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Factors to achieve a balanced market

Background

In accordance with the provisions of the International Coffee Agreement 2007 the Organization seeks to promote an understanding of structural conditions in international markets and possibilities of achieving balanced prices. In this context, the present report provides an introductory analysis of the dynamics of the coffee market and determining factors in price formation, as well as measures to ensure a sustainable coffee economy.

Action

The Council is requested to take note of this document.

FACTORS TO ACHIEVE A BALANCED MARKET

Introduction

1.   In general economic equilibrium theory the price system reflects the balance of physical transactions. In the absence of storage, a market is in equilibrium when supply and demand quantities are equal. The interaction between supply and demand will determine that market prices always tend towards the equilibrium price. The market is always balanced, therefore, since any imbalance is corrected by movements in price[1]. The situation is slightly different in the case of agricultural products where prices can be determined by a market imbalance created by lack of storage facilities. In the coffee industry market prices are the result of a number of factors ranked in hierarchical levels of determination. Price formation factors are found mainly in production, consumption and stock movements. At the same time, however, less fundamental factors come into play in trading activities, and may superimpose themselves on underlying supply and demand factors in such a way as to influence price behaviour.

2.   The concept of a balanced coffee market relates to a market situation in which, on the one hand, the price set covers the production costs of the most efficient producers, and, on the other, when there is a relatively narrow gap between supply and demand, preventing any significant medium and long term imbalance that would fuel price volatility. The behaviour of the coffee market during the free market period from 1990 to the present, which had highly beneficial aspects for many participants, also posed a number of challenges for exporting countries, particularly price volatility and their weakness in relation to production costs at origin.

3.   It is worth analysing the extent to which fundamental factors could be favourable to a balanced market and lead to prices that could ensure a sustainable coffee economy[2]. For this purpose, this study will explore the impact of fundamental factors on the evolution of coffee prices and analyse the extent to which management of these fundamental factors could contribute to achieving a balanced market and price levels that would cover the production costs of efficient producers. The following points will be covered:

I.   Evolution of coffee market fundamentals
II.   Supply/demand relations and world coffee prices
III.   Suggestions for achieving a balanced market for a sustainable coffee economy

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[1] *Return to a stable balance can be achieved either by adjusting prices (upward or downward), or by adjusting quantities (production cuts or increases).*
[2] *The concept of a sustainable coffee economy refers to a situation in which price levels cover at least production costs to enable producers to maintain their activities.*

Methodology

4.   The methodology is based on the observation of prices and fundamental market factors during the period 1990 to 2013. Data on production and opening stocks in exporting countries were converted to cover calendar years to facilitate comparisons.

I.   Evolution of coffee market fundamentals

5.   The main factors involved in determining coffee prices are related to supply and demand, particularly production, consumption and stock movements. However, exogenous factors like speculative movements in the market can sometimes have a profound effect on the impact of fundamental factors on price formation.

A)   Coffee production and prices

6.   Graph 1 shows the evolution of production and prices, including ICO indicator prices and prices on the New York and London futures markets. Like most agricultural commodities, coffee is subject to marked variability in its production as a result of agricultural and climatic conditions. For example, a shortage or excess of rainfall affects the volume of production from one crop year to the next. Moreover, costs of production factors, particularly fertilizers and labour, can limit their use and lead to reduced production. Although growth of world production has been uneven, it recorded a remarkable increase from 94.8 million bags in 1990 to 142.5 million bags in 2013, an average growth rate of 1.8% a year.

