

# Characterizing the Drivers of Global Food Trade Growth in 21st Century

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## Abstract

21st century is characterised by a steady growth in the global demand for basic foodstuffs. This paper reviews the drivers of this growth, through a descriptive analysis of the main literature on the subject, in order to synthesize the most relevant information generated by researchers and position the current state of the issue. The results of the analysis suggest that emerging economies have taken over in the increase of food imports; this is due to the potential of countries such as China, India, Brazil and Russia, which have become propellers of the global economy. From the developing countries, the increase in population and income are the driving forces behind the dynamism of world food demand, whose direct consequences are the increase in per capita consumption, the acceleration of the urbanization process in these regions and the increase in the consumption of products with greater added value. In developed economies, increases in per capita income do not translate into increases in the demand for food; rather, its role with respect to global demand is to promote it as they deepen the production of biofuels, the liberalization of the agricultural sector and the signing of trade agreements. Finally, the work concludes by warning about the uncertainties that surround the demand for food imports, including the crucial role played by climate change.

**Keywords:** demand, foodstuffs, international trade, population, income

## 1. Introduction

The eradication of hunger is one of the world's greatest challenges. The UN's Food & Agriculture Organisation (FAO) has predicted that the world population will rise to 9,100 million persons by 2050, 34% more than at present. By that time lifestyles will be different and most of the population will be concentrated in the developing countries. To guarantee future food supplies, production will have to rise by 60% over the reference period of 2005-07 (Alexandratos & Bruinsma, 2012). In this context the trade in foodstuffs and agricultural products will play a key role in channelling foodstuffs towards the growing demand in countries with food deficits.

Indeed, the trade in agricultural products has continued its upward trend in the 21st century, stimulated by the high demand from the emerging economies. According to the World Trade Organisation (WTO), the value of global food exports almost tripled between 2000 and 2012, while agricultural exports rose by around 60% in the same period (WTO, 2014). Since the demand for agricultural products is expected to remain stable in the next decades, this trend will probably continue and many regions will depend more on trade, either as net exporters or net importers (FAO & OECD, 2015). The future trend in the agricultural trade will be affected to a greater or lesser extent by the evolution of energy prices, which will determine the competition from biofuels for the use of land, by the impact of climate change, by reforms of agricultural policies and the possible adoption of protectionist policies, and by advances in bilateral and regional agreements.

In this context, the aim of the present work is to identify the principal driving forces behind the demand for basic foodstuffs in world trade and follow its evolution since 2000, a period of undoubted interest to economists, since it includes both boom years and a recession. This implies satisfying the following specific objectives:

- Show the growth in the global demand for basic foodstuffs in the different regions of the world, based on data provided by the FAOSTAT.
- Identify the principal driving forces behind the demand for food in world trade in the 21<sup>st</sup> century and other relevant factors that could influence the demand in the future.
- Document the evolution of these variables and consider their impact.

The aim of this work is to contribute to a better understanding of the driving forces and the consequences of the evolution of food imports, an essential step in contextualising the debate on the relationship between the role of trade and eradicating hunger. In a single document it combines the most important data and analyses of the fundamental driving forces in order to understand market movements and future perspectives, considering the most pertinent questions in the debate.

In the academic literature on the evolution of global imports in the 21st century most of the studies focus on analysing specific determining factors. Fewer studies use a global approach, as in the present work, *e.g.* Hertel (2015) discusses all the factors involved in producing sustainable food supplies and analyses the various demands in the competition for the world's resources.

The main line of research relates the dynamics, persistence and consequences of the dramatic rise in price of the world's agricultural raw materials that began in 2006. Oluwatoyin and Balcilar (2012) examined the impact of these price rises on global economic growth, using consumers and producers' price indexes as a proxy to assess the gains and losses they caused. Their findings reveal that the rise in prices to the producer have an obvious positive impact on growth, while a rise in prices to the consumer also has a positive, but insignificant, impact that at least does no harm. In the same field, Abbott and de Battisti (2011) analysed price rises in individual products, their different effects on the developed and developing countries, and the changes to agricultural trade policies they caused to importers and exporters.

Another field of study focused on changes on the supply and demand factors since 2005 to determine those most likely to cause price increases (Alexandratos, 2008; Westhoff, 2010; Headey & Fan, 2010). The studies by Dawe (2009), Wrigth (2011), Severova and Svoboda (2011), and Lacirignola et al. (2015) warned of the danger of rising prices and associated them with the evolution of world food stocks and their role in food safety. Zhang et al. (2009), Mallory et al. (2012), and Kristoufek et al. (2012) associated them to oil prices.

Other studies associate the continual rise in world prices with the increased demand for biofuels and consider the nutritional and ethical aspects involved (Pimentel et al., 2009; Oluwatoyin & Balcilar, 2012). Some studies include economic models or elasticity calculations specifically designed to analyse the repercussions of biofuels on the rise in food prices (De Gorter et al., 2013; Hochman et al., 2011; Bair et al., 2009). Others assess the economic consequences of biofuels from different world agricultural models (Hertel et al., 2010; Timilsina et al., 2012; Tokgoz et al., 2012). Yach (2008) assessed the impact of price rises on the nutrition of the populations in developing countries and criticised the failure of governments, donors, foundations and other organisations to invest in basic nutrition.

