5.1 Introduction

The United Nations Agenda 2030 on Sustainable Development (Transforming our World: The 2030 Agenda for Sustainable Development) was signed at the 70th session of the General Assembly in September 2015. It is the successor to the Millennium Development Goals (MDGs) which had been in place between 2000 and 2015. The new agenda aims to build on the work of its predecessor, while building on the lessons and experience of recent years in implementing policies and measuring results. The two programs differ widely in the scope of the objectives and the approach adopted to their implementation. In particular, the Millennium Goals put at the center issues such as tackling poverty, combating AIDS, and reducing child mortality worldwide, in absolute terms. On the other hand, the agenda for Sustainable Development is much more ambitious. It is not only aimed at solving pre-existing problems but also at reshaping the economic and social system in a way that prevents problems and ensures the preservation of the natural environment and resources so that future generations are not deprived of opportunities and means of economic development and quality living. In other words, Sustainable Development seeks to meet the needs of modern (and future) generations without jeopardizing the ability of future generations to meet their own needs.
Obviously, the Covid-19 crisis has come to change the priorities of human society by putting health issues first. In a way, the current issues raised by Covid-19 for societies do not differ significantly from environmental issues. The similarity lies in the fact that both issues have an external origin in terms of the economic system and concern supply conditions in the economic system and above all the supply conditions of the labor factor since they first affect productivity and then the availability of the workforce.

However, the objectives of Sustainable Development as set out in Agenda 2030 are very broad and we do not intend here to address this in particular, even though we recognize the value of the framework it sets. In this book, we have chosen to pay attention to some of those who we consider to be particularly important for the Greek economy.

In this chapter we are therefore paying attention to matters concerning the environment, renewable energy sources, natural resources and formerly on population evolution, recognizing the role of epidemics/pandemics as black swans in the operation of the economic system. In this section, we are thus giving importance to environmental issues, renewable energy sources, natural resources and formerly on the population evolution.

In addition, some of the objectives also related to additional factors also found in the 2030 Agenda are developed in the following chapters, such as those relating to sustainable governance, inclusive growth, social enterprises, and dynamic growth.

Sustainable Development requires environmental sustainability. Promoting the use of renewable energy sources that can provide an opportunity to boost the economy significantly (notably by reducing the cost of producing or importing energy from other economies), the existence and rational use of natural resources—as national resources can give a competitive advantage—and sufficient population evolution.

This chapter presents the above factors for Greece, thereby highlighting opportunities and threats. Greece has made significant efforts to improve the state of the environment in recent decades and is increasingly using renewable energy sources.

Section 5.2 shows the extent to which the Greek economy has achieved the Sustainable Development Goals set by the United Nations. Section 5.3 presents the state of the environment for Greece, while the next section (Sect. 5.4) shows the use of renewable energy sources. Section 5.5 analyses the natural resources available in Greece, which either
already provide or are expected to provide significant comparative advantages in the future. Finally, Sect. 5.6 presents demographic developments in Greece, and more specifically the way in which the natural and migration balance has evolved over recent decades, since these are a critical area from which destabilizing pressures can emerge on the possibilities of preserving the development perspective in the Greek economy. Finally, Sect. 5.7 presents the global epidemics—of the twentieth and twenty-first century—as black swans in terms of their impact on the functioning of the economic system.

5.2 The Attainment of Sustainable Development Goals

The United Nations (UN) has set 17 action targets to achieve sustainable development globally by 2030. The action areas cover 5 major sections on human needs (poverty, hunger, health, education, gender equality), planet earth (water, sustainability, climate, seas, biodiversity), prosperity (energy, economy, infrastructure, inequality, cities), peace (security), and cooperation (means of implementing sustainable development policies). Specific quantified targets and indexes have been set to achieve these objectives.

The Organization for Economic Cooperation and Development (OECD) has calculated the distance between each country and achieving these objectives by 2030. On the basis of these figures, Greece has, over time and not only since 2015 when the 17 UN targets were set, covered 49% (compared to 58% for the OECD) of the distance from a minimum position covered by all OECD countries to the desired end-point of full achievement of the OECD objectives (common to all countries) by 2030. It should be noted that Greece, together with Mexico, Chile and Turkey, have the lowest rates of coverage of the sustainable development objectives.

