



Coffee Consumption and Industry Strategies in Brazil

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CONSUMPTION
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CHAPTER 2

Perspectives of global coffee demand

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2.1 Introduction

The exact origins of coffee are unknown. However, popular legends assert that the beginning of coffee production and consumption dates back to Abyssinia, in present day Ethiopia. The first observations concerning this beverage apparently involved its energy-giving effects on goats. The first mention of coffee is attributed to the Persian physician Rhazes (CE 865–925), who referred to the drink as *bunchum*. But he was not writing about the same beverage that we drink today; the first time that coffee beans were roasted, ground, and infused was in the 15th century (Pendergrast, 2010).

During the following centuries, coffee consumption spread throughout the world, including Europe, and also gained a major role during mercantilism, according to Ormrod (2003). At the 20th century, coffee was largely traded worldwide, and some underdeveloped countries such as Brazil had their economies based on coffee exports, as explained by Skidmore (2009).

Nowadays, the supply chain of coffee has evolved to a complex system that involves several agents, from the agricultural inputs firms, farmers, and commodity traders to food industries and retailers. One of the biggest challenges faced by them is how to add more value to the final product and, thereafter, to the value chain. But to attain that purpose, it's crucial to understand how consumers perceive the value of the coffee, that is, how the demand will respond to changes of the final product or at the supply chain.

The main objective of this chapter is to provide information about coffee demand that can assist all agents of the coffee value chain to organize themselves to be more competitive in the near future, keeping in mind the consumers that they will be selling to.

The specific objective of this chapter is to analyze the perspectives of the global demand for coffee in the present, providing a summarized literature

review as well as new ideas based on available demographic and income data for a better understanding of future scenarios.

2.2 Coffee production and supply chain

For a better understanding of the coffee market, it's indispensable to observe how production behaves and how it fits consumers' preferences over time. The first topic to be reviewed is the behavior of the coffee supply chain.

Lewin et al. (2004) studied the global supply and demand for coffee in different markets and provided new trends at that time, with regard to the importance of this product for low-income economies. The real prices of coffee were at 100-year lows in 2002, which caused a poverty increase to small farmers that produced coffee in countries like Nicaragua, for instance.

A consequence of the decline in coffee prices has been a decline in the share of the final retail price that is received by producing countries. This decline has been caused by two factors. First, the coffee roasting and retail industries have made profits by developing new products and by taking advantage of various value-adding activities, such as marketing, branding, differentiation, and flavoring. [...] Second, the noncoffee components included in the retail price of coffee, such as wages, packaging, and marketing, have grown and now represent a much more significant share of the total retail price than the actual coffee itself.

For that reason, new ways of adding value to this beverage's value chain were necessary, not only to the retailers and industry, but also at the farm level.

The updated table that follows shows the biggest coffee producers worldwide and analyzes if the global coffee supply has changed significantly from this chapter's analysis.

Table 2.1 makes explicit states where coffee is produced worldwide in the last 17 years. It shows that the global green coffee supply has not changed its origin from the study of Lewin et al. (2004) until today. The only difference is that Honduras, Peru, and Uganda increased their share in the global market, whereas India and Guatemala saw their market shares reduced. But the main players (Brazil, Vietnam, Colombia, and Indonesia) still compose the top four.

The next relevant point is the global exports, shown in Table 2.2.

Basically, the framework of the main exporters has not changed during this period, as the top four exporters are the same as the top four producers.

Table 2.1 The 10 biggest coffee-producing countries in 2016/17 and the evolution of their production in the last 17 years (in thousands of 60-kg bags)

Country	Type ^a	Years								
		2000/01	2005/06	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Brazil	A/R	31.310	32.935	53.428	50.592	55.420	54.698	52.299	50.388	55.000
Vietnam	R/A	14.841	13.842	20.000	26.500	23.402	27.610	26.500	28.737	25.500
Colombia	A	10.400	12.564	8.523	7.652	9.927	12.163	13.339	14.009	14.500
Indonesia	R/A	6.987	9.159	9.129	10.644	11.519	11.265	11.418	12.317	11.491
Ethiopia	A	3.115	4.779	7.500	6.798	6.233	6.527	6.625	6.714	6.600
Honduras	A	2.667	3.204	4.331	5.887	4.686	4.578	5.258	5.766	5.934
India	R/A	5.020	4.567	5.033	5.233	5.303	5.075	5.450	5.800	5.333
Peru	A	2.676	2.489	4.069	5.373	4.453	4.338	2.883	3.304	4.222
Uganda	R/A	3.401	2.175	3.267	3.115	3.914	3.633	3.744	3.650	3.800
Guatemala	A/R	4.940	3.676	3.950	3.850	3.763	3.189	3.310	3.420	3.500
10 Biggest producers		85.356	89.391	119.230	125.643	128.619	133.077	130.828	134.104	135.880
World		113.673	111.396	139.600	147.904	149.623	152.228	148.738	151.565	153.869

^a Type R refers to Robusta and A to Arabica coffee.

Data from the International Coffee Organization (ICO, 2017).

Table 2.2 Exports of all forms of coffee by the 10 biggest exporting countries (in thousands of 60-kg bags)

Country	Years								
	2000	2005	2010	2011	2012	2013	2014	2015	2016
Brazil	18.016	26.198	33.167	33.806	28.549	31.662	36.429	37.018	34.267
Vietnam	11.618	13.432	14.229	17.717	22.920	19.718	26.097	20.655	27.422
Colombia	9.177	10.871	7.822	7.734	7.170	9.670	10.954	12.716	12.831
Indonesia	5.358	6.744	5.489	6.159	10.722	10.882	6.175	8.379	6.545
India	4.229	2.829	4.647	5.414	5.044	5.033	5.131	5.262	6.086
Honduras	2.879	2.392	3.349	3.947	5.508	4.185	4.252	5.030	5.306
Peru	2.362	2.369	3.817	4.697	4.310	3.971	2.720	2.790	3.960
Uganda	2.513	2.369	2.657	3.142	2.685	3.672	3.442	3.596	3.543
Guatemala	4.852	3.466	3.468	3.697	3.750	3.575	3.043	2.961	3.072
Ethiopia	1.982	2.435	3.324	2.675	3.203	2.870	3.117	2.985	3.001
10 Biggest exporters	62.985	73.105	81.968	88.989	93.861	95.237	101.361	101.391	106.032
World	89.559	87.562	97.067	104.449	111.023	110.509	114.658	113.953	119.048

Data from the International Coffee Organization (ICO, 2017).

Macdonald (2007) analyzed some initiatives aimed at transforming the institutional arrangements that organize coffee production and trade worldwide, for example, Fair Trade, Starbucks' Café Practices Program, and other wider campaign activities about "trade justice." It was observed that, even though these initiatives helped empower marginalized workers and producers, they failed to develop transparent ways of defining the boundaries of partial responsibilities or institutional procedures to enable their coordination, which has "significantly weakened their capacity to entrench empowerment principles throughout the governance system of the coffee industry as a whole," according to the author.

2.3 Coffee demand

With an overview of the coffee supply chain, we can now analyze the main subject of this chapter: coffee demand. So first, studies about the demand for coffee will be summarized, then the global demographic and income will be analyzed, and, finally, the global demand for coffee.

