Czech University of Life Sciences Prague

Faculty of Economics and Management

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Bachelor Thesis

Analysis of Food Security and Related Macroeconomic Indicators in Italy

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

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Thesis title

The Analysis of Food Security and Related Macroeconomic Indicators in Italy

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Objectives of thesis

The World faced multiple crises in the recent years: a global pandemic, a climate crisis, and a number of local military conflicts. All these adverse events have heightened the urgency with which food security issues are discussed.

The main aim of the present Bachelor thesis is to disclose the relationship between national food Security and selected macroeconomic indicators on the example of Italy.

To achieve this goal the following research questions will be raised, discussed and gradually answered:

1. How the very concept of Food security is defined?
2. What aspects does Food security include?
3. Which organizations/institutions deal with the issues of achieving and maintaining Food security (at a national and global level)?
4. Which indicators are used to measure different aspects of Food security?
5. What macroeconomic indicators can be referred to as core ones for characterizing any economy?

Methodology

Theoretical part of the Bachelor thesis will rest on the analysis and synthesis of relevant literature comprised of selected study books, scientific articles, legal documents and some electronic sources.

Having collected all the necessary information and data, the Methodology, mainly based on descriptive and comparative techniques plus estimation of a linear relationship between selected macroeconomic indicators and food security in Italy, will be applied to answer the main and partial research questions. The results of the conducted analysis along with their discussion will constitute the Practical part.

Based on theoretical findings and outcomes of the Practical part, the conclusion and recommendations will be framed.

The proposed extent of the thesis
40-60

Keywords
Food Security, Macroeconomic Indicators, Italy, Descriptive and Comparative analysis, Statistical inference

Recommended information sources

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Prague on 15. 03. 2023

Declaration

I declare that I have worked on my bachelor thesis titled " Analysis of Food Security and Related Macroeconomic Indicators in Italy" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15.03.2023   _____Opincheva Maryana_____

Acknowledgement

I would like to thank Mgr. Elena Kuzmenko, Ph.D. for her suggestions and advices from the start to the end of completing this thesis as well as my family and friends for the support and motivation throughout my studies.

Analysis of Food Security and Related Macroeconomic Indicators in Italy

Abstract

This bachelor thesis explores the relationship between food security and macroeconomic indicators in Italy. Using data from 2000 to 2020, the study analyzes trends in food availability, accessibility, utilization, and stability, as well as economic indicators such as GDP, inflation, and unemployment. The analysis reveals that Italy has a relatively high level of food security, with consistently high scores across all four dimensions. However, the study also identifies several challenges to food security, including rising food prices and income inequality. The thesis also examines the relationship between food security and macroeconomic indicators, finding that food security is positively associated with economic growth and employment levels, but negatively associated with inflation. The study concludes with policy recommendations to enhance food security in Italy, including increasing investment in agriculture, improving social safety nets, and promoting sustainable and equitable food systems.

Keywords: Food Security, Macroeconomic Indicators, Italy, Descriptive and Comparative analysis, Statistical inference.

Analýza potravinové bezpečnosti a souvisejících makroekonomických ukazatelů v Itálii

Abstrakt

Tato bakalářská práce zkoumá vztah mezi potravinovou bezpečností a makroekonomickými ukazateli v Itálii. S využitím dat z let 2000 až 2020 studie analyzuje trendy v dostupnosti potravin, přístupnosti, využití a stabilitě, stejně jako ekonomické ukazatele, jako je HDP, inflace a nezaměstnanost. Analýza odhaluje, že Itálie má relativně vysokou úroveň zabezpečení potravin a trvale vysoké skóre ve všech čtyřech dimenzích. Studie však také identifikuje několik problémů se zabezpečením potravin, včetně rostoucích cen potravin a příjmové nerovnosti. Práce také zkoumá vztah mezi potravinovou bezpečností a makroekonomickými ukazateli a zjišťuje, že potravinová bezpečnost je pozitivně spojena s ekonomickým růstem a úrovní zaměstnanosti, ale negativně s inflací. Studie končí politickými doporučeními ke zvýšení potravinové bezpečnosti v Itálii, včetně zvýšení investic do zemědělství, zlepšení sítí sociálního zabezpečení a podpory udržitelných a spravedlivých potravinových systémů.

Klíčová slova: Zabezpečení potravin, Makroekonomické ukazatele, Itálie, Deskriptivní a srovnávací analýza, Statistická inference.

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List of pictures, tables, graphs and abbreviations

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List of abbreviations

- FAO…Food and Agriculture Organization
- WTO…World Trade Organization
- WFP…World Food Program
- GDP…Gross Domestic Product
- UN …United Nations
- IFAD…Internationsl Fund for Agricultural Development
- ENEA…Italian National Agency for New Technologies, Energy and Sustainable Economic Development
- MiPAAF… The Ministry of Agricultural, Food and Forestry Policies
- CNR… The National Research Council

1. Introduction

When considering identifying elements of food security, it is possible to capture key aspects related to the Food security is becoming more and more important for societies all over the world in both developed countries and developing. Food security itself is a part of the state mechanism and it is directly related to the nutrition policy exercised by governments all over the world. Food security is an ambivalent question and concerns all European countries and the concept is also often highlighted in the eyes of public media space. Macroeconomic indicators, related to economic crisis, the impacts of migrants flows, the increasing concerns for food security issues are even strengthening the presence of food security related issues on the public social thesis: availability, access, utilisation and stability. Italian food security, as a part of European sector, is vulnerable because of macroeconomics indicator related to agricultural aspect, as dependent on third-party countries because of human staple. Work is dealing with the current macroeconomics factors affecting the food security in Italy, analysis of the whole food security in a country and the economic perspective and sufficiency.

In this regard, the main ways the main ways of measurement of food security are also taken into account in the work and global and multi-dimensional approaches are provided. The practical part describes in detail all aspects related to correlation analysis, trend function analysis, relevant data and quantitative analysis (Dilley, 2001). Nowadays, food security is an issue. According to FAO, more than 1 billion people- nearly one-seventh of the world's population – lacked food security in 2010. Moreover, situation unlikely will get better; in fact, world population is expected to rise by 2 billion by 2050, and with it demand for food will rise by an estimated 50 percent.

2. Objectives and Methodology

2.1.   Goals and Objectives

The World faced multiple crises in the recent years: a global pandemic, a climate crisis, and a number of local military conflicts. All these adverse events have heightened the urgency with which food security issues are discussed.

The main aim of the present Bachelor thesis is to disclose the relationship between national food Security and selected macroeconomic indicators on the example of Italy.

To achieve this goal the following research questions will be raised, discussed and gradually   answered:

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Theoretical part of the Bachelor thesis will rest on the analysis based on time period from 2000 to 2020 and synthesis of relevant literature comprised of selected study books, scientific   articles,   legal   documents   and   some   electronic   sources. Having collected all the necessary information and data, the Methodology, mainly based on descriptive and comparative techniques plus estimation of a linear relationship between selected macroeconomic indicators and food security in Italy, will be applied to answer the main and partial research questions.

The results of the conducted analysis along with their discussion will constitute the Practical part. Correlation analysis method is adopted. Based on theoretical findings and outcomes of the Practical part, the conclusion and recommendations will be framed.

$$r = \frac{\sum(X_i-\bar{X})(Y_i-\bar{Y})}{\sqrt{\sum(X_i-\bar{X})^2 \sum(Y_i-\bar{Y})^2}} \qquad (1)$$

The Pearson correlation coefficient (r) is a widely used statistic that measures the strength and direction of the linear relationship between two quantitative variables. Apart from estimating a correlation coefficient, the author also proceeds to the verification of coefficients at the significance level of 5% according to the following formula for t ratio:

$$t\ ratio = \frac{r_{xy}\sqrt{n-2}}{\sqrt{1-r^2}} \qquad (2)$$

Table 1, explanation of correlation

Pearson correlation coefficient (r)	Correlation type	Interpretation	Example
Between 0 and 1	Positive correlation	When one variable changes, the other variable changes in the **same direction**.	Baby length & weight: The longer the baby, the heavier their weight.
0	No correlation	There is **no relationship** between the variables	Car price & width of windshield wipers: The price of a car is not related to the width of its windshield wipers.
Between 0 and -1	Negative correlation	When one variable changes, the other variable changes in the **opposite direction**.	Elevation & air pressure: The higher the elevation, the lower the air pressure.

Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/.i

It is also referred to by different names such as Bivariate correlation, Pearson's r, and Pearson product-moment correlation coefficient (PPMCC). The coefficient describes the degree of correlation between two variables and summarizes the characteristics of a dataset.

**Table 2, meaning of correlation coefficient numbers**

Pearson correlation (r) value	Strength	Direction
Greater than .5	Strong	Positive
Between .3 and .5	Moderate	Positive
Between 0 and .3	Weak	Positive
0	None	None
Between 0 and -.3	Weak	Negative
Between -.3 and -.5	Moderate	Negative
Less than -.5	Strong	Negative

Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/.

It also indicates whether the observations are close to a line of best fit and the slope of the line. When choosing the Pearson correlation coefficient as a measure of correlation, certain conditions should be met, such as the variables being quantitative, normally distributed, having no outliers, and having a linear relationship. Checking the variables for these conditions can be done by creating histograms and scatterplots to ensure that the variables meet the necessary criteria for using the Pearson correlation coefficient.

When *r* is 1 0r -1, all the points fall exactly on the line of best fit:

Figure 1, depiction of correlation direction
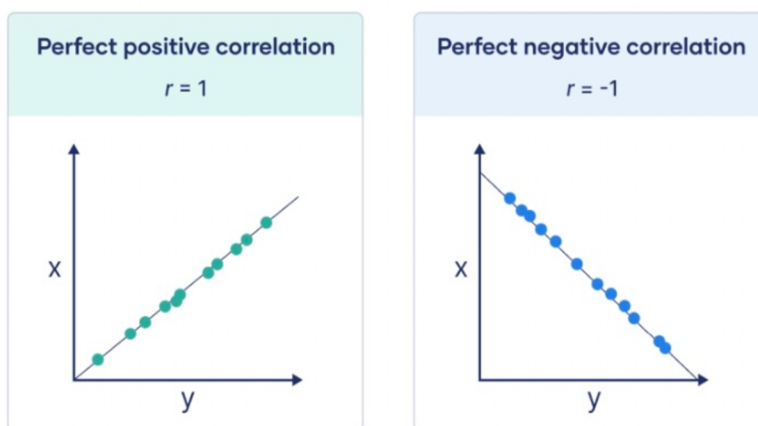
Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/.