On the basis of the analytical data, which also reflect the progress of Greece to date in sustainable development, it appears, for example, that the relative poverty rate (population with an income below 50% of median income) coincides with the OECD average, at the same time as Greece has low per capita income, low productivity and faces high unemployment. Greece does not have problems with hunger, obesity, or good health, but there are significant high smoking rates and not satisfactory levels of gender equality. There are also low levels of lifelong education and training, there is high proportion of young people who do not work,
study or train, and at the same time R&D expenditure is low. In addition, there are problems related to sewage, rubbish, recycling, and high carbon dioxide emissions, although a high level of biodiversity protection applies. In addition, Greek cities are characterized as densely populated but also by high levels of air pollution. Finally, the rates of criminality in the country are low, while there is no great trust in institutions.

Obviously, it should be noted that economic development cannot be sustainable unless it is balanced and accompanied by progress, for all citizens, in all areas that define humanity in its entirety, including caring for the planet we live in. It is difficult for a country to perform well in sustainable development if it does not perform well in the economy. It is thus also difficult to achieve the sustainable development goals by 2030, as the strong economic foundations are lacking. Surely, the economic situation is expected to improve in the coming years (see Chapter 12), thus correcting the distortions that exist between the sustainability and development objectives.

5.3 The Environment

The environmental situation of Greece varies according to the sector under consideration and its monitoring is a necessary step toward continuous improvement. Many indexes show an improvement in time, but not in all. This improvement is partly due to the inherent characteristics of the country (morphology, density and population distribution) but also to the policy measures implemented, many of which are EU policies.

The Environmental Performance Index (EPI) provided by the Yale University, the Columbia University and the World Economic Forum (Wendling et al., 2018) ranks 180 countries on 24 performance indexes across ten issue categories covering environmental health and ecosystem vitality. These metrics provide a gage at a national scale of how close countries are to establish environmental policy goals. The EPI offers a scorecard that highlights leaders and laggards in environmental performance, gives insight on best practices, and provides guidance for countries that aspire to be leaders in sustainability. The EPI index tracks two fundamental dimensions of sustainable development: (1) environmental health, which accounts for 40% of the total score of the EPI, which rises with economic growth and prosperity, and which concerns factors such as air quality, water sampling, and the heavy metals, and (2) ecosystem vitality, which accounts for 60% of the total score of the EPI, which comes
under strain from industrialization and restructuring as it consists of sub-indicators related to biodiversity and habitat, the forests, the fisheries, the climate and energy, the air distribution, the water resources, and the agriculture.

Figures 5.1, 5.2, and 5.3 show the relative image of the environmental performance of Greece compared to the other OECD economies for 2018, concerning the overall EPI index (Fig. 5.1), but also the environmental health (Fig. 5.2) and the ecosystem sustainability (Fig. 5.3).

Greece ranks 22nd among 180 countries in the 2018 Environmental Performance Index. For the two main sub-indexes, Greece ranks 21st in

![Fig. 5.1 Environmental Performance Index (2018) (Source Wendling et al. [2018] and authors’ creation)](image1)

![Fig. 5.2 Environmental health (2018) (Source Wendling et al. [2018] and authors’ creation)](image2)
The environmental health sub-index, and 47th in the ecosystem sustainability position. The biggest distinction is that it is ranked first in the global water and pollution sub-index, while the worst performance is achieved in the climate and energy sub-index (where it takes 133rd place) and in the air pollution sub-index (where the 105th position is taken).

In particular, the situation of the nature and biodiversity of Greece is quite satisfactory compared to the rest of Europe, with the country making significant progress in recent years. In recent years there has been a large reduction (35%) in Greece’s ecological footprint (with Greece occupying one of the last places in Europe) and a corresponding downward trend in the carbon footprint of agriculture, livestock, forestry, and fisheries. By comparison, terrestrial ecosystems seem to be in a better situation than marine ecosystems, which are under pressure mainly due to overfishing and illegal fishing practices. A positive development is the recent increase in marine protected areas that have been included in the NATURA 2000 network. The progress made in the development of forest maps is particularly positive, which will have made a decisive contribution toward monitoring and protecting Greek forests.