Another line of research can be found in the literature that throws light on how rapid economic growth, rising incomes, urbanisation and globalisation are leading to changes in diets around the world. This is especially noticeable in Asia, where there is a growing demand for meat, milk, fruit and vegetable products and a reduced demand for the traditional rice. The present consumption patterns in these countries show a clear convergence with the Western diet. Pingali (2007) warned that dietary diversity cannot be satisfied only by the traditional food supply chain but also needs the modernisation of the retail food sector and the vertical integration of the entire chain. As a result, Asian agriculture is moving away from its traditional preference for cereals and is becoming more diversified and commercialised, with beneficial implications for small rice producers.

In a recent study Fukase and Martin (2016) explored the evolution of the demand for food in China and found that it was aligned with global trends. They also analysed its agricultural productivity and sustainable handling of resources from the supply perspective in order to predict the future growth in its demand for food imports.

The literature also deals with the worries about other phenomena related to the rise in demand, *e.g.*, potential approaches for improving cultivations methods by means of biotechnology and genetic engineering (Martin, 2001; Long et al., 2015), the relevance of industrialized agriculture for food safety (McMichael & Schneider, 2011), the challenge of water sustainability (Brauman et al., 2013), or the impact of climate change and environmental regulations in future agricultural trade (Larson & Scatista, 2005; Davis et al., 2015).

## 2. Material and Method

Given the nature of the objectives set and in the case of a descriptive research, the methodological approach selected has been qualitative, through the development of a systematic analysis of the essential literature that has allowed to define and contextualize the subject under study. This bibliographical review has covered the search, collection, organization and critical evaluation of both qualitative and quantitative information, with a longitudinal research design.

The documentary sources used were the following:

- For the characterization of the demand for staple foods in world trade since 2000, the data has been extracted from FAOSTAT, which provides detailed information on the quantities imported by country for a wide range of products, making it possible to describe their evolution, current situation and future perspectives.
- To analyze the evolution of prices, the FAO Food Price Index has been used, which is a measure of the monthly variation of the international prices of a basket of food products. It consists of the average of the price indices of five groups of basic products, weighted with the average export quotas of each of the groups for 2002-2004 (Note 1). The FAO Food Price Index was introduced in 1996 as a public good to help monitor developments in the world markets for agricultural products. The only significant modification that it has suffered so far was in 2009, when its base period was updated to 2002-2004. During the large increases in prices recorded in 2008, the index gained importance as an indicator of potential food security problems for vulnerable developing countries. Since then, with the exception of 2009 and 2010, prices of agricultural products have remained at relatively high levels compared to prices before 2008.
- In the identification of the driving factors and their evolution, the conceptual analysis of other authors has been used, through the academic literature, as well as the exploration of the reports usually issued by prestigious international organizations such as FAO, Organization for Cooperation and Economic Development (OECD), World Bank, WTO and others also relevant; its careful examination is fundamental to illustrate the main factors that we consider significant in the behavior of demand. Special attention has been paid to studies that include prospective analyzes.

Based on the foregoing, a set of different variables have been documented and explained, detailing their evolution in developed and developing countries, relating them to the demand for basic foods in world markets and reflecting on the impact that they may generate in the future. Whenever possible, the year 2000 has been taken as a reference and compared with the last data available at the time of compilation (years 2013, 2014, 2015 or 2016). In those cases in which there are estimates for beyond 2020, these have been incorporated into the corresponding tables and graphs.

## 3. Results

### 3.1 Present Situation and Future Prospects

Some basic products were selected as examples from FAOSTAT (Figure 1) to show how world trade in agricultural products has expanded since 2000, driven by increased demand. The cause of this increase can be found especially in the emerging economies. Figure 2 shows the evolution of the net trade in agricultural products by region from 2000 to 2014, with the expected trend until 2024. It can be seen that the rapidly growing Asia was a net importer in these years, with China becoming a large-scale net importer. South America is the world's leading net exporter, with a significant increase in production even higher than the sustained increase in consumption. North America is the second largest net exporter, more as the result of the levelling off in consumption in the region than increased production. From being net importers, Western Europe and Central Asia are now becoming net exporters. In Sub-Saharan Africa net imports rose considerably due to a growing population. The Middle East and North Africa now make up a net importing region since their production cannot meet the growing demand. According to the latest FAO report (2016), more than 95% of the growth in consumption between now and 2024 will take place in the developing world.

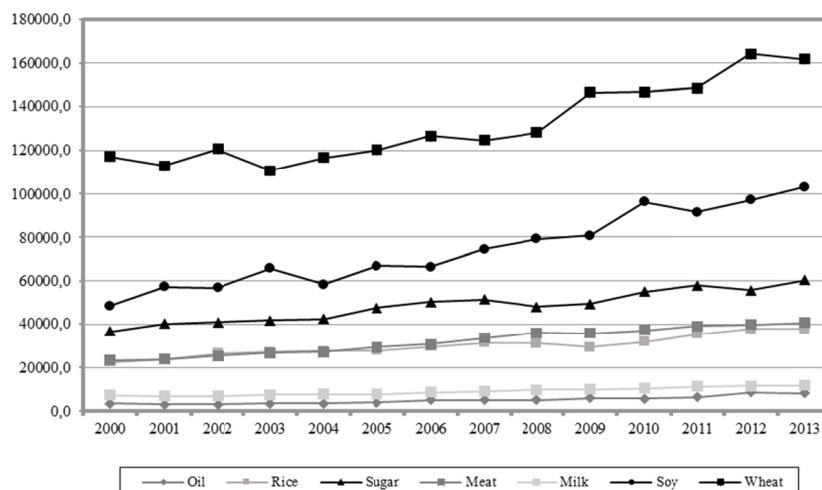


Figure 1. Evolution of world imports 2000-2013 (€m)

Source: Compiled by the authors from information provided by FAOSTAT.

