AMERICAN UNIVERSITY OF BEIRUT

MACROECONOMIC EFFECTS OF FOOD PRICE SHOCKS IN THE MENA REGION

by
TIA AHMAD ISMAIL

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TIA AHMAD ISMAIL

Approved by:

Dr. Nadine Yamout, Assistant Professor — Advisor

Department of Economics

Dr. Ali Abboud, Assistant Professor — Member of Committee

Department of Economics

Dr. Nisreen Salti, Associate Professor — Member of Committee

Department of Economics

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Abstract
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The global food market is complex and places several challenges for policymakers specifically the issue of sudden changes in food prices. These shifts in prices not only challenge policymakers but also propose severe consequences for economies that are not self-sufficient and rely on food imports to meet their food demand. Given all the challenges, using the Structural Vector Autoregressive Model, this thesis focuses on revealing how the different macroeconomic variables of major oil-exporting countries (Algeria, Bahrain, Libya, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) and the non-major oil-exporting countries (Jordan and Morocco) in the MENA region respond to these types of shocks. In addition, this thesis aims to identify ideal policies the government should implement to adjust and resist such shocks. The findings of this paper suggest that net- food-importing and non-major oil-exporting countries align in the direction of responses to surges in food prices. As for the major exporting economies, the responses differ over time and by country; however, these economies all showed the ability to absorb the severity of the shock at higher levels than the non-major oil-exporting. As for the government responses, the research revealed the need to tailor policies based on the specific circumstances of each economy. Yet, sustainable agriculture practices, maintaining food reserves, and stabilization policies are necessary for any economy.

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Chapter 1

Introduction

1.1 The Global Food Market

Agricultural production essentially yields but is not limited to comestibles. A wide range of outputs that include silk, wool, rubber, cotton, and tobacco are classified as indispensable commodities of agricultural production (Mehta, 2022). With the advantage of their large populations and vast land area, countries such as China, India, Brazil, and the United States are identified as global leaders in the marketplace. Their classifications as conducive climatic regions have also played a major role in their agricultural development. Nonetheless, the contributory role that agricultural output plays in each of their economies differs (Mehta, 2022). To illustrate, China takes the world lead as an agricultural producer, with its output valued at $1.56 trillion in 2020 where 96% of the latter was yielded from food products (Ross, 2023), in addition to being a prominent global player in the production of cereals, cotton, fruit, vegetables, meat, poultry, eggs, and fishery products (FAO, 2021). In that prospect, India ranks second to China, generating an output estimated at $382.2 billion in 2020 (Mehta, 2022). In contrast, India takes the lead as the world's largest producer of milk, jute, and pulses (a class of legumes that includes dry beans, lentils, and chickpeas); however, remains the world's second-largest producer of rice, wheat,

sugarcane, fruit, vegetables, cotton, and groundnuts (Mehta, 2022). Subsequently, the United States holds the third position with an output valued at the output at $306.4 billion (Ross, 2023), and predominant production of corn, soybeans, dairy, wheat, and sugar cane. Lastly, Brazil ranks 4th amongst the world's leading agricultural cultivators at $125.3 billion (Ross, 2023). Its production of sugarcane has allowed Brazil's economy to rely on agriculture as a major focus.

Although the dominant producers are China, India, the U.S., and Brazil, the ranking changes when it comes to the global food exports which signifies the dynamic nature of the global food market. For example, India, a major producer, prioritizes domestic consumption because of having the lowest GDP per capita (Mehta, 2022). Another example is China which is not the leading exporter despite being the top producer because of its food consumption outpacing its food supply. Based on the latter and in terms of export, the United States agricultural exports are valued at 196.4 billion U.S. dollars in 2022, exceeding that of the other major nations, and comprised mainly of rains and feeds, soybeans, livestock products, tree nuts, fruits, vegetables, and other horticultural products (Russell, 2023). East Asia and North America are the major contributors to this value, being on the receiving end of 60% of the United States' agricultural exports. East Asia (led by China, Japan, and South Korea) on the other hand was the largest market, possessing a collective stake of 31% share. Despite not being among the world's major producers, the Netherlands surprisingly holds the second ranking as the world's leading agricultural exporter. The Netherlands was able to stand its position despite facing the limitation of its relatively smaller total area of just 41,850 km^2. This was achieved by catering to the agricultural needs of its neighboring countries such as Germany, Belgium, France, and the UK. Among its other exports, the value of the dairy and eggs exported from the Netherlands amounted to roughly 12 billion euros, making it the

most popular agri-food export product category (Statistics Netherlands, 2023). The third major supplier ranking goes to Germany, with $86 billion per year. In 2021, the top partner countries to which Germany exported food products included the Netherlands, France, Poland, Austria, and the United Kingdom (World Integrated Trade Solution, 2021). Although the U.S., Netherlands, and Germany are leading in terms of total food exports, the landscape shifts considerably when considering specific food products. For instance, when examining the top exporter of wheat, Russia ranks as the top exporter (Cook, 2023); another example is corn export, which is currently dominated by Brazil after surpassing the U.S. this year (Monteiro, 2023).

On the other side of the equation, major importing regions are the key variable that opposes the dominant forces of food exports. Examining these regions allows for a comprehensive understanding of the inter-dependencies that drive the global food market. Africa, for instance, is one of the regions that highly relies on importing its food, totaling roughly 81 billion U.S. dollars of food imports in 2019 (Statista, 2023b). Several reasons underlie the latter dependency, despite Africa having the potential of being not only self-sufficient but also a net exporter. Technical, infrastructural, and institutional constraints bog the continent, thus being a major reason that creates this reliance (Fundira, 2017). Moreover, protectionism and taxation are among the economic and agricultural policies that create a demotivating environment for execution (Fundira, 2017). Staple foods such as wheat, palm oil, and rice fall under the region's top imports in the category (Cedric Okou, 2022). Several EU countries have formed long-standing trading ties in Africa, in addition to the emerging markets of Brazil and India at the top (Fundira, 2017). However, South Africa still dominates as the main African supplier to the rest of Africa. Similarly to Africa, the Middle East is also recognized as a net food importer as a result of multiple key factors that govern the MENA region collectively, includ-

ing rapid population growth, climate change, water scarcity, limited investments in agriculture, and economic instability. Overall, the MENA region imports 50% of its food from the U.S., Brazil, and the EU with several countries, like Algeria, Iraq, Lebanon, Tunisia, and countries of the Gulf, exceeding this share of imports (Nejla Ben Mimoune, 2023). Some Latin American countries added to the list of significant importers of food products (OECD,FAO, 2019), with Mexico being the major world importer of maize, soybeans, dairy, pork, and poultry, and Brazil is one of the top world wheat importers.

Food prices are one critical element that affects the importers and exporters of food, especially the frequent fluctuations in this essential determinant, often referred to as "food price shocks". By definition, a food price shock is a "significant change. in the direction and magnitude of food prices" (FAO, 2011). Multiple diverse factors cause these fluctuations, and each affects food prices in a distinctive manner that yields different observable trends. (Serpil Aday, 2020).

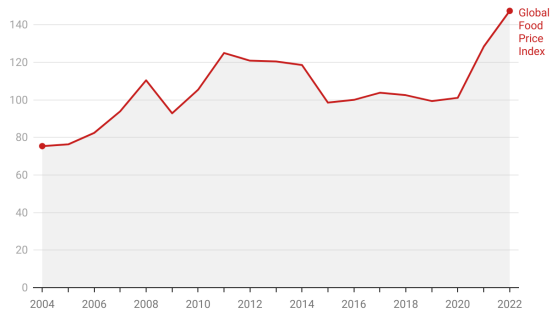


Figure 1.1: The Change of Global Food Price Index From 2004 Till 2022

By referring to Figure 1.1, it is evident that there are major food price spikes spread over different years, whereby each spike is an attribution to different factors. This trend can be recognized by a series of events that took place for example, the twofold increase in the price of crude oil in 2004, contributed to higher food prices. In 2008, the financial crisis that unfolded caused a severe recession thus reducing consumers' purchasing power which in turn impacted the food demand and increased food prices.

Global food prices rose significantly by 40% in 2010, due to drought and wildfire in grain-exporting regions of Russia and Eastern Europe as well as the flood in grain-importing Pakistan (Holland, 2012). This continuation of the spike during the Arab Spring in 2011 was due to the instability in the region (Holland, 2012). Moreover, the COVID pandemic in 2019 that caused a significant rise in food prices as it led to restrictions on workers, changes in the demand of consumers, closure of food production facilities, restricted food trade policies, and financial pressures in the food supply chain. Recently, in 2022, the onset of the Ukraine-Russia war spiked the food price index to a high of 150 points and the intensified climate change caused another sharp increase as crops were down significantly. The dry and hot summer in the Mediterranean in 2022 has damaged olive trees and caused poor crops as the reduced soil moisture has stunted plants and crops during their crucial growing season. As a result, prices of olive oil have soared to an all-time high (Edmond, 2023). The drought in Italy in the year 2022, caused its rice production to decrease by 30% leading to higher prices (Edmond, 2023).

Overall, producers, exporters, and importers are complex interconnected, and vulnerable players in the global food market.

