A Flagship Report of the International Coffee Organization

Coffee Development Report 2019

Growing for prosperity

Economic viability as the catalyst for a sustainable coffee sector

INTERNATIONAL COFFEE ORGANIZATION

The ICO's mission is to strengthen the global coffee sector and promote its sustainable expansion in a market-based environment for the betterment of all participants in the coffee sector.

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Abbreviations

ACE	Alliance for Coffee Excellence
ACPC	Association of Coffee Producing Countries
AMIS	Agricultural Market Information System
AMSP	Accompanying Measures for Sugar Protocol countries
ASAP	Adaptation for Smallholder Agriculture Programme
BASIC	Bureau for the Appraisal of Social Impacts for Citizen information
BMEL	German Federal Ministry of Food and Agriculture
BMZ	German Federal Ministry for Economic Cooperation and Development
CACHET	Climate and Commodity Hedging to Enable Transformation
CAP	Common Agricultural Policy
CCC	Conseil du Café-Cacao, Côte d'Ivoire,
CFI	Cocoa and Forests Initiative
CPI	Consumer Price Index
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FNC	Colombian Coffee Growers Federation
FOB	Free On Board
FRED®	FRED data - Federal Reserve Bank of St. Louis
GBE	Green Bean Equivalent
GCP	Global Coffee Platform
GDP	Gross Domestic Product
GISCO	German Initiative on Sustainable Cocoa
GIZ	Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
HDI	Human Development Index
ICA	International Coffee Agreement
ICAFE	National Coffee Institute, Costa Rica
ICC	International Coffee Council
ICE	Intercontinental Exchange
ICO	International Coffee Organization
ICT	Information and communication technology
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
ITC	International Trade Centre
MFN tariff	Most Favored Nation Tariff
NAMA	Nationally Appropriate Mitigation Actions
NCA	National Coffee Association of USA
NCF	National Coffee Fund, Honduras
NY	New York City (US)
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
PFAN	Private Financing Advisory Network
PPI	Producer price index
PRM	Price risk management
PWT	Penn World Table
SAFE Platform	Sustainable Agriculture Food Environment Platform
SAI Platform	Sustainable Agriculture Initiative Platform
SCC	Sustainable Coffee Challenge
SDGs	Sustainable Development Goals
SECO	State Secretariat for Economic Affairs, Switzerland
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UN-WIDER	United Nations University World Institute for Development Economics Research
US	United States of America
USAID	United States Agency for International Development
USDA	United Stated Department of Agriculture
VSS	Voluntary Sustainability Standards
WB	World Bank
WFP	World Food Programme
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Foreword

Women and men started drinking coffee many centuries ago and traces of “formal” cultivation and trading of coffee go back as far as the 15th Century. Nowadays, coffee is commercially produced in more than 50 countries and the world drinks over 3 billion cups a day – either alone or with family, friends or colleagues. Some drink it at home, others at work or in coffee shops. People even drink coffee in outer space.

Since 1990, coffee growers have increased production from 100 million to over 165 million 60-kg bags today. Coffee producing countries still export the bulk of their produce, earning around USD 20 billion in exports a year. The annual revenue of the coffee industry is estimated to exceed USD 200 billion. Around 25 million farming households depend on coffee for their living. At least 100 million families depend on coffee for their living. A substantial number of jobs and economic opportunities are created along the global coffee value chain. These range from input providers to farmers, traders, processors, roasters, distributors, marketers, packaging suppliers, baristas and even those who deal with the disposal and re-use or recycling of coffee waste. Coffee is a growth market. Globally, the number of consumers continues to rise and consumption is steadily growing at a healthy annual rate of 2.2%.

In spite of the positive market trends, significant differences exist among actors in the coffee value chain in terms of risks, income, access to resources and vulnerability to price volatility and climate change. The drop in coffee prices by 30% over the last two years has had negative repercussions for the lives of many coffee farmers. How can we ensure equitable prosperity for all coffee stakeholders, and especially for millions of coffee farmers? They represent the weakest link in the value chain and often struggle to cover basic production costs at current price levels, especially taking into account increases in cost of inputs and logistics.

All those involved in the coffee sector agree on the need to take corrective actions in order to ensure greater prosperity for coffee farmers and their families, so that the growth in the sector is equitableand sustainable in the future. This

Report seeks to tackle these complex issues. It has been produced using rigorous, factual, informed and independent analysis.

This first Coffee Development Report (CDR) marks the launch of a new series of flagship reports, which represent a significant upgrade in the ICO’s function as a global forum for discussion of coffee policies. The flagship reports will strengthen the Organization’s role as the major and neutral source of coffee data and analytics and set the agenda in the global debate on issues related to the development of the coffee sector. In this perspective, the CDR responds to the ICO’s mandate to be a leading source of information on the coffee sector in order to enhance market transparency, as set out in the International Coffee Agreement 2007 and also reiterated in the current Five-year Action Plan 2016-2020.

This first edition of the CDR is based on the analysis of ICO data and information from external sources and seeks to offer a framework to capture the complex nature of the coffee market. It builds on and complements other ICO studies that also shed light on the strong relations between the development of a sustainable and inclusive coffee sector and its economic viability. The Report draws on the outcomes of the structured sector-wide dialogue launched by the ICO in 2018-19, in which 80 experts and 2000 participants were involved in five consultative events organized by the ICO in Nairobi, at the United Nations in New York City, in Rome at the EXCO Development Expo and at the European Commission in Brussels.

By placing economic sustainability at the centre of attention, this year's CDR responds to the concerns of ICO members, as set out in Resolution 465 on Coffee Price Levels.

By virtue of a rigorous quantitative analysis, the relationship between coffee farming and socio-economic indicators such as poverty and food security is examined. The solutions identified seek to address low price levels and price volatility in order to meet the long-term sustainability goals set out in the United Nations Sustainable Development Agenda. At the heart of the UN Agenda is the concept that "No one should be left behind", and surely the vision of the ICO is that this should not happen to coffee farmers, workers and their families and to all coffee stakeholders.

This effort, I hope, will inform the political debate and help mobilize the support of governments, financial institutions and international organizations in order to help the world coffee sector to grow sustainably, while reducing barriers to trade, fostering social, economic and environmental sustainability and generating prosperity for all those involved in the coffee value chain.

It is a great pleasure for me to present this Coffee Development Report 2019, which adds a new dimension to the analysis of the development of the world coffee sector. The Report reaffirms the commitment of the ICO in supporting its members and all coffee stakeholders to achieve inclusive and sustainable development and to meet all 17 Sustainable Development Goals. A key message of the Report is that the sustainable and inclusive development of coffee sector requires major shifts, through enhanced sector-level cooperation based on shared values and responsibilities and an alignment of actions, funding and schemes through pre-competitive action, public-private partnerships and investments.

Finally, I extend my personal compliments to the entire ICO team, including our international experts and external contributors, who accepted the challenge of initiating and blazing a new trail for the Organization by producing this timely Report that should inspire all parties interested in promoting the sustainable development of the whole coffee sector.

José Sette

Executive Director, ICO

Overview

SINCE 1990 GLOBAL PRODUCTION OF COFFEE HAS INCREASED BY MORE THAN

65%

IN 2017/18 THE VALUE OF COFFEE EXPORTS WAS

$20 BILLION

REVENUES OF THE COFFEE INDUSTRY EXCEED

$200 BILLION

As the world's love of coffee continues to grow, how do we ensure that everyone involved in getting the crop from field to cup is fairly remunerated and protected from market shocks?

1. Background

Coffee is one of the most important tropical commodities and provides economic benefits at each step of the global value chain that links growers to consumers. The coffee industry contributes to the economies of both exporting and importing countries. As a beverage, it brings joy to a growing number of consumers around the world.

At origin, production of coffee provides a livelihood for up to 25 million farmers and their families. Additional economic benefits are accrued by actors along the global value chain, be they traders, roasters, retailers and their workforce or other stakeholders.

Since 1990, the global coffee sector has expanded significantly as production has increased by more than 65% (ICO, 2019a). The main driver of growth has been rising consumption in emerging economies and coffee-producing countries. Demand in traditional markets with already high per capita consumption has been reinvigorated by the growth of high-value market segments, such as specialty coffee, and as result of product innovations that provide new flavours and more convenience to consumers.

FIGURE 1
Coffee prices dropped by 30%

SOURCE: ICO

The value of coffee exports amounted to USD 20 billion in 2017/18 (ICO, 2019a). The revenue of the coffee industry is several times higher and is estimated to surpass USD 200 billion (Samper, Giovannucci and Vieira, 2017).[1] Most of the value is created in coffee importing countries.

Despite the overall growth in the sector, coffee prices have experienced a continued downward trend since 2016, dropping 30% below the average of the last ten years (Figure 1). Coffee growers worldwide are struggling to cover their operating costs as input, compliance and transaction costs continue to rise (ICO, 2019b, 2019c). Consequently, farm incomes decline and the livelihoods of coffee-producing households, the majority of which are led by smallholders[2] in low- and middle-income countries, are increasingly at risk. The slump in coffee prices has severe economic and social consequences for producing countries.

This situation poses a serious risk to the sustainability of the sector and to future coffee supply. If no action is taken, the coffee sector may not be able to make its critical contribution to achieving the Sustainable Development Goals (SDGs) of the United Nations. Instead, progress made previously could be jeopardized or reversed.

2. Objectives and structure of the report

This report provides an in-depth analysis of the root causes and impact of the current coffee price crisis. It contains an independent assessment of possible actions to address the economic challenges and foster long-term sustainability of the coffee sector. In addition, the report introduces the concept of living income as reference framework for the identification of priority solutions (Text box 2).

The report provides the analytical underpinning to the Structured Sector-Wide Dialogue, a process initiated by the ICO as part of the implementation of Resolution 465 (Text box 3).

The aim of the dialogue is to identify solutions and concrete actions to alleviate the short-term impact of low prices on producers and to achieve a sustainable coffee sector in the long term. The sector-wide dialogue initially comprised a series of five global consultation events with contributions from more than 80 coffee sector and development experts as well as participation of over 2,000 stakeholders.[3]

The report is structured in two main sections:

Section A assesses market fundamentals as well as other factors determining price levels and volatility. The current coffee price crisis is contextualised within a wider framework that links the commodity price cycle with development indicators at farm, regional and country level. Market opportunities for farmers that result from the

[1] The valuation depends on how widely the industry is defined. A recent estimate of the National Coffee Association estimates the US coffee industry alone at more than USD 250 billion http://www.ncausa.org/Industry-Resources/Economic-Impact

[2] There is no single definition of smallholder farmers. However, in general terms, a smallholder farmer owns less than two hectares of land, relying chiefly on family labour and only rarely on occasional workers on a contractual basis for cultivation and harvest (FAO, 2015).

[3] The results of the consultative process are summarised in the interim report of the ICO Sector-wide Dialogue (Document ED 2309/19).

TEXT BOX 1
COFFEE PRICES

Throughout this Report various coffee prices are quoted and used for analysis. Coffee prices fall broadly in two categories: spot prices and futures prices.

International spot market prices: ICO group indicators for Colombian Milds, Other Milds, Brazilian Naturals and Robustas (based on ex-dock quotations reported in main markets).

The group indicator prices are combined in a single measure, the ICO composite indicator which represents an 'average coffee price'.

National spot market prices: Prices paid to growers refer to farm-gate prices reported in local currency by ICO Member countries.

Futures market prices: Quotations from the New York (Arabica) and London (Robusta) exchange. The prices are the average of the 2nd and 3rd positions.

SOURCE: ICO document ICC-105-17 'Rules on Statistics – Indicator Prices'.

TEXT BOX 2
THE CONCEPT OF A LIVING INCOME

Living Income is defined as 'the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household.'

The concept was inspired by the living wage debate in the garment sector, where cost of living benchmarks have been calculated based on the Anker and Anker (2017) methodology. This methodology has been adapted and is being piloted in multiple smallholder-dominated agricultural sectors around the world. In the coffee sector, initial steps are being taken by various stakeholders to conduct living income benchmarks (for example, in Uganda). Once the cost of a basic but decent living in a coffee growing region is calculated, it can be compared against the actual income that coffee smallholders earn in that region. As a holistic, household-based concept, living income allows for the identification of solutions that strengthen the profitability of a farming business from diversified sources whether coffee or other crops, livestock, and off-farm income-generating activities. The concept is increasingly recognized by donors, industry, civil society, and researchers as a credible and practical framework to address the incomes of smallholder farmers.

SOURCE:: Anker, R. & Anker, M. (2017). Living Wages Around the World: Manual for Measurement. Cheltenham: Edward Elgar Publishing.

overall growth of the coffee sector are assessed in relation to more equitable growth. The comparison of the ongoing 'coffee price crisis' with previous down-cycles in the markets highlights important differences that define the scope for potential action.

Section B analyses concrete actions that coffee stakeholders, both public and private, can take to address the impact of the coffee price crisis in the short term, as well as actions in the medium and long term that can effect transformational change towards a global sector that is competitive, fair, inclusive and environmentally friendly, thereby contributing to providing growers with a living income and achieving the SDGs. By considering trade-offs and barriers to implementation this report prioritizes solutions that are effective and scalable. The section closes by articulating stakeholder roles and responsibilities.

3. Main findings

Coffee is economically important but the cyclical nature of the market is a challenge at farm-level and for producing countries. Coffee is a source of income for more than 12 million farms worldwide, a quarter of which are operated by women. It provides direct employment to more than 25 million families in producing countries. Coffee remains an export commodity. With 70% of production exported, coffee provides vital foreign exchange earnings. However, export dependency exposes farmers, many of whom are vulnerable smallholders, and governments in producing countries to significant market risks. Volatile markets are challenging, in particular to the 20% of coffee producing countries that are ranked low in the Human Development Index (HDI < 0.5), as defined by the UNDP.

Current low coffee price levels are mainly the result of overproduction. The study identifies the fundamentals of demand and supply to be key drivers of price levels. Two consecutive years of surplus in the market have resulted in an estimated oversupply of almost 8 million 60-kg bags in 2018/19, the equivalent of nearly 5% of global output. Oversupply is the key factor driving current low coffee price levels, despite steady growth in consumption.

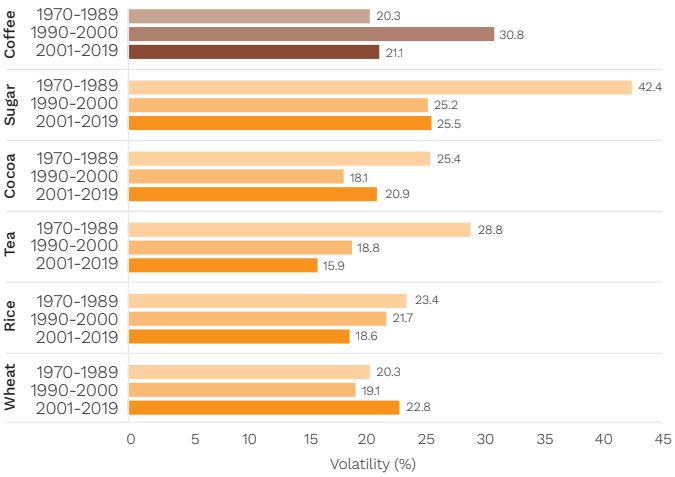
Non-fundamental factors can also affect price levels. Depreciation of local currencies of certain producing countries against the dollar increases the competitiveness of some countries on the world market. While this lies outside the influence of growers, it provides incentives to produce and export, further fuelling the oversupply in the market.

Speculation in coffee futures markets can intensify price movements. The activity of non-commercial traders can initially exacerbate upward and downward price swings, although market fundamentals of demand and supply prevail in the long run. The results for the coffee market are in line with research on other agricultural commodities.

Concentration on the buyer side is increasing, but a link with price levels remains unclear. However, market power on the buyer side could lead to unfavourable contract terms for upstream value chain actors, such as farmers.

Long-term trends in coffee prices are negative in some countries. Real international coffee prices show a high variation in the short run but no long-term trend. In some producing countries (e.g. Brazil, Colombia, Ethiopia, Honduras), however, real coffee prices have decreased since the 1970s, potentially leaving farmers worse off if falling prices have not been offset by higher productivity.

FIGURE 2
Volatility of coffee prices and other agricultural commodities



NOTE: Volatility is measured as the annualized standard deviation of the monthly rate of change of the price indicator. Price indicators are: ICO composite indicator for coffee, and the World Bank Commodities Price Data for Cocoa, Sugar, Tea, Rice and Wheat.
The difference in coffee price volatility between the periods 1970-1989 and 1990-2000 is significantly different at 95% statistical confidence level.
The difference in coffee price volatility between the periods 1970-1989 and 2001-2019 is not significantly different.
SOURCE: ICO

Price volatility is not on the rise but remains at a critical level (Figure 2). In the decade following the liberalisation of the coffee market, price volatility initially increased from 20.8% during the period when ICA economic clauses (quotas) were in place to 30.8%. Volatility in the subsequent period

TEXT BOX 3
RESOLUTION 465

At its 122nd Session in September 2018 in London, the International Coffee Council adopted Resolution 465 'Coffee Price Levels' to address the impact of low prices on the livelihoods of coffee farmers.

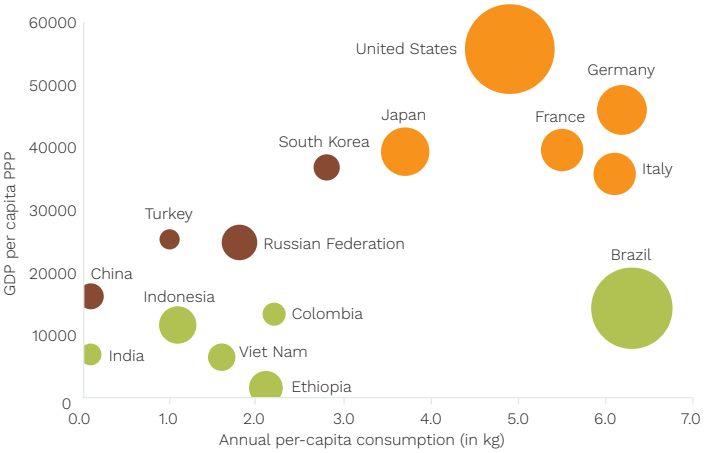
This resolution provides the Organization with a strong mandate to respond in a coordinated and integrated manner to current coffee price levels, including opening a sector-wide dialogue to engage all value chain actors, as well as the international community, in collective action. Other areas include taking measures to promote coffee consumption and to raise the awareness of consumers to the economic reality of coffee farmers.

(2001-2018) was significantly lower at 21.1%, statistically indistinguishable from the level observed during the quota period. Compared to other cash and food crops, coffee prices show similar volatility levels, leaving farmers with risky production and livelihood choices.

The impact of prolonged periods of low price levels on producers is severe. Within a decade, the cost of production in local currency has nearly doubled in major production regions. Labour constitutes more than 50% of total cost in most production systems (except Brazil). In high-cost origins, 25-50% of farmers are unable to cover their full production cost. Systematic global farm-level data is not available – pointing at a severe data gap – but existing studies in individual countries show that strained liquidity of farmers leads to reduced use of seasonal inputs and lack of long-term investments in the modernization of coffee plantations. The risk of pests and diseases spreading across coffee areas increases, as does vulnerability to the impact of climate change.

Spatial concentration of production means less diversity of origins and higher supply risks. Since 1990 the share of top 5 producing countries in global output has increased from 57% to over 70%. Concentration of production could increase further and result in higher supply risks and less consumer choice in terms of origins.

FIGURE 3
Per-capita consumption across markets (2018)



NOTE: The size of the circles represents total annual consumption (in million bags).
Categorization: traditional markets (orange), emerging markets (brown), exporting countries (green)
SOURCE: ICO

Equitable growth is possible but barriers to value addition remain. Coffee consumption in emerging markets and producing countries has increased at a faster pace than in traditional markets, providing new market opportunities. Today 46% of the global demand for coffee stems from emerging markets and coffee-producing countries, compared to 29% in the early 1990s. In view of global population growth and a continuing convergence of per-capita consumption rates between traditional and non-traditional coffee-consuming countries, significant potential for growth of the overall coffee market still exists (Figure 3).

Rising costs for processing, marketing and distribution in consuming countries contribute to the decreasing farmers' share in the coffee retail price. The scope for systematic analysis of margins at various levels in the supply chain is limited due to a lack of data and transparency. However, in a competitive market with increasing costs, margins for value chain actors tend to be low. The scope for re-distribution of value from downstream value chain actors to coffee farmers would be limited. Strategies that aim at the creation of value on farms through decommoditization (e.g. via accessing high-value markets) and at the level of producing countries (e.g. through processing of green coffee) would be more effective in creating economic benefits and fostering prosperity.

Over 90% of coffee is exported in green form and value addition remains concentrated in importing countries. While technical challenges can be overcome, transportation and marketing costs, as well as tariff and non-tariff trade barriers, remain an obstacle to value addition at origin.

An economically viable coffee sector in producing countries contributes crucially to achieving the Sustainable Development Goals. Quantitative analysis traces the effect of coffee price shocks from farm-level to rural communities and the wider economy, confirming a strong correlation between changes in the international price of coffee and economic and social development. Higher coffee prices are associated with more rural employment, higher contribution of agriculture to GDP, lower levels of poverty (SDG 1), increased food security (SDG 2), reduced inequality (SDG 10), and higher political stability (SDG 16). Hence, policies that help to increase and stabilise income levels of coffee-producing households can have a significant impact on economic and social development, thereby directly contributing to the realisation of the 2030 Agenda for Sustainable Development.

Phases of boom and bust are a recurring theme in the coffee market but the sector has changed since the previous coffee crisis. Structural changes include the concentration of production in fewer origins on the supply side and the consolidation of the industry on the processing side. Sustainability initiatives have grown, ethical consumerism is more widespread, the speciality coffee segment has emerged with dynamism and almost half of the coffee produced worldwide is now consumed outside traditional markets. There are new challenges, such as the impact of climate change on coffee production, posing a serious threat not only to the livelihood of millions of growers but also affecting the sustainability of the entire sector.

On the other hand, **there also opportunities related to innovation and new technologies** that can help addressing at least some of the challenges faced by the sector. For example, our ability to collect and analyse data has increased dramatically as a result of the ongoing digitalisation. Digital innovations can support farmers' decision making, increase productivity, result in better access to finance and markets, improve efficiency and transparency in value chains and bring producers closer to consumers.

4. Key areas for action to promote growth for prosperity in the coffee sector

The Report discusses a wide range of actions that can be taken at production, market, and sector governance level and their trade-offs and barriers to implementation are assessed.

Production level. Actions at the production level include mechanisms that can enhance farm performance (productivity, quality and resilience), promote income diversification, improve access to insurance against agricultural and price risks, encourage aggregation of growers and create added value.

In many producing countries, there is still a need to establish, strengthen or innovate new service delivery models that can be driven by supply chain actors, producer organizations, the public sector or specialized service providers. Availability of farm-level data remains a serious constraint. The design of these models needs to consider the farming system and households' needs as a whole (instead of a single focus on coffee) to achieve a living income. Measures that increase the profitability of coffee farming can have important positive, short-term effects for producers. In the long term however, these measures can create an imbalance in supply and demand. Therefore, production measures must take into account sector-level supply management strategies. In addition, greater investment in research and development (e.g. varieties) is needed to enhance the economic sustainability of coffee farming. The adoption of information and communication technology (ICT) innovations also has the potential to achieve transformative outcomes in farm management and efficiency and in organizing sourcing, traceability and payments.

Market level. At the market level, solutions comprise price and premium management, trading practices, demand promotion, value addition and investment strategies by value chain actors.

Price-setting mechanisms can be decoupled from international market prices and be defined against different benchmarks, such as the costs of sustainable production (cost-plus model) or upon income benchmarks, such as the poverty line and a living income. Prices paid to growers can also be based on considerations of fairness in line with expectations of educated consumers (e.g. ethical consumerism). Other options to offer a more stable price environment while remaining aligned with market dynamics should also be considered. These include, for example, fixing prices of forward contracts based upon the futures market, introducing a floating price, or promoting responsible trading practices, such as long-term purchase commitments, short invoice payment periods, respect for contract terms and conditions, providing sourcing plans to suppliers and paying premiums. These trading practices, in combination with stable prices or premiums, help to share risks among value chain actors and, thus, provide coffee producers with a predictability that incentivizes investment in their farms. Responsible trading practices require supply chains with more direct linkages (e.g. outgrower schemes) and greater transparency. Value chain actors can also invest in producer support, community development and landscape management, either individually or collectively, through corporate programmes. More direct, stable and transparent supply chains enable the channelling of better incentives that promote the economic viability of coffee farming. Sourcing decisions cannot be based only on price but need to consider farm competitiveness and sustainability.

Sector governance level. Governments and governing bodies at the national, regional and international level can make use of a wide range of measures, including purchase guarantee mechanisms, price setting, stabilization funds, supply management and demand promotion.

Sector-level interventions require a comprehensive strategy that balances short- and long-term objectives and addresses underlying market fundamentals. This requires a thorough understanding of markets, of the potential impact that measures can have, and many of these measures should not be considered in isolation. For example, supply management is preferably done based upon international coordination in order to avoid that countries undermine each other's strategies to increase producer incomes. There are many opportunities to align national strategies and to catalyse co-investment in a market-based environment.

Transparency and accountability are the cornerstones of sector governance. Effective sector governance requires the monitoring of progress towards the fulfilment of the sector's vision and to inform evidence-based learning. A diversified funding strategy can finance the measures needed to promote sector-wide competitiveness. Complementary strategies, such as a pre-competitive global coffee fund (Sachs, 2019), could co-finance, direct income transfers to alleviate extreme poverty in the value chain, and increase investment in the sector through blending of public and private funding. Finally, both national and international mechanisms need to be built on multi-stakeholder governance and independent decision-making and evaluation.

Table 1 summarises the main actions discussed at the production, market, and sector governance level and classifies them according to barriers to implementation and potential impact. While some solutions may be more difficult to implement, they tend to contribute to more systemic, wide-scaled impacts. The solutions outlined in Table 1 need to be complemented by adequate funding mechanisms, multi-stakeholder coordination and provision of services.

"50 solutions at production, market and sector governance level were assessed and priority actions as well as lead actors identified."

TABLE 1

Potential solutions classified according to three key issues, lead actors and barriers to implementation

Lead actors	Solutions (according to barriers to implementation and potential impact)		
	Low barrier / Narrow-scaled impact	**Medium**	**High barrier / Wide-scaled impact**
A. Solutions to address price levels and demand-supply imbalances			
Producers	• Investment in farm profitability and sustainability	• Income diversification	• Alternative livelihoods
Market actors	• Market promotion • Producer support services	• Market promotion • Producer support services • Full traceability, supply chain partnerships • Price and premium management • Community development, landscape management	
Public sector and international organizations	• Sustainable public procurement • Market promotion • Regulation on quality assurance and social & environmental practices • Investments in R&D	• Supply management by reduction of hectares under coffee production • Landscape management • Basic services e.g. healthcare and education	• Direct income transfers • Differentiated taxes and tariffs • Rural infrastructure development • Land tenure reform • Promotion of alternative uses of coffee • Supply management by international production and export quota
B. Solutions to address issues related to price volatility			
Producers	• Physical strategies	• Hedging strategies	
Market actors	• Contract farming	• Floor prices, access to hedging services	
Public sector and international organizations	• Farmgate price-setting in relation to export price	• Purchase guarantees • National strategic buffer stock management	• Modifications to futures exchange • Price stabilisation funds • International coordination of buffer stocks
C. Solutions to address risk and value distribution in the value chain			
Producers	• Product differentiation, aggregation and marketing	• Roasting at origin / value addition	• Branding
Market actors	• Purchase of certified coffee, premiums • No unfair trading practices	• Purchase of certified coffee, premiums • No unfair trading practices • Full traceability and supply chain partnerships • Price and premium management • Pre-finance	• Decoupling sourcing strategy from futures markets
Public sector and international organizations	• Upgrade existing market information systems • Benchmarks of production and living costs	• Observatory for costs, prices, margins • Export auctions • Regulation on due diligence and unfair trading practices	• Farmgate price-setting in relation to export price • Anti-trust regulation

The Report identifies four priority solutions and three enabling factors as well as critical roles for key actors to play in addressing the current price crisis, in order for farmers to achieve economic viability and for fostering the sustainability of the coffee sector (Figure 4).

Priority solutions

(a) Enhance market transparency by collecting and assessing costs of production and living income benchmarks and through upgrading of existing market information systems

Better insights are required into the cost of sustainable production and the cost of a decent living for different segments of coffee producers. This should also include an overview of how coffee prices relate to these costs and the determination of, for example, reference prices that enable a living income and living wage. This role has to be taken up by an independent international institution or initiative. It is important that all stakeholders use consistent and widely accepted methodologies for these benchmarks across coffee origins. In addition, there is a need to further upgrade existing market information systems to provide real time data on price levels, price volatility as well as demand and supply data and forecasts. This strategy should inform sourcing practices of the coffee industry and empower producers with the objective to come to a more equitable distribution of value generated in the sector.

(b) Adopt responsible sourcing practices

There is scope to develop more direct, transparent and stable commercial relationships with suppliers that reward good performance (e.g. quality, consistency and sustainability) with price incentives and responsible sourcing practices (e.g. contract and payment terms). More impactful measures will require changes in the way that many companies conduct their business. It implies building partnerships across supply chains in which the terms of trade and price match the objective of increasing the profitability and sustainability of coffee production. This match could mean less dependence on the commodity markets (de-commoditisation) and that the prices and premiums paid are informed by cost of production, living income or living wage benchmarks.

(c) Create a level playing field for the industry on trading practices and ensure efficient functioning of futures markets

Within the context of the global trade system, governments in producing countries are responsible for setting the rules of how markets work for the benefit of their coffee producers. Furthermore, governments can create a level playing field by adopting several measures influencing trading relationships, price discovery and value distribution.

Further options are to introduce auctions, fix farmgate prices according to export prices, establish stabilization funds or introduce purchase guarantee mechanisms. All of these measures can, to some degree, be developed in alignment with global market prices, which would therefore reduce financial risks and lessen distortions of the market.

In addition, governments in importing countries also can adopt various measures to foster responsible sourcing practices. They can promote voluntary commitments by the industry to achieve responsible supply chains and/or enforce such practices through regulations on due diligence and fair trading practices. They could incentivize sustainable production, responsible trade and value addition at origin through differentiated taxation schemes and their own procurement practices. Finally, governments can support further research on the influence of commodity exchanges on short-term price developments and consider measures (e.g. regulation on speculation and trading practices) to mitigate volatility if the impact is too substantial.

(d) Achieve a more balanced market

Governments in producing/exporting countries can adopt various measures to influence supply and demand in the short and long terms. They can promote demand in domestic and export markets through market development (e.g. building a reputation for quality and sustainability), while increasing value added through domestic roasting and by removing trade barriers. The latter is a measure that can also be taken by governments in importing countries. Producing countries can devise strategies that contribute to a more balanced market in terms of supply and demand.

FIGURE 4 Priority solutions and enabling factors to address the price crisis, achieve economic viability of coffee production and foster sustainability of the sector.

Governments can limit the coffee-producing areas to the most suitable locations, protect native vegetation against encroachment, stimulate on-farm diversification or promote alternative livelihoods for coffee producers. These strategies will require the integration of coffee-specific policies into wider agricultural and rural development frameworks, possibly including land tenure reforms and trade and industrial policies.

Enabling factors

(e) Promote competitive and sustainable coffee production through viable and scalable service delivery models and a level regulatory playing field on production practices

In the transition towards a more profitable and resilient production base, coffee producers, particularly smallholders and their organizations, need access to extension services, technology, inputs and finance. This access requires investments in research and development and cost-efficient, economically viable and scalable service delivery models (whether public or private). The introduction of digital technology solutions can facilitate farm management and the efficient functioning of producer organizations that service delivery models seek to support. To promote producer resilience, service providers need to take a holistic approach to the farming system and households' needs (instead of a narrow focus on coffee) to achieve a living income.

To ensure a level playing field among coffee producers, governments in producing/exporting countries should consistently enforce sound social and environmental regulation around protection of native vegetation, water management, labour practices, and bans of hazardous agro-chemicals.

(f) Develop financial mechanisms that extend access to finance and enable strategic investments

Coffee producers and small- and medium-scale value chain actors require access to financial products that allow them to invest in their businesses. The financial sector can develop tailored products for these potential clients, including working capital and investment loans as well as insurance. Blended finance mechanisms can also fund various strategic investments, such as research and development, digital innovations, infrastructure, and programmes related to on-farm diversification, alternative livelihoods and landscape management. To coordinate investments in the global coffee sector, an option is to pool resources from donors, governments and coffee industry in a global funding mechanism.

Governments in producing/exporting countries can also work on structural revenue mechanisms (e.g. export fees) to finance investments in the coffee sector. However, the trade-offs between benefits from structural investments in the sector and the impact of taxation of farmers on international competitiveness need to be balanced.

