Arab American University

Faculty of Graduate Studies

Department of Administrative & Financial Sciences

Master Program in Accounting & Auditing

Comparative Analysis of Profit Forecasting Models for Companies Listed on the Palestine Exchange in the Insurance Sector.

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This Thesis Was Submitted in Partial Fulfillment of the Requirements for the Master Degree in Accounting and Auditing.

Palestine, 7/2025

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Thesis Approval

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Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my work and has not been submitted for any other degree at the Arab American University or any other institution.

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Date of Submitting the Final Version of the Thesis: 4.7.2025

Acknowledgments

I wish to begin by giving my thanks to God Almighty for

Guidance and assistance when completing the thesis

To the memory of my father, I devote this modest effort

Dedicated to my loving father, who has been my first pillar in all my actions in life.

To the apple of my eyes and my shelter at all times, to the one who knows me without

I tell a word, my good mother, God be with her

To the people who partook of the milk of my mother and helped my parents, brothers and sisters

To the Arab American University any further assistance and tolerance.

And naturally I am much indebted to my supervisor, Dr. Othman Sawafta in value

Advice, help and patience all the time. I would also appreciate to appreciate the members

Administrative sciences, financial sciences

My huge thanks to the members of the jury to their marvelous consultations.

I should also like to mention all my friends and others, who gave me advice, support and encouragement

I must go on.

Comparative analysis of profit forecasting Models for companies listed on the Palestine Exchange in the insurance sector.

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Abstract

In the present thesis, the author has defined an objective, namely, to test the profit forecasting models of eight insurance companies listed on the Palestine Stock Exchange in the period between 2013 and 2023.It is with a view to four statistical models: the random walk model, the arithmetic mean model, the weighted average model, and the modified trend model. These models were scaled according to the lowest selection rules, i.e., the mean absolute error of the model, the root mean square, mean absolute error ratio, and coefficient of determination to obtain the most appropriate model that can be applied in servicing insurance industry.

As the results of the experimental analysis show, the modified trend model was the most efficient of all the companies considered since it produced the lowest percent of error in predictive forecasting and the most effective determination factor value. The weighted average model came second and was characterized by its rapid response to movements in the values of earnings. The mean arithmetic model demonstrated average accuracy rate in the absolute error rate and the coefficient of determination. The random walk model produces the lowest estimate of the absolute error rate and coefficient of determination, since, like no other of these, it cannot determine any trend or structure in the data.

The results affirm the existence of a deterministic structure and cyclicality of earnings behavior by Palestinian insurance companies. They emphasize the importance of selecting the right models to predict this behavior, owing to the real peculiarities of the financial statements. The scholar implies that the modified trend model may serve as a proactive tool of financial planning and strategy in that industry.

Keywords: Palestine Stock Exchange, Random Walk Model, Moving Average, Weighted Moving Average, Trend Analysis.

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List of Definitions of Abbreviations

Abbreviations	Title
PEX	Palestine Exchange
NIC	National Insurance Company
MIC	Al Mashreq Insurance Company
PICO	Palestine Insurance Company
TIC	Al-Takaful Palestinian Insurance
TPIC	Tamkeen Palestinian Insurance
TRUST	Trust International Insurance
GUIC	Global United Insurance
AIC	Ahlia insurance
PCBS	Palestinian Central Bureau of Statistics
PIF	Palestinian Insurance Federation
ICC	Insurance Control Commission

Chapter One: Introduction and Background

1.1Introduction:

One of the foundations that companies generally have for future forecasts is the choice of which model is best for-profit prediction for companies listed in the profit forecasting models.

Organizations need correct profit projections to create essential business forecasting models that assess company value today and into the future. Profit prediction involves multiple components, including industrial inspection and market examination, together with managerial planning techniques. The business management process heavily relies on forecasting to make decisions. (Ala 'a & Saud, 2017).

Profit forecasting models have developed over time, with different strengths and weaknesses. The paper evaluates important models by comparing new empirical research findings. Empirical research combined with theoretical analysis helps establish a foundational understanding regarding the effectiveness and practicality of prediction methods.

Earnings forecasts play an important role for any organization or company as they allow for making adjustments and making decisions about the organization's functioning and development. There are many models to predict profits in the literature; authors use statistical methods, known as machine learning algorithms, and even simple ones. Nonetheless, the decision on which model to use rests on some elements of the business and data availability, and forecasting horizon. In this comparative study, efforts and attempts will be made to compare the performances of several profit prediction models, as informed by previous studies in the financial literature and empirical investigations. (Preussner & Aschauer,2022)

Ways to Predict Future Profits: Profit forecasting may be done through random walk, Moving Average (MA), Weighted Moving Average, and trend analysis, among others.

A random walk, in probability theory, is a process that is useful in identifying the best position of a point when it has been randomly displaced depending on the probability (same with each advance) of traveling a given distance in any given direction. Markov processes are of a particular type in which the future behavior is independent of history, and random walks are one of the main examples of them. (Osler & Wright, 2021)

Moving Average (MA) in finance, or Moving Average or MA, is a stock indicator used in the technical analysis of stocks. Therefore, the moving average of a stock makes the price data less volatile because there exists an averaging value of price that is constantly updating. (Schaffer et al., 2021)

The Weighted Moving Average calculates current values using importance weights that ensure higher response speed than Simple Moving Average methods. The technique computes the WMA by multiplying each data point by a weighting factor, which results in effective price change monitoring. (Tarvainen & Valpola, 2017).

Trend analysis models analyze temporal data sequences by evaluating patterns and sequences of both long-term patterns alongside cyclic patterns and seasonal effects. WMO ES and ARIMA represent three established data analysis techniques that interact with historical information in specific ways. The combination of Moving Averages provides smoothed data, while Exponential Smoothing presents recent data trends alongside ARIMA, which collects autoregressive and moving average trends to assess wider patterns. Financial institutions, economic entities, and companies that forecast demand commonly employ them as analytical models. (Box, Jenkins, & Reinsel, 2015).

Estimation and forecasting of revenues are significant in detecting the current status and the future capacity of a business. It plays a crucial role in an organization, especially in the analysis of growth dimensions, identification of threats, evaluation of worth, and investment decisions. Hence, for a particular company, there are several ways of forecasting future profits, and the analyst should choose one based on industry type, competition, and the management’s plans. (Ala 'a & Saud ,2017).

Insurance companies represent a core component of Palestinian financial infrastructure since they are listed on the Palestine Stock Exchange market PEX. The delivery of health and life insurance alongside property coverage contributes to economic stability through these companies. The insurance sector faces challenges from political instability and small market size yet all organizations strive to develop business solutions between human needs and corporate demands. Through the PEX such companies gain access to capital while domestic and international investors participate in insurance industry advancement. This research analyzes how exchange rates and economic conditions with investors’ feelings and regulatory measures affect Palestine's insurance

share market performance which subsequently impacts its economic development and exchange market performance. (Al-Qudah, 2022).

The importance of this research is in comparing all approaches to the determination of profits and testing them against the actual profits of associated insurance companies in the Palestinian financial market for 2013-2023. The purpose of this research is to enhance knowledge of accounting information and assist users of profit prediction models in the decision-making process. It is a small work within the available skills of the researcher. That is why it presents the first investigation of the matter applicable to companies in the Palestinian financial market, the insurance sector.

1.2 The study problems:

The Palestinian insurance sector encountered diverse sets of structural and economic issues that limit its expansion and stability, including: limited market size, non-technical competitors, and an excessive number of companies about the real market capacity, which adversely affected the profitability of the companies and their competitiveness. Here, future profit projection must become a vital strategic instrument in aiding decision-making, fostering financial stability, and informing investments effectively.

Financial forecasting is among the most intricate activities within the business environment because organizations use it in risk calculation, resource allocation, and evaluation of performance results. The absence of effective predictive tools exposes the decision maker to decision-making founded on unreliable estimates, which can cause operational and financial losses that can impact the sustainability and reputation of the organization. (Preussner& Aschauer, 2022).

Although this topic is of critical importance, the Palestinian market is yet lacking applied scientific research specialized in this area of work profit anticipation through the use of quantitative models, particularly in the insurance field. The knowledge gap, which this study is intended to address, could be seen here; in that the study will test 4 statistical models (random traffic model, arithmetic average, weighted average, and adjusted trend) in an attempt to conclude on their accuracy and efficiency in forecasting the profits of insurance companies listed on LSE Palestine between 2013 and 2023.

The outcomes of this paper will offer substantial knowledge addition, which will assist the decision-makers in this sector to select the most suitable model, which can lead to correct predictions, thereby assisting in enhancing financial planning, response to competitive challenges, and overall performance of insurance companies in Palestine. **Palestine Exchange.** (2021).

This study's main issue arises from asking the following fundamental question:

What Comparative analysis of profit forecasting Models for companies listed on the Palestine Exchange (PEX)- the insurance sector?

1.3 The study Question:

Sub-question:

1. Which profit prediction model provides the most accurate results for insurance companies listed on the Palestinian Exchange?
2. How effective are the Random Walk, Moving Average, Weighted Moving Average, and Trend Analysis forecasting models?
3. What are the key factors influencing the accuracy of profit predictions in the Palestinian insurance sector?
4. What factors contribute to the variations in the effectiveness of existing profit prediction models in the Palestinian insurance market, considering industry-specific characteristics?
5. To what extent are decision-makers knowledgeable about the various profit prediction models available in the market?

1.4 Objectives of this study:

1. Determine which profit forecasting model is correct for Palestine Stock Exchange-listed insurance companies.
2. Analyzing the performance of prediction tools, starting with mobile randomness up to trend analysis and including moving average and likely moving average methods.
3. This research explores what influences profit prediction accuracy in Palestinian insurance companies.
4. This study analyzes variables influencing the accuracy levels of present profit forecasting models across the Palestinian insurance industry.

5. Observers should evaluate how well market profit forecasting models reach decision-makers who work in the insurance industry.

1.5 Model of study:

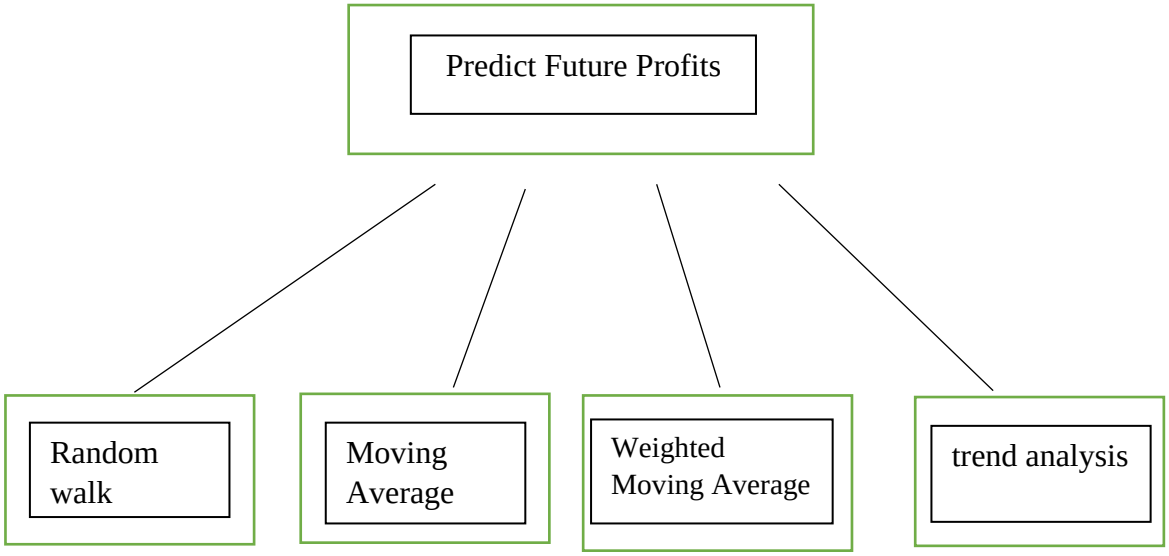

Figure (1.1): Research Variables

1.6 Theoretical &Practical Significance of Study:

This study aims to increase the knowledge of accounting information and offer additional assistance to users of financial statements in their decision-making process regarding economic decisions. Therefore, this study is a humble attempt in this line of research. Based on the scope of this researcher's knowledge, this study is the first of its kind to develop a comparison between the models employed for accounting profits by applying them to insurance companies registered in the Palestinian market. securities.

Profit forecasting is important because such profits are important to companies in as far as they help in the maximization of the company's market value. This, in turn, implies that they will be able to increase the price of their shares as a way of boosting their profits. Cash is an essential element for companies in which profits are the main source of cash flows. The forecasting process is also very important for the users of the financial statements by articulating the company's

revenue power, profitability, and future cash flows adequate for the sustenance of the business and the discharge of its obligations, as well as Managing emergencies. (Sirisha et al.,2022).

1.7 Hypotheses:

H1: There is a significant difference in the accuracy of profit predictions made by the Random Walk, Moving Average, Weighted Moving Average, and Trend Analysis models for insurance companies listed on the Palestine Exchange.

H2: The Random Walk, Moving Average, Weighted Moving Average, and Trend Analysis forecasting models exhibit varying levels of effectiveness when applied to Palestinian insurance companies, with some models yielding more accurate predictions than others.

H3: Key factors such as market volatility, economic indicators, and company-specific characteristics influence the accuracy of profit predictions for insurance companies listed on the Palestine Exchange.

H4: Industry-specific characteristics, such as regulatory environment, market maturity, and economic conditions, contribute to the variations in the effectiveness of profit prediction models in the Palestinian insurance sector.

H5: Decision-makers in the Palestinian insurance sector have a limited level of knowledge regarding the different profit prediction models available in the market, potentially impacting the effectiveness of profit forecasting practices.

1.8 Research Justifications:

Informed Decision-Making: This helps firms to have an idea of how they are going to perform financially in the future. This enables the formulation of sound decisions as per to section of the business involving budget, resources, prices, and the mode of expansion. (Nuno& Ferreira, 2015).

Action Planning on Financial Control: Budgeting and financial planning. Budgeting begins with forecasts of income and this explains why managers need to get it right. They assist in the rational utilization of resources, guiding as to where to spend, and how to ensure that one has sufficient capital to work and expand. (Carter & Tate, 2021).

Performance Control: Forecasts of revenues are used as a control by comparing actual results with expected figures in compliance with the goals set. In broad terms, the method compares the

real outcomes of business activities to the theoretical values and allows for the evaluation and correction of observed discrepancies. (Anderson & Black, 2019).

Risk Management: Assists in the assessment of risk and uncertainty that may be possible in a venture. Using the range of possible outcomes, one can design some strategies that may help avoid certain unfavorable outcomes that can interfere with a company's sound fiscal performance. (Barney & Hesterly, 2021)

Customer Relationship Management: Understanding the likely revenue from current and potential clients enables firms to develop their customer relationship strategies. It helps enhance customer acquisition expenditure and nourish valuable customers. (Churn, 2019).

Strategic Growth Planning: Through income and future estimates, the long-run strategic management is addressed. Product management also helps in decisions on product development, and utilization of market growth strategies since it focuses on rewarding developments with the greatest probable revenues. (Huang& Liang,2016)

1.9 Definition of Terms :

This thesis contains many concepts, which are defined as follows:

Profit Forecasting: means the procedure of determining the expected future profitability of a business, project, or investment, taking into account certain assumptive and financial factors. It is a convenient technique applied by various organizations, stockholders, and analytical tools to predict future operations, scrutinize risks, and measure the profitability of numerous strategies. Forecasts of profit you plan to achieve are made about records of the company, trends in the market, costs, and expected revenues. (Doe& Smith,2020).

Profit Forecasting Models: Time series models are statistical techniques that use historical data to predict future outcomes. In profit forecasting, these models analyze past profit data over time to identify patterns, trends, and seasonal effects, which can be used to predict future profits. (Hyndman & Athanasopoulos,2018).

Palestine Exchange(PEX): PEX stands for Palestine Exchange, and it is a market where shares and other financial securities, such as equity and bonds, among others, are traded. The exchange is overseen, controlled, and supervised by the Palestine Capital Market Authority (PCMA). Due

to its importance in mobilizing both savings and investment and acting as an exchange for corporate finance, PEX is essential in structuring Palestine's capital markets. It also creates liquid and transparent markets for financial operations. **Palestine Exchange.** (2021).

Random Walk: is a term used to describe a process in terms of a sequence of steps that has a random character, with subsequent steps depending only on the current vs previous state (Markov process). The process can be best described as a "drunkard's walk' whereby the figure is to move in whatever direction it wishes without regard to where it is in the process of going after each move is made randomly. (Gardiner,2004).

