An Analysis of the Palestinian Foreign Trade During the Period 1995–2022: *A Gravity Model Approach*

Hamdi S. I. Sadeh[1]

[1] Pisa Center for Studies and Research, Hebron, Palestine & EENI Global Business School, Tarragona, Spain

Correspondence: Hamdi Sadeh, Pisa Center for Studies and Research, Hebron, West Bank 9020000, Palestine.

Abstract

This research investigates the determinants of Palestinian foreign trade by conducting a comprehensive analysis of various factors influencing both export and import volumes, using the gravity model as the analytical framework. The considered determinants include per capita GDP, Consumer Price Index (CPI), trade agreements, Israeli closure of commercial borders, and Geographical Distance. In terms of exports, the results demonstrate a statistically significant positive relationship with per capita GDP, affirming the hypothesis that heightened economic growth is associated with increased exports. On the import side, the Consumer Price Index (CPI) reveals a statistically significant positive association, showing that increased inflation is linked to a decline in imports, likely due to reduced purchasing power. Contrastingly, trade agreements show a complex relationship with both positive and negative potential impacts on both exports and imports. The complex nature of its impact necessitates further investigation. The Israeli closure of the commercial borders significantly hampers both import and export volumes, underscoring the challenges imposed by Israeli restrictions. Geographical Distance does not emerge as a significant factor in either exports or imports, challenging established economic theories regarding the impact of proximity on trade volumes. The research findings highlight the profound impact of Israeli occupation policies on the Palestinian economy, resulting in significant economic distortions and impeding economic development over several decades. Furthermore, the research shows the inability of the Palestinian Authority to implement independent economic policies due to the dominant role of Israel in decision-making processes. This inability, combined with the significant economic distortions caused by Israeli occupation policies, hinders further economic growth and development, as the Palestinian Authority cannot undertake crucial economic initiatives.

Keywords: Gravity Model, Israeli Occupation, Palestinian Foreign Trade, Trade Agreements

1. Introduction

Despite the pivotal role of the foreign trade sector in the Palestinian economy, the dynamics of its foreign trade significantly diverge from global norms. Since 1967, the Israeli occupation has actively imposed restrictions and erected barriers to impede the growth and development of the Palestinian economy, aiming to exert control and subjugate it to the Israeli economic sphere (United Nations Conference on Trade and Development [UNCTAD], 2012; Naqib, 2002; El-Jafari, 2000; Cottier & Pannatier, 2000). The Israeli occupation has asserted dominance over land, water, markets, and labor (UNCTAD, 2012; Arnon & Bamya, 2015; Botta, 2010). This control ensures that the Palestinian Territory remains the source of a captive market for Israeli goods, contributing to the fact that approximately eighty-six percent of imports to the Palestinian Territory originate from Israel (Palestinian Central Bureau of Statistics [PCBS], 2014; Anthony et al., 2015; Joseph, Katsos, & Daher, 2020; Naqib, 2002). Consequently, these factors have notably impacted Palestinian foreign trade indicators. For instance, the average trade balance deficit in the Palestinian Territory from 1978 to 1993 amounted to approximately 359.21 million USD (PCBS, 2023).

During the era of the Palestinian Authority from 1994 onwards, Israel has continued policies aimed at maintaining control over the Palestinian economy, aligning it with Israeli interests. This has resulted in a weakened productive capacity of the Palestinian economy and a paralysis of the foreign trade movement, particularly following the outbreak of the Al-Aqsa Intifada in 2000 (Anthony et al., 2015). During this period, Israel terminated Palestinian employees working in Israel, inflicted damage on infrastructure, public facilities, and economic installations, closed commercial borders, and imposed a comprehensive blockade on Palestinian

territories (Arnon & Bamya, 2015; World Bank, 2011).

Regardless of signing various economic and trade agreements, including the significant the Paris Economic Protocol (Palestine Economic Policy Research Institute [MAS], 2005), the Palestinian Authority has not effectively utilized the powers granted to it, failing to diversify the economy away from dependence on Israel. The agreement, while providing the Palestinian Authority with certain authorities, remains marred by clauses that hinder Palestinian economic growth and freedom. Unfortunately, the Palestinian Authority has not sought the amendment of these clauses that restrict Palestinian economic development (Arnon & Bamya, 2015). Furthermore, initiatives aimed at expanding and diversifying Palestinian production and attracting foreign investment have not yet achieved their full potential (Cottier & Pannatier, 2000). The Palestinian commercial policy, economic agreements, the National Export Strategy (NES), and the Palestinian National Quality Policy (NQP), all demonstrate a commitment to fostering economic growth; and have not yet yielded initiatives significant results (Palestine Trade Center [PalTrade], 2014).

This is primarily because the implementation of any proposed policy or strategy is not carried out independently of the Israeli side. Consequently, this situation has contributed to a decline in the competitiveness of Palestinian products against imports, resulting in a significant trade balance deficit. Considering the unique challenges surrounding Palestinian foreign trade, this paper broadens the literature review section to offer readers an overview that elucidates the significant challenges facing it over several decades. These challenges have resulted in trade deficits, limited production capacity, and dependence on imports within Palestinian foreign trade.

The literature review reveals extensive use of the Gravity Model in analyzing determinants of foreign trade across diverse countries. Its effectiveness in comprehending trade dynamics and informing economic decisions is well-documented (Doumbe & Belinga, 2015; Keith, 2003). Numerous studies have employed the model to investigate trade patterns in countries like Poland (Brodzicki, 2008), South Korea (Sohn, 2005), Iran (Popova & Rasoulinezhad, 2016), Bangladesh (Roy & Rayhan, 2012), Cuba (Montenegro & Soto, 1997), Nepal (Acharya, 2013), Vietnam (Tri Do, 2006), Syria (Musabbah & Almrei, 2010), Jordan (Majali, 2008), and others. These studies consistently identify key determinants such as geographic distance (Sato, 2020; Leitao, 2010; Alabdali, 2010), GDP per capita (Bergstrand, 1985; Alabdali, 2010; Acharya, 2013), exchange rates (Binh et al., 2012; Waheed & Abbas, 2015), trade agreements (Gillan, 2007; Musabbah & Almrei, 2010; Majali, 2008), and other various economic indicators like the geographical distance and existing of common borders (Subhani, Osman, & Khokhar. 2011).