2.3.1 Studies about the demand for coffee

Okunade (1992) tested the compatibility of coffee demand data with the habit formation hypothesis, and assessed implications of demand elasticity estimates for projected producer revenues and demand for imported coffee. Using an unrestrictive Box-Cox Demand Model, they estimated that the model automatically satisfies theoretical demand properties; strongly support incorporating habits and related beverage and sugar prices in coffee demand model; and predict inelastic US coffee consumption per capita will reduce 24% and have a 6.3% increase in producer revenues by 2000.

Goddard (1997) estimated linear versions of the Almost Ideal Demand System for American and German coffee imports with the intent of testing for homothetic and nonhomothetic weak separability and calculating elasticities. Elasticities by country of origin indicated an elastic demand for coffee in the United States and an inelastic demand for coffee in Germany. They also stated that roasters consider these types of coffee as both substitutes and complements.

Analyzing the global demand for green coffee, Silva et al. (2000) found that, for high-income countries, the consumption of coffee had stabilized at the end of the 20th century. High rates of increases in consumption could be found in Asian countries due to high rates of growth in population and income. At the same time, new markets presented specific patterns of preferences observed and analyzed by producers and exporters of coffee.

By analyzing how retail prices, preferences, and market power influence coffee demand in Sweden, [Durevall \(2007\)](#) evaluated the belief that consumer coffee prices are high in comparison with bean prices, and that lower consumer prices would lead to substantial increases in bean exports from Third World countries. He estimated a demand function for the period between 1968 and 2002 and, together with information on import prices of coffee beans, simulated an oligopoly model. Through this model, the level of market power was estimated, as well as how coffee demand would react to reductions in marginal cost to its minimum level. The estimated maximum level of market power was low, but it generated big spreads between consumer and bean prices once the price elasticity had low values. It was stated that the effect of a price decrease would be small because long-run coffee demand was dominated by changes in the population structure in combination with different preferences among age groups. Therefore, a change to perfect competition would only have an unimportant effect on Swedish coffee bean imports.

[Bacci \(2007\)](#) used a time series approach to forecast coffee demand in Brazil for the following years. Through different methodologies, he established a combination method to make the forecast and concluded that, with a better demand forecasting method, coffee processors can make better strategic decisions in terms of financial, marketing, and production planning.

Based on a study about the justifications and motivations of the coffee consumption in Belo Horizonte (Brazil), [Arruda et al. \(2009\)](#) found that the younger population consumes the least amount of coffee, and that the aroma was the most appreciated attribute in coffee.

[Bonnet and Villas-Boas \(2016\)](#) studied if there was an asymmetric price-cost pass-through in the French coffee market, that is, whether prices respond differently to negative and positive upstream cost shocks. They found significant evidence that consumers react differentially to positive and negative price movements, that is, the demand is less elastic to price increases than to price decreases. In fact, they concluded that the shape of the demand curve could explain the observed asymmetric price transmission of cost shocks.

2.3.2 Global demographic and income overview

To reach the objectives of this chapter, the procedure will involve two main steps: first, we analyze the global demographic and income overview, to understand the dynamics of the population (consumers) in terms of size,

age, and income. The second section aims to identify the perspectives of present and future coffee demand and provide a marketing approach to link producers and consumers.

Two important factors that influence global coffee demand are the demographic and income aspects of the global population (Silva et al., 2000). For that reason, the main questions to be answered at this point will be: How is the world's population evolving? What is its age distribution? What is the behavior and trends of global income and its concentration? And how do these relate to coffee consumption?

Silva et al. (2000) highlighted two important factors that influence global coffee demand: the demographic and income aspects of the global population. Following his results, the first variable researched was the global population, which provides a perspective of the global market's gross size. Therefore, the following chart shows the estimated evolution of the world's population from 1990 to 2022 (Fig. 2.1).

We can see that the world's population is increasing in a relatively linear growth. In a logarithmic scale, it presents a relatively weak growth, but from 2017 to 2022, it's expected to grow from 7.52 billion people to 7.92 billion: a 5.28% growth in 5 years. But not all people drink coffee, so what will be the effect of this population increase for coffee consumption? This chapter will attempt to answer this question in the section "Perspectives of the Future," but for now, it's important to know that there is a growing population worldwide, according to the United Nations.

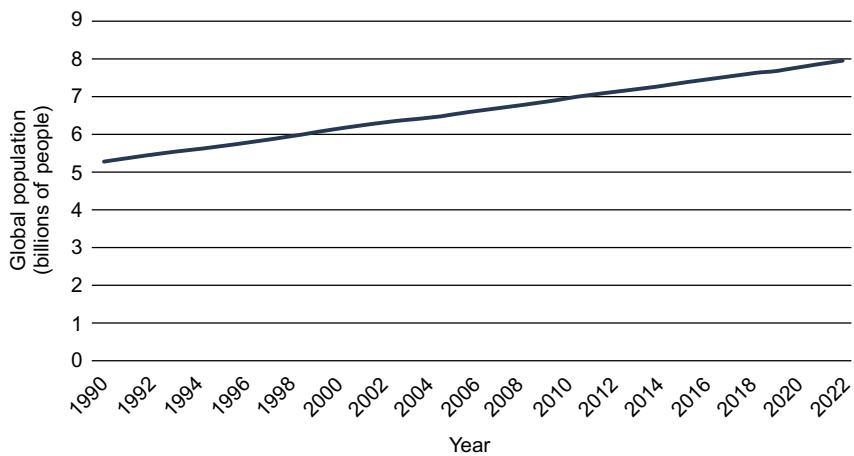


Fig. 2.1 Global population evolution from 1990 to 2022. (Source: Data from the United Nations, Department of Economic and Social Affairs, Population Division, 2017. *World Population Prospects: The 2017 Revision.*)

The next relevant information to be analyzed is the age of the world's population. [Arruda et al. \(2009\)](#) found that younger people are the ones who consume the least amount of coffee for some reasons already mentioned, so the percentage of the population below 14 years old is a good variable to be looked at, since it represents by definition (1 – Percentage of the population above 14 years old).

We can see that the percentage of the population aged below 14 years old has decreased during the last 27 years, from 32.9% in 1990 to 25.9% in 2017, and is expected to reach 25.22% in 2022. That behavior is related to a change in the global age pyramid, which is different among the more developed economies and less developed ones. So, if the results found by [Arruda et al. \(2009\)](#) apply to global coffee consumption, it is expected that there is a negative correlation (and causality) between the percentage of the population below 14 years old and the consumption of coffee per capita ([Fig. 2.2](#)).

The next two charts, extracted from the UN database, show the evolution and forecasts for the age pyramids of more developed economies and developing ones (that, by the way, will not be pyramids within some years).

