

**PRICE TRANSMISSION IN A DEREGULATED ETHIOPIAN  
COFFEE MARKET**

By

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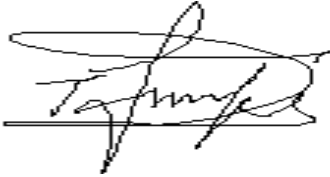
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May 2008

## DECLARATION

I declare that the thesis hereby submitted by me for the PhD degree in Agricultural Economics at the University of the Free State is my own work and has not previously been submitted by me at another university for any degree.

A handwritten signature in black ink, appearing to read 'Tadesse Kuma Worako', written over a horizontal line.

Tadesse Kuma Worako

May 2008

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Tadesse Kuma Worako  
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Department: Agricultural Economics  
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## **ABSTRACT**

Ethiopia's coffee industry has undergone numerous structural changes and deregulation measures as a result of changes in the political and economic landscape of the country since early 1992. The state-controlled marketing system has been replaced with markets run by the private sector. Such changes may have an influence on price transmission, the dynamics of shocks through marketing channels, and the performance of the industry. The principal questions addressed by the study are whether the deregulation of the Ethiopian coffee market has resulted in closer interrelationships among producer, auction and world or FOB prices in the vertically related coffee markets and whether it has improved dynamic interrelationship amongst spatially separated domestic coffee markets. Towards this end, the long-run and short-run dynamics between vertically and spatially related coffee markets were assessed employing the threshold vector error correction (TVEC) modelling approach extending the technique developed by Hansen (1999) to deal with inferential biases occurring as a result of specification errors that have been overlooked till to date by applied studies in the field.

This study attempts to measure both vertical and spatial price transmission in two separate sections. In the first part, vertical price transmission is analysed by considering six separate markets, each of which has producer, auction, and world prices. This includes five major categories of Ethiopian coffee by origin of production (Sidama, Yirgachefe, Jimma, Wollega and Harar) and the national average price as representative of all coffee types in the country. The second part measures spatial price transmission between six selected pairs of spatially distinct local coffee markets. Monthly price data from the Central Statistical Agency and the Agricultural Market Promotion Department in the Ministry of Agriculture and Rural Development, as well as cross-sectional data from the 2006 coffee market survey, are used.

The following salient results were obtained: Firstly, market deregulation in general has induced strong long-run interrelationship between vertically and spatially related markets. Secondly, of the six categories of vertically related market prices in the four groups (Sidama, Yirgachefe, Jimma and national average prices), auction prices are directly affected by world prices (exhibiting dynamic interrelationships) while producer prices are affected by world prices indirectly through auction prices (i.e. weak interrelationship with world prices). Hence the causality flows from world to auction price and then from auction to producer price. In general, producer prices lack direct interrelationship with world prices and are weakly responsive to shocks in world prices, whereas auction prices are highly interrelated with world prices and are responsive to shocks in world prices. Thirdly, in the case of Harar coffee, neither producer nor auction prices show interrelations with world (FOB) prices, which partly accounts for the high concentration of market power and malpractices in the Harar coffee auction and export markets. Fourthly, asymmetries were also found in price transmission where producer prices fell persistently within the equilibrium band from 1998 through 2006 despite unfavourable world prices. This may be partly ascribed to the high local coffee demand, which plays an important price stabilisation role. Fifthly, with regard to spatial price transmission, producer markets located adjacent to each other show clear short-run price dynamics and

integration, while others show weak interrelation. As a result, of the six pairs of spatially separated markets, only three pairs show strong integration while the others do not.

In general, evidence from vertically related market analysis reveals that coffee growers remain segmented from the world and benefit less compared to participants in the auction and export markets. Similarly, most spatially separated local markets either totally lack short-run dynamics or are weakly integrated. This segmentation and lack of short-run dynamics is partly explained by the current organisational structure of the Ethiopian coffee market system where coffee farmers lack strong producer cooperatives, which might enhance their capacity to bargain for a proper share of the market price.

Hence, dismantling market parastatals and deregulation only is a necessary but not sufficient condition for efficient private markets to evolve. In the absence of appropriate infrastructure and institutions at grassroots level, smallholders remain at the mercy of traders. Thus it is important to shift from merely 'getting prices right' to 'getting institutions right' so as to address market failures arising from imperfect information, contract enforcement and property rights, as well as insufficient provision of public goods, in order to improve the lives of primary producers and thereby reduce poverty.

**Keywords:** Ethiopian coffee, market deregulation, price transmission, threshold vector error correction model, nonlinearity, price asymmetry

# **PRYSOORDRAG IN 'N GEDEREGULEERDE ETHIOPIESE MARK**

Deur

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## **UITTREKSEL**

As gevolg van veranderinge op politieke en ekonomiese gebied, het Ethiopië se koffiebedryf sedert 1992 talle strukturele veranderings en deregulasie-maatreëls ondergaan. Die staatsbeheerde bemarkingstelsel is vervang met markte wat deur die privaatsektor beheer word. Sodanige veranderinge kan 'n invloed uitoefen op prysoordrag, die dinamika van skokke deur bemarkingskanale en die prestasie van die bedryf. Die belangrikste vrae wat in die studie behandel word, is of die deregulasie van die Ethiopiese koffiemark gelei het tot nouer onderlinge verhoudinge tussen die produsent, veiling en wêreld of FOB-pryse op die vertikale verwante koffiemarkte en of dit die dinamiese onderlinge verhoudinge tussen ruimtelik verdeelde koffiemarkte verbeter het. In hierdie verband is die lang- en korttermyn- dinamika tussen vertikale en ruimtelik verwante koffiemarkte bepaal deur middel van die drumpel vektor foutregstelling (DVFR) modelleringsbenadering, met uitbreiding van die tegniek wat deur Hansen (1999) ontwikkel is om afleibare onewewigtighede wat mag voorkom weens spesifikasiefoute wat tot nou toe nog nie deur toegepaste studies in die veld raakgesien is nie.

Die studie poog om sowel vertikale as ruimtelike prysoordrag in twee afsonderlike afdelings te bepaal. In die eerste gedeelte word vertikale prysoordrag ontleed deur die oorweging van ses afsonderlike markte, elk met 'n produsent, veiling en wêreldpryse. Dit omvat vyf groot kategorieë van Ethiopiese koffie wat oorspronklik geproduseer is (Sidama, Yirgachefe, Jimma, Wollega en Harar) en die nasionale gemiddelde prys as verteenwoordigend van al die koffiesoorte in die land. Die tweede gedeelte bepaal ruimtelike prysoordrag tussen ses geselekteerde pare van besliste ruimtelike koffiemarkte. Maandelikse prysdata van die Sentrale Statistiek Agentskap en die Afdeling Landboumarkbevordering in die Departement van Landbou en Landelike Ontwikkeling, asook deursnee data van die 2006 koffiemarkopname, word gebruik.

Die volgende opvallende resultate is verkry: Eerstens het mark-deregulasie oor die algemeen sterk, langtermyn- onderlinge verhoudinge tussen vertikale en ruimtelik verwante markte in die hand gewerk. Uit die ses kategorieë van vertikaal verwante markpryse in die vier groepe (Sidama, Yirgachefe, Jimma en nasionale gemiddelde pryse), is veilingspryse in die tweede plek direk deur wêreldpryse beïnvloed (wat dinamiese onderlinge verhoudinge ten toon gestel het), terwyl produsentpryse indirek deur wêreldpryse beïnvloed is deur veilingspryse (d.i. swak onderlinge verhoudinge met wêreldpryse). Daarom die oorsaaklike strominge van wêreld na veilingsprys en dan van veiling na produsentprys. Oor die algemeen het produsentpryse geen onderlinge verhoudinge met wêreldpryse nie en dit reageer swak op skokke in wêreldpryse, terwyl veilingspryse goed verband hou met wêreldpryse en dus reageer op skokke in wêreldpryse. In die geval van Harar-koffie, wys nóg die produsent, nóg die veilingsprys derdens 'n onderlinge verhouding met die wêreld- (FOB) prys, wat deels rekenskap gee van die hoë konsentrasie markkrag en wanpraktyke op die Harar-koffieveiling en uitvoermarkte. Vierdens is ongelykmatighede ook gevind in prysoordrag waar produsentpryse, ten spyte van ongunstige wêreldpryse, vanaf 1998 deur tot in 2006 aanhoudend geval het in die ekwilibriumband. Dit kan gedeeltelik toegeskryf word aan 'n hoë plaaslike aanvraag na koffie, wat 'n belangrike rol speel in prysstabilisasie. Sover dit ruimtelike prysoordrag aangaan, het produsentemarkte wat na aan mekaar geleë is, vyfdens duidelike korttermyn- prysdinamika en integrasie vertoon, terwyl ander swak

onderlinge verhoudinge vertoon het. Daarom het slegs drie paar uit die ses paar ruimtelik verdeelde markte sterk integrasie getoon, terwyl die ander dit nie gedoen het nie.

Oor die algemeen het bewyse van die ontleding van vertikaal verwante markte aan die lig gebring dat koffiekwekers steeds apart van die wêreld staan en dat hulle minder voordeel trek in vergelyking met deelnemers aan die veilings- en uitvoermarkte. Net so is daar 'n totale gebrek aan korttermyn dinamika in die meeste ruimtelik verdeelde plaaslike markte of hulle is swak geïntegreer. Die segmentasie en gebrek aan korttermyn dinamika kan deels verklaar word deur die huidige organisatoriese struktuur van die Ethiopiese koffiemarkstelsel, waar koffieboere mank gaan aan sterk produsente-koöperasies, wat hulle vermoë tot onderhandeling vir 'n behoorlike deel van die markprys kan verhoog.

Die afbreek van mark parastatale en deregulasie, is daarom 'n noodsaaklike, maar onvoldoende toestand om doeltreffende privaat markte te laat ontstaan. In die afwesigheid van toepaslike infrastruktuur en instellings op grondvlak, word kleinboere steeds aan die genade van die handelaars oorgelaat. Om die lewens van primêre produsente te verbeter en daardeur armoede te verminder, is dit dus belangrik om weg te beweeg van blote 'stel pryse reg' na 'kry instellings reg' om aandag te gee aan marksteurings wat voortspruit uit onduidelike inligting, kontrakafdwinging en eiendomsregte, sowel as onvoldoende verskaffing van openbare goedere.

Sleutelwoorde: Ethiopiese koffie, mark-deregulasie, prysoordrag, drumpel vektor foutregstellingsmodel, nie-lineêriteit, prysewewig

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## ABBREVIATIONS

ACPC	Association of Coffee Producing Countries
ADLI	Agricultural Development-Led Industrialization
AMPD	Agricultural Market Promotion Department
CBD	Coffee Berry Disease
CFC	Common Fund for Commodities
CFCUs	Coffee Farmers' Cooperative Unions
CIP	Coffee Improvement Project
CMRT	Coffee Marketing Regulatory Team
CPDC	Coffee Plantation and Development Corporation
CPDE	Coffee Plantation and Development Enterprise
CPWE	Coffee Processing and Warehouse Enterprise
CTA	Coffee and Tea Authority
DBE	Development Bank of Ethiopia
ECEA	Ethiopian Coffee Exporters' Association
ECEE	Ethiopian Coffee Export Enterprise
ECMC	Ethiopian Coffee Marketing Corporation
ECPSE	Ethiopian Coffee Purchase and Sells Enterprise
ECSA	Ethiopian Coffee Suppliers' Association
EPRDF	Ethiopian Peoples' Revolutionary Democratic Front
ETB	Ethiopian Birr (currency)
FAO	Food and Agricultural Organization
FAQ	Fair and Average Quality
FEDE	Federal Democratic Republic of Ethiopia
FOB	Free-On-Board
GIS	Geographical Information System
GoE	Government of Ethiopia
IARC	International Agency for Research on Cancer
ICO	International Coffee Organization

IMF	International Monetary Fund
IRF	Impulse Response Function
JCRC	Jimma Coffee Research Centre
LOP	Law of One Price
MCTD	Ministry of Coffee and Tea Development
MoARD	Ministry of Agriculture and Rural Development
MEDaC	Ministry of Economic Development and Cooperation
NBE	National Bank of Ethiopia
NCB	National Coffee Board
PASDEP	Plan for Accelerated and Sustainable Development to End poverty
PRSP	Poverty Reduction Strategy Paper
SDPRP	Sustainable Development and Poverty Reduction Program
UFS	University of the Free State

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# CHAPTER 1

## INTRODUCTION

---

### 1.1 Background to the study

Ethiopia is known as the birthplace of *coffee Arabica*. Coffee has been and remains the leading cash crop and export commodity of Ethiopia. It has accounted on average for about 5 percent of gross domestic product (GDP), 10 percent of total agricultural production, and 60 percent of total export earnings for the past three to four decades. The sub-sector affects the livelihood of approximately one quarter of the population, providing jobs for farmers, local traders, processors, transporters, bankers and exporters. The various taxes on the crop are also important sources of government revenue (FDRE, 2004). Ethiopia is the seventh largest coffee producer and exporter in the world and the largest in Africa, followed by the Ivory Coast (Côte d'Ivoire) and Uganda, and has been contributing about 3.6 percent of world coffee production and export since 2000 (ICO, 2007).

About 1.3 million farm households produce over 95 percent of Ethiopia's coffee on very small plots of land (Agrisystems, 2001). Farmers in major coffee-producing areas are heavily dependent on coffee income as the main source of their livelihood. In slack seasons when farmers face cash shortages, coffee trees serve as collateral to secure credit from informal money lenders. For these farmers, coffee means not only money in liquid form but also the ability to afford education, healthcare and food. Moreover, coffee production is labour intensive during harvesting and processing and provides an important source of income from casual labour for many poor rural households. Any fluctuation in earning or production affects the welfare of millions of smallholders and their families (Oxfam, 2002).

A large proportion of coffee farmers are experiencing a food deficit and depend on the purchasing of affordable food grains for family consumption while sustaining their livelihood from income generated from coffee sales. The price of coffee relative to that of food grains therefore has a substantial implication for the food security of coffee-producing households. In years with good prices, farmers are able to pay their agricultural credit, government taxes and other obligations from coffee sales and are able to purchase adequate food grains for family consumption. Good prices also have positive spill-over effects when it comes to input use and the consumption of manufactured goods. Conversely, when coffee income fails to cover cash requirements, they sell off their oxen and other assets, rent land or leave their homes in search of work in other places (Oxfam, 2002), which in turn disrupts the social structure and may aggravate the poor status of household food security.

Despite its economic and social importance for the Ethiopian economy, the performance of the coffee sub-sector has remained unsatisfactory. No significant change has occurred for decades in terms of the mode of production and processing. Amongst other things, imperfections in the arena and poor market infrastructure have been cited as major causes of weak performance (IFPRI, 2005). During the era of command economy (1974-1991), the Ethiopian Coffee Marketing Corporation (ECMC), a state monopoly, operated using fixed price arrangements and handled about 80 percent of the entire coffee trade. Private traders were not allowed to get involved in the trading of washed coffee. This was achieved through prohibitive licence fees and other entry barriers. Farmers also had very limited bargaining power to secure a reasonable share of the market price.

According to various researchers who studied the performance of this sub-sector prior to 1992 (Gebremariam, 1989; Mulat, 1979; MCTD, 1987), coffee growers in Ethiopia have historically received a very small share of the export price. They were receiving between 30 and 45 percent of the FOB price, while competitors from Brazil, Colombia, Kenya and India were receiving more than 80 percent of world or FOB prices (CFC/ICO, 2000).

Since 1992, the Ethiopian government – in line with the structural adjustment programs (SAPs) of the World Bank and the International Monetary Fund (IMF), has introduced various deregulation measures for the entire economy, including coffee marketing. In the context of this study, the term ‘market deregulation’ refers to steps taken toward opening domestic and export markets to competition and putting in place public and private institutions consistent with and supportive of private markets. For the coffee market, market deregulation meant removing or reducing government involvement in marketing and production, increasing participation of the private sector based on market forces, and reducing distortions in commodity prices – especially producer prices, privatising government marketing agencies, introducing competition in marketing, reducing explicit and implicit taxes, and so on. Some of the measures implemented by the Ethiopian government to achieve these goals in the coffee industry include the devaluation of the Ethiopian Birr from 2.07 to 5 Birr/\$ in October 1992, foreign exchange auctioning, the removal of entry barriers (Pro. No. 70/1993), the consolidation of all taxes and duties levied on coffee export into a single tax family (Pro. No. 99/1998), abolishment of the quota system at auction, allowing private traders to trade in washed coffees, allowing ‘*akrabis*’ (suppliers) and exporters to sell coffee domestically at market-determined prices, and so on.

These coffee market deregulation measures taken in an effort to open up the domestic and export coffee markets were envisaged to present coffee producers with the ‘right prices’ as a means of stimulating productivity and growth, i.e. bringing producer prices closer to international levels and reducing disincentives emanating from policy and non-policy imperfections at the production and marketing levels. It was hypothesised that market deregulation would improve the transmission of world and auction market price signals to domestic growers, which in turn was expected to improve the supply and quality of coffee (Daviron and Ponte, 2005; Krivonos, 2004; IFPRI, 2003; Ponte, 2002a).

After nearly two and a half decades, however, evidence is mixed. Instead of boosting production, empirical studies show that rapid liberalisation policies resulted in output reduction in many developing and transitional economies (Abdulai, 2000; Chilowa, 1998;

Eicher, 1999; Rashid, 2004). In Africa, only a handful of Sub-Saharan African countries are deemed to have benefited from market deregulation, whilst the vast majority have failed to achieve the expected gains (Mckay, Morrissey and Vaillant, 1997; Rodric, 1999).

In the case of Ethiopia's coffee industry, some positive results were indeed witnessed immediately following coffee market deregulation. These include an increase in the domestic coffee price, an increase in the volume of production and export of coffee (see chapter 4, sections 3-6) and an increase in the number of private participants in the official coffee marketing chain. The positive results with regard to the price of coffee did not last long, however. Following the collapse in the world price of coffee in the early 2000s, the contribution of the coffee industry to the country's economy started to shrink. Its share of the foreign exchange contribution dropped from a historically high 60% to less than 40%, due mainly not to a fall in volume but rather a fall in the value of coffee exports. Moreover, as the anecdotal evidence on the Ethiopian coffee marketing system shows, the prevalence of mounting illicit trade such as smuggling to neighbouring countries, illegal movement of coffee from low-premium to high-premium areas, concentration of power at terminal markets, seemingly false competition, mixing coffee from different origins, traceability problems, and high marketing costs to complete one round of transactions (AMPD, 2006; Petit, 2006) are some of major problems prevailing in the current coffee marketing structure.

In all, while there are promising achievements in certain aspects, very little is known about the performance of the Ethiopian coffee market in the years following the reforms. In other words, there have been hardly any in-depth studies to ascertain whether the market deregulation efforts have fostered competitive marketing channels and whether deregulation has brought about any co-movement of producer, auction, and world or FOB prices.

Therefore, this dissertation evaluates price interrelationships among producers, auction and world or FOB prices using a vertical market relation approach. The latter part also evaluates the spatial integration between major coffee markets in the post-reform period.

## **1.2 Problem statement**

Coffee producers in Ethiopia have historically received a very small share of the export price of green coffee (Gebremariam, 1989; Mulat, 1979; MCTD, 1987). Reasons that are often given for this situation are heavy government intervention and high marketing and processing costs. However, even after substantial reform measures since 1992, improvement in the performance of the coffee sector remains very limited. According to IFPRI (2005) significant constraints to coffee market performance still remain in the coffee marketing chain. Markets remain segmented, there is limited legal recourse for contract enforcement, as well as limited access to finance and modern storage facilities, while marketing margins and transaction costs remain high. The producers' share of FOB price, estimated by the CFC/ICO (2000) for the period 1994-2000, was about 60 percent, with a later estimate by Kuma (2006) for the period 1992-2006 being about 57 percent. On the other hand, producers in competing countries such as Brazil, Colombia, Kenya, Uganda and Vietnam, were receiving 94, 73, 81, 95 and 92 percent respectively during the same period (ICO, 2007).