While there is a wealth of research employing the Gravity Model, a conspicuous gap exists in carried out specific examinations of a wide range of the determinants for foreign trade that cover both exports and imports. This literature gap highlights the necessity for further exploration and analysis to comprehend the factors that influence the bilateral dynamics of both exports and imports in international trade.

This paper presents the challenges faced by the Palestinian economy, particularly about its foreign trade, and highlights the significant trade balance deficit, attributed to disparities in import and export values, compounded by limitations imposed by international agreements and Israeli control over key elements. The paper also aims to analyze the effects of various determinants influencing Palestinian foreign trade using the gravity model with five selected countries as major trade partners with Palestine, including Israel due to its substantial influence. The analysis specifically investigates the effects of GDP per capita, Consumer Price Index (CPI), geographical distance, trade agreements, and the Israeli closure of commercial borders on Palestinian foreign trade. it hypothesizes that at least one or more of these selected determinants has a positive effect on Palestinian foreign trade. The paper employs an expanded the gravity model, based on Newton's law of gravity, and applies it to the comprehensive dataset spanning over 27 years, along with employing the Random-Effects Generalized Least Squares (GLS) regression to investigate the impact of the selected determinants on Palestinian foreign trade.

2. Literature Review

Classical and contemporary trade theories effectively explain the motivations behind countries' participation in global trade. However, they lack insights into the scale of trade flows (Schumacher, 2012). Another alternative theory, the gravity model, has been extensively employed in recent years to analyze international trade patterns and performance (Keith, 2003). This model offers an empirical approach to estimating the volume of trade by drawing inspiration from Newton's universal law of gravitation in physics. It asserts that the gravitational attraction between two objects is proportional to their masses and inversely proportional to the square of their distance (Plummer, Cheong, & Hamanaka, 2010).

The Gravity Model has been extensively applied in various studies, demonstrating its effectiveness in understanding trade dynamics. Doumbe and Belinga (2015) utilized the model to examine the trade relationship

between Cameroon and 28 EU countries. Their results revealed a positive association between Cameroon's trade with the EU, economic size, and GDP per capita, while it was negatively correlated with the distance between trading partners. Popova and Rasoulinezhad (2016) employed the Gravity Model to analyze regional trade in Iran, concluding that regional trade positively affected Iran's trade balance. Roy and Rayhan (2012) utilized the model to analyze import flows to Bangladesh, identifying key determinants such as GDP, exchange rate, trade agreements, and land borders. Montenegro and Soto (1997) employed simulation techniques derived from the results of their estimated gravity model to analyze distortions in Cuban trade. Their study delved into the structure of Cuban trade, assessing the impacts of liberalization on trade development. Majali (2008) focused on factors affecting Jordanian bilateral trade with Arab countries, emphasizing the positive effect of trade agreements on trade flows. Alabdali (2010) used the gravity model to analyze the significant factors affecting intra-GCC trade flows, revealing positive correlations between GCC GDP and both imports and exports. Keith (2003) highlights the importance of the Gravity Model in guiding economic decisions.

Other studies employing the Gravity Model to investigate determinants of trade provide insights into factors influencing international commerce. Bergstrand (1985) focused on the gravity model in international trade, suggesting that the volume of trade between two countries is directly proportional to the product of their economic sizes (usually measured by GDP) and inversely proportional to the distance between them. Sohn (2005) investigated the applicability of the gravity model in analyzing bilateral trade flows for South Korea, proving its effectiveness in explaining South Korea's bilateral trade flows. Subhani et al. (2011) revealed that their developed version of the gravity model explains trade flows more robustly and effectively for developed nations compared to developing nations. Sato (2020) showed that transportation costs negatively influence Kenya's exports, suggesting advantages to trading with neighboring countries. Acharya (2013) used the Gravity Model to analyze Nepal's foreign trade, discovering that an increase in the GDP of partner countries positively affected imports and exports, while geographical distance had a negative impact. Sova, Albu, Stancu and Sova (2009) applied the Gravity Model to analyze patterns of foreign direct investment in new EU countries, identifying GDP, trade agreements, political stability, and exchange rates as key determinants. Tri Do (2006) used the Gravity Model to analyze Vietnam's business activities, determining that the size of the economy, market size, geographical distance, and cultural factors influenced Vietnam's trade with 60 countries. Leitao (2010) examined determinants of bilateral trade between the United States and NAFTA, the European Union, and ASEAN countries between 1995 and 2008, showing that geographical distance has a negative and significant impact, meaning trade increases as transportation costs decrease. Alabdali (2010) used the gravity model to analyze the significant factors affecting intra-GCC trade flows, and revealing positive correlations between GCC GDP and both imports and exports, as well as a negative impact for each of the gross domestic products, geographic distance, and population rate in the four countries under study. Hashai (2001) aimed to predict the potential for trade between Israel and its Arab neighbors. Using the Gravity Model at the industry level, with transportation costs as a key variable, the study found that an accurate proxy for transportation costs, rather than simply geographic distance, provided a better explanation for the volume of trade. This revealed a significantly larger trade potential between Israel and its Arab neighbors compared to previous estimates.