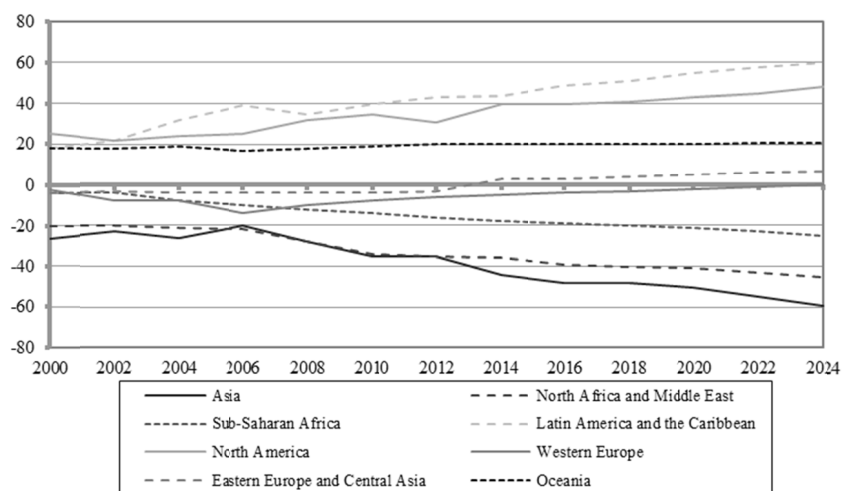


Figure 2. Evolution of net trade in agricultural products by region 2000-2024 (€1,000m)

Source: FAO & OECD (2015).

### 3.2 Evolution and Trends in World Prices

Figure 3 gives the annual Price Index and shows a steady rise from 2000, with peaks in 2008 and 2011. According to the index, in 2008 prices were 58% higher than in 2006. The rise in this interval is attributed to the high cost of oil, the strong demand for biofuels, the drop in food stocks and reduction in cereal production, added to the depreciation of the US dollar. The extent to which international price rises are transformed into price rises for producers and consumers in a given country depends on the rate of exchange with the US dollar, import duties, infrastructures, and market structures, which determine the degree of price transmission.

Since prices are usually expressed in US dollars, a drop in their value reduces the cost of products in countries with stronger currencies than the dollar, which more or less cushions price rises. However, in countries with currencies on a par or weaker than the dollar, a drop in its value increases the cost of acquiring foodstuffs (FAO, 2010) (Note 2). The high prices between 2010 and 2011 (80% higher than in 2006) are mainly attributed to unfavourable weather conditions, market behaviour after the Japanese catastrophe, and internal problems in North Africa and the Near East, rising oil prices, and the turbulence in financial markets and the world economy (FAO, 2011). Since then, unusually abundant cereal crops have increased stocks around the world and have forced prices down (even so, the 2016 value is 27% higher than in 2006) (WTO, 2014).

There is a close relationship between the prices of food and oil. Rises in oil prices are transmitted to food prices by the use of fertilizers and fuel for harvesting and transport, and the biofuel production capacity. Table 1 shows the evolution of the average annual price of a barrel of Brent oil. Even though prices can vary widely within a single year, the peak was reached in 2008 and 2011-2013. Since then oil prices have gone down without interruption and in mid 2014 had dropped by around 60%. Lower transport and material prices contribute to lower food prices and help to boost international trade.



Figure 3. The FAO's annual general food price index

Source: Compiled by the authors from information provided by the FAO (2016).

Table 1. Evolution of the price of Brent oil (\$ per barrel)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34.5	23.9	25.0	28.1	36.0	50.6	61.0	69.0	94.4	61.0	77.4	107.4	109.4	105.8	85.9	46.9

Source: National Statistics Institute.

The expected trend in food prices until 2020 is upward in almost all cases. The rise in basic food prices is transmitted to meat products through the production chain. High prices have a drastic effect on the developing countries since they reduce the purchasing power of the weakest. Consumer food prices are rising in most countries and contribute to the general price inflation. However, high prices are a positive sign for a sector that has suffered price reductions for decades and are an incentive for investment in improving productivity and increasing production to meet the growing demand. Although the projections are not clear, since they mainly depend on the premises used, those included in FAO and OECD (2011) suggest that the risk of high prices is greater than that of lower prices. This analysis also confirms that the reason for the volatility of international prices is mainly caused by fluctuations in production due to variations in the performance of the principal exporters. Volatility generates uncertainty and risk for producers, merchants, consumers and governments and can have negative effects on agriculture, food safety, and on the economy in general in both developed and developing countries. Researchers are unanimous that the principal factors of the present volatility are: climate change, stock levels, energy prices, exchange rates, growing demand, pressure on natural resources, trade restrictions and speculation.

### 3.3 Main Driving Forces Behind the Demand

In this study we identified the growth in population and incomes as the main driving forces behind production and the world food trade. Their relative importance will be reversed around 2050, when rising incomes will become the dominant force. A rise in *per capita* consumption, urbanisation and dietary changes and the emerging economies will be the consequences. The role of the developed countries will consist of generating increased demand due to the greater use of biofuels, less protectionism, and trade agreements. In this context climate change is a serious global threat.