Graph 1: World coffee production and prices
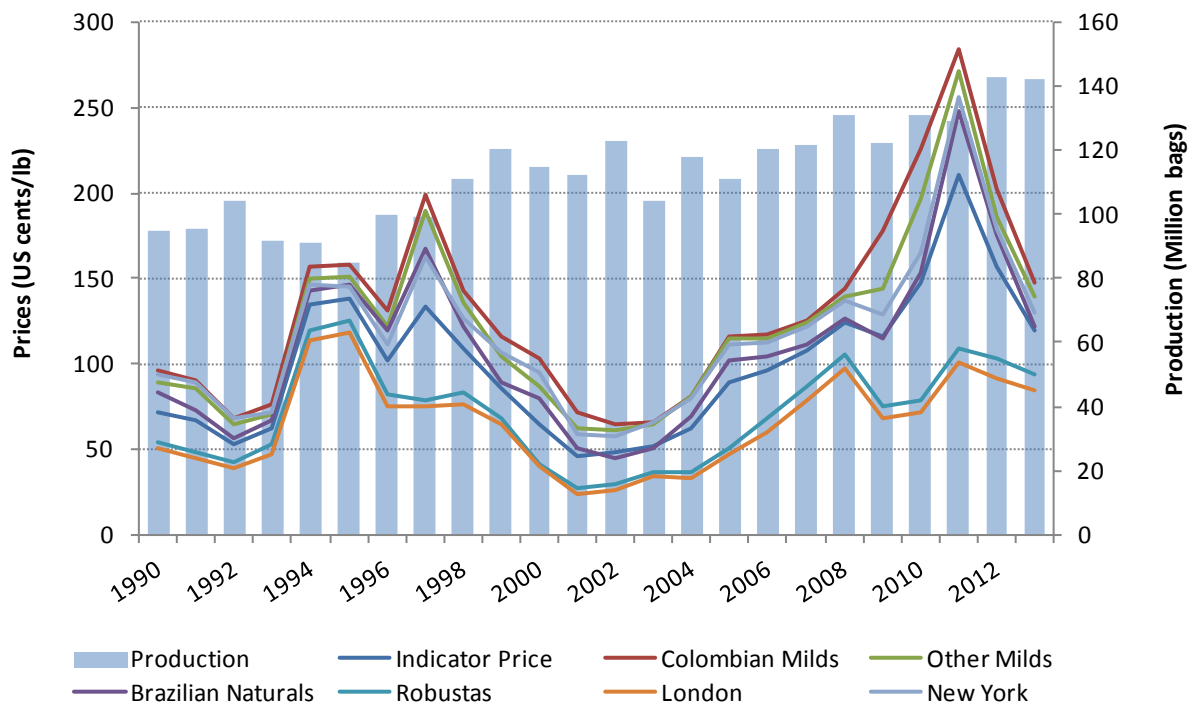
7.   The gap between the decision to commence production and the actual entry into production induces a cyclical character in coffee prices. High price levels encourage producers to plant but since production increases more slowly it can soon become surplus, entailing a fall in prices aggravated by speculative movements on the futures markets. Producers take anticipatory adaptive measures in the sense that decisions to invest or to improve the maintenance of their coffee farms are often motivated by current market price levels.

**Table 1: Changes in world production and prices**

	Production			Prices						
	Total	Arabicas	Robustas	ICO Composite	Colombian Milds	Other Milds	Brazilian Naturals	Robustas	New York	London
1990				71.53	96.53	89.46	82.97	53.6	93.78	50.03
1991	0.68%	1.55%	-1.50%	66.8	89.76	84.98	72.91	48.62	89.18	44.53
1992	9.25%	9.87%	7.63%	53.35	67.97	64.04	56.49	42.66	68.14	38.33
1993	-12.15%	-12.50%	-11.22%	61.63	75.79	70.76	66.58	52.5	71.32	47.15
1994	-0.37%	-2.52%	5.22%	134.45	157.27	150.04	143.24	118.87	145.93	113.13
1995	-7.10%	-7.39%	-6.39%	138.42	158.33	151.15	145.95	125.68	145.54	118.31
1996	17.52%	17.22%	18.22%	102.07	131.23	122.21	119.77	81.92	111.17	74.51
1997	-0.53%	-7.66%	16.29%	133.91	198.92	189.06	166.8	78.75	163.04	75.02
1998	11.93%	18.60%	-0.56%	108.95	142.83	135.23	121.81	82.67	126.27	76.39
1999	8.38%	11.55%	1.29%	85.71	116.45	103.9	88.84	67.53	106.48	64.07
2000	-4.58%	-14.90%	20.81%	64.24	102.6	87.07	79.86	41.41	94.58	40.11
2001	-2.14%	-7.46%	7.07%	45.59	72.05	62.28	50.7	27.54	58.86	23.92
2002	9.32%	19.38%	-5.74%	47.74	64.9	61.52	45.23	30.01	57.02	25.88
2003	-15.06%	-19.66%	-6.33%	51.9	65.33	64.2	50.31	36.95	65.24	34.11
2004	12.90%	17.23%	5.86%	62.15	81.44	80.47	68.97	35.99	79.53	32.84
2005	-5.43%	-9.07%	1.13%	89.36	115.73	114.86	102.29	50.55	111.38	46.8
2006	8.35%	14.38%	-1.43%	95.75	116.8	114.4	103.92	67.55	112.3	59.77
2007	0.80%	-6.87%	15.23%	107.68	125.57	123.55	111.79	86.6	121.83	78.56
2008	7.78%	13.91%	-1.54%	124.25	144.32	139.78	126.59	105.22	136.46	97.17
2009	-6.61%	-13.95%	6.28%	115.67	177.39	143.81	115.3	74.56	128.4	67.69
2010	6.90%	13.69%	-2.76%	147.24	225.52	195.99	153.72	78.74	165.2	71.98
2011	-1.33%	-0.40%	-2.87%	210.39	283.84	271.07	247.62	109.21	256.36	101.23
2012	10.81%	8.12%	15.41%	156.34	202.08	186.47	174.97	102.82	179.22	91.87
2013	-0.56%	-1.35%	1.20%	119.51	147.87	139.53	122.23	94.16	129.41	84.45

8.   The relationship between coffee production and prices shows a number of distinctive features since falls or increases in production do not necessarily trigger rises or falls in prices. Correlation coefficients between coffee production and prices are not very significant. Price elasticity of production is very weak, mainly on account of the time lag between an investment decision and the rise or fall in prices. If we regard available statistics as reliable, it can be noted that over the whole observation period from 1990 to 2013, falls in production during 2000, 2001 and 2013 coincided with falls in price. Similarly, production increases in 2004, 2006, 2007, 2008 and 2010 coincided with price rises. During other years, prices reacted in perfect accord with variations in production.