1.2 Potential Impact of Food Price Shocks on Macroeconomic Indicators

Economic cycles and changes in the macroeconomic variables of a country can be highly influenced by significant changes in commodity prices resulting from food price shocks (Kapusuzoglu et al., 2018). By referring to Rizwanul Islam, 2009, unfavorable results of such shocks are an increase in the cost of importing food which forces some households to reduce their expenditures on food commodities along with durable goods and investment (Gert Peersman, 2016). Moreover, inflation responds

positively to food price shocks on the contrary to GDP which responds negatively and persistently (Gert Peersman, 2016). The decline in economic activities and purchasing power creates an environment of uncertainty for businesses forcing some to shut down and leading to a cut in labor demand pushing up unemployment rates (Barua, 2022). The latter effects all unfolded throughout the different food price shocks witnessed over the years. This was illustrated recently as of 2022, after the onset of the Russian-Ukraine war which led to the highest level of the Food Price Index measured by the Food and Agriculture Organization (FAO) since 1990 (Barua, 2022). Another case was the result of the 2008 global financial crisis when the world witnessed a surge in food prices (Mittal, 2009) increasing the severity of the hunger and poverty crisis by affecting an additional 40 million people in addition to holding back economic activities in low-income-food-deficit countries (LIFDCs) (Mittal, 2009).

Even though the severity of the consequences differs between the two economies, developed and low-income countries experience the negative effects of this price volatility. Since food in low-income countries accounts for approximately 44% of consumption, they're more vulnerable to higher prices. However, in emerging market economies and advanced economies, food consumption accounts for 28% and 16% respectively (Amaglobeli et al., 2022). Developing countries witnessed multiple issues which proved to be more difficult to handle than developed countries since the latter enjoys stronger social safety nets and fewer food insecurity threats (Lee et al., 2016). Their weakly structured monetary policies and financial systems, in addition to their high volatility towards commodity prices, lead to higher inflation rates (Kindberg-Hanlon, 2021). Since food prices are higher in developing countries compared to developed countries we also witness a significant surge in import bills (Rizwanul Islam, 2009). Moreover, in the long term, developing economies

also face a direct threat to household food security, weak population health, lower labor productivity, and held back human development. Developing countries' populations are significantly poor with people whose living conditions are highly fragile to any change in prices specifically of essential goods like food. Thus, in developing countries, and on the contrary to developed economies, any shock in food prices can increase the poverty rate and decrease the purchasing power of the people to spend on goods and services pushing back the economy and increasing interest rates (Ahmed Ouhnini, 2023). Households in developed economies are more resilient in the face of such shocks as they do not spend a larger portion of their income on food but rather diversify their expenditure. Overall, all types of economies are affected by the shocks in food prices yet each on a different level.

1.3 The MENA Region's Food Market

Over a surface of 15 million square kilometers, the MENA region is the home to around 6% of the global population (Eken et al., 1996). The MENA region is one of the most important regions for trade and transportation as several of its countries are located in a very strategic geographical position and are considered as access to Europe, Asia, and Africa (Eken et al., 1996). Containing around two-thirds of the world's crude oil in addition to being the second-largest reserves of natural gas, the MENA region is known to be an important player in the oil and energy sector (Eken et al., 1996). Many countries in this region, such as Saudi Arabia with its 2030 vision, are working on diversifying their economies and shifting their focus away from the oil sector and more into tourism, manufacturing, and technology. The varying climate zones of the region give it another advantage of being a major supplier in the agriculture sector along with being a center of origin to several different crops (FAO, 2001).

A region like the MENA, holding extreme potential, has not yet reached the targeted level of growth. Several countries in the region, from years ago are passing through wars and political instability forcing people to get displaced and making the MENA region rank as the region with the second-highest concentration of internally displaced persons (IDPs) (International Organization for Migration, n.d.). In Syria for example, the civil war has been going on for 12 years, and over this period millions of people left the country as refugees either to Turkey (more than 3,250,000 registered refugees), Lebanon (estimated at 1.5 million), Jordan (660,000), or Iraq (over 260,000). Another case would be the armed conflict in Yemen which has displaced millions into Saudi Arabia (The Embassy of The Kingdom of Saudi Arabia, 2017). Only around 530 cubic meters of water per day is available for the MENA region population and with the pressures of growing population, increase in urbanization, inefficient irrigation methods, and development of the industrial and tourism sector, the per capita water supply is decreasing further (Verner, 2012). What is exacerbating the socio-economic and institutional difficulty in the region is having around 30% of the youth unemployed (International Labour Organization, 2023). Having a high rate of growth in the labor force, a large public sector, skill mismatches between the labor force and the available jobs, and high reservation wages, the MENA has the highest unemployment rate among the regions (International Labour Organization, 2023). Another key challenge for the MENA region is income inequality happening within each country itself and getting wider with time (Moshrif, 2022). By referring to Figure 1.2, it is observed that over the years and up to 2023 where it reached around 18%, the poverty ($3.65 line) has increased in the MENA region pushing significant portions of the population to live in severe poverty and instability unable to secure their basic needs. The MENA is the only region that has this kind of behavior in terms of the growing poverty rate. For example, more than 80% of the people in Lebanon and Yemen, are not able to secure their

basic needs (Human Rights Watch, 2023; MacroTrends, 2023) and in Egypt poverty rate is expected to reach 27.9%(Statista, 2023a).

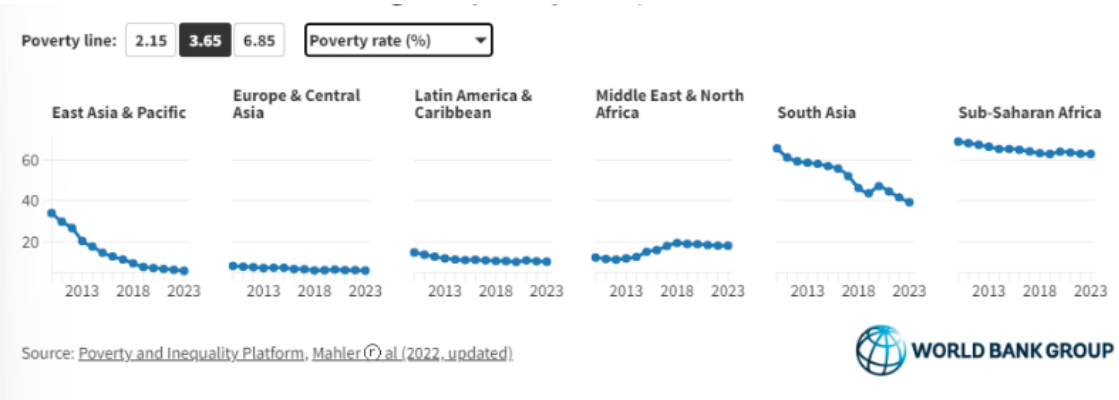


Figure 1.2: The Regional Poverty Trend, 2010-2023

What is driving the situation to become more challenging to enhance is the spread of corruption and lack of transparency in the institutions and governments of the region. Countries in the MENA region have very large institutions built on political infrastructure and functioned by employees who are low-paid (Chêne, 2007). A portion of the population has been dissatisfied with the situation and the governance of their countries which has led them to do a series of protests and rebellions the like of the Arab Spring(Arampatzi et al., 2018). In addition to all the challenges facing the MENA region, its high dependability on food imports and inability to be self-sufficient is yet one of the most significant challenges to the region. The reliance on food imports in the MENA region differs between countries. For example, the GCC and the Levant heavily depend on importing food to meet the demand of the people while Turkey is less reliant on external food markets. Figure 1.3 plots the cereal import dependency ratio of countries in the Middle East and North Africa region. Measured by the Food and Agriculture Organization, the cereal import dependency ratio measures how much of the available domestic food supply of cereals has been imported and how much comes from the country's production. It is computed as the ratio of net cereal imports to the sum of cereal production and net cereal im-

ports. By observing the map, it is evident that a large portion of the countries in the region like UAE, Saudi Arabia, Lebanon, and Egypt are highly dependent on cereal imports.

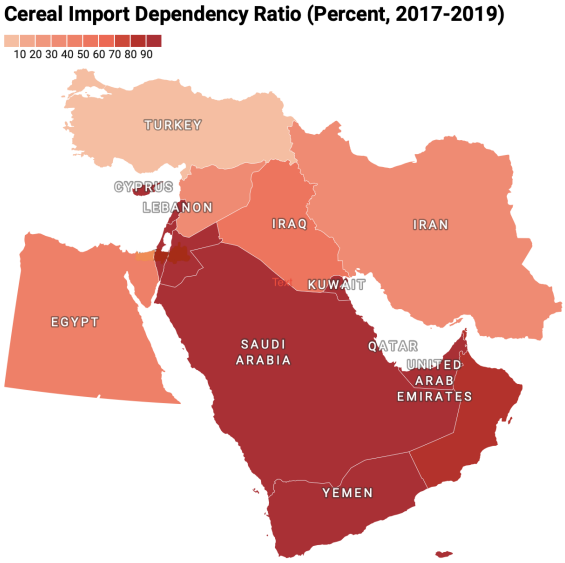


Figure 1.3: Dependence on Food Imports in the MENA Region

Import dependency in the MENA countries varies due to multiple reasons. By referring to World Bank, 2022, climate conditions play a vital role in agriculture production thus affecting how much a country can be self-sufficient and its level of import dependency which is a reason that applies in the MENA region to why there are import dependency differences. Countries like Turkey and Iran have a more appropriate climate and land for agriculture contrary to Jordan and the GCC countries which are deserts and have an arid climate (Raouf, 2008). Another reason that influences how much a country's agriculture sector is efficient and productive in fulfilling its needs is the political and economic stability of the country (Kergna et al., 2014). Syria for example, due to the latter reason, now is one of the top countries that deal with food insecurity after having been self-sufficient for years before the war (Shami, 2022). Policies implemented by the government to enhance the agriculture sector play a major role in helping the country meet its food needs locally. For example, in Turkey, the government is implementing policies such as offering subsidies for

farmers, investing in irrigation system development, and increasing research efforts to enhance crops to aid farmers and motivate people to invest in the agriculture sector that in return placed Turkey as one of the least MENA import-dependent countries (İpekçioğlu et al., 2022). But in countries where the government focuses more on tourism, finance, and oil such as the GCC and Jordan (Darwish, 2021), the level of import dependency is extremely high.