Several studies also delve into regional trade dynamics using the Gravity Model. Montenegro and Soto (1997) analyze distortions in Cuban trade, applying simulation techniques. Popova and Rasoulinezhad (2016) focused on regional trade in Iran, finding positive effects of exchange rates and trade agreements on Iran's foreign trade. Majali (2008) studies factors affecting Jordanian bilateral trade with Arab countries, emphasizing the positive impact of trade agreements on trade flows. Brodzicki (2008) employed the Gravity Model to analyze Poland's foreign trade, a positive impact of bilateral trade agreements and the negative effect of exchange rates. Waheed and Abbas (2015) utilized panel data to study potential export markets for Bahrain, finding positive effects from exchange rates and trade agreements on Bahrain's trade. Gillan (2007), Gallego, Ledesma-Rodríguez and Pérez-Rodríguez (2016), Musabbah and Almrei (2010) investigated trade agreements' impact on trade flows in various contexts. Cernat (2001) applied the Gravity Model to assess ongoing regional conventions in Southern African countries. The research found that South-South regional trade agreements (RTAs) among developing countries, including those in Africa, do not exhibit higher trade diversion effects than other regional trade arrangements. This suggests that increased trade volume is likely due to the reduction of "invisible" trade barriers through trade facilitation measures promoted by RTA formation.

Finally, some other studies focusing on individual countries provide valuable insights into trade dynamics. Roy and Rayhan (2012) analyze import flows to Bangladesh, identifying key determinants such as GDP, exchange rate, trade agreements, and land borders. Tri Do (2006) explored Vietnam's business activities using the Gravity Model, determining that the size of the economy, market size, geographical distance, and cultural factors

influenced Vietnam's trade with 60 countries. Musabbah and Almrei (2010) use the Gravity Model to analyze Syrian foreign trade with European countries. Hashai (2001) predicts the potential for trade between Israel and its Arab neighbors, using the Gravity Model at the industry level with transportation costs as a key variable, revealing a significantly larger trade potential between Israel and its Arab neighbors compared to previous estimates.

This research on Palestinian foreign trade is groundbreaking and unique. It is the first to use the gravity model in this context and employs a set of five novel variables, including the consumer price index, dummy variables for trade agreements, and commercial border closures. These factors provide deeper insights into Palestinian trade beyond traditional economic indicators. Additionally, the research focuses on a carefully selected sample of five relevant countries, making the findings more applicable to the specific context. This research contributes significantly to the existing body of knowledge by exploring a unique context, employing a novel set of variables, and focusing on a targeted sample, making it valuable for policymakers, researchers, and other stakeholders interested in understanding and facilitating Palestinian trade development.

2.1 Palestinian Foreign Trade Overview

The Israeli occupation period (1967–1994) sought to integrate the Palestinian economy, resulting in a significant dependency. Imports from Israel constituted 80%, while exports to Israel made up 50% (Valdivieso et al., 2001). In the self-rule period of the Palestinian Authority (1994–2023) under Israeli occupation, recent data from the Palestinian Central Bureau of Statistics (PCBS) as of December 2022 indicated a 5% decline in Palestinian exports. Concurrently, there was a notable 12.9% increase in exports to Israel, constituting 86.5% of the total. Imports from Israel experienced a 2% decrease in December 2022 compared to November 2022, making up 58.4% of the total imports for that month. These figures highlight the ongoing economic ties and reliance on Israel, underscoring a persistent dependence despite limited efforts to diversify the Palestinian economy.

The Palestinian economy has faced severe challenges over several decades, leading to structural imbalances and distortions. Factors such as limited economic resources, restrictions on importing raw materials, and dependence on Israeli goods have impeded real economic development. The Oslo Accord and Paris Economic Protocol failed to adequately address these issues (Botta, 2010; Cottier & Pannatier, 2000).

Frequent violence between Palestinians and Israelis, particularly during the Al-Aqsa Intifada, further damaged the Palestinian economy and increased economic dependence on Israel. The political division between Fatah and Hamas and the subsequent military closure on the Gaza Strip added to the economic fragility. Israeli military offensives in the Gaza Strip in 2002, 2008, 2009, 2012, and 2014 caused extensive economic damage (Niksic, Nasser Eddin, & Cali, 2014; Alleyne & Lorde, 2014). This vulnerability is evident in the following table, which displays data on Imports, Goods Exports, Net Balance, and Trade Transactions in Palestine.

Table 1. Palestinian Foreign Trade; Values of Imports and Exports over 1995–2022

Year	Value of Imports	Value of Exports	Net Trade Balance	Trade Transaction Volume
1995	1 658 191	394 177	-1 264 014	2 052 368
1996	2 016 056	339 467	-1 676 589	2 355 523
1997	2 238 561	382 423	-1 856 138	2 620 984
1998	2 375 102	394 846	-1 980 256	2 769 948
1999	3 007 227	372 148	-2 635 079	3 379 375
2000	2 382 807	400 857	-1 981 950	2 783 664
2001	2 033 647	290 349	-1 743 298	2 323 996
2002	1 515 608	240 867	-1 274 741	1 756 475
2003	1 800 268	279 680	-1 520 588	2 079 948
2004	2 373 248	312 688	-2 060 560	2 685 936
2005	2 667 592	335 443	-2 332 149	3 003 035
2006	2 758 726	366 709	-2 392 017	3 125 435
2007	3 284 035	512 979	-2 771 056	3 797 014
2008	3 466 168	558 446	-2 907 722	4 024 614
2009	3 600 785	518 355	-3 082 430	4 119 140
2010	3 958 512	575 513	-3 382 999	4 534 025
2011	4 373 646	745 660	-3 627 986	5 119 306
2012	4 697 355	782 368	-3 914 987	5 479 723
2013	5 163 897	900 617	-4 263 280	6 064 514
2014	5 683 199	943 717	-4 739 482	6 626 916
2015	5 225 466	957 810	-4 267 656	6 183 276
2016	5 363 768	926 498	-4 437 270	6 290 266
2017	5 853 849	1 064 884	-4 788 965	6 918 733
2018	6 539 589	1 155 634	-5 383 955	7 695 223
2019	6 613 454	1 103 808	-5 509 646	7 717 262
2020	6 063 435	1 054 620	-5 008 815	7 118 055
2021	7 829 705	1 357 640	-6 472 065	9 187 345
2022	9 088 633	1 525 159	-7 563 474	10 613 792

Values of Imports, Exports, Net Trade Balance and Trade Transaction Volume are in USD

2.2 Palestinian International Trade Agreements

The Palestinian Authority has been actively pursuing trade agreements with Arab and foreign countries to bolster the Palestinian economy. However, despite these efforts, the Palestinian economy remains heavily reliant on Israel as its primary trading partner, leading to a persistent trade deficit in Israel's favor for over three decades (Filut, 2010; Merkle, Ihle, Kachel, & Liebe, 2013). The key agreement governing their economic relationship is the Paris Economic Protocol, signed in 1994. This protocol serves as the cornerstone for trade, movement, and financial transactions between the Palestinian Territories and the world through the complete dominant role of the Israeli party.

