Perspectives from ARDL Analysis on Macroeconomic Factors and Stock Market Performance in Palestine

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Abstract

This study examines the relationship between economic factors and asset values in the Palestine Exchange index (Al-Quds Index) from 1998 to 2022. The research used the Autoregressive Distributed Lag (ARDL) bounds test to examine the relationship between three macroeconomic factors: real GDP growth, net portfolio investment, and exchange rate and the stock market return. The findings demonstrate that there is a substantial and positive correlation between real GDP growth and stock returns, both in the short and long run. However, there is no noticeable effect of net portfolio investment on stock returns. The absence of impact may be attributed to variables such as the substantial risk linked to the Palestinian equities market and the restricted investment prospects. Nevertheless, the exchange rate constantly and significantly affects stock returns, regardless of the time period. This effect is likely caused by differences between the currency used for operations and the currency used for financial reporting by Palestinian-listed companies. Consequently, their profits and cash flows decrease when the exchange rate appreciates. This research highlights the significance of firms reducing their vulnerability to foreign currency risk and provides significant understanding of the complex connection between macroeconomic circumstances and stock performance in developing economies.

Keywords: macroeconomic factors; Palestine Exchange; ARDL Bounds test; cointegration.

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تحليل عوامل الاقتصاد الكلي واداء سوق الأوراق المالية في فلسطين: رؤى مستوحاة من تحليل نموذج الانحدار الذاتي المتباطئ ARDL

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الملخص

تتناول هذه الدراسة العلاقة بين العوامل الاقتصادية وقيم الأصول في مؤشر بورصة فلسطين (مؤشر القدس) خلال الفترة من 1998 إلى 2022. استخدم البحث اختبار الحدود لنموذج الانحدار الذاتي المتباطئ (ARDL) لدراسة العلاقة بين ثلاثة عوامل اقتصادية كلية: نمو الناتج المحلي الإجمالي الحقيقي، صافي الاستثمار في المحفظة الاستثمارية، وسعر الصرف وتأثيرها على عوائد سوق الأسهم

أظهرت النتائج وجود ارتباط إيجابي وملحوظ بين نمو الناتج المحلي الإجمالي الحقيقي وعوائد الأسهم، سواء على المدى القصير أو الطويل. ومع ذلك، لم يظهر تأثير يُذكر للاستثمار في المحفظة الاستثمارية على عوائد الأسهم. قد يُعزى غياب هذا التأثير إلى عوامل مثل المخاطر الكبيرة المرتبطة بسوق الأسهم الفلسطيني وفرص الاستثمار المحدودة. لكن، أظهر سعر الصرف تأثيرًا مستمرًا وملحوظًا على عوائد الأسهم، بغض النظر عن الفترة الزمنية. ومن المحتمل أن يكون هذا التأثير نتيجة للاختلافات بين العملة المستخدمة في العمليات والعملة المستخدمة في إعداد التقارير المالية للشركات الفلسطينية المدرجة. نتيجة لذلك، تتراجع أرباحها وتدفقاتها النقدية عند ارتفاع سعر الصرف

تُبرز هذه الدراسة أهمية قيام الشركات بخفض تعرضها لمخاطر العملات الأجنبية، كما توفر فهمًا هامًا للعلاقة المعقدة بين الظروف الاقتصادية الكلية وأداء الأسهم في الاقتصادات الناشئة

الكلمات المفتاحية: العوامل الاقتصادية الكلية؛ بورصة فلسطين؛ اختبار حدود ARDL؛ التكامل المشترك.

1. Introduction

Gaining insight into and forecasting the behaviour of stock returns is an important topic for scholars, portfolio managers, investors, and policymakers. Assets, which are subject to different risk factors with varying prices, need compensation for the risk involved (Zhang et al., 2024). The Capital Asset Pricing Model (CAPM) characterizes risk by using a single component-the return of the market portfolio-and is the pioneering model that establishes a connection between investment return and risk factors that may be rewarded. The Arbitrage Pricing Theory (APT), proposed by (Ross, 1976) suggests that asset returns may be explained by numerous risk factors.

Chen et al. (1986) indicate that macroeconomic shocks act as systematic risk factors, which prompted the development of multifactor models referred to as macroeconomic models. Chen et al. (1986) identify five non-equity systematic risk indicators: industrial output, changes in the risk premium, yield curve twist, unexpected inflation, and modifications in forecasted inflation. In 1993, Fama & French introduced two more components to the CAPM model: the value factor, which is calculated based on the ratio of book value to market value, and the size factor, which is determined by market capitalization (Fama & French, 1993). Carhart (1997) expanded upon this concept by including momentum, profitability, and investment as new components.

The central problem to be investigated is the temporal impact of the various macroeconomic factors on the returns on Palestine Exchange. Two issues merit investigation as the foundation for this research. First, the identity of the macroeconomic factors that exert significant influence on Palestine Exchange's returns. Several macroeconomic factors have been examined in the Palestine context including: GDP, exchange rate, and consumer price index, credit market, economic growth, interest rates, and inflation and the US dollar index, Libor rate, and balance of trade (Mai et al., 2019; Sabri, 2016; (El Najjar, 2022), (Mohammed, 2022), (Haneen & Murad, 2011)). However, the results of these studies are contradictory, which can be explained by the diverse methods and time periods used by different researchers. This study examines the impact of three macroeconomic factors namely: Real GDP growth, Net portfolio investment, and exchange rate. We exclude monetary policy variables due to the fact that Palestine does not have an autonomous monetary policy tool. Second, the impact of macroeconomic factors on Palestine Exchange's returns need to be evaluated across time. The temporal impact of macroeconomic variables is asymmetric across the short and long-terms (Hashmi & Chang, 2023; Kalbouneh et al., 2023; Rashid et al., 2022; Togonidze & Kočenda, 2022). This study endeavours to elucidate the degree to which macroeconomic factors impact stock market returns by using the Autoregressive Distributed Lag (ARDL) model.