1.4 Goals and Research Questions

What's clear is that insecurity in food prices is both a humanitarian and economic concern, putting tomorrow's youth on paths of limited prosperity and preventing the region from realizing its full economic potential. Thus, it is evident that research should focus on the effect of shocks in food prices on the economies. Within this context, this thesis quantifies the magnitude of the macroeconomic impacts resulting from food price shocks in the MENA region and identifies potential government policies that could mitigate the negative impacts. To this end, this thesis will address the following research questions:

1. How do food price shocks in the MENA region impact macroeconomic indicators in both major oil-exporting countries (Algeria, Bahrain, Libya, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) and non-major oil-exporting countries (Jordan and Morocco)?

2. How can government policies effectively mitigate the macroeconomic impacts of food price shocks in the MENA region?

Chapter 2

Literature Review

2.1 Global Factors Contributing to Food Price Volatility

The changes caused by the perturbation of food prices can either display a behavior of rapid peaks before settling or a behavior of growth with time. The type of the parameter which causes the initial perturbation would determine the type of response. One of the factors that lead to short-term changes is extreme weather conditions. Local food manufacturing relies on crop production which in turn relies on the climate of the nation, the produce decreases in the face of floods, hurricanes, droughts, heat waves, and freezes(Carty, 2012). This plays a significant role in the increase of food prices as the supply shortage throws the supply chain off balance (CMTC, 2023). In nations experiencing such climate, the population has the urge to stock up on products in the fear of weather disasters or the scarcity of supply, thus prices surge (CMTC, 2023). It is also important to the restraints that the weather imposes on producers in terms of increases in production costs that would reflect as an increase in the selling price of the products (Carty, 2012). In 2019, the US experienced a 1.8% increase in food prices after 14 natural disasters (Smith, 2020). Another environmental variable that triggers food price variation in the short term is health epidemics (Amadeo, 2022). The effect is not limited to that on the

consumer alone, but the whole supply chain is disrupted as the producers are faced with labor force unavailability due to lockdown, the restriction of trade, and in turn the cost of production increase (Myers, 2006). Nevertheless, if the duration of the pandemic extends, in the case the effect on food prices would be persistent, which is coherent with the shifts in global trade and the recession of the economy. This was the scenario in various countries as the COVID-19 epidemic disrupted the food market on both ends, supply, and demand, which is depicted as a surge in food prices (Amadeo, 2022) as seen in Figure 2.1.

Figure 2.1: FAO Monthly Food Price Index in Nominal Terms

On the other hand, the rise in food prices remains persistent due to several factors originating from the demand and supply sides (Wiggins & Levy, 2008). In the eyes of the supplier, the increase in the selling value of food products is induced by the increase in the indirect production costs such as that of fuel used in the transportation of the products (Wiggins & Levy, 2008). With the growth of oil prices, the transition to biofuel is starting to be seen as equiprobable (Wiggins & Levy, 2008). However, the expenses of such a transition as well as the expenses to supply the demand would also lead to a surge in sales prices. The expenses entail the need for land, water, labor, fertilizers, and other resources (Kinlay Dorjee, 2008). From the demand point of view, the changes in consumer behavior, especially in rising economies, would play a crucial role in the variation of food prices (Wiggins & Levy, 2008). Consumers of emerging countries are displaying a preference for products like meat fish and dairy over products like grains and tubers. This appeal to a better

quality of life pushes the supply chain to reallocate resources and increase resources eventually to cater to the demand (Wiggins & Levy, 2008). Other factors to be considered are that of military conflicts, which similar to the case of epidemics, can offset short-lived effects on food prices or long-lasting ones and that is determined by the duration of wars, their intensity, and their location. Food production is at risk of becoming scarce due to the threat of war damaging lands and infrastructure (Education, 2023). In addition, there are new limitations posed on trade during periods of conflict such as the seizing of exports or having to reroute trade paths around the areas of conflict which yet again increase cost and eventually sell prices (Oldrich Krpec, 2019). The effect is amplified from a local perturbation of prices to a global one if the country at conflict is one of the largest food suppliers. The Russian-Ukraine war which is still ongoing, has perturbed the wheat market as both parties are large suppliers (Kearns, 2023). While both countries suffered from loss of land and infrastructure, they were not the only parties that sustained losses. Countries that rely on the import of wheat from Russia and Ukraine, the likes of Lebanon Turkey, China, and others are dealing with the gap in the supply and the surge of its price (Aizenman, 2023).

2.2 Impact of Past Shocks on Macroeconomic Indicators Worldwide

History stands as a witness to the variation of the economic response in different countries to the instability of food prices. As demonstrated in Chapter 1, inflation and gain rate are some of the parameters affected by the constant change of food prices. The cause-effect relationship between the parameters mentioned can be depicted from the examination of the available literature review. In Turkey, there was no strong correlation between food price fluctuations and output growth while the Turkish lira suffered appreciation coherent with the increase in inflation (Kapusu-

zoglu et al., 2018). On the other hand, India's response to food price surges is that of mitigation of the rise in inflation by absorbing the effects of increased interest rates, which in turn had effects on the aggregate output, this has been treated in a study conducted by (Holtemöller & Mallick, 2016). According to another study conducted by Khan and Ahmed, 2011, Pakistan, whose economy is very responsive to changes in both oil and food prices, the output growth diminished as opposed to the rise in the domestic inflation rate.

As explained in Chapter 1, low-income countries are experiencing a threat to food security and financial security due to food price shocks. After the surge in prices following the global financial crisis in 2007-2008, consumers purchasing power declined severely as a portion of around 4.5% of the population was pushed under the poverty threshold. Another case, was the growth of the number of people below the poverty line by 4%, around 100 thousand people, in Nepal after the food prices surged by 10% (Chaudhary, 2012). In the same light, 3.1 million people were left to deal with the scarcity of food in Somalia during 2010-2011, as a result of drought and other conflicts, which according to UN parameters can be seen through the 43% rise in the FAO global food index (Maxwell & Fitzpatrick, 2012). Recently, as a response to the Russian-Ukraine war, the price of wheat rose leading to increased food insecurity in Yemen which relies on both parties with around 45% of its wheat import (Bahashwan, 2022). Another recent food price shock occurred during the COVID-19 pandemic leading to the escalation of prices by 35.7% in 2022 in Brazil leading 30.7% of the population to struggle with affording their food needs (Bank, 2023).

Countries that have limited capacity and ability to be self-sufficient often deal with negative repercussions on their RER when food price shocks occur (Alom et al.,

2013). This was evident in countries with limited to no oil production, as was the case in Hong Kong between the years of 2000 and 2010 as the REER was unstable coordinating with the instability of food prices (Alom et al., 2013). Similarly, Taiwan is predisposed to the economic impacts of the increase in food prices as it relies heavily on food imports given the scarcity of its resources as was seen in REER variation during the food prices increase between 2000 and 2010 (Alom et al., 2013). Another country suffering from food shocks is the Philippines which is primarily related to the increase in transportation costs by the increase of fuel prices, and these shocks contributed to the depreciation of the local currency (Nguyen, 2022).

2.3 MENA-Specific Instances of Food Price Shocks and Their Effects

From Chapter 1, it can be concluded that countries in the MENA region are characterized by self-insufficiency when it comes to food production, and that along with political conflicts as well the economic ones leave these countries highly responsive to food price fluctuations. This has also been proven historically as the countries have already withstood several shocks and continue to respond to them today (Climate Diplomacy, 2023).

An era that supports this link is that of 2007-2008, during which the region experienced a surge in the prices of food staples. The price of rice increased to 3 times its original value, while wheat, maize, and soybeans prices rose by twofold (Fontan Sers & Mughal, 2023). Another index that also rose was the World Food Price Index, which according to the Food and Agricultural Organization reported a 45% increase (Fontan Sers & Mughal, 2023). The climate during that period as well as the scarcity of stocks were the root causes behind the skyrocketing prices of crop yield (Fontan Sers & Mughal, 2023). The natural disasters of the period

included the floods in the Midwestern United States which disrupted corn and soybean production (NASA Earth Observatory, 2007), the cyclone that hit Myanmar which affected rice production (United States Department of Agriculture, 2008), and finally the drought that hit Australia in 2006 -2007 that decreased wheat production (Joint Agricultural Weather Facility of the United States Department of Agriculture, 2007). Around the same time frame, countries like India, China, and Indonesia exercised a restriction on the exporting of cereal to maintain domestic reserve which amplified the fluctuation of food prices (Fontan Sers & Mughal, 2023). All these events were accompanied by a change in the market dynamics as a lot of capital was withdrawn from the real estate market and redirected to food markets causing fluctuations in food prices, following the Subprime crisis (Fontan Sers & Mughal, 2023). There was also an increase in demand for corn as it was integrated into ethanol production (Bullisarchive, 2011). The accumulation of all these occurrences threw food security off balance in both Middle Eastern and Western countries. These effects propagated as an increase in famine in countries like Egypt and Morocco which caused a widespread wave of protest especially in poverty-stricken areas (Fontan Sers & Mughal, 2023). The GDP growth rate response to the food volatility was different across MENA countries. On one hand, some countries saw a massive fall, the likes of Egypt which recorded a decline from 7.2% to 4.7% in 2009 according to Zaki, 2017. On the other hand, some countries did not experience a noticeable impact.