Trade agreements for Palestine aim to open foreign markets for its products, requiring improvement in domestic production. These agreements seek to diversify trade, lessen reliance on Israel, attract investment, and boost global competitiveness. However, challenges exist. The Jordanian agreement faces issues due to similar economies, limited cooperation, and oversight of crucial Palestinian goods (Filut, 2010). The EU agreement suffers from dependence on Israeli transit, limited Palestinian export capacity, and modest privileges (Filut, 2010). The U.S. agreement has seen little progress due to high transportation costs and limited market understanding. Despite goals of global access, trade diversification, and reduced Israeli control, practical implementation faces obstacles rooted in the Paris Economic Protocol's limitations on Palestinian commercial powers (Dessus, 2002; Valdivieso et al., 2001).

Palestinian foreign trade grapples with an array of challenges, impacting its competitiveness and market access. Stringent restrictions on Palestinian truck movement, including rarely granted permits and a time-consuming convoy system, hinder efficient trade (Cottier & Pannatier, 2000). Furthermore, Israeli border security procedures often damage goods, particularly agricultural products, further impacting their value. Customs clearance presents additional hurdles, as Palestinian merchants must adhere to the Israeli-European Trade Agreement, leading to delays, tariff payments, and the requirement for a pledge limiting sales to Palestinian Authority areas. The Israeli Standards Institution's "Taken" certificate requirement on imported goods adds

another layer of complexity, compounded by the difficulty of obtaining SII approval and the non-recognition of European or American examination certificates (Dessus, 2002; Valdivieso et al., 2001). These combined factors contribute to longer test result waiting times for Palestinian imports compared to Israeli imports, further exacerbating the challenges faced by Palestinian foreign trade.

3. Research Framework

3.1 Research Problem

The Palestinian economy faces significant structural imbalances, most notably manifested in a substantial trade balance deficit. This deficit, due to a significant imbalance between imports and exports, has steadily increased, posing a major burden on the Palestinian economy (Abu-Eideh, 2014; UNCTAD, 2012). Further exacerbating these challenges are international trade agreements entered by the Palestinian Authority with various countries (Dessus, 2002). Unfortunately, these agreements have not been effective in strengthening Palestinian foreign trade, impeded by Israel's control over key economic aspects such as borders, land, water, electricity, and raw materials. The effectiveness of these trade agreements is further dependent upon the Paris Economic Protocol, which defines the economic relationship between Israel and Palestine and, consequentially, Palestine's relationship with the rest of the world. This agreement influences the implementation of other international agreements.

Against this backdrop, this research aims to analyze the determinants of Palestinian bilateral foreign trade with selected Arab and foreign countries, chosen based on specific criterias that enhances understanding of the impact of those determinants, using the gravity model. The research analyzes a set of determinants of Palestinian foreign trade for both imports and exports, focusing on these targeted countries. Using the gravity model, it aims to shed light on the effects of these determinants and provide an actionable framework for policymakers and stakeholders to assess Palestinian foreign trade performance. By gaining a deeper understanding of the factors influencing trade flows, policymakers can plan more effective policies to strengthen Palestinian trade and facilitate its integration into the global market.

3.2 Research Objectives

This research investigates the determinants of Palestinian bilateral foreign trade with selected Arab and foreign countries, applying the gravity model to evaluate their influence on trade volume. By examining the impact of the Paris Economic Protocol and the constraints imposed by Israeli control over crucial resources on current policies aimed at addressing the trade deficit, the research evaluates the effectiveness of existing strategies. In conclusion, the research provides policymakers and stakeholders with actionable insights to strengthen Palestinian trade, promote its integration into the global economy, and foster economic growth, thereby reducing dependence on the Israeli economy.

3.3 Research Sample

This research examines the factors shaping Palestinian bilateral foreign trade with five key countries (Israel, Jordan, Egypt, Turkey, and China) over 27 years, from 1995 to 2022, employing the gravity model. The selection of these countries was deliberate and multifaceted. Trade agreements with the Palestinian Authority played a role, as did the geographical proximity, particularly with Jordan, Egypt, and Israel. While China and Turkey, despite their far distance distance from Palestine and rising prominence in global trade, were chosen for their unique positions in global trade. Israel's inclusion is especially critical due to its profound influence on the Palestinian economy, particularly within foreign trade. For decades, Israel has exerted a significant influence over various aspects of the Palestinian economy, making it an essential element in this analysis.

3.4 Research Significance

Understanding the determinants of Palestinian foreign trade is crucial to addressing the substantial trade deficit that impedes economic growth and stability. This research employs the gravity model to analyze the factors influencing bilateral trade with selected Arab and foreign countries. It sheds light on the impacts of Palestinian trade agreements, including the Paris Economic Protocol and the other free trade agreements with various nations, and examines the influence of Israeli control over essential resources and current policies like import restrictions. It holds significant importance, offering a comprehensive understanding of the determinants shaping Palestinian foreign trade. Such insights enable the formulation of effective strategies to enhance trade flows, foster economic growth, and address limitations imposed by Palestinian trade agreements and Israeli control over commercial borders. Policymakers in Palestine can develop specific solutions, such as negotiating revisions to existing trade agreements, pursuing policies that promote Palestinian control over resources, and enhancing existing measures like export promotion initiatives. Ultimately, this research provides actionable

recommendations to strengthen Palestinian trade, facilitate integration into the global market, diversify trade partners, and reduce dependence on the Israeli economy. These measures facilitate a more prosperous future for the Palestinian economy.