Air quality in Greece has generally improved in recent decades. The reduction in total national emissions of the main pollutants is significant mainly due to cleaner electricity generation (reduction of lignite plants in the overall energy mix, reduction of air emissions by secondary measures, energy savings, RES), and the use of vehicles with newer cleaner engines, etc.
In terms of water management, water quality in Greece is generally considered to be particularly good. In terms of ecological status, coastal water bodies are predominantly in very good to good condition, rivers in good to moderate condition, while lakes and transitional water bodies are predominantly in moderate and/or unknown state due to insufficient data and lack of an observation station. Finally, the vast majority of groundwater bodies are in good condition both in terms of quality (85%) and quantity (80%). In addition, swimming water quality was and remains excellent.

With regard to the climate change mitigation action in Greece, in 2016 being the year for which the latest data are available, the overall greenhouse gas emission reductions have continued both due to the gradual transition of the energy system to a low-emission system; and because of the reduced activity due to the economic crisis. In particular, emissions decreased in 2016 by 3.703 kt CO2 compared to 2015 (4th largest decrease in the EU after the UK, Spain, and Italy according to EEA data). This is the direction of the national energy and climate planning for 2030 and more broadly toward 2050. The 2030 greenhouse gas emission reduction target is expected to be combined with targets for energy savings and the development of renewable energy sources, within the framework of the European institutional framework.

Finally, the waste management sector remains the most problematic. Greece, due to the chronic problem of illegal landfills and the lack of adequate infrastructure for managing hazardous industrial waste, has been convicted with substantial fines. There are also a number of legal landfills, which operate with significant problems or do not even work due to local reactions. At the same time, municipal waste recycling rates remain stable at around 14%, one of the lowest rates in the EU, with many problems in the functioning of recycling structures.

### 5.4 The Renewable Energy Sources

The energy potential of the Greek economy is low, due to the fact that it is characterized as an energy importer, but it acts as a transit point for energy traffic, particularly from the Caspian to Europe, mainly through the following projects: (a) the Burgas–Alexandroupolis natural gas pipeline; (b) the Trans Adriatic Pipeline (TAP) which transports natural gas from the Caspian region to Europe and passes through Northern Greece, Albania, and the Adriatic Sea before ending on the coast of southern Italy;
(c) the South Stream for the transportation of Russian natural gas through the Black Sea to Bulgaria, Serbia, Hungary, Italy, and Austria; (d) the Interconnector Turkey–Greece–Italy (ITGI) interconnecting Turkey with Italy; and (e) the Eastern Mediterranean (EastMed) pipeline, which aims to transport natural gas directly from the Eastern Mediterranean deposits to the European gas system through Greece.

However, Greece is characterized by a significant potential to use renewable energy sources. The sun, the air, and the mountains of water within and surrounding the country are suitable for the use and production of hydroelectric, wind and solar energy (Fig. 5.4).

As a result of this turn to renewable energy sources, Greece is one of the nine countries in the world producing more than 20% of their electricity from solar and wind energy for 2018, according to the report on the Global Situation in the renewable sources sector of the REN21 network (GSR). On the basis of this report, solar energy has a critical role in Greece (8.2% of electricity generation), while Greece is classified among the best five solar thermal markets for the year 2018 and achieves steady growth every year, reaching an all-time high record in export volumes from the solar thermal industry.

Fig. 5.4 Renewable electricity generation by source (non-combustible), Greece 1990–2018 (in Gigawatt hours—GWh) (Source IEA [2019] and authors’ creation)
In fact, renewable energy sources are an appropriate area for attracting investment. Greece has a strong interest in investing in renewable energy both from Greek companies and from large foreign energy groups. This trend comes as a result of recent successful tenders by the Energy Regulatory Authority for the assignment of installed renewable energy capacity, based on competitive selling prices, and also due to new European targets for greater penetration of renewable energy sources. According to the 2019 Annual Report on the Greek Energy sector by the Institute of Energy for SE Europe (IENE, 2019), the total investment potential for wind farms by 2027 is €8.2 billion; for solar farms is €5.5 billion and for all other forms of renewable energy—including small hydroelectric, solar thermal, biomass and geothermal—is €1.4 billion. In other words, investments totaling more than €15 billion over the next 10 years or €1.5 billion a year.