[Fig. 2.3](#) shows the evolution of the age pyramid from 1950 until 2017, and the forecasts until 2100 for developed economies. We can clearly observe that the reduction in the percentage of the population below 14 years old in these economies is due to the reduction in the birth rates, causing

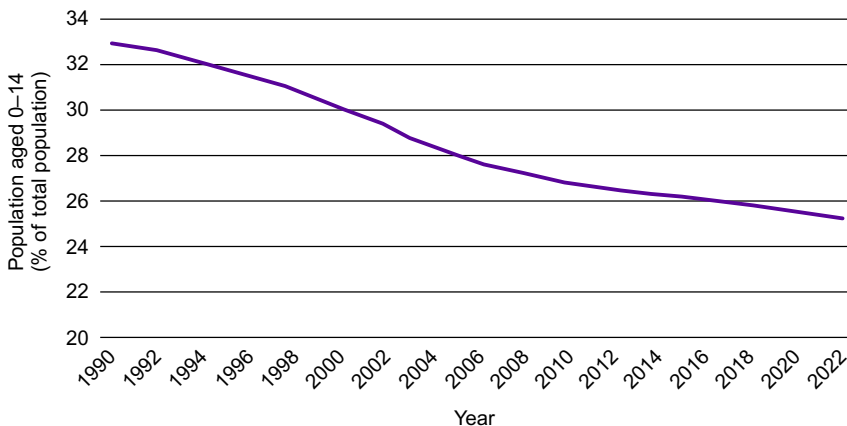


Fig. 2.2 Global population aged between 0 and 14 years old as a percentage of the world's total population. (Source: Data from the United Nations, Department of Economic and Social Affairs, Population Division, 2017. *World Population Prospects: The 2017 Revision*.)

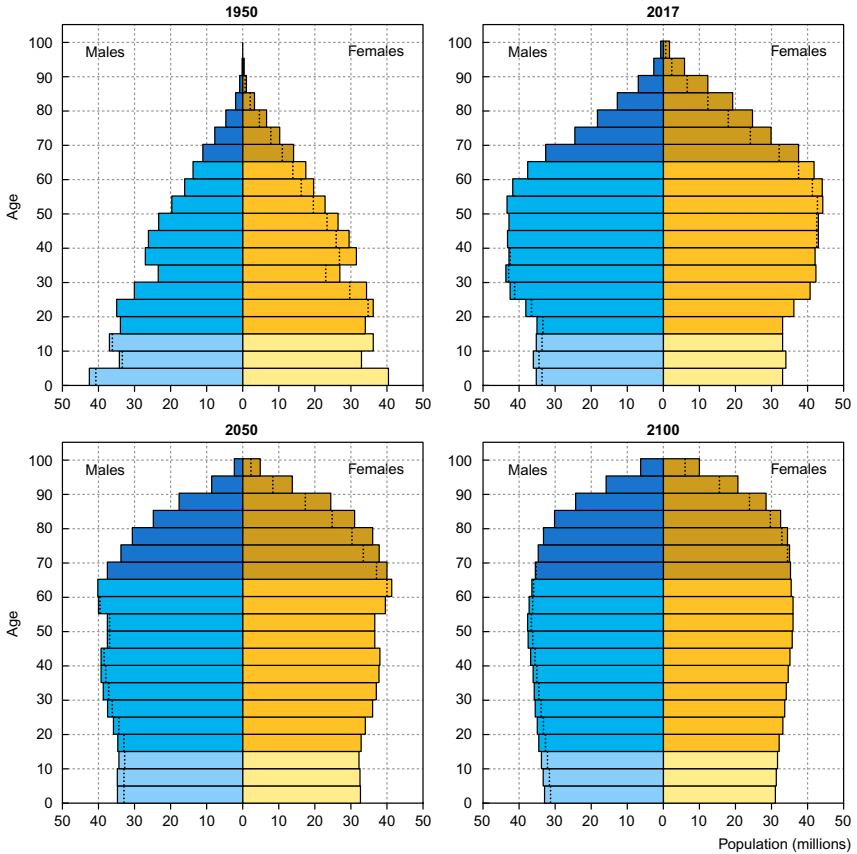


Fig. 2.3 More developed regions' population pyramids from 1950 to 2100. (Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017. *World Population Prospects: The 2017 Revision.*)

a higher percentage of adults (between 25 and 60 years old); by 2050 and 2100, the age distribution will be more uniform, with a higher percentage of people above 80 years old compared to today.

The next chart shows the same information, but for the developing economies (Fig. 2.4).

A similar pattern for the developed economies can be observed for the less developed ones, but with a huge delay. The behavior of the pyramid in developed regions from 1950 to 2017 is much like the behavior of the pyramid for less developed regions from 2017 to 2050.

The important point here is that the reduction of the percentage of the younger population (below 14 years old) and hence the increase of

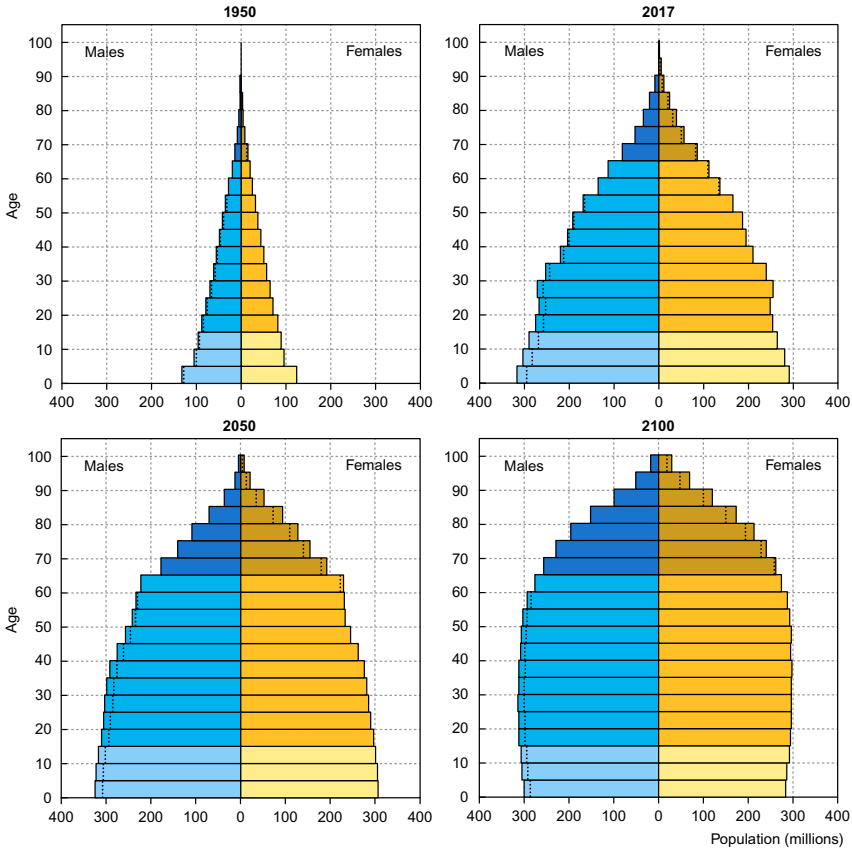


Fig. 2.4 Less developed regions' population pyramids from 1950 to 2100. (Source: United Nations, Department of Economic and Social Affairs, Population Division, 2017. *World Population Prospects: The 2017 Revision.*)

proportion of the population above 14 years old between 1990 and 2022 is affected mainly by the more developed regions, and it may cause distortions in the response of coffee consumption of each region to population changes.

The next relevant point to this study is the behavior of the global income. With more available money, people can buy more goods, including coffee, and also pay more for differentiated ones. As product differentiation is a very important point of this chapter, the first variable to be analyzed will be the world's Gross Domestic Product (GDP) per capita, that is, the sum of all the final goods and services produced by an economy, divided by its total population, which is one of the main measures of income of an economy.