Prices received by producers and price transmission could be partly affected by large marketing margins that arise due to high transfer costs and market power concentration, which may affect the free flow of information and price signals from downstream to upstream. Some major hindrances limiting spatial market performance include poor roads and networks, poor transport and communication services, restrictive government policies, the behaviour of private market participants, and so on. Some of these limiting factors are briefly depicted in the subsequent section.

The major highland coffee-growing areas in Ethiopia are located at altitudes between 1,500 and 2,000 metres above sea level in the highlands of Kaffa (Jimma), Illubabore, Sidamo, Wollega and Hararge. Consequently, coffee farmers are geographically dispersed in areas with poor road networks and market infrastructure, where they have little access to information on prevailing prices even in the nearby markets. In places where the infrastructure is poor, producers are likely to receive lower prices compared to farmers in more accessible areas (FDRE, 2004). Even with liberalisation, private traders and exporters tend to concentrate their purchases in more accessible areas.

In the current marketing system, coffee goes through several market players (value chain) before reaching the auction market. Small amounts of coffee are produced by many peasants over a wide area. This is then collected at dispersed market centres, where traders assemble these small lots, bulk them up and transport to processing centres, from where it is delivered to the central coffee auction markets of Addis Ababa and Dire Dawa. Eventually exporters purchase the coffee from the auction centre, process it up to international standard and then export to overseas markets. In this process thousands of licensed and unlicensed (illegal) traders and middlemen participate in the coffee marketing chain. As a result, adulteration and traceability become significant problems in Ethiopia's coffee marketing chain.

Adulteration here refers to mixing poor- and good-quality coffee and/or mixing high- and low-premium coffee types from two or more separate coffee-producing areas. Premium coffee is high-quality coffee that fetches above-average prices in local, auction and export markets. Mainly Harrar, Yirgachefe and Sidama coffees are known as premium coffees in Ethiopia as well in the international market. Mixing of high- and low-quality or premium coffee takes place at both primary and auction coffee markets. These in turn has resulted in the critical second-generation problem of traceability of coffee's origin. All these problems stem mainly from a lack of strong institutional arrangements supporting quality-based exchange in the coffee marketing system. At farm-gate level, where primary producers sell coffee to local collectors, there is no system rewarding quality. At

auction, although there is better quality inspection and grading systems in place, several loopholes still remain.

Despite its importance, the current auction market is both static in nature and inefficient in practice, as producers have no direct connection to the market. The auction price is relevant for one day only (spot exchange), which exposes the suppliers (*akrabys*) to substantial price risk, because they purchase coffee on the basis of the current price but with no guarantee that the price will be similar when the coffee is processed and sold. In addition, wholesalers on average have to transport coffee over 300-700 kilometres to the Addis Ababa auction centre, where 90 percent of national coffee exchange takes place. As indicated in chapter five of this study, transportation costs are estimated to account for 30 percent of total marketing costs for both private and cooperative suppliers. These high transportation costs sometimes force growers to seek better prices outside the official channels. According to EDE Consulting for Coffee (1997) the amount of coffee smuggled annually via Djibouti and other neighbours is approximated to be more than 1000MT. In March 2006 the Coffee, Tea, Spice and Cotton Marketing Department of the Ministry of Agriculture and Rural Development estimated the coffee smuggled via Sudan to be about 15% of the total supply from south-western coffee-growing areas.

Furthermore, the current marketing regulations require that all coffee must pass through a central auction market prior to export. Since the Addis Ababa auction centre accounts for over 90 percent of national coffee exchange, in the peak season as many as 150 to 200 trucks have to wait in queues for 3 to 7 days, although by law the Coffee Liquoring Unit (CLU) is supposed complete the quality inspection and grading process within 24 hours of a truck's arrival at the centre. This slow inspection and grading process is mainly due to the auction market's limited capacity to effectively provide the required services. This in turn results in unforeseen costs in relation to trucks, labour and storage.

The removal of entry barriers to the export of coffee in the post-liberalisation period resulted in a significant increase in the number of exporters in the auction market. As a result of limited experience, poor business ethics and low working capital of the

exporters, the suppliers were exposed to unreliable coffee exporters who purchased their coffee by means of post-dated cheques not honoured by banks. This was one of the major scandals in Ethiopia's coffee-exporting history, when suppliers lost about USD 7.5 million – or about Birr 60 million – due to dishonoured post-dated checks (IFPRI, 2005). Although there have been measures put in place to tackle the problem, suppliers remain suspicious of selling their coffee to unknown exporters.

When the premium is expected to be higher than the transport cost, traders illegally transport both red-bean and green-bean coffee from low- to high-premium coffee areas in their respective production seasons. This practice is known as “*kosovo coffee*” in the Hararge zone. It is known as ‘Kosovo coffee’ because the incidence of illegally transporting coffee from other regions intensified around the late 1990s, coinciding with the conflicts in Kosovo and Yugoslavia. Due to these problems, tracing coffee to the farm or even cooperatives is at best impractical and in most cases impossible. Buying coffee to meet specific international buyers’ cupping requirements is becoming extremely difficult.

These issues together cast doubt on the efficiency and effectiveness of the current coffee marketing system in terms of its ability to benefit coffee farmers and to assist in integrating world and local coffee markets.

### **1.3 Objectives of the study**

The overall objective of the study is to assess whether the deregulation of the Ethiopian coffee market has resulted in a closer interrelationship between producer, auction and export (FOB) prices, whether the envisaged benefits have been transmitted to the growers in the post-deregulation period, and whether there is asymmetry in the price adjustments in these vertically related markets. The specific objectives of the study are as follows:

1. To assess the impact of market reform on the performance of the world and Ethiopian coffee industries;

2. To measure the producers' share of the export (FOB) price for each coffee type/origin and to estimate marketing costs;
3. To determine the extent of the vertical transmission of price signals between producer, auction, and the world coffee market – specifically the direction of information flow and price symmetry for six types of coffee categories;
4. To measure the extent of spatial integration of selected producer coffee markets in the post-deregulation period;
5. To present suggestions as to how Ethiopia's coffee marketing system can be improved so as to provide farmers with a reasonable share of coffee income.

## **1.4 Data sources and methodology**

### **1.4.1 Data sources**

This study utilises both secondary and primary data. Secondary data on production, consumption, supply, export, different types of prices (producer, auction and export prices) and exchange rate was collected from the Coffee, Tea, Spice and Cotton Marketing Department of the Ministry of Agriculture and Rural Development (AMPD of MoARD), the Central Statistical Agency (CSA), the Ministry of Trade and Industry (MoTI), the Ethiopian Coffee Auction Market (ECAM), the National Bank of Ethiopia (NBE), the International Coffee Organization (ICO) and others. Producer prices for the period October 1981 to September 2006 were compiled from the CSA's monthly producer price surveys (Bulletins Nos. 44 to 377). Producer prices were also collected from primary cooperatives in major coffee-producing zones with historical price data records. Monthly auction and FOB prices were compiled from unpublished coffee statistics bulletins of the AMPD of MoARD coffee statistics department, compiled for the period 1972-2006. To facilitate the comparison, all price data have been converted into US cents per pound, which is the standard international unit of measurement used by the ICO and others.

Cross-sectional data was collected through coffee market surveys conducted in the five major coffee-growing zones (Jimm, Lekemt, Hararge, Sidamo and Gedio). The survey consisted of two parts: The first part entailed panel discussions with coffee collectors, suppliers, exporters, and related institutions and organisations. The second part of the survey gathered information using structured questions posed to suppliers (*akrabys*) and exporters. A total of 260 suppliers and 28 exporters were interviewed. The questionnaire was designed to gather information on traders' demographic characteristics and experiences, human and social capital, marketing services, intuition, and satisfaction or dissatisfaction with auction market services, with the last part dealing with estimates of direct and indirect costs.

#### **1.4.2 Methodology**

More attention was paid to the selection of the analysis method in this research, because the validity of inference is highly dependent on the selection and proper application of the method, which is also consistent with the data in use. Most of the methods used to answer questions about market integration prior to the 1980s were based on price co-movement (bivariate correlation), which provided little reliable information on market conditions. Since then several studies on the integration of agricultural markets in developing countries have typically relied on cointegration analysis to test whether the price series move together (Baulch, 1997; Dercon, 1995; Shively, 1996). All these methods are based on the assumption of instantaneous price adjustment for deviations from long-term equilibrium.

The omission of transaction costs was a major criticism in prior market integration studies. To address this limitation, several studies have attempted to incorporate the effects of transaction costs into models of price transmission based on work by Tong (1978). The parity-bound (PB) models of Spiller and Wood (1988) and Sexton, Kling and Carman (1991), the endogenous switching model of Baulch (1997), which accounts for multiple regimes (and may result from transaction costs), and the threshold cointegration model of Balke and Fomby (1997), etc. were developed on the basis of unconceivable

transaction costs. These models recognise thresholds caused by transaction costs. According to this modelling approach, deviation must exceed a critical threshold before provoking equilibrating price adjustments, leading to market integration. Threshold effects occur when larger shocks (i.e. shocks above some threshold) bring about different responses than do smaller shocks, meaning that economic agents only act to move the system back to the equilibrium when the deviation from the equilibrium exceeds a critical threshold, whereby the benefits of this adjustment exceed the cost (Abdulai, 2000)

Given the above-mentioned developments of improved modelling, this study merits the utilisation of threshold cointegration methods introduced by Balke and Fomby (1997). In particular, the threshold vector error correction model (TVECM) is employed to account for a neutral band representing transaction costs. The TVECM is a multivariate version of the threshold autoregressive (TAR) models. It allows one to investigate the adjustment process of individual prices and provides more information on short-run price dynamics and the asymmetric adjustment of prices.

In addition, as far as is known, there is only one empirical study – by Krivonos (2004) – that attempted to investigate the impact of coffee market reform on producer price and price transmission, with Ethiopia being included with 13 other countries in the study. This study could be criticised on methodological grounds. Firstly, it assumed that producer price is affected only by the history of its own past and that of the world (i.e. price lags). This assumption fails to consider the roles played by middlemen in determining price. It is believed that failure to account for participants in the auction market might create errors in the specification and overshadow the actual effect of a change in the world price on producer prices, since part or all of the benefits from the change could be absorbed by traders owing to high levels of information asymmetry in the industry. The presence of concentration in the wholesale market cannot be dismissed, which could be a potential hurdle to price transmission and adjustment.

Secondly, Krivonos (2004) estimated a linear error correction model within an autoregressive distributed lag ARDL (1.1) framework. The model assumes that the

adjustment is uniform and continuous, regardless of the size of the shocks. This disregards the possibility that the model in question could be nonlinear. Nonlinearity instigates threshold-type adjustments where shocks greater than some threshold amounts might result in a greater response than smaller shocks.

Thirdly, a problem common to all threshold vector error correction (TVEC) models, which analyse vertical price transmissions, is error in the model specification. Available studies simply assume error variances as being homoskedastic without considering formal tests to validate these assumptions (see Goodwin & Harper, 2000; Serra & Goodwin, 2003). It has also become common practice to use a three-regime TVEC model without checking the data, which could be best captured by a two-regime model (see Goodwin & Harper, 2000; Serra & Goodwin, 2003). These might lead to inferential bias, which warrants attention.

Given the above background and specified weaknesses in the earlier modelling approaches, this study attempts to account for these weaknesses as follows. Firstly, this study considers producers, wholesalers and exporters together as participants in the domestic (intermediary) and export market value chain. Assuming that both producers and wholesalers (*akrabys*) are too small to affect the world price, world price measured on the basis of free-on-board (FOB) price enters the system as an exogenous variable. Secondly, with the objective of addressing specification errors and avoiding their consequences on inference, the TVEC model is applied and recent developments in time series econometrics (e.g., Hansen, 1999 approach) is extended by testing for the presence of heteroskedasticity in error variances and whether a two- or three-regime model best fits the data using techniques developed for threshold autoregressive (TAR) models.

### **1.5 Significance of the study**

Reducing rural poverty is one of the main challenges facing the government of Ethiopia, as it is a common problem for many developing countries. Promoting agricultural intensification is the first step required to transform the subsistence, low-input, low-

productivity farming systems characterising Ethiopian agriculture. However, intensification efforts can be self-sustaining only when supported by market development that secures a reasonable share of value for the primary owners (farmers) of the agricultural product, either for export or for local consumption. In this regard, coffee is a typical example of a commodity that plays an important economic and social role in Ethiopia and in many other developing countries, especially in Africa. Reforms and the process of coffee market reform can affect the lives of millions of smallholder communities – and sometimes the economy as a whole – in a significant way.

This study also has methodological significance for two reasons: Firstly, Ethiopia produces widely differentiated coffee beans with distinctive flavours, in geographically separate regions, which are then individually auctioned and exported. Despite this fact, earlier studies were based on highly aggregated data and analyses, which could also mislead policymakers. This study fills the gap by evaluating the price transmission and market integration of five major coffee types one by one by their origin of production. Secondly, many of the studies were based on price data of short duration, which is inadequate for meaningful analysis in policy recommendations. This study addresses these issues through a two-stage approach. In the first stage, time-series historical price data (Oct. 1981- Sep. 2006) for five coffee types is analysed by coffee region. In the second stage, to evaluate marketing costs and institutional arrangements, the study uses coffee market survey data from coffee farmers and traders, collected from the same regions mentioned above. Even though Ethiopia is known for its coffee, in-depth literature on Ethiopia's coffee sector is very scarce, if non-existent, with the exception of a few scattered reports on donor-funded projects. This study is expected to contribute towards filling the gaps as provided above.

## **1.6 Organisation of the study**

The principal focus of this research is on addressing whether the reform in the Ethiopian coffee market has resulted in a closer relationship between world market prices and local

prices. It also explores marketing costs in the current Ethiopian coffee marketing system. Towards this end there are nine chapters, including the first introductory chapter.

Chapter two reviews the existing literatures on market integration and methods of measuring market integration in order to enable the selection of a model for this study. More specifically it explores factors that prompt market deregulation, objectives of market deregulation, and the theories underpinning market deregulation. It also chronologically reviews methods used to measure market integration and the limitations of each. The final part of the chapter explains the importance of the application of threshold models and the limiting factors in this regard. Lastly it discusses the significance of the threshold vector error correction model, which is identified as a model to be employed for this study.

Chapter three reviews the world coffee economy. Specifically, it briefly discusses the history of the origin of coffee and its importance in the global economy. This is followed by an assessment of the impact of global policy changes (i.e. the collapse of the International Coffee Agreement (ICA), as well as coffee market deregulation in producing countries) on world coffee production, consumption and marketing by coffee-producing as well as non-coffee-producing countries. The final part assesses future options for coffee-producing countries.

Chapter four similarly explores the Ethiopian coffee industry and its importance for the national economy. More specifically, it briefly discusses regulatory and policy frameworks during the past three regimes. It then outlines coffee market deregulation measures undertaken to promote improved performance of the sector and its impact on coffee production, consumption and export in the post-reform period (i.e. 1992-2006). The discussion on coffee marketing explores the performance of the current domestic coffee marketing chain, as well as auction and export marketing and major limiting factors in this regard. The final section evaluates price trends of Ethiopian coffee and compares the quality premium of washed and sun-dried coffee over time.

Chapter five deals with the producer share of the export price of coffee over the past half century (1960-2006). Furthermore, it attempts to compare the export price share of coffee farmers in Ethiopia compared with those in competing countries, and outlines the major stumbling blocks in raising Ethiopian producers' share of export prices to the level received by producers in other competing countries.

Chapter six deals with an explanation of the use of threshold model in general and the application procedures of Hansen (1999) in particular while exploring the relationship and differences in methodological ground of this study compared to earlier ones. There is also a brief discussion of the linearity of a given series, locating threshold and its value, significance of the differences between regimes, speed of adjustment, regime switching, impulse response measuring, as well as testing procedures.

Chapter seven discusses the results of parameter estimates of vertical price transmission, specifically the results of stationarity of single-series, long-run relationships between prices, as well as linearity test results and threshold values, the estimates of TVECM, regime switching, and impulse response function (IRF). The direction of information flow between producer, auction and world (FOB) prices, causes of regime switching, and responses of producer and auction prices to shocks in the world markets shall be discussed.

Chapter eight is deals with a discussion of the results of spatial integration of selected producer coffee markets. The presentation of the results followed the same procedure employed in the chapter seven above.

Chapter nine is devoted to the presentation of the findings and conclusions of the study, based on its objectives.

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## CHAPTER 2

### LITERATURE REVIEW ON PRICE TRANSMISSION AND MARKET INTEGRATION

---

#### 2.1 Introduction

The principal objective of this chapter is to review literature on agricultural commodity market deregulation, price transmission and market integration before deciding on an appropriate modelling framework based on the existing theories and literature. Towards this end, theories of market integration, relevant studies on vertical and spatial price transmission and measures of market integration are reviewed in chronological order. The final part features a discussion of the advantages of applying the threshold vector error correction (TVEC) model, which has been selected for application in this study.

##### 2.1.1 Factor-driven market deregulation

It has been typical for the governments of developing countries to isolate domestic agricultural markets from world price movements through either direct tax and subsidy mechanisms or quantitative restriction, thus shifting resources from sectors possessing comparative advantage to sectors that do not (Akiyama, 2001). In the 1950s and 1960s governments of many developing countries frequently pursued policies that taxed agriculture in order to promote industrial development. This approach was supported by the developmental theory viewpoints of the 1950s and 1960s (Lewis, 1954). In addition, the arguments of Prebisch (1949) and Singer (1950) that the terms of trade of commodities had been declining and would continue to do so over time encouraged discriminatory policies against agriculture in order to more quickly shift resources out of agriculture.

Intervention garnered support for practical and political reasons as well. The systems often proved useful for collecting taxes and providing political patronage (Bates, 1981). Indeed, for some countries, taxing commodity exports proved to be the most convenient and practical way to support the state budget in order to provide financial benefits to the urban elite who were important allies for politicians (Bates, 1981).

Coffee is a prime example of such a case of intervention mentioned above. The governments of many coffee-producing countries, especially in Sub-Saharan Africa (SSA), long considered the state control of marketing and pricing systems necessary due to coffee's importance as a source of foreign exchange and government revenue. Latin American coffee producers such as Brazil and Colombia controlled prices and exports even before World War II in order to raise world prices (Akiyama, 2001). Towards this end, in 1962 the International Coffee Organization (ICO) was established to monitor an international quota system.

However, the results of intervention were not promising, with numerous studies in the early 1980s discussing and quantifying the harmful effects of the above policies in developing as well as industrial countries (Stiglitz, 1987; Tyers & Anderson, 1992; World Bank, 1985). These studies revealed that many developing countries were facing severe economic crisis – unsustainable budget, current account deficits, high and unstable inflation, distortionary prices, inefficient parastatals, and a narrow export base. In addition, a sharp decline in the world coffee price and the collapse of the ICO quota system in 1989 triggered financial problems in many coffee-exporting countries. These inescapable difficulties were primary causes for the instigation of coffee market deregulation in many coffee-producing countries.

### **2.1.2 Objectives of market reform**

During the late 1980s and early 1990s, many developing countries initiated market deregulation measures under structural adjustment programs (SAPs), often with the assistance of multilateral lending institutions. This market deregulation had profound

ramifications for the role played by government and the private sector, and hence all institutions related to agriculture. Generally, market reforms are intended to boost an economy's efficiency, i.e. to enhance the productivity of human talents and physical assets. In turn, these improvements in efficiency are expected to generate growth that improves the lives of many and especially the rural poor. In other words, reform has meant a greater reliance on market forces to direct resources and future investments instead of on government rationing (World Bank, 2002). The ultimate aim is to elicit an expansion of exports that will increase foreign exchange earnings and reduce the current account deficit, thus contributing to macro-economic stabilisation and benefiting producers through improved transmission of price incentives.

For commodity markets, market deregulation has meant reducing government involvement in marketing and in production, increasing participation of the private sector in these activities, and reducing distortions in commodity prices – especially producer prices. Measures implemented to achieve these goals have varied, but often they have included the elimination or privatisation of government marketing agencies, the introduction of competition in marketing systems, the elimination of administered prices, a reduction in explicit and implicit taxes, the devaluation of local currencies, and the privatisation of government-owned assets.