(g) Ensure multi-stakeholder dialogue, alignment and learning

The coffee sector is characterized by growing concentration and by a number of private sector-led initiatives. However, there is still scope for better integration and harmonization of approaches or alignment of objectives and actions. National and international multi-stakeholder platforms can play an important role in creating a space for dialogue among sector stakeholders and in supporting the creation of a shared vision, as well as identifying long-term and transformational solutions to the structural issues facing the sector. This includes alignment of ambitious and time-bound action plans by individual stakeholders on priority topics, for which they need to be held accountable. Platforms can also promote the development of specific tools, sector-wide monitoring, and the sharing of best practices and lessons learned.

While sustainable coffee livelihoods are not a sufficient condition for a sector that is inclusive, fair and environmentally friendly, they are certainly a necessary condition. If rural households engaged in coffee production are lifted out of poverty and obtain an income that allows a decent standard of living (i.e. a living income), social objectives such as gender equality and eradication of the worst forms of child labour are more likely to be reached. Environmentally detrimental practices such as deforestation would be significantly reduced. Hence, economic viability is the catalyst for the sustainability of the entire coffee sector.

“There is the need for a space for dialogue and alignment between the public and private sector and civil society.”

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Coffee and economic development – the causes and impact of market volatility

THE TWO COMMERCIALLY PRODUCED COFFEE SPECIES ARE **ARABICA** (COFFEA ARABICA) AND **ROBUSTA** (COFFEA CANEPHORA)

COFFEE IS GROWN IN MORE THAN **50 COUNTRIES** WORLDWIDE

OVER THE PAST TWO DECADES, GLOBAL COFFEE OUTPUT OF ARABICA AND ROBUSTA COMBINED HAS INCREASED BY **65%**

For many developing countries, coffee can be a powerful driver of economic and social development. It is vital that coffee-growing countries are able to overcome the various challenges to reap the full benefits of growing global demand.

1. Coffee and economic development

Natural resource endowment can often be a curse rather than a blessing. Economic growth in countries rich in natural resources tends to be lower than in natural-resource scarce economies (Sachs and Warner, 1995). Due to high commodity export dependency, economic performance is closely linked with developments in commodity sectors in many low- and middle-income countries (UNCTAD, 2017). There is some evidence that commodity prices are more volatile than those of manufactures or services (Jacks, O'Rourke and Williamson, 2011). Volatile commodity prices affect countries' terms of trade as well as their fiscal and monetary stability (UNCTAD, 2017). In the case of agricultural export commodities, price fluctuations affect producers through various channels, including market risks and highly variable incomes.

However, agriculture does have a positive track record in development. Economic growth originating in agriculture is estimated to be more than twice as effective in reducing poverty than growth resulting from other economic sectors (World Bank, 2008). In agriculture-based economies the sector employs 65% of the labour force (ibid). Agriculture provides business opportunities for farmers, for example through the emergence of high-value market segments (ibid). In order to exploit the countries' full agribusiness potential, focus should be on increasing agro-industrial value added and employment along the entire agribusiness value chain in agriculture, industry and services (UNIDO, 2011). Coffee production can be a vital source of household income and provides economic benefits beyond coffee-growing communities.

To reap these benefits, the potential for inclusive growth needs to be reconciled with the challenges of export commodity dependence. This chapter examines the importance of coffee as agricultural subsector for economic and social development in producing countries.

1.1 The economic importance of coffee in producing countries

Coffee is grown and processed in more than 70 countries. Figure 1 shows the geographical location of the 'coffee bean belt' that is bounded by the tropics of Capricorn and Cancer. The two commercially produced coffee species are Arabica (Coffea arabica) and Robusta (Coffea canephora). The top 5 coffee-producing countries account for more than 70% of global output. Brazil is the leading producer with an average annual output of 53 million 60-kg bags in coffee years between 2013/14 and 2018/19, followed by Vietnam (28 million bags), Colombia (14 million bags), Indonesia (12 million bags) and Ethiopia (7 million bags).

Coffee producing countries predominantly rank low in economic and social development metrics, with 18 out of 44 exporting Members of the ICO falling in the category of Least Developed Countries (ICO, 2019c). These countries are characterized by low per-capita GDP and lag behind in Human Development Index (HDI) scores (Figure 2). Around 20% of coffee-producing countries record a low HDI (< 0.5), compared to 4% of countries that do not produce coffee.

1.2 Coffee remains a primary export commodity

Over the past two decades, global coffee output of Arabica and Robusta combined has increased by 65%, from 95 million 60-kg bags produced on average in the mid-1990s to 157 million bags in 2014-2018, on average. While coffee remains an export commodity, the traditional dichotomy of producing countries that export coffee and importing countries that consume coffee is increasingly challenged. Over the past two decades, domestic consumption in producing countries grew at a faster rate than consumption in export markets. As a result, the fraction of exports in global output decreased from 76% to 72% (Figure 3).

TOTAL GLOBAL COFFEE OUTPUT HAS INCREASED FROM

95M

60-KG BAGS ON AVERAGE IN THE MID-1990S

TO

157M

60-KG BAGS IN 2014-2018

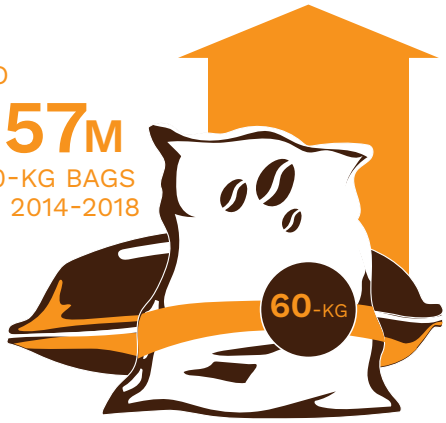
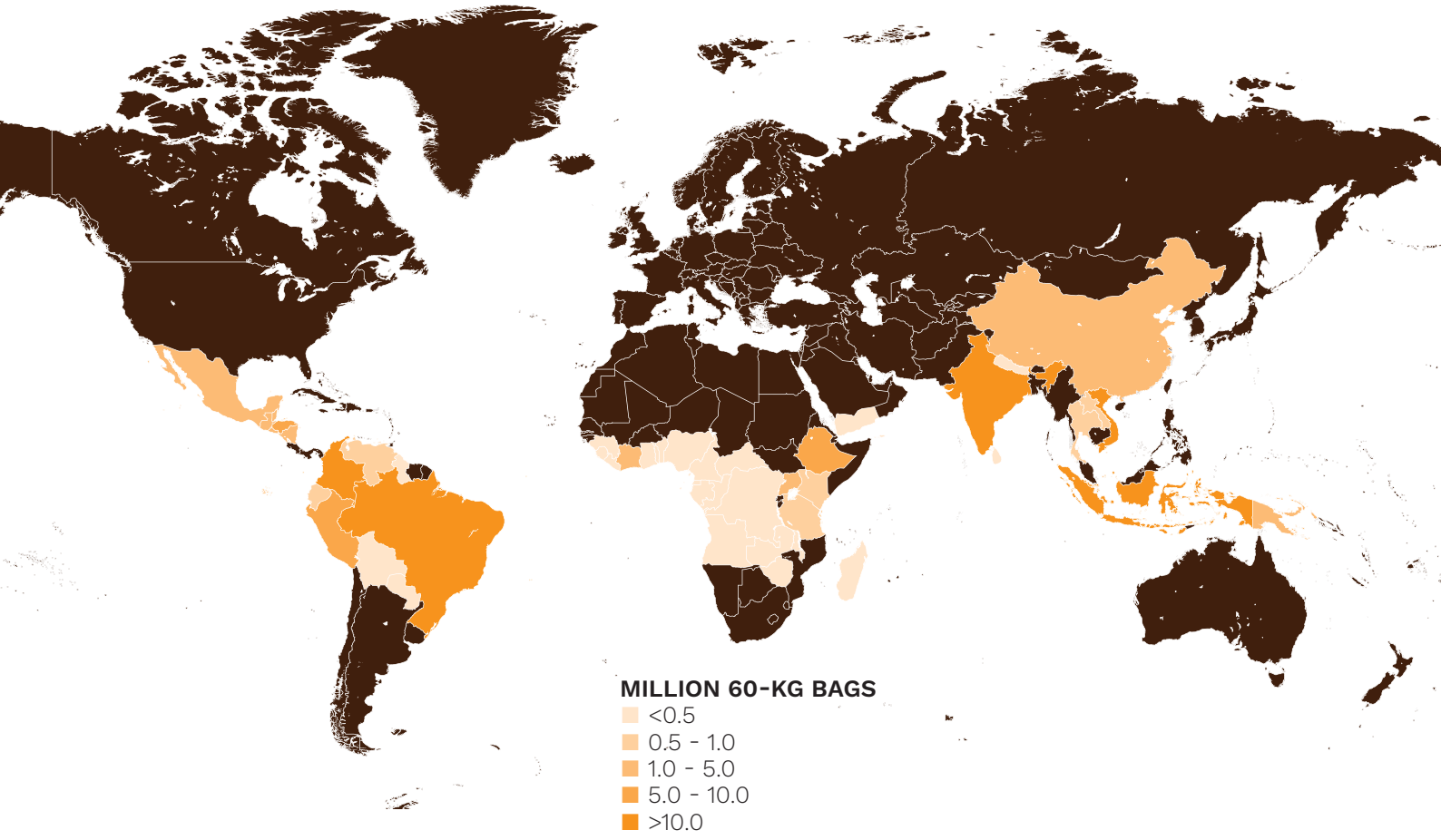


FIGURE 1
Global coffee production (5 -year average 2013-18)



SOURCE: ICO

THE TOP 5 COFFEE-PRODUCING COUNTRIES ACCOUNT FOR MORE THAN

70%

OF GLOBAL OUTPUT

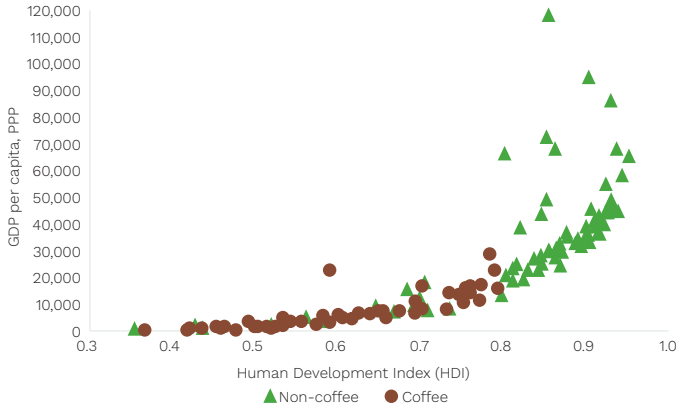
BRAZIL IS THE LEADING PRODUCER WITH AN ANNUAL OUTPUT OF

53M

60-KG BAGS OF COFFEE BETWEEN 2013/14 AND 2018/19

FIGURE 2

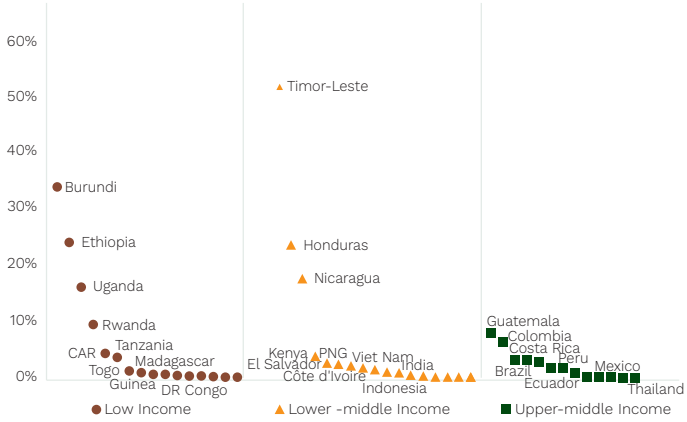
Coffee is produced in countries with relatively low income (2017)



SOURCE: World Bank / United Nations

FIGURE 4

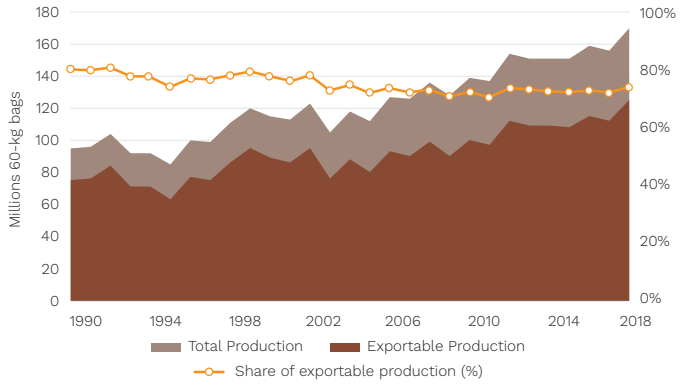
Coffee exports as percentage of total country exports by World Bank income level classification (average 2013-2017)



SOURCE: ICO

FIGURE 3

Share of exportable production in total production (Arabica and Robusta)



SOURCE: ICO

As an export commodity, coffee realises important foreign exchange earnings amounting to USD20 billion globally in 2017/18. The share of coffee in total merchandise exports varies across countries. Today, Brazil, Vietnam and Colombia, the three largest coffee producing countries, show relatively low dependence on coffee with a share in total exports of 3%, 2% and 6%, respectively. In some medium-sized producers, such as Honduras and Ethiopia, this share exceeds 20%. Other smaller producers, such as Uganda, Rwanda and Burundi, are also highly dependent on coffee exports. Generally, those countries with a high dependency on coffee fall in the category of low and lower-middle income countries (Figure 4).

A lack of diversification of the economy and an overreliance on coffee exposes countries to significant commodity market risks (UNCTAD, 2019). At the macro level, fluctuations of capital flows resulting from changes in commodity prices can affect countries' balance of payments and public revenues. Hence, the volatility of commodity markets can directly affect governments' fiscal stability and scope for public spending.

At the micro level, the unpredictability of highly volatile international prices makes financial planning for rural households and agricultural producers difficult (UNCTAD, 2017). A drop in international prices for export crops can result in financial distress for farming households, the majority of which are smallholders, due to lack of savings and limited access to finance.

1.3 Coffee provides a livelihood for millions of growers and workers

Coffee is the main livelihood source for a large number of households across the globe. Estimates range from 12.5 to 25 million farms or farming households, depending on the underlying methodology. Figure 5 shows the number of farms in main producing countries based on statistics provided by ICO Member countries, supplemented with estimates from other sources.

Additional employment is created along the coffee value chain in producing countries, for example as on-farm labour for cultivation and harvest, in post-harvest processing, trading and export. In some countries employment is generated in industrial processes such as roasting and soluble coffee production. Data on employment is not available for all countries. Previous estimates of employment along the value chain in coffee-producing countries exceeded 26 million (ICO, 2010).

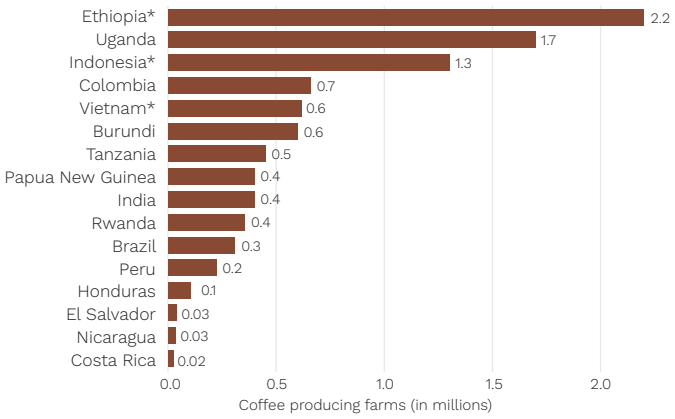
Women contribute significantly to the global coffee sector. Figure 6 shows that between 20% and 30% of coffee farms worldwide are operated by women, while up to 70% of labour in coffee production is provided by female household members and workers, depending on the region and prevailing production system (ICO, 2018a).

“Coffee is the main livelihood source for up to 25 million households around the globe.”

KEY FINDINGS

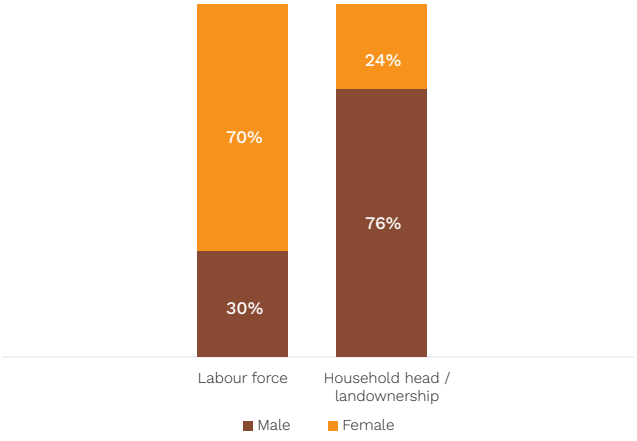
- **Coffee is produced in more than 70 countries.**
- **20% of coffee producing countries rank low in human development (HDI < 0.5).**
- **Coffee is livelihood source for between 12-25 million farms worldwide, a quarter of which are operated by women.**
- **Despite growth of domestic consumption more than 70% of production is still exported.**
- **Commodity export dependency exposes farmers, many of whom are vulnerable smallholders, and governments in producing countries to significant agricultural and market risks.**

FIGURE 5
Number of coffee farms in main producing countries



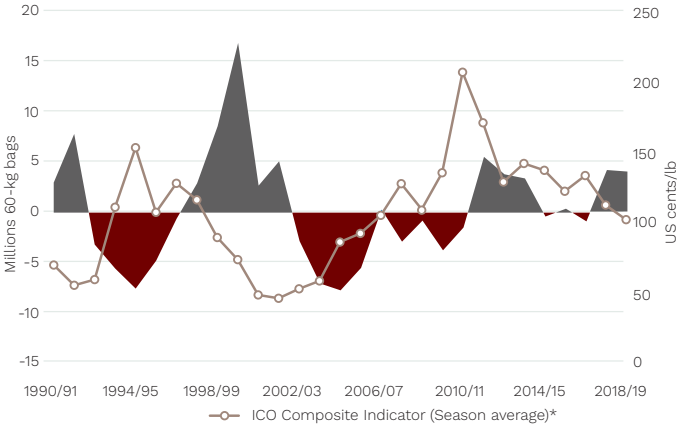
* Estimates from Enveritas (2019)
SOURCE: ICO

FIGURE 6
Female participation in the coffee sector



NOTE: Based on arithmetic average of country specific estimates. Breakdown and data sources provided in Annex A.
SOURCE: ICO

FIGURE 7
Market balance vs. ICO Composite Indicator



*2018/19 price for October2018 to July 2019

SOURCE: ICO

2. Determinants of coffee price levels and root causes of the 'coffee price crisis'

The cultivation of coffee provides income and employment for millions of households and is a vital source of export revenues for many producing countries. Developments in the international market for coffee directly affect farmers' livelihoods and determine the fiscal scope for political action and policies of governments in producing countries. Hence, it is important to understand how prices in international markets are formed and what determines their cyclical nature. This chapter analyses the role of demand and supply as well as other factors in the formation of coffee prices. Root causes for the current low price levels are identified.

2.1 Fundamental factors of demand and supply

The main determinants of coffee prices correspond to supply and demand, particularly production, consumption and stock movements. These factors are referred to as market fundamentals.

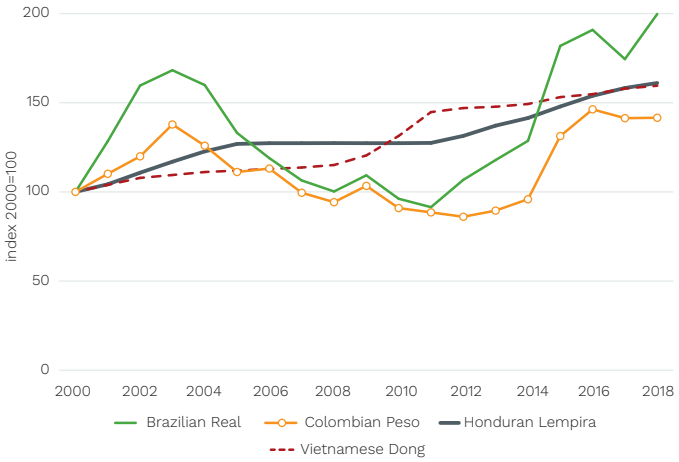
Consumption of coffee shows little fluctuation around the long-term trend. Production on the other hand can vary greatly from year to year. This is due to highly variable yields, which respond to weather conditions and other factors that differ between seasons. Some countries, such as Brazil, have pronounced on- and off-years as part of the biennial production cycle. Typical for agricultural production and compounded by the perennial tree crop nature of coffee, the price elasticity of supply is low. Output can adjust only slowly and with a lag to price signals.

Demand is also inelastic. Consumers do not adjust their consumption significantly when prices change due to the lack of close substitutes. As a result, the coffee market finds itself in a persistent disequilibrium of demand and supply, moving cyclically between surplus and deficit.

Figure 7 shows the development of annual net-supply (production minus consumption) in the global coffee market plotted against the season average of the ICO composite indicator. Between coffee year 1990/91 and today, the market closed in surplus in 13 years, while showing a deficit in 15 years. The coffee price is inversely related to the market balance, implying that in times of oversupply prices tend to drop while they increase when the market is in deficit. There is a notable time lag between changes in price and output response, which is consistent with the low price elasticity of supply.

The coffee market is currently characterised by excess supply, the chief factor determining the current price levels. Production is expected to increase by 1.9% in coffee year 2018/19 to 169 million 60kg bags, while consumption is estimated at 165 million bags. The supply overhang this year is likely to amount to more than 4 million bags, due to expected bumper crops in a number of producing countries. This is the second consecutive year of surplus, adding to the downward pressure on coffee prices. The cumulative surplus amounts to around 8 million bags, similar to the annual crop of a medium producer such as Ethiopia or Honduras. Hence, the price behaviour during this downturn of the market is consistent with the assessment of market fundamentals.

FIGURE 8
Movements in exchange rates against the US Dollar



SOURCE: IMF, ICO

2.2 Non-fundamental factors

Additional factors can supersede the underlying fundamentals and thus influence coffee price behaviour and volatility: exchange rate movements, trading activities in futures markets, and the consolidation in the roasting industry.

Volatility in the exchange rates of the US dollar against the currencies of coffee-exporting countries can have a profound impact on the competitiveness of their producers on the world market. Figure 8 depicts the movement of the Brazilian Real, Colombian Peso and Vietnamese Dong against the US Dollar between 2000 and 2018. Over this period of time the Vietnamese currency consistently lost value against the US Dollar but showed little variation. The Real and the Peso fluctuated more strongly. Since 2012 both currencies depreciated against the US Dollar, however Brazilian producers benefitted more than their Colombian peers. This depreciation increased the earnings in local currency of Brazilian exporters, thereby creating an incentive to release their stocks to the international market (ICO, 2019d). This additional supply is likely to add further pressure on international coffee prices.

> **"The coffee market finds itself in a persistent disequilibrium of demand and supply, moving cyclically between surplus and deficit."**

However, the appreciation of the US dollar can also contribute to higher production costs, caused by increased prices of imported inputs, such as fertilizers, fuel and machinery. The net effect on producers remains an empirical question and differs between countries depending on natural resource endowments and the domestic manufacturing sector.

International futures markets are important as a price discovery mechanism and instrument for market participants to hedge price risks. Over the past two decades the main exchanges have been subject to a process of 'financialization', that is a significant increase in the trading activity compared to the growth in the physical market. During the period 2001-2018, the volume of coffee futures contracts traded in both Arabica (NY) and Robusta (London) markets increased nearly six-fold. Over the same time period, physical output of coffee grew significantly slower by 70% (Figure 9).

This phenomenon has caused concern among sector stakeholders. The increased participation of investors or speculators in the futures markets may exacerbate price movements caused by fundamental factors. Using six common indicators of speculation, which differ in terms of robustness, a study carried out by the ICO analysed the relationship between speculative activity in the futures markets in New York (Arabica) and London (Robusta) and spot prices for coffee (ICO, 2019e).

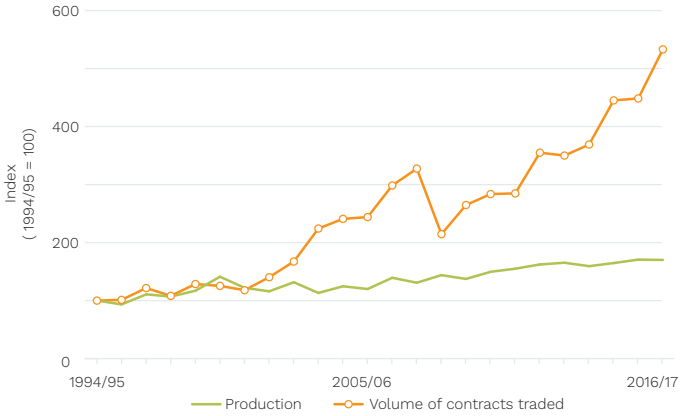
Figure 10 summarises the results. The chart shows the development of the ICO composite indicator price between January 1998 and December 2018. Periods of falling prices are shaded grey. The coloured horizontal bars indicate time periods for which statistical tests confirm a causal relation between specific indicators for speculation and spot prices for coffee. Only the results of the four most robust indicators are presented here. The effect was found to be statistically significant during short periods of both increasing and falling prices. Between August 2009 and September 2014 more than one indicator showed a statistically significant effect of speculation on price movements.

The results are in line with research on other agricultural commodities and suggest that the activity of non-commercial traders can initially exacerbate upward and downward price swings, even while market fundamentals of demand and supply prevail in the long run (ICO, 2019e).

Coffee trading and processing has undergone a process of market concentration. According to the Coffee Barometer (Panhuysen and Pierrot, 2018), the five largest trade houses have a combined global market share greater than 25%. Further downstream the value chain, the top-10 roasting companies process 35% of global coffee output.[5]

FIGURE 9

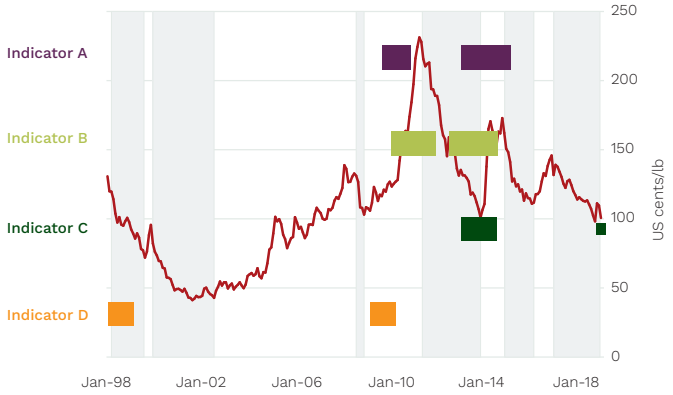
The coffee market is subject to financialization



SOURCE: ICO

FIGURE 10

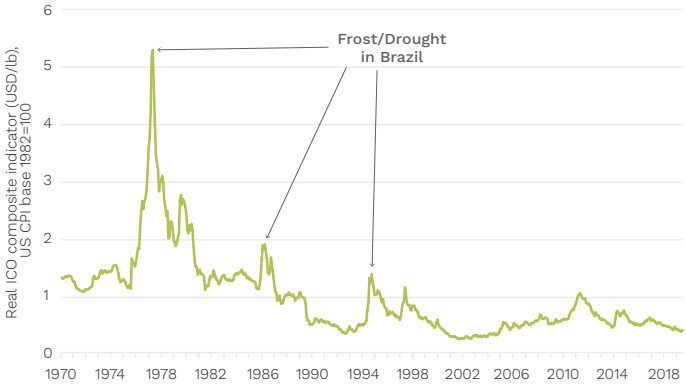
Activities of non-commercial traders in the futures market can exacerbate price movements in the short-run



NOTE: Coloured bars indicate time periods in which a speculation activity, as defined by the respective indicators, has a statistically significant impact on spot prices.
Shaded areas indicate periods of declining prices.
Indicator A: Index traders' net positions (long – short positions)
Indicator B: Ratio of non-commercial short positions to total reportable short positions
Indicator C: Ratio of non-commercial long positions to total reportable long positions
Indicator D: Ratio of volume to open interest
SOURCE: ICO

[5] Another recently published study by think tank BASIC showed that in 2018 the three largest players in the French market, Nestle, JDE and Lavazza, had a combined market share of 81%, compared with 70% in 2008. https://lebasic.com/en/coffee-the-success-story-hiding-a-crisis/

FIGURE 11
Real coffee prices show no significant time trend (1970-2019)



NOTE: Nominal ICO Composite Indicator deflated by US CPI
SOURCE: ICO

Many stakeholders are concerned that an increase in market power could have a negative impact on the relationship between buyers of coffee and farmers, for example in terms of contractual parameters such as prices and payment terms. A reduced number of buyers could result in a weakened bargaining position of farmers, which in turn could lead to higher margins accrued by downstream value chain actors. However, further research is required to understand better how seller-buyer relations may have changed as a result of market concentration on the demand side and if the promotion of supply chain transparency and sustainable sourcing practices (e.g. through stricter regulation) could result in measurable benefits to farmers. Industrial organization models which are used in competition analysis could be employed in this context (Gilbert, 2006).

KEY FINDINGS

- **After two consecutive years of surplus in the market, oversupply is the chief factor causing current low coffee price levels.**
- **The depreciation of local currencies of certain producing countries against the dollar increases the competitiveness of growers on the world market, providing incentives to produce and export.**
- **Speculation in coffee futures can exacerbate price movements in the short term, but fundamentals prevail in the long run.**
- **Concentration on the buyer side is increasing, although a link with price levels remains unclear. Market power on the buyer side could lead to unfavourable contract terms for farmers.**

3. Long-term trends in price levels and volatility

An understanding of long-term trends in coffee prices and volatility is important to develop sectoral policies and support programmes that are effective and viable. For example, in a market that experiences a structural decline of prices, increasing productivity and efficiency as well as cutting costs is vital. The impetus to diversify, both on farms and at the level of the national economy, is stronger when facing declining real commodity prices.

The viability of many price risk management strategies at farm level (physical and financial hedging) crucially depends on the absence of a structural decline in prices. This also applies to government policies, such as supply management at national level (e.g. buffer stocks).

3.1 Trends in real coffee prices

Long-term trends in commodity prices have been a subject of intense discussion and debate since the 1950s. The long held Classical view was that the trend should be positive, as the supply of primary commodities would be constrained by the fixed amount of land, while supply of manufactures would be augmented by technical progress. This view was overturned by two independent but concurrent studies by Prebisch (1950) and Singer (1950), which concluded that relative commodity prices should decline in the long run, a theory known as the Prebisch-Singer Hypothesis. This school of thought was influential in the post-war period, providing the economic rationale that shaped commodity trade policies for several decades. This includes international commodity agreements such as the International Coffee Agreement (ICA) with its 'economic clauses' that determined the export quota system.

The examination of trends in commodity prices is empirical in nature. The results depend on the commodity and time period under investigation. The visual inspection of the ICO composite indicator deflated by the US Consumer Price Index (CPI) could suggest a slight downward trend in real coffee prices since 1970 (Figure 11). However, drawing a

"In a market that experiences a structural decline of prices, increasing productivity and efficiency as well as cutting costs is vital."

line of best fit is an over–simplistic method and results are misleading. The estimation of a long-run trend is challenging due to statistical properties of price data, including noise deriving from variation around the trend. Figure 11 clearly indicates that coffee prices are highly volatile. Large spikes (often caused by weather shocks) or slumps in coffee prices at various points of the sample period can affect the underlying estimate of the trend. Time variant volatility and the existence of structural breaks in the time series can bias the estimation results. For this reason, robust trend estimates should be used, employing quantitative methods that allow one to address the challenges posed by the price data. For a detailed account of the econometric methodology employed for robust trend estimation, refer to Technical Annex B.

An analysis of this nature was conducted on the deflated ICO composite indicator, the international reference price for coffee. Table 1 summarizes the results including the trend estimate, the confidence interval and the level of statistical significance. On average the rate at which the ICO composite indicator changes from month to month is negative and the overall average decline is -0.20%. However, the trend is not statistically significant, that is it cannot be said with certainty that it is different from zero. Hence, it can be concluded that instead of any clear upward or downward trend, the coffee price shows trendless variation over time. Additional statistical tests cannot confirm the existence of structural breaks in the price time series. This implies that there are no changes in the trend between market regimes, for example between the period when ICA market regulation mechanisms were in place and after 1989 when the system was suspended. The use of alternative deflators and other coffee price indicators (spot and futures markets) does not change the results. The findings for coffee are in line with the findings of Deaton and Laroque (2003) as well as other studies of a trendless behaviour of real commodity prices.