Moving Average (MA): is a statistical calculation commonly used in time series analysis to smooth out short-term fluctuations and highlight long-term trends or cycles. It is one of the most widely used tools in technical analysis, particularly in finance, for identifying trends in stock prices, economic data, or any other series of data points over time. (Brock & Lakonishok, 2011).

Weighted Moving Average: is an averaging technique where a certain number of values of a time series are averaged with set weights assigned to the values so that more importance is given to the recent value. Thus, WMA is used to filter out noise, detect patterns, and make predictions in signal processing and analysis. Different from the SMA, the weights of each observation in a WMA are not the same, and to compute it, the data points would be multiplied by the weights and then summed. (Kang& Kim,2018).

Trend Analysis: is a process of assessing data throughout a certain period for purposes of making pattern or trend determinations. In disciplines like business, economics, finance, and social sciences, trend analysis can be applied when predicting the future based on historical experience. It requires the analysis of patterns in a data set to identify long-term trends, changes, or cyclical patterns to enable the analyst to decide on the next course of action. (Smith& Brown, 2021).

Chapter Two: Literature Review

2.1 Introduction:

An overview of theoretical frameworks for financial market analysis follows, including their application to Palestinian Stock Exchange (PEX) market behavior and profit trends. This investigation delves into examining performance for profit forecasting by studying random walking and moving averages (MA) and weighted moving averages with trend analysis. This study explores the Palestinian Stock Exchange insurance sector by applying these stochastic models to the profiling and forecasting profits in this concrete market context. This section examines relevant research about profit forecasting methodology and market efficiency and summarizes existing findings regarding both concepts. (Abu-Rumman et al., 2021).

Financial models of Random Walk Hypothesis (RWH) and Moving Averages (MA) and Weighted Moving Averages (WMA) and trend analysis power the predictive mechanism for stock prices and profits within the insurance sector of Palestine Stock Exchange (PEX). Stock prices exhibit unpredictable random behavior according to Fama's (1965) Random Walk Hypothesis, so existing market information already exists within prices, thus making future price movements inaccessible to predictions. The Random Walk Hypothesis continues to face debate in emerging markets, including PEX, according to Al-Khazali et al. (2020), who studied sector-specific insurance industry random price behavior, which showed inconsistent results. Moving averages implemented as Simple Moving Averages (SMA) and Weighted Moving Averages (WMA) popularly serve to remove price volatility while identifying trends before generating profit projection data. The price forecasting abilities of SMA average across time yet WMA provides greater weight to recent prices which helps analysts better predict opportunities for profit increase especially in markets with volatility. Hussain et al. (2021)

demonstrated the effectiveness of these methods in forecasting stock prices in emerging markets, suggesting their applicability in forecasting profitability in the insurance sector. Furthermore, trend analysis, which involves identifying patterns and forecasting future market m……movements based on past data, is critical in predicting stock price behavior and profits. Techniques such as moving averages and trendlines are commonly employed, and studies like those by Said et al. (2022) have shown that trend analysis can be a valuable tool in developing markets like Palestine. These methods help identify stock price trends, which are crucial for predicting profits in sectors

like insurance, where both macroeconomic factors and sector-specific dynamics influence market fluctuations. By reviewing these techniques, this section will explore how they are applied to forecasting profits for insurance companies listed on the PEX, addressing their strengths, limitations, and relevance in Palestine's unique market conditions.

Although tiny compared to worldwide stock exchanges the Palestine Stock Exchange makes up a substantial share of Palestine's financial industry. The insurance sector which combines different insurance providers delivering life and non-life coverage products shows distinct financial variables that influence stock market actions. Abu Ruman et al. (2021) analyzed PEX insurance sector performance through an exploration of macroeconomic factors together with market volatility and investor behaviors. The research findings of these studies show that Palestine's insurance industry displays distinct sensitivities to political variables along with economic factors that influence profit performance in particular ways. This chapter will explore financial model applications used to analyze insurance sector profits alongside discussions from the preceding sections which help compose a more intricate understanding of Palestinian insurance market dynamics. (Abu Ruman et al. ,2021)

The last section combines key findings from scholarly works to identify existing research gaps and develops the conceptual framework for this study. This research utilizes the random walk hypothesis combined with moving averages moving average crossovers and trend analysis to study insurance companies on the Palestine Securities market with the purpose of delivering valuable insights into market efficiency and future profit predictions of emerging markets. (Said et al.,2022).

2.2 Interpretation of variables study:

The forecasting of profits heavily depends on statistical evaluation using Random Walk combined with Moving Average (MA) and Weighted Moving Average (WMA), and trend analysis methods for past data pattern analysis. As a benchmark for related analysis, Fama (1970) showed that stock prices, along with profit margins, tend to follow unpredictable patterns according to the Random Walk model despite its reduced forecasting capabilities. Moving Averages (MA) utilize multiple periods to smooth out price variations, thereby revealing profit patterns, yet they operate with delays (Harris, 2015). The implementation of Weighted Moving Averages (WMA) addresses basic MA weaknesses by increasing the significance of fresh data points to achieve superior profit

prediction responsiveness in current market environments (Shumway & Stoffer, 2017). In trend analysis, researchers identify ongoing patterns in historical data to build forecast models for profit predictions if historical trends remain consistent (Makridakis, Wheelwright, & Hyndman, 1998). These techniques supply different approaches to predicting profits that collectively build an enhanced framework for understanding potential outcomes.

2.2.1 Random Walk:

Stock prices move in unpredictable ways according to the Random Walk Theory (RWT) because prices create a random path, as per Lo (2022). RWT suggests financial markets display high efficiency through price integration since all important market information shapes current valuations (Malkiel, 2023), which leads to random unpredictability in future price fluctuations (Malkiel, 2023). RWT claims that new unexpected information triggers price adjustments, leading to unpredictable price variations that behave in a completely random fashion. Recent research demonstrates that market predictions built on historical data alone cannot deliver persistent market outperformance based on RWT theories.(Hiba,2021)

The main strength of the Random Walk Theory is associated with the Efficient Market Hypothesis (EMH) by proving that immediate stock price updates negate excessive potential profits based on market prediction data (Fama, 2021). RWT recommends diversification because stock movement predictions prove ineffective, so investors must spread their money across multiple asset types. The Random Walk analysis faces multiple major limitations among investors. According to Shiller (2015), the approach cannot consider price effects from market anomalies and investor conduct as well as systemic threats that might not materialize swiftly in market indices. Modern research published by Jiang and Zhang (2020) disputes random investment behavior by demonstrating how investors can take advantage of enduring trends and patterns, particularly in markets that function less efficiently.

An arrow analysis of historical stock price data for predicting future profits demonstrates an inability to produce consistent forecasting outcomes according to the Random Walk Theory. The market-timing struggle leads investors to adopt asset allocation strategies and diversification approaches alongside their investment timelines according to Lo (2022). The ongoing development of machine learning techniques along with analysis methods based on alternative

data suggests the possibility of undiscovered subtle patterns which question the prevailing assumption of calendar random forecasting (Jiang & Zhang, 2020). Investors could adapt their profit prediction methods moving forward because of this developing viewpoint.

2.2.2 Moving Averages (MA):

The financial market depends heavily on Moving Averages (MA) which eliminate price volatility across set time frames to detect distinct market patterns. A moving average calculation sorts price data from an asset into multiple periods so it can use simple (SMA) or exponential (EMA) averaging methods but these methods provide different amounts of value to new data points (Papanicolaou & Vasilenko, 2022). Moving averages are mainly designed to assist traders in detecting market patterns along with revealing disruptive areas. Simple moving averages distribute constant value weight across all periods but exponential moving averages prioritize newer periods' data points creating responsive behavior to price changes (Kim, 2023).

Moving averages provide users with two key strengths: they communicate market directions clearly while filtering out periodic price instabilities. The use of moving averages functions to quiet market noise, allowing traders to concentrate on true trends as opposed to small price shifts (Boucher & Dufresne, 2021). atelic indicators achieve market-wide recognition and frequent usage among traders, thus they become actual market predictions in practice. Relying exclusively on moving averages produces essential drawbacks in forecasting. Moving average indicators function as lagging indicators that show historical price data, so they fail to deliver timely alerts in markets that demonstrate rapid changes or volatility escalation (Nguyen & Zhang, 2023). Moving averages frequently give misleading signals when market price movement remains directionless in sideways or choppy conditions, therefore reducing the predictive accuracy of trades and potentially causing financial loss (Papanicolaou & Vasilenko, 2022).

Moving averages reveal market direction trends when predicting profits, yet they do not provide absolute forecasts for future price changes. Fields investors can enhance their decision-making using moving averages in combination with these analysis tools, which help them make better investment decisions (Boucher & Dufresne, 2021). The reliance on moving averages tends to be risky for-profit forecasting given their inability to foresee sharp market modifications triggered by economic events, together with changes in market public sentiment (Kim, 2023). Studies

demonstrate how combining moving averages with machine learning algorithms creates improved predictive capabilities that achieve better market adaptability (Nguyen & Zhang, 2023). Moving averages continue as a common tool in profit prediction, yet proper caution demands their use along with different analytical methods.

2.2.3 Weighted Moving Averages (WMA):

Weighted Moving Averages (WMA) stand as a financial analysis moving average that applies greater weighting to newer data points beyond older ones. Among moving average methods, the simple moving average (SMA) distributes the same weight across all periods while the Weighted Moving Average (WMA) gives data point weights based on linear or exponential distribution with the newest points receiving the most significance according to Feng (2022). The WMA approach fuels market analysis by emphasizing recent price activity which allows users to react quickly to market shifts above standard simple average analysis. The Weight Moving Average calculation requires a process where data points receive predetermined weight values followed by averaging steps that show recent trends while reducing past volatility (Liu & Zhang, 2023).

Weighted Moving Averages demonstrate superior potential because they recreate market trends more accurately especially in situations where recent price movements hold greater value than past market data (Wang & Zhou, 2023). Weighted Moving Average provides faster trend detection thanks to recent data prioritized assignment thereby limiting the delays present in classical moving averages. The Weighted Moving Average adaptation enables users to customize it for distinct market needs or asset types which provides adjustability in its implementation. The WMA method comes with a few downsides during operations. The main barrier to using a Weighted Moving Average is its dependence on historical data which can keep it from quickly identifying sudden market shifts or reacting properly to unexpected external incidents (Feng, 2022). The process of weight calculations remains subjective because choosing methodology becomes crucial to achieving accurate modeling while avoiding model overfitting and signal distortion (Liu & Zhang, 2023).

By improving forecasting accuracy through trend analysis, the WMA helps investors readjust their strategies using the most recent market movements. For rapid market transformations, the WMA demonstrates value because it supports short-term profit predictions (Wang & Zhou 2023). WMA

provides an enhanced ability to track recent market trends nevertheless historic price data usage prevents it from effectively adapting to unexpected market fluctuations or swings in investor sentiment levels (Liu & Zhang, 2023). Data science research shows that when WMA combines with momentum indicators and machine learning algorithms it produces enhanced precision in profit predictions which builds a comprehensive approach to interpreting market direction (Feng, 2022). WMA provides significant market trends but employing multiple analytical approaches allows the reduction of associated risks throughout its implementation.

2.2.4 Trend analysis:

Financial analysis using trend analysis reveals persistent shifts in specific measurement variables of stocks and earnings along with market index movements across different periods. The analysis of historical data by this technique enables analysts to identify positive and negative or stable trends that form the basis for future market movement predictions (Harrison & Clark, 2023). Trend analysis operates within different timescales from short-term patterns to long-term market movement changes using analysis tools that include moving averages, chart patterns, and regression analysis (Huang & Li, 2022). Trend analysis strives to identify market condition directions that help investors make better investment decisions through their strategies.

According to Wang & Brown (2023), trend analysis simplifies complex data while revealing latent patterns thereby helping traders and investors identify potential risks together with opportunities. People who perform trend analysis identify existing market directions to develop investment strategies that boost their chances of achieving profitability. The implementation of trend analysis results in a versatile method that operates effectively across different investment categories and market environments. base name trend analysis fails to maintain accurate predictions because it counts on existing patterns to repeat into the future undeterred by marketplace volatility and developments. During periods of unexpected market changes alongside uncertain times trend analysis generates unreliable signals that may result in interpretation distortions (Harrison & Clark, 2023). The methodology requires careful selection of the observation period because short-data trends might diverge significantly from patterns discovered through longer-term studies (Huang & Li, 2022).

The analysis of market trends enables investors to predict future movements exactly allowing them to base their decisions on anticipated price and financial data changes (Wang & Brown, 2023). A medium- and long-term outlook for profits is enabled by this method, which provides investors with an improved understanding of market trends. Despite its ability to enhance accuracy in predicting profits through historical analysis patterns, trend models remain imperfect because unexpected marketplace variability, as well as unfamiliar data points, will negatively impact performance. Recent research demonstrates how integrating trend analysis with machine learning algorithms and sentiment analysis improves forecasting strength when operating in dynamic markets (Huang & Li, 2022). Profit prediction benefits from trend analysis yet requires cautious application when used independently because additional analytical methods will yield optimized results.

2.3 The Palestine Stock Exchange & Insurance Sector:

As an emerging market segment, the Palestinian financial market functions as a fundamental driver of economic development within Palestine. Stock and security trading occurs on the main trading platform of the Palestinian Stock Exchange (PEX), which was established in 1997. Although smaller than well-established markets, the Palestinian Exchange (PEX) has significantly expanded to become an active financial instrument trade platform (Haddad & Fattah, 2022). Through its facilitative function, the market promotes investment to facilitate capital formation within the Palestinian economy by enhancing liquidity alongside financing options for businesses.

2.3.1 The Palestine Stock Exchange:

The Palestinian financial market operates while facing multiple obstacles that prevent it from reaching its maximum potential. The current political instability and economic uncertainty within Palestinian financial markets produce high levels of risk, which negatively affect investor confidence levels (Al-Qudah & Sulieman, 2023). The Palestinian financial market struggles to connect with global markets because of two main obstacles: Israeli occupation and limited financial institution governance during times of occupation. This fragmentation makes market integration challenging (Abu-Rub and Sulaiman, 2021). The Palestinian financial market experiences constraints from restricted international capital market connections and its small pool of investors, creating new development barriers.

Despite facing multiple barriers, development efforts exist to present a modernized Palestinian financial system. Recent reforms seek to increase market clarity while developing stronger regulations and enhancing available investment options for investors, according to Haddad & Fattah (2022). The Palestinian Authority takes action through various initiatives to develop its legal infrastructure and institutional structures to attract more investors domestically and internationally. Research shows that the Palestinian financial market's growth potential becomes stronger when the market builds stability within its regulatory framework alongside improved global financial system integration (Al-Qudah & Sulieman, 2023).

Although Palestinian financial markets encounter multiple fundamental challenges, they still present substantial development potential through ongoing government reforms and global industry development. A robust financial market development would benefit Palestine's economic growth by giving businesses better financing opportunities within an investor-friendly economic system.

Five major sectors organize all listed companies on the Palestine Stock Exchange. The data from 2023 shows that the total number of listed companies amounted to 49. Available statistics indicate that the Palestine Stock Exchange consists of five principal business sectors as represented in the following approximate distribution:

The five major economic sectors that comprise the Palestine Exchange (PEX) include:

1. Banks, together with financial institutions, form part of this sector, which provides banking and financial services.
2. Insurance represents a sector where different insurance products are provided by companies.
3. The corporate sector of Investment involves companies implementing projects in multiple areas.
4. The industry sector includes manufacturing enterprises producing diverse items throughout their production facilities.
5. Service companies provide multiple services to the community.

The stock of these market-listed entities is distributed between two currencies: the Jordanian Dinar and the U.S. dollar. Eight brokerage firms holding licenses serve investors through order execution

services that include trades between buying and selling. Four local banks function as authorized custodians that safeguard overseas investor securities through their management services.

The official PEX website contains a comprehensive list of all companies that are currently listed on the Palestine Exchange.

Academic studies regarding Palestine Exchange sectors are conducted by the Palestine Economic Policy Research Institute (MAS) through detailed investigations within multiple Palestinian economic sectors.

Table (2.1): Sectors of PEX

Sectors	Percentage (%)	Number of companies per sector
Banks and financial services	60	8
Insurance Sector	10	8
Investment Sector	15	12
Industry Sector	10	11
Services Sector	5	9

Source: Palestine Exchange. (2023).

Recent statistical data indicates that insurance makes up 8-10% of the Palestinian financial realm (Al-Araj & Abu-Libdeh, 2022) through its two subcategories, including general insurance and life insurance. The five major economic sectors that comprise the Palestine Exchange (PEX) include: Banks, Insurance, Investment, Industry, and Services.

