Czech University of Life Sciences Prague

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Department of Economics

Master's Thesis

Foreign Trade – Study Case Maize and Sunflower Oils in Egypt

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Bc. Hala Fweti

Economics and Management

Thesis title

Foreign trade – study case of maize and sunflower oils in Egypt.

Objectives of thesis

This research aims to discuss the Foreign trade and the contribution of agricultural products on Egyptian export growth and also analyze and define the foreign trade indicators on Maize and sunflower oils in Egypt and development of export and import of Maize and Sunflower oils in terms of quantity and prices.

Methodology

The historical methodology is used for Egyptian Foreign trade development. Also the descriptive and comparative research methods are used Directional models when studying the evolution of development of Maize and sunflower oils in Egypt.

The proposed extent of the thesis

50 – 80 Pages

Keywords

Foreign trade, International trade, Syria, economic growth

Recommended information sources

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Expected date of thesis defence

2022/23 WS – FEM

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Electronic approval: 27. 9. 2022

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Electronic approval: 27. 10. 2022

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Prague on 01. 03. 2024

Declaration

I declare that I worked on my master's thesis, " Foreign Trade—Study Case Maize and Sunflower Oils in Egypt," by myself, using only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not violate any copyrights.

In Prague on 30.3.2024 Hala Fweti

Acknowledgment

I want to thank prof. Ing. Mansoor Maitah, Ph.D. et Ph.D. For his persistent assistance and instruction, and thanks to my family and all other persons for their advice and support during my work on this thesis

Foreign Trade – Study Case maize and sunflower oils in Egypt

Abstract

This study examines Egypt's economic dependence on maize and sunflower oil imports. The study examines 2001–2020 foreign trade trends to determine the main factors affecting the import and export of these vital agricultural products.

The research uses historical, descriptive, comparative, and econometric analysis. This comprehensive technique will examine complex determinant interactions. It will analyze how local output, import volumes, and exporting country strength effect Egyptian oil prices.

The study will examine domestic supply, export and import, and Egyptian currency exchange rates. It will also examine how trade policies, global market changes, and domestic production levels affect Egypt's import and export dynamics to inform policymakers and stakeholders.

The research aims to improve Egypt's maize and sunflower oil trade efficiency and competitiveness. This will help the nation achieve food security, a crucial goal.

Keywords: Foreign trade, international trade, export, import, Egypt, Maize oil, Sunflower oil, Econometrics

Zahraniční obchod – Případová studie kukuřice a slunečnicového oleje v Egyptě

Abstrakt:

Tato studie zkoumá ekonomickou závislost Egypta na dovozu kukuřice a slunečnicového oleje. Analyzuje trendy zahraničního obchodu v letech 2001–2020 s cílem určit hlavní faktory ovlivňující dovoz a vývoz těchto životně důležitých zemědělských produktů.

Výzkum využívá historickou, popisnou, komparativní a ekonometrickou analýzu. Tato komplexní technika umožní zkoumat interakce složitých determinant. Bude analyzovat, jak místní produkce, objemy dovozu a síla vyvážející země ovlivňují egyptské ceny oleje.

Studie se dále zaměří na domácí nabídku, vývoz a dovoz a směnné kurzy egyptské měny. Výzkum zkoumá, jak obchodní politika, změny na globálním trhu a úroveň domácí produkce ovlivňují dynamiku egyptského dovozu a vývozu, aby informoval tvůrce politik a zainteresované strany.

Cílem výzkumu je zlepšit efektivnost a konkurenceschopnost obchodu Egypta s kukuřicí a slunečnicovým olejem. To pomůže zemi dosáhnout cíle potravinové bezpečnosti, což je klíčový cíl.

Klíčová slova: Zahraniční obchod, mezinárodní obchod, vývoz, dovoz, Egypt, Kukuřičný olej, Slunečnicový olej, Ekonometrie

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1. Introduction

The intricate tapestry of global trade intertwines with agriculture, fostering a complex exchange of goods and services that fuels economic growth and bolsters global food security. This research zooms in on Egypt, a nation boasting a rich agricultural heritage and a prominent role in international trade.

Specifically, the study focuses on two critical agricultural imports– maize and sunflower oil – to illuminate their contribution to Egypt's economic trajectory. The research aims to shed light on broader economic development strategies and food security initiatives by analyzing this segment. The investigation delves more deeply than a mere description, outlining a series of crucial objectives:

1. Charting Egypt's Foreign Trade Journey (2001-2020): This objective entails a historical analysis of Egypt's foreign trade, tracing its evolution over two decades. Understanding this broader context is critical to appreciating the specific influence of maize and sunflower oil imports on the nation's economic landscape.
2. Deciphering Trade Indicators: A meticulous examination of trade-specific data for maize and sunflower oil will be conducted. This analysis will encompass key metrics like import volumes, patterns, and trade balances.
3. Identifying the Driving Forces: The research will explore the factors influencing these two agricultural products' import and export dynamics in Egypt. This might include government policies, global market fluctuations, and domestic production levels.

Through this comprehensive examination of Egypt's trade in maize and sunflower oil, the research aspires to achieve a deeper understanding of:

- The significance of agriculture as a driver of national export growth, particularly in developing economies.
- The complex interplay of factors that shape trade dynamics in these nations.
- How strategic trade policies can be leveraged to achieve economic development and ensure food security.

By focusing on these objectives and exploring Egypt's case, the research aims to provide valuable insights applicable to a broader range of developing economies striving to navigate the intricate world of international trade and agriculture.

2. Objectives and Methodology

2.1 Objectives

The research will delve into several key objectives to understand the role of maize and sunflower oil in Egypt's economic landscape. First, it will analyze the historical development of Egypt's foreign trade from 2001 to 2020, focusing on trends, patterns, and significant trade partners. Understanding this historical backdrop is essential for fully comprehending the specific influence of these agricultural exports.

Next, the study will analyze foreign trade indicators for maize and sunflower oil. This includes tracking import and export volumes, analyzing price fluctuations for imported and exported products, and assessing the balance between Egypt's imports and exports (trade balance).

Furthermore, the research will evaluate the contribution of the maize and sunflower oil trade to Egypt's overall export growth. This involves measuring the percentage share they contribute and identifying any significant changes over time.

To understand the forces shaping trade dynamics, the research will identify key factors influencing the import and export of these products. This includes domestic production levels (self-sufficiency in maize and sunflower seed production) and government policies such as trade policies, subsidies, and regulations.

Finally, based on the findings, the research will provide recommendations for policymakers and stakeholders. These recommendations will aim to enhance the efficiency and competitiveness of Egypt's maize and sunflower oil trade, ultimately contributing to achieving national food security objectives.

2.2 Methodology

This research will employ a combination of methodologies to achieve its objectives:

- Historical analysis: Utilize data and information from official sources like Egyptian government reports, international trade organizations (e.g., FAO, WTO), and academic publications to analyze historical trends in foreign trade, explicitly focusing on the period 2001-2020.

- Descriptive analysis: Describe and interpret the collected data on import/export volumes, prices, and trade balance for maize and sunflower oil in Egypt.
- Comparative analysis: Compare and contrast the trends observed in maize and sunflower oil trade with overall Egyptian foreign trade and trade patterns of similar countries.
- Econometric analysis: Depending on data availability and the complexity of the relationships between factors, econometric models and linear regression are used to analyze the impact of various factors (Export and import values, price of Maize and sunflower oils, Exchange rate) on the trade of maize oil and sunflower oil.

3. Literature Review

3.1 Foreign Trade:

This section will delve into foreign trade, clearly defining and exploring its historical development and evolution.

3.2 Definition of Foreign Trade:

Foreign trade is the fundamental basis of the globalized economy, involving the transfer of goods and services between different countries. Dynamic trade enables nations to satisfy their requirements and preferences for goods they may lack the capacity to manufacture locally in adequate numbers or at competitive prices (Clark et al., 2017). It functions as a catalyst for economic expansion, promoting the generation of employment opportunities, technological progress, and a broader range of products for consumers (Bhagwati, 2008).
Imagine a hypothetical scenario whereby every nation endeavors to manufacture all of its consumable goods. The situation would include a restricted range of options and perhaps an ineffective distribution of resources. Foreign commerce facilitates dismantling these obstacles, enabling nations to concentrate their efforts on sectors where they possess a comparative advantage, hence enabling the production of goods and services at a comparatively lower cost than other nations (Smith, 1776).
The complex dynamics of international trade encompass various essential elements:

- Exports refer to the exchange of commodities and services between nations. A country can potentially export manufactured commodities, agricultural products, or even specialized knowledge in the form of tourism or consultancy services.
- Imports refer to acquiring goods and services from a foreign country. Nations may import raw materials that are not readily available inside their domestic borders, finished goods that are not effectively produced, or even cultural commodities such as films or music.
- Balance of Trade: This measure represents the disparity in monetary worth between a nation's outbound shipments and its inward shipments. A positive trade balance signifies a trade surplus McManus, J. (2016, pp 13-19), signifying that the nation's exports exceed its imports. On the other hand, a trade balance disparity indicates a trade deficit.
- International Trade Agreements: Countries frequently engage in international trade agreements to enhance the efficiency of trade flows. The objective of these agreements is to mitigate trade obstacles through the reduction or elimination of tariffs (import duties) and quotas (restrictions on import volumes) (Bhagwati, 2008). Moreover, it is possible for them to develop uniform norms and rules in order to enhance the transportation of commodities and services on a global scale.

Nevertheless, the realm of international trade is not devoid of intricacies and obstacles. Several crucial things should be considered:

- In the context of trade agreements, it is not uncommon for certain nations to implement tariffs or quotas to safeguard their home sectors against foreign competition. Although these measures have the potential to provide temporary protection to domestic manufacturers, they may also result in increased prices for consumers and impede the progress of innovation.
- Protectionism refers to an overemphasis on safeguarding home businesses by implementing trade restrictions. In the long term, it has the potential to impede economic progress and create inefficiencies.
- Fluctuations in global markets pose a significant risk to foreign trade. Several factors, such as currency exchange rates, political instability, and shifts in consumer preferences, can influence trade flows.

Understanding the complexities of international trade is essential for navigating the interconnected world. By promoting effective and equitable trade practices, countries can utilize this influential instrument to attain economic expansion, enhance quality of life, and contribute to a more prosperous and linked global community.

Moreover, trade agreements and policies substantially influence the formation and consequences of international commercial connections. Countries may establish a stable economic growth and development environment by cultivating robust partnerships and enforcing trade restrictions. Nations must consistently adjust to evolving global dynamics and strive to establish equitable conditions for all participants in the international economic sphere.

3.3 Foreign Trade History and Evolution

Foreign trade, the complex interchange of commodities and services across national boundaries, possesses a profound and continuously developing past. The origin of this phenomenon may be traced back to its inception several millennia ago and is intricately linked to the advancement of civilizations and advancements in transportation and communication (Findlay & O'Rourke, 2007).

Historical trade routes, like the Silk Road that linked China and the Mediterranean, had a pivotal role in enabling the interchange of high-end commodities, aromatic substances, and intellectual capital. According to Abu-Lughod, J. (1988), these interactions were of significant importance in influencing cultures and economies, cultivating a perception of worldwide interconnection well in advance of the term "globalization" being introduced.

The Age of Exploration, from the 15th to the 17th centuries, represented a pivotal historical juncture. European countries undertook audacious exploration expeditions, establishing commercial pathways with uncharted lands and colonies. During this period, there was a significant increase in the trade of commodities such as sugar, tobacco, and cotton, motivated mainly by the principles of mercantilism (Landes, 1994). The mercantilist philosophy places significant emphasis on wealth accumulation through the exportation of goods and the maintenance of a trade surplus. It advocates for strong government intervention to foster native industries and restrict imports. During this era, the economic expansion in Europe frequently resulted in the loss of colonial regions.

The Industrial Revolution, which occurred throughout the 18th and 19th centuries, prompted a subsequent phase of profound change. The rise in the manufactured goods trade can be attributed to enhanced production capacity and innovations in transportation, such as the introduction of steamships and railways. During this period, free trade theories gained prominence, with Adam Smith advocating for them in the influential work "An Inquiry into

the Nature and Causes of the Wealth of Nations" (1776). Smith advocated for the advantages of open markets and diminished trade barriers, contending that unrestricted commerce would result in heightened efficiency, specialization, and overall worldwide wealth. Although several individuals found these concepts appealing, countries struggled to reconcile the principles of unrestricted commerce with safeguarding their own industries.

The 20th century included episodes of both global collaboration and upheaval. The establishment of global institutions such as the General Agreement on Tariffs and Trade (GATT) and NAFTA, subsequently, the World Trade Organization (WTO) was driven by the objective of fostering unrestricted commerce and diminishing obstacles to trade via the implementation of multilateral accords (Jackson, 1995). During the second half of the 20th century, these organizations played a pivotal role in facilitating the process of global trade liberalization. Nevertheless, occurrences such as World War I and the Great Depression brought attention to the weaknesses of global trade dependency, revealing the dangers linked to excessive dependence on particular trading allies and the disturbances created by geopolitical instability.

In the aftermath of World War II, the latter half of the 20th century witnessed a revival of global trade due to the emergence of globalization. The rapid rate of cross-border movement of products, services, and capital has been greatly assisted by technological breakthroughs, namely in communication and information technology. The promotion of trade integration was further facilitated by establishing regional trade blocs, such as the European Union, which effectively eliminated internal trade barriers and implemented shared external tariffs (Mansfield & Milner, 2010). Regional integration stimulated economic expansion within the bloc but also sparked apprehensions regarding the possibility of trade diversion when trade is redirected towards member nations while non-members suffer negative consequences.

Presently, international trade continues to be a crucial catalyst for worldwide economic expansion and progress. The rise of developing economies, exemplified by China and India, has significantly transformed trade dynamics, as these countries have emerged as large exporters and assumed a more prominent position in global trade discussions. Emerging obstacles such as climate change and technological upheavals necessitate inventive strategies to guarantee equitable and enduring trade practices. Issues such as intellectual property rights, the increasing prevalence of automation and its effects on

employment, and the imperative for environmentally sustainable trade practices necessitate continuous international communication and collaboration.

Through comprehending the extensive history and progression of international commerce, we acquire invaluable perspectives for maneuvering through the intricacies of the interconnected world. By drawing lessons from history, we may shape a future where international trade cultivates economic well-being, stimulates creativity, and guarantees mutual advantages for all countries, resulting in a more linked and enduring global economy.

3.4 Theories of Foreign Trade

Understanding the various theories of foreign trade is crucial. These theories provide valuable insights into the rationale behind international trade and emerging patterns. This section explores two primary schools of thought: classical country-based theories and modern firm-based theories.

3.4.1 Classical Country-Based Trade Theories:

These early theories, formulated primarily between the 16th and 19th centuries, analyze foreign trade from the perspective of entire nations. They aim to explain how countries, as a whole, benefit from participating in international exchange:

3.4.1.1 MercantilismAccumulating Wealth Through Trade Surpluses (16th-18th Centuries):

This early school of thought, dominant during the rise of European colonial empires, viewed international trade as a zero-sum game. The gain of one nation was seen as another's loss. Mercantilists believed that a nation's wealth was directly tied to its positive trade balance – the difference between the value of its exports and imports (Kindleberger, 2010, pp. 14-20). They advocated for government policies that aimed to achieve a mercantilist trade surplus by maximizing exports and minimizing imports. These policies often included:

- Export subsidies: Financial incentives provided by the government to domestic producers to encourage them to export more goods.

- Import tariffs: Taxes levied on imported goods, making them more expensive for domestic consumers and businesses to purchase, thereby discouraging imports.
- Colonization: The establishment of colonies in other parts of the world to secure sources of raw materials and new export markets.

While mercantilist policies may have led to initial growth for some colonial powers, they ultimately proved unsustainable and hindered global trade expansion in several ways. First, the zero-sum mentality discouraged cooperation between nations and led to trade wars. Second, mercantilist policies often raised consumer prices due to import restrictions, reducing overall economic efficiency. Third, focusing on accumulating wealth through exports often neglected the importance of domestic production efficiency and technological advancements. As other economic ideas emerged, mercantilism gradually faded from prominence.

3.4.1.2 Adam Smith and the Absolute Advantage (1776)):

In his groundbreaking work, "An Inquiry into the Nature and Causes of the Wealth of Nations," Adam Smith challenged the mercantilist view. He laid the foundation for modern theories of international trade. He introduced the concept of absolute advantage, arguing that a country gains from trade if it can generate a product with greater efficiency (at a reduced cost) than any other country (Smith, 1776). This efficiency could stem from a variety of factors, including:

- Superior Technology: Advancements in technology can allow a country to produce goods with fewer resources or at a higher quality, giving them a significant edge in the global marketplace. For example, a country that develops a more efficient method of cotton ginning could produce textiles at a lower cost than its competitors.
- Skilled labor: A workforce with specialized skills and knowledge can be more productive, leading to lower production costs. For instance, a country with a well-educated population and a strong tradition of craftsmanship might have an absolute advantage in producing high-quality, intricate goods.

Access to natural resources: The availability of natural resources, such as fertile land, mineral deposits, or abundant energy sources, can significantly influence a country's production costs. A country with rich natural resources might be able to produce resource-

intensive goods, like agricultural products or metals, at a lower cost than countries that lack these resources.