The following peak of global food prices was in 2010 with an estimated increase of 40% (Holland, 2012). The first root cause was the 1.25% demographic increase in 2009 which was accompanied by 7.6% of income in third world countries (Coulibaly, 2013). This resulted in a demand for a better quality of life which was portrayed as the preference of meat over that of grains and such required more cereal for livestock feeding, this caused the increase of prices of corn, wheat, and soy (Coulibaly, 2013).

As seen before, the rise in prices of wheat stems from natural disasters as well. This was certainly evident when a drought spread across parts of Russia, Ukraine, and Kazakhstan causing a decline in wheat production by 27%, 19%, and 35% in each with respect to 2009; it is important to note that these countries contribute to 27% of global wheat exports (Coulibaly, 2013). In addition, Pakistan experienced a great loss of crops and land due to heavy rainfall in 2010. The rise in the cost of transportation induced the rise of the selling value of food products, this came as a result of the 16% annual increase in oil prices (Baldwin, 2010). Another factor that affected food volatility was the unsteadiness of political conditions in the MENA region, as the Arab countries struggled to accommodate the new regulations of the World Bank and IMF of liberated markets (Salih, 2013). It is also worth noting the uneven divide of wealth across those nations, resulting in a large percentage of the population struggling to cover their food expenditures (Holland, 2012). There was also a division between the population and the repressive government, as people expressed their helplessness with such food prices (Salih, 2013). The tension resulting from the corruption of the government and the increase in prices yielded the Arab Spring (Salih, 2013). In December 2010, a series of anti-government protests and uprisings spread across the Arab World involving countries like Tunisia, Morocco, Syria, Libya, Egypt, and Bahrain and it was known as the Arab Spring(Salih, 2013). While the Arab Spring led to some sort of political reform in some countries like Tunisia, Egypt, and Libya, it escalated to destructive civil wars and worse conditions in others like Syria, Yemen, and Libya (Kali Robinson, 2020). In Syria particularly, the Arab Spring triggered a devastating ongoing conflict, resulting in widespread destruction and the displacement of more than 14 million refugees since 2011 (UNHCR, 2023). Despite one of the main reasons for youth participation in these protests being their frustration because of the high unemployment rates, today the MENA region remains the region with the highest youth unemployment rate

(Kali Robinson, 2020). Moreover, corruption and conflicts persist and have worsened in countries like Syria, Lybia, and Yemen (Kali Robinson, 2020). Overall, the Arab Spring had a significant impact on the lives of people in the involved countries, whether for better or worse.

During the COVID-19 pandemic, food prices rose significantly, reaching levels observed during the 2007-2008 and 2010-2011 spikes (see Figure 2.2). The lockdown that led to movement restrictions, panic buying, and stockpiling along with higher input costs, labor shortages, and trade bans caused a downturn in the food supply chain, which in return caused the initial sudden increase in prices (Stoevska, 2020). But as the lockdown measures were enacted in 2020, prices started to gradually fall back due to a global economic downturn, reduced consumer spending, and low oil consumption hence low oil prices (Stoevska, 2020). As life started getting back to normal, the economy began to rebound. As a result, restrictions were lifted and production boosted, causing a rapid increase in prices reaching a steady state greater than that before the pandemic (Stoevska, 2020).

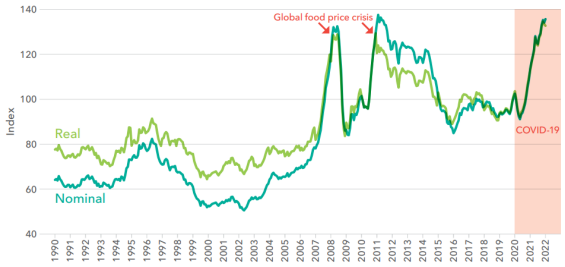


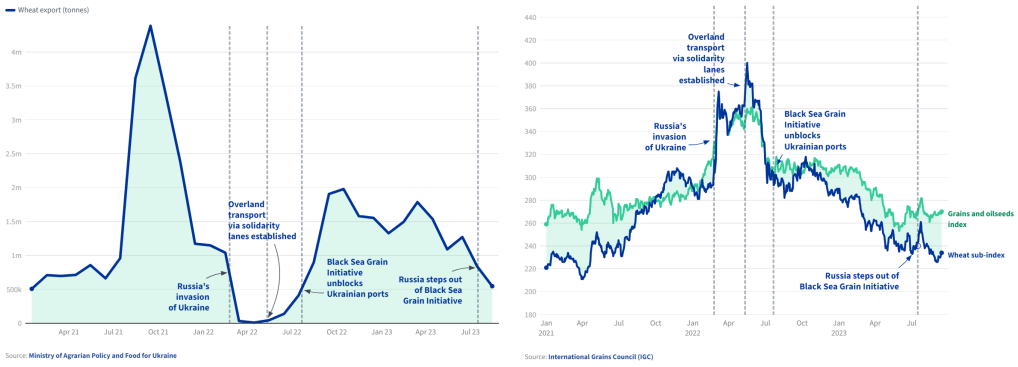
Figure 2.2: FAO monthly food price index in real and nominal terms, January 1990–January 2022

An added pressure on the MENA region was the COVID-19 pandemic which further exacerbated the critical status of the region and its socioeconomic status (World Bank, 2021). The case in Lebanon had already deteriorated and the economy was already failing and with the emergence of the pandemic, the inflation rate rose to 402%. In Iran, as the situation initially started to progress and the inflation

was declining, the hit of the pandemic rose back inflation to 41.2% (World Bank, 2021). Overall, there has been a significant increase of 20% for some main staples although the price changes are inconsistent across different countries in the region (World Bank, 2021). This dual pressure of the pandemic and the surge in food prices placed extreme pressure on vulnerable economies and their populations as their purchasing power worsened and more people got pushed to poverty and hunger(World Bank, 2021). For example, it was reported that 33% of Tunisian families and 40% of Djiboutian families suffered from low food income (World Bank, 2021). As a result, the government had to expand food aid and social safety programs due to the pressure that has been pushed on its budgets. For example, in Egypt, 17% of the government's total expenses were towards aid, grants, and social benefits during 2020-2021 (Talaat, 2022). In Morocco, the government granted $1.7 billion to fund the local market in 2022 to address the outcome of the COVID pandemic (Rahhou, 2022).

The Russian-Ukrainian war that started in 2022 caused a recent rise in food prices in the MENA Region. Add to that, the severity of the weather and climate in India and Pakistan, as these two countries represent a key source in production and exportation (Kennedy, 2023). Since the start of the war, food prices have witnessed a significant increase. Which, compared to March 2021 levels, wheat prices rose by 58% and grain prices rose by 34%. This is due to reduced exports from the two major exporters of wheat, corn, and sunflower oil, market speculation and uncertainty, and the increase in fuel and energy prices (European Union, 2023). As a leading country in grain, 90% of Ukraine's grain exports are transported by sea. However, due to the war, the world faced a decrease in grain exports and supply. Which was a result of the naval blockade by Russia as it blocked the Black Sea ports (European Union, 2023). The European Union authorized alternative routes, known as

"Solidarity Lanes." On the other hand, the United Nations and Turkey reopened ports through the "Black Sea Grain Initiative." In Figure 2.3 we can see that these policies caused a rise in wheat exports from Ukraine. However, the rise remained significantly lower than that in 2021. For example, in September and October, when exports reached a peak of 57% and 42%, respectively, it was still lower than that in 2021. As a result, food prices decreased gradually up to July 2023, when prices began to increase again due to the withdrawal of Russia from the Black Sea Grain Initiative.



(a) Ukraine's wheat exports (b) Grain prices worldwide

Figure 2.3: Impact of Ukrainian Wheat Exports on Global Prices

As Russia is considered a top natural gas exporter and oil extractor, the war between Russia and Ukraine has massively affected the energy market. The war has caused variations of 70.72% in WTI and 73.62% in crude oil prices (Zhang et al., 2024). Furthermore, the conflict has increased irregularity in oil prices and deep down changed their course (Zhang et al., 2024). The increase in prices of crude oil will lead to an increase in food prices as well, given how important crude oil is in fuel and energy production for food production and cultivation. Even countries that do not rely on Ukraine or Russia for food import are in danger of seeing inflation in prices of food due to the increased price of energy and a decreased export of fertilizers (Anissa Berin, 2022). On the other hand, the MENA region is facing the aftermath of the war, as this region is highly dependent on these exports. This has

led to a substantial jump in food costs in different countries in the region. The Tunisian government was unable to bear the cost of wheat exports for example, along with the 50% increase in costs in Egypt just after the war (Nagi, 2022). Additionally, gasoline and energy costs in non-oil-producing countries have increased. The Lebanese government, for example, has announced that fuel dealers could no longer pay for imports using the Lebanese pound as the LBP value has plummeted. This has led to a skyrocketing in fuel prices (The Lebanon Crisis Analytics Team, 2023). It has also led to a shortage in electricity, down to a couple of hours of power a day, as the Lebanese found it hard to accommodate for the increased cost (The Lebanon Crisis Analytics Team, 2023). Egypt is another sample of the MENA region countries that depend profoundly on tourism from Russia and Ukraine (State Information Service, 2023). This sector has been heavily struck by the war, leading to financial losses and a decrease in the economic activity in the areas of hospitality. Generally speaking, the war has left a long-lasting mark on the MENA region in terms of incertitude and complexities.