When *r* is greater than .5 or less than -.5, the points are close to the line of best fit:

Figure 2, strong correlation depiction
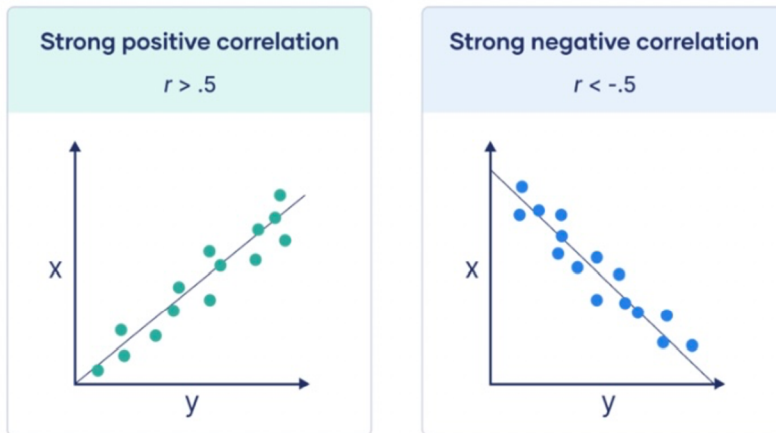
Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/

When *r* is between 0 and .3 or between 0 and -.3, the points are far from the line of best fit:

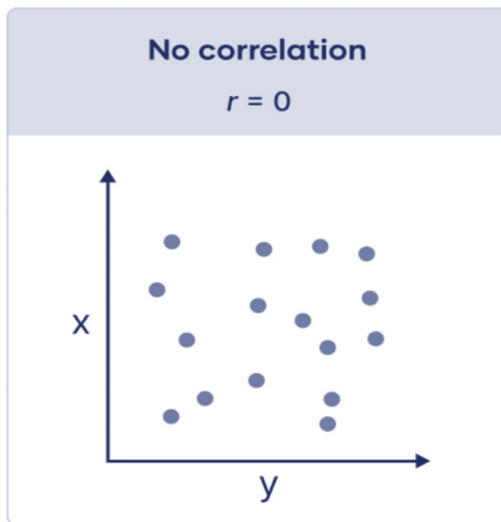**Figure 3, weak correlation depiction**
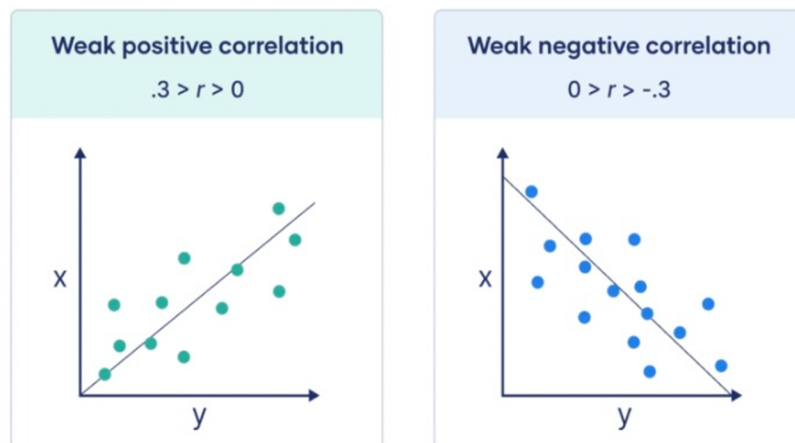
Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/

Figure 4, no correlaton depiction

Source: *Pearson Correlation Coefficient (r) | Guide & Examples*. Available at: https://www.scribbr.com/statistics/pearson-correlation-coefficient/

When r is 0, a line of best fit is not helpful in describing the relationships between the variables.

The correlation coefficient (r) tells us about the strength and direction of the linear relationship between two variables (x and y), but it is also needed to consider the sample size (n) to determine the reliability of the linear model. Hypothesis test is used to determine whether the correlation coefficient is significantly different from zero, which helps us decide whether the linear relationship in the sample data can be used to model the relationship in the population. If the test concludes that the correlation coefficient is significant, the regression line can be used to model the linear relationship between x and y in the population. However, if the correlation coefficient is not significant, the regression line cannot be used to model a linear relationship between x and y in the population. If the correlation coefficient is significant and the scatter plot shows a linear trend, the regression line can be used to predict the value of y for values of x within the observed domain. But, if the scatter plot does not show a linear trend or the predicted values fall outside the observed domain, the regression line should not be used for prediction (Statistics LibreTexts, 2015).

3. Literature Review

3.1.   Definition of Food Security

Food security was defined in the Proceedings of World Food Summit (1974) as availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices"

Food security is a wide term used to measure an individual's ability to access food that is nutritious and sufficient in quantity. Some definitions of food security specify that food must also meet an individual's food preferences and dietary needs for active and healthy lifestyles.

"An access by all people at all times to enough food for an active, healthy lifestyle, including, at a minimum: (a) the ready availability of nutritionally adequate and safe foods, and (b) an assured ability to acquire acceptable foods in socially acceptable ways (eg. without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)" (USDA,1990).

The term „food security" is usually applied at three levels of aggregation: national, regional, and household or individual.

Food security is a fundamental human right. The Food and Agriculture Organization of the United Nations (FAO) defines food security as when „all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". The main pillars affecting food security are availability (which depends on domestic supply and trade of food); accessibility (which is influenced by income, employment, and poverty patterns related to economic growth and development); stability (physical and economic access to adequate food all the time); and utilization. When all determinants concur population is considered food secure. A country with a lack of opportunity to provide food with essential nutrients, or lack of providing to those who need it, is food insecure. Food insecurity means that people not only need to be fed, but they also need the economic means to procure food over the long term for themselves and their families no matter what the agrarian, political, or economic situation is; it makes food insecurity wider definition than hunger because the term hunger basically

means that person needs to eat. The spectrum of food insecurity ranges from occasional malnourishment to severe famine (FAO, 2006).

The challenge of achieving global food security and eliminating hunger and malnutrition is among the most intractable problems humanity faces.

Food security refers to the availability and accessibility of a regular and diverse food supply that can meet the nutritional requirements of individuals, as well as access to sufficient quantities of food at all times to maintain a healthy and active lifestyle. The lack of food security affects 10 to 20 percent of the global population, leading to the problem of world hunger. Policymakers examine food security at three levels: global, national, and household. However, the global level of analysis is the most abstract, simplistic, and hypothetical. It compares the caloric content of the world's production of major staples with the estimated food energy needs of the global population, often using only rice and wheat as staples. This method fails to account for the fact that food is not distributed equally around the world. Thus, the global food-to-people ratio cannot accurately describe the hunger situation. However, it can indicate whether it is theoretically possible to feed everyone with rice and wheat given the current or projected status of food production and population size. In reality, hunger affects individuals rather than nations, and the problem of food insecurity is prevalent in millions of households, leading to too little food for specific individuals in those households.

At the national level, food analysis helps to identify populations in need of assistance and to determine policy actions required to prevent and eliminate hunger. This analysis determines whether a country has an adequate national food supply and infrastructure, both of which are necessary for household food security. A national food supply large enough to ensure household food security can be achieved through either domestic production or sufficient imports to meet the nutritional and market demands of the population. The second precondition for household food security is a reliable national infrastructure for safe food storage, processing, and distribution, including transportation and communication networks, marketing processes, and procedures for providing food assistance to vulnerable groups. The Food and Agriculture Organization of the United Nations identifies countries that do not meet the supply precondition for food security as food-deficit nations, with 65 countries fitting this description in 1985. While a lack of infrastructure is typical of countries in the early stages of modern economic development, it is not inevitable and may also affect

developed countries like the United States. In order to achieve food security, policymakers must understand which groups of people are most vulnerable to hunger, why this is the case, and what policy actions can be taken within each nation's means to prevent it. The data presented in this chapter provides insights into these questions (Kutzner,1991).

3.2.   Components of Food Security

Food, as a fundamental human right, is vital for population existence. Firstly, it was recognized in the 1948 Universal Declaration of Human Rights as part of the right to an adequate standard of living and is enshrined in the 1966 International Covenant on Economic, Social, and Cultural Rights. Moreover, it is also protected by regional treaties and national constitutions.

Regarding that, food security can be defined as a right to have physical, social, and economic access to sufficient, safe, nutritious food that meets preferences and dietary needs for an active and healthy life. Basically, there are 4 determinants affecting food security:

As an economic factor, food **availability** is determined by the presence of a sufficient amount of food that meets the desired quality standards, which can be obtained through domestic or international sources, including food aid. Information about food availability is generally obtained through FAO balance sheets at the national, regional, and sub-regional levels. Food availability is dependent on a range of factors, including production, distribution, and exchange, and refers to the physical availability of food within a specific geographic area; food availability refers to the amount of food that is produced, stored, and traded within a region.

Accessibility - access by individuals to adequate resources for acquiring appropriate foods for a nutritious diet. It can be affected by affordability, allocation, and preference. It could be physical access to food in the market or economic access to food at the household level. Food availability at the national and regional levels and the associated infrastructure such as roads and market outlets to buy food determine physical access to food. Economic access depends on the purchasing power of the household and the existing level of food prices which could depend on the physical access to food. This component of food security depends on factors such as income, expenditure, markets, and prices (Thomson and Metz, 1998).

Stability - food may be available and accessible to the people who are able to utilize it effectively. It can be defined as food availability over time. Furthermore, this component of food security includes the availability and affordability of food during periods of stress or shock, such as natural disasters, conflicts, or economic downturns. Instability, in perspective, can exacerbate poverty and inequality (Barrett, 2013).

Utilization - it includes adequate dietary intake and the ability to use nutrients in the body. Food utilization relates to how good consumed is translated into nutritional and health benefits to the individuals. In this approach, the consumption of foods both in quantity and in quality that is sufficient to meet energy and nutrient requirements is a basic measure of food utilization (International Food Policy Research Institute Washington DC, USA).

These components should be provided with the lack of the risk of loss of supply due to economic, political, and environmental factors. Food security all over the world depends on lots of factors: domestic production, food aid, and imports (Pinstrup-Andersen, 2009).

Figure 5, Food security pillars

Source: own processing based on Pinstrup-Andersen, 2009

3.3.   EU and Global Policies

In order to provide an accurate description of the idea of food security, it is absolutely necessary to begin by mentioning the fact that governments everywhere have a tendency to meddle in the economics of their respective countries through a variety of different mechanisms. These mechanisms are accomplished in large part via a variety of policies that are connected to an infinite number of fields, such as trade policies, nutrition policies, economic policies, military policies, and so on. Nevertheless, the specific goal that the government is working off of will determine the type of involvement. In spite of this, there is one thing that all of these policies have in common, and that is the fact that the government devotes a certain portion of the state budget to the respective field (Sachs, 1995).