The removal of distortionary price and trade policies is also consistent with economic theory that postulates that the proper functioning of markets and marketing channels is essential for the optimal allocation of resources. This theory centres on “getting prices right” by means of exchange and price controls. The objective of getting prices right is to create competitive markets where buyers and sellers are well coordinated, together with low transaction costs, enforceable contracts, manageable risk, impersonal exchange, dampened price volatility, and ultimately benefits for the poor by moving domestic prices closer to international ones, thereby benefiting producers (Gabre-Madhin, 2003).

The objective of benefiting smallholder producers through market deregulation is one of the most important agendas. As in the case of most agricultural commodities, coffee

growers in many producing countries historically received a very small share of the export price of green coffee (Krivonos, 2004). One reason often mentioned in the literature is heavy government intervention in the sector. Government regulation of domestic markets in the form of fixed producer prices and the monopolistic power of marketing boards that place a substantial wedge between producer prices and the world price of coffee result in a wide price-spread between world price and producer price. Efforts in respect of market deregulation are expected to improve the flow of price incentives by removing barriers in the marketing system.

As stated by the International Food Policy Research Institute (IFPRI, 2005) small farmers are one of the more disadvantaged and vulnerable groups in the developing world, since half of the world's undernourished people, three-quarters of Africa's malnourished children, and the majority of people living in absolute poverty can be found on small farms. If the United Nations' millennium development goals for poverty and hunger are to be achieved, governments and development assistance groups need to shift their attention to developing agriculture in general and strengthening small farms and marketing in particular. However, given the current infrastructure and general capacity of the governments of developing countries, it is highly difficult to perceive that smallholders will be able to become competitive in the global market. Temu, Winter-Nelson and Garcia (2001) expressed their concern that recently liberalised commodity markets relying on the institutions and organisations developed to facilitate trade during the period of state control are less likely to fit into the new market-oriented environment.

Daviron and Ponte (2005), in their study on the so-called "coffee paradox", indicated the coexistence of a 'coffee boom' in consuming countries and a 'coffee crisis' in producing countries. In consuming countries, coffee has become a fashionable drink, and coffee-bar chains have expanded rapidly. At the same time, international coffee prices have fallen dramatically and producers are receiving the lowest prices in decades. Their findings on the coffee paradox show that what the farmers sell and what the consumers buy is becoming increasingly 'different', with the prices becoming more widespread. It is not material quality for which contemporary coffee consumers pay – it is mostly symbolic

quality and in-person service. They concluded that as long as coffee farmers and their organisations do not control at least parts of this 'immaterial' production, they will keep receiving low prices.

With these general realities behind reformed markets, it is important to assess how policy reforms have affected the domestic marketing of export crops, such as coffee, which make up a large share of Africa's commodity export earnings. In such evaluative instances of performance effectiveness in deregulated markets, the analysis of price transmission between different levels of markets provides information on the extent of market functioning. Mostly, the response of producer prices to changes in international prices within deregulated commodity marketing systems is fundamental to understanding its effectiveness.

## **2.2 Theory and concepts of price transmission**

Price transmission is the degree to which market shocks are transmitted up and down the marketing chain and across spatially or vertically distinct markets. It has long been considered an important indicator of market performance. In other words, the extent to which a price shock in one market affects a price in another market can broadly indicate whether efficient arbitrage exists in the space that includes the two points. As indicated by theories of market integration there are two extremes, namely a full transmission of price shocks indicating the presence of a frictionless and well-functioning market, and at the other end an assumption of total absence of price transmission or market segmentation that may make the very existence of a market questionable. In most cases, the reality lies somewhere in between. Therefore, the degree of price transmission can provide at least a broad picture of the extent to which markets are functioning in a predictable way and price signals are passing through consistently between different markets (Rapsomanikis, Hallam & Conforti, 2004). For this very reason, the analysis of price transmission has attracted a considerable amount of theoretical and empirical work.

The underlying issue when analysing the impact of agricultural market reform in developing countries is the extent to which domestic agricultural commodity markets respond to shocks in international market prices. Price transmission from the world to domestic markets is vital in understanding the level of the integration of economic agents into the market process. A very large volume of the literature has examined price transmission in agricultural commodity markets (Conforti, 2004; Goodwin & Holt, 1999; Meyer & Von Cramon-Taubadel, 2004; Woldegebriel, 2004). Much of this literature has been concerned with vertical, spatial and temporal price linkages.

### **2.2.1 Vertical price transmission**

Vertical price transmission (VPT) refers to the transmission of price shocks at different stages of the marketing chain (e.g. prices at farm-gate, wholesale and retail level) for transformed products. Vertical price linkage is often considered to be relevant to the study of market structure, conduct and performance (Goodwin, 2006; Meyer, 2004). In particular, the extent to which shocks at one level of the market are realised at the other market levels is often taken as an important indicator of the existence of market power. Of course, price is the primary mechanism whereby various levels of the market are linked. The extent of adjustment and speed with which shocks are transmitted among producer, wholesale and retail market prices is an important factor reflecting the action of market participants at alternative market levels.

The analysis of vertical price transmission allows one to better understand the overall functioning of the market. The extent to which shocks are transmitted between different levels of the marketing chain, and the rate at which this happens, can have important implications for pricing practices and may reflect the level of competition in the market. In a competitive market with perfect information, price changes at one market level will usually result in changes at other levels. Market efficiency often suggests an equilibrium relationship between prices at different levels of the marketing chain. Some authors have hypothesised that the long-run relationship between prices may be asymmetric (Bailey & Brorsen, 1989; Goodwin & Holt, 1999; Kinnucan & Forker, 1987; Ward, 1982). This

may occur if middlemen in the marketing chain pass input price increases on to customers more quickly and completely than they do input price reductions (Goodwin & Holt, 1999; Serra & Goodwin, 2003).

The study of vertical price transmission among various levels of the agricultural commodity and food market has recently gained special importance in economics literature. The attention devoted to these analyses can be explained mainly due to progressive concentration, which has been occurring both in the commodity and food industry and in the distribution sector. This concentration may modify the competitive positions of different economic agents participating in the market and may alter price transmission processes, which in turn have an effect on producers and consumers (Serra & Goodwin, 2003).

As stated by Meyer (2004) the extent of markets' adjustment for shocks has important implications for marketing margins, speed of adjustment and mark-up pricing practices. Three aspects of vertical price transmission have been of particular importance in the applied literature; i.e. the extent of adjustment (the extent of the response triggered by a shock of given size), the speed or timing of adjustment (whether there is a significant lag in adjustment), and the extent to which adjustments are asymmetric (whether positive shocks trigger different shocks than negative shocks). The speed of price adjustment refers to the speed of price transmission, i.e. how many days, weeks or months are needed for prices to be transmitted from one market to another.

The transmission of price signals may not be similar to the textbook theory of 'law of one price' – rather it might be asymmetric. Asymmetric price transmission occurs when the response of one market to positive and negative shocks in another related market is not similar in magnitude and direction. In other words, downstream prices may react to change in a different manner than upstream prices. Sexton, Kling and Carman (1991) summarise three factors that may contribute to a lack of market integration. Firstly, the markets are not linked by arbitrage, i.e. they represent autarkic transaction costs that are prohibitive in relation to price differences or due to public protection. Secondly, there

may be impediments to efficient arbitrage, such as trading barriers, imperfect competition, or risk aversion. Thirdly, there is imperfect competition in one or more of the markets, probably arising from collusion among traders or preferential access to scarce resources (e.g. credit, transport, storage, communication) that may result in higher price differences between markets that can be attributed to transaction costs. Similarly, Fafchamps (1992) specifies the major factors that determine the magnitude of transaction costs, including the quality of physical and facilitative marketing infrastructure, as well as market information.

Recent research has focused on the potential asymmetry for price adjustments. In particular, it is often argued that positive shocks at one level of the market may elicit different responses at other levels. Peltzman (2000) notes that most standard theoretical models that examine market linkages do not incorporate factors that would explain the existence of asymmetric responses. He concludes that theoretical models that fail to incorporate the issue of price asymmetry are incomplete or invalid. Hence, identifying the causes of price differences in interregional or spatial markets has therefore become an important economic analytical tool for better understanding markets.

According to Meyer and Von Cramon-Taubadel (2004) asymmetric price transmission has considerable importance: Firstly, it points out gaps in economic theory, and secondly it could have important welfare and policy implications – for instance, if producers are not benefiting from a price increase in the world market and consumers are not benefiting from a price reduction or sellers from a price increase. Hence, asymmetric price transmission implies a distribution of welfare different to what would be achieved under symmetry, because it alters the timing and size of welfare changes associated with price changes.

Meyer (2004) indicates that to date, much of the substantial literature on APT has concentrated on statistical issues while neglecting the economic relevance thereof and the underlying causes. Furthermore, authors rarely attempt to translate their statistical results into practical economic terms. For example, papers in the literature rarely calculate just

how much processors have actually benefited from what appears to be a failure to pass on input price reductions. Therefore, a considerable need for further research remains and it is premature to draw far-reaching conclusions on theory and policy. Peltzman (2000) allows APT to be classified as either positive or negative. If domestic price reacts more fully or rapidly to an increase in world price than to a decrease in world price, the asymmetry is termed positive. Correspondingly, negative asymmetry denotes a situation in which domestic price reacts to a decrease in world price more fully or rapidly than to an increase in world price.

A commonly cited source of asymmetric price response is market power or non-competitive market structure (Scherer & Ross, 1990). Oligopolistic middlemen in agricultural markets might react collusively more quickly to shocks that squeeze their marketing margins than to shocks that raise them, reducing asymmetric short-run transmission – i.e. along production chains some agents may behave as price makers and others as price takers, depending on the degree of concentration of each industry. For instance, an input price increase in an industry may be passed over to consumers, while an input price decrease can be captured in the mark-ups of the industry (Azzam, 1999; Goodwin & Holt, 1999; Wohlgenant, 1999), especially in agriculture where farmers at the beginning and consumers at the end of the marketing chain suspect that imperfect competition in the marketing of raw products, processing and retailing allows middlemen to use market power (Kinnucan & Forker, 1987).

The role of inventories as a source of asymmetric price response is also well documented in the literature (Blinder, 1982; Meyer, 2004). Commodity price changes often send signals to inventory holders, leading to either the accumulation or the release of stock. The anticipation of price increases in the wholesale or world markets in the next period creates an incentive for traders to increase their stock holdings by buying large quantities of a given commodity at the present date. The increased supply from inventories in the local market puts downward pressure on prices so that they do not rise as much as they would in the absence of inventories. If, on the other hand, central market prices are expected to decline, there is an incentive for producers to reduce their inventory holdings,

which tends to moderate the initial downward pressure on the local market prices in the next period. In either event, current local market prices will not adjust fully to a change in the current central market prices (Wohlgenant, 1999).

Kovenock and Widdows (1998) point out that if input cost changes are perceived as temporary, then the menu costs that are likely to arise may serve as an incentive not to adjust prices when input costs decrease. These costs may result from the re-pricing of goods and the informing of salespeople and customers. The presence of search costs in locally imperfect markets is also frequently cited as a reason for asymmetric price adjustment in commodity markets (Blinder, 1982). In many areas firms may enjoy local market power due to a lack of similar firms in the neighbourhood. As a result of search costs, customers of these firms may not be able to acquire complete information about prices offered by other firms, although they face a finite number of choices. Under these conditions, firms can raise their prices quickly as prices in the central markets increase, and lower them slowly in response to price reductions in the central market. According to Conforti (2004) increasing returns to scale in production may be the origin of market power, because this enables a firm to produce at low cost. Similarly, product homogeneity and differentiation may also be considered causes of market power. The degree of substitutability in consumption between similar goods produced in different countries may affect market integration and price transmission.

### **2.2.2 Spatial price transmission**

Spatial price transmission (SPT) is the degree to which price shocks tend to be transmitted across spatially distinct but similar product markets. The price relationships between these markets are generally analysed within the framework of the spatial price equilibrium theory developed by Enke (1951), Samuelson (1964) and Takayama and Judge (1964). The key assumption underpinning spatial price equilibrium theory is that price relationships between spatially separated competitive markets depend on the size of transaction costs. It is based on the 'law of one price' (LOP), which postulates that price transmission is complete, with equilibrium prices of a commodity sold on competitive

foreign and domestic markets differing only by transfer costs when converted to a common currency. In other words, in very competitive systems, spatial arbitrage should lower the price difference between markets to the level of transaction costs. These models predict that changes in supply and demand conditions in one market will affect trade, and therefore prices in other markets adjust instantly through spatial arbitrage.

According to Tomek and Robinson (1990) price is the primary mechanism whereby different levels of markets are linked, and hence the analysis of price transmission enables a better understanding of the overall functioning of the market. In a competitive market with perfect information, price changes at one market level will usually result in changes at other levels. Spatial price transmission is determined largely by transfer costs between regions, provided competitive conditions prevail. Transfer costs consist of transportation and handling costs, fixed costs, and unmeasured transaction costs – for example, the cost of time spent identifying and negotiating transactions, risks associated with opportunistic behaviour of trading partners, contract monitoring, and enforcement (Gabre-Madhin, 2003; Penzhorn & Arndt, 2002).

The underlying theoretical assumption is that under competitive market conditions and in the absence of trade barriers, the price differentials that could prevail between trading areas are less than or equal to transport costs. The basis of this assumption is that if the price difference between two markets exceeds transfer costs, the buyer would be motivated to purchase and transport commodities from areas with low prices (surplus region) to those with high prices (deficit regions). This would eventually cause price increases in the surplus regions and price decreases in the importing regions at a level at which price differences no longer exceed transfer costs (Tomek & Robinson, 1990). This sustained effort by market participants to exploit arbitrage opportunities can result in the maintenance of equilibrium relationships among commodity prices in distant markets. However, even though the absolute price difference is greater than the transport cost, the existence of impediments (infrastructure, policy barriers, lack of market-supporting services, etc.) may block the free flow of agricultural products between two markets, indicating a lack of perfect market integration (Baulch, 1997).

### **2.2.3 Temporal price transmission**

Temporal price transmission (TPT) involves patterns of price behaviour over time. Such behaviour includes seasonal patterns of change, as well as year-to-year fluctuations, trends and cycles. This is due to the fact that prices observed over time are the result of a complex mixture of changes associated with seasonal, cyclical, trend and irregular factors. The most common and regularly observed pattern of change in agricultural prices is the seasonal pattern of change. Normally, prices of storable commodities are lowest at harvest time and then rise as the season progresses before reaching a peak prior to the next harvest (Tomek & Robinson, 1990). For instance, coffee prices are usually low at the beginning of the crop year and then start to increase before reaching their peak, and then they begin to fall when the next round of production starts. However, changes in government policy and the occurrence of drought or frost in Brazil, for example, can create irregular movements that are impossible to forecast.

## **2.3 Empirical studies on commodity market integration**

In this subsection some of pertinent studies on commodity market integration and their findings shall be explored.

### **2.3.1 Studies on market integration elsewhere**

Several previous studies have investigated the responsiveness of domestic prices in developing countries to fluctuations on the world commodity markets. The evidence of the relationship between world market prices and domestic prices has been mixed. The estimates of the elasticity of transmission from border to domestic markets seem to be highly sensitive to the methodology applied.

Most of the earlier studies on market integration relied on correlation between prices in the pairs of the regions (e.g. Richardson, 1978), while later studies considered the correlation of price differences (Stigler & Sherwin, 1985). Hein (1980), in his study on

price transmission, considered the transmission from free-on-board (FOB) to retail prices. Using a simple dynamic time series model he tested his mark-up hypothesis using Granger causality tests. His results indicated that retail prices responded to FOB price shocks, but that FOB prices did not respond to retail price shocks. In other words, the direction of causality ran from wholesale to retail markets, but not the other way round.

In view of advances in time series analysis, recent efforts dealing with spatial price transmission have focused on the integration between prices in the different markets using the cointegration technique (e.g. Aldeman, 1993; Alexander & Wyeth, 1994; Dercon, 1995). The cointegration approach is based on the fact that deviation from equilibrium conditions for two non-stationary variables should be stationary. A significant implication is that, while individual price series may wander extensively, certain pairs do not diverge from one another in the long run (Aldeman, 1993).

Hazell, Jaramillo and Williamson (1990) examined whether the volatility in world market prices had been passed through to producer prices in developing countries. The authors used data from 22 developing countries over the period 1961 to 1987 to test whether price instability had increased over time and whether fluctuations in domestic markets had followed the variability of the world prices. The methodology involves obtaining the residuals from a trending price regression and regressing their absolute values on the time component to test whether variability has increased over time. The authors found that while variability in world prices had been transmitted to developing countries in the dollar value of their export unit values, it had not been fully transmitted to average producer prices, and they thus concluded that in addition to trade restriction, exchange rate misalignment or domestic distortions had been responsible for discrepancy between domestic and world prices.

Mundlak and Larson (1992), in a study covering 58 countries for the period 1968-1978, concluded that most of the variations in the world prices are transmitted and that they constitute the dominant component in the variation of domestic prices. They employed the error-correction model to estimate the relation between two price-time series. Unlike

the static framework, the error-correction model includes a dynamic component that captures the effect of adjustment of the dependent variable when it deviates from its long-term equilibrium level. Quiroz and Sota (1996), on the other hand, using a sample of 60 countries for the period 1968-1991, concluded that in the overwhelming majority of cases, the transmission of international price signals in agriculture is either very low or non-existent.

Baffes and Gardner (2003) also used the error-correction model to estimate the responsiveness of domestic prices to fluctuations on the world market. The authors analysed price transmissions for 10 commodities on a country-by-country basis for the period mid-1970s to mid-1990s. Again, estimation of price adjustment suggests that changes in world prices account for only a small share of the variation in domestic prices. Taking things one step further, the authors assessed whether policy reforms under structural adjustment programmes improved price transmission, with structural breaks introduced corresponding to the years of substantial market reforms. Their results showed that in most countries the reforms had a very limited effect on price transmission. Of the thirty-one country-commodity cases, only six showed closer integration with the world market following the reform.

Morisset (1997) examined in more detail the growing spread between world and domestic commodity prices in consuming countries for the period 1975-1994 and evaluated the losses to developing countries caused by this spread. He found that the gap had widened over time due to the asymmetric response of consumer prices to movements in world prices; that is, while upward movement in world prices was clearly passed on to domestic prices, downward movement was not. This means that throughout the period examined, the increases in world prices had been passed on to consumers more fully than price decreases, causing a loss of over \$100 billion a year in export earnings for developing countries. Coffee is the sector that is characterised by the greatest price asymmetry.

Fafchamps, Hill and Kaudha (2003), examining the transmission of international coffee prices through the domestic value chain, with coffee growers, traders and exporters as

main market participants, found that fluctuations in international prices are not fully reflected in the prices actually received by coffee farmers. According to them, this apparent lack of price transmission may be attributed to the fact that producers are more likely to sell at the farmgate rather than at the nearest market when prices go up, thereby lowering the price they actually receive. More frequent selling at the farmgate is consistent with a higher presence of itinerant traders purchasing coffee from farmers when prices increase. In contrast to producer prices, the prices paid by large coffee traders and exporters track the international prices relatively closely, which suggests a fairly smooth and competitive operation of the liberalised coffee value chain from larger traders to exporters.

Temu *et al.* (2001), in their study on Tanzanian coffee market liberalisation, expressed the view that private traders have been unable to function effectively due in part to inadequate facilitating institutions, regulations and infrastructure. In the case of Tanzanian coffee, liberalisation has resulted in the backward integration of coffee exporters into domestic coffee trading, but has not altered the processes and regulations of the Tanzanian Coffee Board Auction, which governs the export of coffee. They employed simple price elasticity as proxy for price transmission measures and concluded that the success of domestic market liberalisation in the agricultural recovery of developing countries in Africa depends on the ability of institutions to evolve and perform as the market structure changes, although this has not happened in practice in most of the developing countries. Institutions and organisations that arose during the state-dominated marketing period still govern and have been slow to adjust to the new environment. In the case of Tanzania, coffee market reform brought about changes in the market structure, but not changes in the formal process of institutions guiding the marketing process.