B)   Stocks and world prices

9.   Opening stocks in exporting countries were very high at the beginning of the 1990s following the abolition of the market regulation system but have fallen progressively since then. In specific terms opening stocks in exporting countries totalled 66.5 million bags in 1990 as against 47.2 million bags in 1998. This gradual decline was interrupted between 1999 and 2003, a period which coincided with the low prices crisis that affected the coffee economy in exporting countries. During this period opening stocks oscillated between 50 and 62 million bags, representing around over six months of world consumption.

Graph 2: Opening stocks in exporting countries and coffee prices
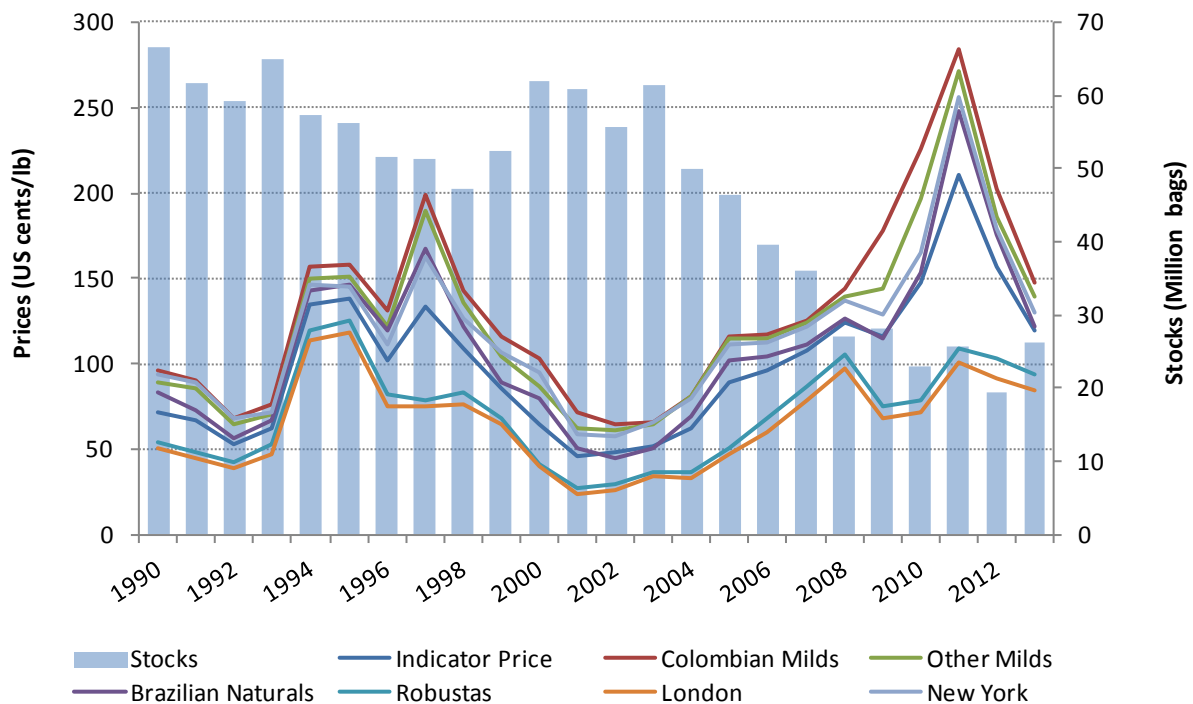
10.   Between 1994 and 1997 prices were relatively high despite opening stock levels of over 50 million bags mainly on account of climate shocks in Brazil. A severe frost occurred in Brazil in 1994 and it led in 1997 to speculation based on fears of further frosts that could affect supply availability and triggered some sharp rises in prices. Brazil was also hit by a drought in 1999[3]. It should be noted that stock retention programmes designed to support prices were operated in the framework of the Association of Coffee Producing Countries (ACPC) which has ceased to exist. Since 2008 levels of opening stocks have fallen to below 30 million bags, today representing slightly less than three months of world consumption. During the year 2013, however, stock levels increased rising from 19.3 million bags in 2012 to 26.2 million bags and exerting renewed downward pressure on prices. Some symmetry can be observed, therefore, between price movements and opening stocks in exporting countries. High price levels correspond to low stock and vice-versa. Correlation tests indicate strong negative correlation coefficients between opening stocks in exporting countries and green coffee prices (Table 2).