### 3.3.1 Greater Participation of Emerging Economies in World Markets

#### (1) Rising Population

Table 2, which shows the expected trend until 2050, needs no explanation. 2014 world population increased by 81.7m persons; 95% of this growth was in the developing countries: 54% in Asia and 33% in Africa. However, by 2050 more than 80% of the increase will be in Africa and only 12% in Asia.

As can be seen in Table 2, the UN foresees a drop in population growth in all regions down to a global rate of 0.05% in 2050. In the next decades the growth rates in North America and Oceania will outstrip those of Asia, South America and the Caribbean, while the European population will start to fall after 2020. Growth between 2020 and 2050 will be concentrated in the US, Ethiopia, India, Indonesia, Nigeria, Pakistan, The Democratic Republic of the Congo, and the United Republic of Tanzania and Uganda. On the other hand, population reductions can be seen in: Germany, China, Russian Federation, Japan, Poland, Rumania, Serbia, Thailand, The Ukraine, Eastern Europe and east, south-east and western Asia and other zones in Europe, South America and the Caribbean.

In the expected evolution of the population the most significant role is that of the marked drop in the fertility rate (except in Central and Eastern Asia) and in the mortality rate of children under five years of age (which has fallen from world figures of 9,782,839 in 2000 to 6,311,970 in 2013) and the steady rise in life expectancy. The importance of the better education of women and children can be seen in these figures. The UN Report on Human Development (UNDP, 2014) and the World Bank's World Development Indicators reflect the evolution of these factors by region in the last 40 years and show that Africa is the slowest to change, which explains why (as can be seen in Table 2) it adapts to world trends at a slower rate than other regions and will thus provide more than 80% of the world's population growth in 2050.

A world population expanding to 9,500 million, mainly in the developing countries, guarantees an ever growing demand for food in the fight for survival.

Table 2. Population, average annual increase and annual growth rate

	Population (millions)		Average annual increase (millions)		Average annual growth rate (percentage)	
	2014	2050 (estimation)	2014	2050 (estimation)	2014	2050 (estimation)
All the world	7,244	9,551	81.7	48.5	1.15	0.51
More developed regions	1,256	1,303	3.7	0.1	0.3	0.01
Less developed regions	5,988	8,248	78.0	48.4	1.33	0.6
Least developed countries	919	1,811	20.3	26.7	2.28	1.54
Others	5,068	6,437	57.7	21.7	1.16	0.34
Africa	1,138	2,393	27.0	39.9	2.46	1.74
Asia	4,342	5,164	43.9	5.7	1.03	0.11
Europe	743	709	0.6	-1.6	0.08	-0.22
Latin America and the Caribbean	623	782	6.8	2.1	1.11	0.27
North America	358	446	2.9	2.0	0.83	0.45
Oceania	39	57	0.5	0.5	1.42	0.82

Source: Report on Human Development (UNDP, 2014).

Table 3. Life expectancy at birth and total fertility rate

	Life expectancy at birth, total (years)		Fertility rate, total (births per woman)	
	2000	2013	2000	2013
All the world	67.6	71.2	2.7	2.5
Sub-Saharan Africa	50.3	58.1	5.8	5
North America	76.9	79.1	2	1.8
Latin America and the Caribbean	71.5	74.7	2.6	2.1
Europe and Central Asia	73	76.8	1.6	1.7
South Asia	62.9	67.8	3.5	2.6
East Asia and the Pacific	71.4	74.7	1.8	1.8
Middle East and North Africa	69.7	72.7	3.2	2.9

Source: World Development Indicators (World Bank, 2016).

## (2) Rising Incomes

Table 4 shows the growth of GDP in the 21st century, which can be taken as an indication of the growth in available income. Two factors stand out above all: firstly, the effects of the Great Recession, which especially affected Europe and America, and secondly, of greater interest in the present study, the high rate of growth of the developing world, substantially higher than that of the developed regions. Asia is growing at a rate of between 5 and 9%, thanks to the rapid reactivation of China, India and countries like Korea, Taiwan, Hong Kong and Singapore, whose economies specialising in electronics are driven by external demand. Africa economies are growing by between 4.5 and 6% annually, with the assistance of internal investments, increased production, profits from oil sales and better debt control (IMF, 2013). Latin America and the Caribbean have grown by between 4.5 and 7% in at least half of the years in the study period, stimulated by the growth in Brazil, Chile, Mexico and Argentina, based on increased production, exports, the prices of basic products and foreign investments (IMF, 2013).

Table 4. Annual percentage growth of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
All the world	4.3	1.8	2.1	2.8	4.1	3.6	4.1	3.9	1.5	-2.1	4.1	2.8	2.3	2.4
Africa	3.1	3.2	3.1	4.8	6.4	5.9	5.7	6.1	4.9	2.8	4.8	1	5.3	4.1
North America	3.9	0.4	2.5	2.8	3.6	3.1	2.8	2.2	1	-3.1	2.4	1.8	2.7	1.9
Latin America and the Caribbean	3.1	0.4	-1.4	2.5	6.9	5.1	5.4	5.9	5.4	-0.2	6.5	4.5	2.5	3
Asia	2.5	3.1	5	6.9	7.8	7.5	8	8	5.9	4.3	8.8	6.9	5.1	5.3
Europe	3.3	1.5	1.1	1.2	2.4	1.8	2.9	2.7	0.8	-4.2	2.1	1.5	-0.3	0.2
Oceania	2	3.8	2.9	3.4	3	2.9	3	3.8	1.7	2.2	1.7	3.1	3.3	2.6

Source: Compiled by the authors from information provided by the World Bank (2015).