Winter-Nelson and Temu (2002), using survey data on producers and traders, studied the impact of liberalisation on institutional adjustment and transaction costs using descriptive methods. They found that liberalisation had reduced costs in output exchange, but increased costs in input marketing, thus limiting access to finance. They concluded that

market liberalisation enhances agriculture only if it reduces the costs associated with producing output and moving it from farm to final market. Whereas most of the attention has been focused on reducing margins associated with output exchange, marketing costs must be reduced throughout the entire commodity system if liberalisation is to yield benefits. Moreover, price policy reform is institutional reform and its success depends on the capacity of organisations to reduce their transformation and transaction costs.

Akiyama (2001) assessed the success and failure cases of coffee market reform efforts in Africa, finding that reform efforts have significantly altered the structure of marketing institutions and significantly shifted political and economic power from the public to the private sector. He also revealed that in cases where interventions were greatest and reforms most complete, producers have benefited from receiving a larger share of export prices. While there are significant costs associated with market-dependent reforms, experience suggests that reform measures are a necessary step toward a dynamic commodity sector based on private initiative.

Bettendorf and Verboven (2000) attempted to explain the incomplete transmission of coffee-bean prices to consumer prices. They adopted and estimated an aggregate model of oligopolistic interaction, finding that demand and cost parameter estimates are consistent with conventional wisdom in the industry. Their results mainly imply that the relatively large share of costs other than bean costs accounts for the greater part of the incomplete price transmission.

### **2.3.2 Studies on market integration in Ethiopia**

Empirical literature on Ethiopia's coffee sector in general and on price transmission in particular is very scarce, if non-existent, with the exception of a few unpublished studies on the supply response of coffee (Amme, 1995; Shibr, 1998) and descriptive donor reports (Negewo, 1993; IFPRI, 2003). Some sector-related literature is discussed below.

Dercon (1995) attempted to analyse the effects of liberalisation and the end of civil war on food market integration in Ethiopia by employing a modified cointegration analysis approach – nesting proportional and constant marketing costs to a standard cointegration model and using monthly price data from July 1987 to September 1993. In his study based on the *teff* market, which is the main staple food in Ethiopia, he concluded that market liberalisation increased the price paid for *teff* in the main producing area and improved the functioning of markets through increased short-run integration.

Negassa (1998) assessed the vertical and spatial integration of the grain market in Ethiopia at individual market level and for groups of markets that are spatially linked – i.e. the nature of the relationship between producer, wholesale, and retail prices in individual markets and between different markets. He employed both descriptive and standard econometric tests for price spreads and price transmission, with the results indicating that the grain market in Ethiopia exhibits a high degree of vertical and spatial price transmission.

Krivosos (2004) evaluated the impact of coffee sector reforms during the late 1980s and early 1990s on coffee producer price transmission by selecting thirteen major coffee-producing countries (including Ethiopia) and employing the Autoregressive Distributed Lag (ARDL) model to evaluate whether there was cointegration between world and producer price. The results showed that in most countries the long-term producer price share had indeed increased substantially following liberalisation. Moreover, his results suggested that the reforms had induced a closer cointegrating relationship between grower prices and world market prices. He finally estimated an error-correction model that revealed that the short-run transmission of price signals from the world market to domestic producers had improved as such that domestic prices were adjusting more rapidly to world price fluctuations after the reforms than they did prior to the reforms. On the downside, he pointed out that negative price shocks were being transmitted faster in the post-reform period compared to pre-reform period. However, any recommendations on national price transmission that are based on a price that is too aggregate is misleading, because in countries like Ethiopia the coffee of one region differs from that

of another in respect of several factors (e.g. flavour and other quality factors), which clearly affects price transmission.

Petit (2006) attempted to evaluate the future of Ethiopia's coffee sector using a simple descriptive approach. He tried to identify the best policy option to improve the performance of the sector so as to yield benefits for the government and coffee-farming households. The researcher argues that despite limited room to manoeuvre, Ethiopia has not yet fully exploited its position as a producer of some of the best coffees in the world. He points out that Ethiopia has a number of competitive advantages that may still be seized if quality and consistency are guaranteed.

In general, rigorous studies on commodity market policies and market integration are very limited. Most of them are based on descriptive analysis or standard time series methods (OLS estimation, cointegration and error correction) using annual data with very limited observations.

## **2.4 Measures of market integration**

The previous sections discussed the drive of market reform, theories of price transmission and seminal empirical works. The subsequent section reviews, in chronological order, the major measures of market integration that have been developed to date.

### **2.4.1 Bivariate correlation approach**

One simple way to study market integration is to consider the correlation of the price series of two markets at a time. This is intuitively related to the idea that integrated markets exhibit prices that move together. Earlier studies on market integration relied on correlation between prices in the pairs of regions (e.g. Diakosavvas, 1995; Richardson, 1978). Bivariate Correlation Coefficient (BCC) is the simplest tool employed to measure price relation between local and central markets. The coefficients indicate the strength of the relationship between the series. A low correlation coefficient is an indicator of weak

integration or non-integration of the markets. According to the cut-off points of Goetz and Weber (1987) a correlation coefficient above 60 is an indicator of a strong connection or integration, while a coefficient between 20 and 60 shows a weak connection and a coefficient below 20 shows no connection between the markets under consideration. Later studies considered the correlation of price differences rather than their use at a particular level (e.g. Stigler & Sherwin, 1985).

Price correlation is a relatively simple way to measure market integration; however, this approach later recognised serious methodological flaws. Firstly, price correlation assumes instantaneous price adjustment and cannot capture the dynamic nature of marketing systems (e.g. Ravallion, 1986; Sexton *et al.*, 1991). Secondly, it is possible that price correlation might suggest spurious market integration, because prices may tend to move together for reasons other than market integration, such as common trends, common seasonality, and monopoly price fixing, etc. (Delgado, 1986; Harris, 1979). Thirdly, price correlation tests may also overestimate the lack of market integration if a lag in market information produces a lag in the price responses between markets (Barret, 1996). Fourthly, bivariate price correlation considers only a pairs of markets at a time and cannot be used for evaluating a marketing system as a whole (Delgado, 1986). Finally, the coefficient indicates only the association between the two price series and does not indicate causation. In order to overcome the weakness of bivariate correlation tests, various alternative methods have been developed (e.g. Delgado, 1986; Engle & Granger, 1987; Johansen, 1988; Ravallion, 1986).

#### **2.4.2 Variance decomposition approach**

Delgado's (1986) variance decomposition approach tests market integration for the marketing system as a whole instead of conducting pair-wise tests of bivariate market integration. The method purges out the common trends and seasonality presence in the price series before testing for market integration. It implicitly assumes constant transport and transaction costs for any two markets within a system for a given season. Spatial integration between pairs of markets for a given season is then indicated by the equality

between the spatial price spread and the constant transport and transaction costs during that season (Delgado, 1986; Negassa, Myers & Gabre-Medhin, 2003). This means that if the price spread between any pair of markets is random, then inter-market price differentials are equal due to the presence of transportation and transaction costs, with deviation from the constant being random noise. In other words, if price-divergent trends are non-random over seasons between a pair of markets, this supports the hypothesis of a constant relationship between the series. However, this approach is based on a test of contemporaneous price relationships and does not allow for dynamic relationships between prices in different markets. It assumes constant inter-market transfer costs.

### **2.4.3 Radial market integration approach**

The Ravallian (1986) method assumes a radial spatial market structure between a group of local markets and single central markets, with price formation in the local market being mainly influenced by trade with central markets. In other words, it assumes that price shocks always originate from one central (urban) market where the prices are weakly exogenous from those of other markets. This method allows for the testing of several hypotheses regarding spatial market integration (market segmentation, short-run market integration, and long-run market integration) between local and central markets, after controlling for seasonality, common trends and autocorrelation (Negassa *et al.*, 2003).

However, this method also has serious flaws. Firstly, the assumption of radial market structure does not always hold true due to inter-seasonal flow reversals and direct trade links between regions (Barrett, 1996). Secondly, the method assumes that constant inter-market transfer costs are time-varying and that the test of market integration is biased against market integration (Barrett, 1996). Thirdly, the method also does not distinguish market integration due to non-competitive behaviour such as collusion (Faminow & Benson, 1990).

There are several common characteristics of commodity prices such as high volatility, stochastic trends (unit roots), co-movement in commodity prices, time-varying volatility and excess kurtosis, which have implications for the economic methods used in spatial price analysis (Meyers, 2004). For example, Ravallion (1986) used OLS regression to test various hypotheses of market integration. However, in the presence of stochastic trends (unit root) in the price series, the classical assumption of OLS regression is violated and hypothesis testing may be problematic. This led to the application of cointegration analysis, which tests for market integration by taking into account the presence of stochastic trends in price series.

#### **2.4.4 Cointegration analysis**

Time series data management requires a slightly cautious approach. In other words, understanding the statistical properties of individual series is the first and most important step. Indeed, the speedy development in time series literature, together with progress in computer technology, has led research to be more concerned with properties of the time-series data-generation process, methods and testing tools (see Appendix A for a detailed discussion). The major breakthrough in this field of time-series data analysis occurred after the research of Ravallion (1986), which entailed early research into the stationarity of the time-series variable, which has important implications for the reliability of inferences.

The concept of cointegration is used to capture the notion that non-stationary variables may nonetheless possess long-run equilibrium relationships and thus have a tendency to move together in the long run (Engle & Granger, 1987; Granger, 1986). In other words, even if the economic variables drift apart in the short run, in the long run they will move together because of common economic forces such as the market mechanism and government intervention (Engle & Granger, 1987).

Cointegration analysis ensures that deviations from equilibrium conditions between two economic variables that are individually non-stationary in the short run are stationary in

the long run. Intuitively, the concept of cointegration implies that economic forces should prohibit persistent long-run deviations from equilibrium, even though short-run deviations may be observed (Goodwin & Schroeder, 1991; Negassa *et al.*, 2003). An important implication of this is that while individual economic variables such as price drift apart, certain pairs of such variables should not diverge from one another in the long run. Systems in which variables are cointegrated can be characterised by an error correction (EC) model. The EC model describes how the variables respond to the deviations from the equilibrium. One can think of the EC model as an adjustment process whereby long-run equilibrium is maintained.

Therefore, if market prices are cointegrated, then the markets concerned are said to be integrated (Alexander & Wyeth, 1994; Dercon, 1995; Goletti, Ahmed & Farid, 1995; Goodwin & Schroeder, 1991). In other words, market integration is an indication of interdependence. Cointegration has been regarded by many researchers as not absolute but a measure of degree of market integration (Gonzalez-Rivera & Helfand, 2001). Spatial market prices that diverge from one another for a long time would have a weak long-run relationship, while two prices that co-move are likely to be cointegrated. According to Goodwin and Schroeder (1991) various factors affect cointegration, e.g. transaction costs, risk associated with transacting business, and the influence of volume of trade. Low-volume markets have the tendency to display significant price variability, and the distance between markets has a great influence on transaction costs. The presence of cointegration between two series is indicative of interdependence, while its absence indicates market segmentation. If the markets are far away from each other, the lack of cointegration may be due to transportation costs (Goletti, Ahmed & Farid, 1995).

According to Baulch (1997) a cointegration test may be deemed as being both an unnecessary and insufficient condition for a measure of spatial market integration. It is an unnecessary condition because if transfer costs are non-stationary, arbitrage between two markets may be efficient even when their price series are not cointegrated. It is an insufficient condition, because the price series may be cointegrated but their price differentials may be too small to offset the transfer costs. The practical importance of

cointegration is not as a test for market integration, but as a pre-test for other tests of market integration (Alexander & Wyeth, 1994).

Modelling cointegration involves several steps. The first step in cointegration analysis is assessing the statistical properties of individual series. The second step is to determine the order of integration of the univariate price series using appropriate unit tests. Order of integration means nothing but the numbers of differencing required before the series becomes stationary (Engle & Granger, 1987). Thirdly, if both price series are integrated of the same order, a cointegrating regression of one is run on the other. Fourthly, unit root tests are applied to the residuals from the cointegration regression or to linear combination residuals from the cointegration in order to confirm if it is white noise, i.e.  $I(0)$  indicates that two series exhibit a long-run relationship. This absence of a stochastic trend in the residual from the cointegration regression indicates that there is a cointegrating (long-run equilibrium) relationship between the two series. Lastly, if the cointegration is accepted, an EC model can be developed to study the short-run price relationships.

The Granger cointegration approach assumes stationary spatial marketing margins for markets to be integrated. However, it has been regarded that if transaction costs are non-stationary, lack of cointegration can also be consistent with market integration (Barrett, 1996). Also, finding cointegration does not always mean integration. If the markets are subjected to the same types of shocks, like supply or demand shocks, macro-economic shocks (money-supply or interest-rate shocks), speculation or overreaction, then prices can be cointegrated without true market integration or market efficiency (Pindyck & Rotemberg, 1990).

The Granger cointegration approach also does not allow for the investigation of all possible cointegrating vectors in a multivariate system (Fackler, 1996). Johansen (1988) developed a multivariate method of cointegration analysis, which uses maximum likelihood to test the hypothesis of cointegrating relationships among several economic

time series. Following on Johansen, a multivariate test of market integration under non-stationary prices was also developed and applied (Gonzalez-Rivera & Helfand, 2001).

Cointegration has also experienced a fair amount of criticism. The cointegration analysis is based on an assumption that constant transaction costs between different markets are linked by a constant trade pattern (Baulch, 1997; Fackler, 1996). Barrett (1996) indicates that cointegration is neither necessary nor sufficient for market integration. To further stress this point, he states that if transaction costs are non-stationary, failure to find cointegration between two markets' price series may be completely consistent with market integration, so cointegration is unnecessary. He further indicates that agricultural markets, particularly in developing countries, are still poorly understood, because conceptual advances that combine transaction costs, price data and trade flow have not accompanied them. Baulch (1997) also states that conventional tests for market integration, including cointegration, fail to recognise the pivotal role played by transfer costs. Thus these assumptions are contested and so the resulting tests of market integration may be misleading. Towards this end, recently there have been two major developments in the methods used to account for transaction costs, namely the parity-bound (PB) model and threshold cointegration tests.

#### **2.4.5 Parity bound model**

The various methods indicated above are based on assessments of price series. This reflects the fact that other variables that may be pertinent to the measure of price transmission (e.g. transfer and transactions costs) are omitted from the analysis. Many criticisms raised in the existing literature have been based upon this lack of important information and resulting ignorance of potentially important factors in empirical tests. The parity-bound model approach to spatial market analysis, first developed and applied by Spiller and Wood (1988), was further developed by other researchers (Barrett & Li, 2002; Baulch, 1997; Fafchamps & Gavian, 1996; Park, Jin, Rozelle & Huang, 2002; Penzhorn & Arndt, 2003; Sexton *et al.*, 1991). The conventional analyst assumes that transaction costs and trade flows are unobservable phenomena and hence are constant

(Baulch, 1997) while the PB model allows for transaction costs, trade reversals, and autarky. It measures the probabilities of being in different spatial market efficiency regimes over the sample period.

The parity-bound model developed by Baulch (1997) is an extension of earlier studies on stochastic frontier and switching regression models. It allows for transfer costs to vary, makes no implicit assumptions about the nature of marketing margins, and can be estimated using time-series data that is incomplete in contrast to assumptions made under traditional analysis. Using a parity-bound model, Baulch (1997) estimated transaction costs using structure, conduct and performance studies by physically examining transportation, interviewing traders, tracking shipments, and looking for unexploited arbitrage opportunities. Since transaction costs are time variant, an extrapolation from observed transaction costs in one period is used as an estimate over the entire time series.

When data on prices, transaction costs and trade flow is simultaneously available, the PB model allows for a clear distinction between spatial market efficiency and spatial market integration (Barrett & Li, 2002). Yet the PB model has also been criticised on many grounds (Negassa *et al.*, 2003). Fackler (1996) provides three major critiques with regard to the PB model. Firstly, he argues that there is no link between economic theory and the distributional assumptions used in the switching regime models. From this it is argued that the appropriateness of the interpretations of the regime probabilities depends on the validity of the distributional assumptions made. Secondly, the PB model handles only a limited number of markets. Thirdly, the results may be misleading because the approach considers short-run deviation from the equilibrium as inefficiency, whereas it may actually represent traders' rational responses to lags in information and shipment flows.

#### **2.4.6 Structural models of market integration**

Markets are complex institutions, encompassing hierarchies and interlinked transactions that may involve simultaneous consideration of various issues together (Palaskas and Harris, 1991). To expect that a simple measure based only on price data can describe the

process of transmission of information conveyed by price signals is quite ambitious. In order to explain this holistically, a more systematic effort is needed to verify measures of market integration to structural factors (Goletti *et al.*, 1995). However, a comparison of various measures and an analysis of the structural factors affecting these measures of market integration have been largely neglected – with the exception of the works by Goodwin and Schroeder (1991) and Faminow and Benson (1990). Markets are multifaceted organisations, and their performance and integration rely on numerous factors.

Distortions introduced by governments in the form of policies either at the border or as price-support mechanisms weaken the link between international and domestic markets. Agricultural policy instruments such as import tariffs, tariff rate quotas, export subsidies or taxes, intervention mechanisms, as well as exchange rate policies insulate the domestic markets and hinder the full transmission of international price signals by affecting the excess demand or supply schedules of domestic commodity markets (Abdulai, 2000; Gardner, 1975; Mundlak & Larson, 1992; Quiroz & Soto, 1996; Sharma, 2002).

Apart from policies, domestic markets can also be partly insulated by large marketing margins that arise due to high transfer costs. Especially in developing countries, poor infrastructure, transport and communication services give rise to large marketing margins due to the high cost of delivering the locally produced commodity to the border for export or the imported commodity to the domestic market for consumption. High transfer costs and marketing margins hinder the transmission of price signals, as they may prohibit arbitrage (Sexton, Kling and Carman, 1991). As a consequence, changes in world market prices are not fully transmitted to domestic prices, resulting in economic agents adjusting only partially (if at all) to shifts in world supply and demand.

Goletti, *et al.* (1995), in their seminal work on structural determinants of market integration for the Bangladesh rice market, attempted to estimate market integration as a function of infrastructure, policy and production shocks. They used certain structural variables, namely distance, density of paved roads, density of telephone lines, density of bank branches, density of railways, number of strikes, as well as number of shocks to

production, and found that distance from the central market, frequency of strikes, and number of production shocks have a significant and negative effect on integration, since they disrupt the normal flow of goods. On the other hand, paved-road density, telephone-line density and bank-branch density have a positive and significant effect on integration.

Non-competitive behaviour such as that considered in pricing-to-market models (Froot & Klemperer, 1989; Krugman, 1986) can hinder market integration. Pricing-to-market models postulate that firms may absorb part of the exchange rate movements by altering export prices measured in home currency in order to retain their market share. Alternatively, oligopolistic behaviour and collusion among domestic traders may retain price differences between international and domestic prices at levels higher than those determined by transfer costs.

The price-based measures of market integration discussed above face serious criticism in that they are solely based on price data alone, they assume constant transaction costs and continuous adjustment of prices to long-run equilibrium, or they assume that any small deviations from long-run equilibrium will always lead to instantaneous adjustment in each market. However, in practice, they are nonsensical and fallacious. The movement toward the long-run equilibrium need not occur in every period. For example, the presence of fixed costs of adjustment may prevent economic agents from adjusting continuously. It is only when deviation from equilibrium exceeds a critical threshold that the benefits of adjustment exceed the costs and, hence, economic agents act to move the system back towards the equilibrium (Abdulai, 2000; Balke & Fomby, 1997; Goodwin & Piggott; 2001). The idea is not new; nearly a century ago Heckscher (1916) as quoted in Obstfeld and Taylor (1997) noted that transaction costs between markets could limit the transmission of price shocks below a critical level. In other words, transaction costs could create “commodity points” – a neutral band that causes deviation from market integration. This is because potential gains from the trade cannot outweigh these costs and hence perfect price adjustment will not occur.