The Palestine stock market, as an emerging market, is under-researched in the global financial literature. While studies on the impact of various macroeconomic variables are plentiful in

developed markets, they are much less in conflict-affected and emerging economies like Palestine. In addition, the lack of full monetary sovereignty adds to the uniqueness of the Palestinian situation. Palestine operates without its own currency, relying on Israeli Shekel, U.S dollar, and Jordanian Dinar for its financial transactions. This unique situation creates additional risks for Palestinian businesses. In addition, understanding the relationship between the macroeconomic variables and the stock market performance is crucial for policymakers. This study is to offer evidence-based recommendations that could improve economic policies, enhance investor confidence, and foster the growth of the Palestine Exchange. Furthermore, this research aims to make a significant contribution to the asset pricing literature in emerging markets by applying the autoregressive distributed lag (ARDL) model, utilizing the longest time window to date within the Palestinian context.

The paper is structured to present a coherent analysis: the following section explores the theoretical background and hypothesis development, followed by the methodology, data, variables, and analytical techniques. The results are discussed in the analysis section, and the paper concludes with a summary of key findings and recommendations.

2. Literature Review

The stock market serves as a mirror of the economy, reflecting the general state of the economy. As a result, a considerable number of studies have investigated the relationship between macroeconomic factors and the performance of the stock market. Macroeconomic factors, such as inflation, GDP, industrial production, oil prices, and consumption, have a direct influence on a company's future cash flows and the discount rates used to determine their fair values. These factors have a direct impact on stock returns since a company's return depends on its future cash flows and the discount rate. Determining the appropriate macroeconomic variables necessitates making a subjective decision based on existing theory and empirical evidence (Chen et al., 1986).

Stock markets are expected to help economic growth via two primary mechanisms: firstly, by stimulating domestic savings, and secondly, by increasing and improving the quality of investments. The relationship between fluctuations in the national economy and the expansion of the stock market has been widely acknowledged, with the stock market becoming more dynamic as a country's economic circumstances improve (Sahu, 2016).

Comprehending the determinants of variations in stock market indexes is crucial. Multiple macroeconomic indicators, such as foreign exchange reserves, employment rates, budget deficits, foreign trade, international stock markets, small savings, open market operations, inflation, interest rates, money supply, GDP, crude oil, gold, and silver prices, exchange rates, foreign institutional investment (FII), and balance of payments, have the potential to influence stock prices (Sahu, 2016).

The literature thoroughly analyses a wide range of macroeconomic indicators. Chen et al. (1986) argue that identifying the relevant elements of macroeconomic issues is a complex task that requires consideration of both existing theory and empirical evidence. This research focuses on examining the influence of three key macroeconomic factors namely: real GDP growth rate, net portfolio investment, and exchange rate on the returns of the Palestine Exchange's Index (Al-Quds index).

2.1 Real GDP Growth

The stock market's performance is heavily impacted by the state of the economy. Gross Domestic Product (GDP), a metric that quantifies economic activity, is extensively used in research (Acikalin et al., 2008; Mohammed, 2022; (Pražák & Stavárek, 2017); Sabri, 2016). Several studies provide evidence of a direct relationship between economic activity and stock returns. The discounted cash flow models of stock valuation suggest a positive correlation between the value of the stock and the expected future cash flows (Fama & French, 2002). As the growth

of GDP is anticipated, it is expected that future corporate earnings and cash flow will increase, thereby impacting positively the stock prices and market returns. (Modigliani & Brumberg, 1954) argue that growing GDP leads to an increase in the household wealth with the subsequent enhancement in consumer confidence and increased levels of spending. This is in turn, has the potential to yield higher corporate profits and stock returns. The Efficient Market Hypothesis (EMH) states that stock prices reflect all available information, including macroeconomic indicators like GDP. Therefore, if the markets are semi-strongly efficient, positive GDP announcements should quickly impact stock prices (Fama, 1970).

(Lee, 1992) utilizes the vector autoregressive (VAR) methodology on U.S. data and discovers a positive correlation between real stock returns and increase in industrial output. (Humpe & Macmillan, 2009) find a direct correlation between stock prices in the United States and Japan and industrial output. In their study, (Kalyanaraman & Tuwajri, 2014) investigate the enduring correlation between industrial production (IP) and the Saudi all-share stock index, and discover a sustained connection. Acikalin et al. (2008) establish a persistent, enduring correlation between GDP and stock market returns on the Istanbul Stock Exchange (ISE). Khataybeh and Ghassan (2021), Al-Zararee and Ananzeh (2014) find a negative relationship between the real GDP and ASE's performance. However, Mohamed and Ahmed (2018) find a positive but insignificant relationship between the GDP and stock market return

Abugri (2008) argues that industrial output levels positively impact stock returns in Brazil and Chile, but do not have a noticeable effect on expected stock returns in Argentina and Mexico. Pražák & Stavárek (2017) examine the influence of GDP on the stock prices of financial services companies listed on several stock markets, revealing a clear correlation between GDP and stock prices. (Pooja & Pooja, 2018) use the vector error correction model (VECM) to analyze the correlation between industrial output and stock returns in the BSE Sensex. Their findings reveal a Granger causality link between the BSE Sensex and the industrial production index.

In the Palestinian context, Mai et al. (2019) see a substantial impact of GDP on stock index returns, however Sabri (2016) does not identify any noticeable connection between GDP and market index performance. In their study, Haneen and Murad (2011) examine the relationship and causal connection between the Palestine market index and other macroeconomic indicators, such as GDP. Their findings indicate that there is no noticeable correlation between these variables. An exhaustive examination of these studies reveals a continuous and positive relationship between actual economic activity and stock returns in both developed and developing countries. Thus, the first set of hypotheses might be stated as:

H_1: A considerable positive correlation exists between real GDP and stock market performance.

H_2: A cointegrating link exists between the real GDP growth and the stock market returns in both the short and long term.

2.2 Net Portfolio Investment (NPI)

Net portfolio investment refers to the net movement of funds into and out of a country's investment assets. It represents the net change in domestic investors' transactions in international markets, subtracting foreign investors' transactions in the country's financial markets, which include bond and equities markets, during a certain time period. This statistic is an essential element of a country's balance of payments and acts as a gauge of investor trust in the nation's economy and financial system. The data have significant value in understanding the flow of money across international boundaries and in assessing the attractiveness of a nation's financial markets for policymakers, analysts, and investors.