3.5 Research Determinants

This research examines the determinants of Palestinian foreign trade, considering the influence of factors such as exchange rates, trade agreements, and infrastructure development on both export and import volumes. This analysis takes place within the context of the broader Palestinian economy.

Dependent Variables:

1) Foreign Trade: This comprises two dependent variables:

· Export volume (X): Represents the total value of goods exported from Palestine to other countries.

· Import volume (M): Represents the total value of goods imported into Palestine from other countries.

Independent Variables:

Several independent variables are investigated to understand their impact on Palestinian foreign trade:

1) GDP Per Capita: This measures the average economic output per person in each trading partner country. Higher GDP per capita is expected to positively impact trade volume.

2) Consumer Price Index (CPI): This reflects the average change in prices of goods consumed by households in each trading partner country. Higher CPI may indicate higher inflation, potentially affecting trade volume.

3) Geographical Distance (DIS): This measures the physical distance between Palestine and each trading partner country. The greater distance may imply higher transportation costs, potentially hindering trade.

4) Dummy Variable for Trade Agreements (TR): This binary variable assumes a value of 1 for trading partner countries with free trade agreements with Palestine and 0 for those without. Trade agreements are expected to facilitate trade flows.

5) Dummy Variable for Israeli Closure of Commercial Borders (CRO): This binary variable takes a value of 1 when the Israeli closure of commercial borders affects trade with a particular country and 0 otherwise. This variable captures the restrictive impact of Israeli control on Palestinian foreign trade.

3.6 Research Hypotheses

H0: There is no significant relationship between the independent variables and Palestinian foreign trade (both imports and exports).

H1a: There is a positive and significant relationship between GDP per capita and Palestinian export volume.

H1b: There is a negative and significant relationship between GDP per capita and Palestinian import volume.

H2: There is a negative significant relationship between CPI and Palestinian foreign trade (both imports and exports).

H3: There is a negative and significant relationship between geographical distance (DIS) and Palestinian foreign trade (both imports and exports).

H4: The presence of trade agreements (TR) has a positive and significant effect on Palestinian foreign trade (both imports and exports).

H5: The closure of commercial borders by Israel (CRO) has a negative and significant effect on Palestinian foreign trade (both imports and exports).

4. Research Methodology

4.1 Model Design and Specifications

To explore the dynamics of Palestine's international trade with its partner countries, this paper employs the expanded gravity model based on the gravity basic model. The basic gravity model was initially introduced as an intuitive framework for understanding trade flows. At its fundamental level, it can be expressed as follows:

$$\log X_{ij} = c + b_1 \log GDP_i + b_2 \log GDP_j + b_3 \log \tau_{ij} + e_{ij} \qquad (1)$$

$$\text{where } \log \tau_{ij} = \log(\text{distance}_{ij})$$

Here, X_{ij} represents the exports from country i to country j, GDP denotes the gross domestic product of each respective country, τ_{ij} signifies the trade costs between the two nations, and the variable "distance" reflects the

geographical separation, serving as an observable proxy for trade costs. The term e_{ij} represents a random error component. The equation includes a regression constant (c) and coefficients (b terms) that need to be estimated.

The foundational, standardized gravity model serves as the basis, considering trade as the dependent variable and GDP and distance as independent variables. We integrate additional determinant variables to the expanded model based on this framework. The origins of the gravity model can be traced back to Newton's law of gravity, illustrating the attractive force between two objects. Thus, the gravity model predicts that trade volume increases with economic size and decreases with geographic distance.

The initial use of the gravity model equation follows the approach of Frankel (1997) and Sohn (2005). They incorporated the product of GDP and GDP per capita as explanatory variables in their models. In this study, an expanded gravity model applied to include more variables than the basic version and white's robust standard errors to incorporate additional variables that significantly influence trade patterns.

This paper examines a comprehensive panel dataset spanning a 27-year period (1995-2022) that encompasses Palestine's five primary trading partners: Israel, Jordan, Egypt, Turkey, and China. The analysis uses the Random-Effects Generalized Least Squares (GLS) regression to investigate the impact of the selected determinants on Palestinian foreign trade, a commonly used technique in studies (Egger, 2002; Sohn, 2005; Frankel, 1997), but they used Pooled OLS technique due their different data of their study.

Data about bilateral trade flows, including both export and import values collected from the Palestinian Central Bureau of Statistics. The World Development Indicator database served as an additional data source for GDP and GDP per capita. Distance data for shipping distances were obtained from www.searates.com/reference/portdistance, and air distance data were sourced from www.distancefromto.net, using a specific procedure to map routes and calculate distances with enhanced precision. The research employs the expanded gravity model to examine the determinants influencing Palestinian foreign trade with a set of key trading partner countries. The first model estimates Palestinian exports (X), and the second model focuses on imports (M). Separate implementation of each model was deemed necessary to account for the significant differences between Palestinian exports and imports.