Table 5. *Per capita* GDP by region

	GDP per capita (US dollars at current prices)		
	2000	2013	2013/2000
All the world	5,460.1	10,664.4	1.95
Sub-Saharan Africa	551	1,784.1	3.24
North America	35,242.1	52,707.1	1.50
Latin America and the Caribbean	4,300.8	10,114.6	2.35
Europe and Central Asia	11,606.5	25,672.1	2.21
South Asia	454	1,391.4	3.06
East Asia and the Pacific	3,971.1	9,337.7	2.35
Middle East and North Africa	3,065.5	8,714.3	2.84

Source: World Development Indicators (World Bank, 2016).

The figures given in Table 4 show that the highest annual growth in GDP in the last decade was in the developing regions, where the emerging economies have taken over as the driving force in world growth, due especially to the potential of powers such as China, India, Brazil and Russia. Considering *per capita* incomes (GDP divided by the mid-year population), Table 5 shows the enormous gap between the developing and developed worlds. However, it is also true that incomes are growing faster in the former than the latter in the 21st century. According to Krugman and Obstfeld (2006), economies can be divided into four classes: low incomes (India, Pakistan and their neighbours and a great deal of Sub-Saharan Africa); medium-low (China, most countries in the Middle East, many countries in South America and the Caribbean, many countries that belonged to the former Soviet Bloc and most of the remaining countries in Africa); medium-high (other countries in South America, Saudi Arabia, Malaysia, South Africa, Poland, Hungary, Czech Republic and Slovakia); and high incomes (the rich economies of industrialised countries and a few fortunate developing countries such as Israel, Kuwait, Korea y Singapore).

A developing world with higher incomes from more dynamic economies is a guarantee of a steady rise in the demand for foodstuffs to satisfy the population's nutritional needs.

### (3) Principal Consequences

The principal consequence of the combination of bigger populations and higher incomes is higher *per capita* consumption in the developing world. Table 6 shows the rise in consumption *per capita* in basic foods at a global level, headed by sugar, milk and meat and, to a lesser extent, cereals. FAPRI (2008) considers that this will increase on average annually by 1.1%. According to the FAO, average food consumption *per capita* in the world has risen from 2,360 kcal/day in the mid sixties to 2,800 kcal/day at the present time.

Table 6. World *per capita* food consumption (Kg/year)

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Sugar	22.1	22.6	22.7	23	22.9	23.8	23.8	24.7	25
Cereals	152.2	152.7	152.6	152.7	152.8	153	153.3	152.5	153.1
Meat	39.5	40	40	42	41.7	42	42.1	42.8	42.8
Milk	93.8	95.1	96.2	103.7	101.7	102.3	103.1	107.7	108

Source: Compiled by the authors from FAO data.

The Agricultural Outlook Report (FAO & OCDE, 2016) also considers that the consumption of basic products will continue to rise, mainly in developing countries and foresees consumption will grow faster in Eastern Europe, Central Asia, South America and other Asian countries. However, Sub-Saharan Africa will not show the same growth rate due to the disparity in growth and the distribution of income (Note 3). These expectations are reflected in Figure 4, which shows the rising tendency of the consumption of basic foods in industrialised and developing countries. The rise in consumption in the latter is expected to reduce the number of under-nourished persons in the world from 11 to 8% in the next ten years, or from a total of 788 m to 650 m.



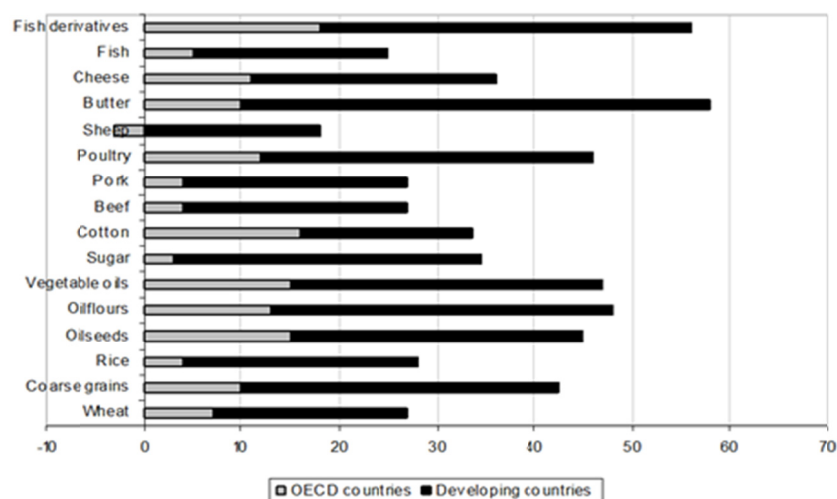


Figure 4. Projection of the consumption of agricultural products, meat and fish (percentage change in 2022 from 2010-12 average)

Source: FAO & OCDE (2013).