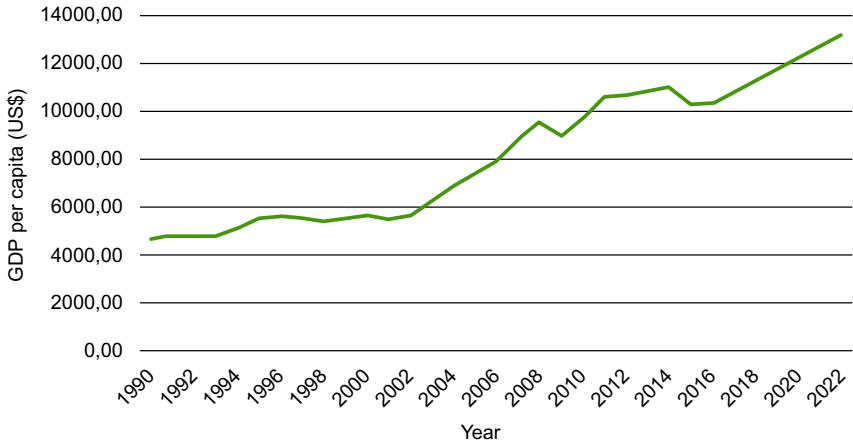


Fig. 2.5 Global nominal GDP per capita (US\$) estimates from 1990 to 2022. (Source: Data from the International Monetary Fund, 2017. *World Economic Outlook*. International Monetary Fund.)

Fig. 2.5 shows that the global nominal GDP per capita increased from US \$4738 in 1990 to US \$10,751 in 2017 (a 126.9% rise) and is forecast to reach US \$13,210 by 2022 (a 22.9% rise in comparison with 2017). That is, the world is getting richer, in a gross approach, and if the results found by Arruda et al. (2009) can be applied to global coffee consumption, it is expected that there will be a positive correlation and causality between the percentage of the population below 14-years old and the consumption of coffee per capita.

But this variable alone is not enough to measure how this income is being distributed, so the next charts will deepen the evolution of the wealth distribution between low- and middle-income economies and high-income ones.

Fig. 2.6 states how strong inequality is among countries. The high-income economies had, in 1997, around 7.3 times the average income of the rest of the world. This number became 4.5 times in 2016, which that shows an income convergence^a effect.

Although the nominal GDP per capita does not embody the effects of inflation, it is relevant because the available data from the IMF until 2022 does not include this variable at constant prices. But comparing it to the GDP per capita PPP at constant prices, it's possible to observe that, from 1997 to 2016, the growth was about half of the nominal measure.

^a For further studies on income convergence, see Tamura (1991).

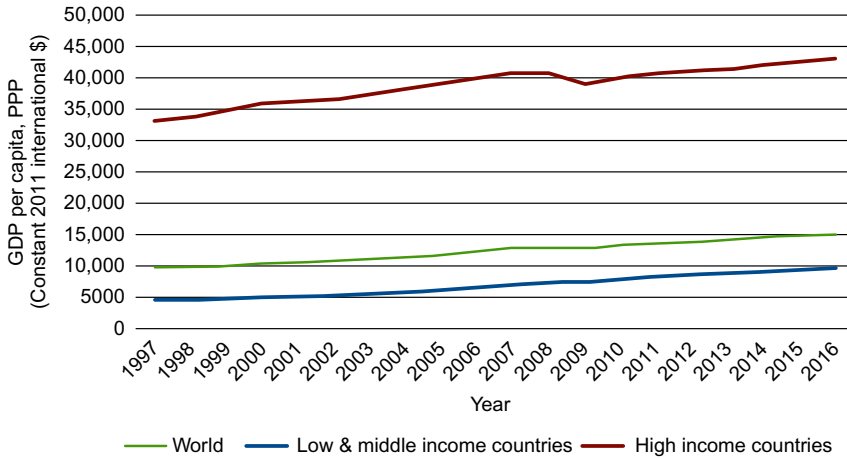


Fig. 2.6 Global GDP per capita, PPP by income level from 1997 to 2016. (Source: Data from the World Bank national accounts data and OECD National Accounts data files.)

But which countries belong to the high-, middle-, and low-income definitions of the World Bank and the International Monetary Fund?

We can summarize the high-income (or developed) economies as North America (without Mexico), Western Europe, Japan, Australia, New Zealand, South Korea, Israel, Singapore, Taiwan, and Hong Kong. All the other countries are classified either as middle- or low-income economies (or emerging markets and developing economies).

But beyond the per capita GDP, another important number to this analysis is the household final consumption expenditure, that is, how much of the gross income of the economy is spent on final consumption by the families for goods and services (Figs. 2.7 and 2.8).

We can see that the consumption of the families as a percentage of the GDP in high-income economies was, in 2015 (the last available data), higher than that at low- and middle-income countries, but the annual growth of the household consumption at the low- and middle-income ones is higher; if this trend persists, these economies will buy more products and services throughout the years than the developed countries.

Thereby, the overview of this section is that the world is getting more populous, older, richer, and with a growing consumption of goods, especially in developing economies. These are very important factors for a complete analysis of global coffee demand. These results can mean that

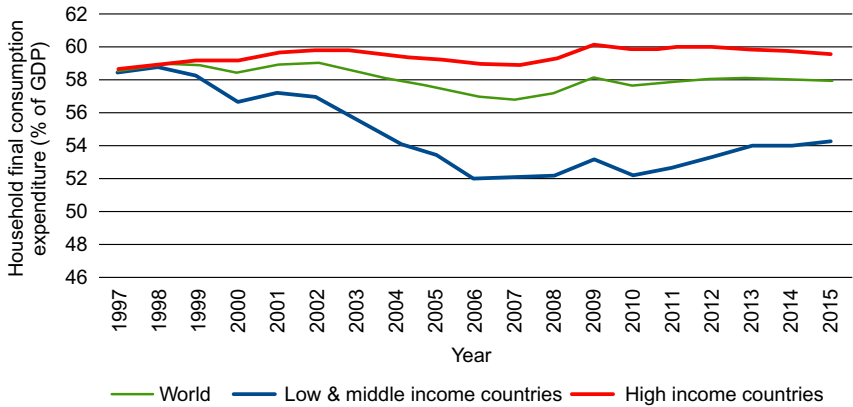


Fig. 2.7 Global household final consumption expenditure (% of GDP) from 1997 to 2015. (Source: Data from the World Bank national accounts data and OECD National Accounts data files.)

