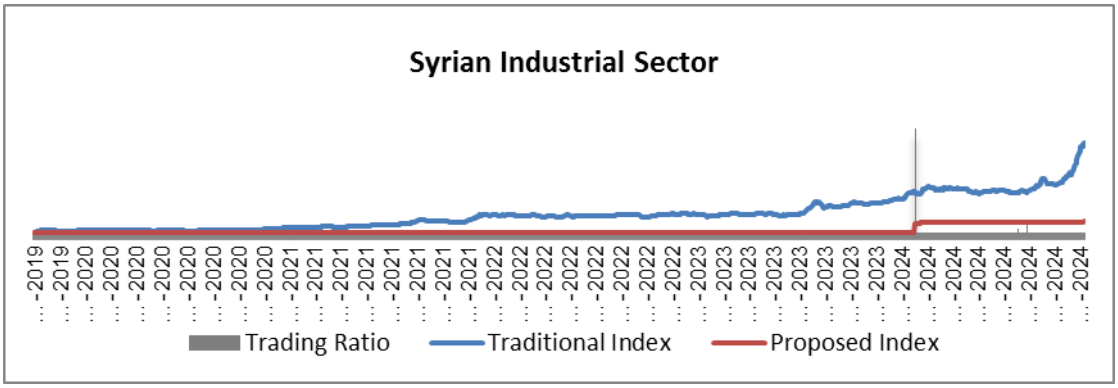


**Figure V.**
**comparative graph illustrating the development of the industrial sector index and the trading ratio in the Damascus Securities Exchange during the period (15/10/2019 - 5/12/2024).**
**Source: Figure prepared by the researcher.**

Figure 5 also shows the same observation as in the previous two figures, where the proposed index was stable and somewhat logical, unlike the traditional index.

Fourth: the Jordanian banking sector (246 observations), which consists of 14 banks listed in Amman Stock Exchange during the period (2/1/2024 - 31/12/2024), the average trading rate during the period was 0.011%.

The following figure VI shows a comparison between the daily development of the traditional index and the proposed index, combined with the daily trading rates.

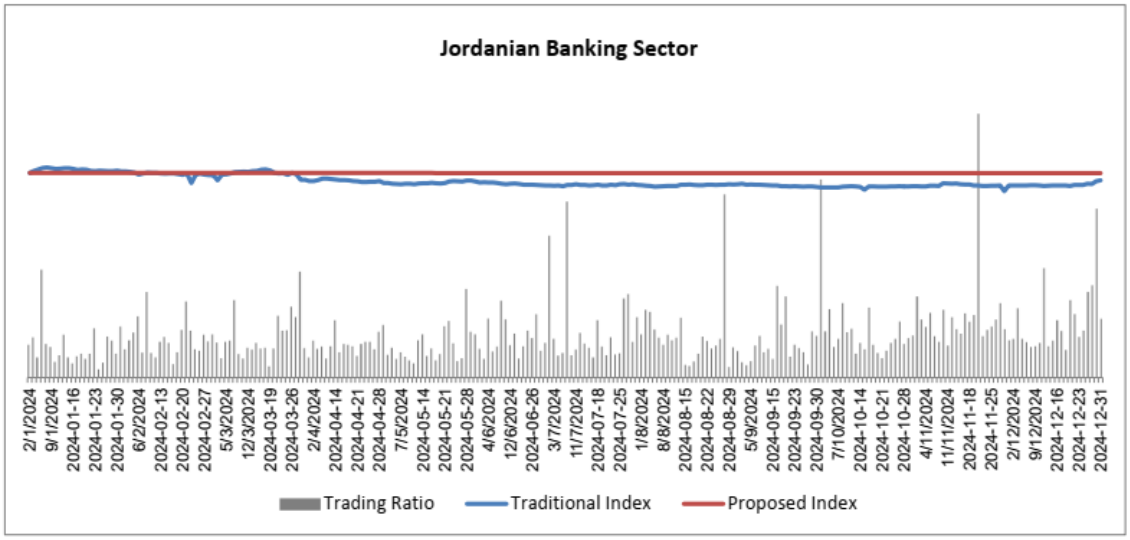


**Figure VI.**
**comparative graph illustrating the development of the banking sector index and the trading ratio in the Amman Stock Exchange during the period (2/1/2024 - 31/12/2024).**
**Source: Figure prepared by the researcher.**

By comparing the graphical representations of market sector indicators calculated using the traditional methodologies currently employed in capital markets with the approach proposed by the researcher, The sensitivity of the proposed index to both the trading rate and the change in selling prices is shown.

This index reveals a clear degree of stability in narrow, shallow, and inefficient markets, the trading rate during the studied periods in the Syrian banking, service and industrial sectors reached (0.006%, 0.003% and 0.026%) respectively, and in the Jordanian banking sector (0.011%). whereas traditional indicators tend to fluctuate and follow established trends influenced by selling rates, regardless of trading volumes. This underscores the effectiveness of the proposed index in accurately reflecting the realities of the stock market it represents.

## **Hypotheses Testing:**

Based on previous studies, simulated scenarios, and comparative analysis, the study confirmed the validity of the first hypothesis H1 stating that there is a direct relationship between stock trading volume and the objective value of the stock market index. It also confirmed the validity of the second hypothesis H2 stating that there is a direct relationship between stock trading prices and the objective value of the stock market index. Consequently, the third hypothesis H3 stating that there is a direct relationship between the adjusted trading prices of trading volume-weighted stocks and the objective value of the stock market index, was also confirmed.

This demonstrates that the objectivity of stock market indices is significantly affected by transaction volume and adjusted transaction prices, which means that ignoring these factors leads to indices that do not represent actual market conditions.

## 13. Conclusions, recommendations, and future researches

### *13.1 Conclusions*

Based on the literature review, analytical findings, and results from hypothesis testing, the researcher reached the following conclusions:

1. A significant difference was observed between the values of market indicators calculated using traditional methodologies and those derived from the proposed approach.
2. The proposed index exhibited stability when prices associated with low trading volumes fluctuated.
3. The proposed index demonstrated stability in response to fluctuations in trading ratios accompanied by slight price fluctuations.
4. The values of stock market indices, their level of objectivity, and their ability to accurately reflect the actual state of the relevant markets are significantly influenced by the methodologies used in their calculation.
5. Stock market indices demonstrate greater objectivity and improved representation of actual market conditions when trading volume is incorporated as a key variable in their computation.
6. The use of the average stock price rather than the traditional closing price as a primary input in index calculation enhances the objectivity and accuracy of the indices in reflecting real market dynamics.

### *13.2 Recommendations*

To enhance the accuracy of market indicator calculations, it is essential to consider the following:

1. Do not overlook trading rates when calculating market indicator values.
2. Adjust market share prices with each transaction according to the proposed mechanism to determine the average price from the last daily trade in the market.
3. Adopt the calculation method proposed in this study, which integrates trading volume and transaction price, to improve the accuracy, objectivity, and logical coherence of stock market indices in representing actual market conditions.
4. Replace the traditional reliance on the closing price with the researcher's method of calculating the weighted average trading price of a stock, thereby enhancing the reliability and representational quality of market indices.
5. Adjust the published market data, particularly capitalization values (CAP) based on the adjusted price value in order to express the true market values of companies.

### *13.3 Future research*

Future research should focus on reapplying the proposed methodology to markets that may experience extreme and sharp fluctuations to assess its capability to identify such scenarios, and it should explore the development of stock market indices using artificial intelligence techniques.

Such research should aim to identify the most effective and objective methods for index calculation, thereby improving the indices' ability to reflect market realities with greater precision.

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