3.4.1.3 Comparative Advantage: Specialization Beyond Absolute Efficiency (1817):

Building on Smith's ideas, David Ricardo introduced the concept of comparative advantage in his work "On the Principles of Political Economy and Taxation" (1817). This theory suggests that even if a country can produce all goods more cheaply than another country in absolute terms, it can still Maximize trade advantages by focusing on the specialized manufacture of commodities, which gives it a more significant comparative advantage. A comparative advantage pertains to the capacity to manufacture a particular good. At a relatively lower opportunity cost – the cost of producing one good in terms of the forgone production of another good (Krugman et al., 2018). For example, a country with abundant land and a relatively small population might have a comparative advantage in producing agricultural goods, even if it could technically produce manufactured goods at a lower absolute cost. By specializing and trading, both countries can benefit, with the less efficient producer focusing on goods where the efficiency gap is smaller.

3.4.1.4 The Heckscher-Ohlin (HO) Model: Linking Factor Endowments to Trade Patterns (1930s):

The Heckscher-Ohlin (HO) Model, developed in the 1930s by Swedish economists Eli Heckscher and Bertil Ohlin, is a cornerstone theory in international trade. It builds on the idea of comparative advantage but takes it a step further by focusing on a country's factor endowments the resources available for production, such as land, labor, and capital (Ohlin, 1933)

- Factor endowments: These are the resources a country has access to, like labor (skilled or unskilled), capital (machinery, infrastructure), and natural resources (land, minerals). The model assumes countries have different relative abundances of these factors.
- Production and Trade: Countries tend to produce and export goods that intensively use their abundant and cheap factors. Conversely, they will import goods that rely heavily on their scarce factors.

For instance, a country with a large, cheap labor force (labor-abundant) might export labor-intensive goods like clothing, while a country with abundant capital (capital-abundant) might export machinery.

The HO Model emphasizes that international trade allows countries to specialize in production based on their factor endowments, leading to increased efficiency and mutual gains from trade.

3.4.2 Modern Firm-Based Trade Theories

While classical country-based theories provide a valuable foundation for understanding international trade, the late 20th century saw the emergence of modern firm-based theories. These theories shift the focus from national perspectives to the strategic decisions and behavior of individual firms operating in the global marketplace. Let us delve deeper into some key modern firm-based trade theories:

3.4.2.1 Country Similarity Theory: Catering to Shared Preferences (1961):

Developed by Staffan Linder in his work "The Pattern of World Trade" (1961), the country similarity theory challenges the traditional notion that trade primarily occurs between countries with dissimilar factor endowments. Instead, Linder suggests that trade in manufactured goods will likely flourish between countries with similar income levels and preferences (Linder, 1961). This is because such countries are likely to demand similar goods, creating a larger market for firms. Economies of scale, the cost advantages associated with producing larger quantities, become a significant driver of trade in this scenario. Firms can leverage these economies of scale by producing for a larger market encompassing multiple countries with similar preferences, increasing efficiency and potentially lowering consumer prices.

For example, imagine two developed countries with a sizeable middle class. Both countries might have a high demand for high-quality smartphones. A smartphone manufacturer can benefit from economies of scale by establishing production facilities in one of these countries and exporting to the other, potentially lowering production costs and offering competitive prices in both markets.

3.4.2.2 Product Life Cycle Theory: The Evolution of Trade Patterns (1966):

Raymond Vernon's "International Trade and Development in the Product Cycle" (1966) proposed the product life cycle theory, which offers insights into how the international trade patterns of new products evolve (Vernon, 1966, pp. 190-207). The theory suggests that new products are introduced and produced in the innovating country, often driven by factors like proximity to research and development facilities and a skilled workforce. This initial production phase might also benefit from strong intellectual property protection laws in the innovating country.

As the product matures, however, several factors can lead to a shift in production location. Competition intensifies, putting pressure on costs. Additionally, the technological know-how required for production becomes more widely available. This can incentivize firms to relocate production to countries with lower labor costs, particularly in developing economies, to maintain competitiveness. In the later stages of the product life cycle, the focus might shift towards even lower-cost producers, potentially leading to a geographically dispersed production network.

For instance, a new innovative smartphone might be initially designed and produced in a developed country with a strong technology sector. As the technology matures and competition increases, production might shift to countries with lower labor costs, allowing the manufacturer to maintain profitability and cater to a broader market segment.

3.4.2.3 Global Strategic Rivalry Theory: The Power of Multinational Corporations (1980s):

Loped by Paul Krugman and Kelvin Lancaster in the 1980s, the global strategic rivalry theory emphasizes the role of multinational corporations (MNCs) in shaping international trade patterns (Krugman, 1984). This theory argues that MNCs are not simply passive participants in the global market but rather strategic players actively engaged in competition. They may engage in various strategies to gain a competitive advantage, including:

- Locational advantages: MNCs may locate production facilities in different countries to take advantage of cost differentials in labor, raw materials, or taxes.
- Foreign direct investment (FDI): MNCs may invest directly in firms or establish subsidiaries in foreign countries To acquire entry into novel markets, resources, or knowledge.

- Research and development (R&D) activities: MNCs may locate R&D facilities in countries with strong scientific talent pools or supportive government policies to foster innovation.

These strategic decisions by MNCs can significantly influence trade flows and shape the global competitive landscape. For example, an MNC might establish a manufacturing plant in a developing country to take advantage of lower labor costs and then export the finished product back to developed markets.

3.4.2.4 Porter's National Competitive Advantage Theory: Building a Strong Foundation (1990):

In his groundbreaking work "The Competitive Advantage of Nations" (1990), Michael Porter proposed the national competitive advantage theory. This theory delves into the factors within a country that contribute to its overall competitiveness in international trade. Porter's "diamond" framework illustrates these key determinants (Porter, 1990, Free Press).

The four pillars of Porter's diamond framework are:

- Factor Conditions: This refers to the quality and availability of a country's resources. These resources can be broadly categorized into:
  - Human resources: The workforce's skill level, education, and training.
  - Physical resources: The availability of natural resources, land, and infrastructure (transportation networks, communication systems).
  - Capital resources: The availability of financial resources for investment and innovation.
  - Knowledge resources: The level of scientific advancement, technological expertise, and innovation capabilities within a country.
- Demand Conditions: This refers to the nature and sophistication of a country's domestic market. The size, growth rate, and level of customer demand within a country significantly influence firm competitiveness. A large and demanding domestic market can push firms to innovate and improve efficiency to meet customer needs and compete effectively. This can lead to a spillover effect, where these advancements benefit firms when they compete in the global market.
- Related and Supporting Industries: Strong and competitive supporting industries within a country's borders play a crucial role. These supporting industries provide essential

inputs, services, and expertise that contribute to the competitiveness of focal industries. For instance, a strong automotive industry might be supported by a network of efficient steel producers, parts manufacturers, and design firms.

- Firm Strategy, Structure, and Rivalry: A country's overall business environment, including management philosophies, organizational structures, and the intensity of competition between domestic firms, shapes national competitiveness. A strong emphasis on innovation, collaboration, and continuous improvement within firms can foster a competitive advantage. Additionally, the presence of intense but healthy competition within a domestic market can drive firms to become more efficient and innovative.

By analyzing these four interconnected elements, The utilization of Porter's diamond framework offers a valuable instrument for comprehending the factors that contribute to a nation's success in international trade. A country with a well-developed diamond, where all four elements reinforce each other, will likely be more competitive in the global marketplace.

4. Assessment of Foreign Trade

Foreign trade, the intricate web of goods and services exchanged across borders, is a critical driver of the global economy. Understanding its various aspects through foreign trade assessment is crucial for informed decision-making at both national and firm levels. This section delves into the rationale behind foreign trade, its potential benefits and drawbacks, its impact on economies, and the various factors that influence these exchanges.

4.1 Countries engage in foreign trade

Several compelling reasons motivate countries to participate in foreign trade. Here are some key drivers:

- **Access to a Wider Range of Goods and Services:** Foreign trade allows consumers to enjoy a greater variety of products, often at lower prices due to increased competition. Imagine a country with a limited domestic textile industry. Through trade, consumers access a more comprehensive selection of clothing from different countries, potentially at more competitive prices than in a scenario with limited domestic options. (Krugman et al., 2018)

- **Achieving Economies of Scale:** Firms can potentially reduce costs per unit by producing for a larger global market. This phenomenon, known as economies of scale, makes them more competitive. For example, a car manufacturer can spread the fixed costs of production (e.g., factory setup, research, and development) over a larger volume of vehicles when exporting to other countries, potentially leading to lower production costs per car (Hill et al., 2021).
- **Gaining Access to Resources and Technology:** Countries may lack specific resources or technologies needed for domestic production. Foreign trade allows them to acquire these essential elements through imports. A nation with limited domestic oil reserves might rely on oil imports from other countries to meet its energy demands (Kindleberger, 2010).
- **Generating Employment:** Exports can create jobs in export-oriented industries. This can significantly impact a country's overall employment rate and economic growth (Grossman & Helpman, 2004). For instance, an increase in demand for a country's coffee exports might lead to the creation of new jobs in the agricultural sector involved in coffee production.
- **Promoting Economic and Political Relations:** Trade can foster cooperation and understanding between countries, leading to improved political relations. Trade agreements often involve provisions that encourage diplomacy and collaborative problem-solving, potentially reducing political tensions (Mansfield & Milner, 2010).

4.2 A Double-Edged Sword: Advantages and Disadvantages of Foreign Trade

While foreign trade offers numerous advantages, it also comes with potential drawbacks. Here is a closer look at both sides:

Advantages:

- **Increased Economic Growth and Development:** Trade stimulates economic activity, leading to higher production, consumption, and investment. This can contribute to a country's economic growth and development (Krugman et al., 2018).
- **Improved Access to Goods and Services:** Consumers gain increased availability of a diverse range of products and services at potentially lower prices due to increased competition.

- **Job Creation:** Trade generates jobs in various sectors, including manufacturing, transportation, and logistics.
- **Technological Advancements:** Increased competition from foreign firms incentivizes domestic firms to be more innovative and efficient, potentially leading to technological advancements (Grossman & Helpman, 2004).
- **Enhanced Competition Leading to Innovation and Efficiency:** Competition from foreign firms can push domestic firms to improve their production processes, develop new products, and become more efficient.

Disadvantages:

- **Job Losses in Certain Sectors Due to Competition from Imports:** Increased imports can lead to job losses in industries facing stiff competition from foreign producers. For example, a rise in cheaper textile imports might lead to job losses in a country's domestic textile industry.
- **Increased Vulnerability to External Economic Shocks:** A country's reliance on foreign trade can make it more vulnerable to external economic shocks, such as a global recession or trade wars.
- **Exploitation of Labor and Environmental Standards in Some Countries:** Unethical practices, such as employing low-wage labor with poor working conditions or utilizing environmentally unsustainable production methods, might exist in some countries. Trade with such countries can raise ethical concerns (Bhagwati, 2004).
- **Dependence on Other Countries for Essential Goods and Resources:** Excessive reliance on imports for essential goods and resources can leave a country vulnerable if supply chains are disrupted or trade relations deteriorate.

It is crucial for policymakers to carefully weigh the potential benefits and drawbacks of foreign trade in the context of a specific country's economic and social development goals.

4.3 The Engine of the Global Economy: Foreign Trade's Impact

Foreign trade plays a significant role in the global economy by:

- **Promoting Economic Growth:** Increased trade activity stimulates economic activity, leading to higher production, consumption, and investment across participating countries.

- **Facilitating Resource Allocation:** Trade allows countries to specialize in producing goods and services for which

4.4 Types of Foreign Trade

There are several ways to categorize foreign trade, each offering a unique perspective on the flow of goods and services:

- **By Direction:**
  - **Exports are goods and services sent from one country to another**. A nation's export sector is crucial to its economic growth and competitiveness. For instance, a country with a booming automotive industry might export a significant number of vehicles to other countries (Hill et al., 2021).
  - **Imports:** These are goods and services received from another country. Imports allow consumers to access a wider variety of products and potentially benefit from lower prices due to increased competition. Imagine a country with a limited domestic coffee industry. Through imports, consumers gain access to a broader selection of coffee beans from different countries (Krugman et al., 2018).
- **By Trade Mode:**
  - **Merchandise Trade:** This refers to the trade in physical goods. This encompasses a vast array of products, from raw materials like oil and minerals to manufactured goods like automobiles and electronics (WTO, 2023).
  - **Service Trade:** This involves exchanging intangible services, such as tourism, banking, education, and healthcare. The service sector has become increasingly important in the global economy, with international trade in services playing a significant role (UNCTAD, 2023).
- **By Level of Processing:**
  - **Primary Goods:** These are unprocessed or minimally processed products like raw materials (e.g., iron ore) and agricultural products (e.g., wheat, cotton). International trade in primary goods plays a vital role in supplying essential resources for manufacturing and consumption across the globe (Bhagwati, 2004).
  - **Secondary Goods:** These are manufactured goods that have undergone significant processing. They encompass a wide range of products, from automobiles and machinery to textiles and clothing (Hill et al., 2021). International trade in

manufactured goods is a significant driver of economic growth and development for many countries.

- **Tertiary Goods:** These are services, which are intangible economic activities that provide value to consumers. Examples include tourism, banking, education, and healthcare. Trade-in services have become increasingly important in the global economy (UNCTAD, 2023).

By analyzing foreign trade through these different lenses, we gain a deeper understanding of the flows of goods and services across borders and the complex dynamics at play.

4.5 Influential Factors:

Several factors shape the volume and direction of international trade. Understanding these influences is crucial for policymakers and businesses alike:

- **Trade Policies:** Government policies, such as tariffs (taxes imposed on imports), quotas (limits on the quantity of a specific good that can be imported), and subsidies (financial assistance provided to domestic producers), can significantly impact the flow of imports and exports (Krugman et al., 2018).
- **Exchange Rates:** Fluctuations in exchange rates can affect the competitiveness of a country's exports in the global market. A weaker currency can make exports cheaper and more attractive to foreign buyers, while a stronger currency can have the opposite effect (Hill et al., 2021).
- **Transportation Costs:** The cost of transporting goods across borders can significantly impact the feasibility and competitiveness of trade. Advancements in transportation technology, such as containerization and improved shipping infrastructure, have significantly reduced transportation costs, facilitating international trade (Grossman & Helpman, 2004).
- **Economic Conditions:** A country's economic growth can significantly influence its trade patterns. Economic growth often leads to increased demand for imports and a larger export market for a country's goods and services (Krugman et al., 2018).
- **Political Stability:** Political instability and uncertainty in a country can discourage foreign investment and trade. Conversely, a stable political environment can foster confidence and encourage international trade (Mansfield & Milner, 2010).

- **Technology:** Technological advancements can play a crucial role in promoting trade. Developments in communication technologies, such as the Internet, have facilitated communication and information sharing between businesses across borders, streamlining international trade processes (Hill et al., 2021).

By understanding these factors and their interactions, policymakers can develop informed trade policies that promote economic growth and development, while businesses can make strategic decisions regarding their international operations.

5. Trade Agreements and Organizations

International trade also takes place within the framework of various trade agreements and organizations:

5.1 World Trade Organization (WTO)

The World Trade Organization (WTO), established in 1995, stands as the leading international organization overseeing global trade. It serves as a multilateral forum where member countries come together to:

- Promote Free Trade: The WTO actively negotiates and enforces trade agreements that aim to reduce or eliminate barriers to trade, such as tariffs (taxes on imports) and quotas (limits on import quantities). By fostering a more open trading environment, the WTO seeks to stimulate economic growth and development for all participating countries (Krugman et al., 2018).
- Settle Trade Disputes: Inevitably, disagreements arise between countries regarding trade practices. The WTO provides a neutral platform for member countries to resolve these disputes peacefully through a well-defined legal framework. This dispute settlement mechanism helps to maintain stability and predictability in the global trading system (Hoekman & Mavroidis, 2004).
- Promote Transparency: Transparency is vital for building trust and ensuring fair play in international trade. The WTO encourages member countries to be transparent in their trade policies and practices. This includes notifying the WTO of any new trade measures

they implement and providing regular updates on their trade policies (Bownas & Hoekman, 2010).

The WTO's role is multifaceted. It promotes a rules-based trading system that fosters free trade, facilitates the settlement of trade disputes, and encourages transparency among member countries. These efforts contribute to a more stable and predictable environment for international trade, potentially benefiting Egypt's maize and sunflower oil exports by opening new markets and ensuring a level playing field.

5.2 Euro-Mediterranean Partnership (EMP)

The Euro-Mediterranean Partnership (EMP), established in 1995, offers a more specific example of a regional trade agreement. It is a framework for trade and cooperation between the European Union (EU) and Mediterranean partner countries, including Egypt. The EMP strives to achieve several key objectives:

- Promote Free Trade: The EMP aims to gradually reduce or eliminate tariffs and other trade barriers between the EU and partner countries. This can create new export opportunities for Egyptian maize and sunflower oil producers by making their products more competitive in the EU market (Hill et al., 2021).
- Encourage Economic Cooperation: The EMP goes beyond simply reducing trade barriers. It also fosters economic cooperation through initiatives such as investments, technology transfer, and support for sustainable development projects in partner countries. This broader cooperation can contribute to improving Egypt's agricultural sector's efficiency and competitiveness in the long run (Baldwin, R. 2016).
- Enhance Political Dialogue and Cultural Exchange: The EMP seeks to build stronger relationships and understanding between the EU and partner countries by promoting political dialogue and cultural exchange. This can create a more stable and cooperative environment for trade to flourish (Mansfield & Milner, 2010).