Foreign investor equity purchases, as part of the net portfolio investment category that includes stocks, bonds, and other financial instruments, is found to affect stock performance in the host country. (Sharpe, 1964). The same factors influencing foreign direct investments also influence the flow of portfolio investments within countries: interest rates, exchange rates, and economic growth. Portfolio Theory suggests that the optimum addition to the risk-return profile is achieved by spreading investments internationally. This implies that an increase in NPI would reflect the confidence of foreign investors in the economic prospects of the host country and imply, hence, in principle, higher stock market returns due to the rise in demand for equities (Markowitz, 1952). According to the Efficient Market Hypothesis (EMH), The net portfolio investment, NPI, should be motivated by expectations of future stock returns according to new information. Thus, when investors increase their level of NPI, they are signaling good things ahead in consideration of the future performance of the stock market. The opposite normally happens when NPI goes down. Moreover, the Capital Asset Pricing Model (CAPM) assumes that the expected return on an investment is linearly related to its risk. In this whole context, NPI flows are able to influence the functioning of stock markets, thereby increasing the perception of risk and return in investments. For instance, an increase in NPI could be associated with a reduction in the market risk premium, as increased liquidity and reduced volatility from NPI could be used to boost stock prices.

Enabling overseas investors to access capital markets yields many advantages, including the reduction of capital expenses, the diversification of risk among local and international investors, and the bridging of the gap between savings and investment (Errunza & Losq, 1985; Blonigen, 1997; (Grubel, 1968)). Additionally, it supplies the necessary foreign currency to tackle the existing imbalance in the current account (Garg & Dua, 2014) and improves market efficiency by attracting foreign investment that has access to superior information (Bekaert & Harvey, 2000)

Nevertheless, there are disadvantages associated with the attraction of foreign investment, since these financial inflows are vulnerable to abrupt decelerations and swift reversals, which have the potential to amplify market instability (Padhan & Prabheesh, 2019). Foreign investors' use of positive feedback trading tactics might result in excessive stock price reactions to macro-

economic fluctuations (Dornbusch & Pak, 1995; Choe et al., 1999). Financial crises may lead to stock market instability as a consequence of the short-term speculative actions of foreign investors, leading to abrupt withdrawals (Kim & Wei, 2002; Singh & Weisse, 1998).

(Topaloğlu et al., 2019) examine the influence of portfolio investments on stock returns in E7 nations (Brazil, China, Indonesia, India, Mexico, Russia, Turkey) over the period of 2005 to 2016. Their analysis reveals a strong and positive correlation between the performance of the stock market and investments in international portfolios. (Berko & Clark, 1996) discovered a significant and positive correlation between monthly foreign acquisitions of Mexican equities and the Mexican market's performance, which lends credence to the concept of expanding the tax base. Omar et al. (2022) demonstrate an immediate positive connection between foreign direct investment and the growth of Pakistan's stock market, albeit with a harmful long-term relationship. Paramati et al. (2016) conducted a study on 20 developing nations from 1991 to 2012. Their findings indicate a favorable relationship between foreign investment and long-term stock market performance. The empirical evidence demonstrates a direct correlation between the growth of the stock market and foreign direct investment, which gives rise to the formation of the following hypotheses:

H_3: A considerable positive correlation exists between *net portfolio investment* and stock market performance.

H_4: A cointegrating link exists between the *net portfolio investment* and the stock market returns in both the short and long term.

2.3 Exchange Rate

Stock returns are significantly impacted by exchange rates, particularly in economies with substantial levels of international transactions. Empirical research shows contradicting effects of the exchange rate on stock market performance due to various factors that impact exchange rate fluctuations. Because of the increased competitiveness of global commerce, exchange rates can have a favourable effect on stock performance. The decline in value of a nation's currency has a favourable impact on exports and, consequently, on business cash flows. On the other hand, a rise in local spending brought about by an appreciation of the currency benefits customers, businesses that rely on imports, the travel and tourism sector, capital goods, and machinery. Furthermore, portfolio investment rises with local currency appreciation. That is, a rise in interest rates can cause a country's currency to appreciate via raising discount rates. The study conducted by (Singh et al., 2011) investigates the relationship between the returns of Taiwan's stock market and several macroeconomic parameters, including the exchange rate. The findings indicate that changes in the exchange rate have an impact on stock returns. (Megaravalli & Sampagnaro, 2018) analyse the relationship between economic indicators and stock market

performance in China, Japan, and India. A significant positive association is shown between exchange rates and stock market performance. Barakat et al. (2016) found a direct cause-and-effect link and a long-term connection between the exchange rate and stock market returns in Egypt and Tunisia. Epaphra (2018) examines the relationship between a group of macroeconomic variables, such as exchange rates, and the performance of 10 companies listed on the Tanzanian Dar es Salaam Stock Exchange. By analyzing monthly data from 2012 to 2016, the researchers use the Vector Error Correction Model (VECM) and Johansen cointegration analysis to determine that exchange rates have a beneficial impact on stock returns. (Norehan & Ridzuan, 2020) use the ARDL methodology to examine the influence of macroeconomic factors on the Malaysian stock market. Their findings suggest a consistent and a positive relationship between the exchange rate and the stock market over a prolonged period of time. Anusha et al. (2022) examines the impact of the exchange rate on the performance of the Colombo Stock Exchange (CSE). The research uses the Auto-Regressive Distributed Lag (ARDL) bounds testing technique to determine that there is no long-term relationship between the exchange rate and all share price indexes. However, it does find a positive correlation between the exchange rate and all share price indexes in the short term.

The Israeli Shekel is the most prevalent form of cash for usage throughout Palestine as there is no national currency. Changes in the Israeli Shekel have an immediate effect on the expenses and revenues of businesses. A rise in the price of imported goods is anticipated as a result of the Israeli Shekel's strengthening, which will lower the firms' cash flows. As a result, the following hypotheses are stated as follows:

H_5: A considerable positive correlation exists between *the exchange rate* and stock market performance.

H_6: A cointegrating link exists between the *exchange rate* and the stock market returns in both the short and long term.