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[3] During *the period 1990 - 2013, climatic phenomena observed in many coffee exporting countries included frosts, droughts, the advent of El Niño and Hurricane Mitch.*

Table 2: Correlation coefficients between fundamental factors and coffee prices

| Correlation between volume and prices						
	Total Production	World consumption	EC-Opening stocks	IC-Inventories	World stocks	Global availability
ICO Composite	0.33	0.49	-0.72	-0.17	-0.81	-0.54
Colombian Milds	0.37	0.50	-0.72	-0.16	-0.81	-0.49
Other Milds	0.35	0.49	-0.71	-0.17	-0.80	-0.51
Brazilian Naturals	0.28	0.43	-0.66	-0.23	-0.76	-0.55
Robustas	0.13	0.28	-0.55	-0.31	-0.67	-0.66
New York	0.34	0.48	-0.69	-0.16	-0.77	-0.48
London	0.09	0.24	-0.52	-0.33	-0.65	-0.67
Correlation between ratios and prices					
	Production/ Consumption	Stocks/ Consumption	Op.stocks/ world consumption	IC-Inventories/ IC-Consumption	Global availability/ World consumption
ICO Composite	-0.41	-0.69	-0.63	-0.42	-0.72
Colombian Milds	-0.35	-0.70	-0.64	-0.41	-0.71
Other Milds	-0.37	-0.69	-0.63	-0.42	-0.71
Brazilian Naturals	-0.37	-0.64	-0.57	-0.46	-0.66
Robustas	-0.39	-0.51	-0.43	-0.49	-0.56
New York	-0.35	-0.66	-0.60	-0.39	-0.68
London	-0.38	-0.48	-0.40	-0.50	-0.53

11.   Stocks of green coffee in importing countries averaged 16.7 million bags during the period 1990 to 2013. Low stock levels were recorded between 1994 and 1999 as a consequence of the climate shocks that seriously affected supplies of some origins. As can be seen in the graph below, high inventory levels in importing countries correspond to low price levels (Graph 3). Correlation tests show, however, that the inverse relationship between prices and inventories was not significant (Table 2).

Graph 3: Inventories in importing countries and green coffee prices
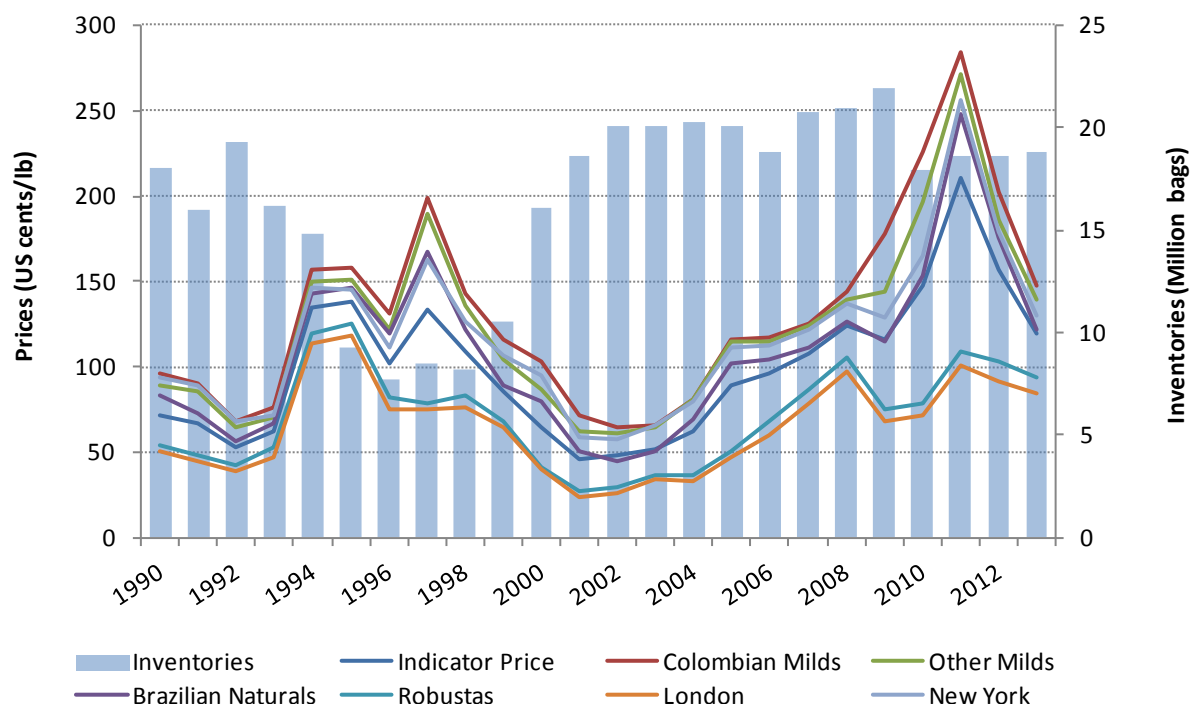
12.   As in the case of opening stocks in exporting countries, world stocks have a significant impact on green coffee prices. World stocks were estimated at 45 million bags in 2013 compared with 84.6 million bags in 1990. Correlation tests indicate strong negative coefficients with green coffee prices, including prices in futures markets and ICO indicator prices (see the Annex). With the free market in force since 1990, coffee prices have become very sensitive to changes in world stocks with a high stock level corresponding to a fall in prices (Graph 4).