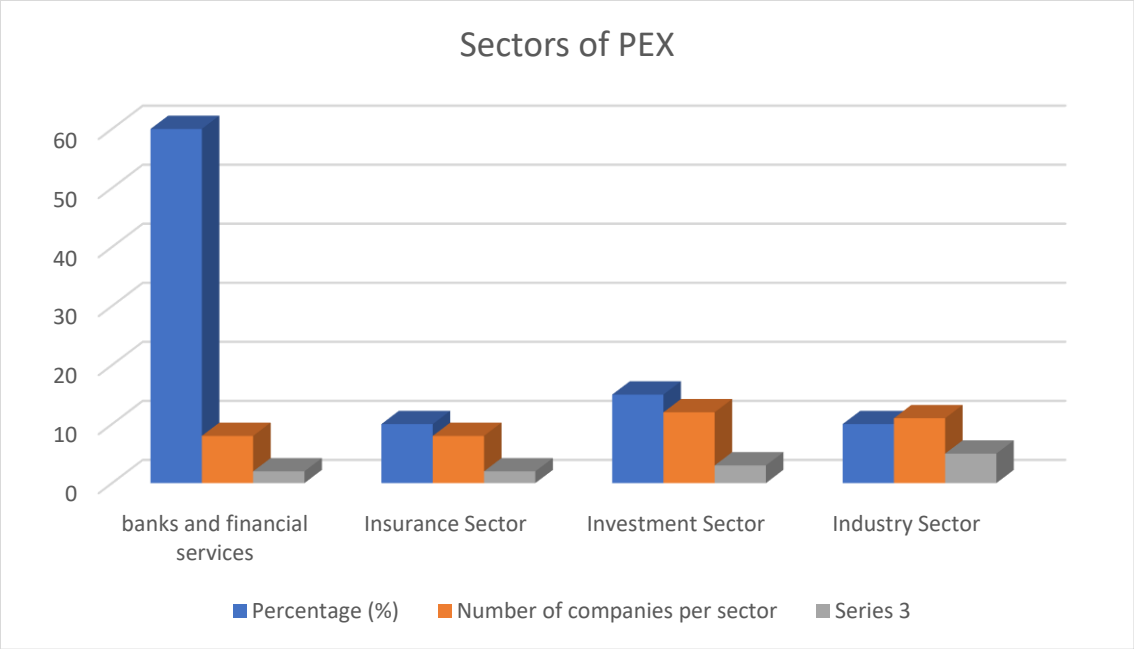

Figure (2.1): Sectors of PEX

2.3.2 Insurance Sector:

The Palestinian insurance market establishes one fundamental component of the nation's financial structure, developing various protecting products for business operations and private individuals. The Palestinian insurance framework contains insurance solutions that extend from life insurance coverage through health insurance provision and property insurance to automobile insurance. The Palestinian Monetary Authority acts as the regulatory authority while focused on maintaining stability alongside industry transparency and business development. During the last twenty years, the Palestinian insurance market sustained gradual expansion despite facing political and economic obstacles. Palestine Exchange. (2022).

The latest industry data suggests the Palestinian insurance market has increased steadily from a relatively tiny starting base in the broader financial services sector. Health insurance demand has increased because people better understand healthcare requisites, while life insurance continues evolving to serve older populations. Insurance demand becomes stronger because of swelling private automobile ownership, especially in the automotive market. Palestine Exchange. (2023).

As of 2023, the Palestinian insurance market comprises several key companies. Here's an overview of their market shares based on available data:

The insurance sector in Palestine encounters various difficulties because of unstable political situations and economic conditions that negatively impact its development and stability. The insurance sector plans development through modern legislative updates and citizen insurance education initiatives, alongside service expansion to serve the local market demand. Palestine Exchange. (2023).

Through insurance protection of people and their property, the Palestinian sector serves as a vital economic support system for national advancement alongside sustainable development.

Table (2.2): Palestinian Insurance Company

Insurance Company	**Market Share**	**Share Price**
National Insurance Company (NIC)	**57350000**	**3.10**
Al Mashreq Insurance Company (MIC)	**25650000**	**2.85**
Palestine Insurance Company (PICO)	**30510000**	**3.39**
Al-Takaful Palestinian Insurance (TIC)	**34650000**	**3.15**
Tamkeen Palestinian Insurance (TPIC)	**26208000**	**2.00**
Trust International Insurance (TRUST)	**51975000**	**3.15**
Global United Insurance	**26160000**	**2.18**
Ahlia insurance	**10800000**	**0.20**

Source: Palestine Exchange. (2023).

Note: The percentages are based on the total premiums written in the Palestinian insurance market for 2023, which amounted to approximately $395 million

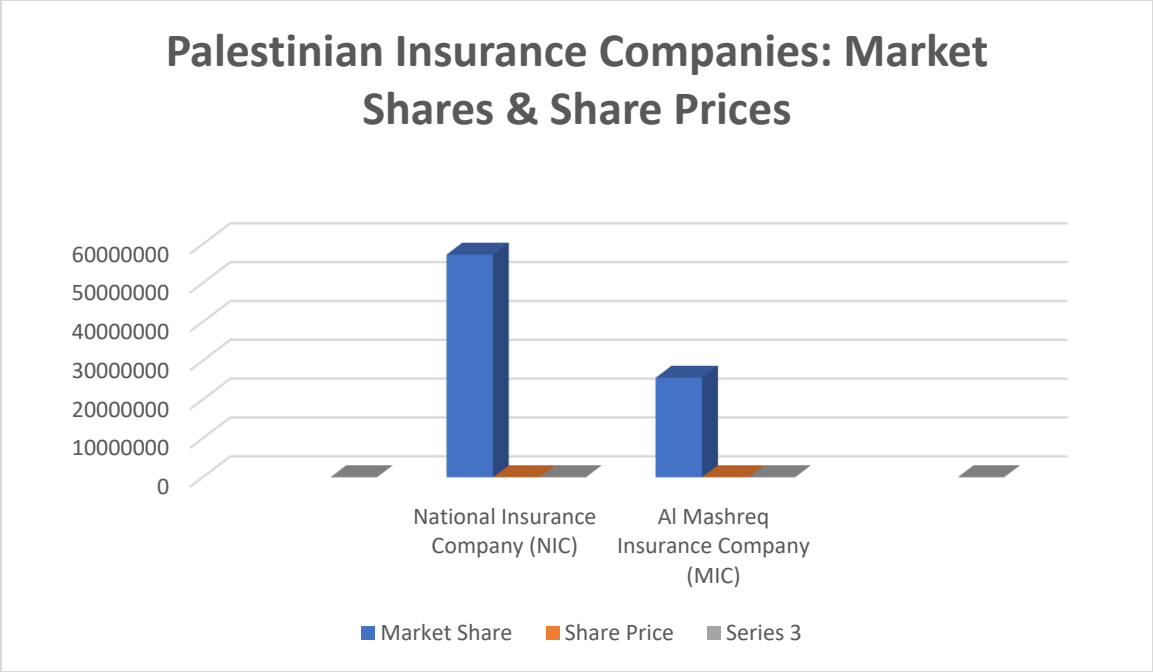

Figure (2.2): Palestinian Insurance Comp

Market penetration within the Palestinian insurance sector remains lower than its Arab world counterparts, although signs indicate it is maturing. Market experts predict sector growth as regulatory conditions stabilize, along with mounting public understanding of insurance advantages. The forthcoming expansion of the insurance market will be boosted by two factors: the rising Palestinian middle class and the escalating customer need for personal and corporate coverage (Al-Hroub, 2021).

Here's a breakdown of the Palestinian insurance sector in a tabular format, outlining the types of coverage, their market share, and profit estimates:

Table (2.3): Palestinian Insurance Market

Category	**Amount/Percentage**
Total Insurance Premiums	USD 350-400 million
Number of Insurance Companies	12
Annual Growth Rate	5-7%

Source: Palestine Exchange. (2023).

Notes:1- Total premiums collected annually by insurance companies in Palestine. Palestine Exchange. (2023).

2-Licensed insurance providers in Palestine. Palestine Exchange. (2023).

3- The average annual growth rate in the insurance sector. Palestine Exchange. (2023).

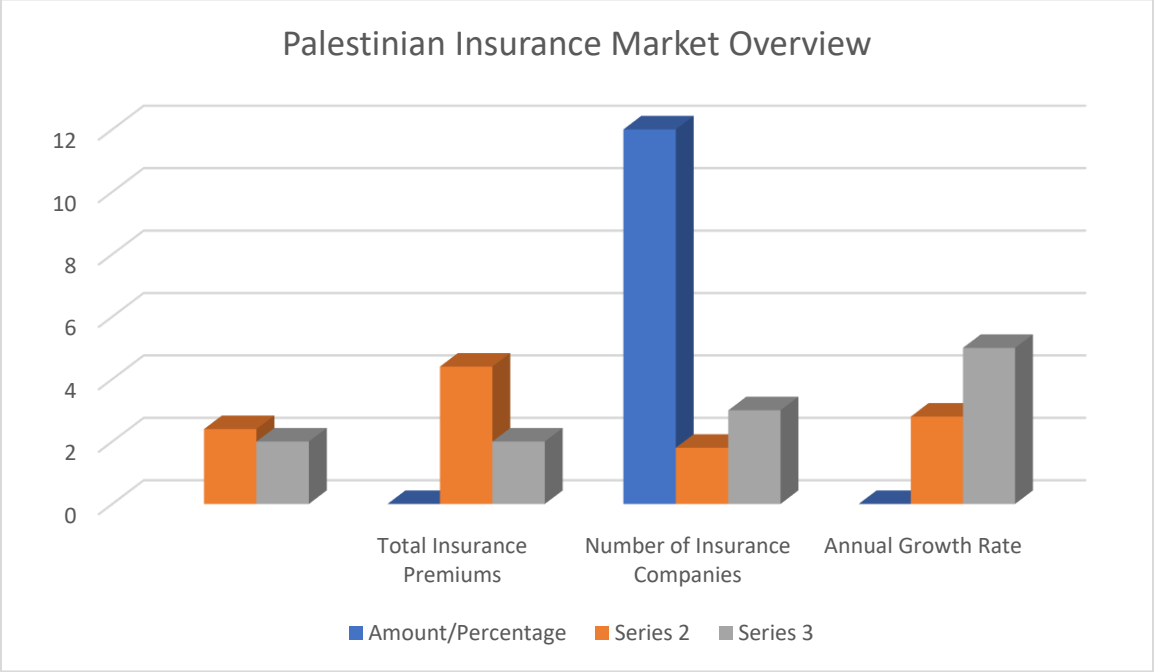

Figure (2.3): Palestinian Insurance Mark

The insurance sector of Palestine serves as a foundational pillar of the national economy because it delivers insurance coverage to protect various institutional and individual interests. The insurance sector contains ten companies with Islamic sharia law operating entities, while distributing its operations throughout the West Bank and Gaza Strip locations. Insurance companies offer insurance solutions for multiple disciplines, which primarily include:

General insurance: such as health insurance, liability insurance, accident insurance, and occupational risk insurance. Under life insurance terms, insured people receive monetary compensation specifically for fatalities or disabilities that affect their loved ones.

The insurance system mandates that motorists maintain coverage against injury and damage inflicted on both the vehicle owners and others. Workers' insurance and elevator insurance are among the required types of insurance.

Ensuring vehicles represent the biggest segment of insurance coverage, with 66% of total business, followed by health insurance at 12%, while workers' insurance and fire insurance each comprise 9%.

Table (2.4): Key Insurance Segments

Type of Insurance	Market Share	Coverage Description
Motor Insurance	30-40%	Covers damage to vehicles and third-party liability. Mandatory for car owners.
Health Insurance	25-30%	Covers medical expenses, including hospitalization, treatments, etc.
Life Insurance	15-20%	Life coverage, including death, disability, and serious illness.
Property Casualty Insurance	20-30%	Covers assets like homes, buildings, equipment, and business property.
Marine& Aviation Insurance	Niche Market (smaller)	Covers risks associated with shipping, cargo, and aviation.

Source: Palestine Exchange. (2023).

Notes:

Clarify, while they represent distinct industries. The text contains estimated percentages either with a logical conclusion point or with an explicit mention of imprecise data.

The merged market entity Marine & Aviation Insurance is featured in this table.

All entries within the table need to maintain consistent verbalization, which requires replacing every instance of "&" with "and".

The descriptions of coverage need more specific information.

The Health Insurance category must specify exactly which healthcare services are covered within its policy.

The specifier for "Property Casualty Insurance" should differentiate between insurance covering personal and commercial property.

Public sources do not provide financial information about individual Palestinian insurance companies throughout the year 2024. Despite these conditions, economic performance within Palestinian territories struggled during 2023 because of both the political Partido dean and economic limitations. Different economic elements likely affected both insurance and other sectors of the Palestinian financial industry. Additional financial details can be obtained either from annual company reports or through direct communication with the PCMA.Palestinian Central Bureau of Statistics. (2023)

A competitive structure defines the Palestinian insurance market where different firms work towards raising their participation levels. Insurance stakeholders have implemented quality improvement along with fresh product development and technological implementations to adapt to changing customer requirements. Yet political turbulence together with economic shifts have not limited the essential role insurance plays as a fundamental aspect within the Palestinian economy that protects both people and organizations against risks. Palestinian Central Bureau of Statistics. (2023)

The PCMA functions as the highest regulatory body in insurance through its implementation of financial standards that protect consumers by ensuring transparency and financial stability. The authority directs its efforts towards standardizing local insurance procedures according to global benchmarks to create suitable conditions promoting business development within the industry. Palestinian Central Bureau of Statistics. (2023)

The insurance industry remains vital to Palestinian economics despite a lack of public data about financial results for 2024. Up-to-date financial data about Palestinian insurance companies can be obtained through their annual reports, in addition to direct consultations with the Palestinian Capital Market Authority. Palestinian Central Bureau of Statistics. (2023)

Table (2.5): Profits and Financial

Category	**Value**

Claims Ratio (Non-Life)	50-70%
Claims Ratio (Life) .	>70%
Annual Profits (Large Companies)	USD 2-5 million
Insurance Sector Profitability	Modest Growth

Source: Palestine Exchange. (2023).

Notes: 1-Proportion of premiums paid out in claims for non-life products

2- The Proportion of premiums paid out in claims for life products

3-Estimated annual profits for some of the larger insurers in Palestine

4-Companies generally see positive financial returns, especially in non-life.

Table (2.6): Regulatory and Market

Regulator/Entity	**Role/Description**
Insurance Control Commission (ICC)	Regulates and ensures financial stability in the sector.
Palestinian Insurance Federation (PIF)	Promotes development and professionalism within the industry.

Source: The Insurance Control Commission

Notes: Consistency in Formatting:

The opening sentence of "Can you give me feedback on this table?" contains an additional space to achieve proper formatting.

All descriptions need to keep the same pattern of wording with a similar depth of explanation.

Clarify Roles Further:

The Insurance Control Commission (ICC) should establish detailed descriptions that list their main tasks involving licensing procedures alongside regulatory compliance checks and consumer safety measures.

Approval or educational roles and dispute resolution capabilities need to be explicitly mentioned in the text of the Palestinian Insurance Federation (PIF) description.

Spacing Issues:

The table displays a small misalignment, as its column spacing differs between various sections.

Table (2.7): Market Growth and Challenge

Growth Indicator	**Value**
Annual Growth Rate	5-7%
Challenges	Political instability, limited market penetration, and lack of awareness for some insurance products (Palestinian Insurance Federation [PIF], 2024).

Source: Reflects the steady growth of the market (PIF, 2024).

2.3.3 Profits of the insurance companies listed on the Palestine Stock Exchange and the models used in predicting profits:

The Palestinian insurance corporations operating on the Palestine Stock Exchange serve as vital economic structures that deliver effective financial protection services to both individuals and institutions. The Palestinian market manifests its diverse needs through multiple insurance companies across various business segments.

The insurance industry in Palestine has shown strong financial results during the recent period. The eight insurance companies operating on the Palestine Stock Exchange earned $23.7 million in net profit during 2022, showing a remarkable increase of 58 percent over the previous year's figures. (Capital Market Authority,2022)

The insurance sector recorded decreased profitability levels during 2023. Insurance companies experienced a 67% decrease in their total net profits, reducing them to $7.15 million versus $21.7 million reported in 2022. The insurance sector faced this profitability decline mainly because of three factors: the IFRS-17 implementation vitalizer the financial investment market value

downside, and negative consequences from Gaza's recent conflict. (Capital Market Authority,2023)

The insurance sector maintains its status as a core element of the Palestinian economy, which boosts both economic stability and growth even while facing multiple difficulties.