The second major consequence is also a direct consequence of bigger populations and incomes, urban expansion and diet changes. According to the World Bank's Development Indicators, in 2015 54% of the world population, 3,943 million, lived in urban areas. As can be seen in Figure 5, which includes the UN's projections until 2050, this population will reach 6.3 million in 2050, *i.e.* 2,000 million new urban residents can be expected. The rural population has hardly changed so far and is now expected to decrease. South America and the Caribbean have experienced the highest urban growth; in 2014 three quarters of the population lived in towns and cities, on a level with North America and Europe. The least urbanised regions are Africa and Asia, with 41 and 47% of urban populations, respectively. More than 10% of the world's population live in cities of over 10 million people and this is expected to rise to 14% in 2025. In 2014, 51% of the population lived in cities of less than 500,000 people and this figure will fall to 43% in 2025.

In a globalised framework, the rise in incomes and unstoppable urban expansion are leading to dramatic changes in the diets of the developing countries. The FAO and OCDE (2013) considers that these diets have considerably improved in recent decades, since the *per capita* availability of fruits and vegetables, meat products and vegetable oils has risen by 90, 70 and 32%, respectively, since 1990-92, including an increase of 20% in the availability of proteins per person. Africa and Southern Asia have not benefitted fully from these improvements as their diets are still unbalanced and disproportionately dependent on cereals, rice and tubers.

With the creation of an incipient urban middle class, the population's life style and their shopping basket undergo changes. Diets in China and India have changed radically and as these countries compose 40% of the world's population they have become the driving force behind a transition characterised by substituting wheat for rice and increased consumption of meat, milk, fruit and vegetables grown in temperate climates, fats and oils. The consumption of sugar, fats and oils is rising faster than that of basic products and proteins as there is a growing preference for processed products. Fukase and Martin (2016) and Pingali (2007) have shown that the consumption patterns in the developing world, with high protein contents and rich in energy foods, are converging with western diets.

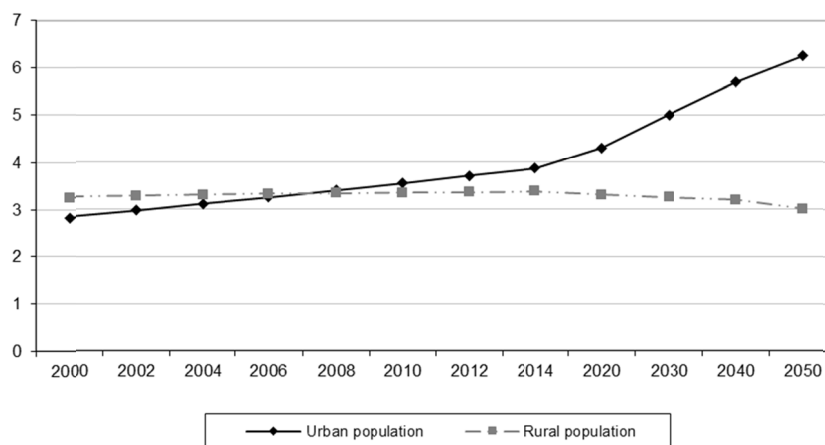


Figure 5. Estimation of urban and rural populations (2000-2050)

Source: Compiled by the authors from World Bank and UN data (World Bank, 2016; UNDP, 2014).

### 3.3.2 The Role of the Developed Economies

#### (1) Biofuel Production

The world depends on oil. In view of its high prices and a tendency to limited reserves, agriculture has collaborated in reducing this dependency by producing energy crops capable of being transformed into biofuels. According to Gil et al. (2000), biofuels (Note 4) are any organic materials (Note 5) that can be used to produce energy through combustion, regardless of their physical nature.

When crops are produced for biofuel, the first direct effect is to reduce the available amount of food for humans and animals, since it creates a new demand for the traditional food crops. This causes prices to rise, reduces the demand for food of the poorest members of society and encourages farmers to produce more. It also has substitution effects on consumption and production and is one of the reasons why the higher prices are transmitted to other crops. A number of authors (Pimentel et al., 2009; Oluwatoyin & Balcilar, 2012; HLPE, 2013) have considered the controversy generated by this situation. In less than ten years world biofuel production has increased by 500% from less than 20,000 million litres in 2001 to more than 100,000 in 2011. The biggest rise in production was in 2007/08 (Note 6), which was accompanied by a sharp increase in food prices.

Official policies have played a fundamental role in the rise in biofuel production in both the EU and the USA. The developing countries are still in the process of adopting these policies, with the exception of Brazil, which has been producing ethanol from sugar cane for forty years and biodiesel for ten. The growth of the demand for biofuels is uncertain and may continue as long as oil prices remain above the cost of producing biofuels. Due to the rising trend in oil prices, ethanol produced from sugar cane and corn will become more competitive with fossil fuels even without incentives or protective import duties. Biodiesel is only profitable in a context of high oil prices and will continue to be supported by government policies, any change in which could put an end to its growth. FAO and OECD (2013) give a projection of the regional distribution of the production and use of ethanol and biodiesel for 2022.

#### (2) Reform of Agricultural Policies

The cycle of agricultural policy reforms has profoundly changed the conditions for producers, especially in the USA and EU (Note 7). This process consists of the progressive liberalisation of agriculture by dismantling public market intervention mechanisms, thus doing away with production incentives and market distortions. The OECD and WTO are among the most active organisations in dismantling price and income support policies in the developing countries. The OECD's annual report on Agricultural Policy Monitoring and Evaluation provides information on the evolution of agricultural policies and support in OECD countries and emerging economies as measured by the *OECD Producer Support Estimate* (Note 8).