The estimation of trends in real international prices provided a general view at the global level. However, real price trends could be different in individual producing countries. Hence, an additional analysis of real prices paid to growers in individual exporting countries using country-specific deflators (e.g. CPI or production cost indices) is carried out.

Using monthly prices paid to growers of eight coffee producing countries in Africa, Asia and Latin America, the analysis reveals a mixed picture.[6] The results in table 1 show that real prices paid to growers declined over time in Brazil, Colombia, Ethiopia and Honduras. The rate at which real prices have declined ranges from -0.08% in Ethiopia to -0.35% for Arabica and -0.37% for Robusta in Brazil.

The results imply that farmers in these countries lost purchasing power when exchanging a unit of coffee for a bundle of consumer goods between the baseline period and today. If increases in productivity and efficiency were not sufficient to offset this effect, farmers in these countries could be economically worse of today compared to the respective baseline period. No significant trends are found for Costa Rica, India, Indonesia and Uganda.

[6] The period under study varies by country depending on the availabity of price or CPI data: Brazil: July 1994—January 2019 (both Arabica and Robusta), Colombia: January 1970 – April 2019, Costa Rica: January 1976 – September 2017, Ethiopia: January 1970 – September 2018, Honduras: January 1973 – February 2019, India: January 1973 – May 2019 (Arabica) and October 1985 – May 2019 (Robusta), Indonesia: April 1975 – September 2007 (Robusta), and Uganda: March 1992 – March 2019 (Arabica and Robusta).

TABLE 1
Trends in real coffee prices

Real price	Price trend	Confidence interval	Statistical significance[1]
Global[2]			
ICO composite indicator	-0.20	(-0.77, 0.36)	No significant trend
Country[3]			
Colombia	-0.11	(-0.17, -0.05)	Significant decrease
Brazil (A)	-0.35	(-0.48, -0.22)	Significant decrease
Brazil (R)	-0.37	(-0.53, -0.20)	Significant decrease
Costa Rica	-0.08	(-0.65, 0.49)	No significant trend
India (A)	-0.08	(-0.65, 0.49)	No significant trend
India (R)	-0.19	(-0.70, 0.31)	No significant trend
Indonesia	0.16	(-0.95, 1.28)	No significant trend
Ethiopia	-0.08	(-0.16, -0.01)	Significant decrease
Honduras	-0.16	(-0.25, -0.07)	Significant decrease
Uganda (A)	0.22	(-0.69, 1.14)	No significant trend
Uganda (R)	0.44	(-1.09, 1.96)	No significant trend

[1] At 90% significance levels; [2] Nominal price deflated by US CPI; [3] Nominal price paid to growers deflated by national CPI.
SOURCE: ICO

3.2 Trends in price volatility

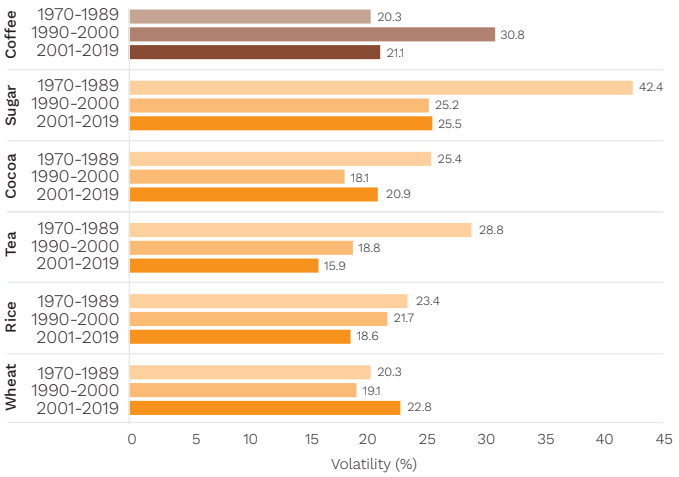
Market volatility, that is the inter-temporal variation in the price (measured e.g. as day-to-day differences in price levels), is an inherent feature of agricultural commodities. Excessive volatility in coffee prices can pose a risk to market participants, in particular to coffee farmers who tend to have limited access to price risk management strategies and tools (World Bank, 2015).

The level of price volatility in the coffee market is calculated based on fluctuations of the ICO composite indicator, employing a statistical method based on Gilbert and Morgan (2010). The use of an extensive series of monthly observations covering the period 1970 to 2019 allows one to investigate the existence of trends in price volatility. Finally, volatility levels in coffee are compared to volatility estimates of other agricultural commodities.

To examine changes in the level of coffee price volatility over time, three distinct 'regimes' were defined: first, the period 1970-1989 when the quota system was in place; second, the period 1990-2000 – a decade of radical change in the sector following the liberalisation of the coffee market; and third, the period 2001-2018, which was characterized by the financialization of the coffee futures markets.

The results of the analysis show that the volatility of the ICO composite indicator grew sharply from 20.3% in the period 1970-1989 to 30.8% in 1990-2000 (Figure 12). This significant increase is in line with the existing literature that found coffee to be more volatile in the immediate aftermath of market

FIGURE 12
Volatility of coffee prices and other agricultural commodities



NOTE: Volatility is measured as the annualized standard deviation of the monthly rate of change of the price indicator. Price indicators are: ICO composite indicator for coffee, and the World Bank Commodities Price Data for Cocoa, Sugar, Tea, Rice and Wheat.
The difference in coffee price volatility between the periods 1970-1989 and 1990-2000 is significantly different at 95% statistical confidence level.
The difference in coffee price volatility between the periods 1970-1989 and 2001-2019 is not significantly different.
SOURCE: ICO

liberalisation (Gilbert and Morgan, 2010). However, volatility in the subsequent period (2001-2018) was significantly lower at 21.1%, statistically indistinguishable from the level observed during the quota period. Hence, the there is no evidence that the international coffee price has become more volatile in recent years.[7]

A possible explanation is that other structural features of the coffee sector that are correlated with price volatility have changed over the same time period, reducing overall volatility. For example, production in Brazil, the world's largest producer and exporter of coffee, has moved progressively out of frost-prone areas. As a result, the incidence of frost damage reports in the Brazilian winter months – a known cause of market fluctuations between May and August – decreased. Furthermore, there is evidence that stocks of green coffee are increasingly held by importing countries. The closer proximity of inventory to the point of consumption has a stabilizing effect through the reduction of supply chain risks, potentially lowering short-term price volatility.

On balance, the volatility-increasing effect of market liberalization as well as the financialization of futures markets may have been partially offset by other factors, such as larger inventories in importing countries and the less frequent occurrence of weather shocks in major producing regions. In view of the impact of climate change and the increased likelihood of extreme weather events in the future (Stott, 2016), it is not clear if the trend towards lower price volatility will persist.

[7] The volatility estimates are sensitive to varying definitions of regimes but the overall conclusions remain unchanged.

"While coffee price volatility has not increased, it remains high in absolute terms and broadly in line with other cash crops."

A cross-commodity comparison of the volatility levels reveals that, while coffee price volatility has not increased in relative terms, it remains high in absolute terms and broadly in line with other cash crops (cocoa, tea and sugar) and annual food crops (wheat and rice). This shows that farmers face risky production and livelihood choices.

To inform decision makers in governments and the private sector, public information systems track key parameters of agricultural commodity markets, including volatility. This function has traditionally been fulfilled by international commodity bodies, such as the ICO. An innovation in this field is the Agricultural Market Information System (AMIS), a multi-agency platform. This information system was set up by the G-20 as a response to the 2008 food price crisis.

Compared to the existing market information system in the coffee sector, AMIS comprises additional functionality such as an early warning system for excess volatility in food crops as we all as strong integration into political processes of G-20 (see also Box 9 in Section B).

KEY FINDINGS

- **Real international coffee prices show high variation in the short run but no long-term trend.**
- **In some producing countries (e.g. Brazil, Colombia, Ethiopia, Honduras) real coffee prices have decreased since 1970, potentially leaving farmers worse off if falling prices have not been offset by higher productivity.**
- **Coffee price volatility today is not higher than during the period of market regulation mechanisms.**
- **Volatility of coffee prices is similar to other tropical commodities leaving farmers with risky production and livelihood choices.**

4. How coffee price movements affect agricultural incomes and rural livelihoods

The analyses in the previous chapter have shown that coffee prices show little or no long-run trend but are extremely volatile in the short run. This has implications for producing countries, especially those that are highly dependent on coffee. While price spikes on the international market can provide windfall profits for producers in exporting countries, falling prices can have severe negative consequences for farm incomes and livelihoods.

This chapter describes the channels through which volatile commodity prices as well as other market factors affect agricultural livelihoods. The analysis differentiates by geographical location, farm types, production systems and supply chain efficiency. The impact of prolonged periods of low prices on the structure of the coffee supply are discussed.

4.1 The impact of coffee prices on profitability, income and livelihoods of coffee producers

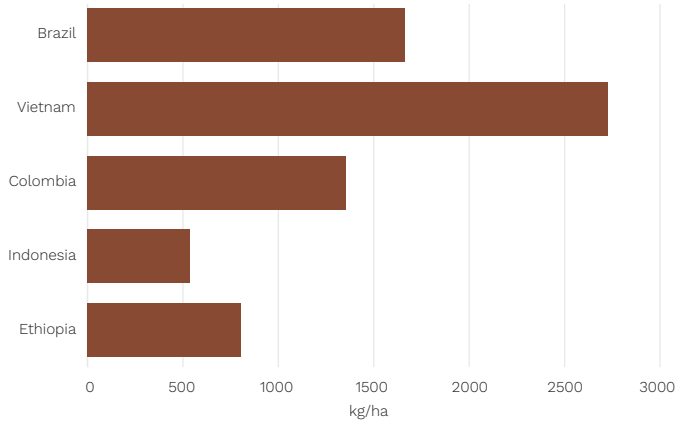
Cost of production

Coffee is a cash crop providing a vital source of farm income for growers. To produce coffee, farmers incur costs throughout the season with the expectation to recover these by selling the crop at a point in the future. In a competitive market, the optimal production intensity and output level is such that marginal cost (of growing a unit of coffee) equals marginal revenue (from selling a unit of coffee) and marginal profits are zero. This enables marginal producers to cover their full production costs. Full economic costs of production include cash costs, e.g. for seasonal inputs such as hired labour, fertiliser and pesticides, and additional costs such as depreciation of assets (coffee plantation, machinery) as well as unpaid labour provided by the farm operator and their family.[8]

Production costs vary drastically between farmers, regions and countries depending on prevailing production systems, productivity levels and efficiency of input markets. Figure 13 shows yield levels across the top 5 producing countries. Production systems with high yields (e.g. Brazil and Vietnam) are characterised by high per-hectare production cost and low per-unit costs; production systems with low to medium yield levels (rest of the world) usually have lower production cost per hectare and higher per-unit costs (ICO, 2016).

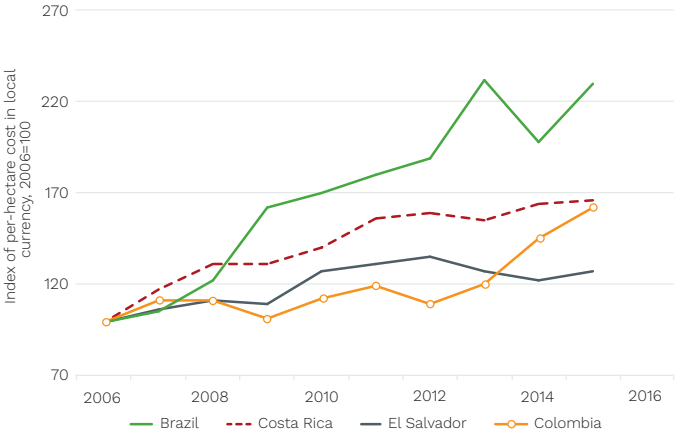
Labour represents the highest share of costs in many producing countries. For example, in a study carried out jointly with University of California, Davis (ICO, 2019b) labour was found to account for 75%, 57% and 56% of total costs in Colombia, Costa Rica, and Honduras, respectively. A notable exception is Brazil, which is characterized by a higher degree of mechanisation and use of agro-chemicals.

FIGURE 13
Yields of the top 5 producing countries (avg. 2016/17-2018/19)



SOURCE: USDA (2018)

FIGURE 14
Production costs are on the rise



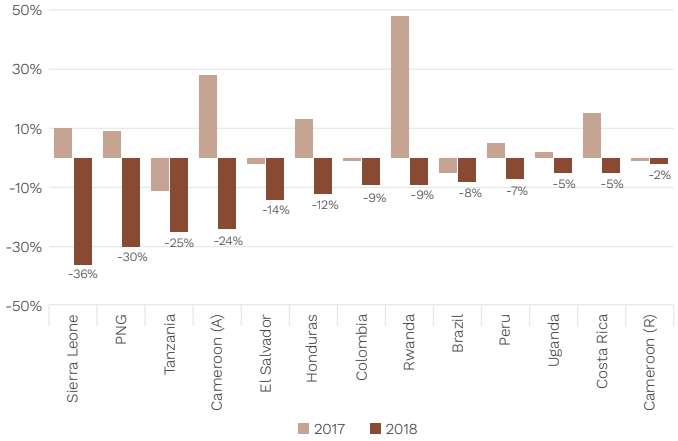
SOURCE: ICO

Production costs have steadily increased in most producing countries. This is due to rising costs for labour, fertiliser, pesticides and machinery. For example, economic growth in coffee-producing countries leads to higher wages. This in turn translates into higher costs for manual cultivation or harvesting. In many origins terrain and farm size make it difficult to substitute labour by capital and use of machinery. If labour productivity does not increase, for example through the adoption of technology, higher wages will inevitably increase cost of production.

Figure 14 shows a steady upward trend for productions costs in Brazil, Colombia, Costa Rica and El Salvador. Since 2006, per-hectare costs in Brazil have more than doubled and increased by two-thirds in Colombia and Costa Rica.

[8] No unified methodology exists for calculating coffee production costs. Differences in the literature can be found in particular with regard to economic costs, e.g. assumptions on depreciation of assets as well as valuation of unpaid family labour. For a discussion of assumptions and their impact on production cost estimates, refer to (ICO, 2019b).

FIGURE 15
Year-on-year change in prices paid to growers



SOURCE: Survey of ICO Member countries (ICO, 2019a)

Revenues

Revenues of individual farmers are a function of the quantity sold and the selling price received. Both, yields and selling price vary significantly between seasons. Per-hectare yields in a given season depend on input use (e.g. fertilisers, pesticides, irrigation) and stochastic factors such as weather conditions and the incidence of pests and plant diseases.

Farmers are price takers. The price received by growers derives from the world market reference price with an adjustment for the quality of coffee produced (positive of negative differential). The international price for coffee and producer prices are co-integrated, that is these prices follow the same movements in the long run (ICO, 2018b). The share of the world market price transferred to farmers, however can vary significantly across individual producing countries depending on the efficiency of the supply chain as well as government policies (e.g. export taxation and levies) (Gilbert, 2006). Markets of most coffee-producing countries are liberalised as previously implemented policies, such as minimum prices, have been abolished. Hence, price signals from the world market are transferred fairly efficiently to the farm-gate price (Krivonos, 2004).

The current downturn of the market has a severe impact on prices paid to growers. Exporting Members of the ICO reported that in 2018 the average price paid to growers of coffee fell by 14% on average, with significant variation recorded between countries (Figure 15).

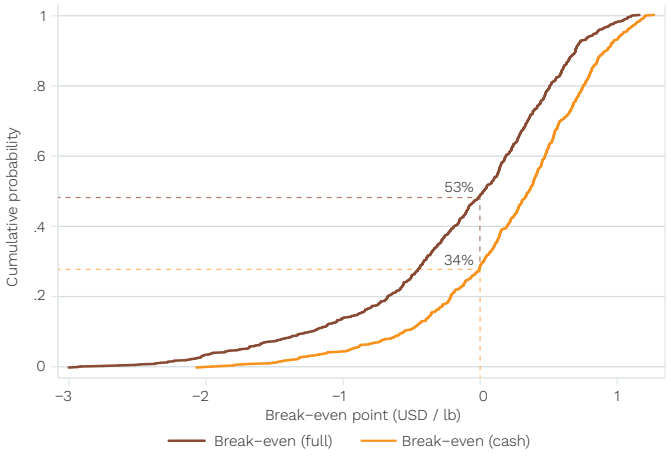
Profitability

Farmers are profitable when revenues from selling coffee are at least equal to the cost of production. In the short term, covering cash costs is sufficient to remain operational until productive assets are depreciated. In order to be economically sustainable in the long run, farmers must be able to cover the full cost of production. These include both cash outlays for seasonal inputs and economic costs such as unpaid family labour. Crucially, the revenue stream from selling coffee should enable growers to reinvest (e.g. replanting, replacement of machinery and other assets).

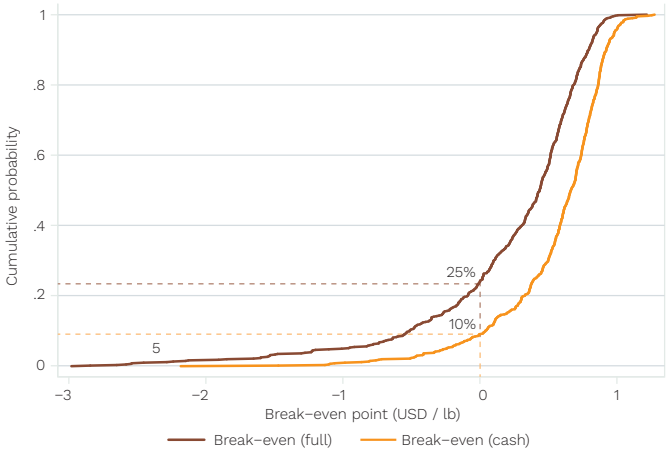
The impact of current low prices varies between countries and across prevailing production systems. Origins with low productivity and high costs are most severely affected. Figure 16 summarises the results of a break-even analysis

FIGURE 16
Share of farmers operating at a loss (2015/16)

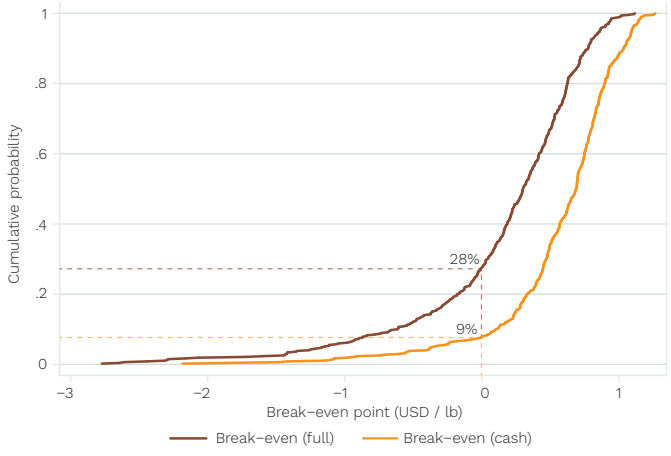
(a) Colombia (n=720)



(b) Honduras (n=644)



(c) Costa Rica (n=493)



DATA: Transustain Project, University of Münster
SOURCE: ICO (2019b)

of a sample of more than 1,500 farmers in three countries, Colombia, Costa Rica and Honduras (ICO, 2019b). Gross margins were calculated as the difference between the unit price of green coffee received by the farmer and the farmer's unit cost. These gross margins are indicated on the horizontal axis. The height of the curve represents the fraction of sample farmers who fall at each level of those gross margins. In Colombia, 53% of coffee farmers were operating at a loss with negative gross margins (Panel a). Growers in Honduras (Panel b) and Costa Rica (Panel c) perform slightly better, but more than 25% could not cover their costs of production (ICO, 2019b). This analysis is based on coffee prices during the 2015/16 season, which were significantly higher than today. Similarly, more than one third of coffee growers in Rwanda faced very low gross margins or even net losses in 2015 (Clay et al., 2016). This strongly suggests that the economic situation of farmers has worsened in the more recent past.

Strategies to improve the profitability of coffee production include increasing productivity and efficiency. In view of the surplus in the global coffee market, industry programmes and public policies that aim at increasing productivity have come under scrutiny for exacerbating pressure on prices. If the additional output produced is not matched by a similar increase in demand, the impact of such programmes in raising household incomes of coffee farmers could be limited.

4.2 Profitability of coffee production and household welfare are closely linked

The degree to which the profitability of coffee production affects overall household welfare depends on the contribution of coffee to total household income. Coffee can be the main cash crop for producing households, e.g. in Asia and Central and South American countries. In other producing regions households tend to be more diversified in terms of their income sources (Fairtrade, 2017). These can include other agricultural activities, off-farm activities, wage labour and remittances. More diversified household incomes provide a better natural hedge against fluctuations in the coffee price.

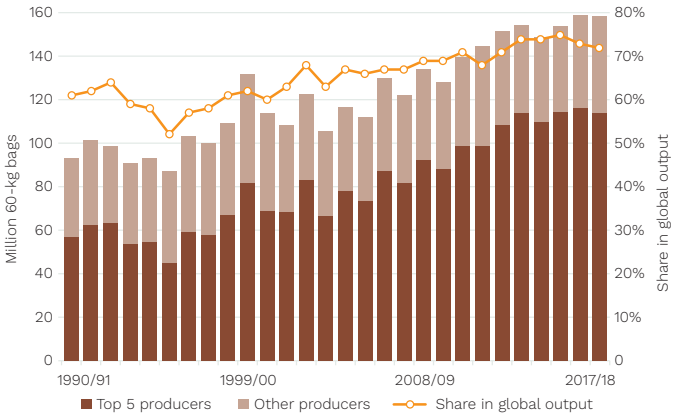
Those households that are highly dependent on income derived from growing and selling of coffee are particularly exposed to the vagaries of the commodity market. Formal risk management tools, such as hedging in futures markets, are often too complex and too costly for small farmers and remain a viable option only for larger or aggregated producers.

Female farm operators and women in coffee-producing households have systematically lower access to both formal and informal risk management tools and strategies (ICO, 2018a). As a result, female producers are among those most vulnerable to volatile coffee markets.

4.3 Concentration of production in highly competitive origins and increased supply risk

If output prices remain low for an extended period of time and farmers are not able to cover the full economic cost, vital investments in rehabilitation and replanting of coffee trees

FIGURE 17 Share of Top-5 producers in global coffee production increases



SOURCE: ICO

are postponed or cancelled. As a result, the adoption of new varieties that are resistant to plant diseases, such as coffee leaf rust, and more tolerant to the impact of climate change is severely constrained. While efficient and low-cost growers remain profitable and are able to invest in the modernisation of their farms, there is increasing economic pressure on high-cost producers with limited resources to expand or in some cases even maintain current production levels. Hence, current coffee price levels foster concentration of production and exports in a small number of highly competitive origins. Today, just five countries produce and export over 70% of the world's coffee (Figure 17).

If this trend continues, the global market share of the top 5 producers could surpass 80% over the next 15 years. Losing diversity of origins reduces consumer choice and increases the global coffee sector's vulnerability against severe market shocks. For example, extreme weather events affecting such droughts or frosts in any of the top producers can have severe effects on both the coffee industry and consumers.

KEY FINDINGS

- **Within a decade cost of production in local currency has nearly doubled in major production regions.**
- **Labour constitutes more than 50% of total cost in most production systems (except Brazil).**
- **In high-cost origins 25-50% of farmers are unable to cover their full production cost.**
- **Since 1990 the share of top 5 producing countries in global output has increased from 57% to over 70%. If prices remain low, concentration of production could increase to 80% over the next 15 years resulting in higher supply risks.**

5. Impact of coffee price levels and volatility on economic and social development

FLUCTUATIONS IN THE PRICE OF COFFEE HAVE A SIGNIFICANT IMPACT ON ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS

Tracing the impact of price variations from farm-level to rural communities and the wider economy, this chapter explores the relationship between international coffee prices and socio-economic development in producing countries.

5.1 The relationship between movements in coffee prices and economic and social development

The economic and social impact of changes in international coffee prices is assessed using a range of indicators on employment, economic activity, poverty, food security and migration (for the full methodology refer to Technical Annex C). These indicators were obtained from databases of the World Bank (WB) – World Development Indicators, the Food and Agriculture Organization (FAO) – FAOSTAT, the Organisation for Economic Co-operation and Development (OECD) – Migration Database, Reserve Banks – FRED® Economic Data and other macro-data sources, including the Penn World Table. The final dataset contains information for 56 coffee-producing countries over a period of 28 years, from 1990 to 2017, for a maximum of 1,568 observations. The time period covers multiple phases of boom and bust in the coffee market.

As coffee producing countries are heterogeneous, e.g. in terms of economic development and dependence on coffee production, a multivariate regression framework is employed. This allows one to control for country- and time-specific factors that can be correlated with economic and social outcome indicators of interest. The controls include time-varying country specific parameters such as life expectancy at birth (years), fertility rate (total births per woman) and average years of schooling, and other time-specific controls that account for annual events affecting all countries in the sample, such as the occurrence of a global recession. The framework also controls for time-invariant unobservable characteristics of each country. Furthermore, the analysis allows for heterogeneous effects of price changes depending on one of three prevailing price regimes.[9]

Since information on outcome variables is available only with a time lag, the historical dataset used for the quantitative analysis does not cover the most recent period of low coffee prices. Hence, the results of a survey of ICO Member countries, launched in coffee year 2018/19 complement the quantitative analysis with information on the impact of the current price levels in coffee producing countries.[10]

The socio-economic indicators analysed are grouped in four categories: (a) economic and social impact, (b) food security, (c) political stability, and (d) migration. Each category comprises one or more indicators. Results are presented in Figure 18 and discussed below. The analysis of the relation between coffee prices and migration is on-going and only preliminary findings are presented here.

[9] Regimes were determined by splitting the distribution of the ICO composite indicator distribution in three equal shares. The following price regimes were determined: low: 0-80 US cents/lb; medium: 81-125 US-cents/lb; high: >126 US-cents/lb.

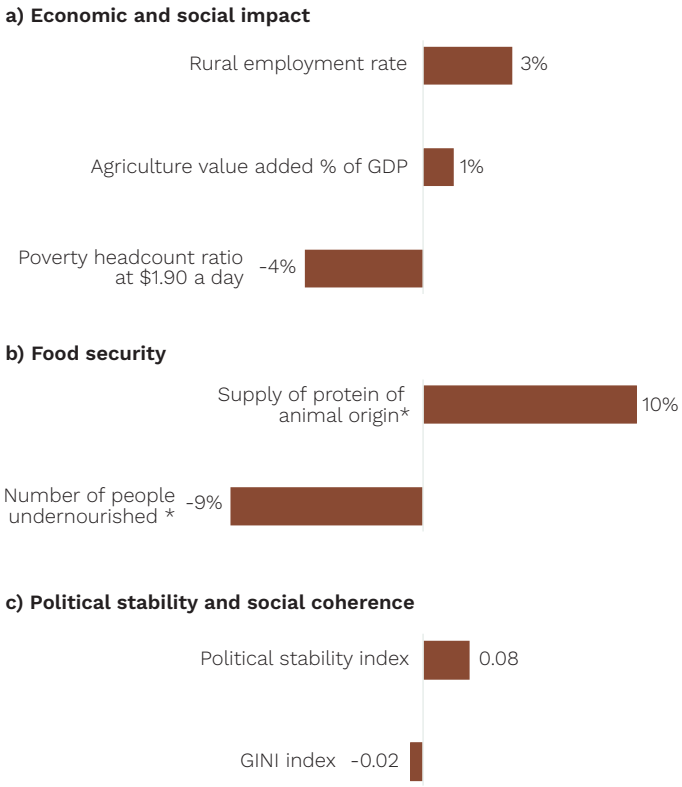
[10] The full report of the survey is contained in document ICC-124-4.

5.2 Economic and social impact

The analysis revealed a statistically significant relation between changes in the price of coffee and employment, value addition as well as poverty rates. A 1% increase in the price of coffee is associated with a 3% increase in the rural employment rate (Figure 18a). This sizeable positive effect on the non-urban labour market suggests that the coffee value chain provides employment for workers at the farm level (e.g. during harvest) and beyond (processing, handling, export). A rise in international prices of 1% has positive knock-on effects on the contribution of agriculture to the GDP of producing countries (+1%). These effects on the rural economy translate into a reduction of poverty. A 1% increase in coffee prices is correlated with a 4% decrease in the World Bank poverty headcount ratio (at 1.90 USD a day), thereby suggesting a relevant contribution to Sustainable Development Goal 1.

FIGURE 18

Relationship between a 1% increase in coffee prices and economic and social development indicators in coffee producing countries



NOTE: The sample of countries included in the analysis comprises all ICO Member countries.
Results are statistically significant at least at the 10% level.
* Results are significant for countries which are highly dependent on coffee (share of coffee in total export value)
Data obtained from World Bank, FAO, PWT, FRED®
SOURCE: ICO

The results of the survey on the impact of current price levels on ICO Members, completed at the beginning of 2019, confirm the relationship between prices and economic impact that emerged from the analysis of historical data. The income of coffee growers decreased by 10% on average in 2018 among the respondents (ICO, 2019a). With farm incomes falling, poverty rates in coffee-producing areas are rising. The survey results suggest that the proportion of farmers living below the poverty line of USD 1.90 per day increased between 7% and 50% (Figure 19).

Due to data limitations, the prevalence of child labour in coffee-producing areas was not included as a dimension in the quantitative analysis at this stage. Existing quantitative studies using smaller samples of coffee-farming households are rare but indicate that low prices are indeed correlated with increased risk of child labour, as adults in coffee-producing households take on off-farm employment to supplement dwindling agricultural income.

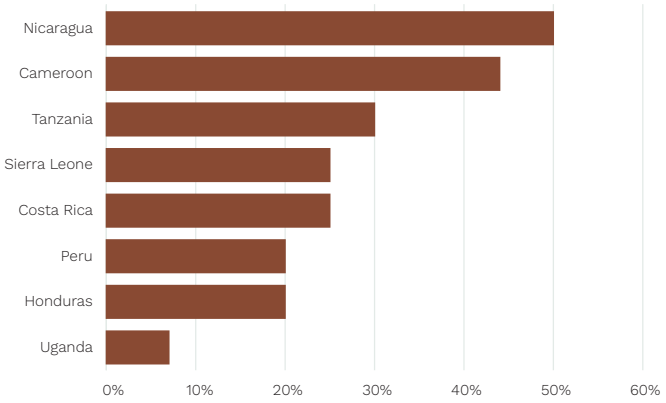
For example, the evidence for countercyclical wage employment among adults in the context of Vietnam found by Beck, Singhal and Tarp (2016) is compelling. A one standard deviation increase of the international coffee price leads to a 19% lower propensity to work off-farm. Simultaneously, an increase in the coffee price reduces the probability of children (aged 6-14 years) and adolescents (15-19 years) working on the farm by 19% and 10%, respectively. These results imply that children are more likely to work the family coffee farm when coffee prices are low and livelihoods are at risk.

5.3 Food Security

Some progress has been made towards the goal of achieving the Zero Hunger target by 2030 (SDG 2). Nevertheless, 820 million people in the world remained hungry in 2018. Hunger has increased in all African sub-regions, making Africa the continent with the highest prevalence of undernourishment. Hunger is also on the rise in Latin America and the Caribbean, while Western Asia shows a steady increase since 2010, resulting in a 12 percent rate of undernourishment today (FAO, IFAD, UNICEF, WFP and WHO, 2019).

The quantitative analysis shows a significant positive correlation of higher coffee prices with food security in producing countries that are highly dependent on coffee (Figure 18b). A 1% increase in the international price of coffee is associated with a 10% higher supply of animal-based protein, a proxy for the dietary quality. The prevalence of some forms of hunger, as measured by the share of undernourished people in the overall population, would decrease by 9%. The results are statistically significant only for the subset of countries that are highly dependent on coffee. The findings are in line with previous research which showed that commercialization of agriculture contributes to increased nutrients from purchased foods while not reducing the consumption of nutrients from own-produced foods (Ogutu, Gödeke and Qaim, 2019). The results confirm the critical contribution of the coffee sector in achieving SDG 2.

FIGURE 19
Increase in the proportion of farmers living with less than USD 1.90 a day



SOURCE: ICO, 2019a

5.4 Political stability, social coherence and switching to illicit crops

Economic growth, social coherence and political stability at the national level are closely interlinked. The causal relation runs in both directions. Growth rates tend to be higher in countries with stable political systems and in the absence of social conflict and turmoil. At the same time equitable economic growth fosters social coherence and political stability (Alesina et al. 1992).