Chapter 3

Data

This study uses annual data from 1990 to 2023, based on data availability, for countries in the MENA region, in particular: Algeria, Bahrain, Jordan, Libya, Morocco, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The dataset includes key macroeconomic indicators, like current account (% of GDP), gross domestic product per capita (in real terms), inflation, and consumer prices (annual %). All data for the former variables was sourced from the International Monetary Fund (IMF) database. The real exchange rate (RER) was computed using the following formula: $\frac{\text{CPI}_{\text{US}} \times \text{E}_{\text{US/home}}}{\text{CPI}_{\text{home}}}$ where nominal exchange rate and consumer price index (CPI) data was extracted from the IMF. Additionally, data on global food prices (in $), are sourced from the Food and Agriculture Organization (FAO) while data on the global price of Brent Crude Oil (in $) was sourced from the Federal Reserve Bank (FRED). Contrary to developed countries where historical data is available and updated, developing countries do not have the same availability and accessibility of data which makes it challenging to gather data for the MENA countries. Hence, data on inflation was missing for the United Arab Emirates in 1990. In addition, data on the RER in 2023 was unavailable for all countries. For the United Arab Emirates, RER data was also missing for 2022. A comprehensive overview of the details provided in this paragraph can be found in the table that follows (Table

3.1) and summary statistics of the variables for each country is present in Appendix A. By examining the table of the descriptive statistics, the results show that GFP series varies by almost 27$ above or below the average price. As for the GOP, the results reveal that the series tends to differ from the mean by around 33$. The most volatile GDPpc series is that of Qatar while the least is for Bahrain. As for inflation, the data shows that prices are mostly volatile in Libya and the most stable around the mean in Saudi Arabia. Examining the RER, Bahrain shows to have a steady exchange environment contrary to Algeria where the RER tends to move by 15.09 below or above the mean. Observing the CA, Jordan seems to have a negative mean with a modest standard deviation reflecting that Jordan is consistently in a current account deficit.

Variable	Description	Source
GOP ($)	Global Brent Crude Oil Prices	FRED
GFP ($)	Global Food Prices	FAO
GDPpc ($)	Gross Domestic Product per Capita	IMF
INF (%)	Year-to-year changes in average consumer prices	IMF
CA (%)	Current account as a percentage of GDP	IMF
RER	Real Exchange Rate	IMF

Table 3.1: Summary of the Dataset

Chapter 4

Methodology

The thesis employs an SVAR framework to analyze the impact of food price shocks on the countries of the MENA region. The SVAR is a dynamic empirical framework that possesses the ability to explain economic phenomena underpinned by underlying economic theories (Nasir et al., 2019). This makes it particularly useful for macroeconomic shocks such as food price shocks. The insights on the dynamic responses of the variables to shocks in food prices will be gathered through Impulse Response Functions (IRF) used to visualize the response of the variable to the shock over the short and long run. In addition, a thorough comparison will be made to assess the response of every country to the food price shock which will facilitate policy recommendations.

4.1 The Structural Vector Autoregressive (SVAR) Model

The general specification of an SVAR model is as follows:

$$A_0 Y_t = A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + \epsilon_t \tag{4.1}$$

- Y_t is an $(n \times 1)$ vector of relevant variables including global food prices, global oil prices, real exchange rate, inflation, current account, and gross domestic product per capita.

- A_i represents an $(n \times n)$ matrix of coefficients.

- ϵ_t is the structural shocks that are independent and identically distributed (iid) which will include: $[\epsilon_t^{\text{GFP}}, \epsilon_t^{\text{GOP}}, \epsilon_t^{\text{RER}}, \epsilon_t^{\text{INF}}, \epsilon_t^{\text{CA}}, \epsilon_t^{\text{GDPpc}}]$

The reduced form of the SVAR is as follows:

$$Y_t = A_0^{-1}A_1Y_{t-1} + \ldots + A_0^{-1}A_pY_{t-p} + A_0^{-1}\epsilon_t = B(L)Y_t + u_t \tag{4.2}$$

where $B(L)Y_t = A_0^{-1}A_1(L)$ and $A_0u_t = \epsilon_t$.

4.2 Identification and Restrictions

The SVAR model requires imposing identification restrictions that are based on economic theories to establish a clear connection between the parameters. As such, for this study, the identification restrictions for non-major oil exporting countries are such that the global food prices variable is exogenous as neither of the countries can influence the global food prices given that the market is competitive and influenced by several other global factors as discussed in Chapter 2. On the other hand, the global food prices do have considerable consequences on the macroeconomics of these countries affecting GDPpc, CA, INF, and RER, as outlined in Chapter 2, making these variables endogenous. In the case of the major oil exporting countries, it is vital to add the oil prices into the model to be able to only capture the impact of food price shocks given that commodity prices move together. As discussed in Chapter 2, oil prices can influence food prices as such, the oil variable is treated as exogenous, while the food prices variable is included as an endogenous variable.

The system of equations for non-major oil exporting countries is as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{bmatrix} \quad \begin{bmatrix} u_{GFP} \\ u_{RER} \\ u_{INF} \\ u_{CA} \\ u_{GDPpc} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{bmatrix} \quad \begin{bmatrix} \epsilon_{GFP} \\ \epsilon_{RER} \\ \epsilon_{INF} \\ \epsilon_{CA} \\ \epsilon_{GDPpc} \end{bmatrix}$$

$b_{11}\ \epsilon_{GFP} = u_{GFP}$

$b_{22}\ \epsilon_{RER} = a_{21}u_{GFP} + u_{RER}$

$b_{33}\ \epsilon_{INF} = a_{31}u_{GFP} + a_{32}u_{RER} + u_{INF}$

$b_{44}\ \epsilon_{CA} = a_{41}u_{GFP} + a_{42}u_{RER} + a_{43}u_{INF} + u_{CA}$

$b_{55}\ \epsilon_{GDPpc} = a_{51}u_{GFP} + a_{52}u_{RER} + a_{53}u_{INF} + a_{54}u_{CA} + u_{GDPpc}$

The system of equations for major-oil-exporting countries is as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \quad \begin{bmatrix} u_{GOP} \\ u_{GFP} \\ u_{RER} \\ u_{INF} \\ u_{CA} \\ u_{GDPpc} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & b_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{66} \end{bmatrix} \quad \begin{bmatrix} \epsilon_{GOP} \\ \epsilon_{GFP} \\ \epsilon_{RER} \\ \epsilon_{INF} \\ \epsilon_{CA} \\ \epsilon_{GDPpc} \end{bmatrix}$$

$b_{11}\mathrm{n}\ \epsilon_{GOP} = u_{GOP}$

$b_{22}\ \epsilon_{GFP} = a_{21}u_{GOP} + u_{GFP}$

$b_{33}\ \epsilon_{RER} = a_{31}u_{GOP} + a_{32}u_{GFP} + u_{RER}$

$b_{44}\ \epsilon_{INF} = a_{41}u_{GOP} + a_{42}u_{GFP} + a_{43}u_{RER} + u_{INF}$

$b_{55}\ \epsilon_{CA} = a_{51}u_{GOP} + a_{52}u_{GFP} + a_{53}u_{RER} + a_{54}u_{INF} + u_{CA}$

$b_{66}\ \epsilon_{GDPpc} = a_{61}u_{GOP} + a_{62}u_{GFP} + a_{63}u_{RER} + a_{64}u_{INF} + a_{65}u_{CA} + u_{GDPpc}$

Chapter 5

Results and Discussion

5.1 Unit-Root Test

The basic Dickey-Fuller test (dfuller), Dickey-Fuller test with a linear trend (dfuller, trend), and Dickey-Fuller test with both a constant term (drift) and a linear trend (dfuller, drift) were applied for the key variables being studied, namely GOP, GFP, GDPpc, RER, INF, and CA to test for stationarity (the variable is considered non-stationary if all the three tests collectively resulted as such). For all countries being studied, the GFP and GOP displayed non-stationary results, as such, the log difference was applied transforming the variables to stationary. On the other hand, for some countries, a simple log transformation resulted in stationarity for GDPpc. However, log difference was applied to GDPpc for all countries for consistency and minimal divergence in results. Similarly, the RER for specific countries including Bahrain, Jordan, Libya, Morocco, Qatar, and the UAE displayed non-stationary initially, necessitating applying the first difference operation. The results for the Dickey-Fuller tests are displayed in Table 5.2 below. After the unit-root testing, a lag length section test using alternative information criteria (Akaike Information criterion, Schwarz Information Criterion, Hannan-Quinn Information Criterion) was performed to determine an appropriate lag length. The tests suggested four lags for

the non-major oil-exporting countries and three for the major oil-exporting countries.