5.5 The Natural Resources

Greece has always been a place rich in natural resources. In ancient Greece, the island of Sifnos and the mountains of Thrace were areas of significant silver and gold mining, while silver existed in Lavrio, Attica. These materials were used to create coins and jewelry, while their limited quantity in other countries has since made Greece an important trading partner for many other countries.

Today, Greece still has a wealth of natural resources that characterize it, making it one of the richest places in the wider region of Southeast Europe. Tsirambides and Filippidis (2012) in their assessment estimate the total value of the reserves of energy mineral resources of Greece at about €1.5 trillion; the total value of the indicated reserves of the industrial minerals and rocks is €60 billion, the total value of the indicated reserves of the metallic minerals is €72 billion, the total value of the indicated reserves of the energy mineral raw materials is €1362 billion (of which €268 billion belong to lignite which is exploited for decades to produce only electricity), the indicated oil reserves are 10 billion barrels with current value of €685 billion and the corresponding natural gas is 3.5 trillion m³ with a current value of €409 billion.

In more detail, the Greek economy relies heavily on the production of petroleum products, although the raw material is in its largest proportion an imported product. These products are the first ranked export product of the Greek economy, accounting for around 32% of total exports in
2018. Greece has a stock of about 10 million barrels of oil. There are also estimates by the US geological Society that there are still around 22 billion barrels of oil in the Ionian Sea, off western Greece, and another 4 billion barrels in the northern Aegean Sea.

There are also estimates that the largest gas reserves in Europe (Bruneton, Konophagos, & Foscolos, 2011) are located in Greece. Considering that Greece is currently importing gas from Russia (6000 km away), finding a deposit would be particularly crucial for the future of the Greek economy.

Also, although Greece does not have a large production of mineral metals, it is one of the world’s leading producers in the production of nickel and bauxite. Indeed, in these minerals Greece is the leading producer country at a European Union level. Moreover, almost all of the country’s biggest companies are major players in its mining industry. In addition, there is production in the Greek land of lignite, iron ore, lead, zinc, magnesite, marble and salt, and there are gold mines.

Furthermore, the geographical location and climate of Greece are favorable factors for the development of agriculture, in particular products such as grapes, olives, tobacco, and various types of cereals, such as maize, wheat and barley and products such as feta cheese, barley, sugar beets, tomatoes, wine, tobacco, potatoes, beef, and dairy products. Another important agricultural product coming from Greece is cotton, with Greece being the only country that produces it in the European Union. Obviously, the Greek economy’s agricultural production is not as effective as it could be because only one third of the country is suitable for cultivation (the other two-thirds consist of forests and scrubs where education is less sustainable). At the same time, the level of rainfall observed is not considered to be particularly high and there are artificial hindrances such as unsustainable farming methods. It should be noted that the entry of the Greek economy into the Eurozone has gained a great deal of benefit to the country’s agricultural industry, as it opened up the profitable European market for Greek agricultural products, while at the same time EU subsidies have helped in particular the development of the country’s agricultural sector. Forest land accounts for about one-fifth of Greek land, but forest products are not particularly important for the Greek economy.

At the same time, the abundance of tourist attractions in Greece combined with the prevailing climate make the country particularly dependent on its tourism industry. The islands are a main morphological
characteristic of the Greek region and a constituent part of the country’s culture and tradition. The Greek territory comprises 6000 islands and islands scattered in the Aegean and Ionian Seas, of which only 227 are inhabited. This is a unique phenomenon on the continent of Europe. The Greek archipelago has 7500 km of coastline—over the entire 16,000 km of the country—which is very diverse and is suitable not only for swimming, but also for diving, exploring, water skiing, sailing and windsurfing. Some of the oldest European civilizations (Cycladic, Minoan, etc.) have developed in the Greek islands, so they have unique archaeological sites, unique architectural heritage and charming local traditions of a long-time and multi-faced culture. Together with the excellent climate, the safety of the Greek seas and the short distances between ports and coasts, these elements have made the Greek islands famous and extremely popular to Greek and foreign visitors. At the same time, the continental backbone of the country is covered by a rare natural beauty, offering plenty of winter tourism options. Virgin forests, national parks, imposing mountains, impressive caves, deep-shaded gorges and lakes hosting rare habitats, and unique ecosystems are the gift of the Greek land.