Figure 6, European Union members
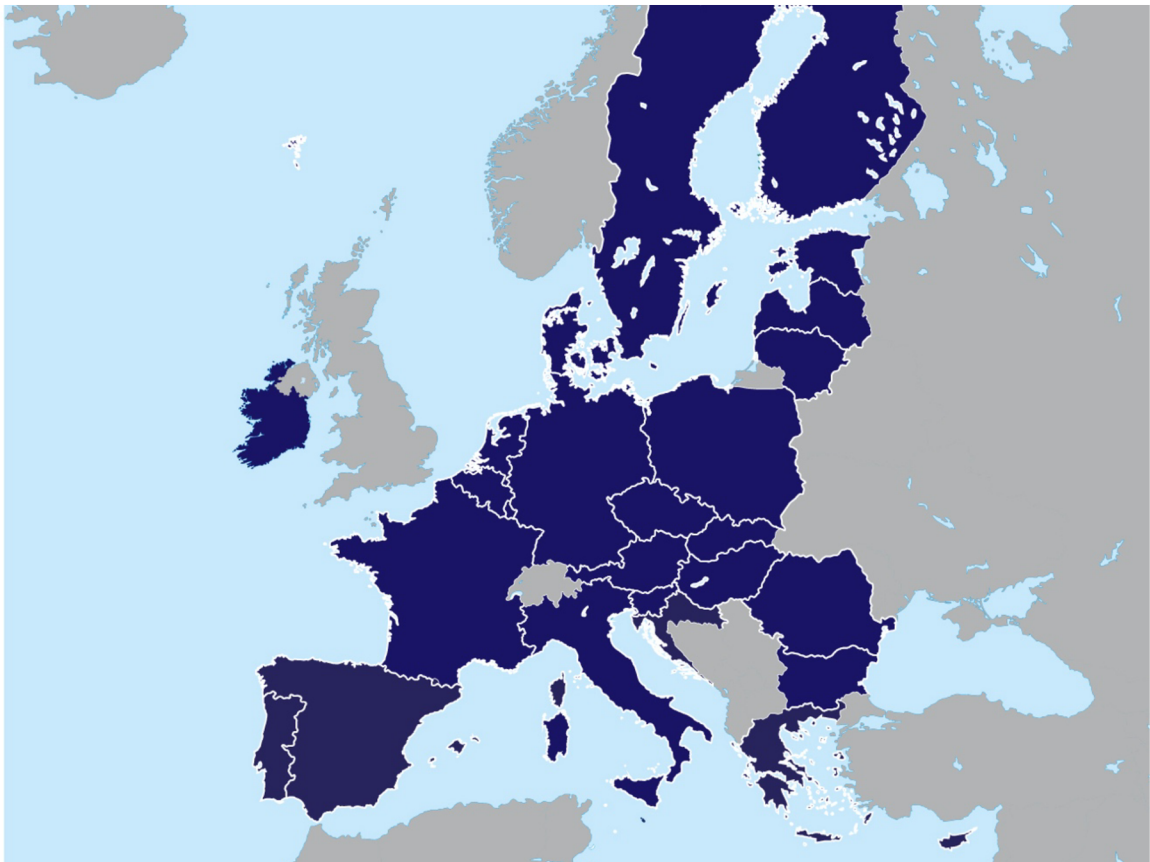
Source: *European Union Members*. Available at: Source: *European Union Members*.

Available at: https://fra.europa.eu/en/cooperation/eu-member-states

It is ultimately necessary to define the parameters of this study in light of the setting of the subsequent analysis. Food security is a concept that is directly related to the food policy of the government. Food policies are used by governments all over the globe to help keep their populations healthy and in excellent condition. This is done with the goal of reducing the burden on their national healthcare systems and preventing them from being overwhelmed. Food security may be summed up as the means by which the government makes certain that the people living in the nation have access to nutritious food in sufficient quantities.

EU policy areas include agricultural policy, bioenergy policy, food standards, trade policy, and development (food aid) policy. As a consequence, the impact of EU policies on global food security is huge. The harm that EU farm subsidies, food aid, and tariffs do to the food security of developing nations is currently a cause for concern. The impacts of EU food standards and bioenergy policies are currently a source of concern. The EU's trade, agricultural, food aid, and bioenergy policies—which contributed the most to market distortions globally—have undergone significant reform in recent years. The impact of EU policies on the food security of the poor varies depending on whether these people are consumers or producers, or whether countries are exporters or importers, as highlighted by recent changes in global food prices.

Global agricultural markets and food security are impacted by numerous EU policies. They include the EU's bioenergy policy, trade policy, development aid policy, and the EU's macroeconomic and immigration policies, which are implemented through a variety of mechanisms. EU policies have long been criticized by development organizations for their lack of coherence and conflicting effects on developing nations, including food security. For instance, the EU utilized export refunds (also known as subsidies) and variable high tariffs to stabilize its domestic agricultural markets. As a result, agricultural surplus production was dumped on global markets for decades. This contributed to the destabilization of global markets and resulted in lower market prices.

Local production in developing nations was harmed as a result of this. As a result, it was alleged that the CAP undermined EU development policy, which was specifically aimed at assisting in the development of local food supplies. The EU's trade policy (tariffs, restrictive import standards) and renewable energy policy (biofuels) was also accused of

being inconsistent with EU efforts to combat nutrition and food insecurity. In the past two decades, a lot has changed. Within the EU, the coherence of policies with its goals for development cooperation has received more attention. A relevant example is the policy on food aid, which has undergone significant changes over the past few decades.

The EU has given the poorest countries generous trade preferences that support development, like the Everything But Arms initiative, which was meant to help producers in developing countries. Since the beginning of the 1990s, a lot has changed in the CAP itself. In addition, everyone has been reminded by the "food crisis" of the late 2000s that food prices have a complicated effect on food security: in poor nations, the outcomes frequently are opposite for food producers and consumers. At the same time, new criticisms have been detected of the EU's food standards for creating non-tariff trade barriers and denying poor farmers access to markets, thereby jeopardizing their food security; that EU imports from developing nations have negative effects on the environment and local livelihoods: and that EU bioenergy policies harm food security for the poor when global price effects are taken into account (Bureau, 2018).

3.4. Factors Influencing Food Security

3.4.1. Agrarian

Adequate food availability is largely dependent on effective agricultural production, which is influenced by various factors that can either hinder or enhance its development. These factors include soil properties such as texture, slope, chemical composition, and nutrient content, as well as plant species and genetic variation. Climatic factors such as moisture supply, temperature, solar radiation, and carbon dioxide concentration also play a role. Additionally, socioeconomic factors such as the price of agricultural inputs and products, farm income, availability of credit, and infrastructure for disseminating new knowledge and practices can impact agricultural productivity and availability (Smith,1998).

The global population has been steadily increasing, and a majority of people now live in urban areas. Technological advancements have been rapid, and the economy has become more interconnected and globalized, but not all countries have experienced sustained growth. The world economy is also not growing as expected, and conflicts and instability have risen,

leading to greater population displacement. Climate change and its effects, such as extreme weather patterns, are impacting agricultural productivity, food production, and natural resources, resulting in challenges for food systems and rural livelihoods, including a decline in the number of farmers. As a result, there have been significant changes in the way food is produced, distributed, and consumed globally, leading to new challenges for food security, nutrition, and health.

Factors related to the agrarian sector can be determined as a one having huge impact on stability, access, and availability of nutritious food and food security in general. Food security is a constant challenge for the agrarian sector, especially in low-income and middle-income countries. Agriculture affects the environment through its direct impacts on land cover and ecosystems, and on global and regional cycles of carbon, nutrients, and water.

The agrarian sector is mainly affected by climate change. The impact of climate change on food security is huge; climate changes enhance risks to food security, especially for the most vulnerable countries and populations. Key risks induced by climate changes have direct consequences on food security: loss of rural livelihoods and income, loss of marine and coastal ecosystems, loss of terrestrial and inland water ecosystems, food insecurity, and breakdown of food systems (FAO, 2015).

The availability and productivity of land for agriculture play a crucial role in ensuring food security. The agricultural sector provides a significant portion of the world's food supply, and the productivity of this sector is often linked to a country's ability to feed its population. The ability to produce food is impacted by several factors, including the availability of fertile land, access to water, and favorable weather conditions. Additionally, agricultural policies and investments in research and technology can significantly impact food production. Thus, policymakers must consider the agrarian factor when developing policies and strategies to address food security challenges (Nelson, 2010).

3.4.2. Political

Food security and political stability are often linked in many countries. Food security can influence the political stability of countries, while political instability, such as wars or other forms of civil strife, can influence food security. Historically, significant malnutrition and famine have been caused by the disruption of food supplies through wars and civil strife. However, the concepts of food security and political stability are often mutually dependent

and reinforcing. Generally, starvation in the countryside does not result in political instability as those who experience the brunt of food shortages tend to be rural and have little political voice. However, urban riots can be sparked by food shortages or sudden price increases among food products, as seen in the case of Indonesia where riots erupted when the price of rice soared, making it prohibitively expensive for a large segment of the population. Food security is thus linked to fears of social instability and perhaps even political revolution as it becomes an issue of regime survival. Another security concern prominent in many Asian capitals is the prospect of increased economic migration as a result of food shortages. To the extent that food insecurity might spur greater migration, then it may be viewed by many governments in the region as a security concern. Finally, food can be linked to security when it is used as a "weapon" or even a tool for gaining political leverage of some sort. In some cases, governments will use food as a weapon, by restricting its access, for instance, against segments of its own population, such as political opposition groups (Smith,1998).

Political factors have a significant impact on food security, as policies and decisions made by governments can directly affect the availability, access, and affordability of food for individuals and households. In many cases, political instability and conflict can disrupt food production and distribution systems, resulting in food shortages and price increases. Moreover, government policies related to trade, subsidies, and agricultural investment can either enhance or hinder food security. Historically, political instability and food insecurity go hand-in-hand. It affects three primary pathways: food production, Exchange for food, and food transfers.

For a variety of political reasons, some countries may impose economic sanctions on certain countries. Countries are vulnerable when they believe that their food security may be threatened by such international economic penalties (or embargoes brought on by conflicts) and as result, they insist on pursuing „self-sufficiency" policies despite having no competitive advantage. The tendency of using food as a weapon also discusses how specific countries interests might manipulate food supplies. For instance, trade policies that favor certain industries or countries can lead to food shortages in some areas, while agricultural subsidies may create incentives for farmers to grow certain crops at the expense of others. Political conflicts may also arise due to a clash of thoughts among large urban populations, leading to neglect of food security. In slums and informal settlements, the risk of increasing

food insecurity is higher, where socio-economic development is lower compared to rural areas (Barrett, 2013).

3.4.3. Economic

Economic policies such as trade policies, investment policies, and macroeconomic policies play a significant role in ensuring food security. Trade policies such as tariffs and quotas can impact the availability and prices of food imports, while investment policies can affect the level of investment in agriculture, food production, and distribution systems.

Food insecurity has economic roots. Food insecurity prevalence within education, income, and race/ethnicity. Basically, it means that social groups struggling to reach out to suffcient life levels and conditions are at risk of having a lack of access to food that suits dietary norms. Poverty is one of the greatest causes of hunger around the world.

Historically, there has been considerable pressure on governments, both in developing countries and in decentralized economies, to limit their economic interventions to areas of market failure or where some form of collective action is required. This is more efficient than the market in organizing economic activity and delivering goods and services. It is widely recognized that centralized economies, and those in which the state plays a key role in the provision of goods and services, have suffered from distorted incentive structures and prices. At the same time, it has benefited and has had a negative impact on economic growth (Weis, 2020).