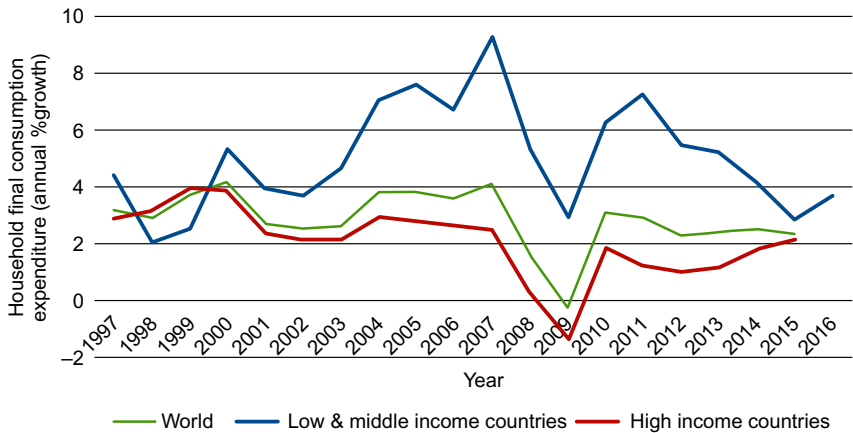


Fig. 2.8 Global household final consumption expenditure (annual % growth) from 1997 to 2016. (Source: Data from the World Bank national accounts data and OECD National Accounts data files.)

the increase of consumption will be higher in low- and middle-income countries given that increases in income imply increases in coffee consumption, but this relationship will be better studied in the next sections that analyze coffee demand itself in the present and provides perspectives to the future.

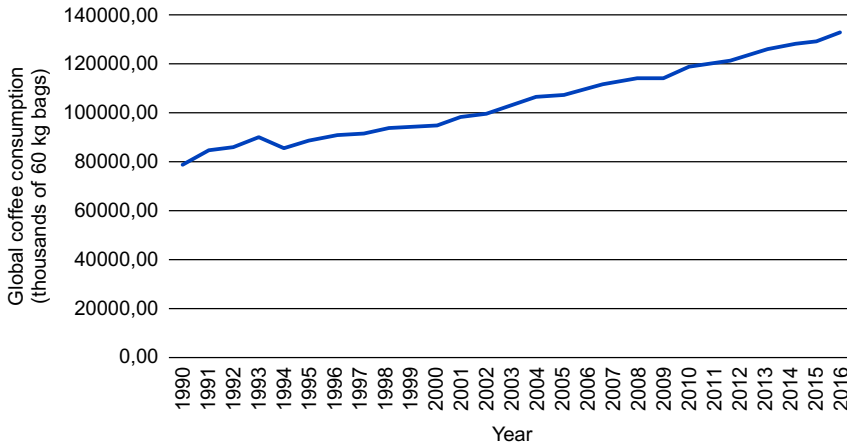


Fig. 2.9 Global coffee consumption in thousand 60-kg bags from 1990 to 2016. (Source: Data from the International Coffee Organization (ICO, 2017).)

2.3.3 Perspectives of present coffee demand

2.3.3.1 Global coffee demand overview

For an outlook on global coffee demand, the main data to be analyzed are global coffee consumption, coffee consumption per capita, and the major consumer markets. The International Coffee Organization (ICO) provided all these data.

The first chart shows the world's total consumption on the last 26 years (Fig. 2.9).

Global coffee consumption increased in almost all the years of the series, except for 1994 and 2009. The percentage variation during the period was 67.9%, from nearly 79 million 60-kg bags in 1990 to 133 million in 2016. But are consumers actually drinking more coffee, or is it just a population expansion? The answer is found through per capita consumption (Fig. 2.10).

The per capita increase on coffee consumption was more moderate, from approximately 0.897 kg per year in 1990 to 1.069 kg per year by 2016, but that's still a 19.2% increase. The real growth in per capita consumption took place after 2000, and the reasons behind it go beyond the demographic and income effects, and will be better studied in Section 2.4.3.

2.3.3.2 Perspectives of selected countries and regions' total and per capita coffee consumption

This topic will focus on regional differences of coffee consumption worldwide and how they evolved. The first step in the analysis is to understand which countries buy the most coffee, that is, who are the biggest consumers of the global market (Table 2.3).

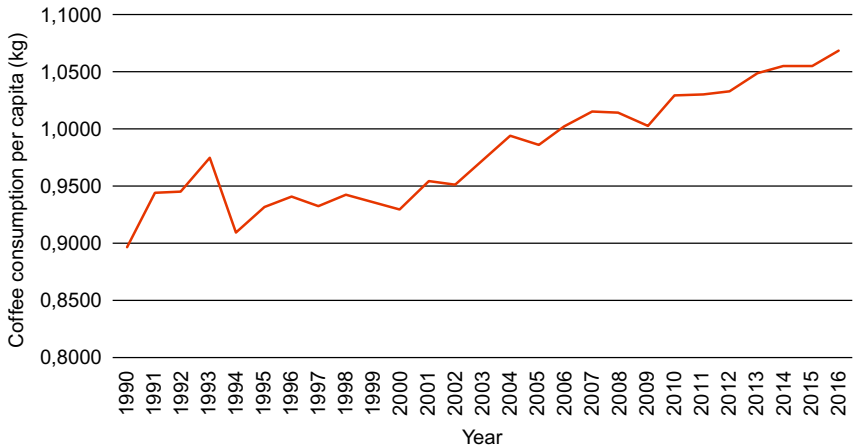


Fig. 2.10 Global coffee consumption per capita in kilograms from 1990 to 2016. (Source: Data from the International Coffee Organization (ICO, 2017).)

It’s possible to observe that the European Union is responsible for more than half of the total consumption of the importing countries. The biggest consumers of coffee outside of the EU are the United States (holding the world’s largest consumption), Japan, and the Russian Federation. Additionally, the consumption of these four corresponded to 96% of the global consumption by importing countries and 61% of the global consumption in 2016.

Another important point to be observed is that the consumption of these countries is very similar to their imports of coffee, which indicates that a very high percentage of their coffee is imported (Table 2.4).

Even though these importing countries don’t produce significant quantities of coffee, there is a marked difference between their imports and consumption. For instance, taking the example of Germany in 2013, about 21.1 million bags were imported, whereas 9.3 million bags were consumed. This difference is caused by an interesting characteristic that is key to understand the dynamics of the global coffee market: re-exporting. Table 2.5 shows the top 10 re-exporting countries.

Comparing this table with the top exporting countries, Germany, Belgium, United States, and Italy show up among the top 10 exporting countries, with Germany in the third place (in quantity exported). Another interesting point of view is to analyze the main exporters of roasted coffee (Fig. 2.11).

Either exporting raw or processed coffee, it’s crucial to understand the role of the re-exporting countries on the international coffee market to realize that their demand is not only for internal consumption.

Table 2.3 Domestic consumption of importing countries (disappearance) (in thousands of 60-kg bags)

Country	Years								
	2000	2005	2010	2011	2012	2013	2014 ^a	2015 ^a	2016 ^a
United States	18.746	20.998	21.783	22.044	22.232	23.417	23.767	24.438	25.243
Germany	8.770	8.665	9.292	9.460	8.830	9.378			
Japan	6.626	7.128	7.192	7.015	7.131	7.435	7.494	7.695	7.872
France	5.402	4.787	5.713	5.962	5.790	5.707			
Italy	5.149	5.552	5.781	5.689	5.710	5.634			
Russian Federation	1.863	3.185	3.700	3.754	3.696	3.648	4.021	3.846	4.438
Spain	2.991	3.007	3.232	3.149	3.435	3.501			
United Kingdom	2.342	2.680	3.134	2.925	2.926	2.828			
Poland	2.046	2.267	2.156	2.034	1.936	1.669			
Netherlands	1.860	1.927	1.347	909	1.382	1.625			
European Union	38.351	39.877	41.196	40.756	40.979	41.852	42.234	41.578	43.307
Top 10 countries	55.795	60.196	63.330	62.941	63.068	64.842	35.281	35.979	37.553
Total of importing countries	67.548	73.683	76.540	76.438	76.910	79.457	80.661	81.085	84.304
World ^b	94.784	107.137	118.892	120.390	122.225	125.565	127.905	129.329	132.602

^a Countries from the European Union are not included, because their data are available only until 2013.