The ICO analysis reveals a significantly positive relationship between higher coffee prices and income equality as well as political stability (Figure 18c). Income equality is measured by the Gini coefficient that ranges from 0 to 1 where 0 describes a state of full equality and 1 a state of absolute inequality. A 1% increase in the international price of coffee reduces the Gini by 0.02 across all coffee producing countries on average. This finding shows that the positive economic benefits of coffee production on employment, and agriculture value added reach the poor and thereby reduce inequality. Hence, higher coffee prices are associated with equitable outcomes, contrasting the potential benefits from price increases in other non-agricultural commodities such as oil, which are often accrued by elites, depending on the governance of states (Humphreys, Sachs and Stiglitz, 2007).

Political stability is expressed by an index of the Worldwide Governance Indicator family of the World Bank, which measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. The index ranges from -2.5 to 2.5 with lower values indicating less political stability. The empirical analysis finds a statistically significant relationship between coffee prices and political stability in producing countries. A 1% increase in coffee prices is correlated with a 0.08 points increase in the political stability index. Hence, higher coffee prices – through their impact on economic development – are likely to have positive indirect effects on social coherence, the rule of law and business environment in producing countries. Falling coffee prices on the other hand, could result in instability in those communities that are economically dependent on

coffee sales. This is in line with research showing a causal relationship between coffee prices and conflict in the context of Central and South America (Dube and Vargas, 2013). It is documented that the erosion of the rule of law in rural areas that are economically depressed as a result of low international prices for coffee can also lead to the switching from coffee growing to the production of illicit crops such as coca (Ibáñez, Muñoz-Mora and Verwimp, 2013).

5.5 Migration from coffee-producing countries to OECD countries

This chapter contains preliminary results of the analysis of the relationship between changes in coffee prices and migration. The number of international migrants has increased in recent years, reaching 258 million (UN, 2017). The reasons for migration are varied and its drivers complex. People may migrate in search of jobs and economic opportunities or as the result of conflict, terrorism and persecution.

The quantitative analysis estimates the impact of changes in coffee prices on migration from coffee-producing countries to OECD countries. The analysis is based on a large dataset containing annual estimates of migration for the years 1990 to 2016, from the International Migration Statistics (IMS) of the OECD. The migration estimates are recorded as number of migrants arriving in OECD destination countries from a specific country of origin. This allows us to assess migration flows based on pairs of countries (e.g. from Guatemala to the United States). The migration estimates capture overall flows from rural and urban areas and are not limited to coffee growers or coffee-growing communities. As such the analysis is expected to account for knock-on or indirect effects of changes in the price of coffee on the entire economy of a producing country. These include the channels identified in this chapter including employment effects, food security, poverty and inequality as well as political stability.

A multivariate regression framework, based on Mayda (2010), is employed to isolate the effect of a change in the international price for coffee on migration, controlling for country- and time-varying indicators that are likely to be correlated with migration, such as income levels measured by real per-worker GDP of the origin and destination countries. The methodology also controls for year effects and time-invariant unobservable characteristics of each pair of origin-destination countries, which are particular to the relationship of those pairs and could influence migration patterns.

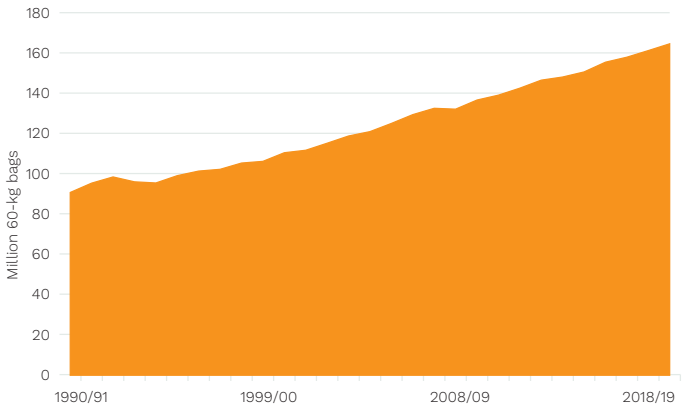
The preliminary results of the quantitative analysis suggest a statistically significant effect. An increase of 1% in the coffee price is associated with lower migration from coffee producing to OECD countries of up to 25,000 people. This is an average effect across the set of 56 coffee-producing countries included in the analysis. The results of the analysis are in line with anecdotal evidence emerging in the current market downturn. Low coffee prices are reported to result in increased migration flows, especially from Central America to the United States (Financial Times, 2019; The Economist, 2019). However, additional robustness tests are required to assess potential discrepancies with the body of research on migration. For example, some studies show that positive income shocks increase the likelihood of migration (enabling effect).

“A 1% increase in the price of coffee is associated with a 3% increase in the rural employment rate.”

KEY FINDINGS

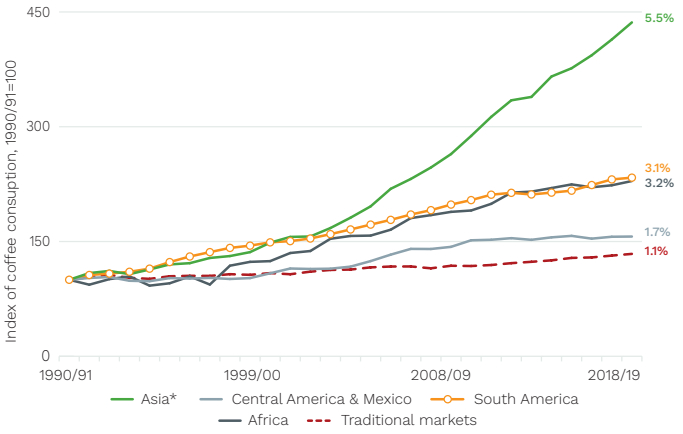
- **Quantitative analysis at the macro level shows strong correlation between changes in the international price of coffee and economic and social development in producing countries.**
- **Higher coffee prices are associated with more rural employment, higher contribution of agriculture to GDP, lower levels of poverty and income inequality, increased food security, and higher political stability.**
- **A healthy coffee sector in producing countries contributes crucially to achieving the Sustainable Development Goals.**

FIGURE 20
Global demand for coffee (million 60-kg bags GBE)



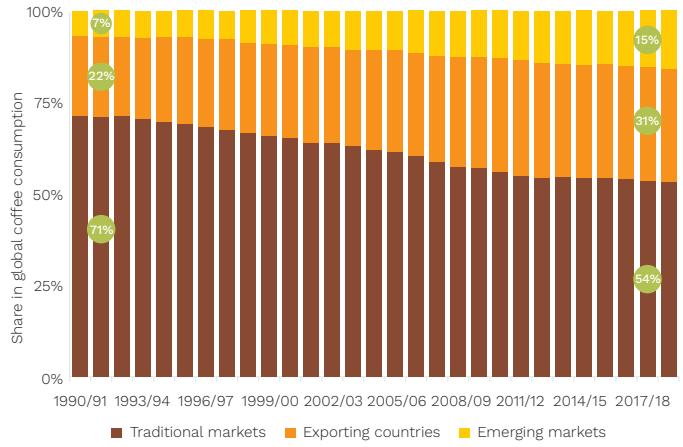
SOURCE: ICO

FIGURE 21
Comparison of coffee consumption by region (index of volume)



NOTE: Asia excludes Japan, which is classified as traditional market
SOURCE: ICO

FIGURE 22
Evolution of global market shares in consumption



SOURCE: ICO

5.6 Coffee and sustainable development

The quantitative analysis in this chapter shows that changes in international coffee prices represent an external shock to coffee-producing economies with repercussions for economic and social development, including poverty and equality, food security, political stability and, potentially, international migration. Hence, policies that help increasing and stabilising income levels of coffee-producing households can have a significant impact on economic and social development, thereby directly contributing to achieving the SDGs.

6. Harnessing growth in the coffee market for equitable outcomes and sustainable development

Coffee can be a driver of development in producing countries. The analysis so far has shown that stabilising and increasing incomes of coffee farmers leads to significant positive economic and social outcomes at farm level, as well as spillovers for rural communities and the economies of producing countries. While producer prices have deteriorated substantially in recent years, the trend for the overall sector points upwards. Both market volume and value are increasing steadily. To ensure equitable growth, it is crucial to support growers and producing countries in creating more value at origin.

This chapter analyses global demand trends followed by a discussion on the creation and distribution of value along the global coffee supply chain. The chapter assesses the potential of and barriers to value addition at origin.

6.1 Coffee is a growth market in volume terms

Coffee is a growth market. Over the past two decades, global demand for coffee has increased by 65%, from 95 million 60-kg bags produced on average in the mid-1990s to 157 million bags in 2014-2018, on average (Figure 20). Over this period global demand for coffee grew at an annual rate of around 2.2%.

Growth rates differ between markets (Figure 21). The increase of volumes consumed in traditional markets with high per-capita consumption rates (e.g. Europe, North America and Japan) has been modest at 1.1% and mostly due to new trends such as specialty coffee and product innovations including coffee pods (NCA, 2019; BASIC, 2018). The largest contribution to overall growth in the global market stems from steadily increasing consumption in emerging markets as well as in coffee-producing countries. In Asia, the consumption of coffee increased at an average annual rate of 5.5%, showing greater dynamism in recent years. Latin-American and African markets have grown at a slower pace with rates of 2.8% and 3.2%, respectively.

As a result of the divergent growth rates, there has been a shift in terms of global consumption with an increasing importance of non-traditional markets. In 2017/18 almost

half (46%) of the world's coffee was consumed in emerging and exporting countries, up from less than 30% in 1990/91 (Figure 22).

Despite rapid growth over the previous two decades, per capita consumption rates in emerging countries are still modest in absolute terms. Figure 23 shows that for example in China and India, which together represent 36% of the world's population, only around 0.1kg of coffee is consumed per person and year, significantly less than in the United States (4.9kg), the single largest consumer market.

A notable exception in terms of annual per-capita consumption in producing countries is Brazil (6.3kg), which has emerged as second largest consumer of coffee worldwide, recording the consumption rates at the level of traditional markets. While there is positive correlation between per-capita GDP and coffee consumption, the example of Brazil also shows that wealth it is not a necessary condition for drinking substantial amounts of coffee.

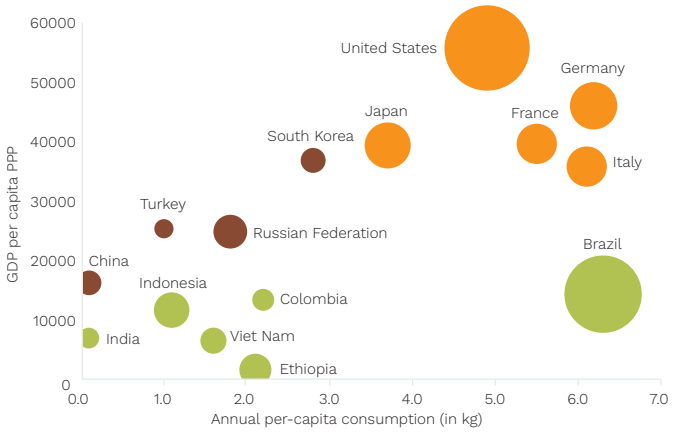
In view of global population growth and a continuing convergence of per-capita consumption rates between traditional and non-traditional coffee-consuming countries, there remains significant potential for growth of the overall coffee market. Demand in emerging markets and producing countries could be further stimulated through promotion campaigns, both by the private sector (brand-specific, generic) and the public sector (generic), contributing to a more balanced global market.

6.2 Value creation in the global coffee sector is on the rise

The coffee sector is not only growing in terms of volumes but also in terms value creation. Revenues of coffee roasters and retailers have increased significantly over the past two decades. However, the international price for green coffee has not shown any sustained upward trend (and real prices have fallen in some countries). A recent study conducted in the French market illustrates this phenomenon (BASIC, 2018). Figure 24 shows that the value in sales of roasted ground coffee (packets, pods and capsules) almost doubled between 1994 and 2017, rising from 1.260 billion Euro to over 2.437 billion Euro. Over the same period the value of imported coffee has increased only from 397 million to 461 million Euro (Figure 24). As a result, the producer share in retail prices dropped from 24% to 16% (ibid).

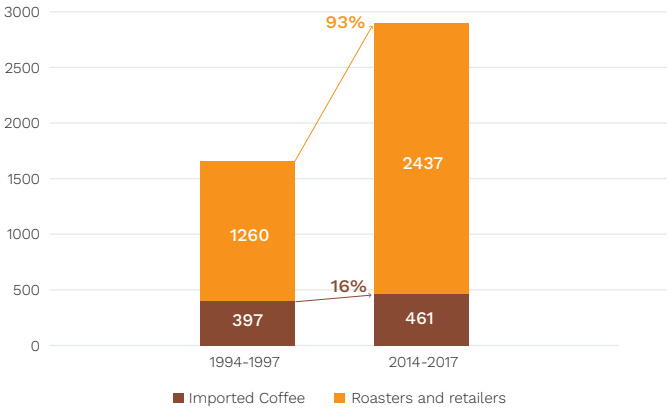
This phenomenon, which can be observed across countries, has been subject to considerable debate. The decline in the producer share initially coincided with the liberalisation of the coffee market (resulting from the changes in the international coffee agreement) and the simultaneous ongoing process of concentration in the trading and roasting industry (Gilbert, 2006). Some studies suggest that the market liberalisation and higher concentration in the downstream supply chain segment led to increased market power of traders and roasters, which in turn led farmers to be squeezed (Oxfam, 2002; Daviron and Ponte, 2005). However, Gilbert (2007) showed that the decline in producer shares is likely the result of increasing costs of processing, marketing and distribution, rather than the result of monopoly-monopsony power of downstream value-chain actors. Hence, the falling producer share does not necessarily imply an increasingly unfair distribution of value.

FIGURE 23
Per-capita consumption across markets (2018)



NOTE: Size off the circles represents total annual consumption (in million bags). Categorization: traditional markets (orange), emerging markets (brown), exporting countries (green)
SOURCE: ICO

FIGURE 24
Change in the value of coffee consumed at home in the French market (in million EUR)



SOURCE: BASIC (2018)

EMERGING COFFEE MARKETS IN ASIA ARE FAST GROWING. SINCE 1990 CONSUMPTION INCREASED BY

5.5%

ANNUALLY.

This is in line with empirical evidence from other agricultural sectors (Tomek and Kaiser, 2014). Additional empirical evidence on this question is provided here by quantifying the relation of producer prices and retail prices using the example of the USA, the largest consumer market for coffee. Figure 25 shows this relationship between the unit value of green coffee imports (used as a proxy for the producer price) and the inflation rate of coffee products in the US market. Using 1970 as base year the unit value of green coffee imports recorded by the ICO is converted into an index (green line) which is compared over time to the development of the Consumer Price Index (CPI) for coffee (brown line) obtained from the US Federal Reserve.

Between the base year 1970 (Index=100) and April 2019 the index of the unit value of green coffee imports increased to 318 points, implying that the nominal price of green coffee has increased more than threefold. Over the same time period, the CPI for coffee rose to 676 points. Consumers in the United States, the world's largest market, pay in nominal terms almost seven times more for coffee products today than in the 1970s. During the most recent period of continuously falling green coffee prices (commencing in November 2016) the index of the unit value of green coffee imports dropped from 358 to 318 points (-11%) while the CPI for coffee decreased marginally from 676 to 675 points (-0.2%).

The divergence of price indices in the long run is likely due to the development of costs of inputs other than green coffee (e.g. labour, energy, packaging, transport, marketing, rent for retail space). Indeed, processing and distribution costs in the USA increased at a higher rate than the costs of green coffee. In figure 25 this is illustrated by the orange line which represent US inflation rate (CPI) that contains a wider bundle of goods and services, used here as a proxy for processing and distribution costs. While the CPI for coffee shows considerable variation over time it follows the same trend as the general US CPI.

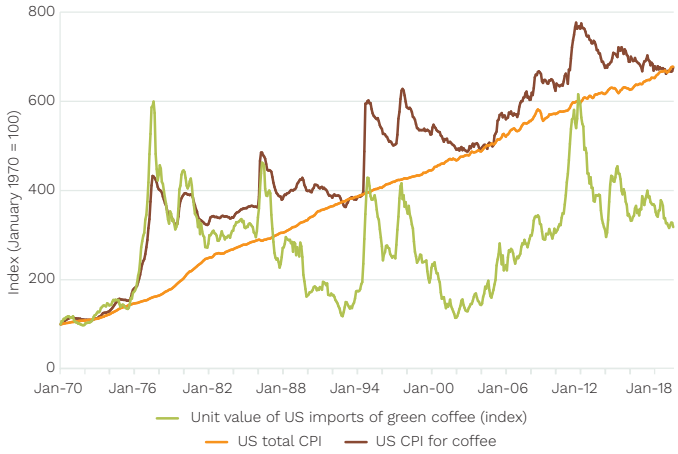
Any increase in consumer prices of coffee that cannot be attributed to rising input costs (other than coffee) would represent elevated margins at various levels in the value chain. Based on the underlying descriptive analysis it is not possible to isolate the size of the margin and track its development over time. Some studies shed light on margins obtained in specific markets or market segments (Samper, Giovannucci and Vieira, 2017, BASIC, 2018; Naegele et al. 2019). However, systematic information on distribution of margins along the value chain is notoriously difficult to obtain, pointing at a significant data gap.

In the short run other factors can play a role in the divergence of green coffee and consumer price movements. For example, research has shown that retail prices adjust differently to upstream price shocks (e.g. frost or drought events affecting supply). An increase in green coffee prices is passed on to consumers more rapidly than a corresponding decrease (Meyer and von Cramon Taubadel, 2005; Bonnet and Vilas Boas, 2015).

As a result of the low producer share in the retail price for coffee and the asymmetric adjustment to price shocks, current retail prices certainly do not indicate fully to coffee consumers that farmers are faced by dramatically low producer prices.

FIGURE 25

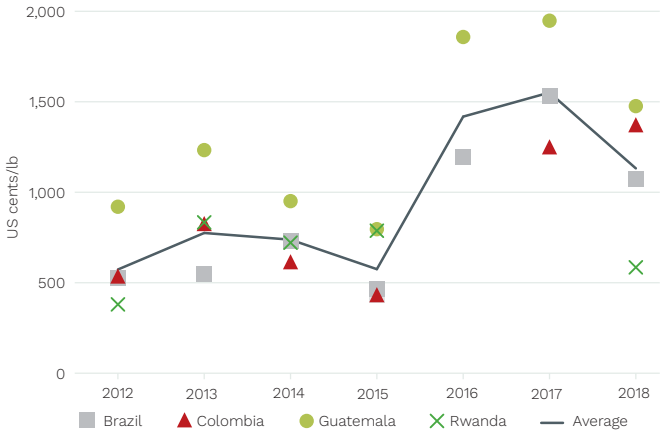
Green coffee price index vs. consumer price indices in the United States (1970-2018)



NOTE: Consumer Price Index (CPI) Coffee data obtained from Federal Reserve
SOURCE: ICO

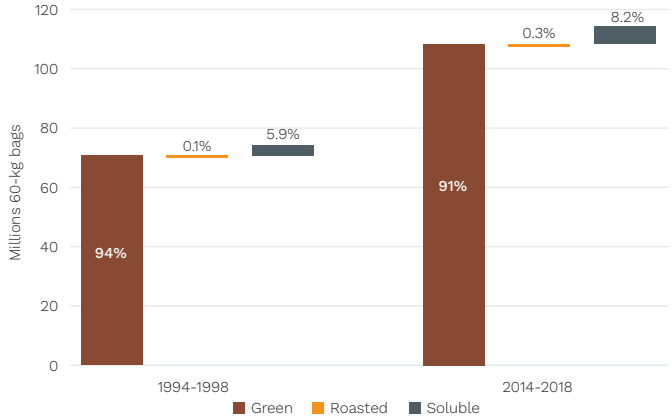
FIGURE 26

Average premium over Arabica futures prices at Cup of Excellence auction



SOURCE: ICO calculations based on Cup of Excellence auction data

FIGURE 27
Coffee exports by form and market share (%)



SOURCE: ICO

6.3 Increasing value added at origin

In a competitive market with increasing costs for processing, marketing and distribution margins are likely to be low. Hence, the scope for re-distribution of value from down-stream value chain actors to coffee farmers would be limited.

Strategies that aim at the creation of value on farms through decommoditisation (e.g. via accessing high-value markets) and at the level of producing countries (e.g. through processing of green coffee) would be more effective in creating economic benefits and foster prosperity.

There is scope for producers to tap into the fast-growing high-value market segment of gourmet or specialty coffees. These coffees are characterised by high quality and non-tangible features, which are recognised and financially rewarded by certain consumers. Hence, gourmet coffees command a premium over mainstream coffees. The size of the price premium can be substantial, as illustrated by the analysis of data on auction results obtained from the Alliance for Coffee Excellence (ACE)[11]. The dataset comprises the unit value of coffee lots sold at auctions in Brazil, Colombia, Guatemala and Rwanda between 2012 and 2018. Figure 26 shows that the differential between average unit value at auction and the season average of the Arabica futures price was significant, ranging from close to 400 US cents/lb to almost 2,000 US cents/lb, depending on the year and country. Due to the relatively small quantities involved, the economic significance of the specialty market segment (in particular 'third-wave' or 'experiential' coffee segment) remains limited today but further growth is likely (Samper, Giovannucci and Vieira, 2017).

While premiums for quality coffee can be substantial but production costs also tend to be higher. Accessing high-value segments requires a certain level of transport and market infrastructure, often a binding constraint for smallholders. Finally, the profitability of specialty coffee production crucially depends on the premium that the market pays over standard qualities. If the supply of high-quality coffee increases, but demand remains unchanged, prices in this market segment could fall, eroding economic benefits at farm level (for a discussion of voluntary sustainability standards, refer to Section B, chapter 5).

Besides de-commoditizing green beans through quality improvements, value addition at origin can be achieved through processing for export markets or where local demand is rising for the domestic market. Differentiating coffee exports by form (green, roasted, soluble) helps to gauge the current state and the potential for value addition through processing at origin. ICO data indicates that the vast majority of coffee is still traded in green form. Figure 27 shows that green coffee exports represented 94% of total exports in 1994-1998 and still made up 91% in 2014-2018. Exports of other forms of coffee have increased only slightly. Exports of roasted coffee have increased nearly sixfold over the last two decades, albeit from a low base. Exports of soluble coffee more than doubled but remain small in volume terms. Hence, most of the value addition in the coffee industry occurs in importing countries (ICO, 2018c).

The low level of value addition in producing countries can be explained by three main factors: (i) investments requirements for processing infrastructure, (ii) transport and marketing costs to reach international markets, and (iii) tariff and non-tariff trade barriers.

In their assessment of factors limiting coffee processing at origin, the International Trade Centre (ITC, 2011) argues that processing green coffee at origin for export is technically feasible, but significant investments are required to produce soluble or roasted coffee competitively at scale. For roasted coffee, the physical distance between processing plant and consumer results in transport times that place roasters in producing countries at a disadvantage in terms of freshness and shelf life of the product. Furthermore, new market entrants face strong competition from well-established local brands (Samper, Giovannucci and Vieira, 2017). Some of these challenges can be overcome through improved packaging technology (roasted coffee), streamlined distribution channels (all forms) or branding.

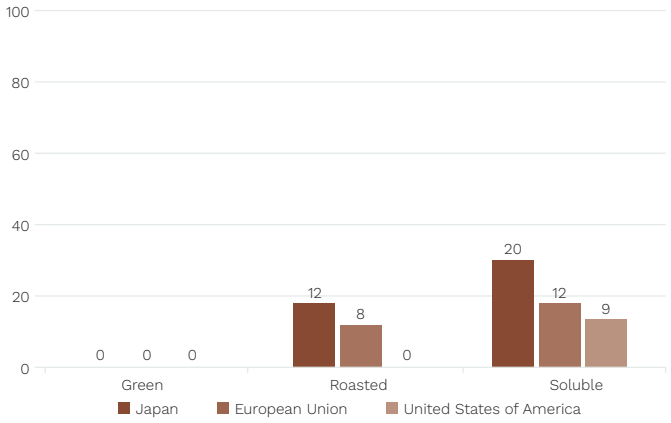
"Speciality coffees command a premium over mainstream coffees. The size of the price premium can be substantial."

[11] Alliance for Coffee Excellence (ACE) is a non-profit organization that runs the Cup of Excellence programme.

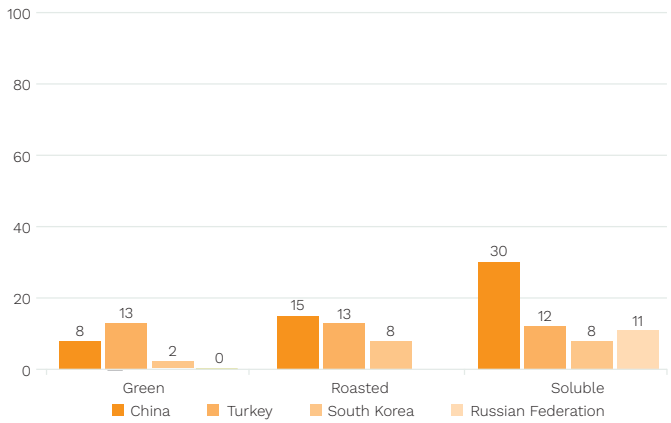
FIGURE 28

Average MFN tariff for coffee (in %)

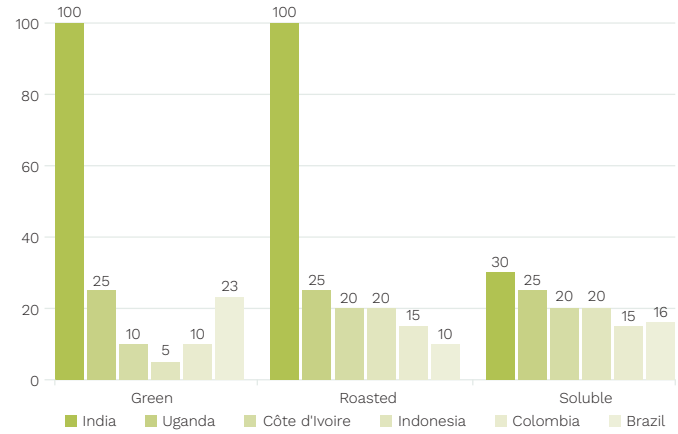
(a) Traditional importing countries



(b) Emerging markets



(c) Exporting countries



SOURCE: WTO

Tariff and non-tariff trade barriers are a structural feature of the global coffee sector. Despite some progress in trade liberalisation, import tariffs remain an obstacle to value addition at origin (ITC, 2011). Figure 28 shows that in traditional and emerging markets green coffee can be imported tariff-free or with a relatively small levy. Import tariffs imposed on processed (roasted and soluble) coffee are higher – a phenomenon called tariff escalation. In contrast, countries that produce and export coffee tend to impose higher tariffs on green coffee.

Tariff escalation observed in importing countries shields the domestic processing industry from competition on the home market while ensuring green coffee supply at competitive rates. However, in line with their development policy objectives, some importing countries grant tariff exemptions to selected low income countries (e.g. the EU under its Generalised Scheme of Preferences[12]).

Among coffee-producing countries India, Uganda and Brazil impose the highest tariffs on green and processed coffee. Duties on green coffee imports shield farmers from competition with lower cost producers that could target the domestic market. This in turn raises the raw materials costs for domestic coffee processors. To offset this disadvantage, tariffs are also imposed on the final product (roasted and soluble coffee). This complex system of trade barriers can help to develop a local processing base and create higher value added at origin (commonly referred to as 'infant industry' argument). However, this is an economic balancing act since the lack of openness to international trade inevitably leads to higher consumer prices domestically and could cement inefficient structures in the sector.

KEY FINDINGS

- **Coffee consumption in emerging markets and producing countries has increased at a faster pace than in traditional markets providing new market opportunities.**
- **Today 46% of the global demand for coffee stems from emerging markets and coffee-producing countries, up from 29% in the early 1990s.**
- **Over 90% of coffee is exported in green form. Value addition is concentrated in importing countries.**
- **While technical challenges can be overcome, transportation and marketing costs, as well as tariff and non-tariff trade barriers remain an obstacle to value addition at origin.**

[12] http://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/index_en.htm

7. Conclusion: economic viability as the catalyst for achieving sustainability in the coffee sector

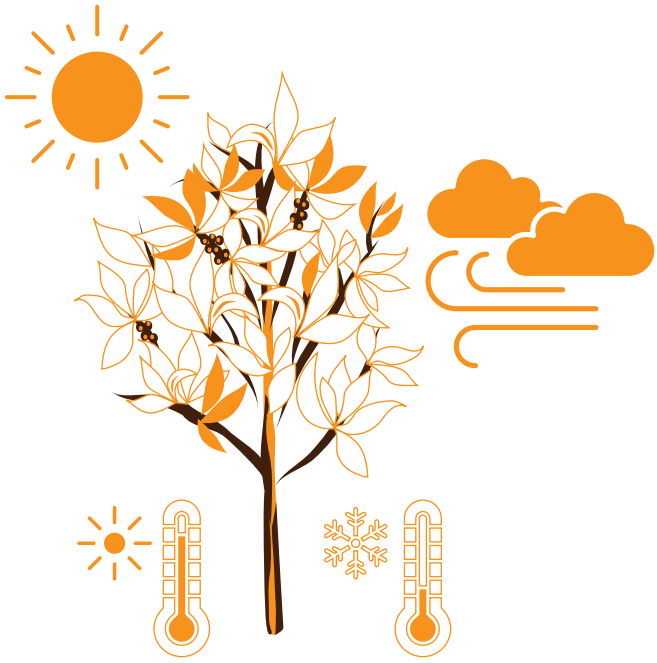
The analysis contained in this section showed that current price levels are chiefly the results of a cyclical downturn following two years of significant surplus in the market. However, non-fundamental factors, such as the increased financialization of futures markets, can also play a role in determining price levels. The impact of prolonged periods of low prices on coffee producing countries is severe and ranges from increased poverty rates, food insecurity, and erosion of labour standards to social unrest, political instability and even international migration. Lack of investment in the sector increases the supply risk in the medium- and long-term due concentration of production in fewer origins and higher vulnerability to the impact of climate change.

While sustainable coffee livelihoods are not a sufficient condition for a sector that is inclusive, fair and environmentally friendly, they certainly are a necessary condition. If rural households engaged in coffee production are lifted out of poverty and obtain an income that allows a decent standard of living (i.e. a living income) social objectives such as gender equality and eradication of the worst forms of child labour are more likely to be reached. Environmentally detrimental practices, such as deforestation, would be significantly reduced.

Phases of boom and bust are a recurring theme in commodity markets and coffee is no exception. Naturally, similarities can be found with previous periods of low price levels, such as the market downturn in the early 2000s. However, there are profound and important differences. Since the previous coffee crisis, the structure of the coffee market has changed with a concentration of production in fewer origins on the supply side and a consolidation of the industry on the demand side. Sustainability initiatives have grown and ethical consumerism is more widespread, the speciality coffee segment has emerged with dynamism, and almost half of the coffee produced worldwide is now consumed outside traditional markets. There are new challenges, such as the impact of climate change on coffee production, which pose a serious threat not only to the livelihoods of millions of growers but also affect the sustainability of the entire sector. However, there are also new opportunities related to innovation and new technologies that can help to address the challenges faced by the sector. For example, our ability to collect and analyse data has increased dramatically as a result of the on-going digitalisation. Digital innovations can support farmers' decision-making, increase productivity, result in better access to finance and markets, improve efficiency and transparency in value chains and bring producers closer to consumers.

Against this backdrop, the following section explores options for coffee stakeholders to address coffee price levels and price volatility and their impact on producers. The solutions analysed aim at effecting transformational change in the sector to achieve economic viability of coffee production and sustainability of the sector, thereby contributing to the 2030 Agenda for Sustainable Development.

"The impact of prolonged periods of low prices on coffee producing countries is severe and ranges from increased poverty rates, food insecurity, and erosion of labour standards to social unrest, political instability and even migration."