While the EMP presents potential benefits for Egypt's maize and sunflower oil trade, it is also crucial to consider the challenges. These challenges might include:

- Complying with EU Regulations: The EU enforces strict food safety and quality standards. Egyptian producers must ensure their products meet these standards to gain access to the EU market.

- Facing Competition from Other Partner Countries: Other Mediterranean countries also participate in the EMP. Egypt will compete with these countries to gain a share of the EU market.

Understanding the opportunities and challenges associated with the EMP is essential for Egypt to devise effective strategies to benefit from this trade agreement.

5.3 International Monetary Fund (IMF)

The International Monetary Fund (IMF), established in 1944, is another crucial player in the global economic landscape. While not directly involved in negotiating trade agreements, the IMF's work can indirectly impact the environment for international trade, including Egypt's maize and sunflower oil trade. Here is how:

- Promoting International Monetary Cooperation: The IMF plays a crucial role in promoting international monetary cooperation. It achieves this by providing financial assistance to member countries facing balance of payment problems, where exports are insufficient to cover imports. This financial support can help to stabilize a country's currency and reduce economic uncertainty, potentially creating a more favorable environment for international trade (Guitián, 2007).
- Encouraging Sound Economic Policies: The IMF advises member countries on economic and financial policies to promote sustainable growth and development. These policies might include promoting fiscal discipline, reducing inflation, and fostering a competitive business environment. By supporting sound economic policies, the IMF can indirectly contribute to creating a more stable and predictable economic environment, which can benefit international trade flows, including Egypt's maize and sunflower oil exports (Goldsmith, 2008).

It is important to note that the IMF's influence on trade is indirect. However, its role in promoting international monetary cooperation and encouraging sound economic policies can create a more stable and predictable global economic environment, ultimately benefiting international trade.

6. Egyptian Maize and Sunflower oil

Maize (corn) and sunflower oil are essential commodities that are critical to Egypt's food security and economic landscape. Understanding their current state, consumption patterns, trade dynamics, and significance is crucial for informed decision-making regarding agricultural policies and ensuring a stable supply for the Egyptian population.

6.1 Egyptian Maize oil:

Production:

Egypt primarily relies on imports to meet its domestic maize demand, making it a **net importer**. While some domestic production exists, it is concentrated in Upper Egypt, facing significant challenges:

- **Limited Water Resources:** The scarcity of water resources in Upper Egypt restricts the potential for large-scale maize production (The World Bank, 2020).
- **Land Availability:** Limited arable land further restricts the expansion of maize cultivation (Food and Agriculture Organization of the United Nations [FAO], 2023).

Government Initiatives: Recognizing the importance of domestic maize production, the Egyptian government has implemented initiatives to increase self-sufficiency, including:

- **Promoting Drought-Resistant Varieties:** Introducing and encouraging the use of maize varieties that require less water, such as heat- and drought-tolerant hybrids (International Maize and Wheat Improvement Center [CIMMYT], 2023).
- **Investing in Irrigation Infrastructure:** Upgrading irrigation infrastructure and promoting water-saving techniques like drip irrigation can help optimize water usage in maize production (International Water Management Institute [IWMI], 2023).

Consumption:

Maize serves a dual purpose in the Egyptian diet:

- **Animal Feed:** A substantial portion of domestically produced and imported maize is utilized as animal feed, particularly for poultry and livestock (United States Department of Agriculture [USDA] Foreign Agricultural Service, GAIN Report, Egypt Grain and Feed Update, Annual Report, Cairo, Egypt, August 14, 2023). This is crucial for Egypt's meat and poultry production.

- **Human Consumption:** A smaller portion of maize is directly consumed by humans in the form of bread (especially "baladi" bread) and other food products like cornflakes (USDA FAS GAIN Report).

Trade:

Egypt relies heavily on imports to meet its domestic maize demand. Major source countries include:

- **Ukraine**
- **Brazil**
- **Argentina** (USDA FAS GAIN Report)

Fluctuations in global maize prices can significantly impact the Egyptian economy. Rising prices can strain government budgets allocated for maize imports and potentially lead to higher food prices for consumers (World Bank, 2020).

Significance:

Maintaining a stable and affordable supply of maize is crucial for Egypt's food security for several reasons:

- **Food Security:** Maize plays a vital role in animal feed production, indirectly impacting the availability and affordability of meat and poultry products in the Egyptian market.
- **Direct Consumption:** Maize consumption, particularly bread, is a significant component of the Egyptian diet. Price fluctuations can have a direct impact on household food security.

The Egyptian government faces a continuous challenge of balancing the need to:

- **Support Domestic Producers:** Encourage and incentivize domestic maize production to reduce import dependence and potentially create jobs in rural areas.
- **Maintain Affordable Prices for Consumers:** Imported maize must remain affordable to prevent food price inflation and maintain food security for the population.

6.2 Egyptian Sunflower Oil

Production:

Similar to maize, Egypt is a **net importer** of sunflower seeds. Domestic production remains limited, meeting only a small portion of the national demand. Production limitations mirror those of maize:

- **Concentration in Upper Egypt:** Sunflower cultivation is primarily concentrated in Upper Egypt, and it faces limitations due to water scarcity and land availability (FAOSTAT, Food and Agriculture Data, https://www.fao.org/faostat/en/).
- **Limited Domestic Production:** The relatively low domestic production volume necessitates significant import reliance to meet the country's sunflower oil needs.

Consumption:

Sunflower seeds are primarily used for:

- **Oil Extraction:** The majority of sunflower seeds are processed to extract sunflower oil, a crucial cooking oil in Egyptian households (FAOSTAT).
- **Animal Feed:** The remaining meal after oil extraction is used as animal feed, similar to maize (USDA FAS GAIN Report).

Trade:

Egypt relies heavily on imports of sunflower seeds to meet its domestic demand for sunflower oil. Major source countries include:

- **Russia**
- **Ukraine**
- **Turkey** (USDA FAS GAIN Report)

Similar to maize, fluctuations in global sunflower seed prices can significantly impact the Egyptian market.

Significance:

Sunflower oil is a vital component of the Egyptian diet, playing a central role in household cooking. However, the heavy reliance

7. Practical Part

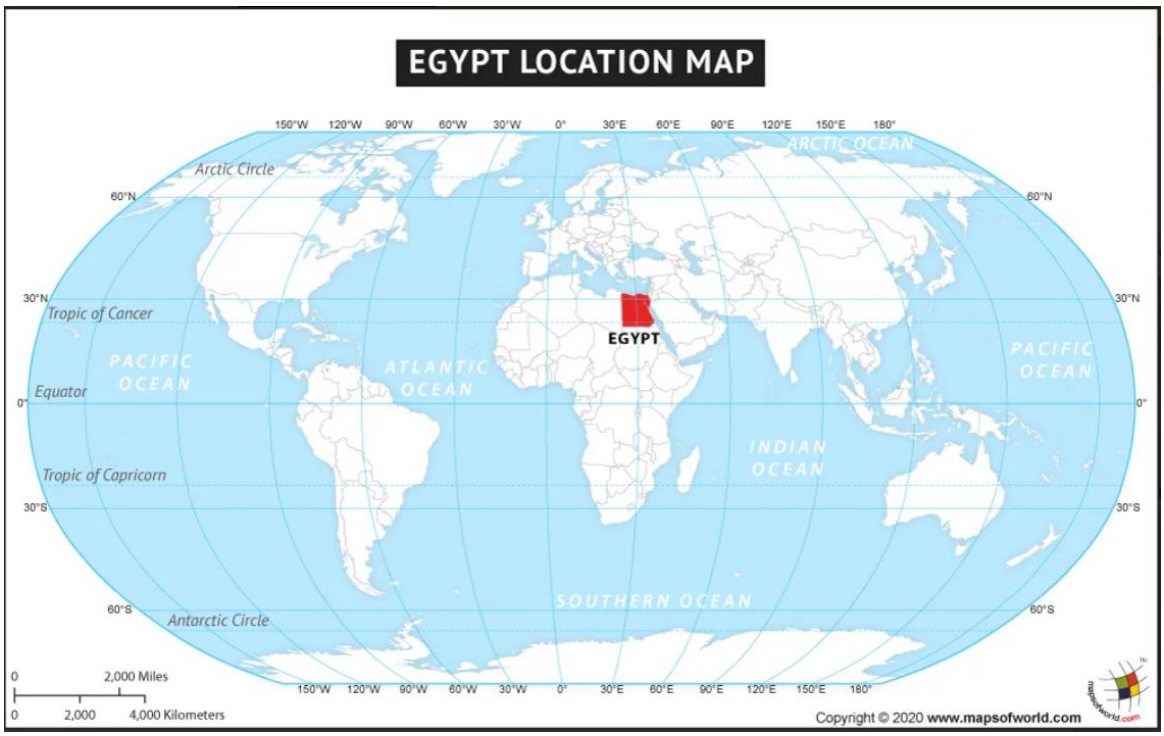
7.1 Egypt: An Intersection of Trade

Egypt has been a crucial commerce hub for thousands of years due to its advantageous position at the intersection of continents. Its distinctive geographical location has established it as a crucial link between the Eastern and Western regions and Africa and Asia, enabling the exchange of commodities and cultural exchanges for ages. Historical trade routes, notably the Silk Road, traversed Egypt, consolidating its position as a prominent hub for commercial activities.

- Egypt, located at the confluence of Africa, Asia, and the European coastline, is a pivotal point for multinational corporations seeking to tap into expansive markets within the Middle East and Africa.
- Egypt benefits from its strategic location along the Red Sea and the Mediterranean Sea, which grants it access to vital maritime routes and enables efficient trade between the Eastern and Western regions.
- The Suez Canal, an artificial waterway that traverses the nation, facilitates marine commerce by substantially diminishing the transit duration between Asia and Europe.
- Egypt's environmental diversity is seen in its varied topography, which includes lush lands in the Nile Delta and desert regions. This diverse landscape facilitates the production of a wide range of crops, enhancing Egypt's trading potential.

  The elements above have solidified Egypt's position as a significant participant in the international commercial arena.

Figure 1, Egypt's location



Source: Maps of World, 2024 https://www.mapsofworld.com/egypt/egypt-location-map.html

7.2 Egyptian Economy

7.2.1 Overview

The Egyptian economy is classified as a lower-middle-income economy with a diverse structure (World Bank, 2023). Key sectors contributing to Egypt's GDP include:

- Agriculture: A significant contributor, employing a large portion of the workforce and accounting for roughly 12% of GDP in 2021 (FocusEconomics, 2023). Major agricultural products include cotton, rice, wheat, fruits, and vegetables. However, water scarcity and limited arable land pose significant challenges for this sector.
- Tourism: A vital sector that generates foreign currency and contributes to employment, particularly in service industries like hospitality and transportation. However, the industry is susceptible to external factors like political instability and security concerns.
- Manufacturing: Growing in importance, with a focus on industries like textiles, chemicals, food processing, and steel. This sector has the potential to diversify the Egyptian economy and reduce dependence on imports (World Bank, 2023).
- Services: A rapidly expanding sector encompassing various activities like finance, transportation, communication, and the Suez Canal. This sector provides essential support to other sectors and is expected to continue growing (World Bank, 2023)

Table 1 Egypt GDP & GDP Growth

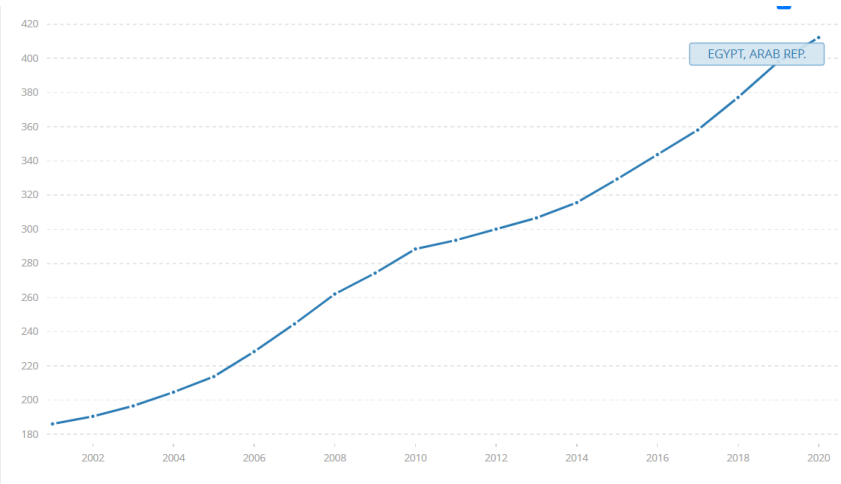
Year	Egypt GDP in Billion (constant 2015 US$)	GDP growth (annual %)
2001	186.04	3.54
2002	190.48	2.39
2003	196.57	3.19
2004	204.61	4.09
2005	213.76	4.47
2006	228.39	6.84
2007	244.58	7.09
2008	262.08	7.16
2009	274.33	4.67
2010	288.45	5.15
2011	293.54	1.76

2012	300.07	2.23
2013	306.63	2.19
2014	315.57	2.92
2015	329.37	4.37
2016	343.68	4.35
2017	358.05	4.18
2018	377.14	5.33
2019	398.08	5.55
2020	412.21	3.55
Mean	**286.18**	**4.25**

Source: Owen process World Bank

The data in Table (1) reveals a notable average GDP growth rate of 4.25% between 2001 and 2020. Additionally, the average GDP for the corresponding period, measured in billions of USD, is 286.18 billion USD. Additionally, the GDP experienced a substantial increase from 186.04 billion USD in 2001 to 412.21 billion USD in 2020.

Figure 2, GDP (constant 2015 US$)

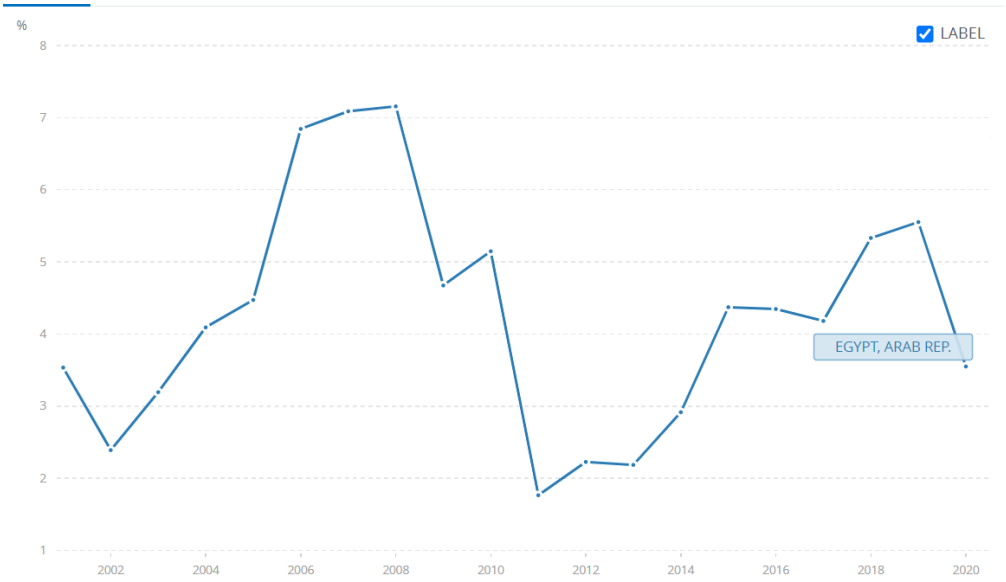


Source: Own process based on World Bank

Figure 2 illustrates the rate of increase in Egypt's Gross Domestic Product (GDP) from 2001 to 2020. This indicates that it varies over the study period from 2001 to 2020. The lowest rate seen over this time frame was 1.76% in 2011. The GDP growth rate experienced a

notable increase from 2002 to 2008, reaching a peak of 7.16% during the study period. However, it subsequently declined due to political instability. After 2011, the growth rate began to rise, reaching 5.55% in 2019, but then declined again in 2020, reaching 3.55%.