As pointed out by Goodwin (2006) a key criticism (among the many that have been directed toward this literature) involves the omission of transactions costs. Spatially-distinct markets are linked by spatial arbitrage. Of course, transaction costs are likely to be significant when one is considering the movement of an agricultural commodity from a rural area to the town centre. This relationship may be flawed by this fact, unless markets are linked by a continuous flow of the commodity (implying that the expected price differences are exactly equal to the costs of trade). In most cases, market opportunity is limited by transaction costs stemming from inadequate information and incomplete definition and enforcement of property rights and barriers to entry by new participants (World Bank, 2002).

A significant criticism of price-based tests of spatial market linkages has involved ignorance of transactions costs and the implications for nonlinearities in the price relationships. Barrett (2002) recently reviewed these criticisms and argued that “... price data alone offer a fragile base for inferences about market efficiency”. Goodwin (2006) points out that the results of price-based evaluations of price transmission are not likely to be very informative without a deeper understanding of the structures and institutions relevant to the market functioning.

To address this, recent research on vertical and spatial price linkages has focused on the potential for nonlinearities, which may be relevant in models of integration. These nonlinearities may reflect the role of unobservable transactions costs. Two specific types of models have been adopted to address these nonlinearities, namely the parity-bound (PB) models of Baulch (1997), Sexton *et al.* (1991) and Spiller and Wood (1988), while Negassa *et al.* (2003) applied endogenous switching models that account for the multiple regimes that may result from transactions costs. The PB model depends on transfer costs extrapolated from observed transfer costs in one period, which are subject to inaccuracy. The subsequent section discusses the advantage of nonlinear models in general and particularly the threshold autoregressive (TAR) model and threshold vector error correction (TVEC) model, which is a multivariate version of the TAR model. TAR and

TVEC models take into account the limitations of the PB model and other price-based models, considering the effects of transaction costs on the model.

Threshold models are nonlinear models based on the assumption that time-series data exhibit nonlinear adjustment due to the effects of transaction costs. Indeed, economic theory suggests that a number of important time-series variables should exhibit nonlinear behaviour. For instance, wages display downward rigidity, while downturns in the business cycle are sharper than recoveries, output and employment fall more sharply than they rise, and producer prices adjust more slowly to a rise in export prices and drop sharply when there is a slight decrease in export prices (Enders, 2004). The assumption that economic processes are linear can provide useful approximations to actual time paths of economic variables. However, errors could be made if policymakers are guided by these assumptions when some or all of the time paths are actually nonlinear.

#### **2.4.7 Threshold cointegration**

As pointed out in earlier discussions, cointegration is neither necessary nor sufficient for market integration. If the transaction costs are non-stationary, failure to find cointegration between two markets' price series is completely consistent with market integration. Recent studies, however, have recognised the potential for nonlinear threshold-type adjustment in error correction models and the importance of transaction costs. In cases of significant transaction costs, adjustment to the long-run equilibrium should not be continuous. Price-equalising arbitrage activities are triggered only when localised shocks result in price differences that exceed the "neutral band". The benefit of adjustment should exceed the cost, and therefore economic agents will act to move the system back to equilibrium. On the other hand, smaller deviations will reduce the incentive to trade, and market players will fail to converge. Infrequent trading will in the long run restore the system to equilibrium. However, the impact of these mean reversion will depend on the size of the deviation from the no-arbitrage condition (Goodwin & Harper, 2000; Goodwin & Piggott, 2001).

Since the early 1980s, promising progress has been achieved with a threshold approach to time-series analysis. For instance, Tong (1978) originally introduced nonlinear threshold time-series models. Later, Tsay (1989) developed a method to test for threshold effects in autoregressive models. Balke and Fomby (1997) extended the threshold autoregressive models to a cointegration framework, thus combining non-linearity and cointegration. One of the most important statistical issues for these models is testing for the presence of a threshold effect. Balke and Fomby (1997) proposed using the application of the univariate tests of Hansen (1997) and Tsay (1989) using cointegrating residuals from the OLS estimate. Lo and Zivot (2001) extended the Balke and Fomby approach to a multivariate threshold cointegration model with a known cointegrating vector, using the tests of Tsay (1989) and multivariate extensions of Hansen (1997). Serra and Goodwin (2003) also extended on this by introducing Sup-LR test null of the VEC model against the TVEC model.

A good number of threshold autoregressive (TAR) models have been developed, such as the smooth transition threshold autoregressive (STAR) model of Chan and Tong (1986) and the functional-coefficient autoregressive (FAR) model of Chan and Tsay (1993). The threshold autoregressive model has a wide range of applications. For example, Potter (1995) used a two-regime threshold autoregressive model to analyse the fluctuations of US economic output, while Tsay (1989) developed a multivariate threshold autoregressive model to study the arbitrage activities of the security market, and Henry, Olekaln and Summers (2001) provided evidence of threshold nonlinearity in the Australian real exchange rate.

Threshold models are quite widely applied to agricultural price series (Goodwin & Harper, 2000; Goodwin & Piggott, 2001; Mainardi, 2001; Meyer, 2004; Sephton, 2003). This type of model is aimed at testing for the presence of nonlinear transaction costs, and in general for the existence of price bands within which there is no transmission. Uchezuba, Alemu and Jooste (2005) employed the threshold error correction (TEC) model to evaluate the integration of the apple market into the South African fresh-

produce market. Alemu, Van Schalkwyk and Biacuana (2006) evaluated the integration of the Mozambican maize market using the TVEC model.

Given the facts discussed above, this study utilises the recently developed threshold vector error correction model (TVECM) to account for a neutral band representing transaction costs. The TVEC model is a multivariate version of threshold autoregressive (TAR) model and allows one to investigate the adjustment process of individual prices and provides more information about short-run price dynamics and asymmetric adjustment of prices. It also allows nonlinear and threshold-type adjustments to long-run equilibrium. These models occur when the size of the (lagged) error correction term allows one to distinguish between different regimes, and the variables in the model exhibit different types of behaviour in each regime.

It is important to note the estimation of the TVEC model, as most time-series models require a sequential approach to analysis. The most important steps include analysis of statistical properties, testing for a long-run cointegrating relationship, testing for nonlinearity and its significance, estimating threshold value and testing for significance of the value, and estimating threshold error correction and impulse response analysis depending on what the researcher needs to analyse. The subsequent section provides a detailed description of how to go about testing the linearity of a given series using univariate and multivariate approaches.

## **2.5 Threshold estimation procedures**

### **2.5.1 Linearity test**

Once it has been confirmed that the series is cointegrated with a known cointegrating vector, the next step is to determine whether the dynamics in the cointegrating relationship among the prices are linear or whether they exhibit threshold nonlinearities. Several approaches are used in the literature to test for the presence of threshold effects. Most tests are based on examining the residual of the linear combinations for the

presence of autocorrelation. They are also broadly categorised as univariate and multivariate tests.

One of the most popular univariate residual-based tests in the literature is Tsay's (1989) F-test. A significant F-statistic of the resulting regression rejects the null hypothesis of linearity and confirms the presence of nonlinearity in the series. Nonlinearity in the series in turn indicates a threshold cointegration process.

Balke and Fomby (1997) extended Tsay's non-parametric test to a cointegration framework combining non-linearity and cointegration. Their test for linearity is carried out by testing for structural breaks in an arranged autoregression for residuals. An arranged autoregression for residuals orders the data according to the value of threshold variable instead of by time. The arrangement of data does not alter the dynamic relationship between residual and lags. It is useful for detecting threshold nonlinearity, since the existence of a threshold in time-ordered data translates into structural change in the rearranged data. However, it is complicated by the fact that the estimated break dates are not identified in the null hypothesis of linearity and need to be simulated on a case-by-case basis (Lo & Zivot, 2001).

Hansen (1997, 1999) illustrates another method for testing the null hypothesis of linearity versus the alternative of a TAR ( $m$ ) model, where  $m$  denotes the number of regimes. To illustrate, consider TAR (3) for  $u_t = \rho'Y_{t-1}$ . A linear autoregressive or TAR (1) results under the restrictions. Hansen's linearity test is a test of the null hypothesis of TAR (1) against the alternative of TAR ( $m$ ) for some  $m > 1$ . Hansen shows that a simple bootstrap procedure can be used to compute p-values for various linearity tests. Hansen's linearity testing procedure has an apparent advantage over Tsay's nonparametric procedures, since it is based on the specific form of the threshold model under the alternative. This is the method used in this study.

The threshold vector error correction (TVEC) model is a multivariate version of TAR, which is used to model non-linear asymmetric threshold-type adjustments to long-run

equilibrium. This happens when a linear TAR model becomes inadequate to measure cointegration because of the asymmetric nature of price adjustments in a series. Balke and Fomby (1997) and Enders and Granger (1998) have confirmed that standard cointegration tests may lack power in the presence of asymmetric adjustment. The momentum of asymmetric price transmission may be stronger in one direction than in the other (Abdulai, 2000; Enders & Granger, 1998; Goodwin & Harper, 2000).

Based on the above findings, Lo and Zivot (2001) extended Balke and Fomby's approach by focusing instead on multivariate estimation and testing procedures. The idea is that if the bivariate TVEC model is the appropriate model, then multivariate procedures that utilise the structure of the model should have higher power than univariate procedures that ignore the restrictions imposed by the multivariate structure. Towards this end, Lo and Zivot (2001) have specified two test procedures for null hypothesis. The test specifications are "no cointegration against linear cointegration" and "no cointegration against threshold cointegration". Given that the cointegrating vector ( $\beta$ ) is known, standard univariate unit root tests on the cointegrating residual can be used to test the null of no cointegration against linear cointegration. According to Lo and Zivot (2001) the results of Balke and Fomby (1997) have low power in both equilibrium-TAR and band-TAR models if the autoregressive coefficients in the outer regimes are close to one and/or the width of the band relative to the variance of the errors is large.

Before Lo and Zivot (2001) nobody had considered a multivariate test based on a known cointegrating vector. To overcome this limitation, they considered Horvath and Watson's (1995) multivariate test for no cointegration. The Horvath and Watson (HW) test shows much better power against cointegrated alternatives than the univariate ADF unit root test on residuals. Lo and Zivot (2001) also show that the HW test generally has higher power than the ADF test when the dynamics of the data invalidate the common factor restrictions imposed by the ADF test.

Similarly, Caner and Hansen (1998), Enders and Granger (1998) and Goodwin and Holt (1999) proposed the use of testing null of no cointegration against alternative threshold

cointegration. They found that unit root tests that consider threshold effect have higher power than tests that ignore the specific nature of the threshold alternative. They require threshold variables to be stationary under the unit root null, since cointegrating residuals are used as the transition variable.

In general, as unanimously proposed by the researchers cited above, threshold vector error correction (TVEC) models that take into account the nonlinear and threshold-type adjustments in error correction have more power than the univariate approach. Accordingly, the TVEC model, which is a multivariate version of the threshold autoregressive (TAR) model that allows one to provide more information on short-run price dynamics, is employed in this research.

### **2.5.2 Locating threshold and value**

The two most common methods of locating threshold are visual inspection through graphical methods and grid search algorithm. The application of locating thresholds for two-regime versus three-regime modelling is also discussed below.

Graphical method is the first step in visual inspection, the use of a graphic device to locate the number and position of thresholds is proposed by Tsay (1989). It involves a scatter plot of various t-statistics against the specified threshold variable. The scatter plot of t-values of the constant and AR coefficients are plotted against the threshold variable. The number and location of the potential threshold values are determined from the scatter plot by simply identifying the points where the t-ratio turns and changes direction as estimates of the potential threshold are reached. Two or more thresholds can be identified in the process, from either the negative or positive side of the scatter plot.

Grid search method is used to identify the number and location of the threshold values. Tsay (1989) suggests using internal estimates or point-sample percentiles as point estimates to locate thresholds. According to him, thresholds are not found at the extreme points on the percentile because of a lack of sufficient observations to provide efficient

estimates and he suggests not considering 10 percent of the data from the lower and upper ends. However, Tsay's (1989) approach has been so criticised for inconsistency and subjective interpretations that Tsay (1989) used another type of graphic device developed by Chan (1993) to find the consistent estimate of a threshold. The sum of square residuals from a grid search in an arranged autoregression is plotted in a graph. The idea is that the sum of squared residuals (SSR) will form local minima at a threshold. The closer to the true threshold, the smaller the SSR should be. Hence, the SSR should be minimised at the true value of the threshold

Balke and Fomby (1997) followed the same approach of using a grid search that minimises the sum of squared error criterion. After arranging the residuals in ascending order (from low to high), for a one-break sup-Wald test they suggest using the interior 80 percent of the arranged sample. For the two-break sup-Wald test, they examined the 5th to 30th percentiles of the arranged residual sample to locate the lower threshold. For the upper threshold, the search was within the 70th to 95th percentile. The 40th percentile of the sample falls in the middle regime. The number of observations in the search is expected to be reasonable enough to increase the chances of locating a potential threshold – i.e. a minimum of at least 20 observations are recommended for the search in each regime. The threshold must lie between the maximum and minimum values of the data.

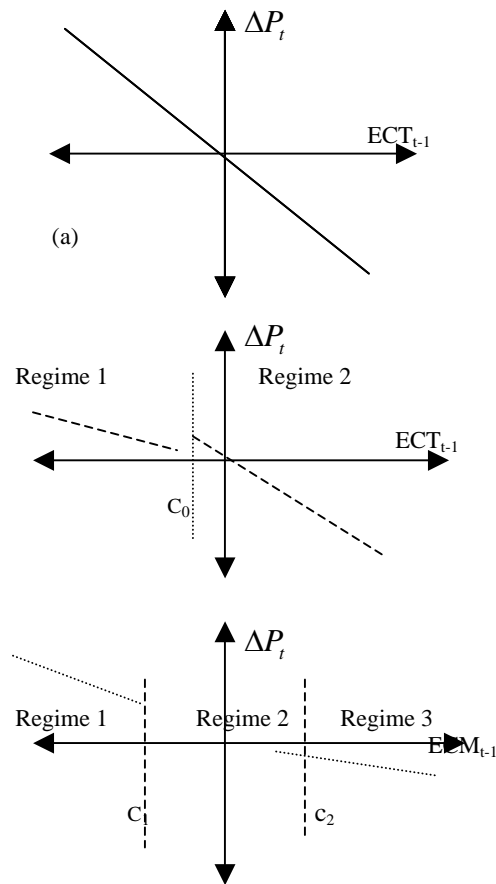
Meyer (2004) searched for the first threshold between 5 and 95 percent of the largest negative residuals (in absolute terms) after arranging these in ascending order. In like fashion, they search for the second threshold between 5 and 95 percent of the largest positive residuals. The TVECM model is then estimated conditional to threshold parameters.

The trace of covariance matrix (TCM) and/or log determinant (LD) grid-search methods are two of the most widely used. For instance, Serra and Goodwin (2003), in order to estimate the parameters of the multivariate TVEC models, used sequential conditional iterated SUR in two steps. In the first step, they carried out a two-dimensional grid search to estimate the threshold parameters for three regimes (i.e.  $c_1$  and  $c_2$ ). They searched

thresholds over 1 and 99 percent of the fractals of the negative and positive lagged error correction terms. The search was restricted to ensure an adequate number of observations for estimating the parameters in each regime. They followed two alternative grid search techniques. The first minimised the log determinant of the variance-covariance matrix of the residuals of the TVEC models, and the second was the standard maximum likely (LR) estimation. This criteria differs from the one used in other analyses in that it does not assume cross-equation independence (correlation) between the residuals (see Goodwin and Holt, 1999; Goodwin and Piggott, 2001; Lo and Zivot, 2001). In the former criterion, they account for the relationship between markets at different levels of the marketing chain and they compare results obtained from both procedures.

As current literature on threshold modelling indicates, one threshold (two-regime model) or two thresholds (three-regime model) are commonly cited in the literature. For instance, one-threshold modelling has been applied by Abdulai (2002), Balke and Fomby (1997), Enders and Granger (1998) and Sephton (2003). Similarly, two-threshold modelling has been employed by Goodwin and Harper (2000), Goodwin and Holt (1999), Goodwin and Piggott (2001), Hansen and Seo (2002), Lo and Zivot (2001), Obstfeld and Taylor (1997) and Serra and Goodwin (2003).

Three-regime models are separated by two thresholds (Figure 2.1). A two-dimensional grid search is conducted to define two thresholds ( $c_1$  and  $c_2$ ). The search for the first residual conducted between 1 and 99 percent of the largest (in absolute value) of the negative lagged residuals (error correction) forms the ordinary least square estimate. The first threshold delineates the lower boundary (i.e.  $-\infty \leq c_1$ ). In the same fashion we search for the second threshold between 1 and 99 percent of the largest positive residuals (error correction) arranged in ascending order (e.g. Goodwin & Piggott, 2001). The second threshold delineates the upper boundary (i.e.,  $c_2 \leq +\infty$ ). In the case of two thresholds, the inner part is that which lies between  $c_1$  and  $c_2$  is considered a 'neutral band' where no adjustment to equilibrium takes place. A similar procedure is followed for locating one threshold.



**Figure 2.1: Two and three regime models**

In general, the number and location of threshold values are identified through a grid search algorithm. The search is conducted over arranged threshold residuals (in ascending order). Five to ten percent of data from lower and upper extremes of the data points are excluded. This study follows a similar approach to that of Balke and Fomby (1997) (i.e. a grid search that minimises the sum of squared error criteria).

### 2.5.3 Testing for significance of threshold value

Once the threshold effects have been confirmed, the next step is to search for threshold values. Once threshold values are identified, the following step is testing for statistical

significance of values or the differences in the parameters across alternative regimes. The Hansen test is one of the commonly applied tests for the significance of differences between alternative regimes. Balke and Fomby (1997) and Enders and Granger (1998) have shown that standard cointegration tests will lack power in the presence of asymmetric adjustment (Abdulai, 2000; Goodwin & Harper; 2000). Hansen's (1997) testing is one of the most commonly applied methods of testing structural significance.

It is well known that this testing problem is complicated by the fact that threshold parameters are not identified under the null hypothesis of no threshold effect and thus conventional test statistics have non-standard distributions. Hansen (1999) developed an approach to testing the statistical significance of threshold effects. Hansen (1999) recommends using a number of simulations whereby the dependent variables are replaced by standard normal random draws. From these simulated sample test statistics, the asymptotic p-value is approximated by taking the percentage by which the test statistics taken from the simulated sample exceed the observed test statistics.

The tests are conducted only for the upper and lower bands and not for the inner band, since the coefficient of the inner band (the neutral band) is not expected to be statistically significant, as there is no mean reversion in this regime and adjustment is expected to be low or zero. The outer band is expected to adjust faster than the inner band, and hence its coefficient is expected to be larger and statistically significant. Given superiority of the approach, this study employs Hansen (1999) approach for its modeling (see chapter 6 for detail).

#### **2.5.4 Estimation of the TVEC model**

If the threshold is located, the data points are divided according to whether equilibrium error is above or below the threshold and OLS regression is estimated. Dummy variables are incorporated and ECM is specified. The coefficient of the inner band is not expected to be statistically significant because there is no mean reversion in this regime and adjustment is expected to be zero. The outer band is expected to adjust faster than the

inner band. Therefore, its coefficient is expected to be larger and to have a significant t-ratio. Price equilibrium arbitrages were found to occur in response to localised shocks that exceed the thresholds of the neutral band. The significance of transaction costs is evident in the more rapid adjustment in response to deviations from equilibrium than when threshold behaviour is ignored.