Country	**Variable**	**dfuller**	**dfuller, trend**	**dfuller, drift**
Algeria	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-2.209	-2.196	-2.209**
	INF	-1.788	-2.119	-1.788**
	CA	-1.902	-1.997	-1.902**
	lnGDPpc	-0.383	-1.478	-0.383
Bahrain	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-1.256	-1.440	-1.256
	INF	-4.099***	-4.031***	-4.099***
	CA	-2.719*	-2.909	-2.719*
	lnGDPpc	-2.536	-2.426	-2.536*
Jordan	lnGFP	-0.692	-2.494	-0.692
	RER	-0.893	-0.979	-0.893
	INF	-6.095***	-5.961***	-6.095***
	CA	-2.559***	-2.605	-2.559***
	lnGDPpc	-1.071	-0.991	-1.072
Libya	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-0.601	-1.395	-0.601
	INF	-3.744***	-3.734**	-3.744***
	CA	-2.490	-2.468	-2.490***
	lnGDPpc	-2.333	-3.851**	-2.333**

Table 5.1: T-Statistic Values from Unit-Root Analysis using Dickey-Fuller Tests
**** denotes 1% level of significance*
*** denotes 5% level of significance*
** denotes 10% level of significance*

Country	Variable	dfuller	dfuller, trend	dfuller, drift
Morocco	lnGFP	-0.692	-2.494	-0.692
	RER	-1.176	-1.651	-1.176
	INF	-2.372	-1.895	-2.372**
	CA	-2.408	-2.500	-2.408**
	lnGDPpc	-0.613	-2.762	-0.613
Oman	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-1.413	-1.244	-1.413*
	INF	-3.813***	-4.306**	-3.813***
	CA	-2.917**	-2.831	-2.917***
	lnGDPpc	-2.449	-1.326	-2.449**
Qatar	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-0.961	-0.619	-0.961
	INF	-3.179**	-3.167*	-3.179***
	CA	-1.494	-1.727	-1.494*
	lnGDPpc	-1.945	-1.244	-1.945**
Saudi Arabia	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-1.459	-1.260	-1.459*
	INF	-3.854***	-3.919**	-3.854***
	CA	-2.021	-2.031	-2.021**
	lnGDPpc	-1.937	-2.428	-1.937**
UAE	lnGOP	-1.078	-2.023	-1.078
	lnGFP	-0.692	-2.494	-0.692
	RER	-1.359	-0.460	-1.359*
	INF	-2.533	-2.528	-2.533***
	CA	-3.817***	-4.185***	-3.817***
	lnGDPpc	-1.195	-1.046	-1.195

Table 5.2: T-Statistic Values from Unit-Root Analysis using Dickey-Fuller Tests
**** denotes 1% level of significance*
*** denotes 5% level of significance*
** denotes 10% level of significance*

5.2 Impulse Response Function (IRF) Analysis

5.2.1 *Algeria*

Observing the responses of Algeria reveals that the food price shocks exert pressure on inflation in the country at the onset of the shock. Even when the effect eased after 1 year from the shock, it is observed to accelerate the inflation rates again starting period 3 up to period 5. On the other hand, the RER appreciated immediately following the food price shock up to the first year. After that, the RER reverted its tendency and started to depreciate up until period 5. This mean-reverting behavior of the RER is consistent with the overshooting monetary exchange rate model which states that when inflation rises, the monetary authority has to respond by contractionary policies, which will lead to an expected appreciation of the exchange rate that translates to a current appreciation. The result of the RER is consistent with the findings of Khan and Ahmed, 2011. The IRF analysis revealed that the current account initially moved in the same direction as inflation which might be attributed to a strategic decision to decrease food imports; however, given the inability of Algeria to meet the demand from domestic production, this might have necessitated the imports to increase back again leading to a decline in the current account up until period 5. Aligning with the findings of Alom, 2011, the GDPpc had no statistical response to the shock.

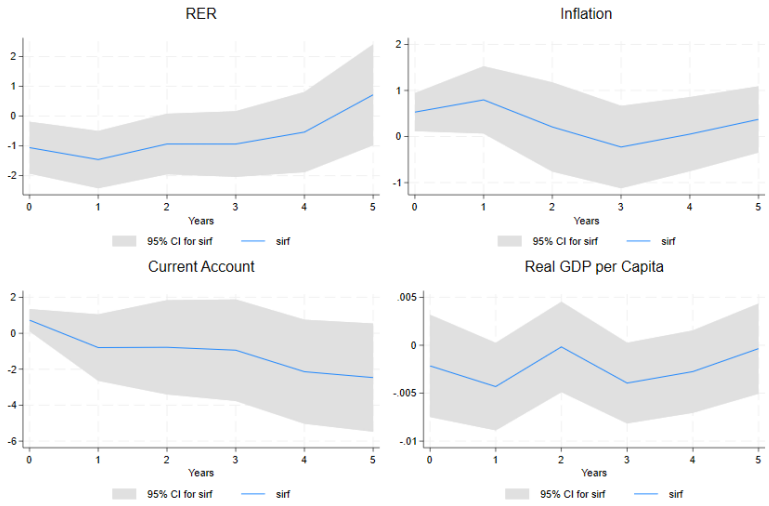


Figure 5.1: The Response of Algeria to Food Price Shocks

5.2.2 *Bahrain*

As shown in Figure 5.2, a positive one-unit standard deviation shock to global food prices appreciated the RER at period 0 and then caused a depreciation over the next period. The effect of the RER then turned negative and reached its highest levels 2 periods after the shock. Then it depreciated gradually and reached its highest levels in period 4. Inflation increased at the onset of the shock to later started declining. Inflation then reached its maximum impact during the second year following the shock and then started declining to reach near-zero levels in periods 4 to 5. As for the GDPpc and the current account, both variables were not significantly affected by the shock throughout all periods.

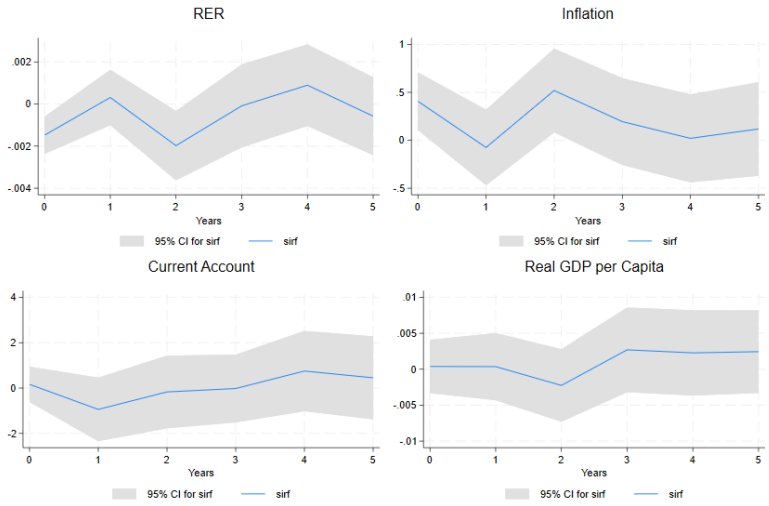


Figure 5.2: The Response of Bahrain to Food Price Shocks

5.2.3 *Jordan*

Jordan's RER was slightly positively affected by the food price shock. Due to Jordan's incapability of self-sufficiency, it relies on food imports to meet the demand of its people, and as such it is unable to decrease its imports in the face of rising prices. This can be reflected by the current account negatively responding to the shock up until period 3 where it reached almost 0 but then declined again. Inflation responded positively to the shock and reached its highest value 3 years after the shock. As for the GDPpc, the effect was of no statistical significance on the lines of Algeria and Bahrain.

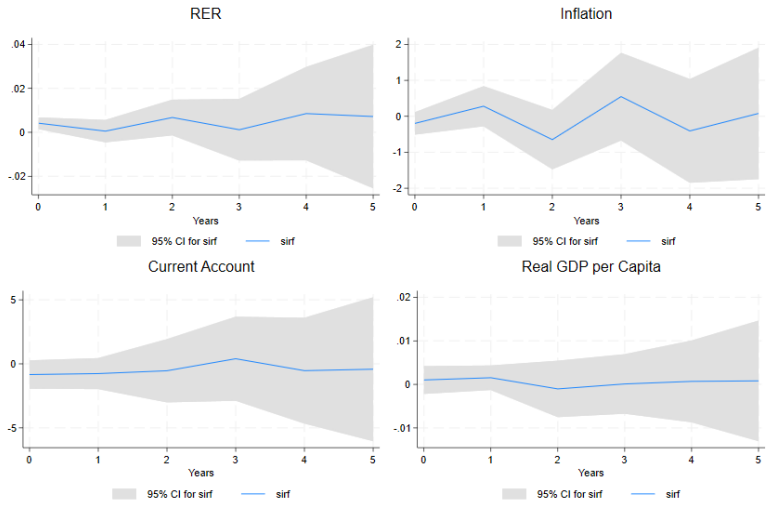


Figure 5.3: The Response of Jordan to Food Price Shocks

5.2.4 *Libya*

In the case of Libya, the IRF analysis revealed a mixed response to the inflation; however, overall the effect remained positive throughout all periods. A closer look into the current account, although the response seems to be insignificant, reveals that as inflation was controlled during periods 0 and 1 the current account was stabilized. However, as inflation reached its highest response, the current account followed the same pattern suggesting a decrease in food imports to counterbalance the pressure of increased food import prices. On the onset of the shock, the RER expressed a positive effect to later appreciate and reach its peak along with inflation peaks in periods 2 and 3. Consistent with the overshooting theory, as inflation declined, the effect on the RER turned positive once again. Examining the GDPpc, it is observed to have an opposite direction to the move of inflation and RER indicating a decrease in purchasing power as inflation increases and RER depreciates aligning with Kapusuzoglu et al., 2018.