3. Methodology

3.1 Data & Empirical Specification

The aim of this research is to evaluate the influence of a set of macroeconomic variables: real GDP growth, exchange rate, and net portfolio investment (measured in US dollars) on the performance of the Palestine Exchange's returns. To ensure brevity, we intentionally limited the number of variables included in our study. This simplified technique is successful since adding more variables may not necessarily improve the model, but instead make it more difficult to identify the correlations between the components being studied.

From 1997 until 2022, we collected macroeconomic data from the World Bank Data Bank and obtained the price series for the Palestine Exchange index, commonly known as the Al-Quds index, from Investing.com. The stock index's rate of return is computed throughout the time span from 1998 to 2022. This time period represents the longest time window ever studied in the Palestinian context. In addition, the Palestine Exchange started its activities in 1997; thus, beginning the study in that year ensures that the analysis includes a substantial and representative period for the Palestine Exchange's development and performance. In addition, the chosen time period encompasses various economic cycles, therefore, a comprehensive analysis of how the macroeconomic variables have influenced stock market performance over time can be performed.

In order to address the potential occurrence of heteroscedasticity, most of the variables were converted into their natural logarithms, following the methods used in previous research (Çetin et al., 2015; Faisal et al., 2017; (Turgut et al., 2017). The net portfolio investment, which sometimes shows negative values, is assessed at the level.

Table 1: Summary Statistics

Variable	Symbol	Measurement
Stock Market Return	Ret	% Δ Ln (Al quds Index)
Real GDP Growth	RGDPG	Ln (real GDP in US$- 2015 prices)
Net Portfolio Investment	PTF	Net Portfolio Investment in US dollar
Exchange rate	LILS	LN(Israeli Shekel/US dollar)

Table 2 displays the measurements of central tendency and dispersion for the pertinent variables. The Palestine Exchange had an average mean return of 5.7% throughout the study period. This is coupled with a standard deviation of 32.29%, indicating a very volatile shares market. However, it is worth noting that there is a positive skewness in stock returns during the whole study period. This suggests that losses are relatively small in comparison to the significant and rare profits. During the research, the highest recorded loss is 49.5%, while the greatest gain seen

is 115%. Moreover, the distribution of returns exhibits leptokurtic characteristics, indicating a positive excess kurtosis. This implies that the returns on the Al-Quds index are more extreme compared to a normal distribution, highlighting the elevated level of risk. The Palestine exchange, as an emerging market, is subject to higher level of fluctuations due to numerous factors such as political and financial instability, limited liquidity, and external economic shocks. These factors contribute to more extreme price movements, which result in higher kurtosis than normal (6.75).

Table 2: Summary Statistics

	RET	RGDPG	PTF	LILS
Mean	0.057331	0.036378	65431828	1.355216
Median	-0.01677	0.045915	79283856	1.34562
Maximum	1.151692	0.198238	3.67E+08	1.555578
Minimum	-0.49499	-0.13341	-1.49E+08	1.172544
.Std. Dev	0.32291	0.080276	1.14E+08	0.103507
Skewness	1.670883	-0.52552	0.322374	0.309204
Kurtosis	6.753082	3.05285	3.491237	2.128804
Jarque-Bera	26.30523	1.15361	0.68439	1.188969
Probability	0.000002	0.56169	0.71021	0.551847
Sum	1.433267	0.909457	1.64E+09	33.88041
.Sum Sq. Dev	2.502499	0.15466	3.13E+17	0.257127
Observations	25	25	25	25

The real GDP growth rate has a standard deviation of 8.0% and an average of 3.6%. The kurtosis value of 3.05 and skewness value of -0.52 suggest that the variable follows a normal distribution. Moreover, the null hypothesis of the Jarque-Bera test remains unchallenged. The net portfolio investment, with an average of US$65.4 million, has sometimes shown negative values during the research period, with the largest negative number reaching 149 million. The variable's distribution is normal, shown by the p-value of the Jarque-Bera test above the 5% significance threshold.

3.2 The Model

The research uses the Autoregressive Distributed Lag Model (ARDL) bounds test technique, which was proposed by (Pesaran et al., 2001) and (Pesaran & Shin, 1998). The ARDL bounds test is a statistical instrument used to ascertain the presence of an enduring link, known as cointegration, between variables. Compared to conventional cointegration testing, This technique offers various benefits. Importantly, it may be used independently of the sequence in which variables are integrated, enabling the estimate of mixed integrated variables at their

respective levels. Furthermore, it allows for the simultaneous estimate of long-term and short-term parameters using the unconstrained error correction model (UECM). The model may be obtained by applying a simple linear modification to the ARDL bounds test, as shown by Çetin et al. (2015). Furthermore, the use of ARDL yields more dependable outcomes when dealing with small and restricted sample sizes. According to the claims made by Pesaran & Shin (1998) and Pesaran et al. (2001), every variable in this process is regarded as endogenous. The ARDL model with order (p,q) is estimated as follows:

$$y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \, y_{t-i} + \sum_{i=0}^{q} \delta_i \, x_{t-i} + \varepsilon_t \quad \textit{Equation 1}$$

The number of lagged terms for the dependent variable is indicated as p, whereas the number of lags for the independent variable is represented by q. The model is represented using an Autoregressive Distributed Lag (ARDL) structure, denoted as (p,q), which allows for the inclusion of various lagged terms and many independent variables. The most suitable lag duration is calculated by using information criteria such as Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC).

3.3 ARDL Bounds Test

ARDL bounds testing is used to evaluate the presence of a long-term relationship between variables. Nevertheless, this approach does not provide any understanding of the directional causation of the connection. Engle & Granger (1987) suggest that variables exhibiting cointegration will possess an error correcting representation. The estimate of the unconstrained error correction model (UECM) is as follows:

$$\Delta y_t = \beta_0 + \sum_{i=1}^{p} \gamma_i \, \Delta y_{t-i} + \sum_{i=0}^{q} \delta_i \, \Delta x_{t-i} + \varphi_1 y_{t-1} + \varphi_2 x_{t-1} + \varepsilon_t \quad \textit{Equation 2}$$

Where is he drift component, is the white noise disturbance term. and are the error correction terms and represent the short-run components, and the coefficients of and denote the long run relationship.