## **2.6 Regime switching**

Since the publication of the Markov switching model by Hamilton (1989), it has become the most famous model used for discrete price adjustment. Many economic time series occasionally exhibit dramatic breaks in their behaviour associated with events. As has been repeatedly discussed in the previous section, the influence of transaction costs usually causes a 'neutral band' or break where no economic forces push price deviation back to equilibrium position (Hamilton, 1989). As indicated in Figure 2.1, the inner threshold regime (regime II) corresponds to the neutral band where the price difference is less than the transaction cost, which reduces incentives for arbitrage. In the outer regimes (regimes I and III), price differences are persistently more than the transaction costs. A particular regime characterises the relationship among the prices at a particular point in time. The characteristics of each realisation of the series depend upon whether the error correction term is less or more than the threshold or whether it lies between the thresholds on either the negative or positive side. Therefore, the switching model illustrates in which of the regimes each observation falls and the time of the switch among the regimes. Regime I corresponds to large negative errors that lie below the threshold. Regime III corresponds to the large positive errors that lie above the threshold. Regime II corresponds to the errors that are between the thresholds that define regimes I and II. The regime-switching model is estimated using information from the TVEC model estimation.

However, the strength of the regime switch depends on the distance between the markets. Goodwin and Piggott (2001) observed that the greatest degree of switching among regimes and the most frequent occurrence of price differences exceeding the neutral

bands is realised by those markets that are widely separated. Regime switching is used to investigate the extent of integration between spatial markets. Observations that persistently fall in regime II (in the three-regime model) indicate market price differentials that are less than or equal to transaction costs – an indication of integration (Alemu *et al.*, 2006).

## **2.7 Impulse response function**

The impulse response function is a concept that provides additional information on the dynamic interrelationships among prices. It measures persistence effect and asymmetry effect in response to shocks. In other words, it measures the time profile of the effect of a shock on the behaviour of the series. This concept has been used to analyse the impact of price shocks and the way in which shocks are transmitted among market prices. According to Potter (1995) the impulse response function has been based on the foundation that the economy's dynamic behaviour can be well explained by random impulse generated over time by a constant linear structure. Potter (1995) improved the standard linear technique of impulse response function analysis to the nonlinear case by defining a generalised impulse response function as a random variable on the underlying space of the time series. Impulse response functions can be applied to both univariate and multivariate time series. Koop, Pesaran and Potter (1996) extended the use of the impulse response function to study multivariate time series.

The estimation of impulse response in this study is based on parameter estimates obtained from TVEC model estimates. The response of producer market price to positive and negative shocks in auction prices was analysed. Similarly, the response of producer and auction market prices to positive and negative shocks in the FOB prices and the time required to normalise the effects of the shock was also investigated.

## 2.8 Conclusion

The integration of markets has important implications for price discovery and the operation of the markets. Accordingly, this chapter reviewed theories on price transmission, as well as studies and measures of market integration chronologically. Measures of market integration have shown rapid progress in terms of the invention and application of computer technology since the work of Ravallian (1986) and since Engle and Granger (1987) extended the cointegration approach by including it with the error correction (EC) model to form a dynamic economic model.

However, cointegration-based tests have been criticised recently for their ignorance of transaction costs. Quite a large volume of the economic literature has pointed out the importance of the limiting effect of transaction costs on the smooth flow of goods between markets, while the assumption of linearity and continuity of adjustment to long-run equilibrium is challenged. The presence of transaction costs, which typically are unobservable to empirical researchers, may lead to a 'neutral band' within which prices are not linked to one another. Price-equalising arbitrage activities are triggered only when localised shocks result in price differences that exceed the neutral band. Hence, there will be more than one regime with different slopes of adjustment. This has led to the application of new empirical approaches that explicitly recognise the influence of transaction costs (Balke & Fomby, 1997; Barrett & Li, 2002; Goodwin & Holt, 1999; Goodwin & Piggot, 2001; Lo & Zivot, 2001; Meyer, 2004; Tsay, 1989). All these researchers applied threshold autoregressive (TAR) models to examine market integration. This study adopted the threshold vector error correction model, regime-switching and impulse-response models based on the theories and literature reviewed.

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## CHAPTER 3

### REVIEW OF THE WORLD COFFEE ECONOMY

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#### 3.1 Introduction

Over the past two and a half decades, almost all coffee-producing countries have undertaken several market deregulation measures at local level. In addition, the quota system of the International Coffee Agreements (ICAs) completely dismantled in May 1989, leaving the international coffee trade open for more competition. This part of the study reviews the impact of these policy and institutional changes on world coffee production, export and consumption. In the latter part of this section the effect of increasing price volatility on producers and alternative price risk management approaches, as well as disparity between producers' FOB and retail prices are also reviewed. It furthermore explores future opportunities for smallholder coffee producers in developing countries.

##### 3.1.1 History of the origin of coffee

Arabica (*Coffea Arabica* L.) and Robusta (*Coffea Canephora* Pierre) are two commercially significant species of coffee beans (Anthony, Combes, Astora, Betrand, Graziosi & Lashermes, 2002; Pearl, Nagai, Moore, Steiger, Osgood & Ming, 2004). Arabica (*C. Arabica*) is grown at altitudes over 1,000m, produces superior quality beans that possess the best flavour and aromatic characteristics, and accounts for about 66 percent of total global coffee (Wolde

mariam et al., 2001). Arabica is grown primarily in Latin and northern America, eastern and northern Africa and in Asia. Robusta plants can grow in humid conditions, at lower altitudes and in areas with moisture stress, have higher yields, are more resistant to

disease, and produce beans of inferior taste to Arabica, usually with a woody and astringent flavour and about twice the caffeine content. Robusta beans, unlike Arabica, command a lower price on the markets and are generally used for instant coffees such as espresso. Robusta coffee is grown mainly in western, central and southern Africa and in Asian countries (Indonesia, Thailand, Vietnam), as well as in Brazil and Ecuador (ITC, 2002).

Much historical and economic evidence has indicated that Ethiopia is the origin of *C. Arabica* (Coste, 1992; De Graaf, 1986; FAO, 1968a; Wellman, 1961; Wrigley, 1988). It is indigenous to the south-western highlands of Ethiopia, in the province of Kaffa, where the coffee tree was first discovered. In addition to Kaffa, wild natural coffee forests still occur in the Illubabore (Yayo-Geba), Wollega (Gimbi, Anfilo) and Mizan (Tepi, *amora-gedel*) areas located on the same plateau. The wild coffee forests refer to undomesticated arabica coffee trees that are not planted by humans (naturally regenerated) and can be found under the forest. About 200,000 ha of coffee forests still remain in Ethiopia (CTA, 2003).

In Ethiopia, since time immemorial, coffee has been found growing wild in the forests Biratu (1998). Biratu argued that the names for coffee in almost every country of the world are descended from the Ethiopian word '*kaffa*'. For instance, the French and Spanish call it *café*, the Italians *caffè*, the Germans *kaffee*, the Dutch *koffie*, the Greeks *kafes*, and so on. All are phonetic approximations of the name of the 'Kaffa' province of Ethiopia. According to Wrigley (1988) the most widely cited legend about the discovery of coffee is that of the goatherd Kaldi who was considered Ethiopian.

A popular legend refers to a goatherd by the name of Kaldi who observed his goats prancing about excitedly after chewing berries from coffee bushes. Curious about this phenomenon, Kaldi tried eating the berries himself. He found that these berries gave him renewed energy. The news of this energy-laden fruit quickly spread throughout the region. Hearing of this amazing fruit, monks dried the berries so they could be transported to distant monasteries. They reconstituted these berries in water, ate the fruit,

and drank the liquid. As a result they managed to keep awake during their long night-time prayers, and coffee became accepted as a stimulant drink.

The FAO's Coffee Mission to Ethiopia of 1964-1965 attempted to establish proof of the nativity of *C. Arabica*. The expedition members obtained 621 samples of *C. Arabica* seeds from the Kaffa and Illubabore provinces of Ethiopia and found that the materials collected were closer to the truly wild Arabica coffee than anything known thereafter. Accordingly they proved that Ethiopia was a primary centre of genetic diversity of the Arabica (*C. Arabica* L.) plant. The mission distributed seeds to experimental stations in Tanzania, India, Costa Rica and Peru, indicating that Ethiopia has also directly contributed to the expansion of modern coffee and possesses several unexplored coffee varieties for future use (FAO, 1968b).

More recent botanical evidence gathered by botanists (Bayetta, Behailu, and Fekadu, 2000) has confirmed beyond reasonable doubt that Ethiopia is the home and cradle of biodiversity of Arabica coffee seeds. More genetically diverse strains of *C. Arabica* exist in Ethiopia than anywhere else in the world, which has led botanists and scientist to agree that Ethiopia is the centre of origin and diversification of the coffee plant.

Yemen was somehow claimed to be the principal source of *C. Arabica* germplasm exploration a few decades ago (Meyer, 1968). After a more careful study of the biodiversity of these rainforest plants, there is little to convince a careful scientist that the mountains of Yemen should in any way be considered the native habitat of *C. Arabica*. According to Biratu (1998), in Yemen coffee does not grow without irrigation and/or under the forest. Coffee farms in Yemen were established by coffee farmers while the opposite is true in the Kaffa and Buno areas of Ethiopia. Thus it is baseless to argue that *C. Arabica* is native to the mountains of Yemen. Perhaps it is time to change the name *C. Arabica* to *C. Ethiopica*. The most justifying evidence is that Ethiopia still has a substantial number of natural coffee forests.

It is uncertain how coffee was taken from Ethiopia, where it was harvested from the forest, to the land where it was first cultivated, known to ancient geographers as Arabia

Felix and known today as Yemen. Some have suggested that coffee came to Arabia through Persia; however, there is no record of coffee having been grown or widely used in Persia, and no apparent reason why coffee should have been taken into Arabia Felix indirectly from Persia rather than directly from Ethiopia across the passage of Yemen, a much shorter journey (Wrigley, 1988).

In the sixth century Ethiopia emerged as an oriental state, deeply involved in the affairs of the Eastern world and fully respected as equal if not superior in the development of the strategy of the Red Sea. For Arabs at the time, Ethiopians were deemed the representatives of an even higher civilization. There was movement of people for trade on both sides of the Red Sea. This might have contributed to the exchange of materials, including plants like coffee. The more definite issue is that there was slave trade from the south of Sudan to Saudi Arabia through Ethiopia across the Denakilis Desert in eastern Ethiopia. To help them through the desert, slaves might have taken coffee beans with them from the Kaffa province, and some of the beans may have survived the journey and germinated. It is also possible that Arab slave traders become acquainted with coffee in Africa and took some berries back for their own consumption or to introduce them to the Arab world (Wrigley, 1988).

Wrigley (1988) suggests that Arabs obtained coffee seeds from the Harar region of Ethiopia in the eleventh century and started to grow the plants in Arabia. He also reveals that the 'mocha' coffee grown in Yemen is said to have a close genetic similarity to coffee from the Haraghe Highlands, which is much closer and more accessible to Yemen. Haarer (1962), however, contests that there is no reputable record of coffee having existed even in the thirteenth century in Arabia.

With regard to the dissemination of *C. Arabica*, Krug and Poerck (1968) disclose that it was introduced to Arabia prior to the 15<sup>th</sup> century. It was first planted in Java in 1690, and in the early 18<sup>th</sup> century was carried to Surinam, Martinique and Jamaica. Cultivation of coffee soon spread throughout the West Indies, Central America and favourable regions of Latin America before later reaching India and Sri Lanka. The

coffee plant was introduced by Yemen to Java (now Indonesia) in 1690, to India in 1700, to the Netherlands in 1706, to Colombia in 1714, to Brazil in 1715 and back to Africa in 1877 (Wellman, 1961).

According to Wrigley (1988) until 1898 the name *C. Robusta* had not been heard, and this was the specific name applied to specimens of coffee discovered in 1893 by the Belgian botanist, Emil Laurent, and sent from the Congo to Brussels and cultivated in a greenhouse, and some seedlings from these plants were obtained by the Dutch and brought to Java in 1900 (Talbot, 2004). It was grown successfully in Indonesia and reintroduced to Uganda in the 20<sup>th</sup> century.

*Robusta* expansion in West Africa is not clearly documented. It used to grow wild in many forests from the Ivory Coast to Angola, and there was no use for the cultivation of this crop by the people of West Africa until about the 20<sup>th</sup> century (Wrigley, 1988). *Robusta* is frequently recoded as having been introduced into the Ivory Coast as late as 1927. This was about the time the French colonial government, to stimulate the plantation economy, imposed a tax on all coffee imports into France and used the revenue to encourage coffee growing in their overseas territories. Today the Ivory Coast (now known as Côte d'Ivoire) is the second-largest producer of coffee in Africa, producing over four million bags a year. Cameroon is also one of the countries with recent expansion (Wrigley, 1988).

### **3.1.2 Importance of coffee in world trade**

Coffee is a global commodity. The importance of coffee in the world economy cannot be understated. It is one of the most valuable primary products in world trade, and in most years coffee stands alongside oil in terms of value. It is a source of foreign exchange for developing countries, with an annual value of about US \$11 billion in the world market (ICO, 2007). Its cultivation, processing, trading, transportation and marketing provide employment for hundreds of millions of people worldwide (ITC, 2002; Lewin, Giovannucci & Varangis, 2004). It fills approximately 400 billion cups a year and is

estimated to be regularly consumed by more than 40 percent of the world's population. Coffee has a particularly large footprint in poor countries, and amongst poor producers in many African countries (Kaplinsky & Fitter, 2004). Some 70 countries worldwide produce coffee. Of the total world coffee production, 70 percent of export is accounted for by about 25 million smallholder farmers in about 50 developing countries. In several coffee-producing countries, it accounts for a substantial share of commodity export value – for instance, 69 percent for Burundi, 60 percent for Rwanda, 48 percent for Ethiopia and 37 percent for Uganda between 1999 and 2004 (ICO, 2004). It also plays an important economic role in Latin America and Asia. For many countries, coffee exports are not only vital contributors of foreign exchange earnings, but also account for a significant proportion of tax income and gross domestic product.

Coffee is a vital export commodity for many African farmers. It is a long-term investment, taking three to four years from planting to the first bearing of fruit, and remaining productive for up to 40 years before becoming less productive. Most African coffee farmers started coffee planting under pressure from colonial governments in the early 20<sup>th</sup> century (Wellman, 1961). Since then cultivating coffee has become a traditional source of cash income for African growers, as well as a source of foreign exchange for government, and therefore any shock in its production and price affects the lives of millions.

### **3.2 World coffee production**

Coffee is predominantly produced in the low- and middle-income countries of North and South America, Asia and Africa. There are more than fifty countries (thirteen from North America, eight from Latin America, twenty-five from Africa, and eleven from Asia) that produce and export coffee to their consuming clients to the north. It is estimated that the more than twenty-five million smallholder coffee producers around the world mainly produce two species of coffee: Arabica and Robusta. Arabica is produced in North America, South America and East African countries, whereas the lion's share of Robusta is produced in western and central Africa and Asia (see Figures 3.1, 3.2 and 3.3).

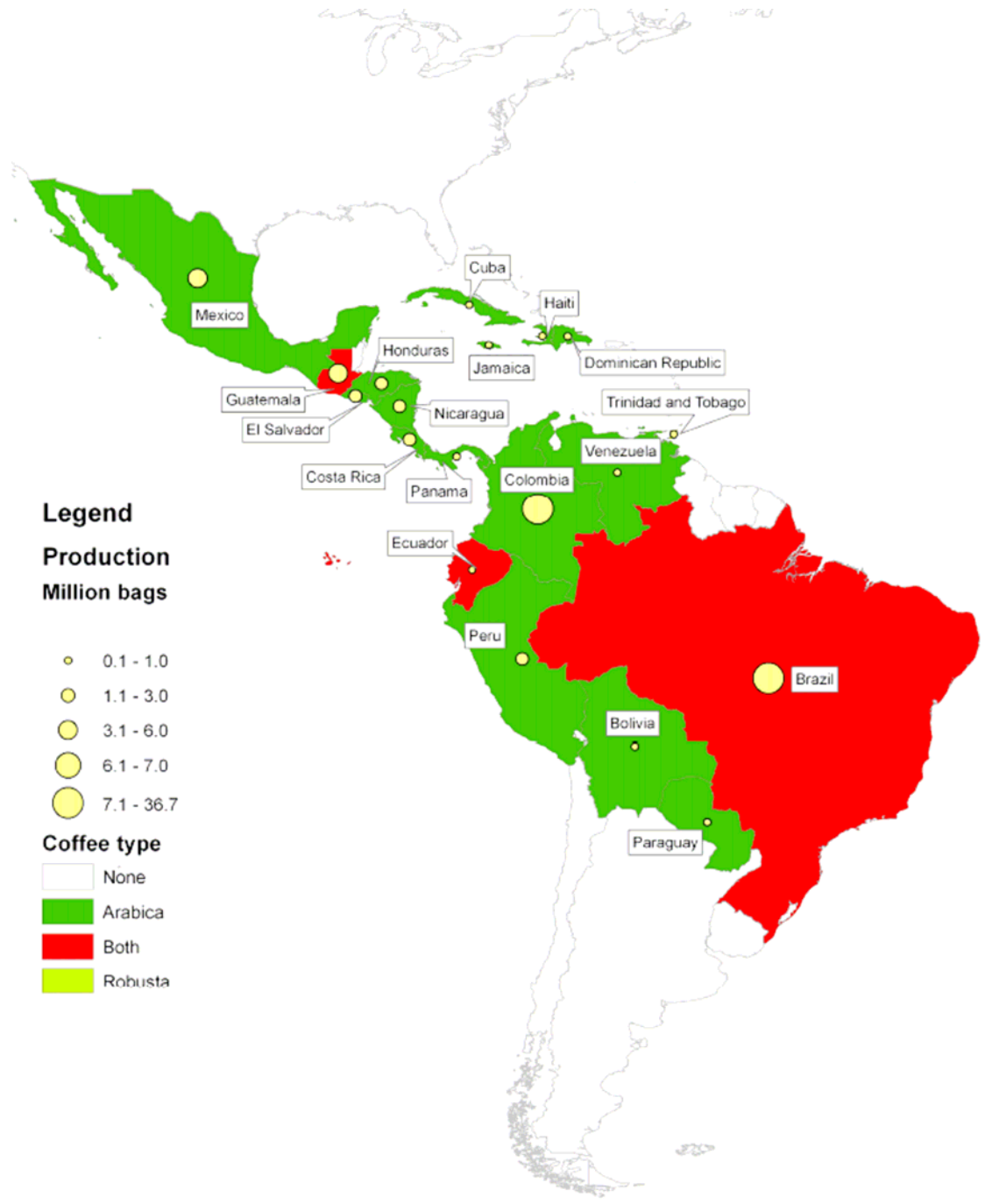
According to the ICO (2006), Latin America accounts for 50 percent of global output, followed by Asia with 23 percent, North America with 14 percent and Africa with 12 percent. More than half of global coffee production is accounted for by three dominant coffee producers, namely Brazil with 31.3 percent, Vietnam with 20.5 percent, and Colombia with 10.2 percent, measured between 1996 and 2006. In the same period, Indonesia with 6.5 percent, Mexico with 4.2 percent, India with 4.1 percent, Guatemala with 3.8 percent, Ethiopia with 3.4 percent and Côte d'Ivoire with 3.1 percent together accounted for 27.8 percent of world production, and when added up, these ten giant coffee-producing countries control 80 percent of world production.

Coffee is a seasonal crop, and its production varies from country to country, starting and finishing at different times throughout the year. World coffee production is categorised into three seasons or 'coffee years'. The season of production or coffee year for the first group of countries begins in April and ends in March. Under this season there are thirteen coffee-producing countries that on average account for forty-three percent of the world's production. The coffee year for the second group of countries runs from October to September and this group embraces about thirty-two countries and accounts on average for fifty-four percent of the world's production. The third season of production begins in July and ends in June. This season comprises only eight countries and accounts for three percent of the world's production. The subsequent section discusses production by region and by type of coffee.

### **3.2.1 Coffee production in North and South America**

Coffee is indigenous to Africa, with Arabica coffee originating in Ethiopia and Robusta on the Atlantic Coast (Koulou region and in and around Angola) and the Great Lakes region (ITC, 2002). The bulk of the world's coffee, however, is produced in Latin America and particularly in Brazil, which has dominated world production since 1840. The history of coffee production, trade and price fluctuation around the world cannot be explained without discussing the situation in the Latin American countries, especially the Brazilian coffee sector. Brazil has remained the world's 'coffee power' for centuries.