5.6 The Population

The population of a society is growing with the birth and inflow of immigrants and is decreasing with the deaths and outflows of migrants. The difference between births and deaths is the natural balance and the difference between immigration flows and inflows is the migration balance. The sum of the two balances reflects the change in a population.

The Greek population increased significantly in the post-war period, a trend observed in all developed countries in the world. More specifically, from 8.3 million people in 1960 it reached around 10.7 million people in 2018, and it had reached 11.2 million people in 2011 (Eurostat, 2020a). The general characteristics which have led to the current size of the Greek population, and which are expected to determine significantly and its future size, can be summarized as follows: (a) characteristics relating to the fertility of women, relating to the number of births, (b) the average age and life expectancy associated with the number of deaths, and (c) the migration balance.

In Greece, fertility has been particularly restricted in recent decades and the overall birth population has also been reduced. This is mainly due to an improvement in the role of women in Greek society, with women’s
participation in education and in the labor market as a main expression, which appears to be linked negatively to fertility. Women born after the end of the nineteenth century have less and less children and do not ensure their reproduction, that is to say, each mother is not replaced, taking into account the current mortality conditions, by a daughter. The average age in acquiring the first child was in 2017 (generation of 1985) at 31 years and the corresponding average age for 1992 (generation of 1965) was 25.8 years (Eurostat, 2020b). At the same time, any postponement of births for later because of unfavorable socioeconomic conditions by generations who were at the age of 25–35 in the years of crisis (i.e., women born in the mid-1980s onward) will probably lead to an acceleration of the trend toward a reduction in the number of children, due to a reduction in both of available reproductive time and of the biological ability to procreate. These conditions are expected to result in an even smaller number of children expected to be brought to the world by women born after 1985. In particular, while in 1960 each mother gave birth to an average of 2.23 children, the figure for 2017 was 1.38 children (World Bank, 2020a). At the same time, the trend of increasing the proportion of women who never make children continues for generations born after 1965, as is the continuing decline in families of multiple children, as the births of the fourth and more children, who accounted for 13.4% of all births in 1960, and in 2017 reached only 3.6% (Eurostat, 2020b) is expected to stabilize at 2% in the mid-next decade.

Another characteristic of the Greek population is that it is aging progressively, as the average age of the population was 31.2 years in 1960 and reached 44.6 years in 2018 (Eurostat, 2020c). In addition, life expectancy at birth has increased significantly, from 69 years in 1960 to 78.8 years for men in 2017 and from 73 years to 83.9 years for women (Eurostat, 2020d). As a result of the aging population, the number of deaths in Greek society has increased significantly, since in 1960 annual deaths were less than 60,563 persons, in 2017 the respective figure was 124,501 (Eurostat, 2020e). Indeed, estimates of the rate of people over 65 years of age in the total population indicate that this percentage, from 21.8 in 2018 to reach 33.8% in 2050 (Eurostat, 2020f), a condition which is expected to place a heavy burden on the Greek insurance system.

As a result of these developments, the natural balance (births–deaths) has fallen significantly in Greek society since 1960 onward. Indeed, the natural balance has been negative since 2011 and has contributed to the decline in Greece’s total population. Figure 5.5 shows the natural balance and the individual development of births and deaths in the Greek society.
Fig. 5.5 The natural balance in Greek society (1960–2017) (individuals) (Source Eurostat data [2020b, 2020e] and authors’ calculations and creation)

After the Second World War, the Greek population was characterized as homogeneous, as in 1960 the non-holders of Greek nationality were 52,495 people; in 2015 the figure was 1,242,514 people (World Bank, 2020b). In fact, the majority of these foreigners comes from the former socialist countries and the less developed regions of the world. It is also estimated that a significant proportion of foreigners have entered Greece illegally and do not hold a residence permit. More specifically, in the first 30 years or so after the end of the Second World War, there was a large wave of Greek migration to the outside world to find job opportunities. From the late 70s to the late 80s, this trend was reversed, due to the return of a significant proportion of migrants from previous decades, making the migration balance positive during this period. Greece turned into a country of influx of migrants mainly during the period from the early 90s till the end of 2000s, when the number of migrants almost quadrupled from 1989 to 2010. Over the last decade, which concerns the years of the major crisis in the Greek economy, positive migration balances have been reversed as part of the foreign and economic migrants established in the past decades have returned to their country, while migrants
from less developed regions have continued to flow. At the same time, during this period, there is a large “brain drain,” with graduates mainly of tertiary education left to seek work and opportunities which were limited in Greece during the crisis.