^b The world's consumption is considered as total consumption of importing countries plus total consumption of exporting countries. Data from the International Coffee Organization (ICO, 2017).

Table 2.4 Imports of the top 10 coffee-importing countries (in thousands of 60-kg bags)

Country	Years								
	2000	2005	2010	2011	2012	2013	2014 ^a	2015 ^a	2016 ^a
United States	23.767	23.042	24.378	26.093	26.056	27.016	27.565	27.708	28.838
Germany	13.895	16.716	20.603	20.926	21.816	21.174			
Italy	6.315	7.269	8.236	8.355	8.691	8.823			
Japan	6.908	7.408	7.407	7.544	7.025	8.381	7.657	8.063	8.026
France	6.520	5.714	6.717	6.992	6.841	6.713			
Belgium	3.491	4.063	5.924	5.828	5.668	5.502			
Spain	3.768	4.356	5.034	4.821	5.094	5.137			
Canada	3.321	3.589	4.366	4.542	4.444	4.520	4.981	4.693	4.871
Russian Federation	1.890	3.336	4.155	4.218	4.175	4.410	4.747	4.710	5.233
United Kingdom	3.012	3.433	4.302	4.183	4.126	4.206			
10 Biggest importing countries	72.887	78.926	91.122	93.502	93.936	95.882	44.950	45.174	46.968
All importing countries	103.574	117.040	135.562	139.516	142.671	146.925	75.541	77.268	73.956

^a Countries from the European Union are not included, because their data are available only until 2013.
Data from the International Coffee Organization (ICO, 2017).

Table 2.5 Re-exports by the top 10 re-exporting countries (in thousands of 60-kg bags)

Country	Years								
	2000	2005	2010	2011	2012	2013	2014 ^a	2015 ^a	2016 ^a
Germany	4.825	8.356	11.542	11.683	12.590	12.020			
Belgium	2.357	2.905	5.053	4.894	4.754	4.257			
United States	2.055	2.452	3.191	3.728	3.384	3.248	3.361	2.958	3.175
Italy	1.156	1.708	2.446	2.663	2.964	3.183			
Netherlands	1.106	1.061	1.236	1.769	1.347	1.781			
Spain	753	1.453	1.803	1.672	1.659	1.636			
Poland	531	524	1.123	1.370	1.607	1.615			
Switzerland	313	567	1.313	1.414	1.425	1.547	1.616	1.641	1.748
Malaysia	754	683	1.732	1.200	1.342	1.440	1.583	1.539	1.563
United Kingdom	652	885	1.193	1.264	1.200	1.380			
10 Biggest re-exporters	14.502	20.594	30.632	31.657	32.272	32.107	6.560	6.138	6.486
World	20.630	29.244	39.871	41.502	42.903	43.711	13.110	12.928	14.328

^a Countries from the European Union are not included, because their data are available only until 2013. Data from the International Coffee Organization (ICO, 2017).

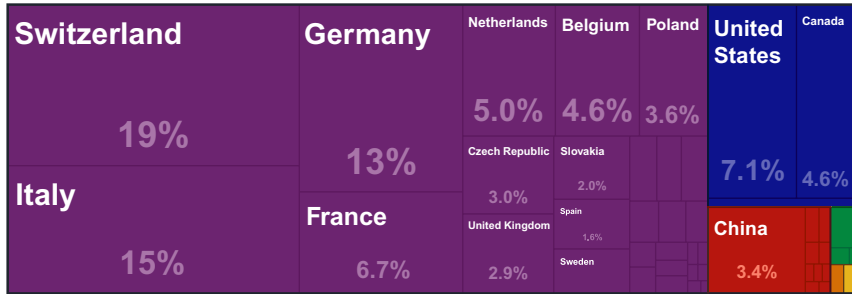


Fig. 2.11 Roasted coffee (not decaffeinated) international trade. (Source: Simoes, A.J.G., Hidalgo, C.A., 2011. *The economic complexity observatory: an analytical tool for understanding the dynamics of economic development*. In: *Workshops at the Twenty-Fifth AAAI Conference on Artificial Intelligence, with data from the UN Comtrade*.)

Finally, the next table shows the biggest consumers of coffee among the exporting markets (Table 2.6).

The table shows that, beyond the world’s biggest producer and exporter of coffee, Brazil is also the second biggest consumer country, just behind the United States. Indonesia, Ethiopia, and the Philippines are also big consumers of the beans.

It is interesting to observe that neither China nor India appear among the top consumers, even though these two countries have the biggest populations worldwide totalling 2.7 billion people or 38% of the global population (UN, 2017). India is the 14th biggest consumer country of coffee worldwide, and China is estimated to be the 16th largest consumer. This behavior is caused by cultural reasons, basically their preference for tea as a hot drink, in substitution for coffee, which leads to lower levels of consumption. ICO (2015) stated that, besides a lack of reliable statistics, in recent years it’s estimated that the consumption of coffee in China has been growing in double-digit rates, consuming more coffee than Australia, which shows signs of slowing. As the economy of China continues to grow, the pool of consumers with disposable income expands, and demand for coffee rises accordingly. The presence of coffee shops is no longer a novelty but rather an essential feature of the urban landscape. Although still predominantly a tea-drinking nation, China is rapidly developing a taste for coffee, which could have significant implications for the world market.

The main ideas presented in this section were the growing consumption of coffee worldwide, both in gross and per capita terms; the economies with the most consumers are, in this order, the European Union, United States, Brazil, Japan, Indonesia, and Russia; and the dynamics of the market’s demand, including importer’s re-exports.

Table 2.6 Domestic consumption of exporting countries (in thousands of 60-kg bags)

Country	Years								
	2000/01	2005/06	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Brazil	13.200	15.540	19.132	19.720	20.330	20.085	20.333	20.500	20.500
Indonesia	1.676	2.500	3.333	3.667	3.900	4.167	4.333	4.500	4.600
Ethiopia	2.014	2.609	3.383	3.383	3.400	3.650	3.675	3.700	3.700
Philippines	820	1.040	2.125	2.175	2.325	2.550	2.800	3.000	3.000
Mexico	1.305	1.725	2.354	2.354	2.354	2.354	2.354	2.354	2.354
Vietnam	402	800	1.583	1.650	1.825	2.000	2.200	2.300	2.300
India	1.000	1.337	1.800	1.917	2.000	2.100	2.200	2.250	2.250
Colombia	1.400	1.400	1.308	1.439	1.441	1.469	1.505	1.672	1.700
Venezuela	1.184	1.457	1.650	1.650	1.650	1.650	1.650	1.650	1.650
Thailand	500	500	775	1.100	1.130	1.200	1.250	1.300	1.300
Top 15	23.501	28.908	37.443	39.055	40.355	41.225	42.300	43.226	43.354
Total of exporting countries	27.236	33.454	42.352	43.952	45.315	46.109	47.245	48.244	48.298
World ^a	94.784	107.137	118.892	120.390	122.225	125.565	127.905	129.329	132.602

^a The world's consumption is considered as total consumption of importing countries plus total consumption of exporting countries. Data from the International Coffee Organization (ICO, 2017).