Brazil began growing coffee some 250 years ago and quickly increased its production to the point where it dominated the market (ITC, 2002).



**Figure 3.1: Coffee production in North and South America: by type and volume**

Source: Prepared by GIS centre of UFS based on ICO database (2007)

As quoted by the ITC (2002), the earliest available statistics for Brazil indicate that in 1852 world production totalled 4.6 million bags, with production in Brazil accounting for 2.4 million bags. By the year 1900 world production totalled 15.4 million bags, with Brazil's production accounting for 11.3 million bags. Six years later (in 1906) Brazil's production was up to 20 million bags and coffee was responsible for seventy percent of the country's foreign exchange earnings. This massive jump in production was short-lived, as in subsequent years it returned to 11 million bags. In the 1950s Brazil accounted for more than fifty percent of the world production of coffee and in 1959 it produced its highest recorded crop of 44.1 million bags. Since then the annual production of coffee in Brazil has averaged 25-35 million bags. In 1987/88 and 2006 its production hit 42.1 and 42.5 million bags respectively.

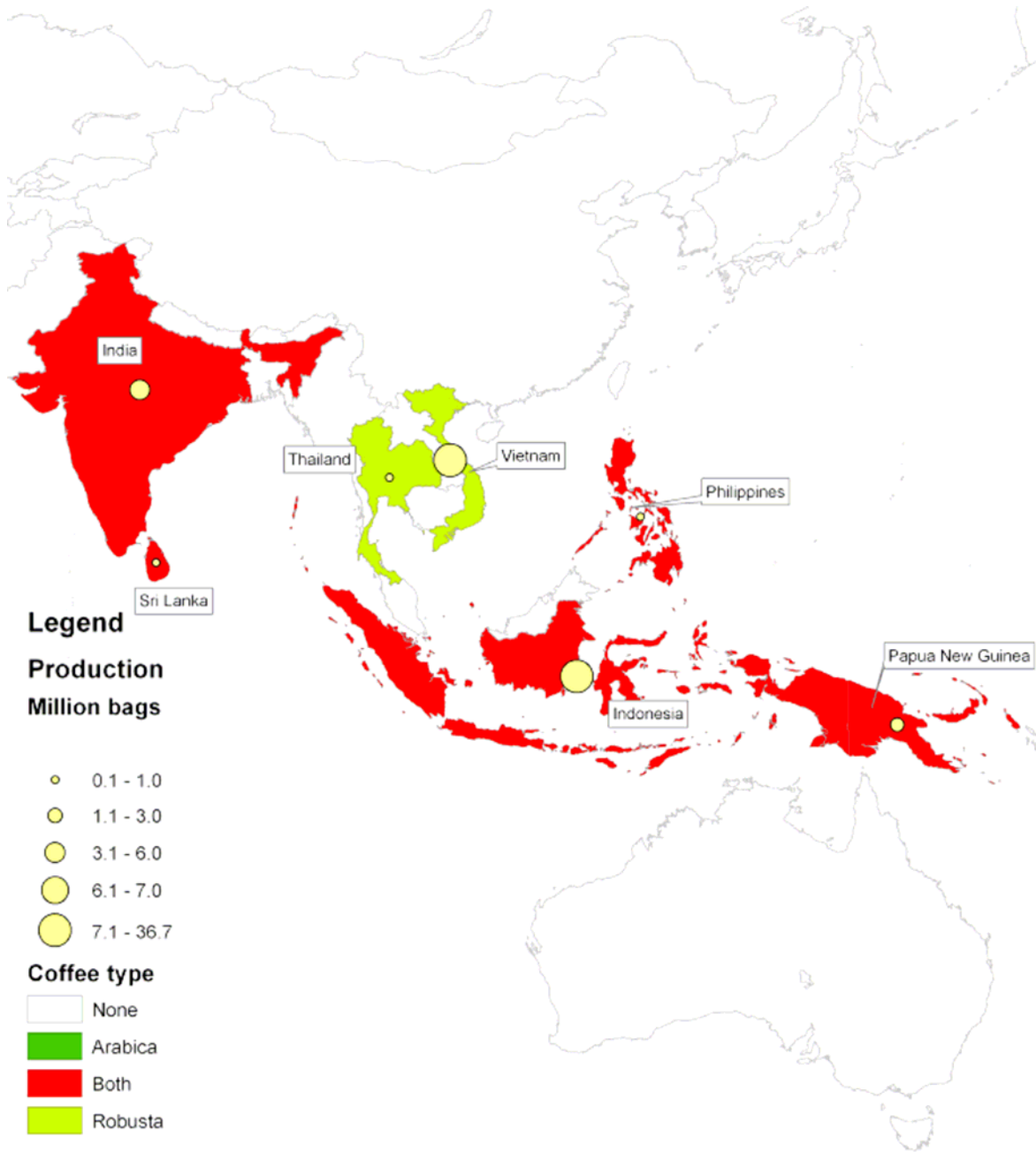
Colombia was the second-largest world coffee producer until 2000 when it was overtaken by Vietnam. Colombia is now the third-largest exporter, exporting 9 million bags in 2006. Colombia is also by far the world's largest producer of washed Arabica. Mexico and Guatemala are the largest coffee producers in Northern America. Mexico is purely an Arabica producer while Guatemala produces both Arabica and Robusta. Between 1990 and 2006, on average the North American coffee-producing countries accounted for 17% (18 million bags) while South American producers accounted for 47% (50 million bags) in the same period, with the two continents together accounting for 64% (68 million bags).

### **3.2.2 Coffee production in Asia**

In Asia, the countries of Vietnam, Indonesia and India are the most prominent coffee producers. Asia on average accounted for 21% (22.5 million bags) of world coffee production between 1990 and 2006. Of this, about 14% was contributed by Vietnam. Coffee production by Papua New Guinea, Thailand and the Philippines accounted for only a small share of regional production. The Vietnamese coffee industry has been recording spectacular growth since the early 1990s, with production rising from merely 0.13 million bags in 1981 to 1.31 million bags in 1991 before jumping to 15 million bags

in 2006, according to ICS ICO statistics. Indonesia is the second-largest producer of coffee in Asia, with production rising from 5.9 million bags in 1981 to 8.5 million bags in 1991 before dropping to 6.9 million bags in 2006.

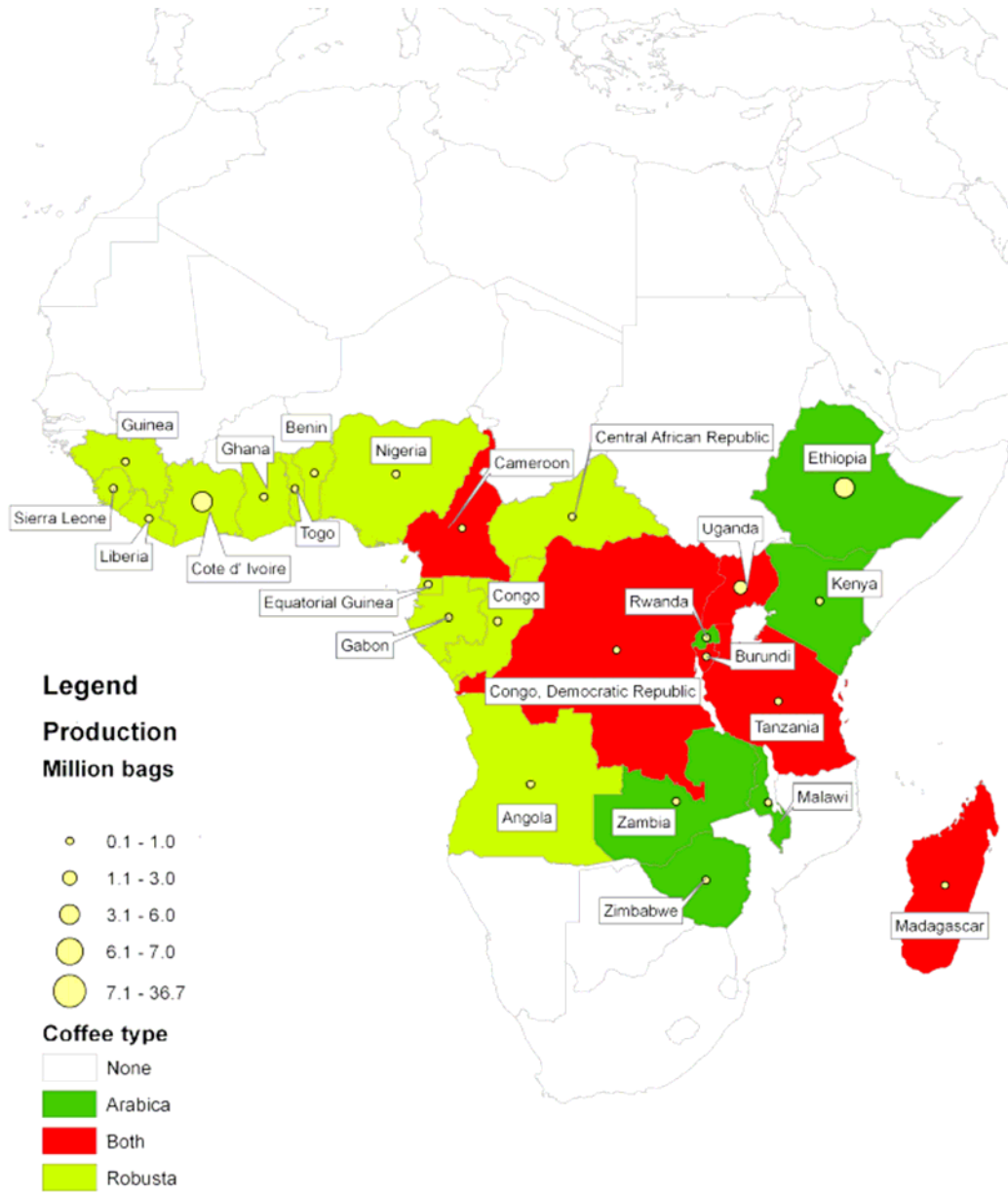
India has also recorded moderate growth in its coffee production, with production increasing from 3 million bags in 1991 to 5 million bags in 2006.



**Figure 3.2: Coffee production in Asia: by type and volume**  
Source: Prepared by GIS centre in the UFS using ICO database (2007)

### 3.2.3 Coffee production in Africa

Africa's coffee production is characterised by a large number of countries (25), each accounting for a small share of world production. Africa had a 25% share of world production in 1986, which dropped to 13% in 2006. Africa's average share of world production between 1990 and 2006 remained at 15% (15.5 million bags). Of this, Ethiopia and Cote d'Ivoire accounted on average for about 50% of Africa's production.



**Figure 3.3: Coffee production in Africa: by type and volume**  
Source: Prepared by GIS centre of UFS based on ICO database (2007)

The remaining 23 countries contributed the balance of production. In addition, West Africa's production of coffee is dominated by Robusta, while East Africa's production is dominated by Arabica and Central Africa produces both types.

The three countries of Cote d'Ivoire, Ethiopia and Uganda together account on average for 65% of Africa's coffee production. Cote d'Ivoire was the largest coffee producer in Africa until 1999, when it produced 6.9 million bags, but then its production dropped to 2.3 million bags in 2006. Since 2001 Ethiopia has been the largest producer in Africa with production rising from 3.7 million bags in 2001 to 5.5 million bags in 2006. The rest of the producing countries have shown little change in their production volume.

### **3.3 Policy changes and production trends**

#### **3.3.1 International policy change**

Regulation of coffee supplies at international level has a long history. According to Baffes, Lewin and Varangis (2005), calls for supply controls were made as early as 1902 following the price declines due to Brazil's oversupply. At least three successful stabilisation schemes took place in Brazil between 1905 and 1921. However, the coffee market depressed following the stock market crash of 1929, also known as the Great Depression. Attempts by Brazil to convince other coffee producers to coordinate supply-containing mechanisms failed. Brazil then introduced a number of coffee destruction schemes. Between 1937 and 1938, a total of 68.7 million bags were destroyed, which is twice the annual global output. Following the years of weak demand from Europe during the Second World War, Brazil negotiated two agreements with other producing countries in Latin America to maintain relatively reasonable prices for producers, but those agreements were largely unsuccessful, since the countries that agreed to restrict their exports in return for Brazil's coffee stock failed to respect their commitment.

In 1962 the International Coffee Organization (ICO) was created to establish and monitor an international export quota system. The ICO had a profound impact on the world coffee

market until its collapse in June 1989 (Oxfam, 2002). Most coffee-producing countries (accounting for 97 percent of world coffee production) and most coffee-importing members of the Organization for Economic Cooperation and Development (OECD) were members of the ICO (Akiyama, 2001). The aim was to keep the price of coffee relatively high and stable, within a threshold price band or 'corset' ranging from US cents 120/lb to US cents 140/lb. To prevent oversupply, producing countries had to agree not to exceed their fair share of coffee exports. In other words, the ICO attempted to stabilise prices through mandatory export quotas under the International Coffee Agreements (ICAs). If, however, prices rose above the ceiling level, producers were permitted to exceed their quota to meet the surge in demand (ICO, 2004). For instance, the ICAs were temporarily suspended in 1972 as coffee prices soared before being restored in 1980 and suspended again in 1986 due to soaring prices. The ICAs were reintroduced in 1987 and suspended indefinitely in July 1989.

The quota system worked relatively well by maintaining relatively high and stable prices and significantly strengthening the economies of coffee-producing countries while enhancing the development of international trade and cooperation. It collapsed mainly because members were unable to agree on a way to control exports to non-members and to distribute quotas for Arabica and Robusta. Opposition from the US, which subsequently suspended its membership, was a major factor. Following the collapse of the ICAs, some coffee-producing countries, including Brazil and Colombia but not Vietnam and Mexico, formed the Association of Coffee Producing Countries (ACPC) in September 1993 to regulate coffee exports and raise world coffee prices, but it had limited acceptance from several important exporting countries. Moreover, the agreements were overtaken by price rises and hampered by Brazilian frosts in 1994. During 2001/02 the ACPC tried but failed to persuade coffee-producing countries to retain part of their export, and then it was effectively dissolved in February 2002. The principal reason for its failure was that in a liberalised market, competitive coffee growers showed no interest in adhering to the voluntary compliance principles of the ACPC. Since the early 1990s, the world coffee production and marketing system has been fully transformed into a free marketing system. Over and above, due to pressure from the International Monetary Fund

(IMF) and World Bank (WB), almost all coffee-producing countries liberalised their domestic coffee production and marketing systems.

### **3.3.2 Domestic policy change**

The governments of coffee-producing countries in Sub-Saharan Africa (SSA), Latin American and Asia long considered state control of marketing and pricing systems necessary due to coffee's importance as a source of foreign exchange and government revenue. Latin American coffee producers such as Brazil and Colombia controlled prices and exports even before World War II in order to raise world coffee prices. This intervention prevailed until the early 1990s, creating several distortions (Akiyama, 2001). According to Akiyama (2001), in 1985, of the fifty-one world coffee-producing and exporting countries, only fifteen had private marketing systems. Twenty-five countries sold coffee through state-owned enterprises and eleven countries had mixed state and private-sector marketing bodies. Most aspects of coffee marketing and trade, especially in Sub-Saharan Africa, were handled by government-controlled agencies, which typically resulted in heavy taxation of the sector.

During the 1990s many coffee-producing countries deregulated their markets by removing or redefining the role of state parastatals and the private sector in their economies. This deregulation revamped the market structures and eliminated or refashioned the mandates of key institutions. Commodity market deregulations are intended to boost an economy's efficiency – that is, to enhance the productivity of human talents and physical assets. Governments generally take a number of steps to achieve these goals in commodity markets. These measures include eliminating marketing agencies and statutory monopolies in the output and input markets, replacing prices set by the government with prices determined by the markets, reducing explicit and implicit taxes, and providing marketing and processing assets. Although some researchers have pointed out that the results of reform seem to be mixed in the sector (see Akiyama, 2001; Krivonos, 2004), reform has undoubtedly stimulated significant private investment in the marketing, processing and transportation sectors.

The impact of the above policy changes at international and domestic level is expected to have an impact on world coffee production, export and consumption. The subsequent sections (3.3.3, 3.4 and 3.5) discuss these issues.

### **3.3.3 Impact on world production trends**

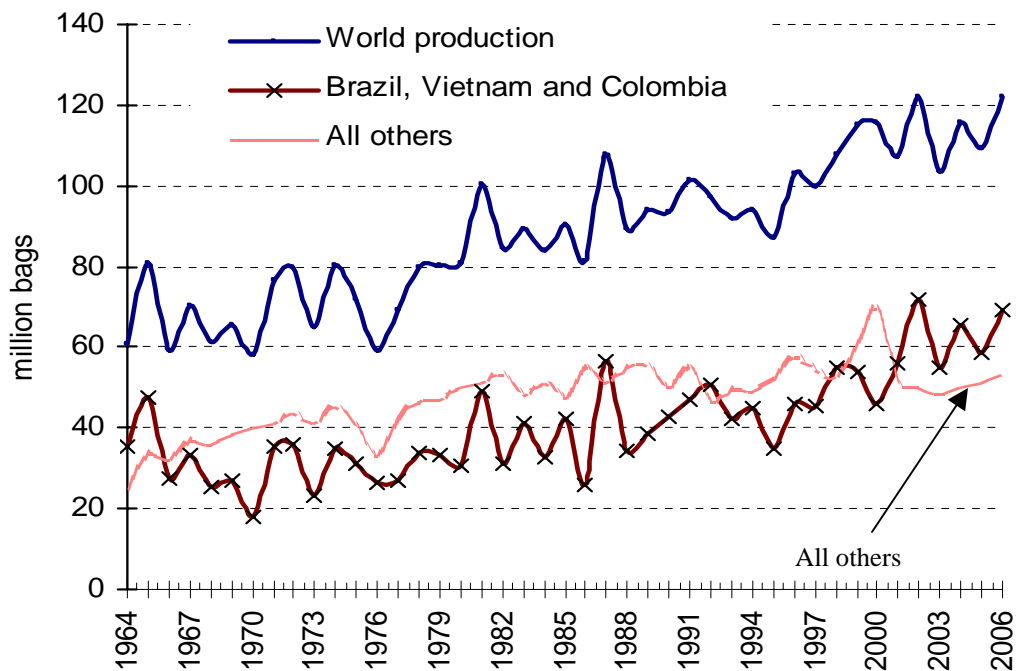
The collapse of the ICO quota system coupled with liberalisation measures stimulated coffee-producing countries to produce and export large quantities of coffee and also clear out their accumulated stock. This is mainly beneficial to major world coffee producers like Brazil, Vietnam, Colombia and Indonesia. Other countries have also expanded production due to periods of profitable prices in the 1990s. Coffee production is no longer managed by the marketing boards of producing countries or by international agreements. Although liberalisation certainly raises the farmers' share of these higher market prices, in many cases it adds to the incentive to expand and be exposed to market price volatility.

Brazil and Vietnam have reshaped the world's coffee supply. Vietnam, the current 'hidden power' of world coffee supply, was barely producing just 77,000 bags in 1980. Its agricultural economy was opened to the world market during the 1990s, with the government providing irrigated land and subsidies to encourage resettlement by farmers into coffee production. By 2000 it had become the largest producer in the world with 15 million bags, largely produced by smallholder farmers (Daviron & Ponte, 2005).

Brazil, on the other hand, has long been the world's largest producer, but production has recently been boosted by changes in how and where coffee is grown. Increased mechanisation, intense production methods, and a geographical shift away from the traditional, frost-prone growing areas have all served to increase yield and reduce fluctuation in the level of production by reducing weather-related risk. This drastic increase in productivity and reduction of risk in the Brazilian coffee production system has had a substantial impact on traditional coffee-producing countries, since they face competition from unprecedented levels of productivity. For instance, in some areas of

Guatemala, it could take over 1,000 people working for one day each to fill the equivalent of one container of 275 bags, each bag weighing 69 kilograms. In the Cerrado of Brazil, five people and a mechanical harvester would take two to three days to fill the same container (Oxfam, 2002). This has made it extremely difficult for smallholder farmers to compete against modern coffee powers.