Figure 5.6 shows the migration balance for the Greek economy combined with the course of the number of inflows and outflows of migrants to the Greek economy.

Result of the above developments: (a) aging of the population, (b) low fertility, (c) an increase in the number of migrants, and (d) the total population of Greece is declining over time. Indeed, the estimates for the future show a trend that is expected to continue in the coming years.

Figure 5.7 shows the evolution of the natural and migration balance in relation to the evolution of the total population of Greek society, from 1960 to 2017, while at the same time presenting estimates on the evolution of the population until 2050.

The large reduction in the natural balance has contributed significantly to the decline in the population since 2011, a trend which is expected to continue for all years up to and including 2050, giving rise to important

![Graph showing migration balance in Greek society (1991–2017)](Source Eurostat [2020g] and authors’ calculations and creation)
issues that must be resolved. The population of Greek society is declining considerably, while at the same time aging significantly, leading to a situation which is expected to result in major problems in the productive structure of the economy, as not only will there be insufficient numbers of active people to work, but at the same time the product produced will probably not be sufficient to meet the requirements of the aging population who will not be able to work.

### 5.7 Pandemics and Epidemics as Black Swans

Just as people have spread across the globe, the same has happened with infections. Pandemics (global epidemics) are mostly disease outbreaks through the transmission and spread of human infection. Historically, many major epidemic and pandemic outbreaks of diseases have been recorded since ancient times, causing crises linked to huge negative impacts on health, the economy, society and the safety of national and
global communities. They also caused considerable political and social upheaval (Qiu, Rutherford, Mao, & Chu, 2017).

Some of the key features of a pandemic are broad geographical expansion, transport, innovation, and severity of the disease, high rates of attack and surge, minimal public immunity, infectivity and transmissibility, which help us to better understand the concept, after looking at the similarities and differences of each case (Qiu et al., 2017). Its classic definition is defined as “an epidemic occurring worldwide, or in a very large area, crossing international boundaries and usually affecting a large number of people” (Last, 2001).

In recent history, in the twentieth century, three influenza pandemics emerged over several decades, the most serious of which was the so-called “Spanish flu” (caused by the A(H1N1) virus), which is estimated to have caused 20–50 million deaths in 1918–1919. Milder pandemics were subsequently emerging between 1957 and 1958 (the Asian flu caused by the A(H2N2) virus) and in 1968 (the “Hong Kong flu” caused by the A(H3N2) virus), which are estimated to have caused 1–4 million deaths each (WHO, 2020). The first twenty-first century influenza pandemic emerged in 2009 and was caused by the influenza A(H1N1) virus. It was the first pandemic for which many States had developed comprehensive public health action plans to reduce disease and deaths (WHO, 2020). The second is the ongoing pandemic (Covid-19), whose consequences are still to be assessed.

Covid-19, like previous pandemic events, are events that are outside the scope of normal expectations and are therefore exceedingly difficult to predict. Despite the warnings about humanity’s lack of preparedness to manage the outbreak of a new pandemic (Dhillon, Srikrishna, & Beier, 2017; GPMB, 2019; Walsh, 2017) and the fact that past disasters serve as a guide to what the future holds us, when it will occur, what extent it will have and how dangerous it can be to human health, it is impossible to assess. As the world entered the 2020s, the event that no one expected was the outbreak of a deadly pandemic (Nathan, 2020). It is characteristic that in the World Economic Forum’s latest report on the greatest risks facing the planet, in terms of the likelihood and magnitude of their effect, the threat of a disease is not perceived as high in either category (WEF, 2020). Indeed, in recent years there has been a reduction in resources earmarked for the prevention and response of epidemic and pandemic crises (Walsh, 2017).
Pandemics, apart from rare and unpredictable events, can have a huge impact on people’s health and the economy, but also on the functioning of societies, the time horizon of which cannot be known in advance, as it is determined by the specific properties of the virus (Bloom, 2020). In addition, comparing new pandemics with older forms, often does not equip us with the necessary knowledge to manage the new crisis, due to the different “behavior” of different viruses (Osterholm, 2020). Above all, a rapidly moving, extremely deadly pandemic can cost—even in modern times—the lives of tens of millions of people (Global Preparedness Monitoring Board, 2019). Secondly, according to estimation by the World Bank, the annual global cost of a medium-to-serious critical pandemic is estimated at around USD 570 billion, or 0.7% of the global GDP. A profoundly serious pandemic, such as the Spanish flu in 1918, could cost up to 5% of the global GDP or around $4 trillion (World Bank, 2016). A crisis on this scale creates widespread destruction, instability, and insecurity.