We can see a clear correlation between the demographic and income variables presented and coffee consumption worldwide, so given the forecasts available until 2022, it's expected that the quantity of coffee demanded globally will continue to grow until this year, but estimating this rise is not part of the scope of this chapter.

2.4 Coffee prices, coffee differentiation, and marketing approach

This section will focus on the relationship between supply and demand for coffee worldwide. Therefore, three main aspects will be studied: coffee prices, coffee differentiation, and marketing perspective.

2.4.1 Coffee prices

Although this chapter will not use prices to produce forecasts for the future, it's important to understand the relationship between prices and consumption to understand both the evolution and the current scenario of global coffee demand.

The following chart shows the evolution of nominal prices of the Arabica and Robusta coffee beans in US cents per pound (Fig. 2.12).

It's possible to observe that coffee prices had their lowest point in the series between 2001 and 2002, at US 22 cents/pound of Robusta and US 52 cents/pound of Arabica due to the global coffee crisis when, although the coffee business was booming in consuming developed countries (see Table 2.7),

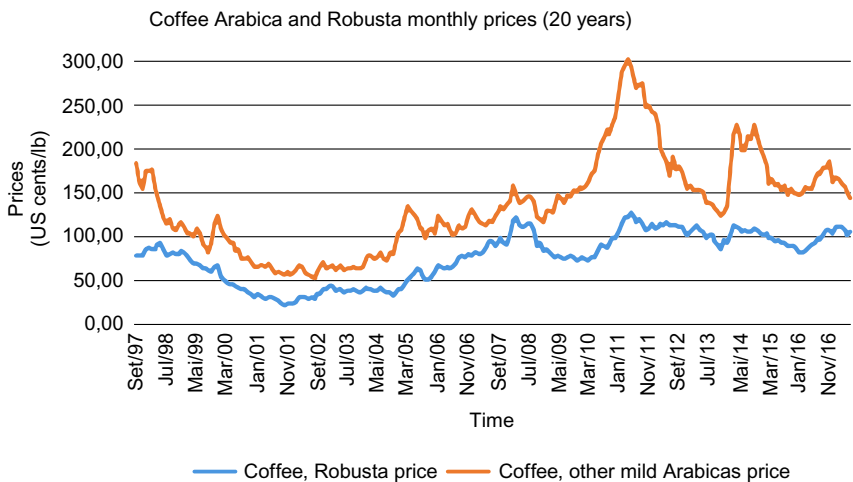


Fig. 2.12 Coffee Arabica and Robusta monthly prices in the last 20 years (1 lb = 0.454 kg). (Source: Data from Index Mundi and World Bank.)

Table 2.7 Retail prices of roasted coffee in selected importing countries (in US \$/lb)

Country	Years										
	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016
United Kingdom ^a	10.55	13.79	12.91	14.74	15.7	19.02	19.2	18.92	20.56	18.91	16.29
Malta ^a		7.8	8.4	10.36	13.1	14.81	14.15	14.99	14.93	12.8	13.33
Italy	5.31	5.7	4.44	6.13	7.34	8.52	8.49	8.99	8.85	7.48	7.45
Luxembourg			4.23	6.04	7.08	8.22	7.89	8.21	7.93	6.91	7.25
Russian Federation					7.03	7.75	8.62	8.69	7.65	6.43	6.65
Latvia		3.88	3.97	3.93	6.1	8.67	8.08	7.52	6.89	6.57	6.46
Japan	10.26	17.72	12.92	8.22	6.39	7.35	7.57	6.05	5.68	5.6	6.21
Czech Republic			3.36	3.79	5.01	6.58	7.13	7	6.61	5.75	6.14
Lithuania			3.62	3.78	5.37	7.81	7.09	6.6	6.55	6.06	6.08
Slovakia			2.44	2.79	4.84	6.06	6.71	6.82	6.67	5.6	5.74
Austria	4.9	5.18	3.05	3.77	6.69	8.32	8.38	8.62	8.63	7.44	5.64
Norway	3.31	4.54	2.98	4.11	4.48	5.78	5.48	5.05	7.5	5.81	5.56
Turkey		4.68	3.19	3.76	5.89	6.31	7.47	7.35	6.45	5.73	5.37
Cyprus	2.83	4.26	3.58	5.28	5.21	6.06	6.36	6.47	6.48	5.3	5.3
Germany	3.99	5.02	2.83	4.06	4.76	5.1	4.74	5.65	5.72	5.18	5.05
Denmark	3.81	5.57	3.45	4.28	5.44	6.92	6.72	6.36	6.43	5.85	4.94

Portugal	4.12	6.24	3.95	4.88	4.93	5.35	5.69	5.79	5.73	4.99	4.93
United States	2.97	4.04	3.45	3.26	3.91	5.19	5.68	5.45	4.99	4.72	4.39
Hungary		5.04	2.72	3.71	5.02	6.08	6.07	5.42	4.86	4.16	4.31
Slovenia			3.56	3.72	4.31	4.8	4.48	4.78	4.62	4.03	3.96
Bulgaria				2.92	3.62	4.16	3.44	3.59	3.75	3.45	3.79
Spain	3.62	4.45	2.69	3.22	3.92	4.42	4.47	4.53	4.44	3.82	3.73
Finland	2.98	3.97	2.29	2.84	3.69	5.36	4.8	4.29	4.31	3.9	3.67
Sweden	3.43	4.85	3.03	2.99	3.99	5.58	5.2	4.34	4.11	3.82	3.48
France	3.73	3.69	2.15	2.75	3.62	4.13	3.92	3.92	3.77	3.11	3.26
Poland		5.67	2.81	2.56	3.64	4.14	4.16	3.92	3.85	3.28	3.17
Belgium	3.27	4.88	3.22	4.1	5.18	6.48	6.2	6.24			
Netherlands	3.03	4.03	2.81	3.75	4.57	5.98	5.83	5.74	5.71	5.38	
Switzerland	4.83	6.32	4.09	5.86	6.59						
Average price	4.53	5.97	4.15	4.7	5.77	6.96	6.93	6.83	6.8	6	5.85

^a Soluble coffee.

Data from International Coffee Organization (ICO, 2017) (1lb=0.454kg).

large supplies of coffee and subsequently low prices caused an immense hardship to countries where coffee is a key economic activity, as well as to the farmers who produce it.^b On the other hand, during the first months of 2011, Arabica coffee especially saw its prices up to almost US \$3 a pound due to a supply shock because of very poor harvests and a demand shock.

We can see that the international crisis of 2008 also made coffee prices fall but not as much as seen in 2001. The point here is to observe that when you have an excess of production, that is, the quantity produced overcomes the quantity demanded, the prices tend to fall. And, for that reason, it is important for agents of the coffee value chain to analyze and develop projections on how the demand will be in the future.

The next table shows the retail prices of roasted coffee in selected imported countries.