Figure 3, Annual percentage increase in GDP



Source: Own process based on World Bank

7.2.2 Role of Foreign Trade

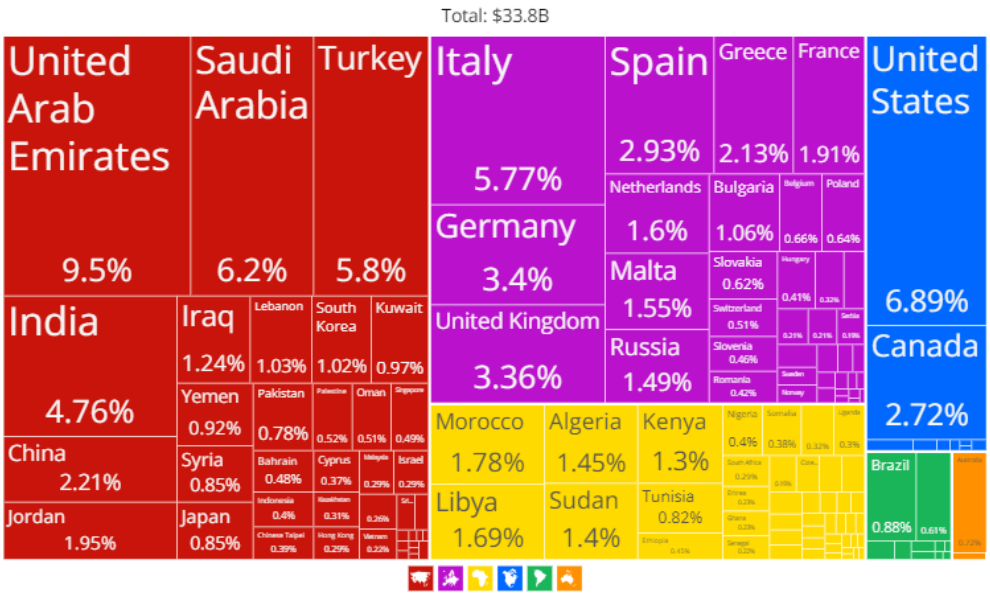
Foreign trade plays a crucial role in the Egyptian economy by:

- Facilitating access to essential goods: Egypt relies on imports to meet its domestic demand for various commodities, including food (wheat, maize, oils), machinery and equipment, and consumer goods.
- Generating export revenue: Key exports include petroleum products, manufactured goods (textiles, garments), agricultural products (cotton, rice, maize, sunflower), and minerals and metals (phosphates). Export earnings contribute significantly to foreign currency reserves and government revenue (FocusEconomics, 2023).
- Promoting economic growth: International trade allows Egypt to participate in global markets, fostering economic activity and potentially attracting foreign investment.

7.2.3 Major Trading Partners:

- European Union (EU): A significant export destination for Egyptian goods, particularly agricultural products and textiles. The EU is also a significant source of foreign investment for Egypt (OECD, 2023).
- Arab countries, particularly members of the Gulf Cooperation Council (GCC), which are significant trading partners and sources of foreign investment for Egypt.
- United States: A vital trading partner, with exports mainly consisting of manufactured goods and textiles. The U.S. also provides significant foreign aid to Egypt.
- China: China is a rapidly growing trade partner with an increasing presence in various sectors like infrastructure development and manufacturing (World Bank, 2023)

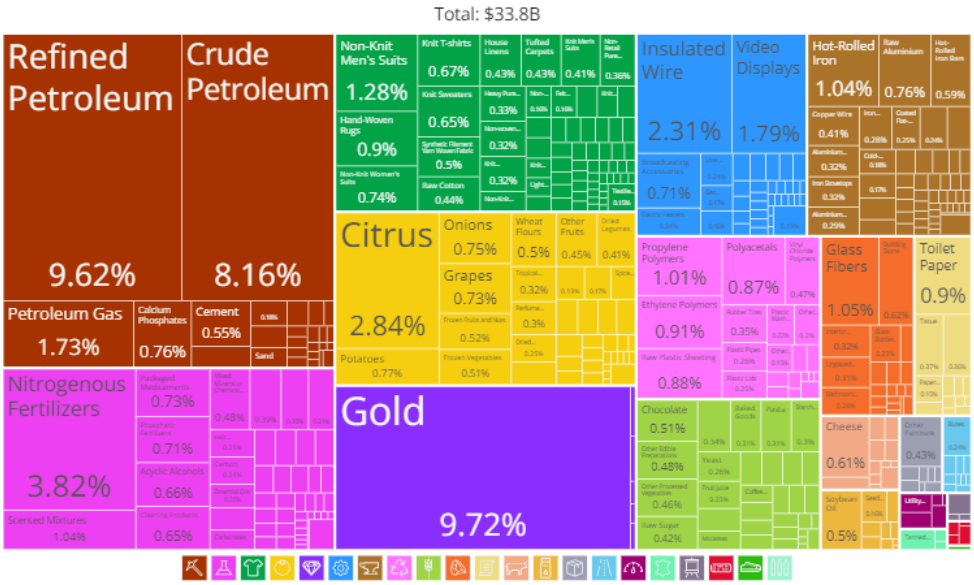
Figure 4, Destination from Egypt 2020



Source: OEC, 2020.

Figure 4 illustrates that Egypt exports to the UAE, the United States, Saudi Arabia, Turkey, and Italy at the following rates: 9.5%, 6.89%, 6.2%, 5.8%, and 5,77%, respectively

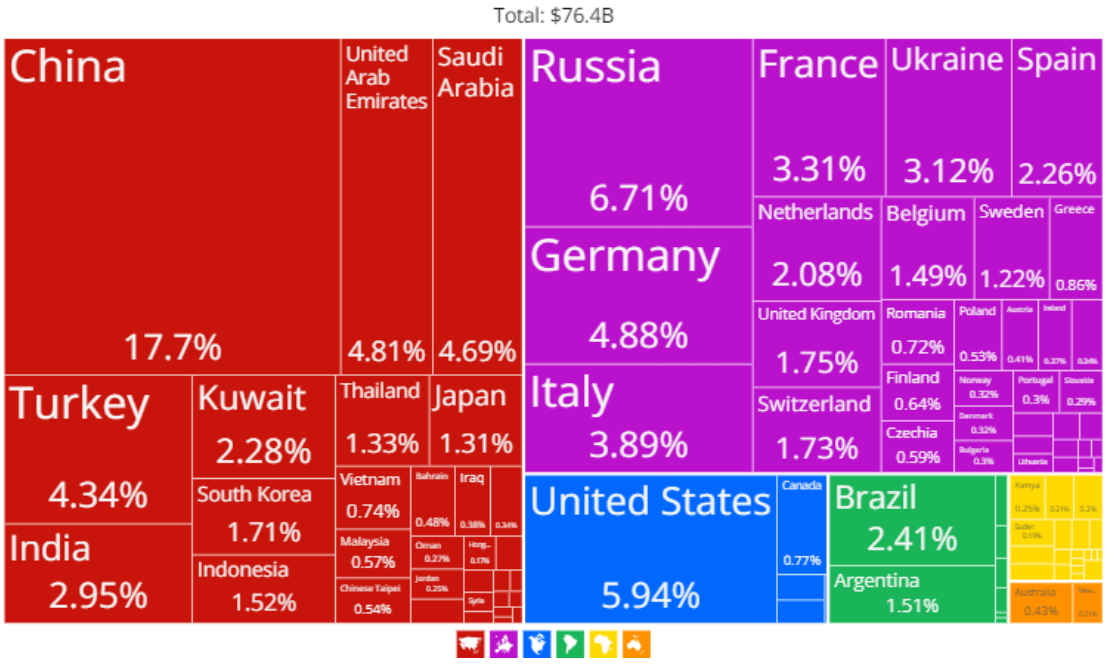
Figure 5, exported products from Egypt in 2020



Source: OEC, 2020.

Figure 5 illustrates the exported products from Egypt Glod, Refined Petroleum, Crude Petroleum, and Nitrogenous Fertilizers with the following rates: 9.72%, 9.62%, 8.16%, and 3.82%, respectively.

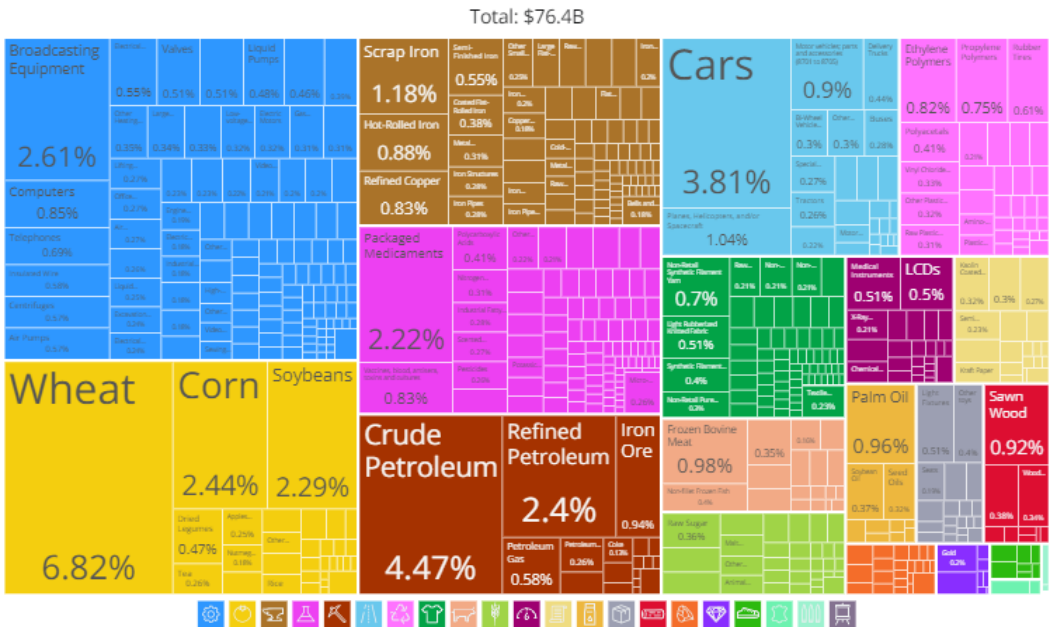
Figure 6, Origins to Egypt (2020)



Source: OEC, 2020.

Figure 6 illustrates that the top importers to Egypt are China, Russia, Germany, Turkey, and Italy, with rates of 17.7%, 6.71%, 4.88%, 4.34%, and 3.89%, respectively.

Figure 7, imported products to Egypt in 2020



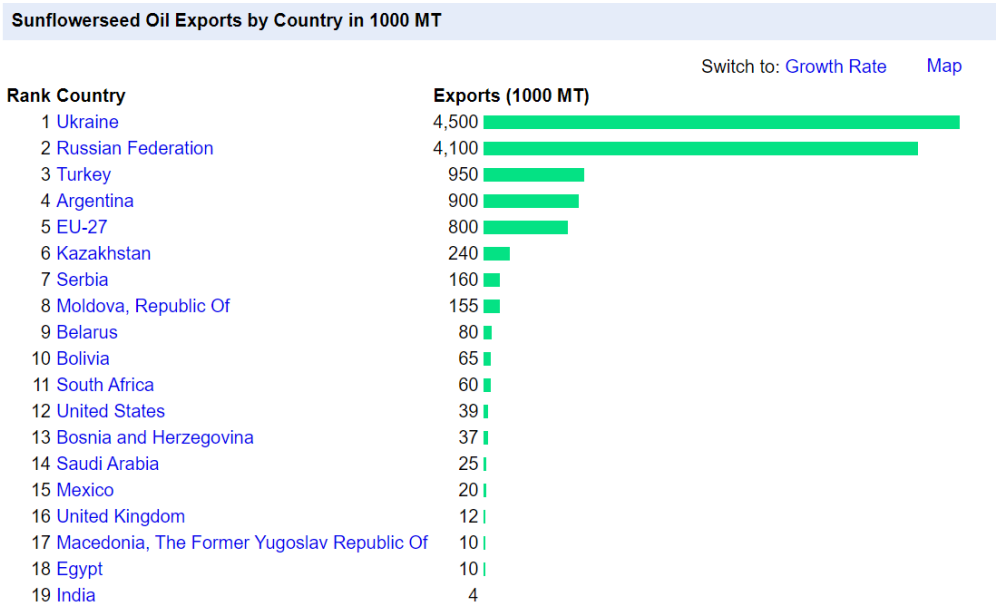
Source: OEC, 2020.

Figure 7 illustrates that the most imported products are Wheat, Crude Petroleum, Cars, Broadcasting Equipment, Corn, Refined Petroleum, and Soybeans at the following rates: 6.82%, 4.47%, 3.81%, 2.61%, 2.44%, 2.4%, and 2.29% respectively.

7.3 Sunflower oil Export ranking:

According to the index Mundi, Figure (8) clearly shows that Ukraine is the most important exporter of sunflower oil, with around 4500 million tons exported in 2020. Russia is the second exporter, with exports that amounted to 4100 million tons in 2020.

Figure 8, Sunflower oil Exports ranking by Country in 1000 MT



Source: www.indexmundi.com

7.4 Development of some indicators of Egyptian foreign trade of Sunflower oil

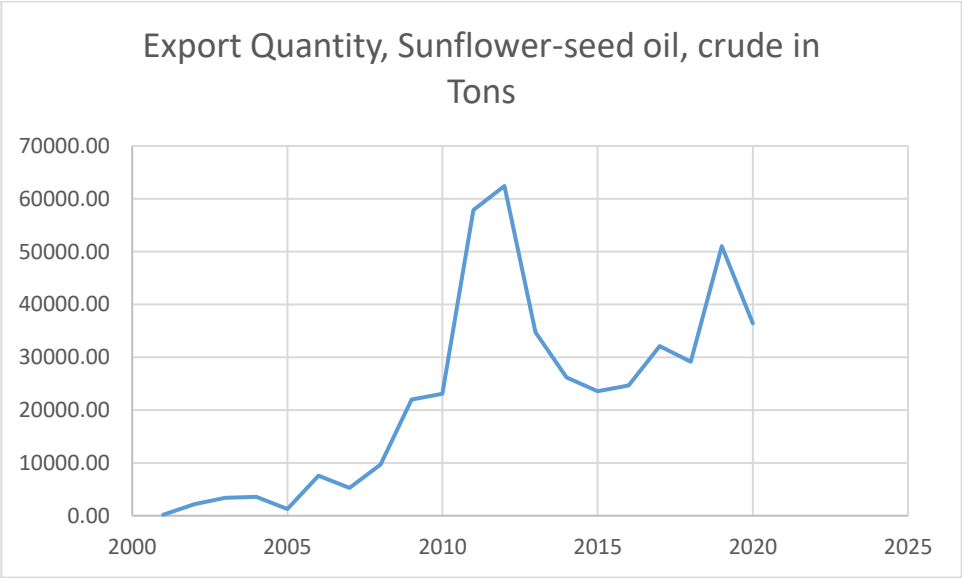
7.4.1 Export of Sunflower Oil Development

Table 2, Development of Egyptian exports of sunflower oil between 2001 and 2020

Year	Export Quantity: Sunflower-seed oil, crude in Tons	Exported value: Sunflower-seed oil, crude in 1000 Tons	Exported Price of sunflower oil in USD per ton
2001	177.00	105.00	593.22
2002	2155.00	1034.00	479.81
2003	3406.00	1344.00	394.60
2004	3558.00	2069.00	581.51
2005	1258.00	1096.00	871.22
2006	7595.00	6052.00	796.84
2007	5291.00	4206.00	794.93
2008	9701.00	14871.00	1532.93

2009	21982.00	27872.00	1267.95
2010	23100.00	23400.00	1012.99
2011	57890.00	154589.00	2670.39
2012	62409.00	89790.00	1438.73
2013	34694.00	51657.00	1488.93
2014	26148.00	28563.00	1092.36
2015	23591.00	23886.00	1012.50
2016	24682.00	23808.00	964.59
2017	32111.00	29609.00	922.08
2018	29119.13	26590.00	913.15
2019	51046.08	55965.00	1096.36
2020	36425.83	43590.00	1196.68
Average	22817	30505	1056

Figure 9, Export Quantity, Sunflower oil graph



Source: Own process based on World Bank

Figure 10, Statistical analysis of Exported Quantity of Sunflower oil

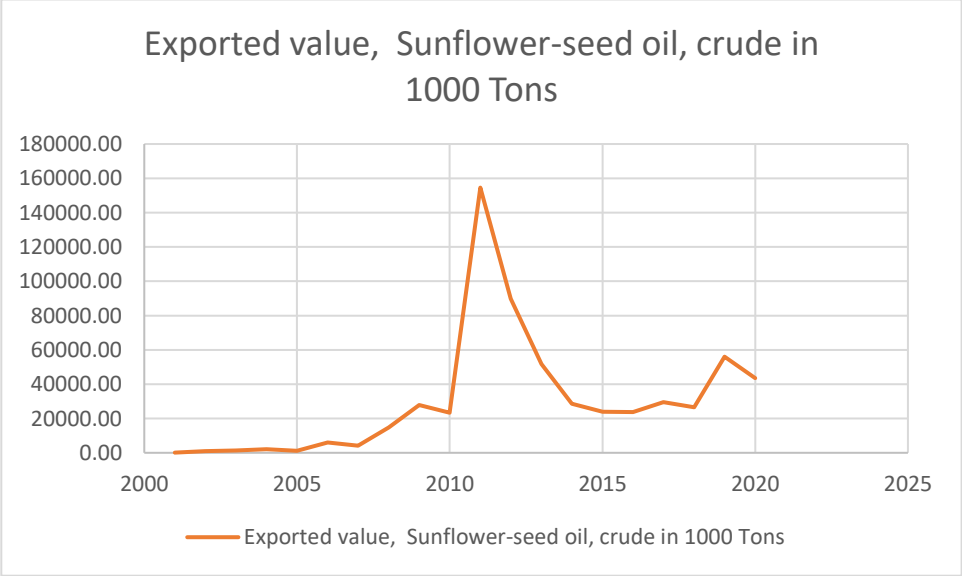
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ExportQuantitySunflowerseed' (20 valid observations)