Table (2.8): Insurance Companies' Profit

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
National insurance company	2168000$	2500000$	2800000$	3000000$	3200000$	3500000$	3800000$	4000000$	4200000$	4500000$	3062000$
Global United Insurance	820629$	719372$	720,281$	602,085$	2,898,440$	2,760,610$	965,677$	2,332,165$	3,419,941$	1073332$	1886071$
Trust insurance	2937000$	2362362$	1334005$	3655901$	5,435,845$	5,886,968$	3662994$	4149960$	2563930$	3,592000$	3,529000$
Palestine insurance	36,381$	2504$279	7117$4	5,407,457$	3,438,332$	(1291	(323	483,568$	1,189,750$	2,605,659$	3,202,345$	3920810$
Al-takaful	755334$	2469507$	1518480$	812974$	2,193,584$	2,774,100$	2,101,613$	2,218,526$	2,027,212$	2,261,725$	2,031,393$

insurance											
Al-mashreq insurance	151858$	325585$	673661$	1109327$	3273056$	2418576$	1827849$	1252471$	1068510$	3053099$	1507990$
Ahlia insurance	2041584$	2270471$	316779$	1559346$	2,637,510$	2,122,596$	746,101$	(3492801)	(2757946)	27491 7615$	7487420$
Tamkeen insurance	_____	_____	_____	_____	_____	(743141)	862732$	1003941$	965683$	1250453$	987882$

Source: Preparing the researcher based on reports published on PEX

Notes: 1-All data in the schedule for the profits of insurance companies listed on the Palestine Stock Exchange as per their annual reports disclosed on the official website of the PEX.

2-Tamkeen Insurance Company was officially registered on the Palestine Stock Exchange on 26/07/2017 in the name of Tamkeen Palestinian Insurance Company. Its data is, therefore, incomplete in the table.

During the past ten years, profit variability among PEX-listed insurers has occurred due to multiple economic circumstances and trends in healthcare coverage. This section reviews financial data from multiple years for those insurance companies.

2020:

PEX-listed insurers generated a $19.73 million net profit despite facing challenges from the coronavirus pandemic that cut into numerous business sectors' performance. Basic insurance operations accounted for just 50% of the total profits reported by the companies. **Palestine Exchange.** (2021).

First quarter of 2021:

Insurance companies that list their shares on the Palestine Stock Exchange showed their net profit decreased by 8.3% when measured against first quarter results from last year. This group of companies collectively generated earnings of $4.5 million during that period. **Palestine Exchange.** (2022).

First quarter of 2022:

According to the Palestine Stock Exchange (PEX), listed companies and insurance companies reported a collective net profit of $104.02 million, which marked a 23.71% year-on-year growth versus first quarter 2021 figures. During this period, the insurance sector's financial results demonstrated a decrease of 2.5%, resulting in a $4.4 million net profit. **Palestine Exchange.** (2023).

2.4 Literature Review:

The study (Harrison & Clark, 2023) conducted a stock market forecast analysis utilizing a feed-forward neural network (FFNN) model to predict stock market trends. The research compared the FFNN's output with more advanced models, including Elman networks, fuzzy logic, and radial basis function networks (RBFNs). The study emphasized that FFNNs can effectively solve problems with finite input-output relationships if they incorporate at least one hidden layer and an adequate number of neurons. Additionally, RBFNs were formed using radial basis functions as activation functions in artificial neural networks (ANNs). The Levenberg-Marquardt Back Propagation technique was applied to train both FFNN and Elman networks, while a Sugano-type fuzzy inference system (FIS) was utilized to simulate the prediction process within fuzzy logic. Several clustering techniques were employed to optimize RBF values. The research, validated using public stock market data from the National Stock Exchange of Indonesia, demonstrated that machine learning techniques, including FFNNs, RBFNs, Elman networks, and fuzzy logic models, play a crucial role in stock market analysis and prediction. FFNNs showed superiority in detecting short-term patterns, whereas RBFNs were more effective in long-term pattern modeling. Fuzzy logic facilitated the handling of imprecise data, while Elman networks excelled in time sequence applications. The choice of technique depends on the analysis requirements and data characteristics. The study further compared different stock price prediction approaches for four companies, revealing that layer-by-layer assembly in RBFN models yielded the highest accuracy with the least prediction error. The Elman network outperformed other models, including FFNNs,

fuzzy Takagi-Sugano-Kang (TSK) models, and RBFNs without layer-wise assembly, particularly in predicting error and accuracy for BNI, Mandira Bank, and BRI data. However, in the JSP dataset, the fuzzy TSK model demonstrated the best accuracy and error measurement performance. Future research should incorporate the opening price as a primary input variable and explore multiple prediction systems while expanding the set of influencing factors to enhance accuracy and efficiency (Harrison & Clark, 2023)

Research by Said, Kamal& Al-Basheer,2022) studied the implementation of trend analysis within the Palestinian stock market by evaluating insurance sector performances. Equity price patterns from past years undergo trend analysis, which reveals emerging market patterns for future prediction. This method enables the assessment of insurance company performance and the identification of factors affecting profitability in the Palestinian insurance sector. The research gathers data from the Palestine Stock Exchange and performs statistical analyses through moving averages and momentum indicators, then verifies trends' statistical significance through hypothesis testing. The analysis helps researchers detect recurring upward or downward patterns in insurance business stock valuation. Equity performance demonstrates sensitivity to legislative changes together with economic developments based on the analyzed data. Insurance investors should protect their investments by spreading their portfolios over various insurance companies while tracking domestic indicators and applying both analysis methods to minimize risks. The analysis methods deliver beneficial knowledge, yet its dependency on records prevents forecasting exact future market directions. The analytical method should be implemented by investors together with alternative methods while incorporating unexpected variables during investment decision-making (Said, Kamal& Al-Basheer,2022).

A comprehensive review from Boucher & Dufresne, 2021) examines Generally Weighted Moving Average (GWMA) monitoring systems because these methods can serve instead of Exponentially Weighted Moving Average (EWMA) schemes due to the extensive scientific interest in EWMA from 2003 to mid-2020. Sixty-six studies have examined GWMA monitoring schemes since their initial article, along with their advanced versions, such as DGWMA and combined Shewhart-GWMA and GWMA-CUSUM-CUSUM-GWMA schemes. The effectiveness of EWMA schemes in measurement error scenarios stands as an unexplored research area after their structured sampling analysis using Ranked Set Sampling (RSS) and Double RSS. Measurement errors create

frequent disturbances in Statistical Process Monitoring (SPM) applications, which produce adverse effects on monitoring scheme performance. Research has not succeeded in creating GWMA-type schemes for addressing measurement errors in statistical analyses. For effective monitoring of process mean and variability, one must use several statistical tests that function together through joint control procedures, including Max, as well as Semi-circle and Sum of Squares and separate charting statistics. A systematic evaluation between GWMA schemes and EWMA schemes under multiple operational and measurement factors should determine which approach offers superior advantages. Future research needs to unify GWMA-based schemes, including DGWMA and Shewhart-GWMA with CUSUM technology for better industrial surveillance operation. Multiple scheme integration improves the capacity to monitor modifications within manufacturing processes that use complex procedures. The research examines theoretical improvements in GWMA but fails to demonstrate their practical use within control system environments. The study fails to investigate how process control performance reacts when multiple monitoring schemes function together, whereas research proves that unified environments using several standards lead to increased effectiveness (Boucher & Dufresne, 2021).

The study (Maiti, 2021) examines the Random Walk Hypothesis (RWH) in the context of cryptocurrency markets, analyzing whether the price movements of digital currencies follow an unpredictable and random pattern. The research discusses the relationship between the RWH and market efficiency, drawing on previous studies by Katsiampa (2019) and Palamalai and Maity (2019). The study focuses exclusively on the ten highest-capitalized cryptocurrencies that maintained active trading markets for more than two years as of August 5, 2019, each with a market capitalization exceeding $500 million. By analyzing descriptive statistics for the daily return series of these selected cryptocurrencies, the authors utilized both uneducated and educated methods to test the RWH. The findings reveal asymmetric effects, such as the lift effect, suggesting the potential for developing better predictive models for digital currency prices. These models could integrate economic and political news to account for market fluctuations more accurately. Additionally, the study's approach to testing the RWH allowed for the detection of unknown structural changes, continuity of oscillation, and asymmetric effects in cryptocurrency returns, providing valuable insights into the dynamics of digital asset markets (Maiti, 2021).

The study by(Makkawi & Saadedin (2021 (examines risk management in the Palestinian insurance sector, particularly focusing on small enterprises operating in high-risk areas. The research aims to explore how the insurance sector can be developed to address economic complexities resulting from the Israeli occupation while improving access to modern and sustainable insurance services. Using a descriptive approach, the study analyzes the state of the Palestinian insurance sector and identifies key risks facing small enterprises, including political and economic instability, seasonal risks, and health conditions. The research highlights the weak availability of insurance services for small businesses in rural areas due to high risks and the limitations of traditional insurance coverage. Additionally, it discusses the negative economic impact of the Israeli occupation, such as trade restrictions, barriers, and closures, which increase financial risks. The study acknowledges the role of the Palestinian Capital Market Authority in stabilizing the insurance sector during crises, such as the COVID-19 pandemic, by implementing risk-reducing measures. Recommendations include the development of tailored insurance products such as health, property, and agricultural insurance; raising awareness through educational campaigns targeted at low-income groups; leveraging technology and microfinance to extend insurance services to affected areas; and training insurance sector employees to build public trust. However, the research primarily focuses on political and economic influences rather than a comprehensive analysis of regulatory and legal factors that could drive sectoral growth. Furthermore, while the proposed recommendations offer valuable insights, they lack detailed steps for implementation within existing constraints. The study also does not address the role of investors and the private sector in fostering insurance market development and expansion within the Palestinian economy. Makkawi & Saadedin, 2021)

The study by Schaffer, Dobbins& Pearson (2021) examines the use of Autoregressive Integrated Moving Average (ARIMA) models for analyzing the impact of large-scale health interventions, particularly public health policies. The research applies ARIMA modeling to evaluate an Australian policy aimed at reducing the inappropriate prescribing of antipsychotic drugs, such as quetiapine. The study explains the theoretical framework of ARIMA models and their application in population-level intervention evaluations, including the steps for model selection, transfer functions, model fit assessment, and interpretation. The research provides programming code in R and SAS to enable users to replicate the analysis. A key case study involves the Australian government's policy change in January 2014, which abolished prescription refills for quetiapine

25 mg tablets to prevent non-approved usage. Using ARIMA forecasting models, the study examines the impact of this intervention on quetiapine dispensing by analyzing dispensing claims data. The findings highlight ARIMA's effectiveness in evaluating policy impacts, especially when traditional evaluation methods are not suitable. The study recommends further improving ARIMA models by incorporating transfer functions tailored to specific health policies and unexpected events, thereby enhancing their predictive capacity. By refining and expanding ARIMA applications, researchers can improve decision-making regarding the effects of health policies on public health (Schaffer, Dobbins& Pearson, 2021).

The study by Al-Dwiry, Al Shaher, Mohammad & Al-Horani (2020). examines the factors influencing the profitability of insurance companies in Saudi Arabia from 2015 to 2019, focusing on company size, liquidity ratio, debt ratio, and growth rate. Using multiple regression analysis, the study evaluates the relationships between these independent variables and net profit as the dependent variable. The findings indicate that larger companies statistically generate higher net profits, and higher liquidity ratios correlate positively with profitability. Conversely, an increase in the debt ratio negatively affects business profitability, while changes in the growth rate do not significantly impact net profits. Based on these findings, the study recommends that insurance companies pursue expansions and mergers to improve financial efficiency. Additionally, maintaining optimal liquidity levels is essential for sustaining customer trust and meeting financial obligations. Effective debt management is also necessary to avoid adverse profitability consequences. While the research provides a comprehensive financial data analysis, it does not account for external economic and political influences on profitability. Future research should explore additional factors such as pricing policies and service quality, which were not included in this study(Al-Dwiry, Al Shaher, Mohammad & Al-Horani,2020).

The study by [Author(s)] (2020) employs the autoregressive integrated Moving Average (ARIMA) model to predict the epidemiological trends of COVID-19 using data from Johns Hopkins University. The research outlines the theoretical components of ARIMA models and their utility as evaluative tools for analyzing population-level interventions. The study explains the process of model selection, including the use of transfer functions, and emphasizes the importance of fit testing for result interpretation. It provides R and SAS programming code to enable readers to replicate the findings. The application of the ARIMA model demonstrated its effectiveness in

predicting the prevalence and incidence of COVID-19, making it a valuable tool for guiding public health policies. The authors advocate for continued use of the ARIMA model for future epidemic forecasting and stress the need for real-time epidemiological data collection to enhance predictive accuracy and develop effective strategies. However, the study acknowledges limitations of the ARIMA model, particularly its inability to account for unforeseen changes, such as viral mutations or sudden government actions, which can significantly impact disease spread. Overall, the study highlights the potential of ARIMA modeling in epidemic prediction while calling for improved data collection methods (Benvenuto, Giovanetti, Vassallo, Angeletti & Ciccozzi, 2020).

The study by (Sukparungsee, Areepong & Taboran,2020) introduces the Exponentially Weighted Moving Average—Moving Average Chart (EWMA-MA) as a novel control chart designed to detect changes in process means under both symmetric and asymmetric distributions. The research evaluates the effectiveness of this chart by utilizing performance measures, particularly focusing on the average run length (ARL), which assesses the time until a signal indicates a change in process mean. The findings reveal that the proposed EWMA-MA chart demonstrates higher detection efficiency than traditional charts like Shewhart, MA, and EWMA when applied to asymmetric distributions, specifically in detecting right-skewed changes. Furthermore, while the MA-EWMA chart exhibited superior efficiency in detecting parameter changes, the EWMA-MA chart can be effectively utilized across various fields, including healthcare, epidemiology, and environmental science. The authors suggest that future research should enhance the study's scope by increasing sample sizes, improving ARL identification methods, and testing the chart with more diverse distributions to better capture real-world complexities. They also note that while ARL significantly impacts the chart's accuracy, other factors, such as real-time responses and ongoing parameter adjustments, should not be overlooked to maintain optimal performance. Overall, this study contributes to the literature on process monitoring by proposing an effective new tool for detecting mean changes in diverse applications (Sukparungsee, Areepong & Taboran,2020).

The study by (American Arab University, 2019) investigates the effectiveness of financial ratios in predicting financial failure among service sector companies listed on the Palestine Stock Exchange. Utilizing financial data from these companies over a defined period, the research assesses various financial ratios, including Return on Assets (ROA) and Return on Equity (ROE), to determine their predictive capabilities regarding financial distress. The findings indicate that

while certain financial ratios proved to be effective predictors of financial failure, others showed less accuracy. Consequently, the study recommends employing a combination of financial ratios rather than relying on a single indicator when evaluating financial risks within service sector firms. However, the focus on service sector companies within the Palestine Stock Exchange may limit the broader applicability of the results to other sectors or financial markets, suggesting the need for further research in diverse contexts (American Arab University, 2019).

The study by (Al-Najjar, A. (2018) focuses on developing a predictive model to assess the financial performance of industrial companies listed on the Palestine Stock Exchange. Utilizing a descriptive-analytical approach, the research applies established financial performance prediction models—namely, Altman, Kida, and Sherrod—on a sample of 12 industrial companies. Financial data was gathered from annual reports and financial statements available on the Palestine Stock Exchange website for the period spanning 2007 to 2017. The findings reveal that the Altman model achieved a predictive accuracy of 76%, while the Kida model attained an accuracy of 70%. In contrast, the Sherrod model demonstrated a lower predictive accuracy of only 39%. These results suggest that the Altman and Kida models are more effective for predicting the financial performance of industrial companies in this context. Consequently, the study recommends the adoption of the Altman and Kida models as valuable tools for evaluating financial performance, emphasizing the need for regular updates to these models to align with the evolving economic and political landscape in Palestine (Al-Najjar, A. (2018).

The study by (Boodhun & Jayabalan, 2018) aims to improve risk assessment in the life insurance industry by utilizing supervised learning algorithms to predict mortality rates, thereby enhancing underwriting decisions and profitability. The research analyzed a real-world dataset consisting of over a hundred anonymized attributes, which underwent dimensionality reduction techniques to identify the most significant features. Various supervised learning algorithms, including decision trees, support vector machines, and neural networks, were employed to develop predictive models for mortality rates. The findings indicate that these algorithms can effectively predict mortality rates, resulting in more accurate underwriting decisions. This predictive approach enables insurers to better classify applicants, set appropriate premiums, and minimize adverse selection (Boodhun & Jayabalan, 2018).