The prevalence of hunger has increased in many countries due to economic slowdowns or contractions. Between 2011 and 2017, an increase in hunger was observed in 65 out of 77 countries that experienced an economic slowdown or downturn. Such economic shocks can aggravate food crises and exacerbate acute food insecurity, necessitating urgent humanitarian aid. In 2018, 33 out of 53 countries that experienced food crises were affected by economic shocks, impacting more than 96 million people. Economic slowdowns and downturns can lead to a rise in unemployment, a decline in wages and incomes, and hinder access to food and essential social services, especially for the poor. Economic shocks can be triggered by a variety of factors, including international and national policies, conflict, and climate shocks. These factors can have cross-border effects, such as disruptions in production and trade flows, leading to migration. The uneven pace of global economic

recovery from slowdowns poses challenges for ending hunger and malnutrition in all its forms.

Economic growth alone does not guarantee improved food security and nutrition, even during periods of high commodity prices for countries dependent on commodity exports. A negative impact on the prevalence of undernourishment is observed in countries with high import or export dependence on primary commodities, despite the slight positive effect during the commodity price boom between 2003 and 2011. A larger study conducted across 202 countries during the period of 1995 to 2014 supports this finding, suggesting that high levels of commodity dependence have a negative impact on social and human development through several channels, including slow economic growth, macroeconomic and political instability, and distributional inequalities. Non-monetary indicators of development such as health and education are also negatively correlated with commodity dependence (FAO,2019).

Food insecurity and hunger not only raise ethical concerns but also have significant economic repercussions, adversely affecting the well-being, productivity, and potential of vulnerable populations. Rural regions, particularly poor farmers, agricultural laborers, and pastoralists, experience a disproportionate impact on food insecurity. Addressing food security issues is intrinsically linked with a broader sustainable development agenda that involves promoting inclusive economic growth, addressing population dynamics, ensuring decent employment, social protection, access to clean water, energy, health, sanitation, natural resource management, and ecosystem protection. Moreover, addressing gender and rural-urban inequalities is crucial to combating hunger and ensuring food security. Despite the existence of international legal provisions to ensure the right to adequate food, millions remain deprived of this right. Achieving the realization of the right to adequate food necessitates that every individual, alone or in community with others, has continual physical and economic access to adequate food or the means to acquire it. The legally binding nature of this right goes beyond mere moral obligations.

3.5.   Entities Tackling Food Insecurity

3.5.1. Organizations

Given the fact that my research is related to Italy, it would be wise to mention the food security institutions in Italy and also mention the international organizations to which Italy belongs. Currently, Italy is partnering with many international organizations, aimed at agricultural development, catalyzing country, and global progress. In fact, Italy is an important donor for the UN mission to make food security a reality worldwide. Internationally and domestically, Italy continues its mission to end global hunger by 2030.

The food and agricultural organization (FAO) is a specialized agency of the United States that leads international efforts to defeat hunger; Italy and FAO have special and strong relationships. As the host country of FAO's headquarters since 1951, Italy has been an integral part of the history and culture of FAO and an active contributor to the organization's work and Rome-based events. Due to the collaboration of mentioned parties and United Nations agencies based in Rome, Italy became a great supporter of joint projects for food security and rural development. Moreover, valuable support and advice to Italy on matters of food and agriculture and their relation to peace, security, and migration worldwide have been provided. FAO recognizes Italy's contribution to 39 projects that have been implemented in 85 countries with the aim of addressing poverty and improving food security by enhancing agricultural productivity (Pernet, 2019).

The World Health Organization (WHO) is a specialized agency of the **United Nations (UN)** that is responsible for the international public health agenda. The organization was established in 1948, and its headquarters are located in Geneva, Switzerland. WHO has the mandate to promote health, keep the world safe, and serve the vulnerable. It achieves this by providing technical assistance, setting global health standards, and working with countries to develop and implement health policies. The Venice Office is the WHO Regional Office for Europe's center of excellence that focuses on social and economic determinants of health, health equity, and investment for health in the context of the 2030 Agenda for Sustainable Development. Additionally, it coordinates the WHO European Regions for Health Network and the Small Countries Initiative. Its primary objective is to create and disseminate cutting-edge knowledge while providing assistance to the Member States of the WHO European Region by developing strong partnerships and networks with governments,

private and public sectors, academic institutions, think tanks, and a diverse range of civil society stakeholders. The Office was established in 2003 by means of a Memorandum of Agreement between the WHO Regional Office for Europe, the national Ministry of Health representing the Government of Italy, and the Veneto Region (DevelopmentAid, 2023).

IFAD (International Fund for Agricultural Development) is both an international financial institution and a specialized United Nations agency. IFAD and Italy are partnering to end hunger and poverty globally. Italian support has furthered the shared development goals of Italy and IFAD in many different ways; for example, Italy channeled voluntary contributions through IFAD to increase food security in Kenya, Liberia, and Mauritania. Strategic partnership in value chain development has helped to raise prices at the farm gate, build strong, inclusive farmer's organizations and reach out to women and the poorest social groups (McGuire, 2015). IFAD's work aims to catalyze country and global progress for rural people to overcome poverty and achieve food security through remunerative, sustainable, and resilient livelihoods.

World Food Programme (WFP) – "Saving lives and changing lives"; is the food assistance branch of the United States and, moreover, the world's largest humanitarian organization headquartered in Rome. WFP aimed to food assistance in emergencies and for people recovering from conflict, disasters, and the impacts of climate change (O'Connor, 2017). Main purposes of WFP: to use food aid to support economic and social development; to meet refugee and other emergency and protracted relief food needs; to promote world food security in accordance with the recommendations of the United Nations and FAO.

ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) is a public research organization established to promote and carry out research in the fields of energy, environment, and sustainable development. ENEA has an important role in Italy's food security, particularly in developing sustainable technologies and practices for agriculture. According to a report by ENEA, sustainable agriculture practices are essential for ensuring food security and reducing environmental impacts (ENEA, 2018).

The Ministry of Agricultural, Food and Forestry Policies (MiPAAF) is the government agency responsible for developing and implementing policies related to agriculture, food, and forestry in Italy. Ensuring food security within a country is a critical responsibility carried out by the Ministry of Agriculture, Food, and Forestry, as it is

responsible for regulating and monitoring the production, processing, and distribution of food. Moreover, MiPAAF has programs in place to promote sustainable agriculture practices and support smallholder farmers, which can contribute to enhancing food security (MiPAAF, 2021).

The National Research Council (CNR) is the largest public research organization in Italy, conducting research in a wide range of fields, including food and agriculture. CNR has several institutes dedicated to food security research, such as the Institute of Sciences of Food Production, which conducts research on food processing and preservation technologies. Additionally, CNR has been involved in several international projects aimed at enhancing food security, mostly EU-funded projects.

Figure 7, organizations dealing with food security

Source: *Organizations dealing with food security*. Available at: https://www.devex.com/news/calls-for-greater-collaboration-to-tackle-food-security-86694

3.5.2. Norms and Agreements

International organizations and institutions dealing with food security issues mentioned before support a number of conventions and agreements and treaties that relate to food and

agriculture. The food and agricultural organization (FAO) work to assist Member Countries to develop and implement standards and guidelines, including the FAO/WHO - managed Codex Alimentarius which protects consumer health and promotes fair practices in food trade. Moreover, there is an extensive legislative database, built by FAO; it operates to give users quick access to national laws, regulations, and policies on food, agriculture, and the natural resource management. The International Fund for Agricultural Development (IFAD) has guidelines on economic and financial analysis, and basic concepts aimed to help country program managers and EFA analysts on their way of dialogue with governments, the performance of tasks and missions, projects, etc. Cooperation on food safety with EU and non-EU countries, through trade agreements, and in the WTO and international standard-setting bodies.

Economic and Social Council and the FAO Council provide a forum for intergovernmental consultation on national and international food aid programs and policies; review periodically general trends in food aid requirements and food aid availability, as well as the implementation of food aid policy recommendations; and formulate proposals for improved and more effective coordination of multilateral, bilateral, and non-governmental food aid policies. In accordance with the most recent scientific research, FAO supports Member Countries in the development, revision, and implementation of food-based dietary guidelines and food guides. FAO also conducts periodic evaluations on advancements made in the creation and application of dietary recommendations, monitoring changes in their general focus and orientation.

Worldwide, more than 100 nations have created food-based dietary recommendations that are customized to each nation's nutrition needs, food availability, culinary traditions, and eating patterns. A useful tool to assist in implementing the principles-based right to enough food is the Voluntary Guidelines to Assist the Progressive Realization of the Right to Food in the Context of National Food Security.

After two years of intergovernmental deliberations that included the appropriate involvement of civil society, they were approved by the Committee on World Food Security (CFS) during its 30th Session and adopted by the FAO Council in November 2004. They offer policy suggestions to States and other stakeholders on pertinent topics, such as access to natural resources, education, legislation, and markets, even though they are not in themselves legally obligatory.

World Food Programme coordinates and evolves short-term and longer-term food aid policies; "Upon approval by the Board or by the Executive Director on its behalf, of a request for a food aid program or project, or for technical assistance to help a government establish or improve its own food assistance program, an agreement shall be prepared by the Executive Director in consultation with the government concerned. All such agreements shall indicate the terms and conditions on which the proposed activities are to be carried out and the responsibilities of the government of the recipient country" (WFP, 2019).

3.6.   Macroeconomic Domain

Macroeconomics studies economics at a country or regional level. It is a process of collecting data on economic activities, such as prices, incomes, unemployment, and many other different variables over different periods of time from many sectors; using this data, economists can measure how a country is performing economically. Food security is a macroeconomic issue, which can be studied both at the regional and country levels. Macroeconomic indicators related to food security described below should be provided with national food security data.

More specifically, macroeconomics is concerned with factors including the total amount of an economy's output, the degree of resource utilization, the size of the national income, and the "general price level." The split of total production among industries, goods, and businesses as well as the distribution of resources among competing uses are the subjects of microeconomics, on the other hand. It involves issues with income distribution. Its focus is on the relative costs of specific goods and services. A macroeconomic variable is a measurable (or scalable) magnitude that varies and whose variation we are interested in, either because of its direct importance or because of its impact on other variables, which is a simple definition (Ackley, 1962).

The main macroeconomic indicators for food security studies are:

GDP (Gross Domestic Product) per capita. It shows the population's able to enjoy a standard quality of life. High GDP, basically, means high incomes and indicates that the wages are high or low in a certain country. High living standards related to GDP mean that people will be having access to good quality healthy and nutritional food alongside adequate sanitation, healthcare, and enough housing.

GDP formula (expenditure approach):

$$GDP = C + I + G + NX \qquad (3)$$

There are different approaches to estimating GDP. The expenditures approach to GDP involves adding up all spending on final goods and services in an economy; regarding this approach, there are five categories of spending: consumption, investment, government spending, exports, and imports. The income approach includes adding up all of the income earned within the country in a certain year, involving wages, rents, interest, and profits. Value-added approach has a structure of summing up all of the value added at various stages of production. The GDP per capita is calculated by dividing the total GDP of a country by its population. This method allows for a more accurate comparison of economic output between countries, as it takes into account the size of the population.