The above equation is estimated using the ordinary least squares (OLS). The resultant coefficients of and are tested jointly under the null hypothesis of no cointegration. That is, verus . This hypothesis is tested using F-test. The calculated F statistic is compared to the critical thresholds established by Pesaran et al. (2001). Rejecting the null hypothesis indicates the presence of a persistent connection between the variables. Upon rejecting the null hypothesis, we continue to estimate the Vector Error Correction Model (VECM) to examine the long-term dynamics and the Autoregressive Distributed Lag (ARDL) specification to study short-term causation. VECM and Causality Test.

Once a long-term link has been established, the next stage is to estimate the correlation between

returns and macroeconomic factors. This is accomplished by employing the delayed residuals obtained from the long-term model to estimate a restricted Vector Error Correction Model (VECM) inside the Autoregressive Distributed Lag (ARDL) framework. The process is delineated in the following manner:

$$\Delta Ret_t = \alpha_0 + \sum_{i=1}^{p} \beta_1 \Delta Ret_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta RGDPG_{t-i} + \sum_{i=0}^{q} \beta_3 \Delta PTF_{t-i} + \sum_{i=0}^{q} \beta_i \Delta LILS_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

Equation 3

The represent the lagged error term from the long run equation. represents the speed of adjustment to the long-term equilibrium.

The Granger representation theorem proposed by Granger in 1986, asserts that the presence of a cointegrating relationship between two variables implies the existence of at least one unidirectional causal link among them. The VECM in matrix form may be used to determine the

$$\begin{bmatrix} \Delta Ret_t \\ \Delta RGDPG_t \\ \Delta PTF_t \\ \Delta LILS_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \sum_{i=1}^{n} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} \end{bmatrix} \begin{bmatrix} \Delta Ret_{t-i} \\ \Delta RGDPG_{t-i} \\ \Delta PTF_{t-i} \\ \Delta LILS_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \end{bmatrix}$$

where, $\alpha 1$ to $\alpha 4$ represent the constant terms; 11 to 44 represent the short-run estimates of the VECM model, $\lambda 1$ to $\lambda 6$ represent the error correction coefficients and $\varepsilon 1$ to $\varepsilon 4$ represent the white noise terms.

The long-run causal relationship between the variables can be verified by testing the null hypotheses $H_0 : \lambda_1 = \lambda_2, = \lambda_3 = \lambda_4 = 0$ while as the short-run causality between the variables can be established through the lagged $\beta_{mn,i}$ coefficients by jointly testing the null hypotheses

$$H_0 : \beta_{mn;1} = \beta_{mn;2} = \beta_{mn;3} = \beta_{mn;4} = 0. .$$

4. Analysis & Results

4.1 Stationarity of the Variables

The property of stationarity is essential for a time series, since it enables the use of the ordinary least squares (OLS) technique, as well as common statistical tests such as the t-test and F-test. When considering the ARDL model, it is crucial to determine the stationarity of variables in order to avoid include variables that are integrated with an order higher than one.

A time series is deemed stable when its average, dispersion, and autocovariance stay constant during its duration. The research used the Augmented Dickey-Fuller (ADF) test, according to the specified procedure:

$$\Delta y_t = \gamma_0 + \gamma_1 t + (\beta - 1) y_{t-1} + \delta_1 \Delta y_{t-1} + e_t \qquad \textit{Equation 4}$$

Furthermore, a Phillips-Perron (PP) test is performed. The Phillips-Perron (PP) test has resemblances to ADF tests, but it incorporates an automated modification to the Dickey-Fuller (DF) method in order to tackle autocorrelated residuals, as emphasized by Brooks in 2019. Performing regression analysis on two nonstationary series might result in a false regression that lacks meaningful interpretation. Nevertheless, when the series are integrated to the same degree, a cointegration connection may ascertain if the stochastically trending series exhibit a long-term equilibrium association (Brooks, 2019; (Laopodis, 2021)

The use of the Augmented Dickey-Fuller (ADF) test indicates the use of integrated variables in combination. The null hypothesis of both the ADF and PP tests posits that a series has a unit root, suggesting non-stationarity. The unit root test results exhibit coherence for both the ADF and PP tests, as reported in Table 3. According to the data, three variables, RET, RGDPG, and PTF, demonstrate stationary behaviour at the level, whereas the fourth variable, LILS, is non-stationary.

Table 3: ADF and PP –Variables in Levels

	Augmented Dickey Fuller Test			Phillips-Perron Test		
	None	Intercept	Trend	None	Intercept	Trend
RET	-4.7003***	-4.6716***	-4.6488***	-4.6967***	-4.6673***	-4.6491***
RGDPG	-3.4983**	-3.8729**	-3.2599***	-3.5564**	-3.4534*	-3.3118***
PTF	-4.1186***	-4.2306**	-3.3786***	-4.1144***	-4.2291**	-3.3857***
LILS	-1.1416	-3.3993*	-0.4845	-1.1584	-3.4073*	-0.6145

**** statistically significant at 1% level, ** statistically significant at 5% level, *statistically significant at 10% level*

Consequently, all the variables are integrated up to a maximum order of one. Out of the four variables, three exhibit stationarity at the level, but the fourth variable, the exchange rate (LILS), demonstrates stationarity at the first difference. The results of the ADF and PP unit root tests done on the first differenced variables are shown in Table 4. The exchange rate is found to sta-

bilize and integrate at a first-order level, with none of the series included showing integration at a second-order level or above.