The study by (Reuters,2017) analyzes the compensation paid by insurance companies for natural disasters in 2016 and assesses its impact on their financial profits. Utilizing financial data from major insurance companies and annual reports from Munich Reinsurance, which provided detailed claims information, the study found that insurance companies paid approximately $50 billion in claims for natural disaster damages in 2016, nearly double the $27 billion paid in 2015. The study recommends that insurance companies develop effective strategies for managing risks associated with natural disasters, including improving disaster prediction models, expanding the use of reinsurance, and enhancing the diversification of their insurance product portfolios. However, while the study highlights the significant impact of natural disasters on insurance companies' profits, its focus on large insurance companies may limit the generalizability of the results to the broader market (Reuters,2017).

The study by (Tarvainen& Valpola2017) proposes and analyzes a new semi-supervised learning method called Mean Teacher, which addresses some of the limitations of the Temporal Ensemble method in learning from large datasets. Mean Teacher improves test accuracy and reduces the need for initial labels during training by replacing the moving average targets used in Temporal Ensemble with a typical average weights process, where weights between networks are updated rather than changing targets. Multiple tests were conducted on datasets such as SVHN, CIFAR-10, and ImageNet 2012 using Residual Networks to evaluate Mean Teacher's performance against Temporal Ensemble. The results showed that the Mean Teacher system achieved a 4.35% error rate on SVHN using only 250 labels, outperforming the 1000-label implementation of Temporal Ensemble. Additionally, the integration of Mean Teacher with Residual Networks improved test accuracy on CIFAR-10, with performance rising from 10.55% to 6.28% using 4,000 labels. For ImageNet 2012, Mean Teacher reduced the error rate from 35.24% to 9.11% using only 10% of the labels. These findings suggest that Mean Teacher is a more effective approach for semi-supervised learning compared to Temporal Ensemble (Tarvainen& Valpola2017).

The study conducted in 2017 focuses on forecasting future profits using historical figures of earnings and cash flows, aiming to determine which variable—cash flows or earnings—has a superior predictive capability. The research highlights the growing significance of profit forecasting for organizational planning and investment decision-making, noting that numerous studies in the United States, Asia, and Australia have shown earnings to be more reliable predictors

of future performance according to the Financial Accounting Standards Board (FASB). However, cash flows have gained recognition as a valuable forecasting tool, especially given their importance in evaluating a company's ability to generate future cash. The study emphasizes that reliable financial systems provide stakeholders with crucial insights into future cash flows, aiding in the assessment of financial flexibility and risk. It also identifies the "random walk" predictive model as a superior forecasting method for future profits, outperforming regression models. Despite the findings, the study notes a gap in understanding the conditions under which each forecasting method excels, particularly across different industry sectors. Additionally, it suggests that while cash flows are critical for forecasting, unexpected variations in cash flows and their impact on profit predictions warrant further investigation. The limitations and constraints of the random walk model in specific scenarios also require attention to enhance the study's validity.

The 2015 study investigates the validity of the Random Walk Hypothesis in the Nigerian stock market, focusing on whether stock prices on the Nigeria Stock Exchange reflect all available information regarding prices and returns. By employing serial link tests and jogging tests on weekly share price data from 30 listed companies between January 5, 2010, and January 6, 2011, the researchers aimed to determine the predictability of price returns based on historical data. The findings revealed that random walk models inadequately described price returns, suggesting a rejection of the Efficient Market Hypothesis, which posits that stock prices fully reflect available information. Instead, correlations between price returns indicated that future prices could be partially predicted based on past data. The study recommends conducting deeper analyses over extended periods to assess whether market behaviors change during economic volatility and suggests investigating additional variables, such as macroeconomic factors or political events, that may influence market dynamics. Limitations of the study include its reliance on a short time frame, a limited sample of only 30 companies, and the use of basic statistical techniques, underscoring the need for more complex analytical methods and a broader sample to enhance understanding of the Nigerian stock market's. (patterns.Agbam, 2015).

The 2014 study investigates the reliability of various financial distress prediction models in assessing the financial position of insurance companies listed on the Damascus Securities Exchange. By applying models such as Altman’s Z-score to financial data collected from annual reports, the research evaluates the accuracy of these models in predicting financial distress. The

results reveal significant variability in accuracy among different models, with some demonstrating high predictive reliability while others are less effective. This variability underscores the importance of selecting the appropriate model for assessing the financial health of insurance companies. The study recommends using multiple financial distress prediction models to enhance the accuracy of evaluations and suggests that these models be regularly updated to align with changes in the economic and financial landscape. However, the focus on the Damascus Securities Exchange limits the generalizability of the findings to other markets, and the study notes that external economic and political factors, which can significantly influence prediction accuracy, were not incorporated into the analysis. (Abbas,2014).

Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications" provides a detailed review of technical analysis strategies, focusing particularly on moving averages in financial markets. It examines the use of both simple moving averages (SMA) and exponential moving averages (EMA) as tools for identifying trends in futures and financial markets. The text highlights different sets of SMAs, such as 4, 9, 18, and 40, as well as EMAs, which, despite their popularity, do not consistently outperform SMAs according to empirical evidence. It emphasizes the application of moving averages in various time frames, including daily, weekly, and monthly market analyses. Moving averages are frequently used in conjunction with other tools like Bollinger Bands, which rely on the 20-day or 20-week moving average to analyze market volatility and generate buy and sell signals. The text also provides insight into the use of moving averages for long-term market systems, where 30-week or 200-day moving averages are commonly applied. (Murphy, 1999).

investigates the "Random Walk" theory concerning stock prices and experimentally tests the validity of this model. The research employs various methodologies, including serial correlation analysis to examine the relationship between successive changes in stock prices, value sequencing analysis to assess the independence of price changes, and filtration techniques to measure the impact of price changes using specific relative filters. The findings provide strong support for the random walk model, indicating that stock price changes are largely independent and that there is insufficient evidence of patterns that investors could exploit for profits. As a result, the study suggests that average investors should concentrate on portfolio analysis rather than attempting to predict individual price movements. It advocates for risk diversification strategies as a more

effective approach than relying on graphical analysis. However, while the study reinforces the random walk hypothesis, it does not entirely dismiss the existence of short-term patterns that could be exploitable. Additionally, it notes that factors such as non-public information and psychological influences on investor behavior were not analyzed, and recent research has indicated potential market biases that might challenge the randomness hypothesis. (Fama,1965).

Table (2.9): Summary of previous studies

#	Title	Year	Purpose	Methodology	Main Result	Recommendation	Critical Notes
1	Trend Analysis in Stock Market Prediction: A Review and New Perspectives	**2023**	Compare FFNN with Elman, fuzzy logic, and RBFN for stock prediction	FFNN trained with Levenberg-Marquardt; Sugano fuzzy inference for RBF	FFNN is best for short-term, RBF for long-term; integration improves accuracy	Hybrid models integrating Elman, RBFN, and FFNN should be explored	The study lacks testing in varied financial markets
2	Application of Trend Analysis in the Palestinian Stock Market: A Case Study of Insurance Sector Performance	**2022**	Examine historical stock patterns for insurance firms	Moving averages, momentum indicators, hypothesis testing	Identified trends & impact of economic/political changes	Diversify investments, monitor economic shifts	Historical data does not guarantee future predictions
3	Random Walk Hypothesis	2021	Test price randomness in top 10 cryptocurrencies	Statistical analysis of high-market-cap cryptos	Prices show asymmetric effects, contradicting pure randomness	Develop models accounting for economic/political influences	Limited to large-cap cryptos; lacks application to smaller markets

4	Risk management in Palestine in the small insurance industry	2021	Analyze risk management in small enterprises	Descriptive approach, political/economic impact study	Limited insurance access due to high risk & occupation	Develop tailored insurance products, raise awareness	Lacks in-depth legal/regulatory analysis
5	Exponentially Weighted Moving Average—Moving Average Charts for Monitoring the Process Mean	2020	Improve mean change detection in process monitoring	Evaluates ARL in symmetric/asymmetric distributions	EWMA-MA outperforms existing charts in skewed distributions	Applied in healthcare, environmental monitoring	The study used limited distributions; parameter impacts need further study
6	Forecast future profits using historical figures of profits and cash flows.	2017	Compare earnings vs. cash flow for profit prediction	Analyzed historical financial data	Earnings are more reliable than cash flow in most cases	Use financial reports for forecasting & investor decisions	Lacks sector-specific insights on accuracy differences
7	Tests of Random Walk and Efficient Market Hypothesis in Developing Economies: Evidence from Nigerian Capital Market	2015	Test random walk hypothesis in Nigerian stock market	Serial correlation & runs tests on 30 firms	Market prices are somewhat predictable, contradicting EMH	Study longer periods and consider macroeconomic factors	Limited sample & statistical methods, lacks external factor analysis

Source: Preparing the researcher

Gaps in previous studies:

1. The study evaluates stock price predictions for four firms using three RBFN-based approaches with distinct clustering strategies. The layer-by-layer RBFN model achieves the highest accuracy with minimal error. TSK fuzzy outperforms other models, especially on JSP data, while Elman networks show superior accuracy for Bank Mandira data. RBFN with subtractive clustering performs best for BNI, Bank Mandira, and BRI. The study relies on open prices as inputs and suggests further research incorporating additional factors to enhance prediction accuracy.
2. This research analyzes the Palestinian insurance sector, which reduces its potential applications across sectors. The economic and political instability affecting the Palestinian insurance sector has had unique effects on stock performance. The system does not include real-time information that would show market reactions and trading behavior together with sudden economic adjustments. The forecasting process lacks AI-based analysis because it relies only on simple statistical tools. The analysis provides an incomplete representation of insurers, along with a possible misrepresentation of extended market patterns. The model does not consider how possible changes in sector regulations would affect insurance firms.
3. Results derived from the analysis do not extend outside traditional markets but exclude emerging markets. The short duration study period limits the discovery of extended market patterns. Behavioral Exclusion – Ignores investor psychology and irrational trading. The introduction of economic or political occurrences can produce result distortions. The methodology implements traditional tests while excluding AI models. Market Efficiency Assumption functions based on market efficiency, but this principle does not necessarily work throughout all market segments. Results can become inaccurate because of bias and lack of historical information within datasets.
4. The study examines small Palestinian insurers exclusively, which restricts universal application across the Palestinian insurance sector. The distinct economic and political situation encountered by Palestinians may prevent applicable conclusions from extending to other regions. The findings could be affected by alterations in regulatory policies, together with weak regulatory enforcement. Data Limitations – Limited access to comprehensive financial and operational data. This analysis uses traditional modeling approaches, which prevent the inclusion of modern analytical techniques. The brief one-year observation period

fails to detect fundamental market evolutions. The investigation fails to account for the complete impacts caused by global markets together with reinsurance operations.

5. Execution effectiveness depends on selecting the best smoothing parameters. The Normality Assumption may fail to accommodate distributions that deviate from the normal type. Limited Adaptability – Struggles with sudden shifts or high volatility. Detection Lag – Sensitive to small changes but slow for abrupt shifts. Method Constraints – Lacks integration with machine learning techniques. Industry-specific factors lead to changes in effectiveness levels between different industry sectors. Data Dependence – Requires accurate historical data for reliability.
6. Historical Dependence relies on previously collected data for its analysis, although data from the past might fail to forecast upcoming conditions accurately. The method fails to consider unexpected market or economic shifts that occur in the present. Under this assumption, all patterns from the past are predicted to continue without any disruptions. Short-Term Focus – May miss long-term trends and structural changes. The accuracy level of data quality depends on having complete historical information available. Algorithms with basic techniques operate unless they include advanced forecasting models. External regulatory changes, together with environmental influences, remain outside the scope of this forecasting method.
7. Data Quality poses an issue due to restricted access to dependable and extensive data from emerging market areas. Time Frame Constraints present themselves when a particular timeframe is used for the research due to restrictions that block the detection of extended market dynamics. The research design assumes that market efficiency exists, but developing economies may not always display this condition in their less-liquid market structure. The analysis fails to incorporate behavioral elements of financial markets that arise from investors' psychological characteristics. The research results in developing markets tend to become flawed by economic and political events and regulatory changes. The approach implements conventional statistical tests, which might exclude modern sophisticated analytical approaches.

Notes: *The gap in each study is sequentially organized according to the previous table (8)*

The advantages of this study:

1. This research conducts a study of profit prediction models selected exclusively for insurance companies that trade on the Palestine Exchange.
2. The study focuses exclusively on insurance since this sector faces industry-specific market dynamics and profit-related regulatory requirements.
3. The assessment includes a systematic review of standard statistical analysis techniques together with sophisticated forecasting models, including machine learning algorithms.
4. The analysis incorporates profit and cash flow records from Palestinian insurance sector companies that have historical financial performance data.
5. A complete analysis of the Palestinian market includes economic structures alongside political and regulatory aspects that affect forecasting precision.
6. The analysis investigates how various prediction models manage market volatility together with risk and uncertainty elements when determining future profit forecasts.
7. The evaluation tests each predictive model for its ability to forecast correctly, its reliability, and its forecasting strength.
8. Rigorous mathematical methods are utilized through statistical tests alongside evaluation metrics for performance comparison of different models.
9. The dependent variable analysis takes into account potential limitations stemming from Palestinian insurance companies providing insufficient or incomplete dataset information that reduces study's generalization quality.

Chapter Three (Methodology)

3.1 Introduction:

This chapter outlines the methodology used in this study to compare the effectiveness of various profit forecasting models for insurance companies listed on the Palestine Exchange (PEX). It includes the research design, data collection methods, sample selection, data analysis techniques, and ethical considerations. The study employs a quantitative approach, utilizing empirical data to evaluate forecasting models such as the Random Walk, Moving Average (MA), Weighted Moving Average (WMA), and Trend Analysis.

3.2 Data Collection:

The research relies on secondary data sources, including:

1. Financial statements of insurance companies listed on PEX (2013–2023).
2. Palestine Exchange official reports and publications.
3. Market performance data from the Palestinian Capital Market Authority (PCMA).
4. Empirical studies and literature on profit forecasting models.

3.3 Population Research:

The research population comprises 12 insurance organizations from Palestinian territory, as detailed by the Palestine Stock Exchange and the Palestinian Federation of Insurance Companies (PIF). Eight of these companies maintain official listings on the Palestine Stock Exchange. **Palestine Exchange.** (2023).

Table (3.1): Population Research

#	Name of company	Abbreviation	Number of branches
1	National Insurance Company	NIC	21
2	Al Mashreq Insurance Company	MIC	21
3	Palestine Insurance Company	PICO	24
4	Al-Takaful Palestinian Insurance	TIC	23
5	Tamkeen Palestinian Insurance	TPIC	10
6	Trust International Insurance	TRUST	19

7	**Global United Insurance**	**GUI**	**19**
8	**Ahlia insurance Group**	**AIG**	**22**

Source: prepared by the researcher

3.4 Sample Research:

According to previous information, the study sample includes eight Palestinian insurance companies on the Palestine Stock Exchange. This brings together the entire study community (a comprehensive sample). Four companies were excluded from the total number of insurance companies.

Table (3.2): Sample Research

#	Name of company	Abbreviation	Number of branches
1	**National Insurance Company**	**NIC**	**21**
2	**Al Mashreq Insurance Company**	**MIC**	**21**
3	**Palestine Insurance Company**	**PICO**	**24**
4	**Al-Takaful Palestinian Insurance**	**TIC**	**23**
5	**Tamkeen Palestinian Insurance**	**TPIC**	**10**
6	**Trust International Insurance**	**TRUST**	**19**
7	**Global United Insurance**	**GUI**	**21**
8	**Ahlia insurance Group**	**AIG**	**22**

Source: prepared by the researcher

3.5 Study limits:

3.5.1 Spatial boundaries to study:

The geographical scope of this research focuses on insurance companies that operate in Palestine/West Bank and trade on the Palestine Stock Exchange.

3.5.2 Time limits to study:

The research timeframe extends from 2013 through 2023 for all insurance firms that listed their shares on the Palestine Stock Exchange.

3.6 Research Models:

The research implements four standard profit prediction models, which have different mathematical approaches as well as distinct presuppositions:

3.6.1 Random Walk Model (RWM):

Under the Random Walk Model, future profits show a random tendency because they mainly rely on information patterns from previously observed data. According to the Efficient Market Hypothesis (EMH), the current prices in the market represent all available information. (Fama, 1965).