If we add to the above findings the people’s ex-post effort to rationalize the occurrence (e.g., underdeveloped health conditions) and the impact of pandemics (e.g., globalization), but also the belief that these could have been foreseen (e.g., scenario analysis), then the pandemics are “Black Swan” phenomena (Taleb, 2007). According to Taleb (2007), Black Swan events can be positive or negative and fulfill three characteristics: (1) They are out of range of normal expectations, (2) they have a huge impact, and (3) they lead to us creating explanations to show that the event was predictable.

Pandemics appear as inevitable obstacles to social welfare and economic progress. Three elements that have always strengthened the spread of lethal diseases, from the days of the plague to the present, have been scientific-medical ignorance, interconnected commercial networks and population concentration. Developed tourism has also been added to this in the modern world. The effects of Covid-19 will be very different from those of pathogens in the past, which have affected much poorer populations than today’s people and with less knowledge of things like viruses and bacteria. Today’s societies are cognitively improved, but their development and dependence on the globalized market and urbanization make them both richer and more vulnerable. The economies most likely to be affected by pandemic events are those with a higher degree of integration with the world market (Verikios, Sullivan, Stojanovski, Giesecke, & Woo, 2011). And as global economic integration continues, along with
the integration of developing and underdeveloped regions, the cost of the outbreak of pandemics will increase. It is characteristic that Chinese imports and the money spent by Chinese tourists (in terms of global GDP), in relation to the SARS epidemic period (2003), are, respectively, three and eight times more today (Tilton, 2020).

The emergence of health crises in the form of Black Swan pandemics in today’s hyperconnected world is more likely and more acute than ever (Taleb, 2007), as it is sufficient that only a few people, being a carrier, travel from one place to another. Covid-19, which in a short time has evolved from endemic to epidemic and then to pandemic, is and is being perceived as a Black Swan event (Halliburton, 2020; Nathan, 2020). It is even stronger than the Great Recession of 2008 (Lonski, 2020). This new pandemic is one of the biggest crises of confidence in the modern world, causing markets to be disturbed more rapidly than by other historical events, such as the Great Recession of 1929 or the crisis of 2008 (Wells, 2020).

Notes

1. Ecological footprint is a way to measure the effects of human activities on earth. It is the demand and consumption measure that measures meeting the needs of a society, as well as the waste and greenhouse gases that it produces daily on productive marine and land areas. It also assesses all the natural resources needed to support the physical needs of a population or individual through the technology, lifestyle and habits of each country.
2. These nine countries are Denmark, Uruguay, Ireland, Germany, Portugal, Spain, Greece, United Kingdom, and Honduras.
3. Since 2005 and every year, the Renewable Energy Policy Network has published the renewable Global Status Report. This is a collection of figures that measure the performance of many states over a large number of renewable energy technologies ranging from photovoltaic to geothermal energy and wave generators.
4. Petroleum oils derived from bituminous minerals (excluding crude oils) containing 70% or more of the oil.
5. The best variety of olives is cultivated in Greece for olive oil production. However, Greece accounts for only 4% of the global olive oil industry. Similarly, in Italy and Spain, small olive oil producers merged into global competitive clusters and replaced their machines with more efficient new technologies. As a result, these two countries now cover almost all the world’s olive oil supply, unlike Greek production, which, despite its many advantages, maintains the least profitable part of the supply chain.
6. Feta cheese is becoming increasingly popular throughout the world, while it is mandated by an E.U. ruling to come from Greece. However, Greece holds only 28% of the world market for feta cheese. Over the past decade, companies from the USA, France, Denmark, and other countries invested in their own food research and production equipment and managed through feta cheese variations to gain the largest market share.

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