Table 4: ADF and PP- Variables in First Difference

	Augmented Dickey Fuller Test			Phillips-Perron Test		
	None	Intercept	Trend	None	Intercept	Trend
RET	***-7.7045	***-7.5674	***-7.884	***-12.031	***-9.9325	***-12.382
RGDPG	***-4.3581	***-4.2999	***-5.0205	***-6.3157	***-5.8743	***-6.5597
PTF	***-7.8114	***-7.6218	***-7.9818	***-9.5909	***-9.4144	***-8.7827
LILS	***-4.4855	***-4.6182	***-5.6824	***-6.0757	***-6.0913	***-5.7018

**** statistically significant at 1% level, ** statistically significant at 5% level, *statistically significant at 10% level*

4.2 Model Estimation

In order to estimate the ARDL *(p,q1,q2,q3*) model, the appropriate number of lags for each variable is found using the Akaike information criteria (AIC). This optimum solution is not affected by the information criteria, since it yields the same optimal lag length according to the Akaike information criterion, Schwartz Bayesian information criterion, and Hannan-Quinnen (HQ) information criterion. Thus, the projected model:

$$RET_t = \beta_0 + \sum_{i=1}^{p} \gamma_i \, RET_{t-i} + \sum_{i=0}^{q1} \delta_i \, RGDPG_{t-i} + \sum_{i=0}^{q2} \theta_i \, PTF_{t-i} + \sum_{i=0}^{q3} \omega_i \, LILS_{t-i} + \varepsilon_t$$

Equation 5

4.2.1 ARDL Bounds Test

The results of the ARDL bounds test are shown in Table 5. The null hypothesis of this test posits the absence of cointegration between the variables, indicating the lack of a long-term link between the variables of interest. If the calculated test statistic values above the upper critical threshold, it indicates the presence of cointegration. If the test statistic values are below the lower critical constraint, it suggests that there is no evidence of cointegration. Moreover, if the values of the test statistic are between the lower and higher critical boundaries, the test is deemed inconclusive.

Table 5: ARDL bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.96710	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

The calculated F statistic of 10.97 exceeds the upper critical limit (UCB) at the 1% level of significance. Thus, we reject the null hypothesis and establish the existence of a long-term connection between the variables under investigation. Therefore, we can conclude the existence of a long-run relationship between the studied macroeconomic variables and Palestine Exchange's returns (Laopodis, 2021).

Table 6 shows the long-term relationship between the Al-Quds index's return and the macroeconomic factors. The real GDP growth has a statistically significant long-run positive effect of 3.93. This data indicates that a 1% increase in GDP leads to a 3.93% growth in Al Quds returns. According to the present value model, the growing economy reflects improved cash flows as well as increased consumer confidence which leads to increased stock prices and returns. This finding confirms the majority of empirical findings in both established and developing markets, as well as theoretical frameworks (Abugri, 2008; Chen et al., 1986; Humpe & Macmillan, 2009; Lee, 1992; Pooja & Pooja, 2018; Praák & Stavárek, 2017). However, it contradicts earlier research conducted in Palestine (El Najjar, 2022; Mai et al., 2019; Sabri, 2016) and those outside Palestine (Samanta & Deo, 2021)

Net portfolio investment has a minimal impact on Palestine Exchange's returns, as only a little positive effect has been seen. This demonstrates that the influx of foreign investment into the country is predominantly directed towards tangible assets, namely real estate, rather than financial assets. This finding is in direct opposition to the conclusions drawn by Adam & Tweneboah (2009), Omar et al. (2022), and (Topaloğlu et al., 2019). The elevated geopolitical risk in Palestine has deterred investors from allocating their capital to financial assets. Moreover, the Palestinian market is constrained by a limited range of investment options, hence restricting participation to local investors and a few international investors. Furthermore, the limited access and substandard nature of data accessible to global investors hinder the attraction of foreign investment.

Table 6: Long-run Relationship

Variable	Coefficient	Std. Error	t-Statistic	.Prob
RGDPG	3.93407	1.094115	3.595664	0.036875
PTF	7.50E-09	3.94E-10	19.035533	0.000317
LILS	-8.688513	2.76358	-3.816848	0.031641
(EC = RET - (3.9341*RGDPG + 0.0000*PTF -8.6885*LILS				

The exchange rate has a detrimental impact on the return of the Al-Quds index, with a negative coefficient of -8.69. This implies that a 1% appreciation in the Israeli Shekel exchange rate leads to an 8.69% decline in the return of the Al-Quds index. The reason for this significant elasticity is that all Palestinian listed firms disclose their financial information exclusively in either US dollars or Jordanian dinars (reporting currency). Consequently, the appreciation of the Israeli Shekel leads to a decline in the reported profitability and cash flows. The majority of previous studies (Anusha et al., 2022; Megaravalli & Sampagnaro, 2018; Norehan & Ridzuan, 2020(Budi & Faizin, 2024; Kamal, 2022; Keregero, 2023) challenge the notion that exchange rates have a negative impact. However, our results confirms that in (Javangwe & Takawira, 2022; Mohnot et al., 2024). The difference in findings can be attributed to distinct characteristics of Palestinian listed companies, such as their dependence on currency in reporting, which may differentiate their behaviour from the general patterns shown in other studies.

4.2.2 Error Correction Model (ECM)

The error correction model (ECM) is employed to capture the short-run dynamics and the long-run equilibrium relationship between Al-Quds returns and the three key macroeconomic variables. ECM is a powerful tool for understanding how deviations from the long-term equilibrium are corrected over time and how macroeconomic variables influence short-run stock market movements. The error correction model (ECM) is calculated using equation 6.

$$\Delta Ret_t = \alpha_0 + \sum_{i=1}^{p} \beta_1 \Delta Ret_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta RGDPG_{t-i} + \sum_{i=0}^{q} \beta_3 \Delta PTF_{t-i} + \sum_{i=0}^{q} \beta_i \Delta LILS_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

Equation6

ECT_{t-1} replaces the ARDL Bounds test long-run coefficients in equation 6 and reflects a parsimonious ECM, where is the speed of adjustment to long-run equilibrium.