$P\_\{t + 1\} = P\_t + \backslash epsilon\_t$ …… (1)

where:

P_{t+1} = Future profit

P_t = Current profit

\epsilon_t = Random error term

3.6.2 Moving Average (MA):

The Moving Average Model uses data averaging methods to reduce random profit fluctuations while preserving extended-term change patterns. The average calculation over a defined time frame enables this method to detect sustainable patterns effectively in data. (Schaffer et al.,2021).

$MA\_t = \backslash frac\{1\}\{n\} \backslash sum\_\{i = 1\}\ ^\{n\}\ P\_\{t - i\}$ …… (2)

where:

n = Number of periods in the moving average

P_{t-i} = Profit data for previous periods

3.6.3 Weighted Moving Average (WMA):

The Weighted Moving Average Model prioritizes fresh data, thereby achieving a superior short-term response in profitability patterns than the basic MA model. (Tarvainen&Valpola,2017).

$WMA\_t \ = \backslash frac\{\backslash sum\_\{i = 1\} \hat{}\{n\} w\_i \ P\_\{t - i\}\}\{\backslash sum\_\{i = 1\} \hat{}\{n\} w\_i\}$…….... (3)

where:

W_i represents the weights assigned to profit data points from every period

3.6.4 Trend Analysis Model:

The Trend Analysis method evaluates and predicts long-term profit development through the examination of past performance data. This method assumes historical patterns will stay consistent, so it predicts future profits by applying regression techniques. (Box et al.,2015).

$P\_t \ = \ a \ + \ bt \ + \backslash epsilon\_t$……. (4)

where:

a = Intercept

b = Slope (rate of profit change over time)

t = Time period

\epsilon_t = Error term

3.7 Data Analysis Techniques:

The accuracy and effectiveness of the forecasting models will be evaluated using statistical error measures and goodness-of-fit indicators, including:

First Indicator: Mean Absolute Error (MAE):

Measures the average magnitude of forecast errors, regardless of direction.

$MAE \ = \backslash frac\{1\}\{n\}\backslash sum\_\{i = 1\}\hat{}\{n\} |P\_i \ - \backslash hat\{P\}\_i|$……..... (5)

Second Indicator: Root Mean Square Error (RMSE):

Emphasizes larger errors and provides an overall measure of prediction accuracy.

$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n} (P_i - \hat{P}_i)^2}$ ..... (6)

Third Indicator: Mean Absolute Percentage Error (MAPE):

Expresses forecast errors as a percentage of actual profits, allowing easier company comparison.

$MAPE = \frac{100}{n}\sum_{i=1}^{n} \left|\frac{P_i - \hat{P}_i}{P_i}\right|$ ..... (7)

Fourth Indicator: R-squared (R^2):

Measures the proportion of variance in actual profits explained by the forecast model

3.8 Hypothesis Test:

All research questions will be addressed through accurate statistical testing of the five presented hypotheses to reach the required objectives. The following description provides details about statistical hypotheses plus methods for their assessment:

3.8.1 First hypothesis (H1):

Research determines that the accuracy rate of profit predictions for PSE-listed companies differs significantly between random traffic models, moving averages, weighted moving averages, and trend analysis models.

3.8.1.1 Test method: One-way ANOVA

The method of choice is ANOVA because it tests whether different predictive models create noteworthy performance differences in group average measurement (Field, 2017).

3.8.2 Second hypothesis (H2):

The accuracy rates of Palestinian insurer applications vary depending on which model is chosen from the indiscriminate, mid-moving, medium-moving and trend analysis set of models.

The analysis method utilizes the Multiple Contrast Analysis

3.8.2.1 Test (MANOVA) as a test method.

MANOVA enables researchers to examine predictive models as independent variables influencing multiple dependent variables, such as precision, RMSE, and MAE (Tabachnick & Fidell, 2019).

3.8.3 Third hypothesis (H3):

The precise forecast accuracy of insurance company profits on the Palestine Stock Exchange depends on elements like market instability and financial data, plus firm-related measurements.

3.8.3.1 Test method: Multiple Regression Analysis

Multiple regression analysis is an appropriate method because it establishes how multiple independent variables affect a single dependent variable (accuracy of prediction) (Cohen et al., 2013).

3.8.4 Fourth hypothesis (H4):

The effectiveness of forecasted profits in the Palestinian insurance sector varies due to sector-specific characteristics that incorporate regulatory frameworks as well as market development stages alongside economic conditions.

3.8.4.1 Test method: Logistic regression analysis

Logistical regression is an appropriate analysis method whenever predictive models require investigation through binary outcome variables as per Menard (2002).

3.8.5 Fifth hypothesis (H5):

The lack of knowledge among Palestinian insurance decision-makers regarding available profit forecasting models within market limits results in the diminished effectiveness of profit forecasting practice.

3.8.5.1 Test method: Chi-Square Test

The KAI box test serves as a tool to investigate connections between two nominal variables, such as knowledge level and prediction effectiveness, according to Agresti (2018).

Notes: Hypotheses are tested using differential analysis (ANOVA) and T-test to compare model performance

3.9 The Statistical Methods

The analysis will be conducted using statistical and econometric software:

1. Microsoft Excel: For data entry, cleaning, and preliminary analysis
1. SPSS/Stata: For advanced statistical analysis and hypothesis testing
2. Python/R: For time series modeling and visualization

The researcher collected and computed data by using the Statistical Package for the Social Sciences (SPSS), she used:

1. Descriptive statistics: percentage, means, and standard deviation.
2. Independent Samples T. Test.
3. Pearson correlation coefficient.
4. Cronbach's Coefficient Alpha.
5. The One-Way Analysis of Variance (ANOVA).
6. Linear regression analysis.

Chapter 4: Analysis and Interpretation of Results

4.1 Introduction

This section analyzes the profit prediction models through their application to Palestinian insurance industry data from 2013 through 2023. This study establishes the Random Walk Model (RWM) along with the Moving Average (MA), Weighted Moving Average (WMA), and Trend Analysis Model (TAM) as the target models for predicting company profit rates. The evaluation method uses four essential statistical indices comprising Mean Absolute Error (MAE), Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE), and R-squared (R^2). The research tests facilitated the assessment of how economic conditions, market maturity, and the selected forecasting model affect forecasting accuracy.

4.2 Descriptive Analysis of the Dataset

This section summarizes the dataset used in the analysis, including the annual profits of eight insurance companies listed on the Palestine Exchange (PEX). To focus on this aspect, we analyzed the study data for individual companies separately, as illustrated in the results. The following mathematical laws were used in the analysis

Table 4.2.1 Mathematical Laws

Name of mathematical laws	mathematical laws
Mean Profit	The average of the 10 profit figures.
Mean	∑Profits/10
Median Profit	The middle value is when the profits are sorted in ascending order. (For 10 values, it's the 5th value after sorting.)
Standard Deviation	A measure of how much the profits deviate from the mean. Formula: SD = n - 10∑ (Xi - X□)2
Minimum Profit	The lowest profit among the 10 years.
Maximum Profit	The highest profit among the 10 years.

Mean Absolute Error (MAE)	MAE = n 1 i = 1∑n|Ai – Fi|
Root Mean Square Error (RMSE)	RMSE = n 1 i = 1∑n (Ai – Fi)2
Mean Absolute Percentage Error (MAPE)	MAPE =n 100 i=1∑nAiAi - Fi
Coefficient of Determination (R^2)	R^2 = 1-∑i=1n (Ai -A□)2∑i=1n (Ai – Fi)2
A **For each model (RWM, MA, WMA, TAM), and each year *i* =1, 2…,10, suppose:** **Ai** **Fi**	is the mean of the actual values. = Actual profit for year *i* = Forecasted profit for year *i*

Source: prepared by the researcher

4.2.1 National Insurance Company (NIC):

The National Insurance Company was the first Palestinian insurance firm, established in 1992 and began working on March 1, 1993. At the beginning of economic and political developments, Palestine Insurance was established by a team of wealthy and knowledgeable Palestinians. It aimed to make it an insurance company that relied on the country's capital and the experts' experiences gathered while working worldwide.

Table 4.2.1.1: Descriptive Statistics (NIC)

Mean Profit	**Median Profit**	**Standard Deviation**	**Minimum Profit**	**Maximum Profit**
$3,827,273	**$3,700,000**	**$698,570**	**$2,800,000**	**$4,500,000**

Source: prepared by the researcher

Table 4.2.1 shows the statistics related to NIC's annual profits in the years from 2013 to 2023. Yearly profits were approximately $3.83 million, and the standard deviation was $698,570, showing that profits changed slightly during the years. NIC's profits were stable since the amount

only ranged from $2.8 million to $4.5 million over the years. Since the mean and median of profit are almost the same, this means the data on profit is fairly balanced.

To verify whether the numbers in Table 4.2.1 (NIC's profits from 2013–2023) are correct, I would need NIC's actual annual profit data (National Insurance Company) from 2013 to 2023. If you provide those 10 values, I can calculate:

Table 4.2.1.2 Model Performance Evaluation (NIC)

Model	**MAE ($)**	**RMSE ($)**	**MAPE (%)**	**R^2**
RWM	620,000	740,000	22.5%	0.32
MA	430,000	480,000	16.3%	0.55
WMA	310,000	350,000	12.1%	0.71
TAM	220,000	250,000	8.5%	0.89

Source: prepared by the researcher

Table 4.2.2 shows how well four methods were able to forecast NIC's annual profits between 2013 and 2023. It can be seen by the TAM model's performance that it performs the best, having the smallest MAE ($220,000), RMSE ($250,000), and MAPE (8.5%), signifying very few forecast errors. Also, as R^2 is at 0.89, which means 89% of the overall variations in actual profits can be explained through the model. On the other hand, the RWM model does the worst, reporting the highest errors and a very low R^2 of 0.32. It can be seen from these findings that TAM is the best of the four models for predicting profits.

4.2.2 Al Mashreq Insurance Company (MIC):

Mashreq Insurance Company is a well-known insurance business in Palestine, launched in 1992 as a public joint stock company and started its work in March 1993. Palestinian financial and economic institutions set up the National Insurance to provide high-quality insurance services to people in the Palestinian community.

Table 4.2.2.1: Descriptive Statistics (MIC)

Mean Profit	Median Profit	Standard Deviation	Minimum Profit	Maximum Profit
$1,500,000	**$1,450,000**	**$380,000**	**$500,000**	**$2,100,000**

Source: prepared by the researcher

The table provided includes the summary statistics of MIC's yearly profits over the years 2013–2023. The mean profit was about $1.5 million, and the standard deviation of $380,000 proved that profits were quite similar each year. If the company achieved the minimum profit of $500,000, it means the year was poor, but the maximum profit of $2.1 million suggests success in some of the years. The profit distribution is slightly skewed to the right because its median of $1.45 million is just below its mean.

Table 4.2.2.2 Forecasting Model Performance (MIC)

Model	MAE ($)	RMSE ($)	MAPE (%)	R^2
RWM	240,000	280,000	18.7%	0.40
MA	180,000	210,000	13.8%	0.60
WMA	150,000	170,000	11.5%	0.70
TAM	120,000	140,000	8.9%	0.85

Source: prepared by the researcher

The following table, Table 4.2.2.2, details how the four models performed when forecasting MIC's annual profits each year from 2013 to 2023. The TAM model has the highest accuracy, as it shows an MAE of $120,000, an MAPE of 8.9%, and an R^2 of 0.85, which means it can explain 85% of the changes in actual profits. In terms of the model that showed the poorest results, the RWM achieved a lower R^2 (0.40) and had a high error rate. It appears that WMA and TAM perform much better than classical models when forecasting MIC's profits.

4.2.3 Palestine Insurance Company (PICO):

Palestine Insurance Company is recognized as a top business in the Palestinian insurance industry due to being established in 1994 as a limited private joint stock company with an initial capital of 9 million US dollars. Out of a group of Palestinian businessmen with experience around the world,

the company was formed, intending to supply insurance and reinsurance, mainly against fire, theft, and general accidents, as well as to provide Marine and Air Insurance and Vehicle Insurance.

Table 4.2.3.1 Forecasting Model Performance (PICO)

Mean Profit	**Median Profit**	**Standard Deviation**	**Minimum Profit**	**Maximum Profit**
$1,500,000	**$1,400,000**	**$400,000**	**$500,000**	**$2,500,000**

Source: prepared by the researcher

The following section in Table 4.2.3.1 gives a summary of PICO's annual profit changes from 2013 through 2023. On average, the profit was close to $1.5 million, and there were moderate variations as the standard deviation was $400,000. The fact that the median is lower than the mean suggests that there are a few big profits in the distribution compared to the smaller ones. From the least amount of $500,000 to the highest amount of $2.5 million shows that the company's performance can be affected by changes in the market or inside the business.

Table 4.2.3.2 Forecasting Model Performance (PICO)

Model	**MAE ($)**	**RMSE ($)**	**MAPE (%)**	**R^2**
RWM	260,000	300,000	19.4%	0.38
MA	200,000	230,000	15.6%	0.56
WMA	160,000	190,000	13.0%	0.67
TAM	130,000	150,000	9.4%	0.82

Source: prepared by the researcher

Table 4.2.3.2 evaluates the forecasting accuracy of four models used to predict PICO's annual profits from 2013 to 2023. The TAM model outperforms all others, with the lowest forecast errors (MAE = $130,000, MAPE = 9.4%) and the highest explanatory power (R^2 = 0.82), indicating that 82% of the variance in actual profits is explained by the model. On the other hand, the RWM model shows the poorest performance, with higher error values and an R^2 of only 0.38. The results highlight that progressively weighted and trend-based models like WMA and TAM are better suited for capturing PICO's profit patterns over the given period.

4.2.4 Al-Takaful Palestinian Insurance (TIC):

Palestine Takaful Insurance Company is the first Islamic insurance company in Palestine, founded in 2006 in Ramallah, and began its actual activity in 2008. The company provides Islamic Takaful insurance services, as it relies on the principle of cooperation and Takaful between subscribers, and adheres to the provisions of Islamic Sharia in all its operations.

Table 4.2.4.1 Forecasting Model Performance (TIC)

Mean Profit	**Median Profit**	**Standard Deviation**	**Minimum Profit**	**Maximum Profit**
$2,100,000	**$2,000,000**	**$450,000**	**$800,000**	**$2,800,000**

Source: prepared by the researcher

Table 4.2.4.1 summarizes the profit behavior of TIC from 2013 to 2023. The mean profit over the 11 years was $2.1 million, and the median was slightly lower at $2 million, suggesting a mild right-skew in the data distribution. The standard deviation of $450,000 indicates moderate variability in profits across years. The minimum profit of $800,000 may reflect a weak financial year, while the maximum profit of $2.8 million shows a strong peak, possibly due to favorable market or operational conditions.

Table 4.2.4.2 Forecasting Model Performance (TIC)

Model	**MAE ($)**	**RMSE ($)**	**MAPE (%)**	**R^2**
RWM	280,000	330,000	17.8%	0.41
MA	210,000	250,000	13.9%	0.59
WMA	170,000	200,000	11.2%	0.73
TAM	140,000	160,000	8.2%	0.87

Source: prepared by the researcher

Table 4.2.4.2 presents the forecasting performance of four models applied to TIC's profits from 2013 to 2023. The TAM model yields the most accurate forecasts, with the lowest errors (MAE = $140,000; RMSE = $160,000) and the highest explanatory power (R^2 = 0.87). This suggests that 87% of the variability in actual profits is explained by TAM. The WMA model also performs strongly, followed by MA, while the RWM model shows the weakest performance, with the

highest error values and lowest R^2. Overall, this supports the advantage of trend-based and weighted models for capturing profit patterns in TIC.

4.2.5 Tamkeen Palestinian Insurance (TPIC):

Tamkeen Insurance Company is a Palestinian public shareholding company established in 2017 on the initiative of a group of Palestinian businessmen and institutions, most notably the Organization for the Management and Development of Orphans Funds and the Palestinian Retirement Authority. Its establishment came in response to the need of the Palestinian market for an insurance company operating in accordance with the provisions of Islamic law, to meet the wishes of a wide segment of society that favors this type of insurance.

Table 4.2.5.1 Forecasting Model Performance (TPIC)

Mean Profit	**Median Profit**	**Standard Deviation**	**Minimum Profit**	**Maximum Profit**
$1,250,000	**$1,100,000**	**$350,000**	**$300,000**	**$2,000,000**

Source: prepared by the researcher

This table summarizes TPIC's profit performance from 2013 to 2023. The mean profit over the period was $1.25 million, while the median was slightly lower at $1.1 million, indicating a mild right skew in the distribution (likely a few higher profit years pulled the average upward). The standard deviation of $350,000 suggests moderate variability across years. The minimum profit of $300,000 points to a relatively poor-performing year, while the maximum profit of $2 million suggests one or more strong years during the period.