  Mean                      22817.
  Median                    23346.
  Minimum                   177.00
  Maximum                   62409.
  Standard deviation        19092.
  C.V.                     0.83675
  Skewness                 0.59687
  Ex. kurtosis            -0.58704
  5% percentile             231.05
  95% percentile            62183.
  Interquartile range       30057.
  Missing obs.                  0
```

Source: Own process based on Gretl SW

Looking to Figure (10) from Gretl and Figure (09), which illustrate that the exported amounts fluctuated (decreasing and increasing) during this particular period, with an average quantity of 22,817 tons. The highest exported amount reached in this particular period was 62,409 Tons in 2012, while the lowest exported amount was 177 Tons in 2001 and the Standard deviation was 19092.

Figure 11, Export Values, Sunflower oil graph



Source: Own process based on World Bank

Figure 12, Statistical analysis of Exported Values of Sunflower oil

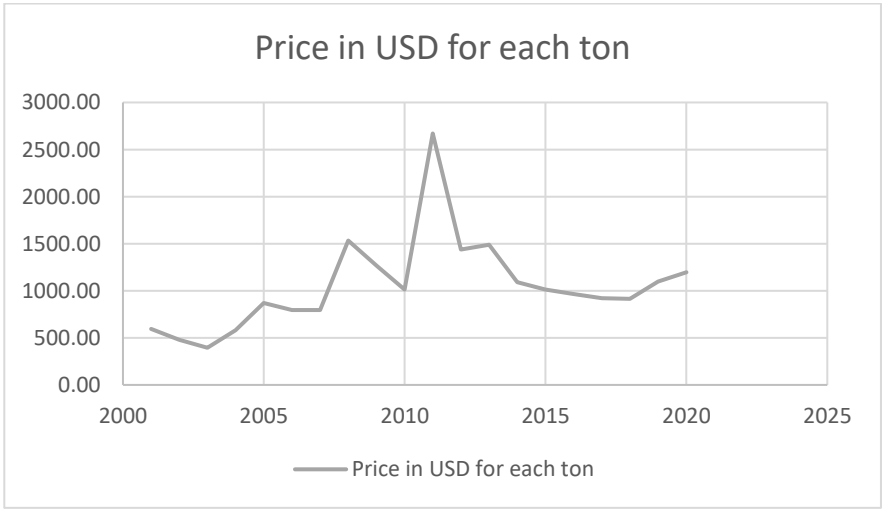
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ExportedvalueSunflowerseed' (20 valid observations)

  Mean                       30505.
  Median                     23847.
  Minimum                    105.00
  Maximum                1.5459e+005
  Standard deviation         37131.
  C.V.                       1.2172
  Skewness                   2.0912
  Ex. kurtosis               4.4239
  5% percentile              151.45
  95% percentile         1.5135e+005
  Interquartile range        37492.
  Missing obs.                    0
```

Source: Own process based on Gretl SW

Figures (11) and Figure (12) illustrate that the exported values fluctuated (decreasing and increasing) during this particular period, with an average value of 30,505 thousand USD and the highest value of was154,589 thousand USD in 2011, while the lowest value was 105 thousand USD in 2001 and Standard deviation 37,131.

Figure 13, Exported price, Sunflower oil graph



Source: Own process based on World Bank

Figure 14, Statistical analysis of Exported Price of Sunflower oil

```
Summary statistics, using the observations 2001 - 2020
for the variable 'PriceinUSDforeachton' (20 valid observations)

  Mean                      1056.1
  Median                    988.55
  Minimum                   394.60
  Maximum                   2670.4
  Standard deviation        495.45
  C.V.                     0.46914
  Skewness                  1.6562
  Ex. kurtosis              3.7222
  5% percentile             398.86
  95% percentile            2613.5
  Interquartile range       454.72
  Missing obs.                   0
```

Source: Own process based on Gretl SW

Figure (13) and Figure (14) illustrate that the price values fluctuated (decreasing and increasing) during this particular period, with an average price of 1,056 USD per ton and the highest value of 2,670 USD per ton in 2011, while the lowest value was 394 USD per ton in 2003 and Standard Deviation 495.45

7.4.2 Import of Sunflower Oil Development

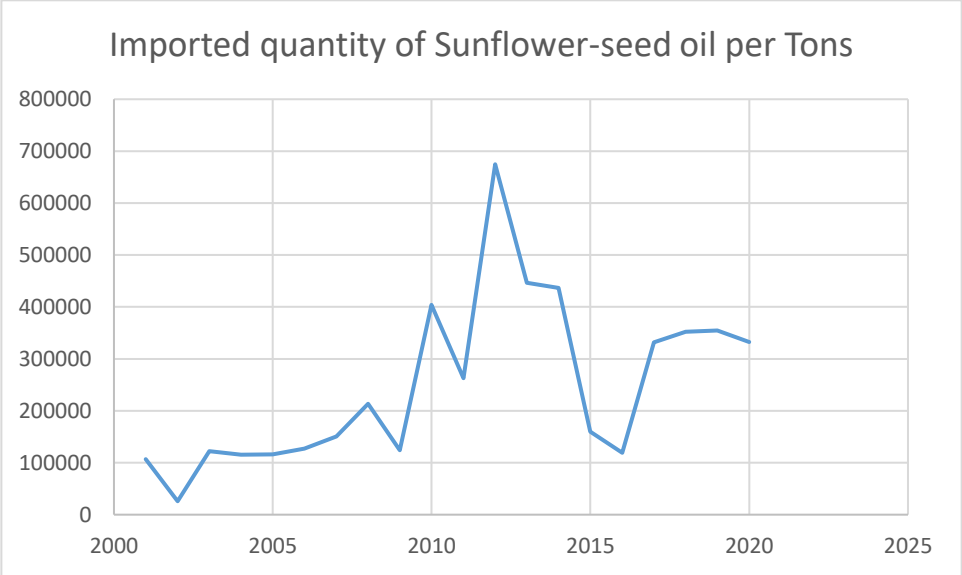
Table 3, Development of Egyptian imports of Sunflower oil between 2001 and 2020

Year	Imported quantity of Sunflower-seed oil per Ton	Imported Values of Sunflower-seed oil per 1000 USD in Egypt	Imported Price of sunflower oil in USD for each ton
2001	107000	55000	514.02
2002	25875	17633	681.47
2003	122505	69807	569.83
2004	115502	72462	627.37
2005	115855	78317	675.99
2006	126900	78715	620.29
2007	150803	111787	741.28
2008	213776	287347	1344.15
2009	124374	250862	2017.00
2010	403939	372799	922.91
2011	262764	482015	1834.40

2012	674742	983673	1457.85
2013	446573	638159	1429.01
2014	436968	429699	983.36
2015	159911	185180	1158.02
2016	118983	126572	1063.78
2017	332053	310468	935.00
2018	352030.28	320721	911.06
2019	354670.81	255154	719.41
2020	332367	240537	723.71
Average	248880	268345	996

Source: Own processed data from https://www.fao.org/

Figure 15, Imported quantity of Sunflower oil Graph



Source: Own processed data based on World Bank

Figure 16, Statistical analysis of Imported Quantity of Sunflower oil

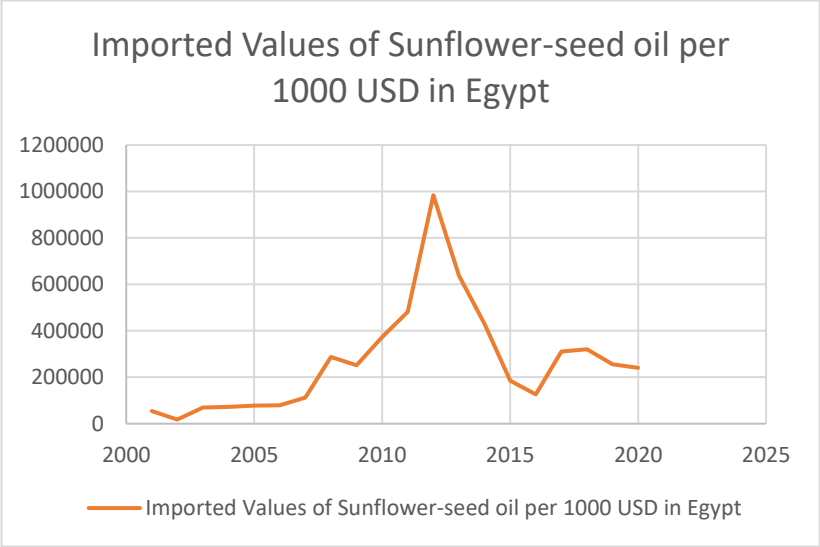
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ImportedquantityofSunflower' (20 valid observations)

  Mean                    2.4888e+005
  Median                  1.8684e+005
  Minimum                      25875.
  Maximum                 6.7474e+005
  Standard deviation      1.6273e+005
  C.V.                        0.65383
  Skewness                    0.88307
  Ex. kurtosis                0.25924
  5% percentile                29931.
  95% percentile          6.6333e+005
  Interquartile range     2.3415e+005
  Missing obs.                      0
```

Source: Own process based on Gretl SW

Studying the development of the imported quantity of sunflower oil during the period (2001 and 2020) Figures 15 and 16 illustrate that the imported amounts fluctuated (decreasing and increasing) during this particular period, with an average amount of 248,880, and the highest imported amounts reached in this particular period was 674,742 Ton in 2012, while the lowest imported amounts were 25,875 Ton in 2002 with Standard Deviation 162,730.

Figure 17, Imported Values of Sunflower Oil Graph



Source: Own processed data based on World Bank

Figure 18, Statistical analysis of Imported Value of Sunflower oil

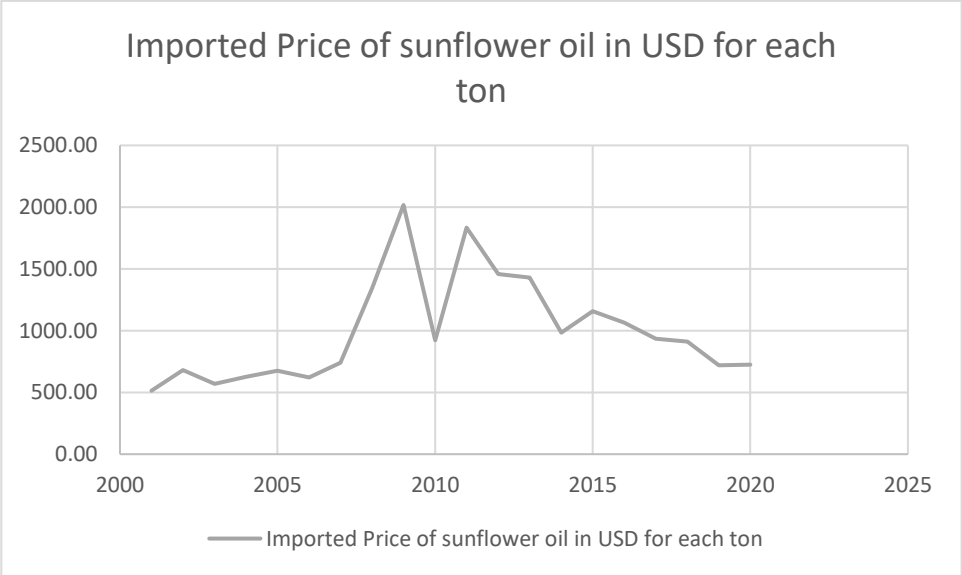
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ImportedValuesofSunflowerse' (20 valid observations)

  Mean                    2.6835e+005
  Median                  2.4570e+005
  Minimum                      17633.
  Maximum                 9.8367e+005
  Standard deviation      2.3474e+005
  C.V.                        0.87476
  Skewness                     1.5452
  Ex. kurtosis                 2.4033
  5% percentile                19501.
  95% percentile          9.6640e+005
  Interquartile range     2.8136e+005
  Missing obs.                       0
```

Source: Own process based on Gretl SW

Figure (17) and Figure (18) illustrate that the imported values of sunflower oil fluctuated (decreasing and increasing) during this particular period, with an average value of 268,345 thousand USD and the highest value was 983,673 thousand USD in 2012, while the lowest value was 17,633 thousand USD in 2002 with Standard Deviation 234,740.

Figure 19, Imported Price of Sunflower oil Graph



Source: Own processed data based on World Bank

Figure 20, Statistical analysis of Imported Price of Sunflower oil

```
Summary statistics, using the observations 2001 - 2020
for the variable 'ImportedPriceofsunfloweroil' (20 valid observations)

  Mean                      996.50
  Median                    916.98
  Minimum                   514.02
  Maximum                   2017.0
  Standard deviation        424.42
  C.V.                     0.42591
  Skewness                  1.0309
  Ex. kurtosis             0.13350
  5% percentile             516.81
  95% percentile            2007.9
  Interquartile range       620.26
  Missing obs.                   0
```

Source: Own process based on Gretl SW

Figures (19) and (20) illustrate that price values fluctuated (decreasing and increasing) during this particular period, with an average price of 996 USD and the highest value of 2,017 USD per ton in 2009, while the lowest value was 514 USD per ton in 2001 and Standard Deviation 424.42.

7.5 Development of some indicators of Egyptian foreign trade of Maize oil

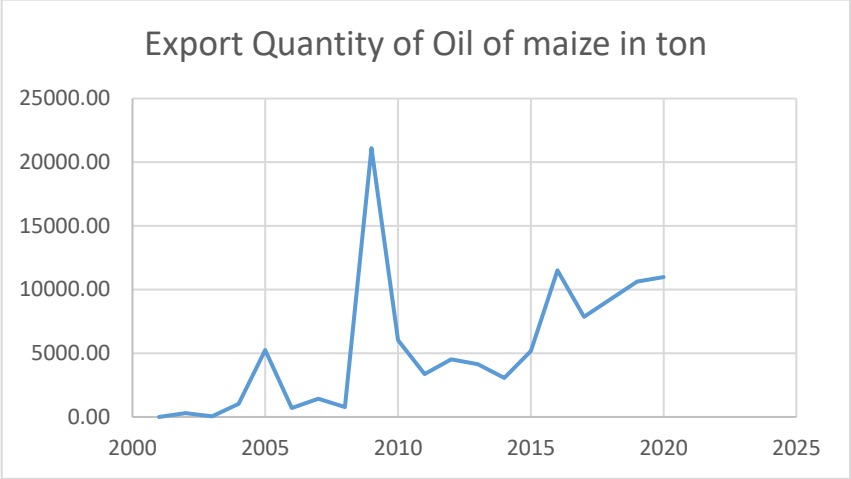
7.5.1 Export of Maize Oil Development

Table 4, Development of Egyptian exports of Maize oil between 2001 and 2020

Year	Export Quantity of Oil of maize in a ton	Export Value of Maize oil in 1000 USD	Price of exported Maize oil in USD per ton
2001	0.00	0.00	0
2002	293.00	244.00	832.76
2003	57.00	51.00	894.74
2004	1038.00	1182.00	1138.73
2005	5261.00	5669.00	1077.55
2006	706.00	620.00	878.19
2007	1434.00	752.00	524.41
2008	786.00	1194.00	1519.08
2009	21105.00	29618.00	1403.36
2010	6020.00	6628.00	1101.00
2011	3362.00	5918.00	1760.26
2012	4526.00	7840.00	1732.21

2013	4141.00	5181.00	1251.15
2014	3075.00	3987.00	1296.59
2015	5185.00	6732.00	1298.36
2016	11517.00	13035.00	1131.81
2017	7866.00	9568.00	1216.37
2018	9234.81	10618.00	1149.78
2019	10634.41	9748.00	916.65
2020	10984.70	11613.00	1057.20
Average	5361.30	6509.90	1109.01

Figure 21, Export Quantity of maize oil



Source: Own processed data based on World Bank

Figure 22, Statistical analysis of exported Quantity of Maize oil

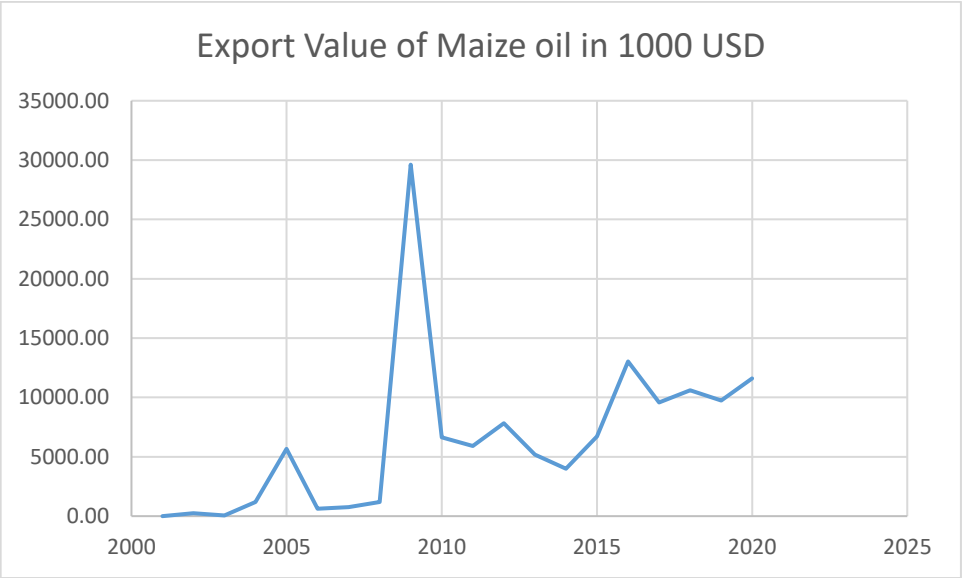
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ExportQuantityofOilofmaize' (20 valid observations)