Graph 4: World stocks and green coffee prices.
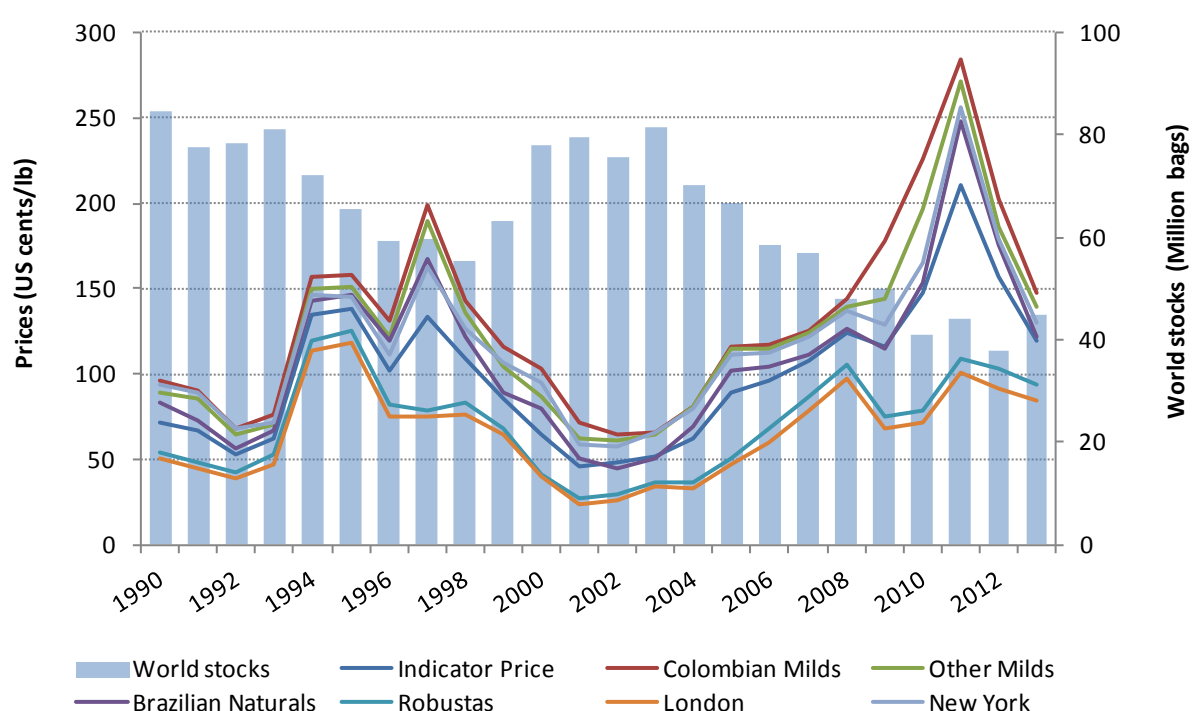
13.   Analysis of supply behaviour seems to indicate that apart from responses following major climate shocks, prices are relatively high when world stock levels are below 40 million bags. In specific terms it can be seen that opening stocks in exporting countries play a significant role in price movements. In the absence of exogenous shocks on supplies, when levels of opening stocks are below 20 million bags the market seems to become balanced around prices that are favourable to maintaining a sustainable coffee economy.

C)   Consumption and world prices

14.   World consumption comprises domestic consumption in exporting countries and consumption in importing countries, including traditional markets and emerging markets. World consumption has recorded sustained growth, increasing from 89.8 million bags in 1990 to 145.8 million bags in 2013, recording an annual average growth rate of 2.1% for the whole period (Graph 5). It is worth noting that in a 10-year period, from 2003 to 2013, world

consumption has increased by 28%, from 113.9 million to 145.8 million, an additional volume of almost 32 million bags. This dynamic growth is attributable mainly to the increase in the domestic consumption of exporting countries and consumption in emerging markets. Domestic consumption in exporting countries increased from 19.4 million bags in 1990 to 44.7 million in 2013, an average annual growth rate of 3.7%. Coffee consumption in emerging markets has also increased significantly and is estimated at 27.2 million bags in 2013 compared with only 7 million bags in 1990, representing an annual average growth rate of 6.1%. Traditional markets continue to be the most important coffee consumption areas despite a relatively weak growth rate (0.9% per annum). These traditional markets absorbed 73.9 million bags in 2013 compared with 60.2 million in 1990. It should be noted that despite this positive growth of around 2.1% p. a. in world consumption, achieving a balanced market for green coffee continues to be a major challenge.