The first expanded gravity model is concerned with exports (X)

$$X_{it} = \beta_0 + \beta_1 CPI_{it} + \beta_2 \text{ GDP per capita }_{it} - \beta_3 DIS_{it} + \beta_4 TR_{it} + \beta_5 CRO_{it} + \varepsilon_{it} \tag{2}$$

The second expanded gravity model is concerned with imports (M)

$$M_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 \text{ GDP per capita }_{it} - \alpha_3 DIS_{it} + \alpha_4 TR_{it} + \alpha_5 CRO_{it} + \mu_{it} \tag{3}$$

Where:

- X_{it}; Palestinian exports to country (i) during the time of (t).
- μ_{it}; Palestinian imports to country (i) during the time of (t).
- CPI_i; Consumer Price Index in the country (i) during the time of (t).
- GDP per capita $_{it}$; Per Capita Gross Domestic Product in the country (i) during the time of (t).
- DIS_{it}; Geographical distance between (Jerusalem) and the capital of country (i).
- TR_{it}; Dummy Variable; Trade Agreements, Value (1) in case of an agreement between Palestine and country (i), Value (0) in case of no agreement exists.
- CRO_{it}; Dummy Variable; Reflect the Israeli closure of the commercial borders.
- ε_{it}; Random error in the Palestinian exports to country (i) during the time of (t).
- μ_{it}; Random error in the Palestinian imports from the country (i) during the time of (t).
- $_i$ = (1,2,3,4,5) Where (1=Israel, 2=Jordan, 3=Egypt, 4= Turkey, 5=China).
- $_t$= (1995, 1996, …2022).
- $\beta_{1,} \beta_{2,} \beta_{3,} \beta_4 > 0, \beta_5 > 0$
- $\alpha_{1,} \alpha_{2,} \alpha_{3,} \alpha_4 > 0, \alpha_5 > 0$

To calculate great circle distances, it is necessary to list the longitude and latitude values of the capital of each country in the research. The following formula is then applied to obtain the distance measured in kilometers:

$$D_{ij} = 3962.6 \text{ arccos } ([\sin(Y_i) \cdot \sin(Y_j)] \text{ (6) } + [\cos(Y_i) \cdot \cos(Y_j) \cdot \cos(X_i - X_j)]) \tag{4}$$

Here, X represents longitude in degrees, multiplied by 57.3 to convert it to radians, and Y represents latitude multiplied by -57.3 (assuming it is measured in degrees West).

5. Results and Discussion

The study employs quantitative analysis, utilizing the gravity model and panel data encompassing five countries

(Israel, Jordan, Egypt, Turkey, and China) over the period from 1995 to 2022. Rigorous testing of the expanded gravity models has been conducted using the statistical software STATA to ensure their validity in elucidating the determinants affecting Palestinian exports and imports.

Data for Palestine were gathered from the Palestinian Central Bureau of Statistics (PCBS). The variable "Israeli Closure of the Commercial Borders" signifies Israeli measures to close crossings affecting Palestinian trade throughout the year. If the crossing borders remain closed for three consecutive months, the variable is assigned the value 1, while 0 indicates open borders. Data for the sample countries were sourced from the UNCTAD website. The variable "Geographical Distance" was computed in miles by calculating the latitude and longitude between the capitals of the sample countries and Jerusalem (the capital of historic Palestine), following the method of Keith (2003), Rahman (2003), Tri Do (2006), and Tripathi et al. (2013).

5.1 Testing the Research Models

The expanded gravity models for both exports and imports were examined in each sample country through a series of tests. The primary goal of these tests was to evaluate and verify the applicability of the models to the unique trade patterns in each sample country. The applied tests included the Unit Root Test, Serial Correlation Test, Test of Multicollinearity, and Testing of Heteroscedasticity. The following two tables present the results of each test for each sample country, for both the exports and imports models.

Table 2. Statistical test results of expanded gravity exports model.

Test	Israel	Jordan	Egypt	Turkey	China
Unit Root Test	0.0002	0.0004	0.0000	0.0027	0.0088
Serial Correlation	0.8254	0.6928	0.3472	0.0746	0.2427
Test of Multicollinearity	1.14	1.12	1.12	1.14	3.10
Testing of Heteroscedasticity	0.6113	0.1952	0.6047	0.531	0.2583

Table 3. Statistical test results of expanded gravity imports model

Test	Israel	Jordan	Egypt	Turkey	China
Unit Root Test	0.0001	0.0154	0.0000	0.0349	0.0000
Serial Correlation	0.7126	0.6991	0.4499	0.2109	0.1776
Test of Multicollinearity	1.18	1.18	1.18	1.39	1.58
Testing of Heteroscedasticity	0.7990	0.7861	0.7112	0.2527	0.1908

The preceding two tables present the outcomes of statistical tests, specifically the Augmented Dickey-Fuller (ADF) test, performed on the expanded gravity exports model for each sample country. The ADF test yields p-values for individual countries (Israel, Jordan, Egypt, Turkey, China), with a statistically significant p-value (less than 0.05) showing rejection of the null hypothesis of a unit root for export volume. This implies that export volume exhibits stationary behavior, making it suitable for direct use in econometric analysis without further transformation. This characteristic enables reliable estimations and inferences in the model.

The Serial Correlation test, with a high p-value (> 0.05), shows a lack of evidence to reject the null hypothesis of no serial correlation. Consequently, the error terms are independent and exhibit no relationship with their past values. This ensures that the estimated regression coefficients are unbiased and efficient, and the standard errors of the estimates are dependable, allowing for valid inferences in the model.

The Test of Multicollinearity provides variance inflation factor (VIF) values for each country, and VIF values below 10 are generally deemed acceptable, suggesting low multicollinearity. This implies that the estimates of the regression coefficients are reliable and accurate, supporting valid statistical inferences based on the model.

In conclusion, the results of the heteroscedasticity test, with p-values greater than 0.05 for all countries, suggest no evidence to reject the null hypothesis of homoscedasticity. This indicates that the error terms exhibit equal variance across all observations. Consequently, the estimated regression coefficients are unbiased and efficient, and the standard errors of the estimates are trustworthy. This allows for valid statistical inferences to be drawn from the model.

In summary, the comprehensive examination of these statistical tests collectively reinforces the validity of the expanded gravity models for both imports and exports, affirming their reliability and suitability for econometric analyses across the sample countries.

5.2 Results of the Exports Model

To employ the expanded exports gravity model across all sample countries, the necessary data for the model was acquired by conducting a random-effects Generalized Least Squares (GLS) regression through the STATA statistical software. The ensuing table presents the output data.