  Mean                     5361.3
  Median                   4333.5
  Minimum                 0.00000
  Maximum                  21105.
  Standard deviation       5319.5
  C.V.                    0.99220
  Skewness                 1.3418
  Ex. kurtosis             1.7555
  5% percentile            2.8500
  95% percentile           20626.
  Interquartile range      8043.6
  Missing obs.                  0
```

Source: Own process based on Gretl SW

Studying the development of the export quantity of Maize oil during the period (2001 and 2020) illustrates that the exported amounts fluctuated (decreasing and increasing) during this particular period, with an average quantity of 5,361.30 tons and the highest exported amounts reached in this particular period was 21105 Ton in 2009, while the lowest exported amounts after ignoring zero value in 2001 were 57 Ton in 2003 and Standard Deviation 5,319.5.

Figure 23, Export Value of maize oil



Source: Own processed data

Figure 24, Statistical analysis of exported Value of Maize oil

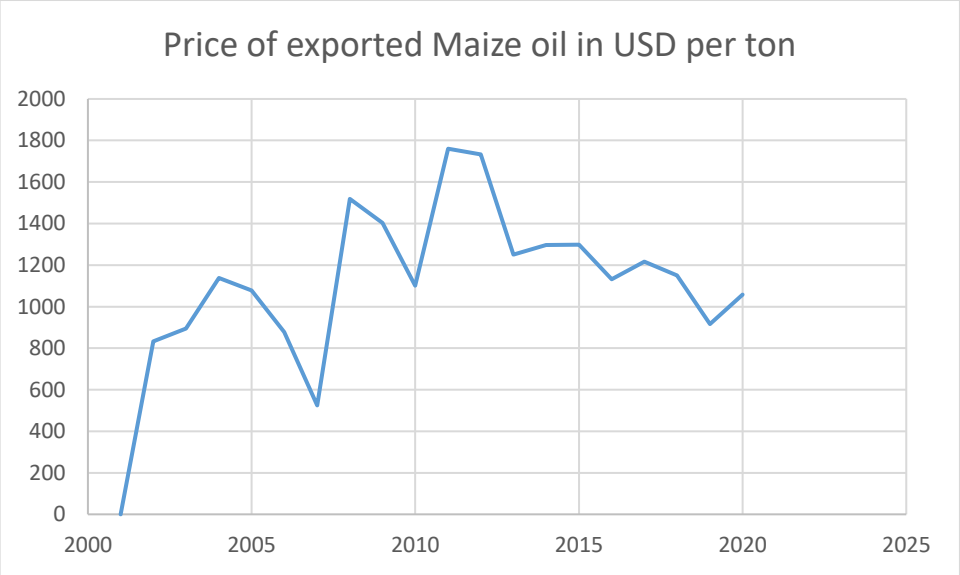
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ExportValueofMaizeoilin10' (20 valid observations)

  Mean                      6509.9
  Median                    5793.5
  Minimum                  0.00000
  Maximum                   29618.
  Standard deviation        6875.5
  C.V.                      1.0562
  Skewness                  1.8902
  Ex. kurtosis              4.3666
  5% percentile             2.5500
  95% percentile            28789.
  Interquartile range       8843.5
  Missing obs.                   0
```

Source: Own process based on Gretl SW

Looking to the Figure (23) and Figure (24) illustrate that the exported values of maize oil fluctuated (decreasing and increasing) during this particular period, with an average value of 6,509.9 thousand USD and the highest value was 29,618 thousand USD in 2009, while the lowest value after ignoring zero value in 2001 was 51 thousand USD in 2003 and Standard Deviation 6,875.5

Figure 25, Exported Price of maize oil



Source: Own processed data based on World Bank

Figure 26, Statistical analysis of exported Price of Maize oil

```
Summary statistics, using the observations 2001 - 2020
for the variable 'PriceofexportedMaizeoilin' (20 valid observations)

  Mean                      1109.0
  Median                    1135.3
  Minimum                  0.00000
  Maximum                   1760.3
  Standard deviation        394.77
  C.V.                     0.35597
  Skewness                -0.86361
  Ex. kurtosis             1.5876
  5% percentile            26.220
  95% percentile           1758.9
  Interquartile range      397.70
  Missing obs.                  0
```

Source: Own process based on Gretl SW

Looking to the Figure (25) and Figure (26) illustrate that the price of exported values of Maize oil fluctuated (decreasing and increasing) during this particular period, with an average price of 1109.01 USD and the highest value was 1760.26 USD per ton in 2011, while the lowest value after ignoring the zero value was 524.41 USD per ton in 2007 and Standard Deviation 394.77

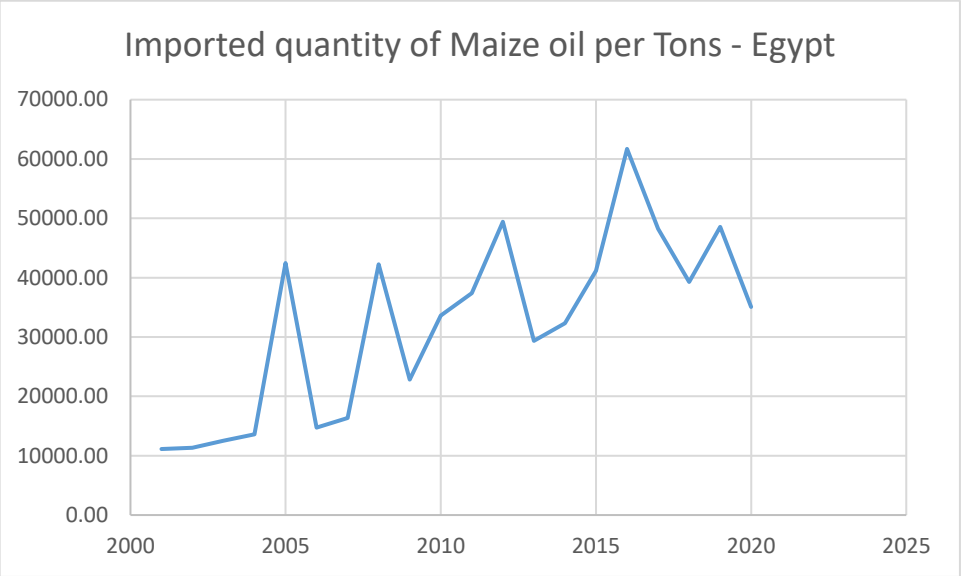
7.5.2 Import of Maize Oil Development

Table 5, Development of Egyptian imports of Maize oil between 2001 and 2020

Year	Imported amounts of Maize oil per Ton - Egypt	Import Value of Maize oil per 1000 USD	Price of Maize oil in USD for each ton - Egypt
2001	11125.00	5564.00	500.13
2002	11337.00	7082.00	624.68
2003	12548.00	8543.00	680.83
2004	13614.00	10098.00	741.74
2005	42488.00	14237.00	335.08
2006	14729.00	8650.00	587.28
2007	16360.00	14534.00	888.39
2008	42264.00	72938.00	1725.77
2009	22851.00	37705.00	1650.04
2010	33634.00	37023.00	1100.76
2011	37415.00	58627.00	1566.94
2012	49409.00	72680.00	1470.99
2013	29363.00	37718.00	1284.54
2014	32333.00	35443.00	1096.19
2015	41164.00	49095.00	1192.67
2016	61700.00	62620.00	1014.91
2017	48246.00	46907.00	972.25
2018	39261.81	37630.00	958.44
2019	48542.03	39283.00	809.26
2020	35092.20	30750.00	876.26
Average	32173.80	34356.35	1003.86

Source: Own processed data from https://www.fao.org/

Figure 27, Imported quantity of Maize oil



Source: Own processed data based on World Bank

Figure 28, Statistical Analysis of the Imported quantity of Maize oil

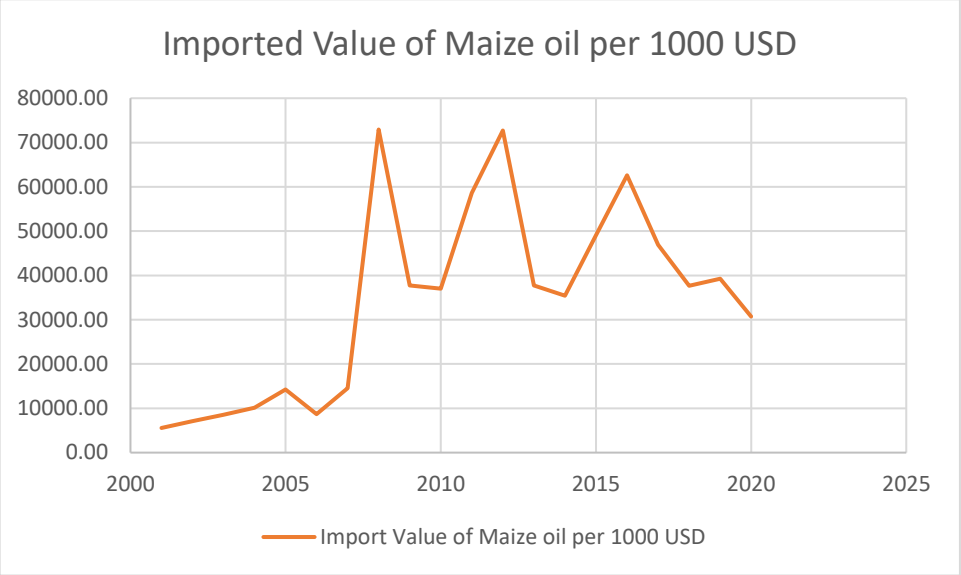
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ImportedquantityofMaizeoil' (20 valid observations)

  Mean                      32174.
  Median                    34363.
  Minimum                   11125.
  Maximum                   61700.
  Standard deviation        15094.
  C.V.                     0.46913
  Skewness               0.0055886
  Ex. kurtosis              -1.0435
  5% percentile             11136.
  95% percentile            61085.
  Interquartile range       27295.
  Missing obs.                  0
```

Source: Own process based on Gretl SW

Studying the development of the imported quantity of Maize oil during the period (2001 and 2020) Figures 27 and 28 illustrate that the imported amounts fluctuated (decreasing and increasing) during this particular period, with an average amount of 32,173.80 tons and the highest imported amounts reached in this particular period was 61,700 Ton in 2016, while the lowest imported amounts were 11,125 Ton in 2001 and Standard Deviation 15,094

Figure 29, Imported Value of Maize oil



Source: Own processed data based on World Bank

Figure 30, Statistical Analysis of Imported Value of Maize Oil

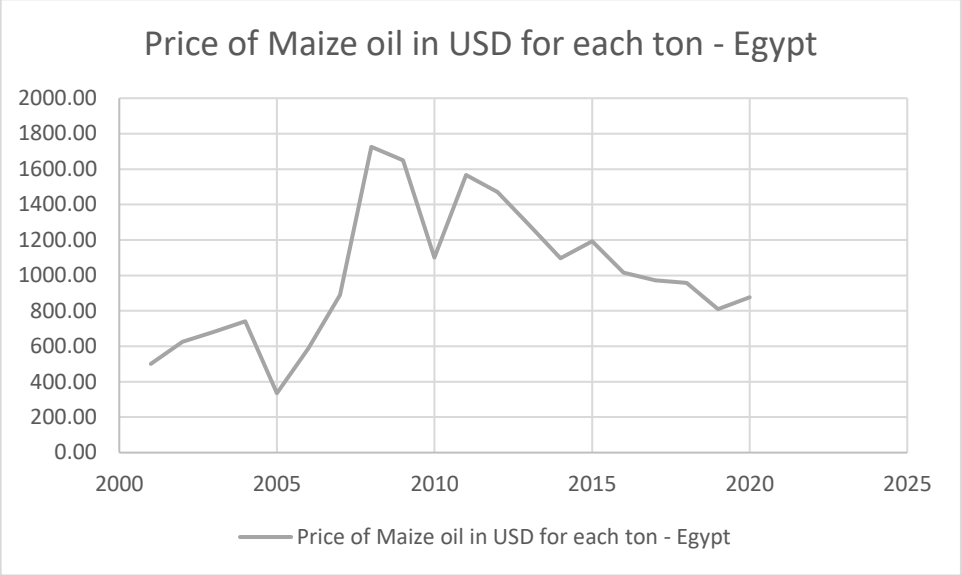
```
Summary statistics, using the observations 2001 - 2020
for the variable 'ImportValueofMaizeoilperl' (20 valid observations)

  Mean                      34356.
  Median                    37327.
  Minimum                   5564.0
  Maximum                   72938.
  Standard deviation        21867.
  C.V.                     0.63647
  Skewness                 0.24491
  Ex. kurtosis            -1.0089
  5% percentile             5639.9
  95% percentile            72925.
  Interquartile range       37415.
  Missing obs.                  0
```

Source: Own process based on Gretl SW

Looking to the Figure (29) and Figure (30), illustrate that the imported values of maize oil fluctuated (decreasing and increasing) during this particular period, with an average value of 34,356.35 thousand USD and the highest value was 72,938 thousand USD in 2008, while the lowest value was 5,564 thousand USD in 2001 and Standard Deviation 21,867

Figure 31, Imported Price of Maize oil Graph



Source: Own processed data based on World Bank

Figure 32, Statistical Analysis of Imported Price of Maize Oil

Summary statistics, using the observations 2001 - 2020
for the variable 'PriceofMaizeoilinUSDfore' (20 valid observations)

Mean	1003.9
Median	965.34
Minimum	335.08
Maximum	1725.8
Standard deviation	388.54
C.V.	0.38705
Skewness	0.31345
Ex. kurtosis	-0.72850
5% percentile	343.34
95% percentile	1722.0
Interquartile range	565.52
Missing obs.	0

Source: Own process based on Gretl SW

Figures (31) and (32) illustrate that the imported price values of maize oil fluctuated (decreasing and increasing) during this particular period, with an average price of 1003.86 USD and the highest value of 1,725.77 USD per ton in 2008. The lowest value was 335.08 USD per ton in 2005, and the Standard Deviation was 388.54.

7.6 Econometric model construction of Sunflower oil:

There are three critical areas in which the statistical model diverges from the economic model. The econometric model contains a stochastic variable in addition to parameters and a functional form that has been described.

Figure (8) illustrates that Ukraine plays an important role in Exporting sunflower oil, so the author will study the GDP of Ukraine as one variable for the Linner regression, which is used to analyse the correlation of the Price of sunflower oil with its Imported quantity, production quantity, and the Ukraine GDP for the period 2001 till 2020.

The following is a mathematical expression that can be used to describe the econometric model for analysing the correlation of the Price of Sunflower oil with its Imported Quantity, production quantity, and Ukrainian GDP.

The following regression form was used for this analysis:

$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \varepsilon$

Where:

Y: The dependency variable is the price of sunflower oil per ton.

β_0: Loading constant, which is the value of Y when all independent variables are zero.

β_1: The regression coefficient of the Imported amounts of Sunflower-seed oil per 1000 Tons is the effect of changing the imported amounts of sunflower oil per 1000 tons on the price of sunflower oil per ton.

X1: The Imported amounts of Sunflower-seed oil per 1000 Tons

β_2: regression coefficient of sunflower oil production in 1000 tons in Egypt, which is the effect of change of sunflower oil production in 1000 tons in Egypt on the price of sunflower oil per ton.

X2: Production of sunflower oil in 1000 tons in Egypt.

β_3: regression coefficient of Ukrain GDP (current US$), which is the effect of Ukrain GDP in 1 Billion USD on the price of sunflower oil per ton.

X3: Ukrain GDP is 1 Billion (current US$).

ε: Error term, which is the unobserved factors that affect the price of sunflower oil.

7.6.1 Data set:

Table (7) displays the data obtained for parameter estimates from 2001 to 2020. The equation expresses the shape of a one-equation econometric model

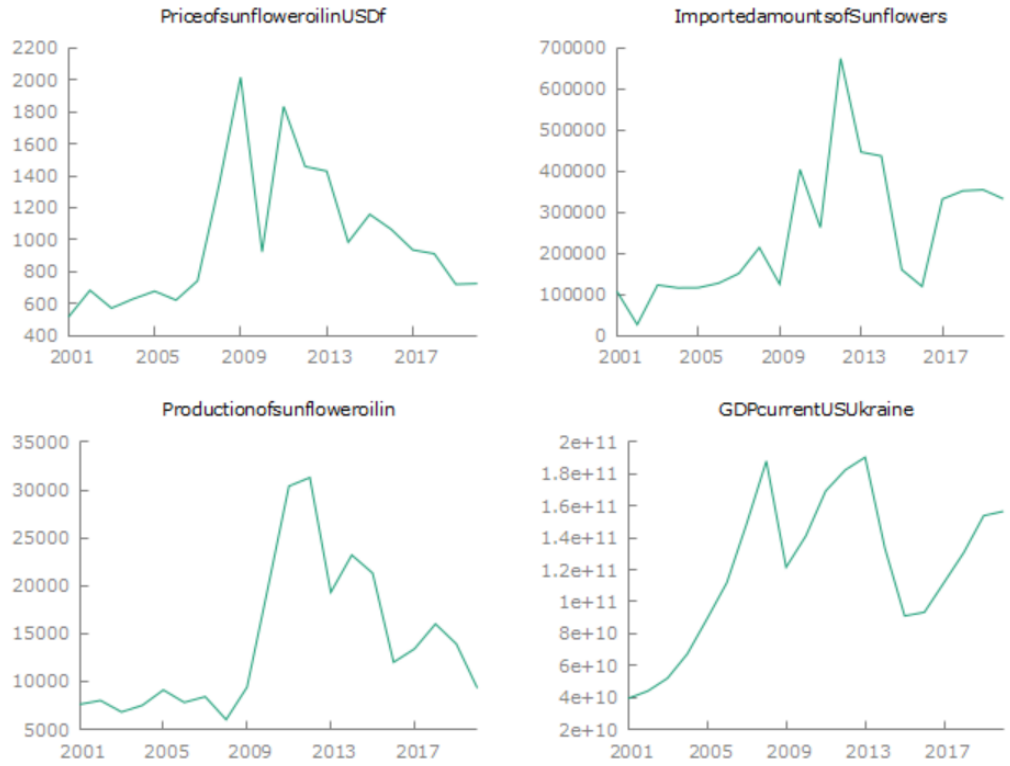
Data used to analyze the linear regression:

Table 6, dataset for the linear regression of Sunflower oil

Year	Price of sunflower oil in USD per ton - Egypt	Imported quantity of Sunflower-seed oil per 1000 Tons - Egypt	Production quantity of sunflower oil in 1000 tons in Egypt	GDP in billion(current US$) Ukraine
	Y	X1	X2	X3
2001	514.02	107	7.6	39.31
2002	681.47	25.875	8	43.96
2003	569.83	122.505	6.8	52.01
2004	627.37	115.502	7.5	67.22
2005	675.99	115.855	9.1	89.24
2006	620.29	126.9	7.8	111.88
2007	741.28	150.803	8.4	148.73
2008	1,344.15	213.776	6	188.11
2009	2,017.00	124.374	9.4	121.55
2010	922.91	403.939	19.8	141.21
2011	1,834.40	262.764	30.4	169.33
2012	1,457.85	674.742	31.3	182.59
2013	1,429.01	446.573	19.3	190.50
2014	983.36	436.968	23.2	133.50
2015	1,158.02	159.911	21.3	91.03
2016	1,063.78	118.983	12	93.36
2017	935.00	332.053	13.4	112.09
2018	911.06	352.03028	16	130.89
2019	719.41	354.67081	13.9	153.88
2020	723.71	332.367	9.3	156.62

Own processed data from https://www.fao.org/

Figure 33, Time series of the variables



Source: Own process based on Gretl SW

Correlation matrix: First, the correlation matrix is utilized to determine whether or not multicollinearity exists between the extraneous variables. Before continuing with the econometric analysis of the model for which the correlation matrix is constructed, it is necessary to determine if the variables in question exhibit multicollinearity. It illustrates the interdependence between exogenous variables. The phenomenon of multicollinearity occurs when the range of correlation coefficients is equal to or greater than the absolute value range [-0.8;0.8] using Gretl software.

Figure 34, the correlation matrix of Sunflower oil regression