Although agricultural policies help to boost trade, there are doubts on both sides of the Atlantic. Firstly, the start of the Trump political era augurs a return to protectionism in the USA; and secondly, it is more than likely that there will be cuts in the EU's Common Agricultural Policy (CAP). If the 2013 CAP reforms ensured the continuation of funds from the Multiannual Financial Framework, the EC's initial proposal involved a considerable reduction of these funds, and the more radical UK proposed cutting the budget by 50%. Boulanger

and Philippidis' recent study (2015) analyses the effects of these cuts on world agricultural markets and the trade balances of the EU's member states. At this moment in time, therefore, it is extremely difficult to predict the course of future agricultural policies.

### (3) Regional Trade Agreements

Every year an ever increasing percentage of world trade is transacted through commercial agreements. Initially put into operation by the developed countries, their number has grown from less than 20 in 1990 to 262 at the present time, and the so-called inter-regional agreements will push this percentage even higher. All together, the UE-US Transatlantic Trade and Investment Partnership, the Trans-Pacific Partnership Agreement and the South-East Asia Regional Comprehensive Economic Partnership make up more than 75% of the global GDP and 66% of world trade (Ash & Lejarraga, 2014). By limiting the number of partners and concentrating on strategic areas, regional agreements usually set better conditions and encourage better economic integration than the WTO agreements (Note 9), by eliminating non-tariff barriers, harmonising regulations and boosting trade, instead of merely reducing tariffs and removing other trade barriers. The harmonisation and simplification of these measures in trade blocs could be a great help to trade. The FAO (2016) provides up-to-date information on the WTO's agricultural negotiations and regional agreements.

Although agricultural protection measures have now been reduced in most OECD countries, some of the emerging economies (*e.g.*, China, India and Indonesia) have aimed at promoting self-sufficiency by restricting imports.

#### 3.3.3 Climate Worries

The possible effects of climate change are impossible to predict, however they may put a limit to potential growth in trade, modify flows and make trade more susceptible to a crisis. Climate change is not only putting at risk production in the regions of the "world's granary", where reduced productivity is expected due to higher temperatures and less rain, but is also making many countries more dependent on imports of basic foods, such as wheat, secondary cereals and rice, and maritime transport more vulnerable to the closure of harbours due to higher sea levels and worse storms (Dronin & Kirilenko, 2011). These phenomena could mean a return to protectionist measures (FAO, 2015).

Although global warming is now seen as practically inevitable, the dynamic nature of the food chain may mitigate its negative effects through biotechnology, reducing post-harvest losses and adapting local food products (Lakner & Baker, 2014).

## 4. Conclusions

One of the United Nations' key objectives is to eradicate hunger from a world with an ever increasing population. Given the continuous evolution in consumption and production, the trade in agricultural products and food will play an ever more vital role, especially in view of the growing demand from food-deficit countries. World production of agricultural products is thus predicted to go on rising in the next decades, although at a somewhat reduced rate.

The world food trade has experienced rapid growth in the last 20 years, with more importers and exporters, which has its good and bad sides. If the opening of trade makes more food available in importing countries and forces consumer prices down it also involves potential risks. The greater dependence on world markets could expose countries to short-term trade fluctuations both in the form of scarcer supplies with higher consumer prices and rising imports with lower prices for the producer. Opening a country's trade too quickly could reduce domestic production in sectors that have to compete with the imports, which is a serious problem especially during the initial stages of agricultural transformation, when the agricultural sector still plays a vital role as the driving force behind economic growth. Although it can be foreseen that those countries able to expand their exports will benefit from the growing trade opportunities, neither will these countries be free of risks. Higher exports could force internal consumer prices upwards, which is a special problem when production is below normal levels. On the other hand, a rapid drop in the prices of basic products could cause problems in those countries whose strategies depend on their agricultural exports. In addition, the trade in basic food products is limited by the search for self-sufficiency in food production in some countries and by a structural change towards products with higher added value. In this context, being aware of what is happening is essential since it has important implications for economists, researchers and decision makers.

In view of the foregoing, this paper explored the context of the rapidly evolving world demand for basic foods in order to identify its principal explanatory factors and any new relevant events. These changes will have implications for the future reliability of international markets as an accessible source of food, not only as regards their availability but also as regards their volatile prices and wider implications for food safety and nutrition.

From the information gathered from a number of organizations such as the FAO, World Bank, IMF and OECD this paper shows the importance of basic food imports in the world economy. The findings obtained from this analysis suggest the following conclusions:

- 1) The trade in food products has continued to rise in the 21st century driven by the high demand from the developing countries. Asia and Africa have confirmed their status as importers, while America and Oceania have strengthened their positions as exporters.
- 2) The period from 2000 to 2006, when historically low prices were registered, was followed by high and volatile prices from 2007 to 2013. In 2014 the markets began to stabilise again and lower prices are forecast in the mid term. Food prices have been affected by oil prices, food stocks, fluctuations in the value of the dollar and increased demand. The recent rise in the dollar have made US exports less competitive in world markets and reduced exports to countries with currencies tied to the dollar. However, this appreciation could benefit exports from countries whose currencies depreciate in relation to the dollar; for example, Brazil and Argentina could obtain larger quotas for their meat in world markets, while Australia and New Zealand will probably retain their large share of milk products.
- 3) The rising populations and higher incomes of the developing countries have increased the global demand for food. Africa and Asia together contribute 90% of the 82 million people added to the world's population every year, most of these from the former, which now has the largest proportion of young people in the world. The world's population is expected to go on growing, although at a slower rate, at least until 2050. The relative importance of both factors will then be reversed, and the growth of income, which reached a rate in excess of 4.5% in the 21st century will become the dominant force. Besides the rise in consumption *per capita*, they are the direct consequence of the higher populations and incomes and urban growth in these areas, added to the higher consumption of products with higher added value. Diets are more varied and of better quality, as reflected in the contents of the shopping basket, with traditional products like rice being replaced by higher meat consumption. This in turn impinges on the demand for animal feeds, especially for secondary cereals and protein flours. In both the developed and developing countries the consumption of sugar, oils and fats will rise faster than basic products and proteins, mostly due to a greater demand for processed foods.
- 4) The developed countries, which still make the world's most important economic decisions, have grown in recent years but at a slower rate than the developing countries. In the former, rising *per capita* income is not transformed into an increased demand for food. These countries are the pioneers of expanding towns and cities and their diets have long been rich in added value, so that no perceptible changes are expected in this area. The role of the developed economies in world demand appears to be that of increasing the demand for biofuels, freeing the agricultural sector and signing trade agreements.
- 5) The higher levels of biofuel production have created and promoted a new demand for the traditional food crops. The developed countries are pioneers in the production and use of biofuels, due to the high investment in R&D&I these products require. The price of oil acts as a wild card: continuing with low prices (around \$50 in 2017) would cushion the demand for biofuels, while a return to high prices would increase the pressure to expand the use of arable land for non-food crops and increase the competition for water.
- 6) The industrialised countries are negotiating new trade agreements to lower even further the barriers to trade on both sides of the Atlantic. In spite of the controversial negotiations now taking place, such as the Transatlantic Trade and Investment Partnership and the Comprehensive Economic and Trade Agreement, there is no doubt that when these come into force they will create larger free trade areas with important implications for the international food trade. The WTO continues unsuccessfully in its bid for multilateral free trade. As regards the agricultural sector, with the elimination of export subsidies by the Nairobi Package in December 2015, the WTO wants to guarantee improved market access to its member states, especially to the less well developed, and reduce and control internal aid.
- 7) Climate change is playing a crucial role in agriculture. Rising temperatures and changes in rainfall are affecting production and making producers consider alternative products. Scarcer water supplies are limiting the production of irrigated crops in key river basins and Africa is becoming even more arid than before. The reduced crops lower food stocks, influence prices and encourage speculation in the futures market. However, on a world scale, international trade could moderate the impact of climate change on food supplies and prices. In addition, both public and private R&D efforts, now reinforced by the contribution from China, India and Brazil, could reverse the reduction in global productivity and technological progress will be a determining factor in world food prices.

There is no doubt that feeding the world's population while guaranteeing environmental sustainability is one of the great challenges we now face. Bearing in mind that as food imports rise and many countries are becoming worried about the reliability of world markets as food sources at reasonable prices, the contribution of the present work shows the need for a better understanding of the different demands that compete for the world's food resources. These demands are subject to a wide range of uncertainties, including variations in oil prices, productivity, economic growth, public policies and extreme weather phenomena, all of which make a greater interdisciplinary and analytic research effort indispensable.

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## Notes

Note 1. For detailed information see the special note in FAO & OCDE (2013).

Note 2. For example, at the following link a graph of dollar/euro exchange fluctuations in the last ten years can be seen. In fact, the dollar reached its lowest value in 2008, since when it has steadily risen. Retrieved from <http://www.xe.com/es/currencycharts/?from=USD&to=EUR&view=10Y>

Note 3. This report, which dedicates a special chapter to the situation of Sub-Saharan Africa, explains how malnutrition in the area is still high and in ten years is expected to have more than one third of the world's under-nourished, as compared to slightly over one quarter at the present time.

Note 4. Ethanol, biodiesel, firewood, charcoal, bagasse, biogas, etc.

Note 5. Sugar cane, sugar beet, maize, wheat, rapeseed, palm oil, jatropha, reeds, willow, etc.

Note 6. In 2008, 15% of world corn production (principally in the USA), equivalent to 5.7% of total world secondary cereals and corn production, was used to make ethanol; 10% of world vegetable oil crops (especially in the UE) was used for biodiesel; 18% of sugar cane (mainly in Brazil) was used to make ethanol (HLPE, 2013).

Note 7. For details of US agricultural policy, Farm Bill 2014, see the Department of Agriculture's official site at <https://www.usda.gov/wps/portal/usda/usdahome?navid=farmbill>. For the CAP, consult: [http://ec.europa.eu/agriculture/index\\_es](http://ec.europa.eu/agriculture/index_es).

Note 8. An example of the OECD's method in Spanish agricultural policy can be found in Andrés & Estruch (2017).

Note 9. It seems evident that the multilateral agenda is now obsolete, while the differences in agriculture still remain. Although the organization refuses to admit that the Doha Round is finished, no agreement is expected, and only the most optimistic expect a generic (and light) conclusion of the Round.

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