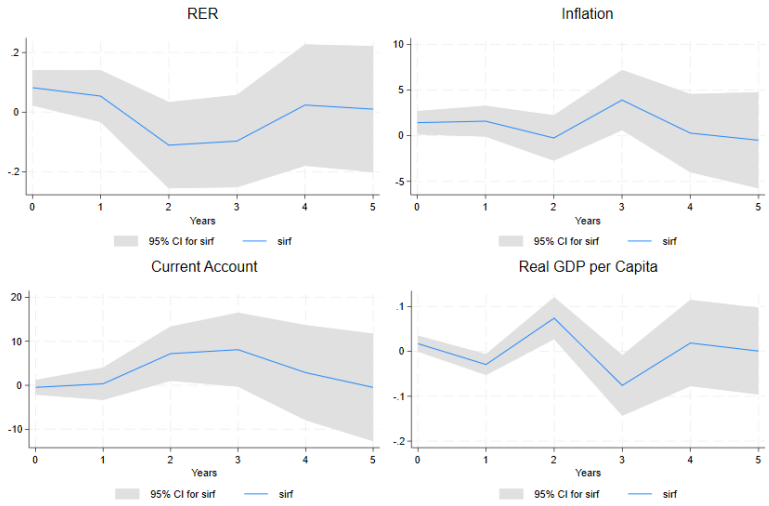


Figure 5.4: The Response of Libya to Food Price Shocks

5.2.5 *Morocco*

The IRF analysis for Morocco shows that although prices seem to have increased over all the periods, overall, the effect on inflation was insignificant. By referring to Figure 5.5 it is observed that the RER experienced an appreciation at the onset and later the effect turned positive which is consistent with Alom, 2011 and the overshooting theory. Due to the increase in food import costs and increased pressures on the trade deficit, the current account of Morocco responded negatively throughout all tested periods. GDPpc response for Morocco was similar to Algeria, Bahrain, and Jordan as it had no significance.

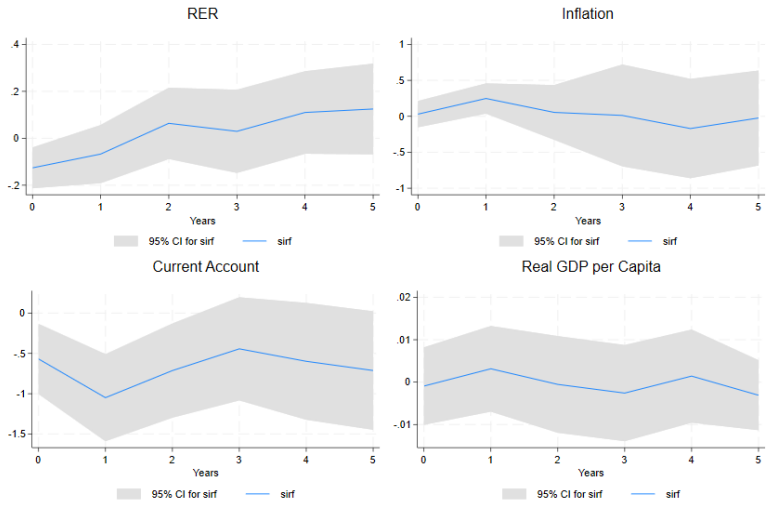


Figure 5.5: The Response of Morocco to Food Price Shocks

5.2.6 *Oman*

In Oman's case, the variables under study responded in different ways over the five periods. At the beginning of the shock, inflation spiked and then started decreasing for the effect to turn negative as of period 3. At the start of the shock, the RER responded positively with a slight appreciation up until period 1 to later start depreciating which is consistent with Alom, 2011. The current account experienced an increase through periods 1 up to 5 which is potentially due to the depreciation of the RER making Oman's exports cheaper and more competitive. GDPpc reached its lowest peak in period 5 probably because of the depreciation of the RER reducing the people's purchasing power. Overall, all variables' responses whether positive or negative were visible 1 year later post the shock.

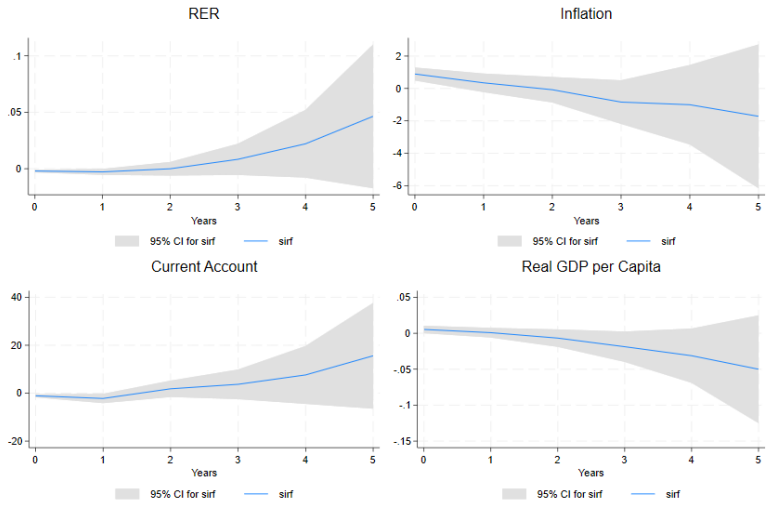


Figure 5.6: The Response of Oman to Food Price Shocks

5.2.7 *Qatar*

In Qatar, on the onset of the shock, inflation responds positively yet later declines in the following periods. The GPDpc, although revealing insignificant responses, decreased from period 0 to 1 as inflation spiked suggesting that the increase in food prices led to a decrease in the purchasing power and the economic output at the initial phase of the shock. The current account showed insignificant effects yet decreased after the start of the shock potentially due to the negative impact on the trade balance. At the start of the shock, the RER exhibited a negative effect (an appreciation) followed by a depreciation onwards. This response of the RER to the shock reflects the initial appreciation of the RER as a temporary response as it later adjusts to align with the overshooting theory.

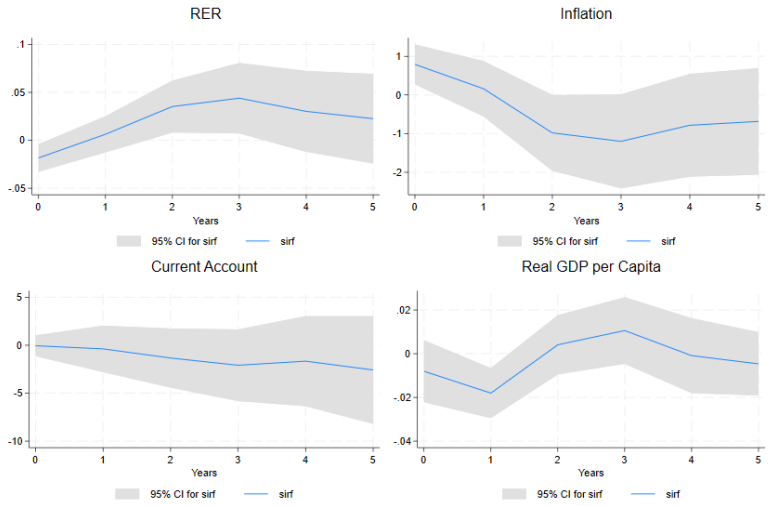


Figure 5.7: The Response of Qatar to Food Price Shocks

5.2.8 *Saudi Arabia*

Although Saudi Arabia's RER response has shown to have no statistical significance, it still shows an appreciation throughout the periods examined. As for inflation, prices in Saudi Arabia are observed to have increased as a response to the shock given that the inflation indicates a positive response throughout all five periods. Initially, the current account positively responded to the shock, yet, after period one, it started to decrease. Similar to the current account, the GDPpc also increased at period 0; however, it later returned to zero impact in the periods that followed.

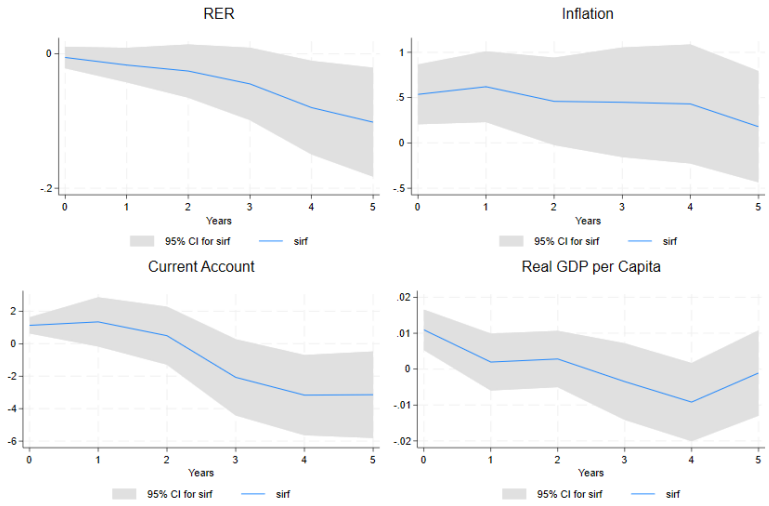


Figure 5.8: The Response of Saudi Arabia to Food Price Shocks

5.2.9 *UAE*

The key macroeconomic indicators for UAE responded differently. Looking at the RER, we see that the UAE currency depreciated following the increase in food prices reflecting a positive response to the shock. As for the current account, the response appears to be negative at the initial stage potentially due to the increased cost of imports which increases the deficit in the trade balance. However, as the RER depreciates, the current account starts to increase primarily because UAE exports became cheaper and more competitive in the global market. Regarding the GDPpc, the results show to be insignificant which aligns with Alom, 2011, suggesting that food price shocks may not have adverse effects on output for countries that rely on food imports. Finally, observing inflation, it is obvious that the shock did not lead to significant changes in the domestic price levels as the results showed insignificant responses to the shock.