```
Correlation Coefficients, using the observations 2001 - 2020
Two-tailed critical values for n = 20: 5% 0.4438, 1% 0.5614

 Priceofsunflow~ Importedamount~ Productionofsu~ GDPcurrentUSUk~
         1.0000          0.3100          0.5422          0.5645 Priceofsunflow~
                         1.0000          0.7268          0.7124 Importedamount~
                                         1.0000          0.5017 Productionofsu~
                                                         1.0000 GDPcurrentUSUk~
```

Source: Own process based on Gretl SW

The figure 34 above illustrates that the relationship among the exogenous variables is not strong, as we can see from the correlation coefficients between the variables (0.7268, 0.7124, 0.5017) within the interval [-0.8;0.8], which identify the nonexistence of a multicollinearity problem.

Figure 35, OLS output sunflower oil

```
Model 1: OLS, using observations 2001-2020 (T = 20)
Dependent variable: PriceofsunfloweroilinUSDf

                       coefficient   std. error   t-ratio   p-value
  ---------------------------------------------------------------------
  const                 141.001      208.240       0.6771   0.5080
  Importedamountso~      -1.85007      0.772703    -2.394    0.0293   **
  Productionofsunf~      38.0128      13.1220       2.897    0.0105   **
  GDPinbillioncurr~       6.47746      2.11494      3.063    0.0074   ***

Mean dependent var   996.4955   S.D. dependent var   424.4182
Sum squared resid     1490828   S.E. of regression   305.2486
R-squared            0.564402   Adjusted R-squared   0.482727
F(3, 16)             6.910370   P-value(F)           0.003386
Log-likelihood      -140.5699   Akaike criterion     289.1397
Schwarz criterion    293.1227   Hannan-Quinn         289.9172
rho                  0.144437   Durbin-Watson        1.696771
```

Source: Own process based on Gretl SW

7.6.2 Statistical Verification:

The importance of evaluated parameters and a model as a whole is investigated via statistical verification. The t-test and the F-test are used to examine the statistical significance of the estimates at the significance level, and the p-values are compared to the significance level. In the case of model verification, the coefficients of determination are assessed.

Statistical tests are employed to examine if the estimated parameters are statistically significant and to assess the goodness of fit in the statistical verification.

The null hypothesis is rejected if the t-value is larger than the t-tab. Looking to the figure (35), the F-statistic is 6.910, with a p-value of 0.00339, indicating that the overall model is statistically significant.

Coefficient of Determination R^2:

R^2 =56.44 %

The R^2 determination coefficient is a metric that indicates how well the data fits the regression line. According to Gretl software output, R^2 for the diploma thesis one equation model is 0.5644

The model explains 56.44% of the variation in the price of sunflower oil (Y) using the imported quantity of sunflower seed oil (X1), Egyptian sunflower oil production (X2), and Ukrainian GDP (X3). This indicates a moderate fit, suggesting other factors beyond these three variables influence the price.

Adjusted R^2 = 48.27%

The adjusted R-squared value of 0.4827 is the same as R^2, but it considers the amount of data in the model. It indicates that independent variables explain 48.27 percent of the model compared to the number of variables.

The adjusted R-squared of 48.27% further accounts for the number of independent variables, suggesting a slightly weaker fit when considering model complexity.

The constant term in the model is 141.0006, representing the intercept of the regression equation.

Consequently, the following model was estimated based on the dataset presented at the beginning of the chapter:

$$yt = 141.001 - 1.85X1 + 38.0128X2 + 6.4774X3 + \varepsilon i$$

Based on the model, the following relationships are created:

- The coefficient for the variable "Imported amounts of Sunflower-seed oil per 1000 Tons - Egypt" is -1.85, suggesting that for each unit increase in the imported amounts of

sunflower-seed oil per 1000 tons in Egypt, the price of sunflower oil decreases by 1.8501 USD per ton.

- The coefficient for the variable " the production quantity of sunflower oil increases by 1000 Tons " is 38.0128, suggesting that for each unit increase in the production quantity of sunflower oil, the price of sunflower oil increased by 38.0128 USD per ton.
- The coefficient for the variable " the Ukraine GDP " is 6.4774, suggesting that for each unit increase in the Ukraine GDP, the price of sunflower oil increases by 6.4774 USD per ton. A more robust Ukrainian economy might indicate increased global supply and potentially higher prices.

All signs fully coincide with what had been assumed (economic verification. has successfully been passed), so the F test will proceed for the model. Based on the F value and P value related to it, which is equal to 0.0033, the author can conclude that the model is significant at the significance level of 5 percent because the null hypothesis about the model's insignificance was rejected. Then, the author proceeds to t-tests related to each variable.

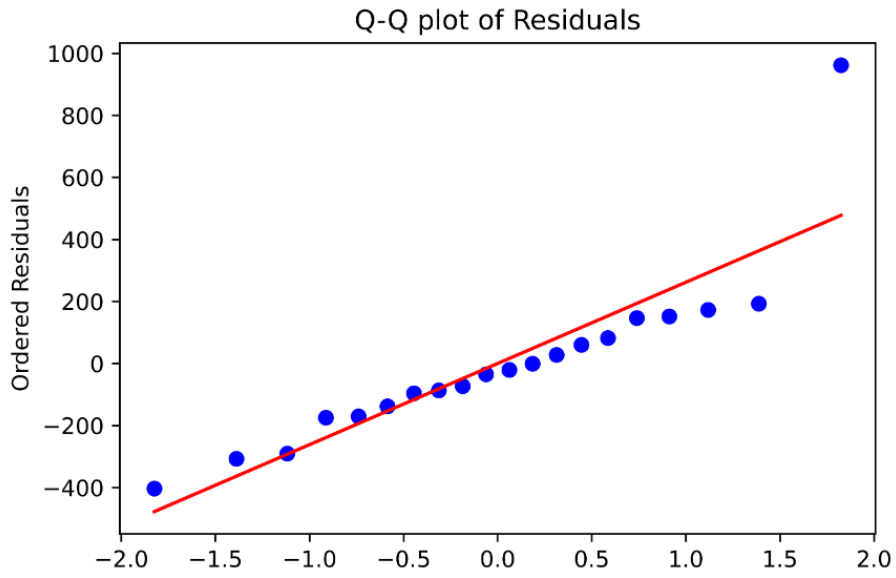
- Imported quantity of sunflower oil is significant at P = 0.0293, where the null about insignificance was rejected.
- Sunflower oil production is significant at P = 0.0105, where the null about insignificance was rejected.
- Ukrainian GDP is significant at P = 0.0074, where the null about insignificance was rejected.
- This implies that changes in these variables are likely associated with changes in the price of sunflower oil.

Normality Test of Residuals

The Q-Q plot of the residuals shows how closely they follow a normal distribution. If the residuals fall along the diagonal line, it indicates that they are normally distributed.

Based on the Q-Q plot, the residuals appear to roughly follow the diagonal line, suggesting that they are approximately normally distributed. This is a positive indication of the validity of the regression model.

Figure 36, Q-Q plot of Residuals



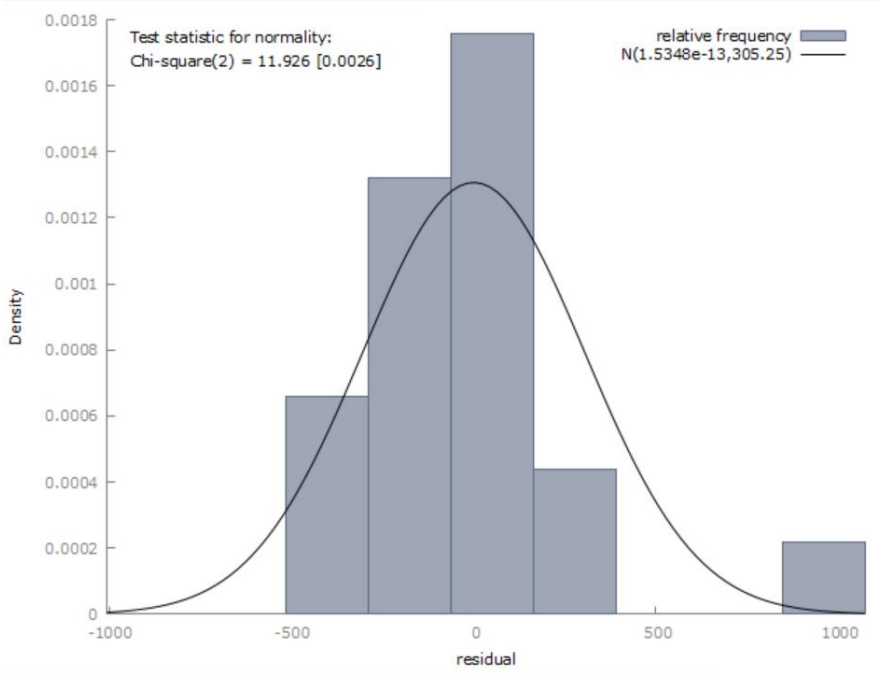
Source: Own process based on Gretl SW

This test mainly aims to check if the residuals are dispersed evenly. The normal distribution of residuals was investigated using the Jarque-Bera test. Hypotheses were created, and the null hypothesis was accepted or rejected based on the test results.

H0: normal distribution of residuals. (p-val > α level)

H1: No normal distribution of residuals. (p-val < α level)

Figure 37, normality of residuals – one-equation model



Source: Own process based on Gretl SW

Figure 38, Frequency distribution for Residual

```
Frequency distribution for residual, obs 1-20
number of bins = 7, mean = 1.53477e-013, sd = 305.249

       interval          midpt   frequency    rel.     cum.

          < -289.71   -403.45         3     15.00%   15.00% *****
-289.71 - -62.233   -175.97         6     30.00%   45.00% **********
-62.233 -  165.25    51.507         8     40.00%   85.00% **************
 165.25 -  392.73    278.99         2     10.00%   95.00% ***
 392.73 -  620.21    506.47         0      0.00%   95.00%
 620.21 -  847.69    733.95         0      0.00%   95.00%
       >=  847.69    961.43         1      5.00%  100.00% *

Test for null hypothesis of normal distribution:
Chi-square(2) = 11.926 with p-value 0.00257
```

Source: Own process based on Gretl SW

In terms of the Jarque-Bera test for normality, the test statistic of 11.926 has a p-value of 0.00257, implying that the null hypothesis is rejected since 0.00257 is less than α=0.05, indicates a rejection of the null hypothesis of normality for the error terms. This suggests that the model might benefit from further exploration or transformation if normality is a crucial assumption for specific statistical tests.

Limitations:

The model assumes a linear relationship, which may not perfectly capture real-world complexities.

Other factors not included (e.g., global demand and production costs) can influence the price.

The non-normality of errors suggests potential limitations in using specific statistical tests.

Conclusion: This research utilizing data from 2001 to 2020 reveals that the imported quantity of sunflower seed oil, Egyptian sunflower oil output, and Ukrainian GDP are all statistically significant factors impacting the sunflower oil price in Egypt. However, the model explains a moderate percentage of the price changes, indicating the need to include additional aspects and prospective model enhancements.

7.7 Econometric model construction of Maize oil:

The statistical model diverges from the economic model in three key areas. The econometric model contains a stochastic variable in addition to parameters and a functional form that has been described.

Due to the data limitation in Egypt, the author chose to study the period between 2010 and 2020.

The absence of production statistics for Maize oil prompted a study on how Export, Impor, and domestic supplies affect the exchange rate. The following is a mathematical expression that can be used to describe the econometric model. The Linner regression was used to analyze the correlation of the Exchange rate of Domestic currency to USD with the Domestic supply quantity of Maize oil, Maize oil Imported quantity in Thousand tons, and Maize oil Imported quantity in Thousand tons from 2010 to 2020.

The following regression form was used for this analysis:

$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \varepsilon$

Where:

Y: Exchange rate of domestic currency to USD.

β_0: Loading constant, which is the value of Y when all independent variables are zero.

β_1: The regression coefficient of the Domestic supply quantity of Maize oil per 1000 Tons, which is the effect of changing the Domestic supply quantity of Maize oil per 1000 tons on the Exchange rate of the domestic currency to USD.

X1: The Domestic supply quantity of Maize oil per 1000 Tons.

β_2: The regression coefficient of the Exported quantity of Maize oil per 1000 Tons is the effect of changing the exported quantity of Maize oil per 1000 tons on the Exchange rate of domestic currency to USD.

X2: The exported quantity of Maize oil per 1000 Tons.

β_3: The regression coefficient of the Imported quantity of Maize oil per 1000 Tons is the effect of changing the imported quantity of Maize oil per 1000 tons on the Exchange rate of domestic currency to USD.

X3: The Imported quantity of Maize oil per 1000 Tons.

ε: Error term, which is the unobserved factors that affect the exchange rate of domestic currency to USD.

7.7.1 Data set:

Table (8) displays the data obtained for parameter estimates from 2010 to 2020. The equation expresses the shape of a one-equation econometric model

Data used to analyze the linear regression:

Table 7, the dataset for the linear regression of Maize oil

Year	Exchange rate Domestic currency to USD	Domestic supply quantity -Maize-Germ Oil- 1000 ton	Export Quantity - Maize-Germ Oil - 1000 Ton	Import Quantity - Maize-Germ Oil- 1000 Ton
2010	5.62	31.00	6.00	34.00
2011	5.93	34.00	3.00	37.00
2012	6.06	37.00	5.00	49.00
2013	6.87	33.00	4.00	29.00
2014	7.08	29.00	3.00	32.00
2015	7.69	36.00	5.00	41.00
2016	10.03	38.00	12.00	62.00
2017	17.78	40.00	8.00	48.00
2018	17.77	30.00	7.00	25.00
2019	16.77	38.00	11.00	49.00
2020	15.76	27.00	11.00	38.00

Own processed data from https://www.fao.org/

Figure 39, Time series of the variables

Source: Own process based on Gretl SW

Correlation matrix: First, the correlation matrix is utilized to determine whether or not multicollinearity exists between the extraneous variables. Before continuing with the econometric analysis of the model for which the correlation matrix is constructed, it is necessary to determine if the variables in question exhibit multicollinearity. It illustrates the interdependence between exogenous variables. The phenomenon of multicollinearity occurs when the range of correlation coefficients is equal to or greater than the absolute value range [-0.8;0.8] using Gretl software.

Figure 40, the correlation matrix of Maize oil regression