Interest rate is a term that is used to refer to the cost of borrowing money, typically expressed as a percentage of the amount borrowed. Economists generally view interest rates as a fundamental factor in the functioning of financial markets and the broader economy. Interest rates have a direct impact on the cost of credit for households and businesses, as well as on the return on investments for lenders and investors. The level of interest rates is often influenced by a range of factors, including monetary policy decisions made by central banks, changes in inflation expectations, and shifts in global economic conditions. Understanding interest rates and their determinants are critical for economists and policymakers seeking to

analyze and forecast economic developments and to design effective policies to promote economic growth and stability (Mishkin, 2016).

Interest rate formula:

$$Interest = P \times R \times T \qquad (4)$$

Where P = principal amount (the beginning balance), R = interest rate (usually per year), T = a number of time periods.

Investments in the food industry may positively affect food security and the population' living standards; it gives economic opportunities, improves nutrition and food security, and provides environmental sustainability.

Inflation is a persistent increase in the general price level of goods and services in an economy over time. It is an economic concept that affects consumers, businesses, and governments. When inflation is high, it reduces the purchasing power of money, leading to a decrease in the standard of living for households and a decline in profitability for firms. Inflation can also erode the value of savings and investments and lead to higher interest rates, which can further reduce economic growth. There are several types of inflation, including demand-pull inflation, cost-push inflation, and hyperinflation, each caused by different factors such as increased demand or supply disruptions. Economists use various measures to track inflation, such as the Consumer Price Index (CPI) or the Producer Price Index (PPI), and implement policies to control it, such as monetary policy or fiscal policy (Mankiw, 1997).

Exchange rate- the worth of local currency against foreign currency. Exchange rates mainly affect imports and export.

In macroeconomics, the real exchange rate is represented by the following equation:

$$real\ exchange\ rate = \frac{Price\ of\ good\ A}{Price\ of\ good\ B} * Exchange\ rate \qquad (5)$$

Exchange rates indicate the value of one currency compared to another. Exchange rates are determined by two main factors: the value of the domestic currency and the value of the foreign currency. They can be quoted directly, where the price of a unit of foreign currency is given in terms of the domestic currency, or indirectly, where the price of the domestic currency is given in terms of the foreign currency. Cross rates are another way of quoting exchange rates, where the exchange rate between two currencies is determined using the exchange rates of both currencies against a third currency.

Exchange rates are influenced by several economic factors, such as interest rates, inflation rates, government debt, political stability, export and import activities, recession, and speculation. For example, higher interest rates in a domestic country can increase the demand for its currency, while higher inflation rates can decrease its demand. Political instability can discourage foreign investment, and a country's net exports or imports can affect its currency's value. Safe-haven currencies like the USD, euro, Japanese yen, and Swiss franc tend to be more stable during economic uncertainty, and the USD's status as the

global reserve currency gives it a higher baseline demand than other currencies (Corporate Finance Institute, 2023).

Unemployment Rate – a percentage of the unemployed workforce, demanding income for a good healthy life.

Older generations of economists took for granted that excess supplies and demands-respectively, unemployment and vacancies in particular labor markets- commonly occur and cause movements. In labor markets, unemployment and vacancies are consequences and indicators of failures of markets to clear at prevailing prices, or, to put it another way, prices are not flexible enough, instantaneously flexible enough, to equate demand and supply at every moment in time (Cross, 1995).

The unemployment rate is calculated as:

$$Unemployment = \frac{Employment}{Labor\ Force} \times 100 \tag{6}$$

The term "unemployment" is often subject to misconceptions, as it includes individuals who are waiting to return to a job after being discharged but excludes those who have ceased seeking employment in the past four weeks due to reasons such as pursuing higher education, retirement, disability, or personal issues. Individuals who desire employment but are not actively seeking it are also not considered unemployed. The Bureau of Labor Statistics (BLS) defines "employment" as individuals aged 16 and above who have worked in the past week, paid or unpaid, due to self-employment.

Unemployment can be classified into four types: demand-deficient, frictional, structural, and voluntary. Demand-deficient unemployment is most commonly observed during a recession when companies experience a decrease in demand for their products or services, resulting in layoffs. Frictional unemployment refers to workers in-between jobs, while structural unemployment arises when the skills of workers do not align with the skills required by available jobs or when workers are unable to reach job locations due to geographical barriers or visa restrictions. Voluntary unemployment occurs when workers choose to leave their jobs due to financial reasons.

Unemployment is caused by both demand-side and supply-side factors. Demand-side reductions can be caused by high-interest rates, global recessions, and financial crises, while frictional and structural employment is supply-side factors.

Unemployment that lasts longer than 27 weeks even if the individual has sought employment in the last four weeks is called long-term unemployment. Its effects are far worse than short-term unemployment for obvious reasons, and the following are noted as some of its effects (CFI Team, 2022).

Trade- indicator related to the export and import of a certain country, helping to boost a particular economy. This data is important to describe trade and tariffs in the agricultural sector (Ramasamy, 2015).

The law of comparative advantage explains why a group of people, regions, or nations can benefit from specialization and exchange. International trade results in mutual gains because it enables citizens of various countries to specialize in the production of those things they do best and import goods foreign producers are willing to supply at a lower cost than domestic producers (Sobel, 2021).

3.7.   World Hunger

Hunger is an uncomfortable or painful physical condition caused by insufficient consumption of dietary energy. It becomes chronic when the person does not consume a sufficient amount of calories on a regular basis to lead a normal, active, and healthy life. Hunger is a multifaceted problem with many root causes and far-reaching impacts. There is plenty of factors playing role in keeping nutritious food out of reach for millions of people around the world; gender discrimination, weak government, and health systems, etc.

The FAO statistics established: there are 2.3 billion people facing dangerous levels of food insecurity. That's roughly 29% of the global population (FAO, 2021). Hunger is a global issue: its impact spread both to wealthy nations, such as, for instance, the United States of America, and poor nations, such as those in Africa

The distribution, demand, and supply of food around the world are all in a complicated state right now. It involves political, economic, and environmental aspects. There is never enough food to satisfy everyone who is hungry. Instead, the issue is how to distribute food

to those who need it most. However, hunger is a problem that affects everyone, not just those who are experiencing it. For decades, people from all across the world have worked to discover answers to the hunger issue (Burby, 1995).

"There has probably never been a time in human history when hunger did not exist" (Burby, 1995)

Since food and money are shared out unequally, a small percentage of people have far more than they need, although the majority do not have enough. at the Rome World Food Summit in 1996, 158 nations signed a commitment to reduce global hunger by half by the year 2015. Although progress is slow, millions of people are saved from starvation every year because of the efforts of governments, businesses, humanitarian groups, and committed individuals around the world. World hunger might be decreased and possibly eradicated with more effort. Three-quarters of the 840 million hungry people in the globe reside in rural parts of developing nations, where small-scale local agriculture supplies the majority of the food. Little farmers are at the mercy of the elements. If the annual harvest is successful, there will be enough food for the family's consumption and possibly some more to sell at the market. For the crop the next year, the profit can be utilized to purchase fertilizer or seed. However, the annual harvest is frequently not a good one in many of the areas where this style of life is predominant. Drought is particularly common in many of the least developed nations. Extreme and drastically changing weather conditions are also common (an extended period with little or no rain) (Maddocks, 2005).

Famine has become a part of modern discourse, with hunger being brought into the realm of human sciences only recently. This incorporation of hunger into modern human sciences has led to a new way of thinking about it based on modern rationalities. Hunger has been removed from the realm of ethics and politics and placed under the control of experts in nutrition, food distribution, and development. This positioning of hunger as an appropriate subject for expert knowledge is a political position that claims political neutrality due to the way science is viewed as "truth" in modernity. The incorporation of famine into the human sciences defines it and leads to specific technical solutions. Some views see food as more than fuel for the human body and hunger as a social tragedy that cannot be solved by technology. Famine, as a scarcity of food, is part of modernity's struggle with scarce resources. Modernity sees progress as the solution to scarcity, leading from a past of deprivation to a future of abundance and civilization. Famine is central to modern politics,

which is focused on the regulation and control of populations, replacing politically qualified life with bare life, which can be killed but not sacrificed. Even political institutions have become technologized (Edkins, 2000).

Hunger can be caused by the following reasons:

Inequity. The world is unequal; hunger is fundamentally about power. Rights and opportunities are unequal within a world, and, moreover, access to nutritious food is not the same. Women, displaced people, and refugees, people with disabilities are at risk and more likely to face barriers to essential services, jobs, income, and resources. Inequality causes hunger.

Climate changes. This factor is mainly connected with agrarian sector economics; droughts, floods, fires, heatwaves, and other types of climate changes have a dramatic impact on the quantity and nutritious quality of food produced around the world and water supply. Although floods can be just as disastrous, droughts frequently ruin harvests. In Malawi, a country in southern Africa, a bountiful harvest in 1999 was followed by severe floods in 2000 that swept away corn fields and drowned livestock. In 2001, additional heavy rains caused planting delays for maize, and severe March frosts harmed maize that was ready to be harvested. The country experienced a severe drought in 2002. The burnt ground and the empty grain bins spoke for themselves as the April harvest drew near once more. According to some analysts, dependency on a single crop and extreme weather conditions are both major contributors to Malawi's food insecurity. There, by the end of the nineteenth century, maize was essentially unknown. Malawians were compelled to harvest and consume the 2003 crop when it was still green (unripe), and even to consume their prized seeds, due to the dismal harvests in 2001 and 2002. Others foraged went wild veggies and banana roots. Several Malawians turned to stealing from their neighbors and destroying one another's crops out of despair. Three-quarters of Malawian women and half of all Malawian men labor in agriculture, making them totally reliant on the land for survival. According to the World Food Programme (WFP) of the United Nations, one in three people in Malawi was considered undernourished in March 2003. Over 3.3 million Malawians would receive food as part of the WFP's commitment. During the 2003 planting and growing seasons, the Malawian government, the WFP, and a number of other non-governmental organizations (NGOs) supplied seed and fertilizer after discovering it was facing a humanitarian disaster. The 2003 crop was far better than the 2002 harvest, despite substantial flooding in certain

regions due to this action and good rainfall. Yet, the situation in Malawi remains incredibly severe despite all the efforts made to address its food emergency. Nevertheless, the example of Malawi is repeated not only across Southern Africa, but in many other countries, where the combination of changeable weather patterns and fragile ecosystems dramatically leads to consequences such as devastating food emergencies (Maddocks, 2005).

Conflicts. Political instability causes food insecurity and hunger. An estimated 60% of the world's hungry people live in countries experiencing active conflict. The lack of food has been the root cause of many conflicts throughout history and continues to be a major problem in the present. This is because food insecurity can lead to social unrest and even violence. Conflict often arises due to competition for control of the factors necessary for food production, such as land and water. The combination of growing populations increased pressure on land and water resources, variable climates, and volatile prices exacerbate these tensions and can lead to civil unrest or conflict. Unfortunately, countries under the greatest stress often lack the resources to respond effectively. To break the cycle of conflict and food insecurity, it is important to focus on rural areas that are particularly vulnerable due to their reliance on agriculture for both food and livelihood. While food aid can help alleviate immediate food shortages in times of conflict, it is not a long-term solution. Significant investment and partnerships in agriculture and rural development are needed to address the root causes of conflict and reduce food insecurity in the long term (World Bank, 2022).