THERE ARE NEW CHALLENGES, SUCH AS THE IMPACT OF

CLIMATE CHANGE

ON COFFEE PRODUCTION, WHICH POSE A SERIOUS THREAT NOT ONLY TO THE LIVELIHOODS OF MILLIONS OF GROWERS BUT ALSO AFFECT THE SUSTAINABILITY OF THE ENTIRE SECTOR

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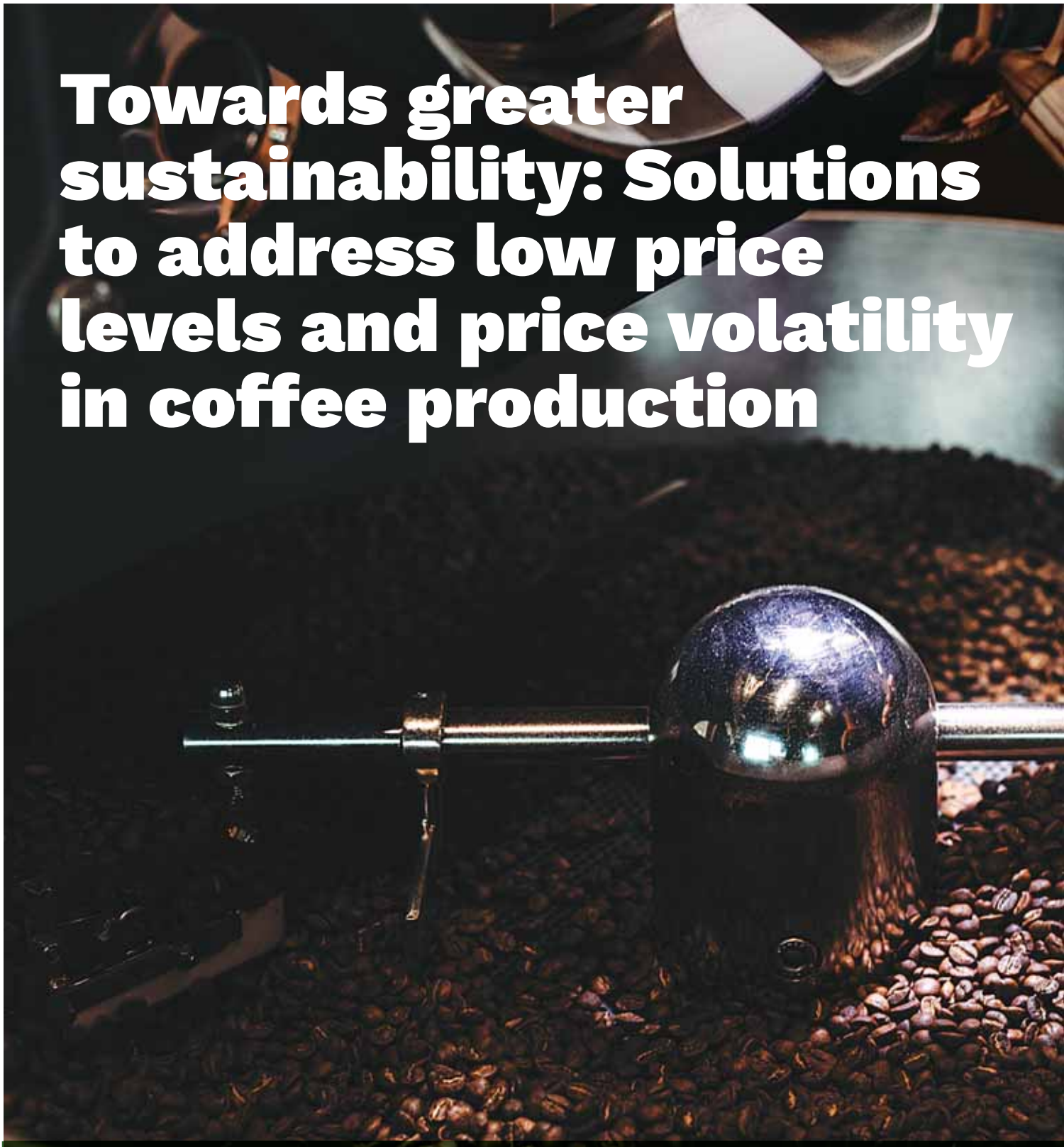
Towards greater sustainability: Solutions to address low price levels and price volatility in coffee production



PERFORMANCE
INCREASING PERFORMANCE OF COFFEE FARMS IS A CENTRAL AND EFFECTIVE STRATEGY TO ENSURE THAT COFFEE GROWERS ARE PROFITABLE AND IMPROVE THEIR LIVELIHOOD.

DIVERSIFICATION
COFFEE GROWERS CAN INCREASE THEIR INCOME AND REDUCE RISK BY GROWING STAPLE OR OTHER HIGH-VALUE CROPS.

VALUE ADDITION
INVESTMENTS IN HIGHER QUALITY AND PROCESSING CREATE ECONOMIC BENEFITS FOR GROWERS AND COFFEE-PRODUCING COUNTRIES.

CONSUMPTION
HIGHER DEMAND IN COFFEE PRODUCING COUNTRIES CONTRIBUTES TO A MORE BALANCED GLOBAL MARKET.

ENABLING ENVIRONMENT
SOUND AGRICULTURAL, TRADE AND INDUSTRIAL POLICIES FOSTER EQUITABLE GROWTH IN THE COFFEE SECTOR.

By working collectively as well as individually, stakeholders in the global coffee sector can take a number of actions to ensure coffee is competitive and sustainable over the long term.

1. Coffee and economic development

The previous section of the Coffee Development Report showed the long-term relationships between coffee market trends and socio-economic development outcomes based on a robust quantitative analysis. Section B will identify potential solutions that can address the current low price levels and volatility as well as improving the long-term economic sustainability of the coffee sector. The solutions discussed in this section were identified during the sector-wide dialogue that included extensive stakeholder participation and were complemented with independent research learning from past and present actions.

Section B is organized into three chapters. Chapter one presents potential solutions. It differentiates solutions that apply to production level, market level and sector-governance level. Chapter two provides a brief overview of the most prevalent initiatives related to the economic sustainability of the coffee sector. The third chapter identifies priority solutions to be implemented by different stakeholders. The priority solutions suggested in Section B form the basis of concrete, meaningful action that responds accordingly to the nature of the current crisis and promotes a global coffee sector that is competitive and sustainable over the long term. Public, private and civil society actors in the coffee sector all share responsibility to be part of the solution by taking measures individually and collectively in partnership.

The discussion of potential solutions in Section B draws on previous research in the coffee sector as well as in other agricultural commodities (Aidenvironment, 2018; Aidenvironment, IIED, Sustainable Food Lab, 2017; Aidenvironment and Sustainable Food Lab, 2018; IDH (2017); Molenaar et al., 2016).

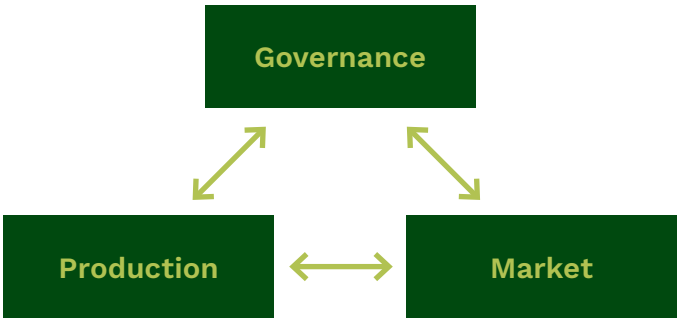
TEXT BOX 1
THE CONCEPT OF A LIVING INCOME

Living Income is defined as,"the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household."

The concept was inspired by the living wage debate in the garment sector where cost of living benchmarks have been calculated based on the Anker and Anker (2017) methodology. This methodology has been adapted and is under pilot in multiple smallholder-dominated agricultural sectors around the world. In the coffee sector, initial steps are being taken by various stakeholders to conduct living income benchmarks (for example in Uganda). Once the cost of a basic but decent living in a coffee growing region is calculated, it can be compared against the actual income that coffee smallholders earn in that region. As a holistic, household-based concept, living income allows for the identification of solutions that strengthen the profitability of a farming business from diversified sources whether coffee or other crops, livestock, and off-farm income-generating activities. The concept is increasingly recognized by donors, industry, civil society, and researchers as a credible and practical framework to address the incomes of smallholder farmers.

SOURCE: Anker, R. & Anker, M. (2017). Living Wages Around the World: Manual for Measurement. Cheltenham: Edward Elgar Publishing.

FIGURE 1
Solutions in Section B are categorized according to whether they apply to production, market or governance level



Section B uses the concept of 'living income' as a reference framework for the solutions presented in the section with regard to their impact on the economic welfare of coffee farming households. Text box 1 (left) provides more information on this concept.

2. Solutions at the production level

Several measures can be implemented at the farm level to enhance the economic viability of coffee production, the catalyst for sustainability in the sector. In view of lower productivity and efficiency compared to large-scale producers and estates, these relate mainly to smallholder production practices and include the marketing practices applied by the organizations with which small-scale producers are associated.

2.1 Farming

Enhanced farm performance to increase profitability

The improvement of coffee farm performance is a central and effective strategy to ensure that coffee growers are profitable and improve their livelihoods. Farm performance refers to productivity, efficiency, quality, and resilience. These performance areas are influenced by some factors within the control of the coffee producer, but some outcomes, like productivity, are to a large extent dependent on factors beyond the smallholder's sphere of control. These include the impact of weather patterns or changes in input costs. Coffee producers may not always be able to respond robustly to changing circumstances even within their control, such as pests and disease outbreaks or market preferences, due to the constraints associated with tree crops, including access to pest- and disease-resistant varieties or the time delay for new plantings to become productive.

Productivity and efficiency

High and consistent productivity, which is achieved by intensification and renovation, is a key component of a profitable coffee farm. Intensification refers to obtaining more coffee (i.e. yield) from fewer resources (i.e. land, inputs). This requires a technical package of good agricultural practices, improved varieties, fertilizer and pesticides applied in an efficient manner to minimize production costs. Cost efficiency contributes to increasing net margins for the coffee volume produced (i.e. profitability). Farm renovation (i.e. replanting, grafting) helps to achieve intensification over the medium term.

Quality

Quality can be an important determinant of the price received by coffee growers and thus drives farm profitability. Quality improvement is a complementary strategy to productivity enhancements (in cases where the market rewards it) and can put a coffee producer on the pathway to value addition and capture, e.g. through tapping into high-value market segments.

Resilience

Along with improving farm performance, productivity measures can strengthen the resiliency of farms to adapt to pests and disease outbreaks, soil erosion, and adverse weather events, like drought caused by climate change. A resilient and high-performing coffee farm requires sufficient resources, knowledge, and access to services. However, farm resilience is largely impeded by inadequate service delivery models for channelling the necessary training, inputs, and finance, with smallholders and female producers running a higher risk of being marginalised.

Income diversification

A major risk of focusing primarily on the performance of coffee farms is income dependence on a single crop. A viable farming system, especially in the smallholder context, combines profitability and resilience and diversifies income streams across coffee and other farming activities along with other off-farm labour and business activities. Income diversification in a viable farming system that can enable a living income requires a viable farm size. This strategy is the basis for the sustainable livelihood of the coffee producer, family and community.

On- and off-farm diversification

On-farm diversification can promote more stable incomes as it generates new sources of cash income as well as various in-kind benefits. Coffee producers can diversify by growing staple crops or other high-value crops (e.g. fruits and vegetables, herbs and spices) as relevant to the context. For example, in Vietnam, the Ministry of Agricultural and Rural Development promotes the intercropping of coffee with pepper, fruit trees, avocado, durian and macadamia (ICO, 2019a). These shade trees provide agronomic benefits while helping to diversify and stabilize farm income. Producers and their families can undertake other farming activities, such as raising poultry and livestock or beekeeping to produce honey. Other products derived from farm diversification can provide in-kind benefits, such as construction material or food for own consumption.

Income can also be diversified through other, off-farm business activities. For instance, entrepreneurial coffee producers can provide services, such as the application of inputs, grafting, and post-harvest processing, to their peers.

“A viable farming system, especially in the smallholder context, combines profitability with resilience and diversified income streams.”

TEXT BOX 2

COALITION FOR COFFEE COMMUNITIES AND OFF-FARM DIVERSIFICATION

Coalition for Coffee Communities shows recent attempts at off-farm diversification in the coffee sector through community development and landscape management. It is an initiative led by a group of American roasters, supported by a grant from the Inter-American Development Bank through the SAFE (Sustainable Agriculture, Food, and Environment) platform, that seeks to influence the enabling environment (i.e. policy, dialogue, and coordination) and channel private and public investments in off-farm service delivery benefiting areas where multiple companies source from. For example, the initiative currently invests in food security programs in Nicaragua.

As a new initiative, the potential effectiveness and scalability of Coalition for Coffee Communities’ operating model is unclear. However, the multi-stakeholder nature ensures that accountability features in the policy development and co-investment of its community development and landscape management.

SOURCE: http://www.coffeecommunities.org/

Insurance against agricultural risks

At the production level, insurance can help mitigate risks in coffee farming and complement farm performance and income diversification measures. The main insurance products available to the coffee sector are crop insurance, weather insurance and weather derivatives.[13] Crop insurance covers the certain value of a crop failure. For crop insurance schemes to succeed, high- and low-performing coffee growers need to be reached, producers must not let intentionally crops fail in order to receive a pay-out and other measures must be taken to reduce promotion and transaction costs.

Index-based weather insurance pays out claims by coffee producers when a pre-established index, such as deficit rainfall, excess rainfall, consecutive dry/wet days, or high/low temperatures, is observed and measured. The success of these schemes and sufficient uptake rates depend on the availability of accurate weather-related data, the extent of governmental financial support, and the ability to bundle them with other relevant services to coffee producers.[14] Regarding data accuracy, experience has shown that the scaling of weather insurance is constrained by the high basis risk informed by the divergence between the calculated weather index and actual productivity loss on farms (Tadesse *et al.*, 2015). Experience in promoting insurance products in coffee producing areas does exist. To foster the widespread adoption of insurance, the Coffee Board of India provided a 50% subsidy to help the Agriculture Insurance Company of India introduce an index-based rainfall insurance product. By 2011, the Coffee Board managed to enrol 3,694 out of the forecasted 13,000 producers[15].

“Smallholder coffee producers can overcome poor basic infrastructure in rural areas by organizing to engage collectively as commercial actors.”

[13] See for example https://toolbox.coffeeandclimate.org/tools/crop-insurance/
[14] https://toolbox.coffeeandclimate.org/tools/crop-insurance/
[15] https://toolbox.coffeeandclimate.org/tools/crop-insurance/

2.2 Marketing

Aggregation

Smallholder coffee producers – often the most affected by low price environments – can organize to overcome poor basic infrastructure in rural areas to engage collectively as commercial actors accessing inputs, services and output markets. Aggregation can take several different forms, including cooperatives, associations, clusters, supply chain networks, out-grower schemes, service provider networks, area-based schemes or sector-wide organization. For example, out-grower schemes (a type of contract farming) are based on agreements made between a buyer and producers that pre-determine production quantity and quality, (future) date of delivery and price levels (either fixed at contract signing or market-based at delivery). Typically, out-grower schemes include service delivery by the buyer to producers (e.g. seed, inputs or finance). Key success factors for smallholder aggregation are professional management, viable business models and accountable governance structures.

Price risk management

Price risk management (PRM) is a key strategy for producers to protect themselves against fluctuations of coffee prices. In a deregulated environment, individual producers are free to negotiate prices while engaging with markets. Producer organizations can manage their own price risk by implementing physical strategies (i.e. mechanisms to trade physical coffee), which can be complemented with hedging strategies that further reduce price risk exposure (i.e. financial mechanisms). Hedging, for instance, is mainly found to be applied in the coffee sector by producer organizations in Latin America.

Physical strategies

The management of physical activities and associated risks of grower associations or producer organization determines, to a large extent, the competitiveness of its business. There are four main physical PRM activities: procurement, sales, price-fixing and financing.

Procurement by producer organizations refers to the purchasing prices, product types, reception or off-take, and payment terms involved in commodity buying, collecting, and storage, which affects the relationship of a producer organization with its members, its ability to buy to fulfil contracts and to sell at margins that make the organization viable. A producer organization’s sales strategy determines product specifications (e.g. quality, sustainability), target sales price, contract type (i.e. open or fixed price), and shipping calendar, which allows for protecting against or benefiting from market changes as well as accessing pre-finance. Moreover, producer organizations define a price fixing strategy for open price contracts to limit risks and optimize margins. This relates to the sequencing and timing of their internal procurement to fulfil a contract in relation to local and international price trends. Lastly, sound financial administration by producer organizations – through financing costs, collateral, financial performance, and financial control – contributes to minimize the risk exposure of other physical activities, such as procurement and sales.

Physical activities, such as procurement and sales, can be a clear and effective way for coffee producer organizations to manage price risks, but their execution requires leadership, competences and accountability by producer organizations. At the production level, producer organizations can also promote crop diversification among their members to make them more resilient to the volatility of one crop.

TEXT BOX 3

EXAMPLES OF PROVIDING ACCESS TO PRICE RISK MANAGEMENT OF SMALLHOLDERS

The Climate and Commodity Hedging to Enable Transformation (CACHET) is a financial solution designed to ensure revenue protection for smallholder producers against climate-related disasters and price shocks. Thanks to a grant from IFAD's Adaptation for Smallholder Agriculture Programme (ASAP), CACHET is the prelude to creating a comprehensive risk management package to protect the incomes of smallholder producers. The ultimate aim is to offer producers more predictable incomes leading to more sustainable livelihoods. CACHET is currently being piloted in Senegal and Nigeria and will progressively scale up to other African countries, assuming availability of funding. CACHET will be tested in the coffee sector in a pilot project that is currently under development in Honduras.

SOURCE: https://www.ifad.org/en/cachet.

The SAFE Platform (see Text box 2) also supports the Price Risk Management (PRM) project executed by Oikocredit. The project aims to transform the profitability, credit-worthiness, and competitiveness of 16 selected cooperatives from Honduras, Guatemala, Costa Rica, Nicaragua, Colombia, and Peru over a three-year period. The project includes the development of a PRM training process under a multi-year approach, refining the fundamentals and learning about PRM with a strong evaluative component that engages the cooperative's Board and Management with tools tailored to the coffee cooperative context. A simulation-based program and a PRM toolkit provide experiential learning in the use of hedging instruments.

SOURCE: http://www.safeplatform.org/price-risk-management

Alternatively, roasters and retailers can facilitate access to the futures market for their suppliers by asking their traders to hedge on behalf of coffee producer organizations. This is, for example, already applied in the specialty coffee and cocoa sector.

"Producer organisations can use futures contracts and options to manage price risks."

Hedging strategies

In addition to their physical management, producer organizations can engage also in financial markets as a form of risk management. Hedging is applicable to those producer organizations directly exposed to international price fluctuations (e.g. exporting cooperatives selling FOB). There are two main financial mechanisms for a producer organization to manage price risk: futures contracts and options.

Futures contracts are a standardized contract between two unknown parties who agree on a certain price today for standard coffee with (intended) physical delivery and payment in the future. Contracts are traded in exchanges by commercial actors active in the physical business e.g. coffee exporters and roasters, as well as by institutional and private investors. An option gives the right, but not the obligation, to trade a futures contract at a certain price (i.e. strike price) until a certain date (i.e. liquidation). Buying an option acts as insurance against future price changes as the buyer is only exposed to the risk involved with the price paid for the option (i.e. premium).

Futures trading, for its part, allows for strong margin protection but involves costs and management capacities that may be beyond the reach of many producer organizations. The ability of coffee producers to benefit from hedging, including price insurance, is largely conditional on the financial services and risk-sharing arrangements provided by buyers, such as the support given by Sustainable Harvest in the US. All in all, hedging strategies can be an important tool for coffee producer organizations even in coffee origins with a fixed price environment.

Value addition

Value addition is a measure that has clear advantages. Coffee growers can give strategic attention to cup quality, product differentiation and other relevant innovations. They can ensure good practices on-farm and in primary processing, thereby laying the foundation for adding value in roasting, blending, and marketing. The decision to vertically integrate coffee growing and processing assumes that the market will adequately reward such value creation. Integrated producers can target domestic consumer or export markets. However, domestic markets often still lack a sufficient demand base despite steady growth in consumption, while export markets are difficult to penetrate due to tariff and non-tariff barriers and strong competition with highly professional, well established brands. In some cases these constraints have been successfully overcome. For example Pachamama, a global cooperative with smallholder members across multiple coffee-producing countries owns roasting and retail operations in the US. A further example is Moyee in the Netherlands, which creates joint ventures with partners in Ethiopia to carry out roasting at origin while Moyee is responsible for marketing in consuming countries.

Another value-addition strategy is to promote alternative uses of coffee. From a circular economy perspective, roasted coffee grounds are the basis of some composts and are a good basis to grow mushrooms on. Moreover, coffee can be used as feed, fuel and mulch. For instance, coffee cherries, pulp and hulls can serve as animal feed on farms with livestock. Coffee can be directly combusted or used as briquetted fuel. Green coffee extracts may be used in some weed control systems for some crops.

2.3 Key insights

Viable service delivery models that focus on the needs of the farm as a whole and treat producers as customers are a key success factor for high performing farms. Coffee producers, particularly smallholders, need access to resources, inputs and knowledge so they can renovate their farms, apply good agricultural practices and improve soil fertility in order to be economically viable and achieve long-term sustainability. This requires cost-efficient, profitable, and scalable service delivery models. In many producing countries, there is still a need to establish, strengthen or innovate new models, whether supply chain-driven, through producer organizations, the public sector, or specialized service providers. Availability of farm-level data remains a constraint. Service delivery models can be designed by service providers to segment their customers, adapt to their needs, and offer them a relevant value proposition. For example, they can provide access to progressively complex and discounted services as producers show improvements on-farm. Financial services (e.g. loans) could be based on flexible terms that adjust to the production and market risks faced by coffee producers. Service providers can bundle various services (e.g. inputs plus insurance) or, at least, complement the other critical services being received. To reach all producers, service delivery models need to be gender-sensitive by design. To promote producer resilience, service providers need to look at the farming system and households needs as a whole (instead of a single focus on coffee) to achieve a living income.

Producer incentives for alternative livelihoods can counter-balance the potential oversupply on the market caused by successfully strengthening the profitability of coffee farming. While some of the above-mentioned measures (e.g. productivity, value addition) can have important positive, short-term effects for producers, such structural support could create an imbalance in supply and demand. They could attract new producers to the sector or deter less efficient coffee growers from exiting the sector. Oversupply and/or wide-scale low professionalism are unintended consequences that can perpetuate current problems and possibly create new ones. Therefore, production measures must take into account sector-level supply management. For instance, producers can be incentivized to diversify with other export and/or staple crops as well as to leave the coffee sector.

Greater investment in research and development (e.g. new varieties) is needed to enhance the economic sustainability of coffee farming. A key component of improving farm performance is the availability and accessibility of more productive and/or climate-, pest- and disease-resistant varieties to coffee producers, which requires robust research and development (R&D). Significant investment in R&D is a critical enabling condition for the improved performance of coffee farms and greater diversification of a producer's crops and income. However, in many coffee-producing countries, there is a clear under-investment in coffee R&D (as is the case of many other crops), even though the returns on public investment in R&D can be substantial (Nin-Pratt and Magalhaes, 2018).

Information and communication technology (ICT) offers an efficient and effective means to create high performing coffee farms. The adoption of digital innovations has the potential to achieve transformative outcomes – whether through transparency, learning, or continuous improvement. ICT solutions can take several different forms, including market information systems, weather information systems, farm management plans, soil testing, and tailored advice on good agricultural practices. For producer organizations, ICT solutions, for instance via mobile phones, can also help in monitoring production and farm performance of their members, and in organizing sourcing, traceability and payments. The use of ICT tools is, however, still limited in coffee-producing areas due to infrastructure requirements and other factors. Moreover, access to electricity in rural communities remains a challenge. ICT solutions that are developed and promoted must be fit for their purpose, user-centric and generate valuable insights for the stakeholders involved, whether at the production or market level.

“The adoption of digital innovations has the potential to achieve transformative outcomes - whether through transparency, learning, or continuous improvement.”

TEXT BOX 4

MALAWI TEA 2020 AND PRE-COMPETITIVE PRICE BENCHMARKING IN SUPPORT OF LIVING WAGES

Malawi Tea 2020 shows an industry-led coalition to revitalize a commodity sector and specifically how its price discovery model enables the global tea industry to fairly share the additional cost of paying a living wage. Under Malawi Tea 2020, a price discovery model has been developed to give clarity on the additional contributions that buyers need to make to enable suppliers to pay living wages to farm and factory workers. The model provides a fair, sustainable, and negotiated price range within a framework provided by a Mombasa market reference and a base price that still provides for a sustainable business model. The interesting feature is that several buyers have committed to use this model as a basis to determine their additional contribution to close the living wage gap. In other words, the companies use a common, pre-competitive model to negotiate the prices and determine price differentials with their suppliers.

The initiative has also been exploring how additional buyer contributions can be distributed to workers across the tea industry. Two disbursement options are considered. The first option is that buyers pay the differential directly to the farm from which they procure. This is called the vertical option. The second option is to collect the price differential in a common fund, from which it will be distributed equally across the Malawi tea workforce. This is called the horizontal option.

SOURCE: Malawi Tea 2020: Living and Actual Income, Learnings from Tea Sector, Malawi Experiences, presentation at the Living Income Community of Practice workshop, Berlin 2017

3. Market-level

There are a variety of measures that individual downstream value chain actors (e.g traders and roasters) can take to increase price levels and reduce price volatility and improve profitability, particularly for coffee growers. They revolve around sourcing and marketing practices and making investments in the supply chain.

3.1 Sourcing

Price and premium management

As shown in the previous section of this report, coffee prices have a determinant influence on the profitability of producers and their ability to make further investments in their farms. They are a key incentive for adoption of practices that are socially and environmentally sound. The framework for coffee farm income and related empirical evidence presented in Section A of this report shows that the price received by producers for their coffee has an important impact on the performance and profitability of coffee farms, and ultimately the livelihood of producers and workers. While mainstream markets follow the international coffee futures exchanges, companies do have options to decouple their pricing models. The following options exist:

Premiums

A premium is the payment of a (pre-agreed) amount in addition to the conventional market price. Premiums are typically a fixed value per volume of coffee (cherry, parchment, green, or roasted) independent of the current market price. This additional value is either a mandatory, fixed amount (e.g. Fairtrade Minimum Price, company quality programmes) or a negotiated amount agreed upon between producer and buyer in advance of production. Premiums can also be a flexible value per volume of coffee. Their value varies in relation to a pre-defined variable, e.g. market price. As the market price decreases, the premium increases and vice-versa.

Premiums can be based on different benchmarks. For example, they can be based on value-added attributes, such as quality specifications, sustainability and ecosystem services, and investment in quality and production. Another option is to relate them to the gap between current producer incomes and the poverty line or living income benchmark. Similarly, the premium can be based upon the additional costs of paying a living wage to plantation workers.

Premiums can be paid in cash or in kind (e.g. inputs, capacity building). Cash premiums could be paid without conditions or be conditioned to certain investments (e.g. good agricultural practices, certification, professionalization of producer organizations or community investments).

Prices

The payment of prices that are decoupled from the movements in international coffee exchanges can reduce a producer's exposure to market price levels and volatility. A minimum price, or floor price, sets a limit on how low a price can be paid for coffee. If the market price is above the floor price, the market price prevails. Companies can also opt to pay a pre-determined fixed price, e.g. through forward contracts. Prices can be fixed for a season or over a longer timeframe.

Prices can be defined against different benchmarks. They can be based upon the costs of sustainable production, including a certain margin (also referred to as the cost-plus model). Alternatively, they can be based upon income benchmarks, such as the poverty line and a living income. Prices paid to growers can also be based on considerations of fairness in relation to the distribution of margins among value chain actors, often in line with expectations of educated consumers in specific market segments (e.g. ethical consumerism).

While price-setting can be decoupled from the market price, there are also options to offer a more stable price environment while remaining aligned with market dynamics. One option is to fix prices of forward contracts based upon the futures market. Another alternative is to introduce a floating price. A floating price is calculated as an average of a reference price over a set period of time thereby smoothing volatility effects. The reference price could, for example, be the spot price of a commodity on a leading coffee exchange.

“Fairness and stability in trading relationships can empower producers and facilitate their investment in sustainable production.”

TEXT BOX 5
SOURCES FOR RESPONSIBLE TRADING PRACTICES

There are various frameworks that identify unfair and fair trading practices. The EU has published a Directive that includes a set of unfair trading practices to be avoided in the agricultural and food supply chains. The UK Grocery Code of Conduct includes a comprehensive set of practices of how retailers should fairly manage their relationships with suppliers https://www.gov.uk/government/publications/groceries-supply-code-of-practice. Fairtrade’s Trader Standard provides an overview of various rules around contracts, payment, planning, and access to finance https://www.fairtrade.net/standard/trader. The Ethical Trade Initiative has developed a guide for companies seeking to develop and implement responsible purchasing practices https://www.ethicaltrade.org/resources/guide-to-buying-responsibly

Trading practices

Responsible trading practices receive less attention in the coffee sector’s current debate, yet can encourage higher prices and reduce market risk for coffee producers. For example, long-term purchase commitments, particularly in combination with stable prices or premiums, help to share risks among value chain actors and thereby provide coffee producers with a predictability that incentivizes investing in their farms. The facilitation to pre-finance assists cash-strapped producers to obtain the inputs needed for production and helps producer organizations procure coffee from their members during the harvest. The fairness and stability in the trading relationships between producers and buyers (e.g. traders, roasters) can empower producers and facilitate their investment in sustainable production. In the same line of reasoning, unfair trading practices undermine such investments. Unfair trading practices include unilateral contract changes (e.g. demanding rebates), lengthy invoice payment periods, termination of a commercial relationship without reasonable period of notice and the transfer of storage or marketing costs to producers.

Text box 5 provides various sources of unfair and fair trading practices. Table 1 shows some the most relevant responsible trading practices to the coffee sector. These practices can promote clarity in commercial agreements and predictability in the relationship for both producers and buyers as well as fair risk-sharing between them.

The basis for responsible trading practices is the mutual responsibility shared by buyer and supplier. As such, exercising each party’s responsibility facilitates the implementation of such trading practices as they may be complex in practice.

Direct, transparent supply chains

The effective implementation of premium and price measures as well as responsible trading practices requires supply chains with more direct linkages (e.g. outgrower schemes) and greater transparency. This is a paradigm shift since most trade is still based on unknown sources and limited information sharing. Creating more streamlined supply chains removes unnecessary actors and potentially promotes more value capture for producers. Companies like GEPA in Germany and Counter Culture in the US show that direct trade can benefit producer-suppliers. Some roasters increasingly commit to disclosing publicly information about the price, volume, and quality from specific suppliers[16].

Traceability is another form that transparency can take, allowing companies to know the source of their coffee (e.g. place of origin) and their suppliers. Traceability allows for more efficient value transfer and can ensure that value reaches the targeted producers. It can also reduce the risk of creating market signals (e.g. price) that could drive oversupply. The creation of isolated supply chains, e.g. through contract farming, will reduce incentives to boost production for producers not included in these supply chains.

Traceable supply chains can also help limit margin escalation that appears to be widespread (Naegele, 2019). Margin escalation can be avoided when end-buyers pay premiums directly to producers or demand their suppliers to not add any margin to the premium part or price differential along the value chain.

[16] https://www.transparency.coffee/pledge/

3.2 Marketing

Demand promotion

The promotion of coffee consumption can shift the market fundamentals and lead to a more balanced market that favours higher prices, ideally benefiting producers. In emerging economies, in particular, ample room exists to promote consumption. For instance, roasters can invest in the marketing of coffee in all markets, focusing on relevant emerging economies. Similarly, domestic consumption can be promoted in coffee-producing countries. Compared to demand from export markets (traditional or emerging), a domestic consumption base provides a secondary market for coffee producers that is less susceptible to exchange rate fluctuations. In addition, if the producers' business case for good quality coffee is better than for poor quality, then companies could try to grow markets for good quality coffee at the expense of poor quality. Companies can also promote coffee's non-beverage applications. For example, coffee can be a valuable ingredient in food as well as non-food products.

Value addition

In a highly competitive, cost-driven market environment, the scope for increasing the price paid to coffee producers or adding price premiums is limited (see also Section A). Margins are thin and there is little scope to re-distribute value. Therefore, more emphasis is required on value creation. This can be achieved by focusing on cup quality, product differentiation and other innovations, as is increasingly seen, in order to increase the value of end-products. However, value creation in consumer markets does not guarantee that additional value is shared and makes its way to producing countries, as observed in some market segments (e.g. capsules). The growth of domestic consumption increases the value added in producing countries (employment, tax generation, etc.).

3.3 Investments

Value chain actors can also invest in producer support, community development and landscape management, either individually or collectively, through corporate programmes. Producer support programmes organize the provision of agricultural and financial services, such as the training, inputs and credit that coffee producers need to significantly improve their farm performance, and are often related to SDG commitments. Service delivery can be integrated into commercial agreements (e.g. through contract farming) or provided on a project-specific basis. At a collective level, producer support programmes can target specific pressing issues, such as climate change adaptation or gender equality. Sound service delivery models are a key enabling condition for improved farm performance, income diversification and financial products that enable investment and mitigate risks for producers.

Corporate programmes can also invest in community development and landscape management. Often inter-related, these programmes address some of the root causes of unsustainable coffee production. This is a service-focused approach to deliver off-farm benefits to geographic areas from which one or more companies source their raw material.