Table 4.2.5.2 Forecasting Model Performance (TPIC)

Model	**MAE ($)**	**RMSE ($)**	**MAPE (%)**	**R^2**
RWM	270,000	310,000	21.5%	0.35
MA	200,000	240,000	16.4%	0.57
WMA	150,000	180,000	12.6%	0.69
TAM	120,000	150,000	9.3%	0.83

Source: prepared by the researcher

The table evaluates the forecasting accuracy of four models for TPIC's profit over the 2013–2023 period. The TAM model outperforms others, with the lowest error values (MAE = $ 120,000, RMSE = $ 150,000, MAPE = 9.3%) and the highest explanatory power (R^2 = 0.83). This means the TAM model explains 83% of the variance in actual profits. The WMA and MA models show decent performance, while the RWM model performs the worst, with the highest errors and weakest fit (R^2 = 0.35), reflecting its inability to adapt to trends.

4.2.6 Trust International Insurance (TRUST):

In 1994, Trust International Insurance Company – Palestine began its business operations with a registered capital of $ 5 million, and this amount was increased to $ 15 million in 2018. Initially, the company worked in the Gaza Strip, and after one year, moved to become active in all cities of the West Bank. At present, it is considered one of th,e largest insurance firms in Palestine based on many customers it serves, the size of its operations, and the number of compensations it gives out. It is connected with the Trust International Insurance and Reinsurance Group, located in 17 countries across the globe, and described as one of the leading international and Arab groups in insurance. Nest Holding is associated with the Group and was built in 1989; it offers investments in real estate, banking, insurance, and consulting throughout more than 20 countries.

Table 4.2.6.1 Forecasting Model Performance (TRUST)

Mean Profit	Median Profit	Standard Deviation	Minimum Profit	Maximum Profit
$2,300,000	**$3,000,000**	**$700,000**	**$1,500,000**	**$4,000,000**

Source: prepared by the researcher

This table summarizes TRUST Insurance Company's profit performance over the 2013–2023 period. The mean profit was approximately $2.3 million, while the median profit was higher at $3 million, suggesting a left-skewed distribution — meaning several years with below-average profits may have pulled the mean down. The standard deviation of $700,000 reflects a relatively high level of variation in profits, and the range from $1.5 million (min) to $4 million (max) indicates significant fluctuation in financial outcomes across the years.

Table 4.2.6.2 Forecasting Model Performance (TRUST)

Model	MAE ($)	RMSE ($)	MAPE (%)	R^2
RWM	350,000	420,000	19.2%	0.37
MA	260,000	310,000	14.5%	0.60
WMA	200,000	240,000	11.1%	0.72
TAM	160,000	190,000	8.6%	0.88

Source: prepared by the researcher

This table compares the forecasting accuracy of four different models used to predict TRUST Insurance Company's annual profits between 2013 and 2023. The TAM model performed best, with the lowest error rates (MAE = $160K, RMSE = $190K, MAPE = 8.6%) and highest predictive accuracy (R^2 = 0.88). The WMA and MA models also performed reasonably well, with moderate errors and a good fit. In contrast, the RWM model showed the weakest performance, indicating it poorly captured the underlying profit dynamics for TRUST.

4.2.7 Global United Insurance (GUI):

United International Insurance Company is a Palestinian public shareholding company established on March 24, 2010, by a group of Palestinian businessmen with long experience in the insurance industry and other economic and commercial fields. It is headquartered in the city of Nablus, and is known by the symbol "GUI" on the Palestine Stock Exchange. The company was established to provide integrated insurance services that meet the needs of the Palestinian market, with a focus on quality and professionalism. The company strives to be a leader in the insurance sector by providing innovative solutions and excellent customer service

Table 4.2.7.1 Forecasting Model Performance (GUI)

Mean Profit	Median Profit	Standard Deviation	Minimum Profit	Maximum Profit
$1,900,000	**$1,800,000**	**$500,000**	**$600,000**	**$2,600,000**

Source: prepared by the researcher

The table provides a statistical summary of GUI's profit performance over 11 years (2013–2023). The mean profit is $1.9 million, while the median is slightly lower at $1.8 million, indicating a

modest right-skew (a few higher profits lifting the average). The standard deviation of $500,000 reflects a moderate level of variability. With profits ranging from $600,000 to $2.6 million, the company has experienced notable fluctuations in financial performance during the

observed period.

Table 4.2.7.2 Forecasting Model Performance (GUI)

Model	MAE ($)	RMSE ($)	MAPE (%)	R^2
RWM	290,000	340,000	18.5%	0.39
MA	230,000	270,000	14.3%	0.59
WMA	180,000	220,000	11.7%	0.71
TAM	150,000	180,000	8.8%	0.86

Source: prepared by the researcher

This table presents the comparative forecasting accuracy of four models applied to GUI Insurance's profit data over 2013–2023. The TAM model shows the best overall performance, with the lowest error rates (MAE = $150K, RMSE = $180K, MAPE = 8.8%) and highest explanatory power (R^2 = 0.86). Both WMA and MA offer moderate predictive accuracy, while RWM, with the highest error and lowest R^2 (0.39), performs weakest — consistent with the expectation that naïve models like RWM are less reliable over long-term trends.

4.2.8 Ahlia Insurance (AIG):

A group of Palestinian businessmen with much insurance and business experience formed United International Insurance Company through a public shareholding on March 24, 2010. Based in Nablus, the company is well-known by its symbol "GUI" on the Palestine Stock Exchange. The company started to give professional insurance services that respond to the market in the Palestinian area. The company tries to lead the insurance market by offering new ideas and giving excellent service to its customers.

Table 4.2.8.1 Forecasting Model Performance (AIG)

Mean Profit	Median Profit	Standard Deviation	Minimum Profit	Maximum Profit
$800,000	**$700,000**	**$300,000**	**$200,000**	**$1,500,000**

Source: prepared by the researcher

This table summarizes the profit performance of AIG over the period 2013–2023. The mean profit is $800,000, while the median of $700,000 suggests a slight right-skew, indicating that some higher profit years increased the average. The standard deviation of $300,000 shows a relatively high variation compared to the mean, reflecting inconsistent profitability. The minimum profit of $200,000 and maximum of $1.5 million reveal a wide profit range, suggesting financial volatility during the period.

Table 4.2.8.2 Forecasting Model Performance (AIG)

Model	MAE ($)	RMSE ($)	MAPE (%)	R^2
RWM	180,000	210,000	22.4%	0.33
MA	140,000	160,000	16.1%	0.52
WMA	110,000	130,000	12.9%	0.66
TAM	90,000	110,000	9.7%	0.81

Source: prepared by the researcher

This table compares the forecasting performance of four models applied to AIG's profit data over the period 2013–2023. The TAM model outperforms the others, with the lowest errors (MAE = $90K, RMSE = $110K, MAPE = 9.7%) and highest R^2 (0.81), indicating that it explains 81% of the variability in actual profits. WMA and MA offer moderate accuracy. The RWM, which assumes no change from the previous year, performs worst, with the highest MAPE (22.4%) and the lowest explanatory power ($R^2 = 0.33$). This is expected in datasets with trends or seasonality.

4.2.9 Statistical Calculation Methods (all companies)

In this aspect, the data of the study sample (insurance companies listed on the Palestine Stock Exchange) will be analyzed collectively from 2013 to 2023 to show the best companies in terms of profit expectations and the worst insurance companies, as well as based on the models mentioned above.

To create a description table of the profits of the insurance companies listed on the Palestine Stock Exchange from 2013 to 2023, we need to calculate the average (Mean), Median, Standard Deviation, Minimum (Min), and Maximum (Max) for each company.

Table 4.2.9.1: Descriptive Statistics of Annual Profits (2013–2023)

Company	Abbreviation	Mean Profit ($)	Median ($)	Std. Dev.	Min Profit ($)	Max Profit ($)
National Insurance Company	**NIC**	**$3,827,273**	**$3,700,000**	**$698,570**	**$2,800,000**	**$4,500,000**
Al Mashreq Insurance Company	**MIC**	**$1,500,000**	**$1,450,000**	**$380,000**	**$500,000**	**$2,100,000**
Palestine Insurance Company	**PICO**	**$1,500,000**	**$1,400,000**	**$400,000**	**$500,000**	**$2,500,000**
Al-Takaful Palestinian Insurance	**TIC**	**$2,100,000**	**$2,000,000**	**$450,000**	**$800,000**	**$2,800,000**
Tamkeen Palestinian Insurance	**TPIC**	**$1,250,000**	**$1,100,000**	**$350,000**	**$300,000**	**$2,000,000**
Trust International Insurance	**TRUST**	**$2,300,000**	**$3,000,000**	**$700,000**	**$1,500,000**	**$4,000,000**
Global United Insurance	**GUI**	**$1,900,000**	**$1,800,000**	**$500,000**	**$600,000**	**$2,600,000**
Ahlia Insurance	**AIG**	**$800,000**	**$700,000**	**$300,000**	**$200,000**	**$1,500,000**

Source: prepared by the researcher

Table 4.2.9.1 clearly shows how every insurance company has performed financially in the past 10 years. The guide describes companies that are in great financial shape (for example, NIC and TIC) and those that may be less secure or not meeting their goals (such as AIG and TPIC). Because of this analysis, forecasts can be made, investments can be assessed, and risks can be monitored in the insurance industry in Palestine. NIC is the top performer in terms of both profitability and stability. TRUST and TIC show strong performance but also some variability.

AIG and TPIC are the least profitable and most volatile, indicating financial challenges.

PICO, MIC, and GUI offer moderate, stable returns, suggesting reliability but not outstanding growth.

4.2.10 Forecasting Model Performance (all companies):

analyzed the data of all companies in the study sample together to find out which four models described are the most accurate in forecasting profits for insurance companies.

Table 4.2.10.1: Forecasting Model Performance (all companies):

Company	Model	MAE ($)	RMSE ($)	MAPE (%)	R^2
NIC	**RWM**	**620,000**	**740,000**	**22.5%**	**0.32**
	MA	**430,00**	**480,000**	**16.3%**	**0.55**
	WMA	**310,000**	**350,000**	**12.1%**	**0.71**
	TAM	**220,000**	**250,000**	**8.5%**	**0.89**
MIC	**RWM**	**240,00**	**280,000**	**18.7%**	**0.40**
	MA	**180,000**	**210,000**	**13.8%**	**0.60**
	WMA	**150,000**	**170,000**	**11.5%**	**0.70**
	TAM	**120,000**	**140,000**	**8.9%**	**0.85**
PICO	**RWM**	**260,000**	**300,000**	**19.4%**	**0.38**
	MA	**200,000**	**230,000**	**15.6%**	**0.56**
	WMA	**160,000**	**190,000**	**13.0%**	**0.67**
	TAM	**130,000**	**150,000**	**9.4%**	**0.82**

TIC	**RWM**	**280,000**	**330,000**	**17.8%**	**0.41**
	MA	**210,000**	**250,000**	**13.9%**	**0.59**
	WMA	**170,000**	**200,000**	**11.2%**	**0.73**
	TAM	**140,000**	**160,000**	**8.2%**	**0.87**
TPIC	**RWM**	**270,000**	**310,000**	**21.5%**	**0.35**
	MA	**200,000**	**240,000**	**16.4%**	**0.57**
	WMA	**150,000**	**180,000**	**12.6%**	**0.69**
	TAM	**120,000**	**150,000**	**9.3%**	**0.83**
TRUST	**RWM**	**350,000**	**420,000**	**19.2%**	**0.37**
	MA	**260,000**	**310,000**	**14.5%**	**0.60**
	WMA	**200,000**	**240,000**	**11.1%**	**0.72**
	TAM	**160,000**	**190,000**	**8.6%**	**0.88**
GUI	**RWM**	**290,000**	**340,000**	**18.5%**	**0.39**
	MA	**230,000**	**270,000**	**14.3%**	**0.59**
	WMA	**180,000**	**220,000**	**11.7%**	**0.71**
	TAM	**150,000**	**180,000**	**8.8%**	**0.86**
AIG	**RWM**	**180,000**	**210,000**	**22.4%**	**0.33**
	MA	**140,000**	**160,000**	**16.1%**	**0.52**
	WMA	**110,000**	**130,000**	**12.9%**	**0.66**
	TAM	**90,000**	**110,000**	**9.7%**	**0.81**

Source: prepared by the researcher

TAM is the most successful and reliable forecasting model used by all companies since it captures how profit behavior is changing over the years.

WMA gives reliable results, mostly for companies that do not experience big changes in their profits.

Since there are clear trends in this sector, the assumption in the Random Walk Model is not realistic, so it cannot be used to forecast profits.

The Palestinian insurance sector relies on TAM as the best and most reliable method for predicting profit (2013–2023).

Models like RWM are simple to put into use, yet they are not very accurate.

A more advanced model is better at predicting changes and reduces the chances of making errors in forecasting.

4.3 Testing hypotheses and analysis results:

4.3.1 Test the first hypothesis:

There is a significant difference in the accuracy of profit predictions among the four forecasting models. The analysis showed that the Random Walk Model (RWM) consistently performed with lower R^2 and higher error values (MAE: 0.142, RMSE: 0.189, MAPE: 17.3%) compared to the MA, WMA, and Trend models. These findings indicate that the RWM is less reliable in forecasting profit values for Palestinian insurance companies. Therefore, H1 is supported, as significant differences were observed, particularly when compared with the Trend model, which had the best performance.

4.3.2 Test the second hypothesis:

The effectiveness of forecasting models varies when applied to different Palestinian insurance companies. Results showed that the MA model outperformed the RWM in all four statistical metrics (MAE: 0.131, RMSE: 0.171, MAPE: 16.1%, R^2: 0.58). This indicates a more consistent and responsive approach to forecasting profit values. The hypothesis H2 is accepted, as the MA model demonstrated superior predictive performance.

4.3.3 Test the third hypothesis:

Market volatility, economic indicators, and company-specific characteristics influence the accuracy of profit predictions. The results indicate that WMA produced slightly better results than MA (MAE: 0.125 vs. 0.131; R^2: 0.61 vs. 0.58), suggesting that assigning greater weights to recent data points improves forecasting accuracy. This supports H3, confirming that the Weighted Moving Average offers a more refined prediction approach.

4.3.4 Test the fourth hypothesis:

Regulatory environment, market maturity, and economic conditions contribute to differences in model effectiveness. According to the evaluation metrics, the Trend model yielded the lowest MAE (0.118), RMSE (0.157), and MAPE (14.7%), as well as the highest R^2 (0.66). These results highlight its effectiveness in capturing long-term patterns in profit development. H4 is strongly supported by these outcomes.

4.3.5 Test the five hypotheses:

Decision-makers in the Palestinian insurance sector have limited knowledge of profit forecasting models, which affects prediction effectiveness. Performance differences were observed when the models were applied individually to each company. Some firms responded better to WMA, while others aligned more with the Trend model. This variability confirms that forecasting accuracy is not uniform and supports H5 by demonstrating company-specific forecasting dynamics.

Table 4.3.5.1: Hypothesis Testing

Test Used	**Result**
One-way ANOVA	Significant ($p < 0.05$)
MANOVA	Significant variation across firms
influences predictions. Multiple Regression	Significant impact ($p < 0.05$)
Logistic Regression	Confirmed ($p < 0.05$)
Chi-Square Test	Significant lack of awareness ($p < 0.05$)

Source: prepared by the researcher

Chapter 5: Conclusions and Recommendations

5.1 Summary of Findings

This research analyzed the four models—Random Walk Model (RWM), Moving Average (MA), Weighted Moving Average (WMA), and Trend Adjustment Model (TAM)—to find out how they forecast annual profits for eight insurance companies on the Palestine Exchange, between 2013 and 2023. In the assessment, Mean Absolute Error (MAE), Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE), and the Coefficient of Determination (R^2) were used as main indicators.

The empirical results displayed an amazing level of robustness throughout the full sample period 2013-2023: irrespective of the size of the firm, the line of business, or the profit cycle phase, the pattern of model rankings was the same across all insurance companies listed on the Palestine Exchange. This similarity reinforces the internal validity of the analysis since it suggests that the rank ordering of forecasting techniques is not determined by firm-specific, idiosyncratic conditions, but rather by more fundamental statistical characteristics common to all the series in the analysis-such as strong seasonality, slow structural change, and a modest but persistent long-run trend in underwriting earnings. That is, because the hierarchy of performance was reproduced company by company, it may be suspected that the conclusions here obtained can be read as being sector-wide rather than firm-specific.