Disasters and emergencies; communities already living in poverty are the most vulnerable to disasters and generally have the fewest resources to bounce back. The manner wars were waged started to change in the second part of the 20th century. Instead of using heavy artillery on the battlefields as in the Second World War, the new wars were fought with small guns in city streets and rural marketplaces. Soldiers killed civilians in addition to enemy combatants. The conflict resulted in two million child deaths, six million major injuries, and twelve million homelessness cases during the 1990s. Drought struck 31 nations in the early 1980s. Only five countries—Ethiopia, Angola, Mozambique, Chad, and Sudan— experienced famine. All five of those people were engaged in combat. In fact, six of the seven major famines recorded between 1980 and 2000 were caused by conflict. In 15 of the 44 countries with food crises in 2001, conflict was the main cause. War and hunger clearly go hand in hand. War leads to a general breakdown of law and order. Soldiers can steal food to feed themselves, or use so-called "scorched earth" (destroying crops to starve the enemy).

They can specifically target food production by bombing farmlands, grocery stores, and irrigation systems, slaughtering animals, and poisoning wells. Alternatively, they can attack agricultural infrastructure by destroying roads and interfering with the distribution of fuel, fertilizers, and seeds. Cities, ports, and airports may be closed. Food shortages often have tragic consequences. New conflicts around the world have resulted in about 15 million people becoming refugees and about 22 million internally displaced people, forcing them to move within their own countries. During the 1994 Rwandan War, fought between Tutsi and Hutus, one million Hutu crossed over to neighboring Zaire (now the Democratic Republic of the Congo) in five days.

Afterward, refugees have nothing more than they can carry. A number of international organizations, led by the United Nations High Commissioner for Refugees (UNHCR), provide emergency assistance, especially food, to refugees (food aid was either for refugees or displaced persons), often through refugee camps (Maddocks, 2005).

Poverty. This factor can be considered the hugest one leading to hunger because without sufficient and sustainable incomes people cannot afford access to nutritious food, clean water, and health care. Without treatment, hunger can lead to stunted growth, limited mental and emotional development, and even death.

"Poverty encompasses different dimensions of deprivation that relate to human capabilities including consumption and food security, health, education, rights, voice, security, dignity, and decent work."
- Organisation for Economic Co-operation and Development (OECD).

The root cause of hunger is poverty among certain segments of the population, rather than an overall food shortage. The distinguishing factor between the poor and others is their lack of purchasing power or effective demand to acquire enough food. This relationship between specific groups of people and food is influenced by their entitlement systems, which are governed by a society's laws, customs, and conventions that determine their ability to obtain food. These entitlements may be acquired through various means, including labor, trade, production, assets, transfer, or gift. Unfortunately, many people's entitlements are not sufficient to allow for adequate nutrition due to a variety of reasons, such as low productivity, inadequate investment, scarce employment opportunities, low wages, and fluctuations in market prices. The ownership of productive assets, such as land and livestock, as well as the ability to transform assets into food, also play a crucial role in determining whether

starvation occurs. The analysis of world hunger directs attention to income and wealth distribution, organizational mechanisms for supplementing income, institutional arrangements for property rights governing access to productive assets, and rationing systems. In some countries, poverty persists among certain groups despite growth in per capita production, leading to persistent hunger despite greater overall prosperity. The excerpt discusses the factors that contribute to widespread hunger in certain countries. These factors include discrimination, low wages, rigid social and class stratification, low productivity of labor, and the concentration of power among large landowners and employers. These issues can lead to a shortage of income for households, which can result in widespread hunger and poverty. The excerpt also notes that famine and starvation can occur even when there is no decline in the availability of food and that some households may experience a greater shortage of income than others (Griffin, 1987).

      Unsafe sanitation. Hunger is an issue until sanitation and safe conditions of food are reached. Dirty water and poor hygiene fuel malnutrition and cause diseases and illnesses, which, more likely, can lead to health threats and even deaths. According to estimates, insufficient access to safe water, sanitation, and hygiene (WASH) led to around 1.4 million deaths globally in 2013, with almost all occurring in low- and middle-income countries. WASH-related deaths are a significant contributor to diarrheal and intestinal infectious diseases, especially among children. The primary factors contributing to these deaths are unsafe water sources, unsafe sanitation, and poor hygiene, including the lack of handwashing with soap. Efforts have been made to improve access to clean water and sanitation, resulting in a decline in WASH-related deaths. Despite these advances, inadequate access to WASH remains a significant health issue, accounting for about 43 percent of under-five mortality in Sub-Saharan Africa and South and Southeast Asia. (Ala Alwan, 2017).

4. Practical Part

4.1.   Overview of Italian economy

The economy of Italy is the third-largest in the European Union and the eighth-largest in the world. Understanding the population and economy of a country is essential for assessing food security and related macroeconomic indicators. This chapter will provide an overview of the population of Italy and the main sectors of its economy. As of January 2022, the population of Italy was approximately 60.3 million, making it the 23rd most populous country in the world (Eurostat, 2022).

The population is relatively old, with a median age of 47.3 years. In Italy, the percentage of the population that is economically active is approximately 59.7%, according to data from 2021. This percentage has remained relatively stable in recent years, with only slight variations. The labor force participation rate is approximately 63.5%, which is slightly higher than the percentage of the economically active population. This difference is due to individuals who are not considered economically active, such as students, retirees, and those who are not seeking employment.

The labor force in Italy is divided into several sectors, including manufacturing, services, and agriculture. The service sector is the largest employer, accounting for approximately 64% of the labor force, followed by manufacturing (24%) and agriculture (12%). The distribution of the labor force across these sectors has remained relatively stable in recent years, although there has been a gradual shift towards the service sector.

The unemployment rate in Italy has been a persistent challenge, particularly for young people. In 2021, the unemployment rate was approximately 9.2%, which is relatively high compared to other European countries. The youth unemployment rate (for individuals aged 15-24) was even higher, at approximately 23.7%. The percentage of the economically active population in Italy is approximately 59.7%, with the majority of the labor force working in the service sector. The unemployment rate in Italy remains a persistent challenge, particularly for young people (World Bank, 2019).

Italy has a diversified economy, with significant contributions from manufacturing, services, and agriculture. The service sector is the largest, accounting for approximately 74% of GDP in 2020. The manufacturing sector is also significant, particularly in the production

of machinery, motor vehicles, and pharmaceuticals. Agriculture accounts for a smaller but still significant portion of GDP, with notable products including wine, olive oil, and pasta. There have been some signs of recovery in recent years, with GDP growth of 4.8% in 2021.

The manufacturing sector in Italy is highly specialized, with a focus on high-quality and luxury goods. Major products include machinery, textiles, motor vehicles, and pharmaceuticals. The sector has faced significant challenges in recent years, including competition from lower-cost producers in Asia and a lack of investment in research and development. Major sub-sectors include tourism, finance, and retail. Agriculture remains an important sector in Italy, particularly in rural areas. However, the sector faces challenges such as low productivity, high labor costs, and competition from lower-cost producers in other countries (EURES, 2021).

Italy's economy has been disproportionately impacted by the Covid-19 pandemic, with a greater reduction in the gross domestic product compared to other European Union countries. The country was one of the first to impose lockdown measures, resulting in a higher death toll from the virus. Italy faced economic, social, and environmental challenges prior to the pandemic, including slower productivity growth and a high rate of poverty. These issues were particularly acute for women and young people, with the latter group having the highest rate of disengagement from employment and education in the EU (GOVERNO, 2021).

The economic downturn of 2008-2009 had significant and widespread negative effects on the Italian production system. The decline in the gross domestic product (GDP) by 5% in real terms in 2009 was the steepest since 1971, which was the year when surveys began. This led to a decrease in the number of people employed by 1.6% on an annual basis, with the unemployment rate rising to 7.8%. This downturn in sales of domestically produced goods and services was particularly detrimental to small companies and industrialized regions. The Ministry for Economic Development attempted to mitigate the effects of the economic crisis by launching over 150 discussion tables with the social partners in 2009, with the aim of finding solutions to corporate and sectoral crises that affected more than 300,000 workers. However, the crisis still had a negative impact on large-sized companies, which affected subcontractors and suppliers. The number of hours authorized for the placement of workers on the Wages Guarantee Fund (Cassa Integrazione Guadagni, CIG)

reached an all-time high in 2009, indicating the difficulties of the Italian production system (Eurofound, 2010).

In 2022, Italy's economy grew by 3.9%, mainly driven by housing investment and domestic demand. However, the sharp increase in energy prices during the second half of the year led to a slowdown in private consumption and investment by firms, due to rising financing costs. Economic activity is expected to gradually pick up in 2023, with GDP projected to grow by 0.8% on average, as household consumption remains constrained by the loss of purchasing power from the expiration of tax rebates on transport fuels and other measures supporting incomes. In the second half of 2023, consumer spending is expected to resume growth, along with accelerating investments, partly due to public investment projects included in Italy's RRP. Net exports are expected to subtract from GDP growth in 2022 and 2023 but become mildly supportive in 2024 due to improved prospects for international trade and recovering tourist flows. Real GDP growth is expected to reach 1.0% in 2024, driven by moderately expanding domestic demand. Inflation picked up substantially in 2022 due to the rise in energy prices and is estimated to have peaked in Q4 with an average of 8.7% over the year. Inflation is projected to gradually decline in 2023 to 6.1%, aided by base effects. The slow process of collective contract renewal and the very partial indexation mechanism, as well as the expected stabilization of commodity prices, are expected to keep core inflation at 2.6% in 2024, following an increase in 2023 (an official EU website,2023).

Italy is a developed country with a strong agricultural sector, yet food insecurity remains a concern for some segments of the population. Malnutrition, including both undernutrition and overnutrition, can have negative impacts on health and well-being. In Italy, efforts to address malnutrition have focused on improving dietary habits, increasing physical activity, and promoting healthy lifestyles. The Italian government has implemented various policies and programs to improve food utilization and reduce malnutrition, including the National Plan for Food and Nutrition Security and the Mediterranean Diet promotion program. In addition, various organizations and initiatives, such as the Food and Agriculture Organization of the United Nations and Slow Food, have worked to promote healthy and sustainable food practices in Italy. Despite these efforts, challenges remain, including persistent poverty and inequality, which can limit access to nutritious food for some individuals and communities (FAO, Italy, 2023).

4.2.   Components of Italian Food Security

4.2.1. Availability

The crop production index measures the change in the volume of crop production over time and is an important indicator of agricultural productivity. The data from 2000 to 2020 for the crop production index in this region shows a fluctuating trend, with highs of 124.07 in 2004 and 118.74 in 2005, and lows of 93.88 in 2019. These fluctuations in crop production could have implications for food security, specifically the component of availability, as changes in crop production could lead to changes in food availability. For instance, a decrease in crop production may lead to a reduced food supply, leading to food shortages and higher food prices. In contrast, an increase in crop production may lead to surplus food production, resulting in lower food prices and increased food availability. Therefore, monitoring crop production trends can help policymakers and stakeholders understand the food security situation and take appropriate measures to ensure adequate food availability for the population.