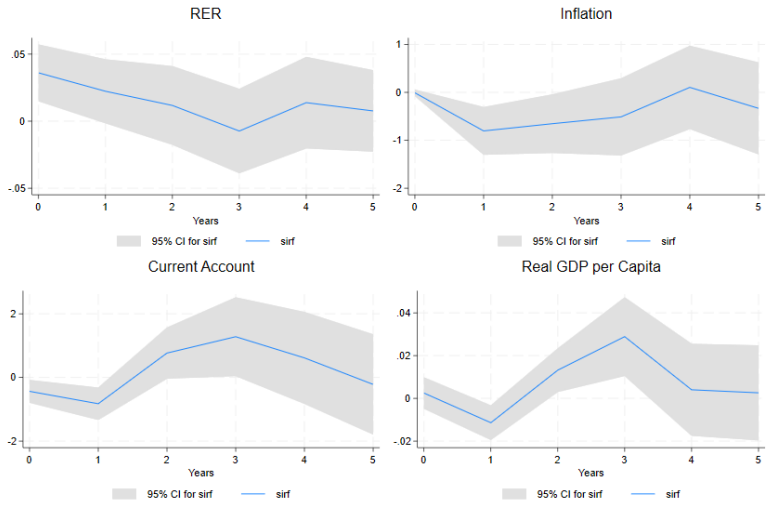


Figure 5.9: The Response of UAE to Food Price Shocks

5.3 Strategies Implemented by the Governments in the MENA Region to Mitigate Vulnerability to Food Price Fluctuations and Their Limitation

The government exercises its role in policy creation to diminish the effects on both the economy and population, even if the expected efficiency of such policies is not reached. This was portrayed as the variations in food prices, which left their mark on both parties, pushed the governments of the MENA region to establish food security policies. The first step towards a solution lay in ending the reliance of these regions on food imports and thus shifting to localized manufacturing of food products (Climate Diplomacy, 2023). The persistence to make this a reality has pushed the GCC countries to attain land from neighboring Africa, to overcome the limitations of resources(NCB Capital, 2010). While this action would be a step forward on a short scale, the implications viewed on both the environmental and social scale could be severe(Climate Diplomacy, 2023). Those immediately affected by such an action are the residents of the grounds that have been acquired, as they face the risk of relocation and breach of rights (Climate Diplomacy, 2023). The

success rate of such a strategy would necessitate establishing a cooperative dynamic between the purchasing and providing parties (Climate Diplomacy, 2023). The governments have also established a list of products made of household food necessities and worked on ensuring easy accessibility of the consumers to such products by price monitoring(Climate Diplomacy, 2023). This includes rice, bread, and flour in Egypt and Morocco, whereby the prices are determined by the authorities (Climate Diplomacy, 2023). By assigning reduced prices to specific groups, the governments exercise price control, which has been done in Lebanon and Morocco (Demeke et al., 2011). As a complementary, nutritional assistance is being provided in Tunisia, Egypt, and Morocco which are in the form of direct food distribution, grant of vouchers, or financial aid to cover food costs (Demeke et al., 2011). These actions present temporary advancements on the issue of food security and will eventually be the root cause behind the fall of the financial capacity of the nation, the government funding for local manufacturing is at risk of being diminished in the face of these subsidies (Brinkman & Hendrix, 2011). In addition, there are raised questions about the ethical conduct of the aid programs as there is a chance of unfair use of such aids for personal gain and thus not reaching the intended groups (Brinkman & Hendrix, 2011). Another issue is whether the solutions are durable, if the authorities could not maintain them, there would be raised tension between the population and authorities (Brinkman & Hendrix, 2011). In this light, some countries have taken another approach to reach food price stability by enforcing trade regulations (Climate Diplomacy, 2023). An example of this was caused by the Russian–Ukrainian war as Egypt halted all the export of food staples including wheat and bread to rectify the increased bread prices (Safty & Lewis, 2022). Once again, this solution when evaluated nationally, but the turmoil is now at an international scale. The country forcing such restrictions risks severing its trade relations with countries that rely on these exports thus building tension. This is alarming as the price of the food

is now regulated inside a country but globally is dependent on the demand which overall would bring the world back to square one to raised prices, especially if the countries are at the heart of the world trade. History stands as a witness to the surge in wheat prices by 40% and that of maize by 25% came to be right after the trade prohibitions were placed back in 2010-2011 (World Bank, 2019).

Chapter 6

Conclusion and Policy Recommendations

Recent events have placed food security at the top of policymakers' priority list, as the present-day augmentation of food prices is affecting the stability of the macroeconomy in the MENA region. In view of studying the fluctuations, this thesis has focused on both major and non-major oil exporters of the MENA region to observe the impact of the raise global food price on the macroeconomy through the use of an SVAR model. The data used in the model is that of 1990 up until 2023, and upon scrutiny allows the drawing of the conclusion that the reflection of the raising of prices on different macroeconomic parameters will be indeed varied. The study showed that the dependency on just food imports with constricted local production was reflected in the increase in inflation in countries that do not export oil like Jordan and Morocco. The outcome of such a rise was felt firsthand by consumers who now find trouble covering their food expenses. The repercussions also reached the local currency in such countries as the trade balance has been perturbed. The simple reasoning is that the increase in imports would signify an increase in foreign currency flow to be able to pay off global trades, and as such the local currency value deteriorates in the face of the dominant need for external currencies. While

this describes perfectly the scenario of what happened in Jordan and Morocco, Morocco provided support to the overshooting theory as the strengthening of the local currency occurred rather simultaneously with the disruption of food security before establishing the decrease mentioned. It is also worth noting that the GDPpc portrayed no considerable variation. The studied trends in the data illustrate a positive correlation between the effect of food security threats in a country that is dependent on food imports and does not export oil. The overshooting theory rests valid in the case of the countries that do export oil, as once again the RER experiences appreciation before depreciating. A complement to this phenomenon was the coordinated increase and decrease of inflation. The study did yield outliers like the case of Libya whereby the RER responded positively, and the case of the UAE whereby the RER did follow the trend but there was a null correlation with inflation. While the behavior of the current account was that of expansion in most countries, the UAE once again deviated from this trend as it showed an opposing behavior, and in the case of Bahrain there was no significant behavior to assume its conformity to the trend. Several countries showed a nonconformity to the GDPpc indifference. Libya and Oman displayed primarily a GDPpc drop. In contrast, Saudi Arabia started with an escalation and then a rapid de-escalation. It is safe to say that the response to food shocks is not uniform across the countries of the MENA region. Moreover, the response in an individual country is also not uniform as a function of time which makes policy creation and implementation more complex and dependent on time. A global wrap-up could be made about the majority of countries, leaving aside the outliers, when it comes to the comparison of countries that export oil and those that do not. Both did not observe a trend in the GDPpc but did note the rise in inflation. The oil-exporting countries had the upper hand in constraining the spreading of the effects of the food shocks as the current account and the RER did not degenerate.

In coherence with policies to reverse the impact of food price increases, the government should put most of the weight on transforming into a self-sufficient country when it comes to food production by endorsing new technologies, especially in favor of achieving agricultural sustainability. Just like any other essential material in the global economy, the authorities should establish reserves that would help mitigate the effect of price increases. Thus, during spikes, these reserves would increase the supply available thus leading to a rebalance of prices. Another attempt at mitigation is the elimination of total dependency on one country to provide the food imports but rather have multiple countries that provide in equal percentages to avoid instability caused by shortcomings of a single source. An additional balance to consider is that between the trade flows in and out of the country whereby supporting exports could help outweigh the huge influence of imports and thus benefit the current account of the nation. The solutions given apply to all countries; however, remain insufficient without the accompanying customized policies that cater to each MENA economy. Further analysis can be done if a panel analysis were to be applied to this study, and a complementary empirical framework could reveal further correlations of the trends seen before. A broadening of the study scope to cover more MENA countries would ameliorate the study of trends and outliers, and also an expansion could be the consideration of political influences.

Appendix A

Descriptive Statistics

Country	**Variable**	**Obs**	**Mean**	**Std. Dev.**
Algeria	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	75.74	15.09
	INF	34	8.37	8.79
	CA	34	3.30	10.97
	GDPpc	34	153443.6	19424.54
Bahrain	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	.36	.03
	INF	34	1.51	1.75
	CA	34	1.60	7.40
	GDPpc	34	8320.58	342.25
Jordan	GFP	34	86.90	26.53
	RER	33	.76	.07
	INF	34	3.61	3.50
	CA	34	-6.11	6.33
	GDPpc	34	2850.04	358.03
Libya	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	.90	.56
	INF	34	5.46	8.80
	CA	34	8.30	17.84
	GDPpc	34	17161.71	4126.90

Table A.1: Descriptive Statistics of the Variables for Each Country

Country	**Variable**	**Obs**	**Mean**	**Std. Dev.**
Morocco	GFP	34	86.90	26.53
	RER	33	9.13	.90
	INF	34	2.58	2.21
	CA	34	-2.77	2.35
	GDPpc	34	24332.37	5896.50
Oman	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	.39	.036
	INF	34	1.83	2.96
	CA	34	.43	9.26
	GDPpc	34	7705.39	529.68
Qatar	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	4.19	.56
	INF	34	3.11	4.25
	CA	34	5.90	19.40
	GDPpc	34	232921.5	42255.42
Saudi Arabia	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	33	3.71	.33
	INF	34	1.59	2.18
	CA	34	5.84	12.48
	GDPpc	34	84248.05	4832.93
UAE	GOP	34	52.30	32.37
	GFP	34	86.90	26.53
	RER	32	4.15	.49
	INF	33	3.27	3.13
	CA	34	8.34	5.07
	GDPpc	34	190911.3	41129.35

Table A.2: Descriptive Statistics of the Variables for Each Country

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