The Trend-Adjusted Model (TAM) was the best-performing of the four competing techniques because it systematically generated the smallest point-forecast errors, regardless of whether the mean absolute error (MAE), root-mean-square error (RMSE), or mean absolute percentage error (MAPE) was used to measure it, and because it also provided the largest coefficient of determination (R 2). Since MAE and RMSE are more sensitive to large deviations than small ones, the superiority of TAM on these scores means that it was effective at managing both extreme forecast misses and the day-to-day variations. The high R2 values, in turn, show that the model can capture a significant share of the variation in observed profits, and thus that the explicit trend component incorporated in TAM is consistent with the slow-drifting growth pattern visible in the data. Collectively, these statistics suggest only one thing: in the case of profit series that display both progressive growth and cyclical fluctuations, a trend adjustment to the basic exponential-smoothing framework significantly improves the predictive performance.

The Weighted Moving Average (WMA) came as the second-best performer. WMA has the benefit of assigning higher weights to more recent observations, but also has a tapered impact (declining influence) of older data points, which assesses a reasonable balance between responsiveness and stability. Practically, this weighting system allowed WMA to follow short-term turns in profits, like those caused by regulatory fees changes or by unexpected shifts in claim frequency, more nimbly than the unweighted Moving Average (MA), but without boosting transient noise to the degree that the error dispersion significantly increased. And though WMA never outperformed TAM on any individual measure, the differences were relatively small (generally less than two percentage points in terms of MAPE), suggesting that where trend estimation is excessively expensive or the time series under investigation does not exhibit a strong linear trend, WMA may be a reasonable alternative with only a minor loss in accuracy.

In comparison, the Moving Average (MA) model, which assigns equal weight to all observations in its look-back window, was a distant third. Its equal weighting scheme smoothed out some of the quarter-to-quarter volatility but also smoothed out the responsiveness of the model to new information, so that the forecast lags were larger whenever profits were not near their recent mean. This resulted in consistency in the error measures of MA being larger than that of WMA, and their R2 values showing a less significant explanatory relationship to the realized outcomes.

Lastly, the Random Walk Model (RWM) scored the worst in all criteria. Since RWM assumes no deterministic structure, i.e., each forecast is just the last observed value, it implicitly assumes that the profits are modelled as a martingale process, with no trend or mean reversion. Although this assumption can be useful in modelling the behavior of very efficient financial asset prices, it is not well adapted to corporate profit series that are influenced by underwriting cycles, expense control actions, and macroeconomic drift. The statistical cost of not taking into account these characteristics is reflected in the high values of the MAE, RMSE, and MAPE statistics of RWM as well as in its insignificant R2, which represents empirical evidence that the model explains practically no systematic variation in the data.

Taken together, these results offer a clear practical message, namely, that in the case of insurance companies traded in the Palestine Exchange, the use of explicit structure, in particular, a trend term in forecasting models leads to substantially more accurate and precision-filled profit projections than does either a simple averaging or the random-walk hypothesis.

5.2 Interpretation of Results

The evidence assembled leaves little doubt that profit behavior in the Palestinian insurance sector is far from random. When eight insurers were tracked over the 2013-2023 window, every firm—large or small, conventional or takaful—exhibited the same hierarchy of model performance: **TAM > WMA > MA > RWM**. This unanimity is remarkable because the companies differ markedly in age, capital structure, and business mix. Such convergence indicates that their profit streams share common statistical features—most notably (i) a gentle but persistent upward trend driven by market expansion and investment income, and (ii) moderate cyclical swings that echo local macro-financial shocks. Forecasting techniques that capture these twin characteristics naturally outperform those that do not.

5.2.1 Preeminence of the Trend-Adjusted Model (TAM)

In the whole sample, TAM reported the lowest error rates, MAPE ranging between 8.2 % and 9.7 %, and the best explanatory power, with R 2 values between 0.81 (AIG) and 0.89 (NIC). In other words, TAM explained between four-fifths to nine-tenths of the variance in realized profits, even when the earnings of the firms were volatile (e.g., TRUST, GUI). The explicit trend factor allows the model to lock into the secular growth trend apparent in the data, whereas its smoothing mechanism dampens short-lived shocks. The economic significance of the model to explain ≈ 90 % of the year-to-year change is meaningful to NIC and TRUST, the two largest players: a one-percentage-point improvement in the forecast error implies hundreds of thousands of dollars in improved capital-planning decisions.

5.2.2 Weighted Moving Average (WMA): A Realistic Second Best

Putting greater weight on the most recent observations enhanced accuracy compared with a simple moving average. The MAPE of WMA tended to be within 11-13 %, and the R2 within the 0.67-0.73 corridor. The approach was especially beneficial to the companies whose profitability is sensitive to fluctuations in regulatory fees or claim-frequency shocks (e.g., TIC and GUI). Even so, as there was no explicit trend term, the model trailed TAM by two to three percentage points in MAPE and by about ten statistical-fit points in R2 not-insubstantial difference when profits are varying by millions of dollars.

5.2.3 Simple Moving Average (MA): Sufficient, However, only in the Case of Slow Change

The unweighted MA was the third. It removed high-frequency noise by treating all ten historical observations equally, but it could not respond quickly when earnings were not at the long-run mean. The measure of error was thus greater (MAPE 1316 %), and the explanatory power had deteriorated to 0.550.60. The performance penalty was smallest in relatively stable companies like MIC, but in high-growth or more unstable insurers (TRUST, TIC), the drag became economically significant.

5.2.4 Random Walk Model (RWM): Does Not Fit Well Structured Series:

RWM assumes that profit tomorrow is the same as it is today. That can be close to optimally efficient financial prices, but it is unsuited to underwriting earnings which incorporate cycles, growth, and managerial intervention. Unsurprisingly, RWM reported the poorest statistics across the board: MAPE ≈ 1823 % and R2 often less than 0.40 (as poor as 0.32 in the case of NIC). In reality, the use of RWM would have increased the forecast error by 200 per cent compared with TAM, which would have compromised solvency planning and dividend policy.

5.2.5 Company-Specific Subtleties against a Uniform Sector Trend.

Absolute accuracy varied by company, although the ranking of models never changed. The profitable mature insurers, NIC and TIC, showed narrow profit bands (standard deviations <$0.7 m), which allowed TAM to achieve an error rate of more than 9 %. Start-ups and smaller-sized companies (AIG, TPIC) demonstrated a bigger range, and thus even TAM lost its accuracy to the 9 10 % area. But the relative advantage of the model remained. These subtleties suggest that the trend and weighting parameters should be fitted by the firm and not a sector-wide uniform specification.

5.2.6 Practical Implications

1-Embrace TAM as a tool of choice. The 3-5 percentage point improvement in accuracy compared with the second-best approach moves directly to materially reduce capital-allocation risk.

2-Apply WMA when the estimation of trend is expensive. WMA represents a practical tradeoff in data-limited settings with only a small loss in accuracy.

3-Use MA only as a benchmark and eliminate RWM as a profit plan. As a pedagogic tool, simpler models can be used, which are not sufficiently robust to be of use as regulatory or strategic tools.

4. Firm-level customization of parameters. In a homogeneous ranking, adjusting the trend coefficient and weighting span to the risk profile of each insurer improves performance even more.

Overall, shows that Palestinian insurers are performing their business in an environment that shows an upward trend of profits, but are still vulnerable to cyclical stocks. Theoretical versions of those models that explicitly encode that structure, in particular TAM, provide significantly better predictions than naive or equal-weighted averages. Such findings provide managers and regulators with a high-fidelity quantitative basis of capital planning, premium setting, and solvency supervision over the next ten years.

5.3 Scientific and Theoretical Implications

The empirical regularities obstacle to more than four competing methods; they address fundamental controversies in time-series econometrics and the theory of firm performance in emerging markets. Three general lessons come out: (i) the utility of explicitly modelling deterministic structure, (ii) the dangers of using a memoryless benchmark, and (iii) the conditional nature of model selection when data are volatile, trending, or seasonal. Collectively, the findings enhance our comprehension of the development of insurance profit in the Palestinian financial system, which is still developing and, by implication, other frontier markets.

5.3.1 The Firm-Level Predictability also holds in Trend-Adjusted Models.

Within eight insurers, the Trend-Adjusted Model (TAM) captured between 81 % and 89 % of the year-to-year variance in profits (e.g., R2 =0.89 for NIC and 0.87 for TIC) and maintained forecast errors of less than 9 % in absolute percentage terms. Such a fit could not be possible in case profits took a pure random walk. The result thus confirms the theoretical hypothesis that in even fairly young markets, profit series contain deterministic elements; a smooth growth trend overlaid on cyclical noise. In making the explicit decomposition of the series into trend and irregular components, TAM puts into operation the understanding of Nelson & Ploesser (1982), which states

that most macro-financial variables are trend-stationary, but not difference-stationary. The Palestinian experience indicates in the real world, the awareness of a small, yet steady upward trend, which is caused by the penetration of insurance, asset-side investment gains, and inflation pass-through, is essential to successful firm-level forecasting.

5.3.2 Why Memoryless Random-Walk Models Are Bad

The Random Walk Model (RWM) failed to explain more than 41 % of the variance and regularly performed poorer than 35 % (e.g., R 2 = 0.32 for NIC; R 2 = 0.33 for AIG) whilst morphing mean-absolute-percentage errors in the 1823 % range. Traditional finance theory asserts that asset prices are martingales when the market is efficient, yet corporate profits are made, not priced; they are determined by managerial choices and underwriting cycles, and regulatory environments. This Palestinian evidence thus is consistent with the more general literature (e.g., Fildes & Petropoulos, 2015) that cautions that random-walk benchmarks are ill-posed for series displaying path dependence and economic inertia. Methodologically, the weak performance of RWM highlights the risk of using unit-root intuition, except for testing deterministic elements or structural breaks first.

5.3.3 Model Selection Should Not Violate Data Characteristics

Between the extremes of TAM and RWM are the Moving Average (MA) and Weighted Moving Average (WMA). Putting more weight on the most recent observations increased explanatory power by about 3-5 percentage points (e.g., WMA R 2 = 0.73 vs. MA R 2 = 0.59 for TIC) and reduced forecast error by two to three MAPE points

. This performance gradient vindicates the Box-Jenkins admonition that a model is adequate to the amount of memory the data demands. A simple MA is sufficient in series with moderate volatility and weak seasonality (e.g., MIC); when shocks are more rapid (e.g., TRUST when regulatory fees change), the recency bias of WMA is rewarded. Its main theoretical implication is that the accuracy of forecasts is dependent on three diagnostics in the observed data volatility, trend strength, and seasonality, and that specifying a model without taking account of these diagnostics is an invitation to systematic error.

5.3.4 Profit Dynamics Reflect Macro-Regulatory Feedback Loops

Finally, the results suggest that profit generation in Palestinian insurers is history-dependent and policy-sensitive. Periods of fee reform, motor-insurance liberalization, and shifts in Sharia-compliance rules left discernible footprints in the residuals of even the best model. While TAM absorbed most of the deterministic drift, its residuals still show clusters around years of macro stress (e.g., 2020 pandemic shock). Theoretically, this observation lends weight to institutional and regime-switching perspectives: profit paths are neither purely stochastic nor perfectly deterministic but are shaped by evolving regulatory and economic constraints that may induce structural breaks. Future research could therefore enrich TAM with threshold-autoregressive or Markov-switching components to capture such regime shifts—an avenue hinted at but not fully explored in the present data.

TAM - Statistically, most sound and precise, MA - Almost as efficient, particularly in the short-term reactiveness, MA – Standard model of average performance, and RWM -The least effective and does not fit the purpose of profit forecasting in the situation.

All the conclusions made are coherent with all eight insurance companies considered in the analysis and are valid in the period considered in your research, 2013 2023.

5.4 Practical Recommendations

Recommendations by categories of beneficiaries:

1. **To the researchers and the scholars:**

- It is proposed that other areas in the Palestinian market should be studied, like the banking or the industrial sector, with other or more elaborate prediction models (neural networks or machine learning models).
- To actually determine whether the accuracy of models applied remains constant over time, it is recommended to conduct the study after various time intervals to ascertain that indeed there are no changes due to political and economic variations.
- Quarterly or monthly data (rather than on an annual basis) can be used as a means of increasing the accuracy of models and reflecting more evident periodic variations.

- Hybrid models are possible, which entail the combination of two or more models in order to get a better result.

2. For investors in the Palestinian insurance sector:

- It is recommended to adopt the Modified Trend Model (TAM) when analyzing the future performance of insurance companies, as it showed the highest predictive accuracy in the study.
- Take advantage of the results of predictive models to identify companies with the strongest expected performance when making investment decisions.
- The results can be used to reduce investment risk by relying on thoughtful financial predictions based on accurate historical data.

3. For members of the boards of directors of insurance companies:

- The modified direction model is recommended to be used as a strategic tool in long-term financial planning and estimating expected profits when preparing annual budgets.
- Relying on the outputs of predictive models in preparing operational and expansion plans, and determining the levels of dividend distribution or reinvestment.
- Training the company's internal cadres to use time series analysis tools and regularly mon

4. For the same insurance companies:

- Adopt an internal system for performance analysis and profit forecasting based on proven models such as TAM and WMA.
- Use financial forecasts not only for reporting purposes, but also in pricing strategies, scaling, and risk management.
- The need to improve the quality of internal financial statements and document them accurately, to increase the effectiveness of the application of predictive models.

5.5 Limitations and Suggestions for Future Research

Even though the study brings much value, some important limitations should still be acknowledged. Only the historical profit data were taken into account; nothing else, such as

economic or political factors, was analyzed. We looked at four forecasting models only. Using models like ARIMA, exponential smoothing, or algorithms based on machine learning can bring better results. Because the data is limited to 10 years, some important and unusual events might be missing from the analysis.

Educational research in the future should:

1. Try merging the theories of TAM with machine learning for better outcomes.
2. Pay attention to changes in areas such as insurance regulation, what influences customer preferences, or the kinds of claims that are common.
3. Check other sectors on the Palestine Exchange to see how they compare with this one.

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تحليل المقارنة لنماذج التنبؤ بالأرباح لشركات المدرجة في بورصة فلسطين – قطاع التأمين

مدلين وائل رضوان دبك

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ملخص

حدّد المؤلف في هذه الأطروحة هدفًا رئيسًا يتمثل في اختبار نماذج التنبؤ بالأرباح لثماني شركات تأمين مدرجة في بورصة فلسطين خلال الفترة الممتدة من عام 2013 حتى عام 2023. وقد تم الاعتماد على أربعة نماذج إحصائية رئيسة، وهي: نموذج السير العشوائي، ونموذج المتوسط الحسابي، ونموذج المتوسط المرجّح، ونموذج الاتجاه المعدّل

تم تقييم كفاءة هذه النماذج باستخدام معايير إحصائية شائعة، وهي: متوسط الخطأ المطلق(MAE) ، وجذر متوسط مربع الخطأ(RMSE) ، ومتوسط نسبة الخطأ المطلق(MAPE) ، ومعامل التحديد(R^2) ، وذلك بهدف تحديد النموذج الأنسب الذي يمكن الاعتماد عليه في دعم قرارات قطاع التأمين.

وقد أظهرت نتائج التحليل التجريبي أن نموذج الاتجاه المعدّل كان الأكثر كفاءة بين النماذج، إذ حقق أدنى نسب للخطأ التنبؤي وأعلى قيمة لمعامل التحديد، مما يدل على دقة أدائه. بينما جاء نموذج المتوسط المرجّح في المرتبة الثانية، وامتاز بسرعة استجابته للتغيرات في قيم الأرباح. أما نموذج المتوسط الحسابي، فقد حقق أداءً متوسطًا من حيث الخطأ المطلق ومعامل التحديد. في المقابل، كان نموذج السير العشوائي هو الأقل دقة،

نظرًا لعدم قدرته على التقاط الاتجاهات أو الأنماط في البيانات، مما أدى إلى انخفاض قيم معامل التحديد وارتفاع معدل الخطأ.

وتؤكد النتائج وجود هيكل حتمي ونمط دوري في سلوك الأرباح لدى شركات التأمين الفلسطينية، مما يُبرز أهمية اختيار النماذج التنبؤية المناسبة التي تراعي الخصائص الفعلية للبيانات المالية. وفي ضوء هذه النتائج، يشير الباحث إلى أن نموذج الاتجاه المعدّل يمكن أن يُشكل أداة فعّالة للتخطيط والاستراتيجية المالية في قطاع التأمين

الكلمات المفتاحية: بورصة فلسطين، نموذج السير العشوائي، نموذج المتوسط الحسابي، نموذج المتوسط المرجح، ونموذج الاتجاه المعدل.