It includes all crops except fodder crops. The Crop Production Index for Italy between 2000 and 2020 averaged 108.7, according to data from the World Bank. This index is an important indicator of agricultural productivity, which can impact economic growth and development in the agricultural sector.

One example of this is the Crop Production Index's decline in 2014: the reasons for this decline are likely multifaceted and could include a combination of unfavorable weather conditions, changes in land use or crop varieties, or economic and political factors such as changes in demand or government policies. For instance, Italy experienced a hot and dry summer in 2014, which may have affected crop yields. Additionally, changes in government policies could have impacted the incentives and resources available to farmers.

Table 3, food security variables

Year	Crop Production Index, points	Poverty rate. %	Number of individuals underweight, % of population	Inflation, %
	Availability	Access	Utilization	Stability
2000	116.25	3.50	-	2.54
2001	113.24	-	-	2.79
2002	107.89	-	-	2.47
2003	104.11	2.10	-	2.67
2004	124.07	1.70	-	2.21
2005	118.74	1.90	1,33	1.99
2006	112.64	1.60	1,36	2.09
2007	108.89	1.70	1,37	1.83
2008	111.51	1.80	1,47	3.35
2009	112.99	2.10	1,35	0.77
2010	108.31	2.70	1,40	1.53
2011	108.45	2.70	1,47	2.78
2012	100.57	3.10	1,47	3.04
2013	100.67	3.20	1,48	1.22
2014	95.40	3.10	1,52	0.24
2015	103.06	3.90	1,52	0.04
2016	101.54	3.40	1,56	-0.09
2017	96.94	3.30	1,56	1.23
2018	95.36	3.20	1,58	1.14
2019	93.88	-	1,51	0.61
2020	97.25	-	1,54	-0.14

Source: data from the World Bank, 2023

4.3.2 Access

According to the provided data, the poverty rate in Italy ranged from a low average of 1.7% in 2005 and 2006 to a high of 3.9% in 2015. The average poverty rate for the period from 2000 to 2020 was 2.7%, which is relatively low compared to many other countries. However, it is worth noting that poverty rates are influenced by many factors, and Italy is not immune to poverty-related issues.

The poverty rate trends in Italy have been relatively stable, with most years falling between 1.7% and 3.4%. In general, poverty rates were lower in the early 2000s and increased slightly in the mid-2000s before declining again in the late 2000s. Poverty rates then increased in the early 2010s before declining again in the mid-2010s. The poverty rate in Italy remained relatively stable from 2012 to 2020, hovering around 3%.

Poverty rates can be influenced by a variety of factors, including changes in the labor market, social safety net programs, and demographic trends. In the case of Italy, economic conditions and government policies have likely played a role in shaping poverty rates.

For example, the global financial crisis of 2008 had a significant impact on Italy's economy, leading to a recession that lasted until 2013. During this time, the unemployment rate increased, and many households faced economic hardship. This likely contributed to the slight increase in poverty rates seen in the mid-2000s. Similarly, the recovery from the crisis likely contributed to the decline in poverty rates in the late 2000s and early 2010s.

4.3.3 Stability

For the stability variable, the author selects the inflation rate for Italy since this indicator directly reflects all shocks happening with the demand and supply at the same time in addition to that, this is something that can directly prevent people from having a sufficient level of daily intake. Based on the variable, it is visible that Italy has a very fluctuating inflation rate but seemingly, the country manages to keep it on a very low level, which is a good sign.

Over the period of 2000-2020, Italy experienced fluctuating inflation rates. The highest inflation rate during this period was in 2008 with a rate of 3.35%, while the lowest was in 2020 with a rate of -0.14%. Inflation rates were generally moderate, with the average rate hovering around 2%. However, there were a few instances of low or negative inflation rates. These fluctuations in inflation can have an impact on food security stability, as unstable prices can affect economic and physical access to food. High inflation rates can result in rising food prices, making it more difficult for low-income households to afford food. On the other hand, low or negative inflation rates can lead to deflation, which can result in reduced incomes for food producers, potentially leading to food shortages. Therefore, maintaining stable inflation rates is important for ensuring food security stability.

4.3.4. Utilization

Provided data measures an important components of food security, known as "utilization". Examining data from 2000 to 2020, it can be seen that the number of underweight individuals in Italy is statistically low and stable.

The data shows the prevalence of underweight individuals in a particular population for the years 2000 to 2020. From 2000 to 2012, the prevalence of underweight individuals decreased gradually from 1.33 to 1.47, but then remained relatively stable from 2012 to 2020, fluctuating between 1.47 and 1.58. This data is closely related to the food security component called utilization, which refers to the way the body makes use of various nutrients in food. Insufficient intake of energy and nutrients can result in undernutrition, which can lead to individuals being underweight. Adequate food utilization requires good care and feeding practices, diverse diets, and proper distribution of food within households. Thus, a high prevalence of underweight individuals suggests that there may be challenges with food utilization and access to sufficient nutritious food

4.3. Italian macroeconomic indicators

The author chooses 2000–2020 for all variables. The time series dataset used to analyze all macroeconomic variables is provided below.

Net migration refers to the difference between the number of people entering and leaving a country. A positive net migration means more people are entering the country than leaving, while a negative net migration means more people are leaving than entering. This indicator can reflect economic, social, or political factors that affect people's decisions to move. GDP is a key measure of economic output and is used to track the growth and performance of a country's economy over time. Changes in GDP can reflect changes in production, consumption, investment, and government spending. Unemployment is important indicator of a country's economic health, as high levels of unemployment can lead to reduced consumer spending, lower economic growth, and social unrest. Exchange rate is a key factor in international trade and investment, as it affects the cost of goods and services in different countries.

Table 4, macroeconomic variables

Year	Net migration, people	GDP per capita, USD	Unemployment, %	Exchange rate, EUR to USD
2000	49166.00	20137.59	10.83	0.92
2001	47084.00	20500.95	9.60	0.90
2002	222527.00	22376.29	9.21	0.95
2003	478254.00	27526.32	8.87	1.13
2004	417189.00	31317.20	7.87	1.24
2005	250910.00	32055.09	7.73	1.24
2006	210398.00	33529.73	6.78	1.26
2007	485871.00	37870.75	6.08	1.37
2008	413349.00	40944.91	6.72	1.47
2009	280126.00	37226.76	7.75	1.39
2010	270043.00	36035.65	8.36	1.33
2011	195257.00	38649.64	8.36	1.39
2012	249033.00	35051.52	10.65	1.29
2013	154366.00	35560.08	12.15	1.33
2014	50102.00	35565.72	12.68	1.33
2015	34031.00	30242.39	11.90	1.11
2016	49591.00	30960.73	11.69	1.11
2017	70475.00	32406.72	11.21	1.13
2018	75863.00	34622.17	10.61	1.18
2019	21615.00	33673.75	9.95	1.12
2020	28021.00	31911.04	9.16	1.14

Source: own calculations based on The World Bank data, 2023

The Italian economy, as reflected by its macroeconomic indicators, has undergone significant changes over the past two decades.

This bachelor's thesis will evaluate nominal GDP per capita initially. Before analyzing the chosen variable's trajectory, it is clear that Italy's GDP per capita is chaotic and not single, as the data reveal several ups and downs in the indicator's value. However, the author proceeds to the trend analysis to consider possible causes for the indicator's behavior.

The current currency in Italy is the Euro, which has been in circulation since January 1, 2002. Prior to the adoption of the Euro, Italy used the Italian lira as its currency. The

transition to the Euro was a part of the European Union's initiative to promote economic and political integration among its member countries.

GDP is cyclical and economic cycles replace each other, but Italy's GDP is more subject to external shocks and still hasn't recovered from the 2008 financial crisis. Italy's GDP peaked before the crisis and hasn't recovered in 10 years. The coronavirus epidemic likely triggered the 2020 recession. The Eurozone crisis and its effects on countries with high debt-to-GDP ratios, such as Italy, may have caused another recession in 2013. The author says the trend is encouraging since the nation increased GDP per capita significantly compared to 2020, although the gain might have been bigger.

Net migration is a downward-sloping curve with an annual drop of 12,737 individuals, indicating that either immigrant decline, or Italians leave the country. However, the author thinks that both components may revert to the development pattern indicated by the author, which might swiftly lead to a negative net migration variable. GDP provides an excellent overview of economies, but it does not represent economic progress or inequities. When comparing Italian GDP growth with net migration, it's clear that individuals are leaving Italy or moving to other countries because they're apprehensive about the country's economic future.

Unemployment has been persistently high throughout the period, reaching a peak of 12.68% in 2014, and remaining above 9% in recent years. The exchange rate has fluctuated considerably, with a strong euro in the early 2000s, a weakening trend from 2008 to 2015, and a partial recovery in recent years. These macroeconomic indicators are interrelated and can have significant impacts on the overall performance of the Italian economy. High unemployment and a weak exchange rate, for instance, can negatively affect the country's trade balance and export competitiveness, while a growing GDP and a positive net migration can boost economic activity and increase the country's overall welfare.

4.4.   Correlation analysis

Correlation analysis is an important statistical technique used to explain relationship between two or more variables. The primary purpose of correlation analysis is to determine whether there is a relationship between variables and the strength of that relationship. A correlation coefficient, ranging from -1 to +1, is calculated to measure the strength of the relationship. A positive correlation indicates that the variables are positively related, while

a negative correlation indicates that the variables are negatively related. The correlation coefficient of 0 indicates that there is no relationship between variables. Correlation analysis is an essential tool for researchers to explore the relationship between variables and to test their hypotheses. It helps to identify variables that are related to each other; it can be used to make predictions as well.

In order to investigate the relationship between macroeconomic indicators and components of food security, several variables were chosen for correlation analysis. The data for this analysis was obtained from specific tables containing information on various economic and food security indicators. The macroeconomic indicators included GDP per capita, inflation rate, and net migration. The components of food security considered in this analysis were crop production index, number of individuals underweight, poverty rate, unemployment, and imports. By examining the correlation between these variables, it was possible to determine the extent to which macroeconomic conditions influence food security outcomes.The strength of a correlation between two variables can be described as weak, moderate, or strong. A weak correlation means that the relationship between the variables is not very strong, and there is a lot of variation in the data. A moderate correlation indicates a somewhat stronger relationship, with less variation in the data. A strong correlation means that there is a very strong relationship between the variables, and there is little variation in the data.

When the correlation coefficient between two variables is close to 1 or -1, it suggests a strong relationship between the two variables. This means that changes in one variable are likely to result in predictable changes in the other variable. Conversely, a correlation coefficient close to 0 suggests a weak relationship between the two variables, indicating that changes in one variable are not likely to have a significant effect on the other variable. (questionpro, 2021).