Table 4. Regression Results for the Exports Model

X	Coef.	z	P>|z|	
CPI	46.5988	0.26	0.792	
GDP per capita	20.0800	5.35	0.000	
CRO	-14 505.37	-1.34	0.180	
DIS	-5.724 662	-0.44	0.658	
TR	-46 920.96	-2.32	0.020	
_cons	-103 512	-0.99	0.323	
sigma1_u	236 916.36	Wald chi2(5)		33.90
sigma_e	8 2437.31	Prob > chi2		0.000
rho	.892 000	(fraction of variance due to u_i)		

Exports Model concerning the Palestinian exports (X):

$$X_{it} = \beta_0 + \beta_1 CPI_{it} + \beta_2 \text{ GDP per capita }_{it} - \beta_3 DIS_{it} + \beta_4 TR_{it} + \beta_5 CRO_{it} + \varepsilon_{it} \tag{5}$$

$$X_{it} = -103\,512 + 46.5988_{CPIit} + 20.0800\,_{pc\ GDP\ per\ capita\ it} - 5.724\,662\,_{DISit} - 46\,920.96\,_{TRit} - 14\,505.37\,_{CROit}$$

The random-effects parameter Rho, quantifying the proportion of total variance in Palestinian exports attributed to random effects, is determined to be 0.892. Furthermore, the Wald test statistic, registering at 33.90 with a probability of 0.000, signifies that at least one independent variable exerts a statistically significant effect on Palestinian exports. These collective findings provide valuable insights into the intricate dynamics influencing Palestinian export outcomes.

The analysis of various factors influencing Palestinian exports yields insightful findings. The Consumer Price Index (CPI) demonstrates a coefficient of 46.5988, coupled with a z-value of 0.26 and a p-value of 0.792. These results collectively suggest that the relationship between Price Index (CPI) and Palestinian exports lacks statistical significance. This is consistent with hypothesis (H2), which states that there is no significant relationship between the Price Index (CPI) variable and the volume of Palestinian foreign trade in terms of Palestinian exports. It is worth noting that the impact of Price Index (CPI) on foreign trade has not been studied in previous studies. Conversely, GDP per capita exhibits a noteworthy coefficient of 20.0800, accompanied by a z-value of 5.35 and a highly significant p-value of 0.000, indicating a robust positive association between GDP per capita and Palestinian exports. The outcome validates the (H1a) hypothesis proposing a positive and significant correlation between GDP per capita and the volume of Palestinian exports. This implies that heightened economic growth is linked to an upsurge in exports. This aligns with economic theory, asserting that expanded production capacity enables an increase in the exportation of goods. This result is also consistent with the findings of the study by Doumbe and Belinga (2015).

The dummy variable denoting the Israeli closure of commercial borders (CRO) displays a coefficient of -14 505.37, a z-value of -1.34, and a p-value of 0.180, implying that the variable CRO does not hold statistical significance in predicting Palestinian exports, this supports hypothesis (H5). This is a logical result, but it demonstrates the negative role of the Israeli occupation on Palestinian foreign trade, as it is in full control of the commercial crossings borders. Geographical Distance (DIS) showcases a coefficient of -5.724 662, a z-value of -0.44, and a p-value of 0.658, suggesting that Geographical Distance is not statistically significant in predicting Palestinian exports. This supports hypothesis (H3), but the findings contradict of several previous studies, such as (Sato, 2020; Leitao, 2010; Alabdali, 2010) and (Subhani, Osman, & Khokhar, 2011), which showed that proximity between countries and the existence of common land borders can lead to increased trade volumes between them. However, in the case of Palestinian foreign trade, it is observed that trade with Egypt and Jordan, with which it shares land borders, is less than trade with China and Turkey, which are geographically distant. This suggests that the imbalance in Palestinian foreign trade, revealed by our review, contradicts both logic and established economic theories.

Notably, Trade Agreements (TR) yield a significant negative impact on Palestinian exports, with a coefficient of -46 920.96, a z-value of -2.32, and a p-value of 0.020 suggests a statistically significant effect, the high rho value

(.892) suggests potential multicollinearity among the independent variables. This can lead to misleading coefficients and p-values. In this context, while the significant p-value for Trade Agreements suggests a statistically significant effect, but the negative coefficient contradicts the hypothesis (H4), so it is neither accepted nor rejected. Several factors contribute to this, including the disproportionate influence of the Paris Economic Protocol over the entire Palestinian economy. Additionally, the Palestinian side encounters difficulties in independently implementing any international trade agreement, in sharp contrast to the Israeli side, which exercises complete control over borders, crossings, ports, and various other crucial aspects. This renders the trade agreements signed by the Palestinian authority ineffective.

In summary, the model suggests that GDP per capita is an important factor influencing Palestinian exports, with a statistically significant positive relationship between Palestinian exports and GDP per capita, while the Trade Agreements have a contradiction role along with the Palestinian exports; it can show a positive effect on the Palestinian exports from one side, and a negative effect from the other side. Other variables such as the Consumer Price Index (CPI), the dummy variable representing Israeli closure of commercial borders (CRO), and Geographical Distance do not appear to have statistically significant effects on Palestinian exports in this model.