TABLE 1 Overview of relevant responsible trading practices to the coffee sector

Responsible trading practices
• No misuse of unspecified, ambiguous or incomplete contract terms
• No excessive contract terms, such as bonded contracts, exclusivity contracts (unless clearly beneficial to the other party) or non-competition clauses
• No excessive transfer of costs or risks to its counterpart e.g. demanding prices below costs
• Provision of sourcing plans to suppliers
• Short invoice payment periods
• Facilitation of technical and financial services (e.g. pre-finance and price insurance)
• Long-term purchase commitments

3.4 Key insights

While some of the pricing and responsible trading measures could be incorporated in current trading models with relative ease, other measures would require more drastic changes. Some of the pricing and responsible trading measures discussed here are already applied In the specialty or ethical coffee market segments. Common practices include payment of premiums, floor prices and longer term purchase commitments. Some specialty roasters have decoupled entirely from the market price or offer access to price insurance to their suppliers. In these cases, it usually involves supply chains that are fully traceable between the end-user and the producer or producer organization. Other mainstream companies operating in premium market segments combine stable procurement, premiums and producer support at a larger scale. While such measures can have a positive effect (Macchiavello and Miquel-Florensa, 2019), they are not necessarily sufficient to lift producers out of poverty, or make them earn a living income. Furthermore, the scale of many of these initiatives is limited, as well as the replication by other companies.

“Sound service delivery models are a key condition for improved farm performance, income diversification and financial products that enable investment and mitigate risks for producers.”

> **“The development of more direct, stable and responsible supply chains can lead to important business benefits.”**

The question arises to what extent these sourcing and marketing measures, and additional more effective ones, are applicable in mainstream coffee markets. Some of these measures, such as short invoice payment periods, respecting contract terms and conditions, providing sourcing plans to suppliers and paying premiums are likely to be introduced by, most notably, exporters, so long as they are able to transfer some of the costs, particularly the premium, to their customers. A greater challenge will be the provision of technical and financial services. Experience in coffee and other sectors, however, shows that this can be achieved at scale, including through the involvement of public development banks (multilateral, bilateral) to share some of the supply chain risks.

While stronger commitments across the value chain are a necessary condition, these investments could be decoupled from sourcing practices. This decoupling is not possible for many of the other measures. For example, the payment of stable prices or higher premiums and entering into long-term purchase commitments require a more fundamental shift in how roasters and retailers organize their sourcing. It will require a transition from anonymous sourcing via commodity exchanges towards developing longer term partnerships with well-known suppliers, including coffee producers. More direct, stable and transparent supply chains enable the channelling of better incentives that promote the economic viability of coffee farming. Decoupling also provides a strong basis for reducing incentives that spur oversupply. For example, introducing contract farming in a company’s supply chain (e.g. outgrower schemes) sets prices for a specific and isolated demand and supply rather than other measures that broadcast high prices and create supply that is not linked to a specific demand. The use of ICT solutions within supply chain management (e.g. blockchain) will also allow the monitoring of farm performance, traceability and payments, which can contribute to avoid margin escalation along the supply chain.

These types of measures also imply that sourcing decisions cannot be based only on price but need to consider farm competitiveness and sustainability. Clearly, they are incompatible with business models of value chain actors driven solely by short-term profit maximization. The introduction of more ambitious pricing and responsible trading measures requires a change in established business practices and in the definition of value in the market, how it relates to price, and how it can be shared in pursuit of longer-term sector objectives. The development of more direct, stable and responsible supply chains can, however, lead to important business benefits, including improved supply security and predictability, improved risk management, reduced transaction costs, improved collaboration, trust and willingness to invest in trading relationships and enhanced reputation. Improved sourcing measures should be matched with marketing measures that educate consumers, create demand, and a willingness to support and pay for sharing and increasing value with coffee producers.

There is merit in discussing and harmonizing pricing and trading measures in a pre-competitive way. Large differences in prices, premiums or contract terms send ambiguous signals at the production and market levels and ultimately undermine loyalty between actors. If companies refer to different benchmarks for a living income or poverty, producers and consumers may become confused. While a direct discussion of prices, premiums and contract terms is unlikely among industry actors considering the nature of market competitiveness and current competition laws, there could be a role for pre-competitive initiatives (e.g. Rainforest Alliance, Fairtrade, Global Coffee Platform, Sustainable Coffee Challenge, the Living Income Community of Practice) to define cost and pricing benchmarks and determine how responsible trading practices could be defined.

Individual company action needs a level playing field. Some companies apply more responsible sourcing practices than others. Indeed, some see a competitive advantage in doing so. However, the effectiveness of these measures over time has been constrained by being limited to niche markets and too little upgrading towards more effective solutions. It seems that to effect change more widely requires regulation through market management (e.g. price, trade, supply, and alternative livelihoods) by relevant institutions. For example, the ICO’s Diversification Fund under the International Coffee Agreement of 1968 was, in terms of its initial ambition and scope, a more comprehensive mechanism to foster economic development in those countries heavily dependent on coffee by expanding and improving their agricultural sectors (ICO, 2002). Other relevant measures for sector governance will be presented in the next section.

4. Sector governance-level

Governments and governing bodies at the national, regional and international level have a wide range of measures at their disposal to address the coffee price crisis and promote the economic sustainability of coffee production. This section refers to what governing institutions, whether public, semi-public (parastatal), multi-stakeholder based or multilateral, could do to create an enabling environment for a more competitive and sustainable coffee sector to foster economic viability and prosperity.

4.1 Price management

Producing countries can implement several measures to influence directly the prices paid to coffee producers.

Purchase guarantees

Purchase guarantee mechanisms allow growers to sell as much of their output as they choose and avoid being left with unsold produce. They can follow market prices or have an established minimum price that protects growers against volatility. In Colombia, coffee producers have the option to sell to the Colombian Coffee Growers Federation (FNC) at an established price. The price is based on criteria of transparency, the current conditions of the international coffee market (ICE 'C' contract), the quality premium granted to Colombian coffee, and the exchange rate (transport costs are subtracted). The price is communicated daily by FNC and acts as a reference point for the entire market. The purchase guarantee ensures a fairer distribution of power between buyers and sellers by providing a point of leverage in price negotiations.

Price setting

Governments can also fix (farmgate) coffee prices. For example, in Côte d'Ivoire, the Conseil du Café-Cacao (CCC) fixes seasonal prices for coffee. These are based upon the forward sales of the majority of production and market projections for the remaining volume. Prices are fixed from farmgate until export. This model ensures producers receive a certain proportion of the export price and protects producers against price volatility during the season. The knowledge of the price at the start of the season also informs their farm management decisions. In Costa Rica, ICAFE also defines the margin for producers, washing stations and exporters (see Text box 6). Contrary to Côte d'Ivoire, it uses a daily reference price based upon prices on the New York futures exchange. Coffee producers receive 80% of this price. They are paid an annual weighted average of the reference price resulting in more stable farmgate prices. The pricing system is supported by a license system and trade registry that includes all producers, washing stations and exporters. ICAFE closely monitors the transactions.

An alternative is to introduce floor export prices that are not based upon market dynamics. Some countries in the coffee and cocoa sector currently consider this in response to the low price environment[17]. Floor prices are feasible only if the industry accepts to pay such price or when a government has sufficient resources to buy and stock the unsold produce. The chances of success will increase if the industry has few alternative origins to source from, e.g. in a concentrated market such as cocoa or as a result of coordination among producing countries.

Stabilization Funds

Both Côte d'Ivoire and Costa Rica have a stabilization fund for coffee. In Côte d'Ivoire, the fund is used to balance the difference between the fixed seasonal price and the spot price for the volumes that were not sold forward. The price stabilization fund allows to buffer against international price volatility during the year but not across growing seasons. The costs and risks, in this case, are borne by the government. In Costa Rica, the fund has a different purpose. Based on a 'one size fits all' approach it compensates all producers if prices drop below the indexed cost of production by more than 2.5%. The fund is capitalized by a 0.5% levy on the export price.

4.2 Supply management

Coffee prices depend largely on the market fundamentals of supply and demand. Interventions to promote productivity or higher prices may result in unintentional supply stimulation. Therefore, price policies at scale need to be complemented by supply management. Supply management can also be used to reduce volatility or shift the fundamental market dynamics in favour of higher prices. There are different policy options to manage supply in the short and long-term.

Strategic buffer stock management

Strategic buffer stock management is a mechanism that attempts to offset price movements by removing from or releasing in the market (part of the) commodity supply. A recent example is Brazil's options programme in 2013. That year, the Brazilian government offered contracts for producers to sell up to three million bags to the government at a fixed price. These 'put' options required coffee producers to pay a small fee for the right to sell their coffee to the government. The programme did set a floor price and forced buyers to pay more for Brazilian coffee. The Brazilian government sold off the beans acquired in the 2013 programme when prices recovered and, by 2017, had eliminated its coffee inventories. This year, Brazil is considering a similar intervention (Teixeira, 2019).

Buffer stock management has limitations. Attempting to stabilise prices using buffer stocks would require significant resources and is potentially very costly (FAO et al., 2011). Buffer stock management that covers large volumes of coffee has a higher potential to be effective. As a major producer and exporter, Brazil has the ability to influence world market prices through buffer stock management. This is not the case for most other origins. For smaller origins, strategic buffer stock management would be effective only if it is coordinated with other producing countries. Previous experience with the International Coffee Agreements and other international commodity bodies shows that this is a challenge. In the 1970s, the introduction of an internationally-controlled reserve stock was discussed but the idea was eventually dismissed (Pieterse and Silvis, 1988).

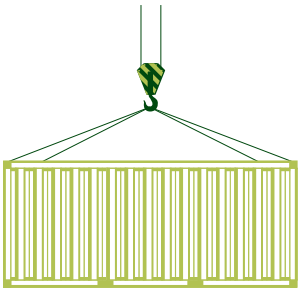
[17] For example, the Colombian Coffee Growers' Federation (FNC) a considered that it will refuse to sell coffee below a certain price (https://www.reuters.com/article/us-colombia-coffee-analysis/colombian-proposal-to-ditch-ny-coffee-price-may-send-buyers-elsewhere-idUSKCN1R027P) and Ghana and Côte d'Ivoire pursue a similar approach in cocoa.

Export restrictions

An alternative measure to support price development is export restrictions, such as export quotas or retention schemes. Export quotas and retention schemes in commodity sectors restrict the export of a specific amount or a percentage of total exports during a certain period of time. To become effective, export restrictions require the participation of a large majority of the production base. Export restrictions were the cornerstone of the International Coffee Agreements in the 1960s-1980s. They were relatively successful in raising and stabilizing prices during certain periods (Gilbert, 1995). However, their long-term effectiveness was undermined by various political and economic challenges. For example, it was difficult to reach compromises on quota distribution and price bands between exporting countries and importing countries (Pieterse and Silvis, 1988). Export restrictions also came with a cost (Gilbert, 1995). For consumers, the cost was market distortion whereby identical coffees were sold at significantly lower prices to non-member countries. For producers, the cost was that the historic distribution of production was cemented while the varying production costs in different origins were ignored. Much of the additional value gained by high prices may have been lost either to governments (through export taxes) or to third parties (through rent-seeking). The challenge with a quota system that is based upon historical figures is that it creates disincentives for producing countries with rapidly expanding production to participate and encourages countries to over-export in non-controlled periods in an effort to establish larger quota entitlements (Gilbert, 1987).

In the immediate post-quota period, when coffee prices dropped significantly, various Latin American, African and Asian coffee-exporting countries, under the leadership of Brazil and Colombia, formed the Association of Coffee Producing Countries (ACPC). The objective of this *de facto* cartel of exporters was to stabilise and raise global coffee prices. The core instrument was a retention scheme. In periods of low prices ACPC members coordinated to withhold coffee from the world market. Several interventions were run during the existence of this organization between 1994 and 2001. While the ACPC claimed some success in pushing prices upward through its interventions, there is no independent assessment of the effectiveness of the retention scheme. Many observers argue that the absence of Vietnam, Indonesia and other important producing/exporting countries in the organization, as well as incentive and coordination problems known from other cartels severely limited its impact and led to its demise (Denny, 2011).

EXPORT RESTRICTIONS WERE THE CORNERSTONE OF THE INTERNATIONAL COFFEE AGREEMENTS IN THE 1960S-1980S. THEY WERE RELATIVELY SUCCESSFUL IN RAISING AND STABILIZING PRICES DURING CERTAIN PERIODS. HOWEVER, THEIR LONG-TERM EFFECTIVENESS WAS UNDERMINED BY VARIOUS POLITICAL AND ECONOMIC CHALLENGES



“Interventions to promote productivity or higher prices may result in unintentional supply stimulation.”

Diverting lower grade coffee to alternative uses

A supply management measure considered by ICO as a response to the low coffee price levels in the early 2000s was the diversion of coffee below a certain minimum standard to alternative uses, such as animal feed, briquetted fuel, mulch and biogas. As with buffer stocks and export restriction, the act of diverting lower grade coffee requires coverage of a large share of the market to become effective. Hence, it would need the establishment of a global system of defect grading at the export and import levels. This measure would also require commitments by exporting countries to refuse to accept low-grade coffees from producers or to purchase low-grade coffees. Such a system would require transitional provisions in producing countries with large volumes of coffee below the minimum grade as well as technical assistance (ICO, 2011).

Reduction of the production area

Buffer stock management, export quota restriction and diverting lower quality grades are bound to fail if the structural market fundamentals work against them. The commodity agreements tried to manage supply by buffer stocks and national export quotas. However, they did not control the volume of production itself. This led to smuggling and build-up of stocks. Hence, the most appropriate policy for dealing with an imbalance of production over consumption is for countries to provide incentives for reduction of the surface area under coffee cultivation (Koning and Jongeneel, 2006). A variety of options are available to producing countries.

Land-use planning and monitoring is one option. This could be done by ensuring (environmentally) protected areas are not encroached on by coffee producers. Governments can also introduce land-zoning to restrict the area where coffee can be produced. This zoning can take into account the suitability from an agro-economic perspective, positively influencing productivity, quality and profits for coffee producers. Any zoning ought to consider the impact of climate change on the suitability of coffee production.

The second option is to promote income diversification as explained in the first section of this chapter. A more diversified farming system allows producers to shift resources between crops, particularly when combined with market intelligence systems. Success may also depend on the availability of non-farm alternatives that enable producers to exit the agricultural sector.

4.3 Demand promotion

While supply is one side of the equation, demand is the other option to improve price levels for coffee producers. Increasing demand is intended to improve the supply-demand ratio, resulting in a more balanced market in favour of higher prices.

Taxes and tariffs

Taxes and tariffs imposed on green, roasted and soluble forms of coffee by importing and exporting countries can hinder trade and consumption (ICO, 2017). Removing these constraints could raise consumption and thus coffee prices. The ratio of taxes and tariffs between green coffee and processed coffee (i.e. tariff escalation) can also influence where value addition takes place.

Importing countries could introduce differentiated tariffs and taxes on coffee imports according to sustainability criteria. Favouring sustainably-produced coffee could potentially shift production towards more economically viable production systems. Such criteria could also include prices paid to producers and the practices under which coffee has been traded. In principle there is scope to introduce such a model in countries that have an excise tax on coffee (which include Germany, the world's third largest consumer of coffee, as well as several smaller markets in the European Union[18]). For example, the German government charges a special tax on roasted (2.19 EUR/kg) and soluble (4.78 EUR/kg) coffee that generates revenues of more than one billion EUR per year. As a result, up to 45% of the retail price of coffee in Germany is retained by the government (including value-added tax). There is an ongoing debate on whether to exempt sustainably-produced coffee from the tax, which could provide a significant incentive to consumers to change consumption habits away from 'conventional' coffee.

While removing tariffs and taxes could be optimal from the point of view of stimulating market demand, it is important to balance this objective with the need to collect revenues for re-investment in the coffee sector or for other public budgetary purposes. Export taxes and levies in producing/exporting countries offer an opportunity to collect revenues that can be re-invested in the coffee sector or wider public goods.

Market promotion

Governments or national associations in producing countries can promote the demand for their coffee domestically and internationally. The FNC has pioneered investments in protected designations of origins and actively markets its trademark Juan Valdez. A consortium of the coffee industry and other organizations successfully ran a campaign to grow domestic consumption (Toma Café). ICAFE actively promotes its national brand in export markets. Brazil has been successful in growing domestic consumption. Market promotion can also be linked to coffee from regions that are subject to jurisdictional or landscape approaches promoting a sustainable and viable production base, e.g. based on the EU system of protected geographical indication. Market promotion has to go hand-in-hand with measures to improve the quality and thus value of the coffee. In the past, ICO administered a Promotion Fund that supported members in activities and campaigns specifically designed to help grow the coffee market. A recent example includes the ICO's support for a regional progamme that promotes coffee consumption in selected East and West African countries. Specific focus lies on the development of national strategies to increase local roasting and processing as well as strengthening communication to consumers.

[18] Belgium, Denmark, Lithuania, Romania

TEXT BOX 6
ICAFE COSTA RICA AND PRICE MANAGEMENT

The case of ICAFE in Costa Rica shows the effectiveness of an independent body's pricing policies. ICAFE's effective governance structure – at arm's length from the government – has led to high levels of trust between stakeholders which helps them to define and implement effective policies, for instance, on price management. Producers receive (at least) a minimum farmgate price based upon the New York coffee exchange prices and are paid an annual weighted average of this price. This has resulted in more stable farmgate prices and guarantees producers receive 80% of the export price. Margins are also set for washing stations and exporters. The price structure includes a fee for a stabilization fund which compensates producers when prices drop below cost of production by more than 2.5%. The price policies also allow the collection of a levy (1.2%) which is used by ICAFE for its running costs as well as investments in research, quality management, and market promotion.

ICAFE's pricing policies are complemented by effective quality and traceability system as they implement rigorous national quality standards and control mechanisms as well as a licensing system and trade registry that includes all producers, value chain actors and trade transactions.

SOURCES: Miguel Florensa, P. Monitoring the markets in the Rwanda coffee sector; Lessons from Costa Rica and Colombia, International Growth Center, Policy Brief 38214, November 2015
Miguel Florensa, P. Regulating the Market: the Costa Rican Case, Toulouse School of Economics, presentation given at the IGC–NAEB Coffee Conference February 9th, 2015

TEXT BOX 7

COCOA AND FORESTS INITIATIVE AND PARTNERSHIPS THAT REDUCES PRODUCTION AREA EXPANSION

The Cocoa and Forests Initiative (CFI) shows how a robust partnership among key sector stakeholders can establish a process that reduces farm expansion and limits potential oversupply in the market. CFI is a public-private partnership between the Governments of Côte d'Ivoire and Ghana and the world's leading cocoa and chocolate companies to protect and restore forests and manage them more responsibly while recognizing the socio-economic importance of cocoa production for the countries. As implementation enters its second year, the evidence is positive that this formal partnership is achieving results in curbing the expansion of cocoa production, which promises to lower the probability of future oversupply and a decline in prices that would result.

SOURCE: WCF's Report on the Launch of the activities of the Joint Framework of Action (2018)

4.4 Market transparency and trade facilitation

Market information systems

Transparency in the global coffee sector is a key pillar of informed decision-making by producers, value chain actors and governments. Market information systems can reduce business risks for producers (e.g. planning, negotiation power) and transaction costs. They can also inform price positions for buyers. Relevant information includes prices (e.g. in international coffee exchanges), demand trends (e.g. consumption figures, stocks) and production costs (e.g. cost of sustainable production benchmarks). In the specialty segment, some roasters and traders provide detailed (anonymous) contract data in order to publish a reference for the sector on FOB prices for green specialty coffees[19].

The systematic collection of data requires technical expertise and resources that are often not available in the public institutions of coffee-producing countries, especially since the dismantling of coffee sector bodies as a result of liberalisation and deregulation in the 1990s. To make data collected through a decentralized network comparable, a common methodology and data governance are required. This requires action at national and international level. International organizations (e.g. ICO, FAO) are the depository of independent market information that is made publicly available. For example, the ICO collects, stores and analyses coffee market data (demand, supply, prices) and makes the information available to its Members and the wider public. At the national level, market information can be distributed through tailor-made communication channels to different type of users and as well inform sector and policy dialogue.

Auctions

Auctions have trading rules that govern the exchange of goods with prices determined by supply and demand, which promote market efficiency and transparency. Produce is sold to the highest bidder and is destined for both domestic and export markets. Auctions can be voluntary or compulsory. Goods in auctions are physically present (in contrast to commodity exchanges). In East Africa, several countries have auctions for coffee. In Tanzania, the auction is compulsory whereas it is not in Ethiopia and Kenya. Auctions can have the potential to promote prompt payment and streamline the supply chain. Although they do not necessarily increase producers´ value capture, auctions allow for price discovery when data on prices and volumes are communicated accurately and in a timely fashion to all market players (Mezui *et al.*, 2013). They also have the potential to reduce transaction costs, though there are cases where these costs increased due to the auctions.

Some features to consider in designing auction systems include:

- Allowing for sufficient segregation on the basis of quality and sustainability
- Designing procedures around quality assessment, traceability, lot sizes, and waiting times in such a way that the auction remains inclusive to market actors of different sizes

Commodity exchanges

On a commodity exchange, commodity derivatives are traded, through future, forward and options contracts, without the physical presence of the traded goods. The aim is market efficiency while offering opportunities for hedging and speculation. The futures market brings buyers and sellers together and allows for price discovery. This informs market behaviour and provides a reference price for many of the other measures presented in this section.

As shown in section A, the coffee market has been subject to a significant financialization (ICO, 2019b). This financialization has sparked concerns that speculation could impact price behaviour. The analysis shows activity of non-commercial traders did impact spot prices in the short term. The effect was found to be statistically significant both in periods of rising and falling prices. Different options exist to reduce the impact of speculation on coffee prices. One option is to change the regulation of commodity exchanges so as to impose a strict limit on the positions held by non-commercial traders (i.e. the volume of speculation versus hedging). Regulation can also seek to increase the cost of non-hedging participation in the market. This behaviour could be shaped by imposing capital requirements on transactions in the futures market and compulsory delivery of contracts or contract positions (Robles et al., 2009). A third alternative is to set up a 'virtual reserve' as a new global institutional arrangement (von Braun and Torero, 2009). Such a reserve would be used to intervene in the commodity market when prices are significantly outside their estimated price band. The expectation is that its presence alone would likely divert speculators from entering this market, although the virtual reserve would need to be ready to intervene when required. However, the concept of a virtual reserve has not been implemented in practice so far and its potential effectiveness remains untested. Finally, specific regulation may be needed to reduce the effect of high-frequency trading on short-term volatility, since coffee markets are increasingly targeted by algorithmic trading activities[20].

[19] https://www.transactionguide.coffee/home/en

[20] https://www.ft.com/content/e06225d2-52b0-11e8-b3ee-41e0209208ec

4.5 Regulatory incentives around quality, trading practices and sustainability

Quality management

A typical role that can be undertaken by the public or semi-public sector in producing countries is quality management. Introducing and enforcing sector-wide quality standards creates a level playing field and can help to improve a country's reputation and promote value capture through quality premiums.

Regulation on trading practices

Governments in producing/exporting and importing countries have different options to promote responsible trading practices. One measure in producing countries is to develop requirements around traceability. For example, Costa Rica operates a system of sector-wide traceability. Importing countries could also develop regulation. For example, the EU has developed a Directive to protect agri-food supply chain actors against unfair trading practices (European Commission, 2019). Individual countries could also develop measures to promote responsible trading practices, as is the case in the UK with the Groceries Supply Code of Practice[21]. Governments in importing countries could also enforce regulation around due diligence in order to force buyers to know the origins of their coffee and to understand under which conditions it is produced and traded.

Social and environmental regulation

Origin governments could also ensure a level playing field on social and environmental performance. This refers to the development and enforcement of a coherent set of policies and regulations around issues such as labour rights, land tenure, natural resource use and biodiversity, and forest protection.

TEXT BOX 8
THE AGRICULTURAL MARKET INFORMATION SYSTEM (AMIS)

The Agricultural Market Information System (AMIS) is an inter-agency platform to enhance food market transparency and policy response for food security. It was launched in 2011 by the Ministers of Agriculture of the G20 following the global food price hikes in 2007/08 and 2010. AMIS provides reliable, accurate, timely and comparable market and policy information related to wheat, maize, rice and soybeans. Data and analysis includes information on prices, futures markets, supply and demand outlooks, crop growing conditions, policy developments and fertilizer outlooks. A key feature of AMIS is an early warning system that identifies periods of excessive volatility that are used as an indicator for potential crop shortages and food insecurity. It also strengthens the technical and institutional capacities of countries to produce and use market information.

SOURCE: http://www.amis-outlook.org

[21] https://www.gov.uk/government/publications/groceries-supply-code-of-practice

"The ICO is the independent source for data on the coffee market, enhancing transparency for the benefit of all coffee stakeholders."

4.6 Investments in supporting services, infrastructure and rural development

Support services

Governments could step in where supply chain-led or commercial service provision is not viable. A typical role to undertake is investment in research and development (e.g. in coffee varieties, pest control, inputs, technology, processing and packaging), extension (e.g. to disseminate climate smart agricultural practices), input provision (e.g. renovation programmes) and finance (e. g. agricultural and trade finance, finance for small-and medium-sized enterprises (SMEs), guarantee schemes, weather risk insurance) and market information services. The public sector is positioned to invest in and design service delivery from a farming system perspective.

Infrastructure and rural development

A healthy coffee sector requires a healthy agricultural sector and rural environment, in general. Hence, integrating coffee-specific strategies into wider agricultural and rural development frameworks is important. This includes investments in infrastructure for transportation, communication, energy, markets, water, waste management, sanitation, education and healthcare. These investments can reduce transaction costs in agricultural production and marketing as well as raise the cost of living of coffee producers. Investments could also be made in support of off-farm income-generating activities and employment to incentivize producers to exit the coffee sector. In Honduras, the National Coffee Fund (NCF) is responsible for the maintenance and construction of roads in coffee-producing areas, thereby reducing transportation costs for producers. Each municipality receives an allocation of funds for road construction in proportion to its production. The fund is capitalized by an export tax.

4.7 Direct income transfers

Instead of promoting coffee production or prices, governments could also consider supporting farmers independent of their production through direct income transfer. This direct support could either benefit all producers or target a subset based on specific criteria (e.g. income levels, gender) to address extreme poverty in the coffee value chain.

The Common Agricultural Policy (CAP) of the European Union provides an example of a sector-wide approach in which governments provide support that is decoupled from production and instead based on other factors, such as farm size. The rationale behind direct income support is to generate less market distortion. In the EU, this type of support has made farmers more market-oriented, since their production decisions now primarily respond to market demand and world market prices (European Commission, 2012). Decoupling income support from coffee production would also reduce the disincentives for on-farm diversification. To mitigate externalities, income support can be linked to compliance with food safety and social and environmental regulation.

Existing income transfer schemes are usually based on taxes collected by governments (as in the case of the EU Common Agricultural Policy). However, other funding models with industry or consumer participation (blending) are thinkable.

4.8 Key insights

Sector governance must be a comprehensive strategy that balances short- and long-term objectives and addresses underlying market fundamentals. Measures taken at the national or international level have the potential to impact millions of producers and consumers. Governments, or governing bodies, can set the boundaries within which markets function. This requires, however, a good understanding of markets and of the potential impact that measures can have. Many of the measures presented in this chapter need not be considered in isolation. For example, measures to support productivity or farmgate prices could contribute to oversupply, which will eventually undermine the effectiveness of these exact measures. Introducing temporary measures to respond to a price crisis can be justified, but building a healthy coffee sector requires strategies that also address the root causes of the crisis. This ambition implies that sector-level interventions be based upon a comprehensive strategy regarding the short- and long-term dynamics in supply, demand, competitiveness and sustainability.

Certain measures will only work in the context of international coordination. Prices are largely determined by global supply and demand dynamics. The performance of an individual producing country partly depends on its competitive advantage over other origins and developments in consumer markets. Consequently, the effectiveness of measures undertaken by an individual country will depend on what happens in other countries. This fundamental dynamic calls for international coordination and alignment. For example, supply management is preferably done based upon international coordination in order to avoid that countries undermine each other's strategies to increase producer incomes. The coffee sector has a long history of international coordination at various degrees of intensity. Experience shows that reaching compromises has been very challenging due to divergent interests between countries. Experience also shows that when agreement was found on fundamental issues, like price support, international collaboration was relatively successful in achieving common objectives during certain periods (Gilbert, 1995). The current coffee crisis, the expected impact of climate change and commitments to achieve the Sustainable Development Goals are good drivers to develop a new and ambitious international coffee agenda. In today's context, it is unlikely that such an agenda would include coordinated strategies to manage prices and supply as in the 1980s. However, there are many opportunities to align national strategies and to catalyse co-investment in a market-based environment.

Today's market concentration on the supply side also implies that unilateral action could have a global impact. If Brazil withdraws some of its coffee from the market, this action can have an immediate influence on global coffee prices. This dynamic may offer opportunities for simpler forms of market management. Still, it would be better if these decisions were made based upon a certain degree of international consensus and cost-sharing.

Transparency and accountability are the cornerstones of sector governance. Weak governance creates opportunities for elite capture and rent-seeking and undermines the trust in these systems. Identifying effective measures can also be challenging due to high levels of uncertainty, trade-offs and conflicting interests. To be effective in managing supply, demand and prices in the short and long term, sector governance needs transparency and accountability in decision-making. This suggests the need for a strong technical basis to decision making, such as macro-economic modelling and formula-based decision-making. This approach would also enhance the capacity to influence markets rather than react to them. An additional option is to put (part of) the sector governance at arm's length from the government and introduce a multi-stakeholder nature to decision making. Finally, effective sector governance requires the monitoring of progress towards the fulfilment of the sector's vision and to inform evidence-based learning.

> **"Sound policies and an effective regulatory environment contribute to a healthy coffee sector."**

A diversified funding strategy can finance the measures needed to promote sector-wide competitiveness. Many of the measures mentioned in this chapter come with a (significant) cost. Producing countries ought to enhance their capability to generate revenues at the sector level for re-investments and reduce their dependency on donors and lead firms. This could be achieved by, for example, taxes at auctions (as in Tanzania), at export (as in Costa Rica and Honduras) or on consumption (as in Germany). The revenues collected could be re-distributed to designated public sector investments or be complemented by investments from the private sector. For example, in Tanzania a fee applied at the auction is channelled to the Tanzania Coffee Development Trust Fund to support investments made by different stakeholders. As mentioned above, a high level of transparency and accountability towards sector stakeholders is a key success factor for sector re-investment mechanisms.

A complementary strategy would be to set up a pre-competitive global coffee fund (Sachs, 2019). Such a fund could be financed by governments, international donors and possibly the industry. The revenues generated could co-finance, direct income transfer to alleviate extreme poverty in the value chain, public sector investments or public-private partnerships (e.g. based upon National Coffee Plans). Blended finance mechanisms could offer various products, including loans, insurance (against agricultural and price risks) guarantees and grants. Both national and international mechanisms need to ensure multi-stakeholder governance and independent decision-making and evaluation.

INTEGRATING COFFEE-SPECIFIC STRATEGIES INTO WIDER AGRICULTURAL AND RURAL DEVELOPMENT FRAMEWORKS IS IMPORTANT. THIS INCLUDES INVESTMENTS IN INFRASTRUCTURE:

TEXT BOX 9
HOW THE EU COMMON AGRICULTURAL POLICY SHIFTED FROM PRICE SUPPORT TO INCOME SUPPORT

The case of the European Common Agricultural Policy's (CAP) shows how public policy can focus on sustainability and rural development objectives through income support rather than a productivity objective through price support. In the early days, the CAP's primary objective was to promote food security by boosting production. Price support was the main mechanism, which soon led to costly and politically-embarrassing surpluses – the so-called 'food mountains'. To align production with market needs, production quotas and exit incentives were introduced (e.g. early retirement subsidies or set-asides). Increased criticism about the degree of market distortion pushed the EU to tailor its system more in line with the world market. This was done through moving from market and product support (through prices) to producer support (direct income support), while reducing trade tariffs. Initially, income support was based upon production, but later it was decoupled from production and is now based upon farm size regardless of what and how much is produced. To mitigate external effects, subsidies are conditioned when a producer complies with food safety, environmental and animal welfare regulation. In addition, the increasing awareness that thriving farming requires thriving rural communities, led to increased investments of the agricultural budget into rural development.

	1960s & 1970s	1980s	1990s	2000 and beyond
Objectives	**Productivity through price support**	**Supply management**	**Competitiveness**	**Sustainability & rural development**
Mechanisms	• Investment support • Minimum prices (through intervention purchases) • Import tariffs • Export subsidies	• Production quota and exit incentives (e.g. early retirement subsidies)	• Shift from market and product support (through prices) to producer support (through income support linked to production)	• Income subsidies decoupled from production • Compliance with food safety, environmental and animal welfare regulation • Rural investments
Unintended consequences	• Overproduction • Exploding public expenditure	• Lack of competitiveness • Market distortion • International friction	• Sustainability issues	

SOURCES: This case box is from Aidenvironment and Sustainable Food Lab (2018), Pricing mechanisms in the cocoa sector: options to reduce price volatility and promote farmer value capture. It is based on the following sources:
- European Commission (2012), The Common Agricultural Policy: A story to be continued, Directorate-General Agriculture and Rural Development.
- RLI (2013), Briefadvies duurzame ketens bij toepassing van het Europees landbouwbeleid in Nederland.