Table 5, correlation matrix

	CPI	Poverty rate	Underweight	Inflation
Net migration	0.66	-0.81	-0.70	0.66
GDP per capita	0.25	-0.52	-0.27	0.61
Unemployment	-0.83	0.92	0.77	-0.61
Exchange rate	0.43	-0.63	-0.50	0.59

Source: own calculations based on the World Bank Data, 2023

After finishing the calculation of the correlation matrix, it is wise to conduct a statistical verification of the situation. Given the critical t value of 2.22, the author indicates significant correlation coefficients with a green color and insignificant ones with a red one. The overview is in Table 6.

Table 6, t-ratios

	CPI	*Poverty rate*	*Underweight*	*Inflation*
Net migration	3.0063885	-4.8228148	-3.3780644	3.08110684
GDP per capita	0.8838932	-2.1302469	-0.954416	2.68165772
Unemployment	-5.2091413	8.28145503	4.21594863	-2.6814373
Exchange rate	1.6538141	-2.7890436	-2.0234455	2.54564465

Source: own calculations based on the World Bank Data, 2023

Consequently, it is visible that the majority of correlation coefficients are significant with just 5 being classified as insignificant, and, notably, the insignificant ones are in fact associated with the GDP per capita variable. The author proceeds to the depiction in the next figure.

Figure 8, correlation depiction
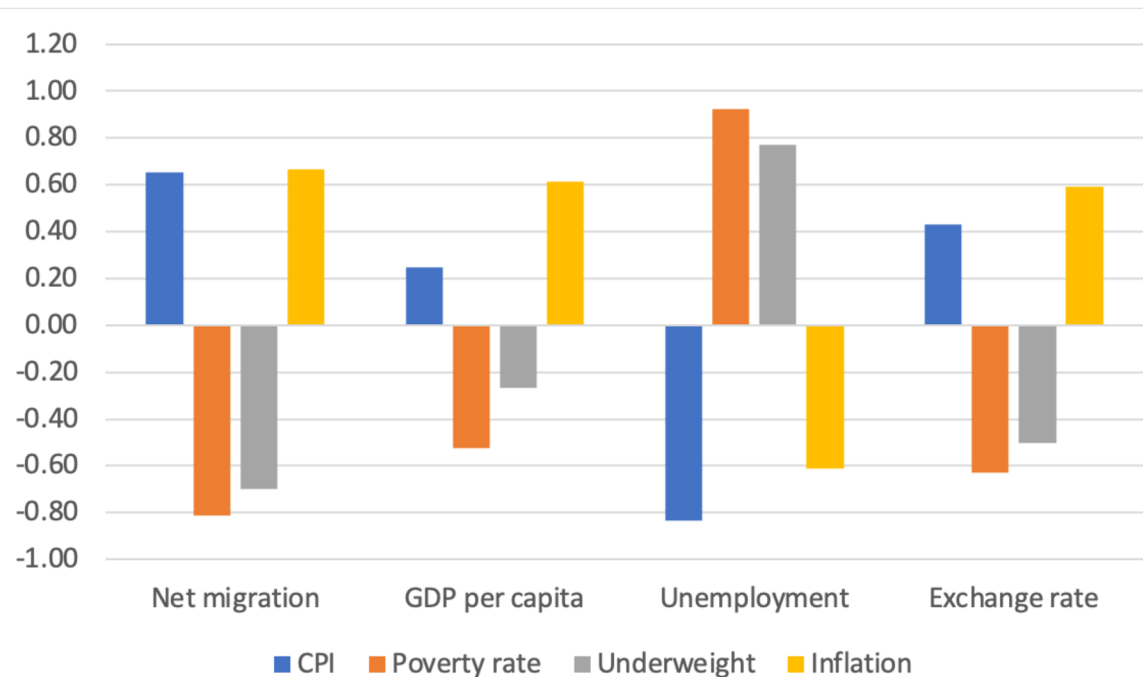
Source: own calculations based on the World Bank Data, 2023

Now, the author will gradually analyze each relationship. Whenever net migration increases, the crop production index increases as well, which is fully logical – more people require more food. On the contrary, whenever net migration increases, the poverty rate decreases, which is not fully logical. Also, whenever net migration increases, the prevalence of underweight decreases. Finally, whenever net migration increases, inflation increases as well – all coefficients are significant.

When GDP per capita increases, CPI also increases by a slight value, which might be a consequence of the fact that Italy is not an agrarian country – the coefficient is not significant. Whenever GDP per capita increases, it has a negative effect on the poverty rate, which is fully logical; yet, the coefficient is not significant. GDP per capita increases as inflation increases, which is also logical given that the GDP was taken in nominal terms and divided by the population – the only significant coefficient out of all pairs related to the GDP per capita domain.

Unemployment is the only variable significantly correlated with all 4 pillars and its effect on the CPI and inflation is negative, which is fully logical; while the effect on poverty and underweight is positive since the presence of unemployment directly influences access to food and sufficient nutrition.

When the exchange rate increases, it slightly increases CPI (not significant) and significantly affects inflation, which is logical due to the increase in the cost of inputs. Yet, when the exchange rate increases, it negatively influences poverty and the prevalence of number of individuals underweight, which is not fully logical.

5. Results and Discussion

Food security in Italy was analyzed in accordance with the goals of the practical part. First, it described how food security is defined, by which factors it is influenced, which components it includes, and how it is related to world hunger. It also presented organizations dealing with food security and willing to overcome the current state of hunger globally. Second, based on the data related to macroeconomic indicators provided (GDP per capita, inflation, net migration, unemployment, etc), relevant data was collected and correlation analysis based on this data was made. Based on the mentioned method, relationships between variables were explained. There were identified variables referred both to the macroeconomic domain and components of food security.

The main aim of the present Bachelor thesis is to disclose the relationship between national food security and selected macroeconomic indicators on the example of Italy. The analysis shows that net migration has a positive correlation with crop production, and a negative correlation with poverty and prevalence of underweight individuals, but a positive correlation with inflation. GDP per capita has a slight positive correlation with crop production and a negative correlation with poverty, while having a positive correlation with inflation. Unemployment has a negative correlation with CPI and inflation, but a positive correlation with poverty and underweight prevalence. Finally, the exchange rate has a slight positive correlation with CPI, but a negative correlation with poverty and underweight prevalence, while having a significant positive correlation with inflation.

The positive correlation between net migration and crop production reflects the basic economic principle that increased demand leads to increased supply. However, the negative correlation between net migration and poverty suggests that migration may have a positive impact on income and employment opportunities. Similarly, the negative correlation between unemployment and food security indicators highlights the importance of employment for access to food and adequate nutrition. The positive correlation between GDP per capita and food security indicators suggests that economic growth can have a positive impact on food security by increasing income and reducing poverty. the negative correlation between exchange rate and poverty could be influenced by factors such as trade policies, social safety nets, and access to credit.

1. How the very concept of Food security is defined?

Food security is a multidimensional concept that refers to the availability, accessibility, utilization, and stability of food at the individual, household, and national levels. The concept is defined as the condition in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996).

2. What aspects does Food security include?

The components of food security are interconnected and are influenced by various factors such as environmental, economic, social, and political conditions. Food availability, which is the supply side of food security, is determined by the level of food production, stock levels, and net trade. Economic and physical access to food, on the other hand, addresses the demand side of food security, and it is determined by the purchasing power of individuals, markets, prices, and distribution systems. Food utilization, which is the third component, refers to the way the body makes the most of various nutrients in the food, and it is influenced by care and feeding practices, food preparation, diversity of the diet, and intra-household distribution of food. The fourth component, stability, refers to the ability of individuals and households to have access to food on a periodic basis, despite adverse weather conditions, political instability, or economic factors such as unemployment and rising food prices.

3. Which organizations/institutions deal with the issues of achieving and maintaining Food security (at a national and global level)?

Achieving and maintaining food security is a major challenge for governments, international organizations, and civil society groups at both the national and global levels. Several institutions and organizations are involved in addressing the issues of food security, including the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), and the World Health Organization (WHO). These organizations work together to promote food security by providing technical assistance, financial support, and policy advice to governments and communities.

4. Which indicators are used to measure different aspects of Food security?

To measure different aspects of food security, various indicators are used. For food availability, indicators such as the production and supply of food commodities, stocks, and

net trade are used. For economic and physical access to food, indicators such as food prices, household income, and expenditure, and market access are used. For food utilization, indicators such as dietary diversity, nutrient intake, and anthropometric measurements are used. Finally, for stability, indicators such as the frequency and severity of food crises, social safety nets, and vulnerability assessments are used.

5. What macroeconomic indicators can be referred to as core ones for characterizing any economy?

At the macroeconomic level, there are several core indicators that can be used to characterize any economy, such as gross domestic product (GDP), inflation rate, unemployment rate, and balance of trade. GDP is a measure of the value of goods and services produced within a country's borders, and it is often used as a proxy for economic growth and development. The inflation rate, on the other hand, measures the rate of increase in the general price level of goods and services over a period of time. The unemployment rate is a measure of the proportion of the labor force that is unemployed but actively seeking employment. Finally, the balance of trade is a measure of the difference between a country's exports and imports of goods and services.

Food security is a complex and multidimensional concept that encompasses various aspects such as food availability, accessibility, utilization, and stability. Achieving and maintaining food security is a major challenge for governments, international organizations, and civil society groups, and several institutions and organizations are involved in addressing these issues. To measure different aspects of food security, various indicators are used, and at the macroeconomic level, core indicators such as GDP, inflation rate, unemployment rate, and balance of trade are used to characterize any economy.

6. Conclusion

The main aim of the present bachelor thesis is to define food security, its components and how it is measured, to investigate main factors affecting food security worldwide and in Italy and to identify links connecting selected macroeconomic indicators with accessibility, availability, utilization and stability of food security.

Food security is a vital economic issue and very multi-dimensional term, as it refers to the ability of individuals and communities to access sufficient, safe, and nutritious food. It is a multifaceted concept that includes availability, access, stability, and utilization of food. In order to measure the different components of food security, specific indicators were used; crop index production and imports data refers to availability aspect, poverty rate percentage refers to access, unemployment rate refers to stability aspect, and number of indioviduals underweight refers to utilization aspect.

Measuring Achieving and maintaining food security is a complex challenge that requires the involvement of various organizations and institutions at both national and global levels, including government agencies, non-governmental organizations, and international bodies such as the United Nations. Some of the notable institutions include the Food and Agriculture Organization (FAO), the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), and the United Nations Development Programme (UNDP). These organizations have played a vital role in addressing food insecurity globally by promoting policies and programs that enhance food production, distribution, and access. Indicators such as the prevalence of undernourishment, dietary diversity, and food price inflation are used to measure different aspects of food security. Macroeconomic indicators such as Gross Domestic Product (GDP), unemployment rate, and inflation rate do not provide a direct characterization of an economy's food security status. In fact, it is possible that food security status may influence macroeconomic indicators rather than the other way around. The underlying factors contributing to food security status may be rooted in other aspects of the economy; for instance - access to land and water resources, availability and affordability of food, trade policies and agreements, agricultural practices and technologies, climate and environmental factors, and social safety nets and welfare programs. Food security is a global issue that requires a multifaceted approach.

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