The error correction term (ECT) of -0.148 represents the speed of adjustments to the long-run equilibrium. The results are statistically significant at a significance level of 5%. This suggest that around 14.8% of any deviation from the long-run equilibrium is adjusted within a single period. The negative sign confirms that the stock market returns converge back to equilibrium after being impacted by macroeconomic fluctuations. This result is similar to that found (ACH, 2024; Alzoubi, 2022; Arikewuyo et al., 2020; Chola, 2024; David et al., 2024; de Melo &

Gomes, 2021; Gbanador; Muthukumar et al., 2024; Ordue et al., 2024; Udo et al., 2022; Zaki et al., 2018)

Table 7: ECM Regression

Variable	Coefficient	Std. Error	t-Statistic	.Prob
C	1.915245	0.201799	9.490833	0.0025
((D(RET(-1	-1.530048	0.097146	-15.7501	0.0006
((D(RET(-2	-1.191725	0.123307	-9.66473	0.0024
(D(RGDPG	2.607714	0.375241	6.949446	0.0061
((D(RGDPG(-1	6.36228	0.465131	13.67847	0.0008
((D(RGDPG(-2	8.874404	0.729022	12.17303	0.0012
((D(RGDPG(-3	2.132637	0.504231	4.229487	0.0242
(D(PTF	1.79E-10	1.33E-10	1.347326	0.2706
((D(PTF(-1	-1.49E-09	1.59E-10	-9.37396	0.0026
((D(PTF(-2	-1.47E-09	1.91E-10	-7.68288	0.0046
(D(LILS	2.809253	0.57598	4.877347	0.0165
((D(LILS(-1	0.091303	0.299303	0.305051	0.7803
((D(LILS(-2	1.386123	0.322086	4.303584	0.0231
((D(LILS(-3	-0.532266	0.392417	-1.35638	0.268
(CointEq(-1	-0.148367	0.01584	-9.36679	0.0026

R-squared	0.993172	Mean dependent var		0.014075
Adjusted R-squared	0.97724	S.D. dependent var		0.447315
S.E. of regression	0.067484	Akaike info criterion		-2.37804
Sum squared resid	0.027325	Schwarz criterion		-1.63195
Log likelihood	39.96939	.Hannan-Quinn criter		-2.21612
F-statistic	62.33733	Durbin-Watson stat		2.040057
(Prob(F-statistic	0.000026			

The coefficients presented in Table 7 demonstrate short-term causality. The short-term analysis indicates that real GDP growth has a significant and positive impact on stock market returns across multiple time lags. The contemporaneous effect of real GDP growth (D(RGDPG)) shows a coefficient of 2.6077 with a t-statistic of 6.9494, which is statistically significant at the 1% level. Moreover, the effect of lagged GDP growth variables D(RGDPG(-1)), D(RGDPG(-2)), and D(RGDPG(-3)) continues to be statistically significant, with high coefficients, further reinforcing the strong positive relationship between economic growth and stock market performance. The persistence of this relationship across multiple lags suggests that GDP growth drives stock returns not only immediately but also over several periods, aligning with economic theory that associates economic expansion with higher stock market valuations.

The results for net portfolio investment (PTF) present a mixed picture. The contemporaneous effect of net portfolio investment (D(PTF)) is statistically insignificant, indicating no immediate impact on stock returns. However, the lagged terms of net portfolio investment, D(PTF(-1))

and D(PTF(-2)), show negative coefficients (-1.49E-09 and -1.47E-09, respectively), both statistically significant at the 1% level (p-values of 0.0026 and 0.0046). These findings suggest that while net portfolio investment does not have a direct contemporaneous impact on stock returns, past investment flows can have a delayed and adverse effect on the stock market. This may reflect the volatility and uncertainty associated with foreign capital flows in Palestine, particularly in the context of geopolitical risks.

The exchange rate (Israeli Shekel/US Dollar) demonstrates a complex relationship with stock returns. The contemporaneous effect (D(LILS)) shows a positive and significant coefficient of 2.8093, suggesting that an appreciation of the Israeli Shekel initially boosts stock returns. However, this positive effect diminishes in the subsequent lag periods. For instance, D(LILS(-2)) remains positive and significant, with a coefficient of 1.3861, while D(LILS(-3)) turns negative and insignificant. These findings imply that while the exchange rate can provide short-term gains to the stock market, the effects are not sustained over time and may reverse, reflecting the underlying instability caused by exchange rate fluctuations.

The ECM model exhibits strong explanatory power, with an R-squared value of 0.9932, indicating that approximately 99.3% of the variation in stock returns is explained by the model. The **a**djusted R-squared value of 0.9772 further confirms the robustness of the model, considering the number of variables included.

The Wald test is used to evaluate the null hypothesis that the lagged value of each variable has a significant influence on the return of the variable, which is distinct from zero and hence has a short-term impact on Al Quds index returns. The results provide evidence to reject the null hypothesis and confirm the presence of short-term causality between each of the variables examined and the returns of the Al-Quds index.

4.3 Diagnostic Checks

Several indicators are used to evaluate the strength and reliability of the projected outcomes. The tests include assessments of residuals normalcy, serial correlation, heteroscedasticity, and stability.

4.3.1 Normality Test

The Jarque-Bera normality test is used to verify the normality of the residuals. The null hypothesis of this test posits that the residuals exhibit a normal distribution. The test results indicate that the residuals follow a normal distribution at a significance level of 5%, with a probability of 0.689, which exceeds the 5% significance threshold. Consequently, the null hypothesis that the residuals have a normal distribution is not disproved.

4.3.2 Serial Correlation

The Breusch-Godfrey serial correlation LM test is used to examine the null hypothesis of no serial correlation in the residuals. The objective of this test is to determine if there are any discernible patterns or unexplainable information that still exist inside the model.

Table 8: Breusch-Godfrey Residual Serial Correlation LM Tests

Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.748668	(Prob. F(2,1	0.6328
Obs*R-squared	0.125914	(Prob. Chi-Square(2	0.5935

Table 8 indicates that the probability of the null hypothesis is 0.6328, which above the 5% threshold of significance. Consequently, we are unable to reject the null hypothesis that there is no serial correlation. Additionally, the model accurately captures the temporal dependencies of the data without displaying any serial correlation in the residuals.

4.3.3 Heteroscedasticity Test

The heteroscedasticity test aims to assess whether the residuals of the estimated model exhibit a consistent variance across time. The results of the Breusch-Pagan-Godfrey heteroscedasticity test are shown in Table 9. Thus, we are unable reject the null hypothesis regarding the presence of homoscedastic residuals.

Table 9: Breusch-Pagan-Godfrey Heteroscedasticity Test Results

Null hypothesis: Homoskedasticity			
F-statistic	1.180711	(Prob. F(17,3	0.5129
Obs*R-squared	1.82694	(Prob. Chi-Square(17	0.372
Scaled explained SS	0.300938	(Prob. Chi-Square(17	0.9989

This conclusion is further reinforced using ARCH test of Heteroscedasticity. Table 10 shows that the model is free from ARCH, time varying residuals.