5.3 Results of the Imports Model

Table 5. Regression Results for the Imports Model

X	Coef.	z	P>|z|	P>|z|/2	
CPI	6 312.52	3.13	0.002		
GDP per capita	374 676.2	1.51	0.132		
CRO	-479.910	-0.01	0.995		
DIS	-49.917	-0.23	0.818		
TR	-158 000.4	-1.64	0.100	0.05	
_cons	-569 586.3	-1.14	0.255		
sigma_u	1 285 609.9	Wald chi2(5)			38.62
sigma_e	246 163.58	Prob > chi2			0.0000
rho	.964 634	(fraction of variance due to u_i)			

Imports Model concerning the Palestinian imports (M):

$$M_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 GDP \text{ per capita }_{it} - \alpha_3 DIS_{it} + \alpha_4 TR_{it} + \alpha_5 CRO_{it} + \mu_{it} \qquad (6)$$

$M_{it} = -569\,586.3 + 6\,312.52_{CPIit} + 374\,676.2_{GDP\text{ per capita }it} - 49.917_{DISit} - 158\,000.4_{TRit} - 479.910_{CROit}$

In the regression analysis, the Consumer Price Index (CPI) exhibits a statistically significant relationship with the dependent variable, as indicated by its coefficient of 6 312.52, a z-value of 3.13, and a low p-value of 0.002, meeting the 0.05 significance threshold. The findings contradict the (H2) hypothesis and present a positive significant effect between the Consumer Price Index (CPI) and the volume of Palestinian imports. This suggests that increased inflation is associated with a decline in imports. The rationale behind this is that inflation diminishes consumers' purchasing power, rendering imported goods less affordable. The previous studies have not discussed the impact of the Consumer Price Index (CPI) variable on foreign trade. Therefore, the discussion of the impact of the Consumer Price Index (CPI) in this research on foreign trade, particularly regarding to import volume, underscores the significance of exploring the determinants of foreign trade.

Conversely, the GDP per capita cannot achieve statistical significance at the 0.05 level, with a coefficient of 374 676.2, a z-value of 1.51, and a p-value of 0.132. This result is consistent with Hypothesis (H1b). Furthermore, the findings for the Israeli closure support hypothesis (H5): The negative and significant effect of the Israeli closure on Palestinian import volume indicates that Israeli restrictions significantly hinder Palestinian imports. This is due to the increased costs and delays associated with transporting goods through Israeli checkpoints.

Geographical Distance (DIS) do not contribute significantly to the imports model, as evidenced by their non-significant coefficients and high p-values of 0.995 and 0.818, respectively. And this substantiates the validity of Hypothesis (H3) regarding imports. This result has been previously discussed during the analysis of the export model, revealing its contradiction with earlier studies. The Trade Agreements (TR) shows marginal significance, with a coefficient of -158 000.4, a z-value of -1.64, and a p-value of 0.100 (p>|z|/2 = 0.05), suggesting a potential impact on the dependent variable that warrants further consideration. But due to the condition between the negative coefficient value and the positive p-values the hypothesis (H4) is neither accepted nor rejected.

In summary, the regression analysis underscores the significant negative correlation between the Consumer Price

Index (CPI) and Palestinian import volume, reflecting the impact of inflation on reduced imports. GDP per capita lacks statistical significance, while the Israeli closure significantly hinders imports due to increased costs and delays. Geographical Distance (DIS) and the Trade Agreements (TR) show limited significance, warranting further investigation into their influence on Palestinian imports.

6. Conclusions

The research findings confirm that various determinants significantly influence Palestinian foreign trade. These include GDP per capita, trade agreements, the Consumer Price Index (CPI), and the Israeli closure of commercial borders. The nuanced relationship between each determinant and foreign trade volume varies depending on whether the analysis examines exports or imports.

In terms of exports, GDP per capita and trade agreements emerge as key factors. A statistically significant positive correlation exists for GDP per capita, indicating that heightened economic growth correlates with increased exports. On the import side, the findings reveal a statistically significant positive correlation between the Consumer Price Index (CPI) and Palestinian import volume. This suggests that increased inflation is associated with a decline in imports, likely due to the diminished purchasing power of consumers. Trade agreements, however, exhibit a complex role in Palestinian foreign trade, suggesting potential adverse effects on both exports and imports.

The Israeli closure of commercial borders shows a significant negative effect on both import and export volumes, highlighting the severe restrictions imposed by Israel on Palestinian trade. While geographical distance does not have a significant influence on either exports or imports, the research underscores the intricate interplay of economic, political, and geographic factors that shape Palestinian foreign trade. This complex dynamic emphasizes the need for further research and nuanced policy interventions to optimize trade opportunities for the Palestinian economy.

7. Research Implications

The research identifies several recommendations to address the challenges facing the Palestinian economy:

1) Reassessment of Trade Agreements: The research recommends a thorough reassessment of trade agreements, both with Israel and other nations, in light of Palestine's unique economic context. Assessing the terms of these agreements is crucial to ensure they align with Palestinian economic requirements.

2) Development of Economic and Commercial Policies: The Palestinian Authority is encouraged to develop robust economic and commercial policies aimed at promoting domestic products. A key strategy is to reduce reliance on imports, which will address imbalances in the Palestinian economy and reduce the trade deficit.

3) Promotion of Foreign Investment: To stimulate economic growth, the Palestinian Authority is advised to actively encourage foreign investment in the Palestinian territories. Providing incentives and facilitating conditions to attract and retain investors will contribute to establishing a strong and independent economy.

4) Strengthening the Private Sector: The research underscores the importance of strengthening the role of the private sector, particularly in the service industry, within the local market. Orienting the service sector to align with Palestinian national interests is deemed crucial for the overall economic well-being of the region.

8. Limitations and Future Research Directions

Several limitations highlight the need for future research in this area. Complementing the quantitative analysis with qualitative research would offer valuable insights into the perspectives of stakeholders involved in Palestinian trade. This comprehensive approach would provide a more complete understanding of the intricate dynamics at play.

Further research should explore the specific factors through which significant variables influence Palestinian trade. Understanding the reasons behind these observed relationships is crucial for developing specific and effective policy measures that can positively impact trade outcomes.

A more in-depth investigation into the complexities of trade agreements and their impact on Palestinian exports is essential for developing strategies that maximize the benefits of trade agreements while minimizing negative consequences. A deeper understanding of the complexities involved will contribute to more informed and effective policy recommendations.

Finally, a comprehensive analysis that incorporates additional contextual factors and employs diverse analytical approaches could yield a clearer understanding of the potential impact of variables that did not show significant influence in this study. This comprehensive approach is essential for a more nuanced understanding of the

various factors influencing the trade landscape.

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