5. Current initiatives in the coffee sector

Coffee played a pioneering role in the development of sustainability initiatives and continues to be a leading sector today. This section discusses the following most widespread initiatives:

- Certification initiatives
- Corporate responsible sourcing programmes
- Producer support, community development and landscape management initiatives
- Public sector efforts around revenue generation and investment
- Public policy and regulation
- Multi-stakeholder governance initiatives

The section also provides a selection of more detailed cases found in the coffee sector as well as relevant cases from other sectors.

“Company sourcing programmes increasingly address social and environmental issues including human rights, gender, and deforestation.”

Certification initiatives

Voluntary Sustainability Standards (VSS) are a set of social, environmental, agricultural, and management practices that are recognized by multiple stakeholders to promote sustainable coffee production at the farm-level. VSS have been the principal approach used by companies to implement sustainable practices on coffee farms. Prominent VSS include Rainforest Alliance (merged with UTZ), Fairtrade, 4C and various organic certifications. Other non-private sustainability standards used are SAI Platform, Enveritas and Certifica Minas Café. Most VSS have been developed by extensive consultation processes with the participation of different types of coffee producers. While most VSS require sustainable practices for producers and producer organizations, only Fairtrade has requirements on price and trading practices for other coffee supply chain actors. Depending on the scheme, VSS can be strong on transparency and accountability, since they are based on multi-stakeholder governance. Most VSS require third-party assurance, ensure some degree of product traceability and undertake monitoring and evaluation of producer performance, which is publicly reported on their websites.

There is a growing evidence base on the impacts of VSS. Most of the evidence shows mixed results of impact within certified production areas. There are clear contributions of VSS to positive impacts, such as reduced operational costs, increased yield and product quality as well as improved social and environmental conditions (Elliott, 2018; Petrokofsky and Jennings, 2018; Carlson and Palmer, 2016; Oya et al., 2017).

In the past twenty years, there has been significant increase in the number of certified coffee producers, though they are known to be the better organized and better performing ones. The potential scalability to the most disadvantaged coffee producers is low without significant investment in organization and capacity building at the pre-certification stage. Furthermore, the fact that slightly more than one third of certified coffee produced is actually sold as certified calls into question the need to scale up if existing producers reached by VSS are not receiving their full market benefits (Panhuysen and Pierrot, 2018).

Increasingly, VSS influence the enabling environment for sustainable coffee production through catalysing stakeholder collaboration, knowledge products, investment promotion, and corporate and public policy development as well as improving the norms and principles that operate in the coffee sector. These changes in the enabling environment that VSS are involved in typically address systemic issues and their underlying root causes.

Corporate responsible sourcing programmes

Responsible sourcing programmes refer to systems that include, in varying degrees, policies, targets, action plans, standards and codes, risk management, monitoring and reporting regarding sustainability of the green coffee purchased. Responsible sourcing programmes demonstrate that sustainability is integrated, to some degree, into the company’s coffee business and part of a comprehensive management system. Corporate programmes include those of Illy, Jacobs Douwe Egberts, Keurig Dr Pepper, Lavazza, Nespresso, Nescafé, Olam, Starbucks, Tchibo as well as various retailers, which differ in terms of their scope, scale, impact and transparency. In various cases, the scope is extended to producer support activities linked to sourcing (e.g. access to finance or inputs) and some programmes comprise long-term purchase commitments. Frequently, these programmes receive donor co-financing. The basis of many of these programmes is certification against a VSS or own company standard. In various cases, the scope is extended to long-term purchase commitments and producer support activities linked to sourcing purposes (e.g. access to finance or inputs). Many company sourcing programmes address the issues facing coffee producers but they can vary considerably. Sourcing programmes tend to focus on quality and productivity. Increasingly, sourcing programmes are adapting their focus to more pressing issues from the point of view of coffee stakeholders and consumers (e.g. hunger, child labour, gender, deforestation). However, these benefits of these programmes tend to reach the better organized and performing farmers and are limited to those who linked to sourcing programmes. Scalability is often constrained by high investment and transaction costs, which can be an obstacle for small- and medium-sized roasters, particularly outside of niche markets.

The impact that responsible sourcing programmes have is not always clear. Companies tend to report limited information about their results due to weak monitoring systems and concerns about competition. Impact measurement can also be methodologicaly challenging and require significant resources. Most evidence points to improved quality and productivity leading to increased income for producers (Macchiavello and Miquel-Florensa, 2019). Hence, the transparency and accountability of corporate responsible sourcing programmes is limited compared to other mainstream initiatives. That said, certain companies begin to engage external assessors, like the major audit firms, in order to substantiate their claims.

Producer support, community development and landscape management initiatives

Grower support initiatives provide services that promote sustainable production and professional producer organizations. They differentiate from the responsible sourcing programmes by not being exclusive to an individual company's supply chain or directly linked to its sourcing practices. Producer support initiatives vary in their focus from being quite holistic to addressing specific issues (e.g. climate change). In some cases, these initiatives include services, such as technical assistance and access to finance; however, the majority do not work on responsible trading practices and alternative pricing. Community development programmes focus on, for example, basic public services, non-coffee income generation and community engagement. Landscape programmes focus on ecosystem conservation and rehabilitation and landscape governance.

Community development and landscape management are typically driven by the corporate social responsibility efforts of individual companies or development organizations. Prominent organizations active in this field include the Neumann Foundation, Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, USAID, Technoserve, Conservation Internationa, Solidaridad and others. They often work in partnership with individual companies. Moreover, several collaborative industry initiatives exist, such as International Coffee Partners, the Coffee & Climate initiative, SAFE Platform and the Coalition for Coffee Communities. These initiatives allow for some of the root causes of unsustainable production and poverty to be addressed. They can provide producers with the means to upgrade their business, improve alternative livelihoods, increase access to basic services or reduce their costs and can ensure a better management of ecosystems around production, livelihood and conservation goals. They can also benefit disadvantaged coffee producers that fall outside the regular supply chain programmes. However, many of these initiatives have a challenge to create impact beyond project boundaries in space and time. They lack, for example, a focus on designing viable models that effectively sustain the provision of services or governance beyond the scope of the project. Their impact is not always clear since monitoring is limited to the activities carried out rather than outcomes or learning that can be shared among participants. Landscape management is quite a novel approach and its effectiveness remains to be proven.

TEXT BOX 10

CHILD LABOUR FREE ZONES: AN AREA-BASED APPROACH TO STOP CHILD LABOUR

The concept of child labour free zones was introduced in 1992 by the Indian organization MVFoundation, which in the past two decades has helped get over 1 million children out of work and into school. MVFoundation has developed an area-based approach towards child labour free zones involving all stakeholders, including teachers, parents, children, unions, community groups, local authorities, religious leaders and employers. The power comes from the people living in these communities who set the norm that 'no child should work; every child must be in school'. Increasingly, the approach is adopted by companies, including in the coffee sector, to ensure that sustainable supply chains are free of child labour (and other human rights abuses).

SOURCE: https://stopchildlabour.org/child-labour-free-zones/

"Businesses and development partners work together to address sustainability challenges faced by the sector."

TEXT BOX 11
EXAMPLES OF FINANCING MECHANISMS

There are various examples of global financing mechanisms that can inspire funding mechanisms in the coffee sector:

The Private Financing Advisory Network (PFAN)
PFAN is a multilateral public private partnership initiated by the Climate Technology Initiative and the United Nations Framework Convention on Climate Change (UNFCCC). It identifies and nurtures promising, innovative, clean and renewable energy projects by bridging the gap between investors, clean energy entrepreneurs and project developers

SOURCE: https://pfan.net/

Better Cotton Growth and Innovation Fund (Better Cotton GIF)
The Better Cotton GIF combines funding from the private sector, public sector and donors. BCI Retailer and Brand Members contribute to the Fund through a fee based on the volume of Better Cotton they procure and declare. The Fund identifies, supports and invests in field-level programmes and innovations while fostering adoption of the Better Cotton Standard System by governments, trade associations and other entities.

SOURCE: https://bettercottonfund.org/

EU's Accompanying Measures for Sugar Protocol countries (AMSP)
AMSP consisted of a 1.25 billion EUR aid facility to support a number of African, Caribbean and Pacific (ACP) countries in their adjustments to the 2006 reform of the EU's sugar regime. The AMSPs supported projects between 2007 and 2013 that enhanced the competitiveness and sustainability of the sugarcane sector, promoted the economic diversification of sugar-dependent areas and addressed broader impacts generated by the adaptation process (e.g. employment and social services, land use and environmental restoration, the energy sector, research and innovation and macroeconomic stability).

SOURCE: https://ec.europa.eu/europeaid/sectors/food-and-agriculture/sustainable-agriculture-and-rural-development/amsp_en

Public sector efforts around revenue generation and investment

Several exporting countries apply export fees to pay for R&D, extension services, quality management, market promotion, stabilization funds, infrastructure development, and the functioning of governing bodies. Various donor funds, often referred to as blended finance, exist that promote public, private and/or non-profit investments in the coffee sector. For example, the German Federal Ministry for Economic Cooperation and Development (BMZ) launched the Coffee Innovation Fund to support projects from the private sector that foster innovation in the production, processing and marketing of coffee at origin. The multi-donor NAMA Facility enables investments in greenhouse gas emission reduction along the coffee value chain, for instance, in Costa Rica. Root Capital's Coffee Farmer Resilience Fund receives funding from US coffee companies that is matched by the public sector and foundations to invest in addressing coffee leaf rust across the production base in Latin America.

Despite the public sector's revenue generation efforts, current investments need to be vastly scaled up to meet the sector's needs. For example, a recent study estimates that the coffee sector requires $10 billion annually for sustainable development (Sachs, 2019). Today, annual investment in sustainable development is driven by the coffee industry at an estimated at $350 million. A closer look at this figure shows that at least 50% of this funding is generated through premiums for certified coffee. Around 20% is direct investment of the private sector, which matches an equivalent of 20% foreign donor funding. Another 10% is available from undefined sources of funding (Steemers, 2016).

Public policy and regulation

There are a number of producing countries applying various regulatory measures to benefit their national coffee sector. For example, Costa Rica and Colombia heavily manage their coffee sectors in the sense that they establish strict boundaries within which market forces can work. Several countries in East Africa have introduced auctions or exchanges to facilitate coffee trade and price discovery. In Honduras, a National Coffee Fund supports the maintenance and construction of roads in coffee-producing areas. Various countries across Latin America and Vietnam heavily invest in research and development, as well as in extension services. Brazil has shown that it can intervene in the market if prices are too low. The effectiveness of regulatory efforts in producing countries, however, may vary depending on the quality of implementation and the presence of complementary measures. In contrast, consuming countries have so far implemented few initiatives to promote the economic viability of coffee growers, except for offering low import tariffs for selected producing countries. In this regard, lessons can be learned from public-led efforts in the cocoa sector (see Text box 12).

Multi-stakeholder governance initiatives

There are many national and international multi-stakeholder initiatives in the coffee sector. Two prominent multi-stakeholder platforms are the Global Coffee Platform (GCP) and the Sustainable Coffee Challenge (SCC). GCP, born out of a merger between 4C and IDH's Sustainable Coffee Program, aims to align the coffee sector in tackling the biggest issues on the supply side to be able to meet growing global demand. GCP organizes national platforms in Brazil, Colombia, Honduras, Tanzania, Uganda, Vietnam, Indonesia and Kenya to focus on changes needed in the enabling environment to promote uptake of improved coffee production practices. The initiative fosters alignment in vision and strategy among stakeholders, develops tools, shares knowledge sector-wide, and launched the Sustainability Reporting Framework.

The SCC aims to promote profitable production through productivity gains while ensuring the conservation of coffee-producing areas. SCC developed a framework of five key components and calls for company commitments, provides a monitoring platform and organizes collective action networks of practitioners. They also co-developed with GCP the Sustainability Reporting Framework.

The impact of multi-stakeholder governance is difficult to assess due to typical measurement and attribution problems. New initiatives, such as the Delta Project, a cross-commodity framework to measure and track progress towards achieving SDGs, are expected to address some of these issues[22].

"The effectiveness of regulatory efforts in producing countries depends on the quality of the implementation and the presence of complimentary measures."

TEXT BOX 12

NATIONAL COCOA PLATFORMS IN BELGIUM, GERMANY, AND SWITZERLAND

Key chocolate manufacturing and consuming countries across Europe have established various sustainability initiatives that show the role of public sector in addressing the root causes of unsustainable commodity production.

Belgium's Beyond Chocolate

Led by public policy, Beyond Chocolate is a partnership of the Belgian public sector, industry and civil society. Launched in late 2018, the objective is to improve the living conditions of cocoa producers and their families in relevant growing regions over the long-term. Key commitments include 100% certified chocolate, a living income for cocoa producers, and ending deforestation in cocoa growing regions.

SOURCE: https://diplomatie.belgium.be/en/newsroom/news/2018/beyond_chocolate

German Initiative on Sustainable Cocoa (GISCO)

Oriented toward development cooperation, the German Initiative on Sustainable Cocoa (GISCO) is an initiative of the German Ministry of Economic Cooperation and Development (BMZ), the German Ministry of Food and Agriculture (BMEL), the German sweets and confectionary industry, the German retail grocery trade, and civil society. Founded in 2012, this multi-stakeholder initiative aims to improve the livelihood of cocoa farmers and their families. PRO-PLANTEURS, one of its signature projects, aims to professionalize 20,000 cocoa-producing, family-owned businesses and producer organizations in the south-eastern regions of Côte d'Ivoire. Through this project, GISCO reports an average yield improvement of 30-50% corresponding to an increase of $648 to $1,080 per household each year as a result of their interventions.

SOURCE: https://www.kakaoforum.de/en/

Swiss Platform for Sustainable Cocoa

Launched in early 2018, the platform is a space for dialogue, learning, and joint projects among trade association CHOCOSUISSE, chocolate manufacturers, importers and distributors of cocoa-based products, retailers, the State Secretariat for Economic Affairs (SECO), non-profit organizations, and research institutions. Members have set the binding goal that, by 2025, at least 80% of the cocoa-based products imported into Switzerland are produced sustainably.

SOURCE: https://www.kakaoplattform.ch/

[22] Global Coffee Platform, *The Delta Project Bridging the Gap of Measuring Sustainability Performance*, Presentation to the Projects Committee of the ICO, April 10th, 2018

TABLE 2

Potential solutions classified according to three key issues, lead actors and barriers to implementation

Lead actors	Solutions (according to barriers to implementation and potential impact)		
	Low barrier / Narrow-scaled impact	**Medium**	**High barrier / Wide-scaled impact**
A. Solutions to address price levels and demand-supply imbalances			
Producers	• Investment in farm profitability and sustainability	• Income diversification	• Alternative livelihoods
Market actors	• Market promotion • Producer support services	• Market promotion • Producer support services • Full traceability, supply chain partnerships • Price and premium management • Community development, landscape management	
Public sector and international organizations	• Sustainable public procurement • Market promotion • Regulation on quality assurance and social & environmental practices • Investments in R&D	• Supply management by reduction of hectares under coffee production • Landscape management • Basic services e.g. healthcare and education	• Direct income transfers • Differentiated taxes and tariffs • Rural infrastructure development • Land tenure reform • Promotion of alternative uses of coffee • Supply management by international production and export quota
B. Solutions to address issues related to price volatility			
Producers	• Physical strategies	• Hedging strategies	
Market actors	• Contract farming	• Floor prices, access to hedging services	
Public sector and international organizations	• Farmgate price-setting in relation to export price	• Purchase guarantees • National strategic buffer stock management	• Modifications to futures exchange • Price stabilisation funds • International coordination of buffer stocks
C. Solutions to address risk and value distribution in the value chain			
Producers	• Product differentiation, aggregation and marketing	• Roasting at origin / value addition	• Branding
Market actors	• Purchase of certified coffee, premiums • No unfair trading practices	• Purchase of certified coffee, premiums • No unfair trading practices • Full traceability and supply chain partnerships • Price and premium management • Pre-finance	• Decoupling sourcing strategy from futures markets
Public sector and international organizations	• Upgrade existing market information systems • Benchmarks of production and living costs	• Observatory for costs, prices, margins • Export auctions • Regulation on due diligence and unfair trading practices	• Farmgate price-setting in relation to export price • Anti-trust regulation

6. Collective action and key stakeholder roles

6.1 Shared responsibility and complementary solutions

The global coffee sector faces a serious challenge in addressing current price levels and price volatility to achieve a sustainable coffee sector. Earlier attempts to address the structural market issues have resulted in well-known successes and failures. More daunting is the objective of closing the gap between current income levels and a living income for coffee-farming households, as well as achieving a living wage for workers in the coffee supply chain.

There is need to assume shared responsibility, identify complementary solutions and translate them into concrete, meaningful action. Business as usual is not a sufficient strategy to secure the long-term economic sustainability of the coffee sector. Instead, systemic change is required. However, given the complexity of the task, no simple solutions exist. Many of the proposed measures come with clear trade-offs. While some measures may achieve short-term gains, they may contribute to long-term failure. For example, higher farmgate prices that initially lead to increased farm profitability can stimulate increased supply, which may undermine prices and profitability, particularly with weak supply-side measures.

Competing objectives need to be balanced. Hence, measures must not be considered in isolation. Systemic barriers to a more competitive and sustainable coffee sector cannot be solved by one actor alone or by a focus on isolated measures. Hence, there is a need for shared responsibility and complementary action by different stakeholders. Realizing this ambition is clearly a great challenge for the coffee sector considering the competing objectives and interests of individual stakeholders. However, the current coffee crisis, the expected negative impact of climate change and SDG commitments can potentially function as a catalyst that helps to reconcile these differences.

The solutions presented in this section can be broadly categorized according to three issues that undermine the viability of the coffee sector. The first cluster of solutions responds to price levels and demand-supply imbalances. It includes various more fundamental solutions to promote demand and manage supply. It also includes investments in making coffee producers more profitable and resilient and those that improve the conditions in which they operate (e.g. land tenure, landscape management, basic services and infrastructure). The second cluster addresses and mitigates the negative effects of price volatility. They relate mostly to price risk management and price management, including short-term supply management measures. The third cluster of solutions provides a response to the distribution of costs, value and risks within value chains. They comprise measures promoting market transparency, value addition by producers and responsible sourcing practices.

Table 2 lays out the main solutions according to the three key issues and the actors responsible for implementing them. The table also makes a distinction between the expected feasibility and potential impact. While some solutions may be more difficult to implement, they tend to contribute to more systemic, wide-scaled impacts.

The solutions in Table 2 need to be complemented by adequate funding mechanisms, multi-stakeholder based coordination and service provision.

Solutions may differ in relevance according to origin and market segment. The coffee sector is not homogeneous. The nature of issues and required solutions may differ for smallholders and plantations. They can also be different for actors operating in the mainstream market or specialty market. Furthermore, climate risks vary across regions. Differences in institutional capacity, quality of service delivery and rural infrastructure may impact the relevance of feasibility of potential solutions for each origin. Therefore, it is important to understand the context and to tailor solutions accordingly.

6.2 Priority solutions and key stakeholder roles

We outline below the four priority solutions and three enabling factors as well as critical roles for key actors to play in addressing the current price crisis, to achieve economic viability of farmers and foster sustainability of the coffee sector (Figure 2).

The following priority solutions have been identified:

(a) Enhance market transparency by publishing costs of production and living income benchmarks and upgrading existing market information systems

A first priority is to develop better insights into the cost of sustainable production and the cost of a decent living for different segments of coffee producers. This should also include an overview of how coffee prices relate to these costs and the determination of, for example, reference prices that enable a living income and living wage. This role has to be taken up by an independent *international institution* or initiative. It is important all stakeholders use consistent and widely-accepted methodologies for these benchmarks across coffee origins. In addition, there is a need to further upgrade existing market information systems to provide real time data on price levels (possibly across the various levels of the value chain), price volatility as well as demand and supply data and forecasts. This strategy should inform sourcing practices of the coffee industry and empower producers with the objective to come to a more equitable distribution of value generated in the sector.

(b) Adopt responsible sourcing practices

Secondly, *coffee-buying companies* should re-evaluate how they operate in the current market system given that, despite existing sustainability claims and initiatives, suppliers often cannot meet their cost of production or living. There is scope to develop more direct, transparent and stable commercial relationships with suppliers that reward good performance (e.g. quality and sustainability) with price incentives and responsible sourcing practices (e.g. contract and payment terms). More impactful measures will require a change in the way that business is conducted for many companies. It implies building partnerships across supply chains in which the terms of trade and price match the objective of increasing the profitability and sustainability of coffee production. This match could mean less dependence on the commodity markets (de-commoditisation) and that the prices and premiums paid are informed by cost of production, living income or living wage benchmarks. The impact would go beyond existing certification schemes and corporate producer support projects. The transformation of "business as usual" by frontrunner companies can be an uncertain and possibly unsuccessful process, particularly without conducive regulation. Therefore, it is recommended to start testing such models at a smaller scale for specific product lines or market outlets. Companies can also invest in higher value end products and share that additional value with coffee producers.

The role of consumers in increasing demand for coffee that has been sourced responsibly is crucial. Greater awareness about economic, social implications of coffee production could translate into a higher willingness to pay and facilitate the sector transformation. However, a large share of consumers is likely to remain price sensitive.

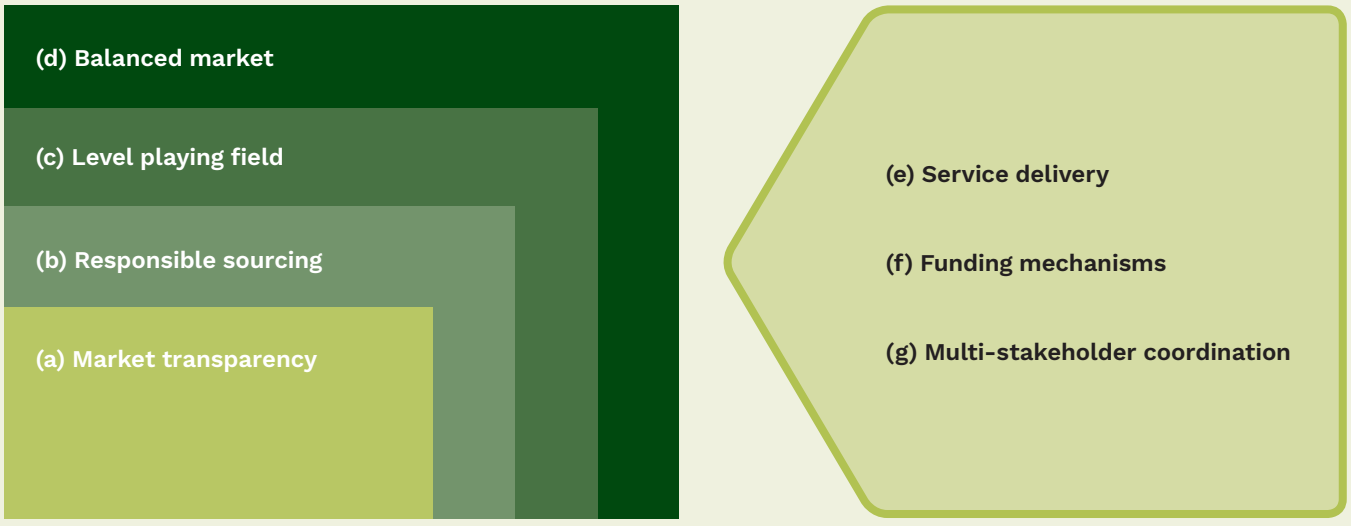
(c) Create a level playing field for the industry on price-setting and trading practices

In recognition that competitive forces, path dependencies related to established practices, and free rider problems limit voluntary action by industry, the third priority is to create a level playing field on price-setting and trading practices. *Governments in producing/exporting countries* have the power to shape the rules of how markets work for the benefit of their coffee producers. They can create a level playing field by adopting several measures influencing trading relationships, price discovery and value distribution. They can introduce auctions, fix farmgate prices according to export prices, establish stabilization funds or introduce purchase guarantee mechanisms. All of these measures can, to some degree, be developed in alignment with global market prices, which would therefore reduce financial risks and lessen distortions of the market. However, policies that deviate from market prices, e.g. setting a floor price above the market price, can result in significant cost and financial risk for producing countries. This approach seems feasible only if industry has accepted to pay such elevated price (or could pass it on to consumers) or when a government has sufficient resources to buy and stock the unsold coffee. In view of the mixed track record of these policies in the past, key success factors for this type of measures are to ensure transparency and accountability as well as decision-making that is based on sound macro-economic modelling.

In addition, *governments in importing/consuming countries* also can adopt various measures to foster responsible sourcing practices. They can promote voluntary commitments by the industry to achieve responsible supply chains and/or enforce such practices through regulations on due diligence and fair trading practices. They could incentivize sustainable production, responsible trade and value addition at origin through differentiated taxation

FIGURE 2

Priority solutions and enabling factors to address the price crisis, achieve economic viability of coffee production and foster sustainability of the sector.



“There is no one-size-fits all solution for the coffee sector as production systems vary greatly between countries and regions.”

schemes and their own procurement practices. At the international level, governments in consuming countries can revise competition laws to help achieve a level playing field where all companies internalize social and environmental costs into prices. Finally, governments can support further research on the influence of commodity exchanges on short-term price developments and consider measures (e.g. regulation on speculation and trading practices) to mitigate volatility if the impact is too substantial.

Voluntary sustainability standards can also contribute to a level playing field. They can extend the scope of their standards from crop-specific to farming systems and pay more attention to supply chain dynamics in their standards systems, including direct payments of premiums, minimum prices and more ambitious premium models. More alignment between the requirements of the sustainability standards is also recommended.

(d) Achieve a more balanced market

The costs, effectiveness and sustainability of many the above measures will be greatly influenced by the market fundamentals of supply and demand. Therefore, the fourth priority is for *governments in producing/exporting countries* to adopt various measures to influence supply and demand in the short and long terms. Governments in producing countries can promote demand in domestic and export markets through market development (e.g. building a reputation for quality and sustainability), increase value addition through domestic roasting and by removing trade barriers. The latter is a measure that can also be taken by *governments in importing/consuming countries*. Furthermore, governments in producing countries can respond to low prices by removing production output from the market through strategic buffer stock management. Such short-term volume-based interventions will only have an impact if done by the largest origins or through international collaboration. These measures can be costly and effective international cooperation could be a challenge. Producing countries have the option to devise long-term strategies to influence the supply and demand balance. Governments can limit the coffee-producing areas to the most suitable locations, protect their forests against encroachment, stimulate on-farm diversification or promote alternative livelihoods for coffee producers. These strategies will require the integration of coffee-specific policies into wider agricultural and rural development frameworks, possibly including land tenure reforms and trade and industrial policies.

Enabling factors are:

(e) Promote competitive and sustainable coffee production through viable and scalable service delivery models and a regulatory level playing field on production practices

In the transition towards a more profitable and resilient production base, coffee producers, particularly smallholders and their organizations, need access to extension, technology, inputs and finance. In many countries these are widely absent. This access requires investments in research and development and cost-efficient, economically viable and scalable service delivery models. The development of these models requires a concerted effort by *public, private and civil society actors as well as development institutions*. For example, companies with vertically integrated supply chains can introduce service delivery to coffee producers, in collaboration with other actors (including International Financial Institutions), into their sourcing models, thereby assuming some of the agricultural and market risks related to coffee production. Service delivery models should segment customers, adapt to their needs, and bundle various services. To reach all producers, service delivery models need to be gender-sensitive by design. In a fragmented producer base, investments should be made in building and strengthening producer organizations around service delivery and marketing. The introduction of digital technology solutions can facilitate farm management and the efficient functioning of producer organizations that service delivery models seek to support. To promote producer resilience, service providers need to look at the farming system and households’ needs (instead of an exclusive focus on coffee) to achieve a living income.

To ensure a level playing field among coffee producers, *governments in producing/exporting countries* should consistently enforce sound social and environmental regulation around forest protection, water management, labour practices, and bans of hazardous agro-chemicals.

(f) Develop financial mechanisms that extend access to finance and enable strategic investments

Most relevant measures require financing and investment. Part of the challenge is to give producers and small- and medium-scale value chain actors access to financial products that allow them to make investments in their business. *The financial sector* can develop tailored products for these potential clients. It can develop products, including working capital, investment loans and guarantee schemes as well as insurance for service delivery models, which balance the financial sustainability of their products with the impact at farm-level. For this type of financial product, the financial sector can partner with *impact investors, institutional funders or donors* with a diversified risk profile. This is a greater challenge for the least-developed coffee-exporting countries.

Blended finance mechanisms can also fund various strategic investments, such as research and development, digital innovations, infrastructure, and programmes related to on-farm diversification, alternative livelihoods and landscape management. It is particularly important for the *donor community* to support systemic and transformational solutions and accept that systemic change can take time and cannot be captured in two or four-year project cycles but requires a longer-term-perspective. Moreover, systemic change cannot be measured by the number of producers, hectares or market shares but by the overall prosperity of all actors of the coffee value chain and the sustainability of the sector at large.

GOVERNMENTS IN PRODUCING/ EXPORTING COUNTRIES SHOULD CONSISTENTLY ENFORCE SOUND SOCIAL AND ENVIRONMENTAL REGULATION AROUND:

FOREST PROTECTION

WATER MANAGEMENT

LABOUR PRACTICES

BANS OF HAZARDOUS AGRO-CHEMICALS

To coordinate investments in the global coffee sector, an option is to pool resources from *donors, governments and coffee industry* in a global funding mechanism.

Governments in producing/exporting countries can also work on structural revenue mechanisms (e.g. export fees) to finance investments in the coffee sector, balancing efficiency trade-offs between benefits from structural investments in the sector with competitiveness. Both national and international mechanisms need to ensure multi-stakeholder governance and independent decision-making and evaluation and must be in line with the requirements and the obligations of the international trade system.

(g) Ensure multi-stakeholder dialogue, alignment and learning

The coffee sector is characterized by a growing concentration and by a number of private sector-led initiatives. However, there is insufficient integration and harmonization of approaches or alignment of objectives and actions. Therefore, there is the need for a space for dialogue and alignment between the public and private sector and civil society. *National, regional and international multi-stakeholder platforms* can play an important role in this endeavour. They can create a space for dialogue, support the creation of a shared vision, and identify long-term and transformational solutions to the structural issues facing the sector. This includes alignment of ambitious and time-bound action plans by individual stakeholders on priority topics, for which they need to be held accountable. Platforms can also promote the development of specific tools, sector-wide monitoring, and the sharing of best practices and lessons learned.

The SDGs provide a framework for the dialogue between sector stakeholders (public, private and civil society) and alignment of actions. This ensures that efforts to achieve economic viability of coffee farming also contribute towards social and environmental objectives. Prosperity at farm level is necessary to achieve long-term sustainability of the sector.

“Removing barriers to trade is an effective way of generating new market opportunities for coffee growers.”

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Annex A

Female participation in the coffee sector compared to the agricultural sector

TABLE A1 Estimates of female participation in the coffee and agricultural sector

Share of labour force	Share of household heads / Land-owners	Region / Country	Source
Coffee sector			
70%	20%	Global+	ITC, 2008
n/a	23%	Uganda	Meemken and Qaim, 2018
n/a	35%‡	Mexico & Central America	Lyon et al., 2010
n/a	29-34%§	Kenya	Dijkdrenth, 2015
n/a	24%	Uganda	Sekabira and Qaim, 2017
n/a	19%	Ethiopia†	ICO, 2018
n/a	28%	Uganda†	ICO, 2018
n/a	26%	Tanzania†	ICO, 2018
n/a	20% (smallholder) 3% (estate)	Kenya	GCP, 2019
n/a	27%	Colombia	ICO, 2019
n/a	19%	Costa Rica	ICO, 2019
n/a	17%	Honduras	ICO, 2019
Agricultural sector			
43%	n/a	Global	FAO, 2011
20%	21%	Latin America	FAO, 2011
50%	17%	SE-Asia / S-Asia	FAO, 2011
50%	26%	Sub-Saharan Africa	FAO, 2011

+ Study comprises 15 countries
‡ Share of female Fairtrade-organic farm operators
§ Share of female coffee-cooperative members
† Nationally representative sample based on World Bank LSMS-ISA survey
SOURCE: ICO

Annex B

Measuring trends in coffee prices: a robust approach allowing for structural breaks and non-stationary volatility

The examination of trends in commodity prices is empirical in nature. As a result a large volume of studies have examined the trend in commodity prices, motivated by the recent developments in time series econometric methods.