Table 10: ARCH Test of Heteroscedasticity

Heteroscedasticity Test: ARCH			
F-statistic	2.007368	(Prob. F(1,18	0.1736
Obs*R-squared	2.006629	(Prob. Chi-Square(1	0.1566

4.3.4 Stability Test

The stability test verifies that the connection between the variables stays consistent over time. Examining the stability of coefficients is essential since these tests evaluate both the overall

structure of the model and the consistency of the coefficients throughout different time periods. Stability testing is conducted on ARDL models for several purposes. Firstly, there are partnerships that change throughout time. The interconnections of economic variables may fluctuate over time as a result of changes in structure, policy, technology, and other external influences. Stability tests can determine if these associations exhibit consistent stability or undergo significant changes over time. Furthermore, the issue at hand is to the soundness of deductions. The accuracy of inferences and reliability of predictions rely on the constancy of the model's coefficients and connections. The model's predictive capacity may be constrained or imprecise due to volatile relationships among the variables.

The coefficients' stability in Figure 1 is apparent by using CUSUM (cumulative sum) and CUSUM of squares tests. These tests exhibit robust consistency when the data point is inside the confidence interval. This suggests that the calculated coefficients are dependable and coherent, exhibiting no noteworthy variation from the anticipated values. This discovery should alleviate any concerns the model's user may have about its stability and trustworthiness, since it indicates that the connections between variables stay constant throughout time.

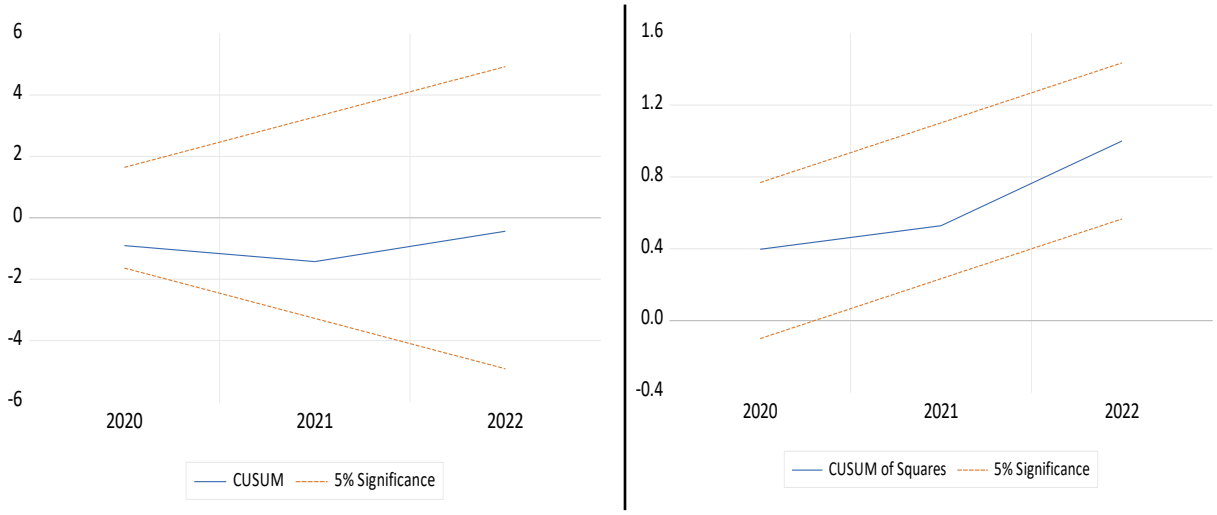

Figure 1: Tests of Stability- CUSUM and CUSUM of Squares

5. Conclusion & Recommendation

This paper investigates the complex relationship between stock market returns and macroeconomic variables in the Palestinian environment and thoroughly explores their dynamic interaction. In order to evaluate their impact on stock market performance, three fundamental macroeconomic variables are investigated: real GDP growth, net portfolio investment, and exchange rate.

The study uses the autoregressive distributed lag (ARDL) model to identify the cointergrating link between the stock market return and the three variables. The results confirm the existence of a cointergrating relationship between the stock market returns in Palestine and the investigated macroeconomic variables. However, the transition to the stable situation occurs very smoothly. In addition, Real GDP growth in Palestine has a significant and positive impact on the PEX's returns. Net portfolio investment shows minimal impact on stock market return, which reflects that heightened geopolitical risks and limited investment options available to foreign investors. Exchange rate exhibits a significant negative effect on stock returns. The adverse influence of the exchange rate (Israeli Shekel per US dollar) on stock market returns is apparent. Moreover, Palestinian enterprises who disclose their profits and financial flows in currencies other from their primary currency are exposed to additional instability, which entitles using a greater discount rate for their future cash flows.

The study underscores the needs for policy reforms that mitigate the risks associated with exchange rate movements, attract foreign investments, and boost real economic growth, thereby fostering stock market development. Therefore, this study recommends that policy makers should prioritize economic policies that enhances real GDP growth opportunities. Additionally, the transparency and liquidity of the Palestine Exchange need to be improved. This includes facilitating the licensing of market makers, the development of new tradable financial instruments (such as bonds, tradable Sukuk, and others) and making financial investments more attractive and easier to international investors and funds. Moreover, Palestinian corporations should implement hedging strategies to manage their exposure to foreign currency fluctuations and ensure the stability of their future cash flows.

The study also makes the following policy recommendations aimed at creating suitable and effective interventions. Public policy decision makers need to focus on creating and implementing strategies and policies that stimulate domestic economic growth through infrastructure development, education, and innovation support programs. In addition, public policy makers need to activate the public-private partnerships (PPP) that facilitate investment in growth sectors such as renewable energy, technology, and manufacturing. Furthermore, creating an investor-friendly regulatory environment is a necessity to increase the flows of foreign investment flow. This includes simplifying procedures for foreign portfolio investments, enhancing

access to information regarding the Palestine Exchange and the listed companies, promoting the transparency of financial reporting, and expanding the range of available tradable financial instruments. Palestinian companies need to implement hedging instruments and currency risk management programs to protect their net income and cash flows against exchange rate fluctuations. The absence of a national currency complicates this endeavour.

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