We can see that, differently from commodity prices, retail prices are less susceptible to price variations. Take, for example, the United States and Western European countries (the world's largest consumers of coffee). In 26 years, their retail prices did not have strong volatility like the coffee bean prices in the international market. One of the possible reasons explaining this behavior could be due to the fact that the industry and retailers develop more studies forecasting demand than producers, so they more efficiently avoid having their products so abundant in the market if there is not enough demand for purchasing them. When processors expect that there will be a reduction in quantity demand, they reduce production. But for agricultural producers, it's harder to operate like this, because they don't grow coffee beans in machines, but in *Coffea* plants. Having a long-term perspective is important for them, and this is why this chapter focuses on this issue.

2.4.2 Coffee differentiation

As Lewin et al. (2004) mentioned in their paper, adding value to coffee production was necessary at that time and is still important today. Therefore, this section will analyze how the “adding value” process that connects supply and demand works, mainly through a term from marketing and economics called “product differentiation.”

One of the first articles about product differentiation was by Smith (1956), which studied product differentiation and market segmentation

^bThe Global Coffee Crisis: A Threat to Sustainable Development—International Coffee Organization (2002). Available from: <http://www.ico.org/documents/globalcrisis.pdf>. [Accessed 01 December 2017].

as alternative marketing strategies. [Rosen \(1974\)](#) introduced the Hedonic Prices approach to product differentiation, that is, a model that identifies price factors determined not only by internal characteristics of the good but also how external factors affect it.

[Green and Srinivasan \(1978\)](#) summarized the development of the methodology of Conjoint Analysis, relating it to relevant topics mainly in psychology and economics, and studied the reliability and validity testing of this methodology. They also discussed its applications to the evaluation of products and services in both the private and public sectors.

[Krugman \(1979, 1980\)](#) analyzed how product differentiation affects International Trade, as well as monopolistic competition and increasing returns of scale.

The main concept for this research will be the one proposed by [Nicholson and Snyder \(2011\)](#), who identified the impacts of differentiated products for the microeconomic theory:

The possibility of product differentiation introduces some fuzziness into what we mean by the market for a good. With identical products, demanders were assumed to be indifferent about which firm's output they bought; hence they shop at the lowest-price firm, leading to the law of one price. The law of one price no longer holds if demanders strictly prefer one supplier to another at equal prices [...] With differentiated products, we will take the market to be a group of closely related products that are more substitutable among each other (as measured by cross-price elasticities) than with goods outside the group.

That is, when a company differentiates its product from the competitors' through new attributes, the competition will be weaker, making room for price increases with a lower demand reduction in comparison to the scenario of perfect competition.

The differentiated coffee market requires that the agents of the supply chain distinguish their products by origin, processes, or other attributes, such as superior taste or fewer defects. These can be traded through more profitable channels than the usual industrial chains of undifferentiated commodity channels and include geographic indications of origin, gourmet and specialty coffee, organic, fair trade and other social appeals, ecofriendly, shade grown, and other certified coffees ([Lewin et al., 2004](#)).

[Raynolds et al. \(2007\)](#) compiled the governance models, environmental and social patterns, and market positions of the five main environmental and social certifications from third-party initiatives for the coffee markets: Organic, Fair Trade, Rainforest Alliance, Utz Kapeh, and Shade/Bird

Friendly. They found that the certifications that attempt to increase ecological and social expectations are expected to be increasingly challenged by those that seek to sustain current standards. They also concluded that the susceptibility of these initiatives to market pressures point to the need for private regulation to work together with public regulation in enhancing both social and environmental sustainability.

2.4.3 Marketing approach

Beyond the demographic and income effects, another point is crucial to understand the behavior of the demand: the marketing aspect, that is, the connection between the supply chain and consumers.

In the early 2000s, Nestlé started to introduce its new Nespresso machines worldwide,^c some years before Starbucks had started its globalization process by opening stores in Asia and Europe.^d

These coffee processors and retailers, as well as the so-called “third wave of coffee,” characterized by an increasing coffee quality, a more direct trade, higher emphasis on sustainability, lighter roast profiles, innovative brew methods, a focus on customer service (Hartmann, 2011), and also indication of origin (Quintão and Brito, 2016), changed the way consumers see and drink coffee, adding perceived value to the drink, as mentioned by Lewin et al. (2004), causing an increase in the per capita consumption worldwide along the 21st century.

We are maybe heading to a “fourth wave of coffee” based on high-tech innovations of the 21st century like e-commerce and drone deliveries. This new wave can change the way people purchase and consume coffee, reducing the importance of the point of sale and increasing the competition for online advertising. These subjects will be approached more deeply along the next chapters.

2.5 Final considerations

It’s crucial for agents of the coffee value chain to understand the consumers they are and will be selling to. The objectives of this chapter were to analyze the perspectives for the global demand for coffee in the present and the future, and to reach them, an extensive literature review, along with demographic and income data, were used to provide a better understanding

^cFor further information, see <https://www.nestle-nespresso.com/about-us/our-history#>.

^dFor further information, see <https://www.starbucks.com/about-us/company-information/starbucks-company-timeline>.

of the available information in such a way that all agents of the chain can organize themselves to be more competitive in the near future keeping in mind the global market that they will be inserted into.

Therefore, to reach this objective, the main points studied were, first, how the coffee supply chain is organized globally and who the main producers and exporters are. Then, the next step was to aggregate relevant data about the global demographic and income evolution, and current and future scenarios and understand how they relate to the demand for coffee. The main conclusions at this point were that the world's population and income per capita are rising, which seem to have a high correlation with the consumption of coffee. Moreover, the world is becoming older too, which is also positive for coffee suppliers. In the last 26 years, there was a 67.9% growth in global coffee consumption, which was not enough to elevate commodity prices given production expansion. This is why product differentiation is so important, so a marketing point of view as extracted from the literature was also approached at this point, highlighting the main attributes that coffee producers, processors, and retailers could use to overcome the pricing issue, mainly based on marketing strategies and technological innovations.

Thus, the last message of this chapter is to highlight the importance of the investments for the coffee value chain to develop not only high-end technologies for production and distribution but also a better understanding of the consumers they are selling to, so that new ways of coffee differentiation can provide a growing value to the entire chain.

The suggestion for future research is to study global consumption and also the per capita consumption by country and region to understand exactly which countries have the biggest potential demand, how to penetrate these markets, and also the development of more deepened pricing and consumption projections.

Appendix

The main data sources for this chapter were the United Nations' (UN) World Population Prospects, the International Monetary Fund (IMF), the World Bank national accounts data, and OECD National Accounts data files.

The available literature and data until 2017, including coffee consumption, its global trade, prices to growers, and retail prices, were extracted from the International Coffee Organization (ICO) and [Simoes and Hidalgo \(2011\)](#): Observatory of Economic Complexity.

Because the ICO separates their data between importing and exporting countries, with different time standards (the consumption of importing countries are available for the calendar years, whereas for the exporting countries, the data is distributed in crop years), the methodology established to estimate the Global Consumption at the year t (C_t^G) will be to sum the domestic consumption for the year t at the importing countries (C_t^m) and the domestic consumption for the crop year $t; t+1$ at the exporting ones ($C_{t;t+1}^x$). That is:

$$C_t^G = C_t^m + C_{t;t+1}^x \quad (2.1)$$

This method may cause distortions in relation to the reality, but it efficiently approximates the yearly consumption worldwide.

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