Early studies examined the trend in commodity prices assuming no persistence in the error terms of the time trend regression. Ignoring the nature of the error terms result in the mis-specification of the trend estimation due to the potential presence of a unit root in the data series. Series with a unit root are non-stationary, meaning that the variance of the series is not constant in time and, thus, a time-shock on the variable will produce a permanent deviation of the long-run behaviour of the variable. Perron (1988) concluded that the presence of a unit root can distort the trend estimation and statistical tests when using ordinary least squares (OLS). Conversely, if the time series data does not contain a unit root, but is modelled as a unit root process, the tests will be inefficient and will lack power relative to the trend stationary process (see Perron and Yabu 2009).

The trend estimation is further complicated with the potential presence of structural breaks since determining the presence of a unit root in the data becomes complicated. For example, one can falsely conclude a data series to be a unit root process by neglecting a structural break in what is an otherwise trend stationary process (Perron 1988). Alternatively, in a difference stationary process, neglecting a trend break can incorrectly suggest the presence of stationarity (Leybourne, Mills, and Newbold 1998). Accordingly, recent studies have allowed for the presence of structural breaks when testing for the presence of unit roots.

Commodity prices, coffee included, are highly volatile and thus a constant variance should not be assumed. Therefore prior to trend estimation, variance profiling needs to be accounted for (Cavaliere and Taylor 2007). A novel method of trend estimation under time varying variance developed by Yang and Wang (2017) will be used to estimate and test trends in coffee prices and the presence of structural breaks

International coffee prices – Results of trend estimation

The trend in global coffee prices is estimated using the ICO composite indicator since January 1970 to June 2019, on a series of monthly prices. The price indicator is deflated using the PPI for durable manufacturing and the U.S. consumer price index (CPI) for urban consumers. All analysis is carried out on the logarithms of the real price data.

The results of the robust test for structural breaks that does not impose an order of integration of the data are reported in Table B1 below. The coffee price series was tested for up to one structural break, $F_\lambda^*(1|0)$, up to two structural breaks $F_\lambda^*(2|0)$ or the double maximum test $UDmaxF_\lambda^*$ or $WDmaxF_\lambda^*$ and up to 3 structural breaks $F_\lambda^*(3|0)$. If the $F_\lambda^*(3|0)$ or double maximum tests do not reject the null hypothesis of no break, then we conclude there are no trend breaks in the price series. The results show that the null hypothesis of no trend breaks cannot be rejected, therefore, there is no structural trend breaks in the deflated ICO composite indicator series from January 1970 to June 2019. The choice of the deflator does not appear to have much impact on the different coffee prices.

Given that there is not enough evidence to conclude that coffee prices have any structural break in the trend function, we can assume that the evidence favours an unbroken trend for the ICO composite indicator. We can, therefore, proceed to estimate secular trends for the entire sample of coffee prices as there is no justification to consider the case of estimating broken trends.

We now proceed to estimate the trends using the robust procedures that do not impose an underlying order of integration of the data. Table B2 reports the results of robust tests of the presence of an unbroken trend for the ICO composite indicator prices. These robust tests were developed by Harvey et. al. (2007), or HLT, and Perron and Yabu (2009), or PY. The first three columns of results show the HLT method and the last three the PY method, which is known to produce tighter confidence intervals and thus more precise trend estimates in comparison to the HLT procedure. The sign of the statistic denotes the slope of the trend (that is, a negative statistic will denote a negative trend, while a positive statistic will denote a positive trend). Further, the magnitude of the statistic will denote whether the trend is statistically significant at 90% confidence (that is, if the magnitude is greater than 1.65, then the trend estimate is significantly different from zero). In all cases (HLT and PY) the trend estimate is negative but not significantly different from zero. Therefore, with 90% confidence, we cannot conclude that the coffee price trend is different from zero. There is no difference in the conclusion from the estimates of the HLT and PY methods. Our overall conclusion is that there are no significant trends in coffee prices, irrespective of the choice of deflators.

Prices paid to coffee growers – Results of trend estimation for eight countries

Similarly, robust test for structural breaks and trend estimations for prices paid to coffee growers was conducted for eight countries: Colombia, Brazil (Arabica and Robusta), Costa Rica, India (Arabica and Robusta), Indonesia, Ethiopia, Honduras and Uganda. Coffee prices paid to growers were deflated with the CPI of each respective country. The period under study varies by country depending on the availabity of coffee prices paid to growers or CPI data, as follows:

- Brazil: July 1994—January 2019 (both Arabica and Robusta)
- Colombia: January 1970 – April 2019
- Costa Rica: January 1976 – September 2017
- Ethiopia: January 1970 – September 2018
- Honduras: January 1973 – February 2019
- India: January 1973 – May 2019 (Arabica) and October 1985 – May 2019 (Robusta)
- Indonesia: April 1975 – September 2007 (Robusta)
- Uganda: March 1992 – March 2019 (Arabica and Robusta)

TABLE B1 Robust structural break tests

	$F_\lambda^*(1\|0)$	$F_\lambda^*(2\|0)$	$F_\lambda^*(3\|0)$	$UDmaxF_\lambda^*$	$WDmaxF_\lambda^*$	SeqUD(0|1)
Using PPI for durable manufacturing as deflator						
ICO composite indicator prices	2.24	2.53	2.50	2.44	2.92	2.24
Using CPI urban consumers as deflator						
ICO composite indicator prices	3.17	3.44	3.73	3.44	4.37	3.17

NOTES: none of the estimated statistics can reject the null hypothesis of no break (all the estimated test statistics are less than the critical values at the 10% significance level). Whether it be the sequential trend break statistics such as $F_\lambda^*(m|0)$ or the break tests statistics such as the Dmax tests, or the modified sequential test statistics – all due to the procedures by Sobriera and Nunes (2016).

TABLE B2 Robust test linear trend estimations

	HLT			PY		
	δ	z_δ	z_δ^m	ρ	t_{PY}	t_{PY}^m
Using PPI for durable manufacturing as deflator						
ICO composite indicator prices	0.000	-0.509	-0.509	1.000	-0.432	-0.432
Using CPI urban consumers as deflator						
ICO composite indicator prices	0.000	-0.564	-0.564	1.000	-0.497	-0.497

NOTES: None of the tests statistics due to HLT (i.e. z_δ or z_δ^m,) or PY (i.e. t_{PY}, or t_{PY}^m) can reject the null hypothesis of no trend. The tests statistics are all negative (implying a negative estimate of the trend) but less than 1.65 in absolute terms implying that we cannot conclude trend estimate is significantly different from zero.

Results of the robust test of structural breaks and linear trend estimation are detailed in Tables B3 and B4, respectively. No structural trend breaks were found in the deflated price series for any country. The results of the robust tests for trend estimation indicate that a significant negative trend is present for Colombia, Brazil (A), Brazil (R), Ethiopia and Honduras. Since the tests statistics are negative, the underlying trend is negative, therefore the real prices of coffee for Colombia, Brazil (A), Brazil (R), Ethiopia and Honduras are declining over time. No significant trends are found for Costa Rica, India, Indonesia and Uganda (Table B4).

TABLE B3 Robust sequential tests for structural breaks

	$F_\lambda^*(1\|0)$	$F_\lambda^*(2\|0)$	$F_\lambda^*(3\|0)$	$UDmaxF_\lambda^*$	$WDmaxF_\lambda^*$	SeqUD(0|1)
Colombia	1.61	2.29	2.02	2.21	2.36	1.61
Brazil (A)	2.26	2.51	1.99	2.41	2.54	2.26
Brazil (R)	3.85	3.30	2.39	4.01	3.76	3.85
Costa Rica	0.89	1.74	1.60	1.68	1.87	0.89
India (A)	1.58	2.43	2.54	2.35	2.98	1.58
India (R)	1.93	3.75	4.17	3.79	4.81	1.93
Indonesia	1.57	3.95	3.61	3.81	4.23	1.57
Ethiopia	1.03	1.91	1.58	1.84	1.94	1.03
Honduras	0.58	2.46	2.35	2.37	2.75	0.58
Uganda (A)	2.46	2.89	3.55	3.27	4.15	2.46
Uganda (R)	2.39	3.91	4.68	4.32	5.48*	2.39

NOTES: none of the estimated statistics can reject the null hypothesis of no break (all the estimated test statistics are less than the critical values at the 10% significance level). Whether it be the sequential trend break statistics such as $F_\lambda^*(m|0)$ or the break tests statistics such as the Dmax tests, or the modified sequential test statistics – all due to the procedures by Sobriera and Nunes (2016). The only exception is Uganda, where one of the Dmax tests is rejected; but this is only a borderline case, and is not supported by the sequential tests. The notation (A) and (R) denote Arabica and Robusta varieties respectively.

TABLE B4 Robust tests for trend estimation

	HLT			PY		
	δ	z_δ	z_δ^m	ρ	t_{PY}	t_{PY}^m
Colombia	0.24	-1.35	-3.95***	0.95	-4.66***	-2.84***
Brazil (A)	0.00	-0.65	-0.65	0.93	-7.16***	-4.35***
Brazil (R)	0.00	-0.70	-0.70	0.93	-6.86***	-3.70***
Costa Rica	0.00	-0.23	-0.23	1.00	-0.23	-0.23
India (A)	0.03	-0.28	-0.42	1.00	-0.23	-0.23
India (R)	0.00	-0.56	-0.56	1.00	-0.63	-0.63
Indonesia	0.02	0.20	0.11	0.94	0.68	0.94
Ethiopia	0.01	-0.34	-0.38	0.95	-2.68***	-1.89*
Honduras	0.15	-1.08	-3.02	0.94	-3.70***	-2.41**
Uganda (A)	0.004	0.40	0.42	1.00	0.40	0.40
Uganda (R)	0.00	0.71	0.71	1.00	0.71	0.71

NOTES: The notation, ***, ** and * denote rejection of the null hypothesis at the 1%, 5% and 10% significance levels respectively. We find that the null hypothesis of no significant trend can be rejected at conventional levels for Colombia, Brazil (A), Brazil (R), Ethiopia and Honduras. The tests statistics are negative in these cases indicating that the underlying trend is negative. This implies, that the real prices of coffee for Colombia, Brazil (A), Brazil (R), Ethiopia and Honduras are declining over time. No significant trends are found for Costa Rica, India, Indonesia and Uganda.

Annex C

Econometric methodology of socio-economic influence of coffee price levels

The socio-economic impact of coffee price levels was assessed using data at the country level (macro data) on annual basis for coffee producing countries. Econometric models were employed to identify robust correlations between coffee prices and different socio-economic indicators. The selection of the indicators and the econometric methods used are explained in this Annex.

I. Socioeconomic indicators

Coffee production is an activity that has an impact on economic growth as well as social parameters of producing countries through the channel of income generation. The level of income is determined by international coffee prices. The objective of the analysis is to measure the socio-economic consequences of changes in coffee prices on a set of indicators for employment, economic activity, investment, poverty and food security. These indicators were obtained from international databases constructed by the World Bank (WB), the Food and Agriculture Organization (FAO) and other relevant organisations. The main databases used were: World Development Indicators (WB), FAOSTAT - food and agriculture data (FAO), Penn World Table (UC Davis and University of Groningen) and FRED® Economic Data (Federal Reserve Bank of St. Louis).

A final dataset was constructed with different indicators of employment, unemployment, labour participation, GDP, agricultural GDP, GDP per-capita, value added by sector, fixed capital formation, consumption expenditure, use of fertilizers and pesticides, poverty headcount, poverty gap, undernourishment, protein supply for diet, GINI index, among others. The dataset contains annual information for 56 coffee-producing countries and 28 years, from 1990 to 2017, for a total of a maximum of 1,568 observations.

Specifically, seven socio-economic indicators were selected to assess the influence of a change in international coffee prices:

- Rural employment to rural population ratio (%)
- Value Added (Agriculture), share of GDP (%)
- Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)
- Food security: Average supply of protein of animal origin (g/cap/day) (3-year average) (in logs)
- Number of people undernourished (million) (3-year average) (in logs)
- Political stability and absence of violence/terrorism (index)
- GINI index (World Bank estimate)

Table C1 presents the descriptive statistics of these indicators.

II. Econometric methods

The effect of a change in international coffee prices on socio-economic indicators is assessed by estimating the following econometric model:

$$Y_{ct} = \alpha + \beta \Delta P_{ct} + \gamma_i X_{ct} + \delta_t + \rho_c + \varepsilon_{ct} \quad [1]$$

in which:

Y_{ct} is each of the nine selected socio-economic indicators for country *c*, at year *t*.

ΔP_{ct} is the annual change of the relevant coffee price indicator for country *c*, at year *t*.

X_{ct} is a set of control variables for individual characteristics of each country *c* that vary in time *t*. The selected control variables are: life expectancy at birth (years), fertility rate (total births per woman) and average years of schooling.

δ_t are year fixed effects that control for time events at the macro-level, and,

ρ_c are country fixed effects that control for country characteristics and unobservables at the country level that do not change over time.

Fixed Effects is a methodology that controls for unobservable factors at the country/time level, and that help to minimize endogeneity problems of the model.

TABLE C1 Descriptive statistics of coffee prices and socio-economic indicators

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
year	year	1568	2004	8	1990	2017
coffeeprice	Coffee price	1526	104.6	48.9	25.9	281.3
dcoffeeprice	Annual change in coffee prices (CCP)	1470	0.1	0.3	-0.4	1.4
lncoffeeprice	ln[coffee price]	1526	4.5	0.5	3.3	5.6
EtPR_RURT	Rural employment-to- rural population ratio (%)	298	67.4	12.9	23.9	95.0
va_agshgdp	Value Added (Agriculture), Share of GDP in USD(%)	435	13.6	8.8	0.2	40.2
povhcr19d	Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	450	20.7	21.1	0.0	94.1
lnanm_protss	ln[Average supply of protein of animal origin (g/cap/day) (3-year average)]	676	2.8	0.6	1.1	3.9
lnpop_undern	ln[Number of people undernourished (million) (3-year average)]	884	14.8	1.5	11.5	19.4
polstab	Political stability and absence of violence/terrorism (index)	896	-0.7	0.8	-2.8	1.1
gini_wb	GINI index (World Bank estimate)	423	47.6	7.0	27.8	65.8

SOURCE: WB, FAO, PWT, FRED®, ICO.

The quantitative computation of the model described by equation [1] will produce an estimate of the coefficients α, β and γ_i. The value of the coefficient β, if statistically significant, will provide a quantitative estimate of the average effect that a 1% change in coffee price has on the socio-economic indicator Y_{ct}, across all coffee-producing countries in the sample.

Non-linearity in price movements

Model [1] assumes that the price effect is the same at any price level. In order to investigate if the effect on socio-economic indicators is different at different levels of prices three groups of coffee price levels were defined: 0 – 80 US cents/lb (low), 80 – 125 US cents/lb (medium), and >125 US cents/lb (high). The change in price will then be assigned to the corresponding level at which the change occurred, as described by model [2]:

$$Y_{ct} = \alpha + \beta_1 \Delta P_{ct} * P_{low} + \beta_2 \Delta P_{ct} * P_{med} + \beta_3 \Delta P_{ct} * P_{high} + \gamma_i X_{ct} + \delta_t + \rho_c + \theta_1 P_{low} + \theta_2 P_{med} + \theta_3 P_{high} + \varepsilon_{ct} \quad [2]$$

Additional variables in the model are:

P_{low}, P_{med} and P_{high} are dummy variables that take value 1 if coffee price was in the range 0 – 80 US cents/lb (low), 80 – 125 US cents/lb (medium), or above 125 US cents/lb (high), respectively, or take value 0 otherwise.

The value of the estimated coefficients β_1, β_2 and β_3, if statistically significant, will indicate the impact of a 1% change in coffee price at each price level.

θ_p are coefficients that capture the relevance of any unobservable characteristics of, Y_{ct}, the socio-economic indicator, that are present at the respective price level but does not depend on the annual change in coffee price.

Heterogeneity depending on economic importance of coffee exports (dependency)

Model [1] estimates an average price effect across all countries. However, the economic contribution of the coffee sector to the economy varies across countries; thus, the influence of a change in coffee price might be stronger if coffee has a larger weight in the economy. In order to investigate the potential effect of this heterogeneity on the impact of price changes on socio-economic outcome variables across countries, we defined the importance of the coffee sector as the share of the value of coffee exports in total exports for each country and classified countries in of three groups: low, medium and high dependence according to the distribution for each year of the study period. All countries with a share of coffee exports below 0.8% percent were classified as low dependency category. For value of exports above 0.8%, the distribution of countries was divided in three 3-quantiles or terciles. Countries in the lower tercile belong to low dependence category, countries in the middle tercile were classified in the middle dependence category and those in the top tercile as high dependence on coffee. Figures C1 and C2 show a visual representation of coffee dependence by country and year. Some countries belong to the same category over the entire time period, e.g. Uganda (High) or Mexico (Low). Other countries show variation in terms of their classification, e.g. Brazil (Low – Medium), Guatemala (Medium-High) or Kenya (Low, Medium and High), depending on the year.

The estimation of price effects by coffee dependence is illustrated in model [3]:

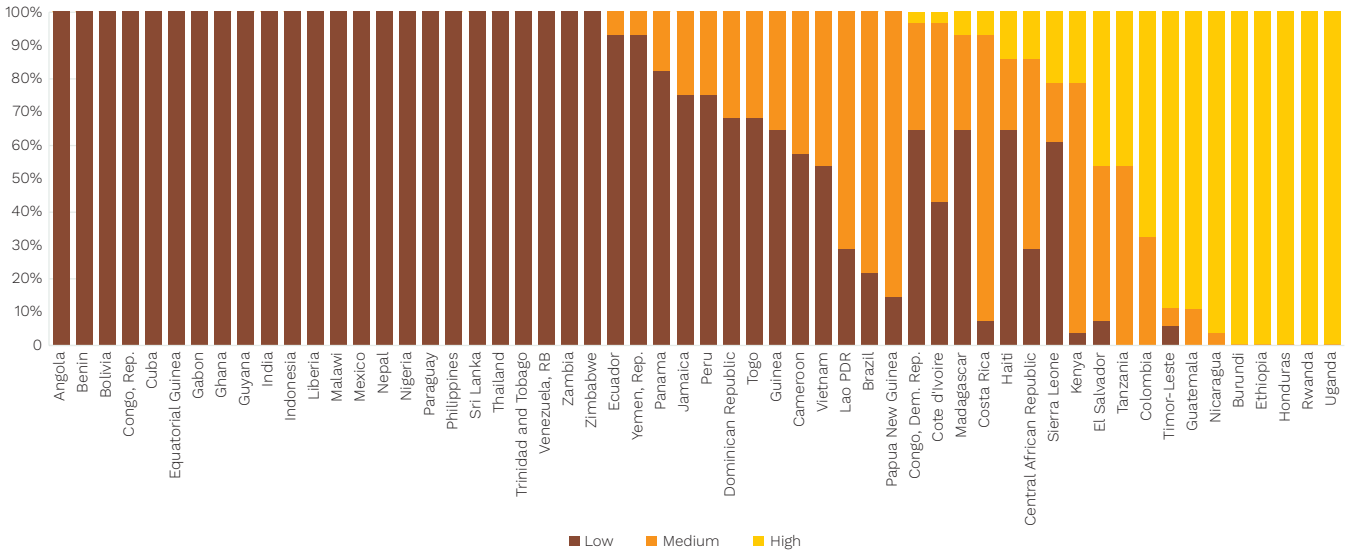
$$Y_{ct} = \alpha + \beta_1 \Delta P_{ct} * LowD_{ct} + \beta_2 \Delta P_{ct} * MedD_{ct} + \beta_3 \Delta P_{ct} * HighD_{ct} + \gamma_i X_{ct} + \delta_t + \rho_c + \vartheta_1 LowD + \vartheta_2 MedD + \vartheta_3 HighD + \varepsilon_{ct} \quad [3]$$

in which the relevant coffee dependence variables are:

$LowD_{ct}$, $MedD_{ct}$ and $HighD_{ct}$ are dummy variables that take value 1 if the country falls in the category Low, Medium or High coffee dependence, respectively in year t, or take value 0 otherwise.

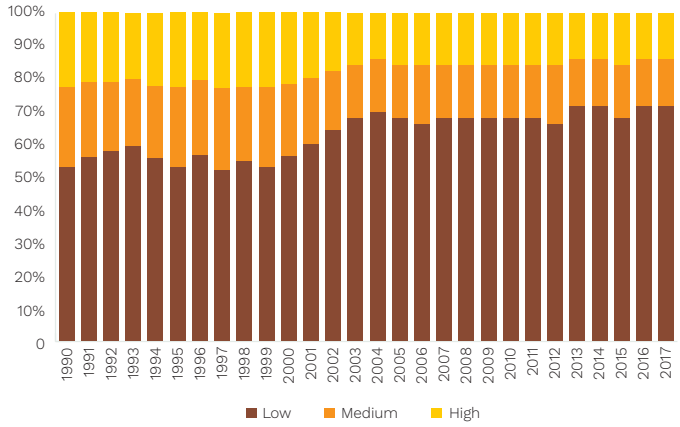
The value of the estimated coefficients β_1, β_2 and β_3, if statistically significant, will indicate the impact of a 1% change in coffee price at each price level.

FIGURE C1 Country classification of coffee export dependence



SOURCE: ICO

FIGURE C2 Share of sample countries classified by coffee export dependency



SOURCE: ICO

ϑ_D are the coefficients that will capture if any unobservable characteristics of, Y_{ct}, the socio-economic indicator, that depend of the level of coffee dependence but does not depend on the annual change in coffee price is statistically significant.

Lagged effects of coffee prices

Since the effect of coffee prices can take some time to be reflected at the macro level for the whole economy and society, we estimate models [1], [2] and [3] with the lagged prices one period (*t-1*). The value of the β coefficients will, then, indicate the delayed influence of changes in coffee prices on the chosen socio-economic indicators.

Results

Table C2 details the estimations of models [1], [2] and [3] for current coffee prices, and Table C3 the estimation of models [1], [2] and [3] for one-period lagged coffee prices.

TABLE C2 Relationship between changes in the price of coffee and socio-economic indicators

	Rural employment-to- rural population ratio (%)			Value Added (Agriculture), Share of GDP in USD(%)			Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)			log of average supply of protein of animal origin (g/cap/day) (3-year average)			log of number of people undernourished (million) (3-year average)			Political stability and absence of violence/ terrorism (index)			GINI index (World Bank estimate)		
Model	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**
Change coffee	2.925+			0.526+			2.065			0.024			-0.011			0.084*			-2.184+		
Price (CCP)	[1.481]			[0.290]			[1.881]			[0.016]			[0.021]			[0.041]			[1.114]		
Price med level		0.128			-0.878+			-1.46			-0.013			0.01			0.026			-0.796	
(80 – 125 c/lb)		[1.194]			[0.481]			[1.532]			[0.024]			[0.039]			[0.063]			[0.767]	
Price high level		-0.692			-1.189			-0.482			-0.034			-0.004			0.062			-1.764	
(Above 125 c/lb)		[2.106]			[0.717]			[2.930]			[0.044]			[0.077]			[0.116]			[1.201]	
CPP * P. low level		5.459			1.598+			-3.224			0.050*			0.015			0.128			-4.509+	
		[5.015]			[0.930]			[2.533]			[0.024]			[0.045]			[0.102]			[2.464]	
CPP * P. med level		8.824*			2.045*			6.624*			0.034			-0.033			-0.01			-0.549	
		[3.493]			[0.776]			[3.142]			[0.049]			[0.070]			[0.156]			[1.559]	
CPP * P. high level		0.692			0.835+			3.796			0.027			-0.018			0.037			-0.766	
		[1.748]			[0.466]			[2.674]			[0.030]			[0.034]			[0.073]			[1.195]	
Coffee medium			-2.501			-0.251			-2.055			0.007			-0.003			-0.078			0.427
dependence			[1.775]			[0.355]			[1.445]			[0.019]			[0.072]			[0.067]			[0.758]
Coffee high			0.42			-0.352			-2.842			0.026			-0.066			-0.263*			0.35
dependence			[2.004]			[0.925]			[2.795]			[0.036]			[0.089]			[0.124]			[1.439]
CPP * low depend.			3.291*			0.428			1.905			0.002			0.018			0.074			-1.525
			[1.585]			[0.371]			[2.113]			[0.017]			[0.030]			[0.055]			[1.232]
CPP * med depend.			0.005			0.881			4.431			0.054+			-0.079			0.037			-3.357*
			[2.027]			[0.831]			[2.702]			[0.031]			[0.061]			[0.095]			[1.356]
CPP * high depend.			2.824			0.456			0.582			0.096*			-0.088+			0.098			-3.360+
			[4.222]			[0.461]			[3.092]			[0.034]			[0.051]			[0.088]			[1.789]
Life expectancy at	0.243	0.245	0.308	0.301+	0.288+	0.296+	-0.144	-0.09	-0.112	0.016*	0.016*	0.016*	0.029*	0.029*	0.029*	0.040*	0.041*	0.039*	0.288	0.265	0.282
birth	[0.543]	[0.553]	[0.515]	[0.156]	[0.149]	[0.162]	[0.604]	[0.609]	[0.606]	[0.008]	[0.008]	[0.008]	[0.011]	[0.011]	[0.012]	[0.019]	[0.019]	[0.019]	[0.264]	[0.270]	[0.263]
Fertility rate	0.901	0.971	0.461	-0.211	-0.357	-0.179	-1.122	-0.724	-1.17	0.028	0.02	0.026	-0.087	-0.088	-0.083	0.203	0.213	0.218	-0.249	-0.444	-0.228
	[3.943]	[4.102]	[4.177]	[1.306]	[1.257]	[1.330]	[3.267]	[3.230]	[3.251]	[0.059]	[0.060]	[0.059]	[0.112]	[0.113]	[0.112]	[0.207]	[0.205]	[0.205]	[1.208]	[1.240]	[1.208]
Average years of	-1.295	-1.756	-1.023	0.162	0.177	0.133	-2.42	-2.133	-2.286	0.03	0.03	0.033	-0.024	-0.025	-0.028	-0.009	-0.009	-0.019	0.829	0.752	0.769
Schooling	[1.542]	[1.471]	[1.506]	[1.194]	[1.183]	[1.270]	[2.465]	[2.344]	[2.536]	[0.037]	[0.036]	[0.037]	[0.072]	[0.072]	[0.071]	[0.139]	[0.139]	[0.139]	[1.097]	[1.090]	[1.118]
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Constant	63.08+	65.09+	58.24+	-3.415	-1.892	-2.942	53.332	45.561	51.991	1.400*	1.465*	1.382*	13.57*	13.59*	13.62*	-3.909*	-3.980*	-3.796+	25.796	28.152	26.094
	[34.97]	[35.69]	[31.98]	[16.25]	[15.54]	[16.84]	[48.09]	[47.70]	[48.5]	[0.637]	[0.635]	[0.647]	[1.052]	[1.028]	[1.058]	[1.904]	[1.874]	[1.904]	[20.97]	[21.82]	[21.08]
N	276	276	276	416	416	415	424	424	424	674	674	673	830	830	829	894	894	893	399	399	399

NOTE: + Significant at 10%, *Significant at 5%, ***Significant at 1%
SOURCE: WB, FAO, PWT, FRED®, ICO.

TABLE C3 Relationship between changes in the price of coffee (lagged) and socio-economic indicators

	Rural employment-to- rural population ratio (%)			Value Added (Agriculture), Share of GDP in USD(%)			Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)			log of average supply of protein of animal origin (g/cap/day) (3-year average)			log of number of people undernourished (million) (3-year average)			Political stability and absence of violence/ terrorism (index)			GINI index (World Bank estimate)		
Model	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**	**[1]**	**[2]**	**[3]**
Change coffee	-0.392			0.729+			-3.806*			-0.005			0.02			-0.05			1.231		
Price (CCP) t-1	[1.374]			[0.355]			[1.763]			[0.016]			[0.021]			[0.065]			[1.068]		
Price med level		1.521			-0.552			-1.26			-0.006			-0.002			0.031			-0.927	
(80 – 125 c/lb)		[1.092]			[0.411]			[1.202]			[0.017]			[0.033]			[0.047]			[0.801]	
Price high level		1.095			-0.884			-1.346			-0.024			-0.011			0.072			-2.528*	
(Above 125 c/lb)		[2.113]			[0.718]			[2.172]			[0.039]			[0.073]			[0.108]			[1.225]	
CPP t-1 * P. low		-1.891			2.840*			2.495			0.027			0.007			0.036			-0.756	
level		[2.689]			[1.285]			[3.180]			[0.029]			[0.061]			[0.151]			[2.064]	
CPP t-1 * P. med		-1.771			0.611			-4.064+			-0.014			0.035			-0.117			1.626	
level		[2.966]			[0.511]			[2.382]			[0.027]			[0.057]			[0.107]			[1.489]	
CPP t-1 * P. high		0.259			-0.052			-5.810*			-0.034			0.026			-0.099+			2.191	
level		[2.046]			[0.460]			[2.432]			[0.024]			[0.020]			[0.054]			[1.311]	
Coffee medium			-2.554			-0.178			-1.087			0.011			-0.005			-0.085			0.117
dependence			[1.773]			[0.391]			[1.288]			[0.018]			[0.071]			[0.066]			[0.800]
Coffee high			0.516			-0.467			-1.815			0.026			-0.066			-0.218			0.226
dependence			[2.096]			[0.950]			[2.599]			[0.037]			[0.090]			[0.135]			[1.163]
CPP t-1 * low dep.			-0.635			0.494			-2.927			-0.026			0.049			-0.044			0.909
			[1.351]			[0.483]			[1.924]			[0.021]			[0.036]			[0.075]			[1.129]
CPP t-1 * med dep.			-1.422			1.349+			-5.234*			0.017			-0.091			-0.07			1.168
			[2.204]			[0.685]			[2.398]			[0.040]			[0.060]			[0.114]			[1.259]
CPP t-1 * high dep.			0.784			1.303*			-3.086			0.070*			0.016			-0.03			4.142*
			[4.420]			[0.450]			[3.021]			[0.030]			[0.038]			[0.100]			[1.539]
Life expectancy at	0.228	0.273	0.292	0.354+	0.327+	0.349+	-0.233	-0.264	-0.214	0.016*	0.016*	0.016*	0.029*	0.029*	0.028*	0.040*	0.041*	0.039*	0.218	0.181	0.219
birth	[0.550]	[0.558]	[0.539]	[0.174]	[0.169]	[0.180]	[0.661]	[0.670]	[0.664]	[0.008]	[0.008]	[0.008]	[0.011]	[0.011]	[0.012]	[0.019]	[0.019]	[0.019]	[0.290]	[0.305]	[0.289]
Fertility rate	0.948	1.01	0.504	0.115	-0.085	0.223	-1.299	-1.241	-1.42	0.028	0.021	0.032	-0.087	-0.089	-0.083	0.204	0.212	0.218	0.034	-0.461	-0.092
	[3.966]	[4.027]	[3.859]	[1.276]	[1.215]	[1.305]	[3.875]	[3.827]	[3.860]	[0.059]	[0.061]	[0.059]	[0.112]	[0.113]	[0.111]	[0.207]	[0.205]	[0.207]	[1.311]	[1.285]	[1.278]
Average years of	-1.386	-1.693	-1.112	0.282	0.264	0.203	-2.329	-2.315	-2.299	0.03	0.03	0.032	-0.024	-0.025	-0.028	-0.009	-0.008	-0.01	0.599	0.473	0.633
Schooling	[1.560]	[1.604]	[1.534]	[1.138]	[1.134]	[1.222]	[2.430]	[2.353]	[2.554]	[0.037]	[0.036]	[0.037]	[0.072]	[0.072]	[0.071]	[0.139]	[0.139]	[0.140]	[1.072]	[1.059]	[1.079]
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Constant	63.85+	62.11+	58.72+	-7.63	-5.13	-7.28	59.56	61.69	58.64	1.392*	1.458*	1.369*	13.58*	13.60*	13.64*	-3.941*	-4.025*	-3.901*	27.303	32.236	27.768
	[35.5]	[36.33]	[33.50]	[17.20]	[16.61]	[18.00]	[52.2]	[52.55]	[52.47]	[0.636]	[0.634]	[0.638]	[1.049]	[1.025]	[1.054]	[1.902]	[1.869]	[1.917]	[22.35]	[23.56]	[22.31]
N	276	276	276	411	411	409	409	409	409	674	674	672	830	830	828	894	894	889	385	385	385

NOTE: + Significant at 10%, *Significant at 5%, ***Significant at 1%
SOURCE: WB, FAO, PWT, FRED®, ICO.

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Notes

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The ICO provides the forum for consultations on coffee matters among governments, and with the private sector.

INTERNATIONAL
COFFEE
ORGANIZATION

222 Gray's Inn Road
London
WC1X 8HB
United Kingdom

Tel: +44 (0)20 7612 0600
Email: info@ico.org
www.ico.org

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