Graph 5: World consumption and prices of green coffee
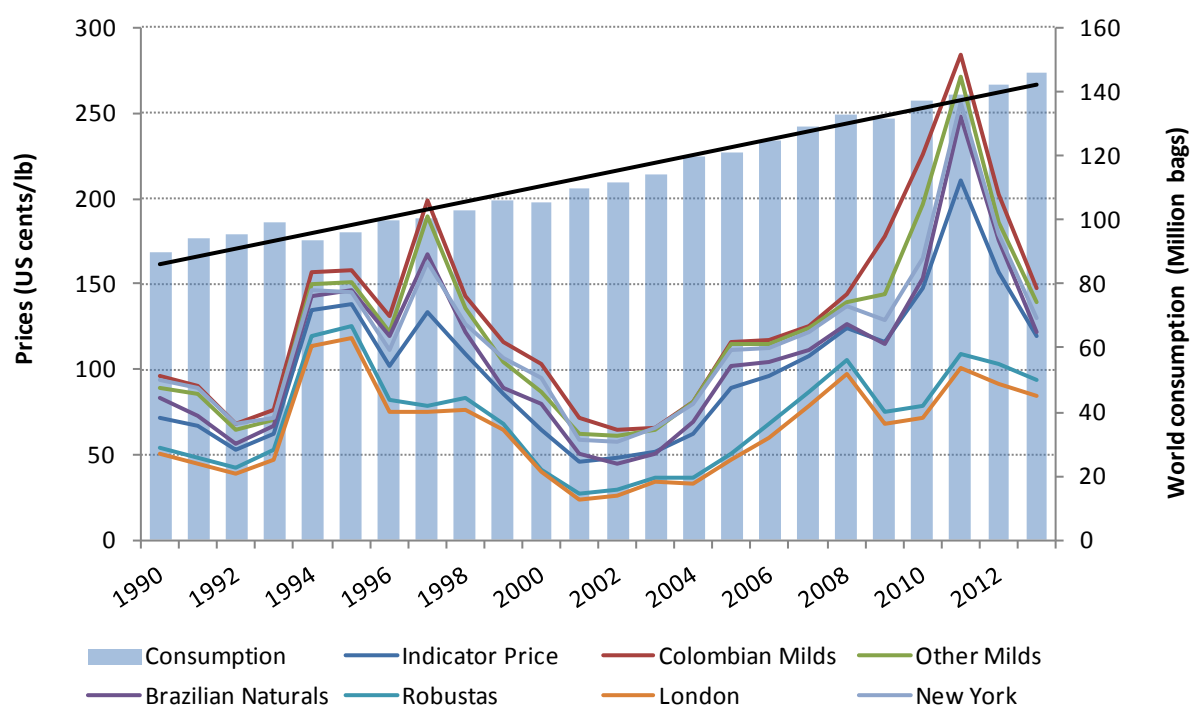
15.   Prices do not seem to follow the dynamics of demand since price falls were recorded despite the increase in demand.   Unlike production, consumption is not subject to disruptions like those related to economic cycles (expansion, crisis, recession and recovery). The price mechanism in a market economy, according to which prices reflect relative shortage, is not observable in the case of coffee.   On the contrary, correlation coefficients of world consumption and prices are significantly positive. Since consumption continues to grow, it would be logical to expect some firmness in prices or at least some downward rigidity.

Box 1

Technical market factors and prices on futures markets

The two main futures markets that reflect the supply situation of green coffee are the New York futures market for Arabicas and the London futures market for Robustas. The increasing activities of investment funds on these markets are linked to the growing importance of trading transactions based on so-called "chartist" methods. Investment fund managers or speculators take buying or selling positions on the basis of chart analysis. Their market positions are generally determined by chart analysis figures predicting price movements. The various technical analysis methods developed and used in daily transactions do not appear to take sufficient account of data on market fundamentals. Rather than reflecting the statistical situation of the market these trading strategies could be a determining factor in the short-term evolution of coffee prices. Apart from these trading techniques, which can increase price volatility, future markets do not increase price volatility. Rather, it is coffee price volatility that attracts operators who take positions on futures contracts that mitigate volatility.

Box 2

Exogenous impacts on fundamental factors:

➢ Climatic events.
➢ Social conflicts or wars in exporting countries.
➢ Trade policies in exporting countries that could affect exports.
➢ Market supply policy: export quota system.
➢ Supply policies in importing countries (tariff and health restrictions, or stock management).
➢ Differences in crop forecasts with possibilities of contradictory forecasts.
➢ Fluctuations in exchange rates for national currencies and the main currency used in the international coffee trade, namely the US dollar.