```
Correlation Coefficients, using the observations 2010 - 2020
Two-tailed critical values for n = 11: 5% 0.6021, 1% 0.7348

 ExchangerateEg~ Domesticsupply~ ExportQuantity~ ImportQuantity~
          1.0000          0.0796          0.6665          0.0917 ExchangerateEg~
                          1.0000          0.2137          0.7490 Domesticsupply~
                                          1.0000          0.5914 ExportQuantity~
                                                          1.0000 ImportQuantity~
```

Source: Own process based on Gretl SW

The figure (40) above illustrates that the relationship among the exogenous variables is not strong, as we can see from the correlation coefficients between the variables (0.2137, 0.749, 0.5914) within the interval [-0.8;0.8], which identify the nonexistence of a multicollinearity problem.

Figure 41, OLS output

```
Model 1: OLS, using observations 2010-2020 (T = 11)
Dependent variable: ExchangerateEgyptianPoundpe

                      coefficient   std. error   t-ratio   p-value
  ---------------------------------------------------------------------
  const                -7.34100      9.62191    -0.7629   0.4704
  Domesticsupplyqu~     0.772948     0.402135    1.922     0.0960   *
  ExportQuantityMa~     1.84404      0.428373    4.305     0.0035   ***
  ImportQuantityMa~    -0.514655     0.191680   -2.685     0.0313   **

Mean dependent var   10.66864   S.D. dependent var   5.195380
Sum squared resid    73.36309   S.E. of regression   3.237351
R-squared            0.728204   Adjusted R-squared   0.611720
F(3, 7)              6.251540   P-value(F)           0.021632
Log-likelihood      -26.04471   Akaike criterion     60.08943
Schwarz criterion    61.68101   Hannan-Quinn         59.08616
rho                 -0.268605   Durbin-Watson        2.205891
```

Source: Own process based on Gretl SW

7.7.2 Statistical Verification:

The importance of evaluated parameters and a model as a whole is investigated via statistical verification. The t-test and the F-test are used to examine the statistical significance of the estimates at the significance level, and the p-values are compared to the significance level. In the case of model verification, the coefficients of determination are assessed.

Statistical tests are employed to examine if the estimated parameters are statistically significant and to assess the goodness of fit in the statistical verification.

The null hypothesis is rejected if the t-value is larger than the t-tab; looking to figure (41) the F-statistic is 6.2515 with a p-value of 0.0216, suggesting that the overall model is statistically significant at a 5% significance level. This means the model explains the exchange rate (Y) better than just using the mean of Y.

Coefficient of Determination R^2 :

R^2 =72.82%

The R^2 determination coefficient is a metric that indicates how well the data fits the regression line. According to Gretl software output, R^2 for the diploma thesis one equation model is 0.7282

The regression analysis results indicate that the model has an R-squared value of 0.7282, which indicates that it explains 72.82% of the variation in the exchange rate.

Adjusted R^2 = 61.17%

The adjusted R-squared value of 0.6117 is the same as R^2, but it considers the amount of data in the model. Adjusted R-squared value is a more reliable measure, considering the number of predictors, and suggests a good fit.

Consequently, the following model was estimated based on the dataset presented at the beginning of the chapter:

$$yt = -7.341 + 0.7729X1 + 1.844X2 \ -0.5146\ X3 + \varepsilon i$$

Based on the model, the following relationships are created:

- The coefficient for the variable "Domestic supply quantity of Maize oil per 1000 Tons " is 0.7729, suggesting that for each unit increase in the Domestic supply quantity of Maize oil per 1000 Tons, the exchange rate of domestic currency to USD increases by 0.7729 unit.
- The coefficient for the variable " the exported quantity of Maize oil per 1000 Tons " is 1.844, suggesting that for each unit increase in the exported quantity of Maize oil

increases by 1000 Tons, the exchange rate of domestic currency to USD increases by 1.844 units.

- The coefficient for the variable " the imported quantity of Maize oil per 1000 Tons " is 0.514, suggesting that for each unit increase in t," the imported quantity of Maize oil increases by 1000 Tons, the exchange rate of domestic currency to USD decreases by 0.514 unit.

All signs fully coincide with what the author assumed (economic verification). has successfully been passed), so the F test for the model will proceed. Based on the F value and P value related to it, which is equal to 0.0216, the author can conclude that the model is significant at the significance level of 5 percent because the null hypothesis about the model's insignificance was rejected. Then, the author proceeds to t-tests related to each variable.

- The domestic supply quantity of Maize oil in 1000 Tons is not significant at P=0.096. This means we may not have enough evidence to conclude a relationship between domestic maize oil supply and the exchange rate.
- The exported quantity of Maize oil is significant at P=0.0035. There is a positive relationship between exported maize oil and the exchange rate, meaning higher exports are associated with a stronger domestic currency (lower exchange rate).
- The imported quantity of Maize oil is significant at P= 0.0313. There is a negative relationship between imported maize oil and the exchange rate, meaning higher imports are associated with a weaker domestic currency (higher exchange rate).

  Therefore, just two variables are significant (Exported quantity of Maize oil and Imported quantity of Maize oil)

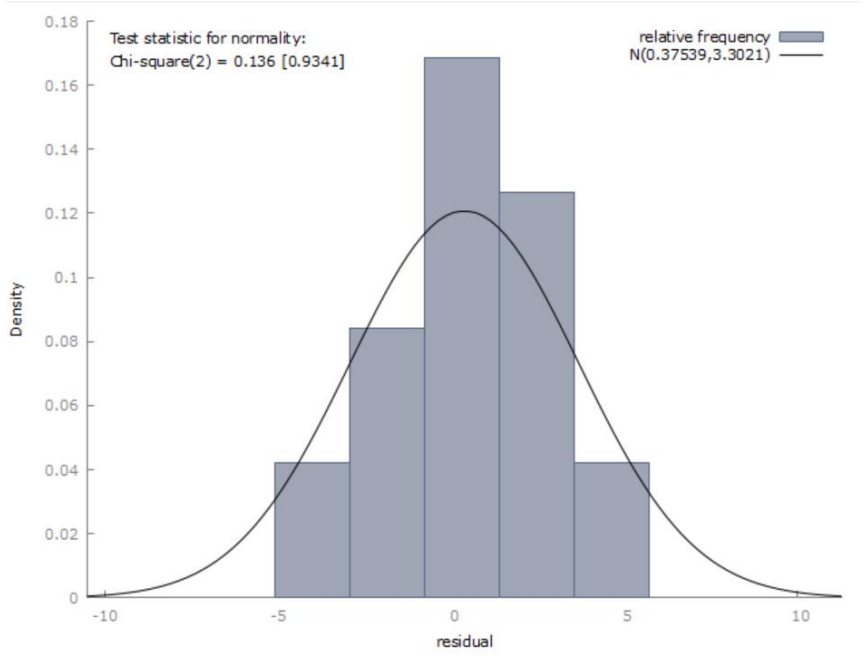
Normality Test of Residuals

This test mainly aims to check if the residuals are dispersed evenly. The normal distribution of residuals was investigated using the Jarque-Bera test. Hypotheses were created, and the null hypothesis was accepted or rejected based on the test results.

H0: normal distribution of residuals. (p-val > α level)

H1: No normal distribution of residuals. (p-val < α level)

Figure 42, normality of residuals – one-equation model



Source: Own process based on Gretl SW

Figure 43, normal distribution of residuals

```
Frequency distribution for residual, obs 1-11
number of bins = 5, mean = 0.375385, sd = 3.30209

       interval          midpt   frequency    rel.     cum.

          < -2.9284   -4.0064         1      9.09%    9.09% ***
  -2.9284 - -0.77259  -1.8505         2     18.18%   27.27% ******
 -0.77259 -  1.3833    0.30534        4     36.36%   63.64% **************
   1.3833 -  3.5391    2.4612         3     27.27%   90.91% *********
         >=  3.5391    4.6170         1      9.09%  100.00% ***

Test for null hypothesis of normal distribution:
Chi-square(2) = 0.136 with p-value 0.93412
```

Source: Own process based on Gretl SW

In terms of the Jarque-Bera test for normality, the test statistic of 0.136 has a p-value of 0.9341, implying that the null hypothesis is not rejected since 0.9341 is greater than α=0.05, implying that the residuals have a normal distribution (random variable).

Limitations:

The model assumes to study the period between 2010 and 2020 due to the lack of information for the period between 2001 and 2009.

Other factors not included, such as agricultural products, international trade policies, or global economic conditions, might also play a role and are not captured in this mode.

Conclusion:

The overall model is statistically significant, explaining the exchange rate better than an average.

While the domestic supply of maize oil is not statistically proven to influence the exchange rate in this model, exports and imports have significant relationships.

Higher exports are associated with a stronger domestic currency (lower exchange rate). Conversely, higher imports are linked to a weaker domestic currency (higher exchange rate).

8. Results and Discussion:

This study explores Egypt's trade landscape dynamics for sunflower and maize oil, focusing on enhancing efficiency, competitiveness, and national food security. The analysis of historical trends (2001-2020) reveals crucial insights into import and export patterns for both oils.

Sunflower Oil: Balancing Imports with Domestic Production

The findings highlight a positive correlation between import quantities and sunflower oil prices. This suggests that overreliance on a few import sources exposes Egypt to price fluctuations and potential supply disruptions. To mitigate this vulnerability, the study recommends diversifying import partners and exploring regional trade agreements that could facilitate imports at potentially lower costs.

Moreover, the research reveals a positive association between domestic sunflower oil production and price stability. This suggests that supporting domestic production, if economically feasible, could enhance price stability and potentially reduce reliance on imports. The proposed strategies include providing subsidies to sunflower farmers, improving access to quality seeds and fertilizers, and implementing irrigation efficiency measures. Additionally, investments in storage facilities and processing capabilities could minimize post-harvest losses and add value to domestically produced sunflower oil.

Maize Oil: A Focus on Exports and Optimized Imports

The study emphasizes the importance of focusing on maize oil exports to generate revenue and potentially strengthen the exchange rate. To achieve this, the research suggests exploring export incentives like subsidies or tax breaks and investing in efficient port facilities and transportation networks to facilitate exports. Additionally, market development efforts could promote Egyptian maize oil in international markets.

Another key recommendation is to optimize import patterns for maize oil. This could involve diversifying import sources to improve bargaining power and potentially lower costs. Implementing hedging strategies and financial instruments to manage price fluctuations could enhance import efficiency.

While the domestic supply of maize does not directly impact exchange rates in the current model, it remains crucial for long-term competitiveness. The study emphasizes increasing domestic maize production by supporting farmers with research, subsidies, and improved technology. Additionally, minimizing post-harvest losses by investing in storage facilities and infrastructure is essential.

A Comprehensive Policy Framework

The research underscores the importance of developing a comprehensive maize oil trade policy incorporating export promotion, import optimization, and domestic supply enhancement. Regular monitoring and adjustments should complement this policy framework to ensure its effectiveness in achieving the desired outcomes.

Connecting the Findings to National Goals

The combined sunflower and maize oil findings contribute significantly to the thesis goals of enhancing efficiency, competitiveness, and national food security. Diversifying import sources, optimizing import strategies, and potentially increasing domestic production can establish a more efficient trade system for both oils. Additionally, export promotion and a secure domestic supply can enhance Egypt's competitiveness in the global market. Finally, encouraging domestic production of both sunflower and maize oil can rely less on imports and contribute to long-term national food security. Implementing a combination of the proposed recommendations can create a more balanced and secure trade system for both sunflower and maize oil, ultimately contributing to the overall success of the Egyptian agricultural economy.

9. Recommendation

- Quantify the impact of trade policies: The data can be used to quantify the impact of existing trade policies on import and export volumes and domestic production levels for both sunflower and maize oil. This can guide policymakers in identifying areas for improvement or potential policy changes.
- Identify optimal import sources: This research can help identify the most efficient and reliable import sources for both oils by analyzing historical import data alongside factors like price fluctuations and production trends in potential supplier countries.
- Evaluate the cost-effectiveness of domestic production: A crucial aspect of the data analysis should involve assessing the economic viability of supporting domestic production. This might involve examining costs associated with subsidies, infrastructure development, potential yield increases, and the long-term benefits of reduced import reliance.
- Develop targeted export incentives: Data on export trends and market dynamics for maize oil can be used to design targeted export incentives. This could involve focusing incentives on specific markets with high demand or tailoring them to specific types of maize oil products.

Towards Evidence-Based Policymaking

By employing a data-driven approach that leverages the detailed information within this research, policymakers can develop more targeted and effective strategies to achieve the following goals:

- Enhanced Efficiency: Data analysis can help identify opportunities to reduce trade costs, minimize post-harvest losses, and optimize resource allocation across the entire supply chain for sunflower and maize oil.
- Increased Competitiveness: A data-driven approach can guide policymakers in developing strategies to strengthen Egypt's position in the global market for both oils. This might involve focusing on specific export markets or value-added products.
- Long-Term Food Security: Analyzing how domestic production levels and import patterns influence food security can help policymakers develop strategies to ensure a reliable domestic supply of sunflower and maize oil.

10. Conclusion:

This study delves into Egypt's trade landscape dynamics for sunflower and maize oil, focusing on achieving a trifecta of national goals: efficiency, competitiveness, and food security. By analyzing historical trends from 2001 to 2020, the research sheds light on crucial insights regarding import and export patterns for both oils.

The analysis reveals a vulnerability in Egypt's dependence on a limited number of import sources for sunflower oil. This exposes the nation to price fluctuations and potential supply disruptions. To mitigate this risk, the study recommends diversifying import partners and exploring regional trade agreements that could facilitate lower-cost imports. Additionally, if economically feasible, supporting domestic sunflower oil production holds promise for enhancing price stability and potentially reducing reliance on imports. Strategies like subsidies for farmers improved access to high-quality seeds and fertilizers, and irrigation efficiency measures are proposed to achieve this. Investments in storage facilities and processing capabilities could further minimize post-harvest losses and add value to domestically produced sunflower oil.

The study emphasizes the importance of export promotion for maize oil to generate revenue and potentially strengthen the exchange rate. Strategies include exploring export incentives like subsidies or tax breaks alongside investments in efficient port facilities and transportation networks to facilitate exports. Additionally, market development efforts could promote Egyptian maize oil in international markets. Optimizing import patterns for maize oil is also crucial. This could involve diversifying import sources to improve bargaining power, potentially lower costs, and implementing hedging strategies to manage price fluctuations.

While the domestic supply of maize does not directly impact exchange rates in the current model, it remains essential for long-term competitiveness. The study emphasizes the need to increase domestic maize production through support for farmers with research, subsidies, and improved technology. Minimizing post-harvest losses by investing in storage facilities and infrastructure is equally important.

The research underscores the importance of developing a comprehensive policy framework for the maize oil trade, incorporating export promotion, import optimization, and domestic supply enhancement. Regular monitoring and adjustments are crucial for ensuring the effectiveness of this framework in achieving its desired outcomes.

The combined findings for sunflower and maize oil significantly contribute to the overall goals of the thesis. Diversifying import sources, optimizing import strategies, and potentially increasing domestic production can establish a more efficient trade system for both oils. Additionally, export promotion and a secure domestic supply can enhance Egypt's competitiveness in the global market. Finally, encouraging domestic production of both sunflower and maize oil can lessen reliance on imports and contribute to long-term national food security. Implementing a combination of the proposed recommendations can create a more balanced and secure trade system for both sunflower and maize oil, ultimately contributing to the overall success of the Egyptian agricultural economy.

However, for genuinely impactful policy recommendations, a data-driven approach is essential. By leveraging the detailed information within the full analysis, policymakers can quantify the impact of existing trade policies and identify areas for improvement. Analyzing historical import data alongside factors like price fluctuations and production trends in potential supplier countries can help identify both oils' most efficient and reliable import sources. Additionally, a cost-benefit analysis is crucial to assess the economic viability of supporting domestic production. Finally, data on export trends and market dynamics for maize oil can be used to design targeted export incentives.

A comprehensive data analysis is key to formulating specific, evidence-based recommendations. This will guide policymakers in developing more targeted and effective strategies to enhance efficiency, competitiveness, and long-term food security in Egypt's sunflower and maize oil trade landscape.

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12. List of pictures, tables, graphs and abbreviations :

12.1 List of Figures

12.2 List of tables