II.   SUPPLY/DEMAND RELATIONS AND WORLD COFFEE PRICES

16.   Comparative analysis of quantity/coffee price relationships will facilitate a better understanding of conditions for a balanced market. The Annex provides a summary of these relationships on the basis of calendar years since 1990 and gives indications that facilitate a comparison of their evolution and impact on prices. When the world production/consumption ratio is 1 or above, the market reacts to a situation of overproduction. The resulting falls in prices will depend on world stock levels, particularly opening stocks in exporting countries. Inventories in importing countries are seldom subject to significant variations since they generally represent two months of their total consumption. Two exceptional situations of intense speculation on the futures markets in 1997 and in 2008 should be noted. In 1997, fears of further frosts in Brazil and the consequences of El Niño climate phenomenon fuelled soaring prices. In 2008 the financial crisis encouraged the replacement of financial stocks by commodities futures contracts, including coffee.

17.   In a situation of production shortfall in relation to world consumption, the extent of readjustments to rising prices will also depend on the volume of available stocks. World stocks will thus have a significant impact on price levels and market equilibrium. Statistical correlation tests confirm this impact on prices (Table 2). The gap between world coffee supplies and consumption also has a significant effect on price movements.

III.   SUGGESTIONS FOR ACHIEVING A BALANCED MARKET FOR A SUSTAINABLE COFFEE ECONOMY

18.   The coffee market does not display the conditions of a competitive market where a state of equilibrium is achieved through adjustments to prices or quantities. The market is in constant disequilibrium and the resulting prices are those of an unbalanced market. One of the main reasons for this is the price inelasticity of supply and demand. When this imbalance is accentuated, particularly in a situation of profound and recurrent oversupply in relation to demand, downward pressure on prices is accentuated, creating unsustainable economic situations, particularly in countries heavily dependent on coffee. The basic question is to establish the extent to which this imbalance can be reduced to realize prices that are not only less volatile but also cover at least the costs of production of the most efficient producers. From this perspective, the challenge to producers in the framework of the free market would be to organize their activities efficiently through supply management and market development.

A)   Supply Management

19.   In the absence of any direct intervention in the market in the framework of regulation agreements, the supply management strategy begins with containment of production costs through improved productivity. Since producers are '*price-takers'*, reducing their production costs will enable them to optimize their earnings. They would also need to introduce improved technology and optimal use of agricultural inputs. In some countries, reduction of production costs would incorporate lower transfer costs thanks to fewer intermediaries between producers and the international market. In fact, in some exporting countries, producer wellbeing is strictly dependent on the transfer cost, which is the difference between the international market price (FOB or CIF price) and the farm gate price (price paid to producer). The strengthening of producer capacities in these countries could help to optimize their profit margins in the coffee industry.

20.   Segmentation of the market by developing the capacity to penetrate niche markets would be another strategy since a niche market provides an escape from strong downward pressures on prices resulting from oversupply in relation to the demand in traditional markets.

B)   Market development

21.   As one of the determining factors in achieving a balanced coffee market world consumption is one of the major concerns. A healthy coffee industry will depend on maintaining dynamic growth in consumption, particularly in areas unfamiliar with this consumer product. Developing the market will reduce the gap between global supply and world consumption to support prices. To achieve this aim, the world coffee industry must intervene in both traditional and non-traditional markets, including some domestic markets in producing countries, to stimulate demand and promote a positive image of coffee for consumers.

C)   Measures for adapting to price volatility

22.   Using the risk management tools available in the futures markets makes it possible to limit risks and improve earnings. Risk coverage strategies based on options seem best suited to producer needs in exporting countries. Options are a risk management tool that provides hedging against negative price movements while keeping open the possibility of profiting from a favourable price evolution. In other words, an option is the right, but not the obligation, to buy or sell a given quantity of coffee (physical or paper contracts) at a predetermined price, known as the 'exercise price', within a predetermined period or at a predetermined date. The price paid for purchasing the option is the premium. The option to purchase is known as the '*call*' and the option to sell is known as the '*put*'. The owner of the option is the only one who has the right to choose whether to exercise this right or not and the seller of the option is obliged to comply with this choice. Until the expiry of the option contract the buyer of the put option can exercise his right if the market price is below the exercise price of the contract. The buyer of the call option exercises his right only if and when the market price is above the exercise price.

CONCLUSION

23.   The coffee market, like most other perennial crop markets, will always be unbalanced given the aleatory nature of production. This means that the main factors for price instability are related to the supply situation, particularly production. Since coffee supply and demand price elasticities are weak in the short term, delayed reactions between production and consumption in response to price developments lead to over-reaction that can sometimes cause marked volatility. Changes in the supply situation can encourage or prevent the emergence of factors of a speculative nature, particularly investment fund activities. The interaction between fluctuating supplies and rigid demand, as well as the existence of adaptive anticipatory measures on the part of producers, induces a cyclical character in green coffee prices.

24.   The problem of market transparency (reliability of available statistics) continues to fuel speculation and increase volatility. For instance, the discontinuation of the system of verifying world stocks makes it impossible to use reliable data to forecast the impact on prices. The market is consequently deprived of real-time information on the movement of world stocks and their true incidence on the evolution of prices. In the absence of reliable information on supply developments, analysis of price equilibrium between supply and demand is a major challenge.

25.   In addition, futures market prices seem to be a better indication of the real supply situation. In this perspective, the best strategies for producers are control over their production costs to increase their profit margins in relation to world prices that are beyond their control.

RATIO OF MARKET FUNDAMENTALS

Ratios	Production/ Consumption	Stocks/ Consumption	Op.stocks/ world consumption	IC-Inventories/ IC-Consumption	Global availability/ World consumption	World stocks as %World cons.	World stocks as month cons.	IC-Stocks as months of IC cons	ICO Composite	Colombian Milds	Other Milds	Brazilian Naturals	Robustas	New York	London
1990	1.06	0.94	0.74	0.26	2.00	94.2%	11.30	3.08	71.53	96.53	89.46	82.97	53.6	93.78	50.03
1991	1.01	0.82	0.65	0.21	1.83	82.3%	9.87	2.57	66.8	89.76	84.98	72.91	48.62	89.18	44.53
1992	1.09	0.82	0.62	0.26	1.92	82.3%	9.88	3.11	53.35	67.97	64.04	56.49	42.66	68.14	38.33
1993	0.92	0.82	0.65	0.21	1.74	81.7%	9.80	2.48	61.63	75.79	70.76	66.58	52.5	71.32	47.15
1994	0.97	0.77	0.61	0.20	1.74	76.8%	9.21	2.45	134.45	157.27	150.04	143.24	118.87	145.93	113.13
1995	0.88	0.68	0.59	0.13	1.57	68.3%	8.20	1.51	138.42	158.33	151.15	145.95	125.68	145.54	118.31
1996	1.00	0.59	0.52	0.10	1.59	59.3%	7.11	1.21	102.07	131.23	122.21	119.77	81.92	111.17	74.51
1997	0.99	0.59	0.51	0.11	1.58	59.5%	7.14	1.33	133.91	198.92	189.06	166.8	78.75	163.04	75.02
1998	1.08	0.54	0.46	0.11	1.61	53.7%	6.45	1.26	108.95	142.83	135.23	121.81	82.67	126.27	76.39
1999	1.14	0.60	0.50	0.13	1.73	59.5%	7.15	1.57	85.71	116.45	103.9	88.84	67.53	106.48	64.07
2000	1.09	0.74	0.59	0.20	1.83	73.9%	8.87	2.44	64.24	102.6	87.07	79.86	41.41	94.58	40.11
2001	1.02	0.72	0.55	0.23	1.75	72.4%	8.69	2.73	45.59	72.05	62.28	50.7	27.54	58.86	23.92
2002	1.10	0.68	0.50	0.24	1.78	68.0%	8.16	2.91	47.74	64.9	61.52	45.23	30.01	57.02	25.88
2003	0.92	0.72	0.54	0.24	1.63	71.6%	8.59	2.86	51.9	65.33	64.2	50.31	36.95	65.24	34.11
2004	0.98	0.59	0.42	0.23	1.57	58.5%	7.02	2.72	62.15	81.44	80.47	68.97	35.99	79.53	32.84
2005	0.92	0.55	0.38	0.23	1.47	55.1%	6.61	2.73	89.36	115.73	114.86	102.29	50.55	111.38	46.8
2006	0.97	0.47	0.32	0.21	1.43	46.8%	5.62	2.50	95.75	116.8	114.4	103.92	67.55	112.3	59.77
2007	0.94	0.44	0.28	0.22	1.38	43.9%	5.27	2.68	107.68	125.57	123.55	111.79	86.6	121.83	78.56
2008	0.99	0.36	0.20	0.22	1.35	36.1%	4.33	2.65	124.25	144.32	139.78	126.59	105.22	136.46	97.17
2009	0.93	0.38	0.21	0.24	1.31	37.9%	4.55	2.84	115.67	177.39	143.81	115.3	74.56	128.4	67.69
2010	0.95	0.30	0.17	0.19	1.25	29.8%	3.58	2.24	147.24	225.52	195.99	153.72	78.74	165.2	71.98
2011	0.93	0.32	0.18	0.19	1.25	31.8%	3.81	2.31	210.39	283.84	271.07	247.62	109.21	256.36	101.23
2012	1.01	0.27	0.14	0.19	1.27	26.6%	3.19	2.26	156.34	202.08	186.47	174.97	102.82	179.22	91.87
2013	0.98	0.31	0.18	0.19	1.28	30.8%	3.70	2.23	119.51	147.87	139.53	122.23	94.16	129.41	84.45