The above-mentioned changes in the production systems of Brazil and Vietnam have resulted in a significant structural changes in the world coffee economy. One area of structural change is in the nature of supply, particularly increases in both the quantity and quality of Brazilian and Vietnamese coffees. Brazil, Vietnam and Colombia accounted for about 29 percent of total production in 1985 (when Vietnam contributed only 0.13 million bags), growing to 50 percent in 1990, 67 percent in 2001, and 63 percent of global exports in 2006 (see Figure 3.4).



**Figure 3.4: World coffee production trends (1964 – 2006)**

Source: ICO database (1964-2006)

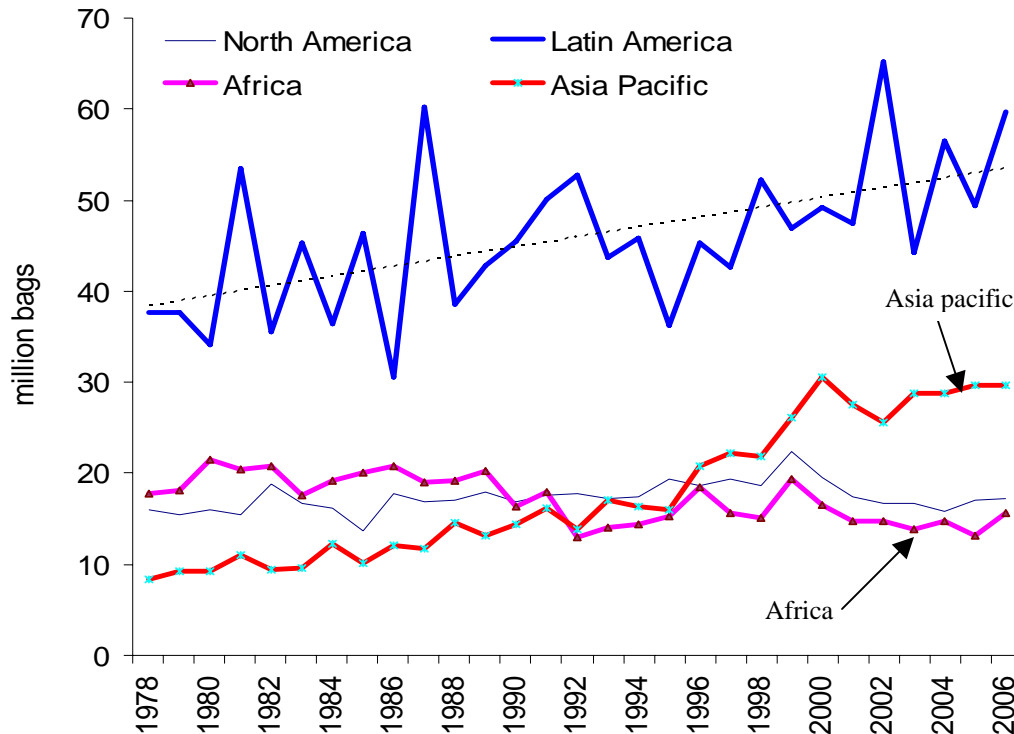
This figure is likely to increase unless there is a significant reversal in the production decline in other countries. For some roasters, these three suppliers can provide almost

everything they need, leaving them to buy only small amounts of coffee from other countries, with each one having strengthened its domination of a different market segment. The increased access to financial and future markets, particularly in countries such as Brazil, has enabled some producers to better manage risk. This will have an impact on supply, making it easier to smooth shipments across wide cyclical production swings that occur particularly in Brazil (Lewin *et al.*, 2004).

The world production share of Latin American countries (including Brazil) is, however, in decline, falling from around 53 percent in 1981 to 48 percent in 2006. This has been mainly due to increases in production in other regions, especially in Asian and Pacific countries, where production has grown relatively steadily from a less than 10 percent share in 1980 to 27 percent in 2005. The largest increase has occurred in Vietnam, where annual production grew from 73,000 bags in 1980 to 29.7 million bags in 2006. During that same period Africa's production exhibited a downward trend (or a decreasing share of world production). For instance, Africa accounted for about 27 percent of world production in 1980, but since then its share of production has oscillated quite widely, dropping to 13 percent in 2006 (see Figure. 3.5).

Africa's production has never again achieved its 1970s level, while Asian and Latin American countries have all exceeded their 1970s levels. Africa's declining trend in the share of world production perhaps instigates an exploration of the major constraints behind its declining production. The major reasons could simply be categorised into supply-side and demand-side factors. On the supply side, in Africa, technological progress is extremely limited in both production and processing areas, which is why for centuries the average yield per hectare remained at 400 to 700 kilograms for Arabica, while Brazil was producing about 1,500 kilograms (FAO, 2005). With the introduction of the market liberalisation programme, all extension, credit and input services delivered by the government have now been banned. In addition, the private sector is not active and motivated to deliver such services effectively. In many poor coffee-producing countries, coffee trees are old, which has a direct effect on production. The most important costs,

like those associated with harvesting, processing and marketing, are tremendously high, forcing some producers out of the coffee market.



**Figure 3.5: World coffee production trends by region (1977-2006)**  
 Source: ICO database (1978-2006)

The demand-side and marketing-side constraints facing African producers are even more severe. As in other regions, coffee producers, dealers and exporters face significant short-term fluctuations in international coffee prices and resulting market volatility. Low international coffee prices discourage farmers from adopting improved cultivation practices or investing in new planting. Moreover, their crops are subject to adverse weather damage, and coffee berry disease (CBD) and other disease contamination is a common problem. The prolonged period of low prices is seriously impacting on producers who are unable to cover the costs of production and harvesting. Growers are losing rather than making money out of coffee cultivation.

These intertwined factors push African coffee farmers to look for alternative routes for their coffee marketing. Coffee smuggling is a frequent phenomenon between neighbouring countries with wide price differences. For instance, smuggling usually occurs from Tanzania to Kenya and Uganda, from Ethiopia to the Sudan and Djibouti, and from Côte d'Ivoire to Guinea and Mali, adversely affecting foreign exchange earnings and government income and discouraging investment in the sector (ITC, 2001).

As stated by Talbot (2004), though there has been extensive rehabilitation of major road systems after the reform, many smaller feeder roads connecting farmers with the main road are in poor condition. Over and above this, adding value to green coffee through processing takes place in the consuming countries. Processing in producing countries is highly constrained by the oligopolistic structure of the market. In the world coffee trade, the manufacturing of roasted and instant coffee is increasingly concentrated in the hands of a very small number of international companies. The sophistication needed to undergo the process of securing organic certification (a process lasting 2-3 years) gives a greater advantage to relatively developed Arabica-producing countries in Latin America than to countries in Africa. Limited access to financial and futures markets, particularly in Africa, is another problem. These could be some of the reasons for the downward trend in Africa's share of world coffee production.

### **3.4 World coffee exports**

Exports from producing countries have fluctuated with production and, to a limited extent, with attempts to manage stock flows. The two most significant drops in exports reflect firstly the 1976 drought in Brazil and secondly the frost and drought of 1994, which came at the end of a period of falling production following the collapse of the ICO agreement and the subsequent price fall of 1989.

For the period extending from 1962 to 1989, the world coffee trade was controlled by a group of importers and exporters through a series of international coffee agreements (ICAs). Each year, the ICAs set export quotas and indirectly regulated coffee prices.

Under this quota system, each producing country was given a percentage share of the market for importing member countries. However, disputes over coffee sales to non-ICA-member countries and the inability of the ICA quota system to deal adequately with the problem of availability of the different types of coffee led to the breakdown of these agreements. Without quotas, major exporters with excess production and export capacity began to sell aggressively, resulting in a sharp drop in world coffee prices in 2001/02.

World coffee exports from ICO member countries doubled between late 1977 and 2004 (ICO, 2006). In this period, exports increased from a mere 48.9 million bags to 90 million bags (Table 3.1). Among the ICO member countries, Brazil, Colombia and Vietnam accounted for the lion's share of exports. For instance, between 1977 and 1989, these three countries accounted for 55.9 percent of total exports, while in the post-ICA period (1990-2006) their share grew to 63.9 percent. Robusta historically accounted for less than 30 percent of the world's total production, but grew to 36 percent in 2000 and since then has occupied levels above 35 percent. Its export share grew to 38 percent in 2000 and remained above 34 percent until 2005 (see Table 3.1). This increasing share of Robusta mainly from Vietnam has changed the structure of the world coffee market.

On the other hand, export trends between ICO quality groups have shown changes – Brazilian Natural Arabica exhibited substantial growth from 18.2 million bags in 2000 to 27.7 million bags in 2005, whereas Other Mild Arabica (predominantly) produced by North American countries underwent a major decline in the same period.

Far too little processing and packing (value adding) of coffee takes place in producer countries, which means that very little of the potential value of the coffee is captured there. In 2001/02, a staggering 94 percent of all coffee exported from developing countries crossed the border in green bean state. Most of the remaining six percent that had been processed came from Brazil, India and Colombia. The progressive nature of tariffs on processed coffee (tariff escalation) applied by the European Union and other importing countries to protect their national roasting industry is clearly a limiting factor when it comes to the growth of value adding in exporting countries (ICO, 2007).

**Table 3.1: World coffee production and export in million bags (2000-2005)**

Years	2000	2001	2002	2003	2004	2005
<i>Total Production</i>	115.3	106.6	121.8	104	114.0	106.9
Colombian Mild	12.2	13.4	13.3	12.3	13.3	12.5
Other Milds	29.2	27.1	26.5	26.7	26.0	26.6
Brazilian Naturals	32.3	28.8	42.7	26.0	39.6	30.1
Robusta	41.6	37.3	39.3	39.0	35.2	37.6
<i>Domestic Consumption</i>	26.2	27.5	27.8	28.5	29.4	30.4
Colombian Mild	1.5	1.4	1.5	1.4	1.4	1.5
Other Milds	5.1	5.6	5.5	5.6	5.8	5.8
Brazilian Naturals	12.3	11.8	12.8	11.7	14.0	13.4
Robusta	7.3	8.7	8.0	9.7	8.1	9.8
<i>Exportable Production</i>	89.0	79.0	94.0	75.5	84.6	76.5
Colombian Mild	10.7	11.9	11.9	10.9	11.8	11.0
Other Milds	24.0	21.6	21.0	21.0	20.0	20.9
Brazilian Naturals	19.9	16.9	29.8	14.3	25.6	16.7
Robusta	34.3	28.6	31.3	29.3	27.0	27.9
<i>Total Export</i>	87.7	85.3	90.0	87.6	89.3	87.5
Colombian Mild	11.3	11.8	11.8	11.4	12.2	11.9
Other Milds	24.0	21.4	21.6	20.8	20.4	20.3
Brazilian Naturals	18.2	22.9	25.9	23.9	27.7	26.5
Robusta	34.1	29.2	30.7	31.5	28.9	28.9
<i>Arabica vs. Robusta</i>						
Arabicas	53.5	56.1	59.3	56.1	60.3	58.5
Robustas	34.1	29.2	30.7	31.4	29.0	28.9

Source: ICO database (2005)

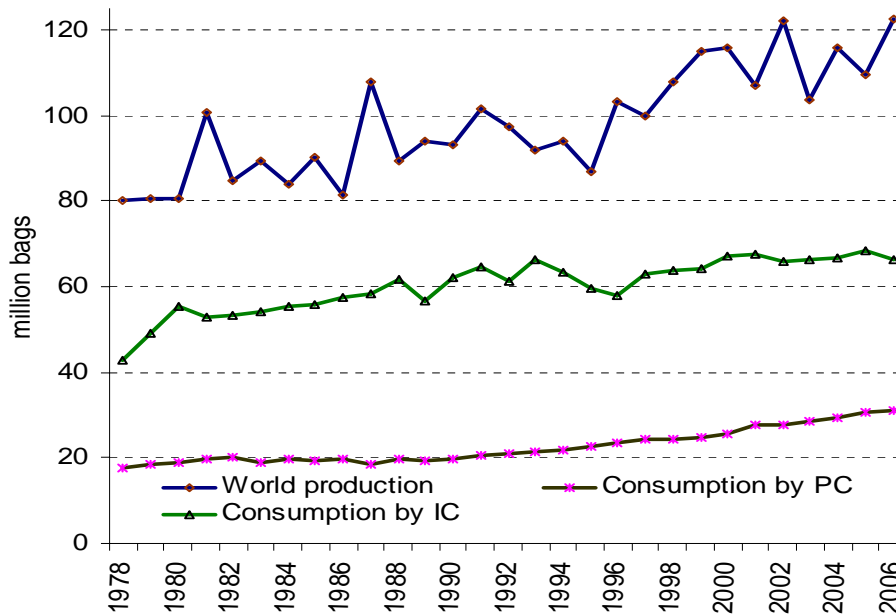
China, traditionally a tea-consuming country, levies 8 percent import duty and 20 percent value-added tax (VAT) even on green coffee imports. China with its large population seems to be a potential market for the expansion of future coffee consumption if current policies are minimised.

### 3.5 World coffee consumption

#### 3.5.1 Consumption trend

Coffee is consumed in both producing countries (PC) and non-producing or importing countries (IC). Only five producing countries consume a substantial portion of their annual output, namely Ethiopia (48 percent), followed by Brazil (35 percent), Mexico (32 percent), Indonesia (24 percent) and Colombia (12 percent), which together have accounted for about 20 percent of global output on average for the past three decades (1977-2006). The remaining 80 percent is internationally traded.

As stated by ITC (2002), among importing countries, the United States of America consumes about 18 percent of global output, followed by Germany (9 percent), Japan (6 percent), and France and Italy (5 percent each). The coffee consumption pattern in importing countries is a more important area of concern. Consumption in importing countries showed smooth upward growth between the early 1980s and the end of the 1990s (Figure 3.6). Despite low world coffee prices in 2000s, consumption remained stagnant.



**Figure 3.6: World coffee production and consumption trends**

Source: ICO database (2006)

Table 3.2 presents per capita consumption of coffee by major coffee producing and importing countries for period 1975-2006. On a per capita basis, the Scandinavian countries consume about 10 kilograms per year, followed by Germany (8 kilograms) and France, Italy and Spain (approximately 5.5 kilograms each). Per capita consumption in the US fluctuates between 4 and 5.5 kilograms, while in the United Kingdom it has fluctuated between 2.5 and 3 kilograms over the past two decades. In growing strategic markets such as Japan it has shown a promising trend. Japan's per capita consumption grew from 1.4 kilograms in the 1970s to 2.16 kilograms in the 1980s before rising sharply to 2.86 and 3.3 kilograms in the 1990s and early 2000s. Consumption of coffee in non-traditional coffee-consuming countries such as China has remained negligible (Table 3.2).

**Table 3.2: Per capita coffee consumption (kilograms per year)**

	1975-1980	1981-1990	1991-2000	2001-2006
World Average	1.1	1.08	1.04	1.1
<b>Major producing and consuming countries</b>				
Brazil	3.6	3.33	3.93	4.6
Ethiopia	2.9	2.13	1.45	1.5
Mexico	1.4	1.28	0.77	0.9
Indonesia	0.5	0.44	0.52	0.6
Colombia	3.4	3.17	2.26	1.93
Costa Rica	5.5	5.91	5.07	3.7
Canada	4.2	4.22	4.52	4.4
<b>Major consuming countries</b>				
United States	5.0	4.49	4.05	4.1
Germany	5.5	6.85	7.36	6.7
Japan	1.4	2.16	2.86	3.3
France	5.6	5.71	5.59	5.5
Italy	3.7	4.48	4.98	5.5
United Kingdom	2.1	2.49	2.53	2.2
<b>Scandinavian and other countries</b>				
Sweden	12.0	11.61	9.57	8.2
Netherlands	7.9	9.6	8.61	6.5
Switzerland	5.8	6.87	7.41	7.1
Finland	12.7	12.53	11.34	11.1
Denmark	11.4	10.89	9.82	8.9
Norway	9.7	10.37	9.86	9.2
Spain	2.45	3.26	4.41	4.42

Source: ICO database and UN Population Division (<http://www.un.org/population/>) (1975-2006)

Note: Per capita consumption for importing countries is total import less re-export divided by population.

### 3.5.2 Factors influencing coffee consumption

As indicated above, while coffee production has grown rapidly, the demand for coffee in the developed world and in producing countries has seen sluggish growth, although newer markets such as Eastern Europe show greater promise. The major coffee companies spend millions of dollars on advertising each year, but have failed to increase consumption to the desired level (Oxfam, 2002). There are several economic and social factors influencing coffee consumption, including income, price, lifestyle, diet and competition from other beverages, changes in processing technology, health-related fears, etc.

As numerous studies have shown (Baffes *et al.*, 2005; Lewin *et al.*, 2004; World Bank, 2002) there are drastic changes taking place in processing technologies. For instance, new technological progress enables the roaster to remove the harsh or bitter taste from Robusta coffee, achieving the same level of quality with lower-quality beans. Roasters have also been more flexible in their ability to make switches between coffee types, implying that the premiums commanded by certain best-quality types of coffee cannot be retained for long. In other words, roasters use more Robusta and blend it with minimal amounts of Arabica in order to reduce cost and increase return. Such a shift to low-quality Robusta coffee could perhaps affect consumers' taste and therefore demand.

On the other hand, income is an important factor affecting the demand for coffee. In many ways this is not surprising, especially as coffee is still perceived by many to be a luxury item, especially in low-income countries and amongst low-income groups. There is clear evidence that consumption is highly dependent not only on absolute income levels, but probably more importantly on changes in real income levels (ITC, 2002). In countries that have a history of coffee consumption, there seems to be a direct correlation between income level and consumption level. For example, the highest per capita consumption is found in Scandinavia, the Netherlands, Sweden, Denmark and Finland, which also enjoy a relatively high per capita income.

Clearly, habit and tradition play a significant role in determining the overall level of consumption in a country, but it is most noticeable in those countries that have a long tradition of drinking coffee although they have a much lower per capita income (e.g. Ethiopia). As a general rule, change in real income has a greater effect on low-income countries than high-income countries. For instance, Spain has witnessed relatively rapid growth in the consumption of coffee per capita over the past three decades and has also experienced a fairly impressive rate of growth in its disposable income per capita, whereas in many Scandinavian countries consumption has remained static or dropped, although real income levels continue to rise.

While price and income are obviously major factors in determining the demand for coffee, it is difficult to ignore the effect of other factors – such as competition from alternative beverages, adverse publicity as a result of various health studies, advertising, or lifestyle – on overall consumption. Apart from its traditionally recognised role as an everyday beverage that is frequently seen as a stimulant and an aid to alertness, coffee is also seen as a social lubricant fulfilling any necessary function that enables people to socialise. “Let’s go for coffee” is a phrase often used to cover a general request for an informal get-together, regardless of whether or not coffee is to be consumed.

Coffee faces strong competition from the soft-drink industry. Over the past thirty years or so, soft drinks have become more popular, invariably at the expense of coffee, especially among young people. For example, in 1970 the annual per capita consumption of soft drinks in the United States was 23 gallons, while in 2000 it exceeded 53 gallons. Simultaneously, the annual per capita consumption of coffee declined from 36 gallons in 1970 to 17 gallons in 2000 (Oxfam, 2002). On the other hand, in Germany, coffee remains the most popular beverage and although the consumption of herbal teas, fruit juices and mineral water is rising, it does not appear to be doing so at the expense of coffee. In Japan, however, coffee is gaining ground at the expense of other beverages (ITC, 2002).

The relationship between coffee and health seems not to have been properly understood due to a lack of information among both the general public and health personnel. The stigma attached to caffeine's effect on health in some way concerns fibrocystic breast disease and an increase in the risk of suffering from a heart attack and different forms of cancers. However, the International Agency for Research on Cancer (IARC), following a rigorous study to ascertain whether there is as correlation between coffee consumption and different forms of cancer, identified no causal effect between coffee consumption and cancer (IARC, 1991). In fact, recently more and more studies have found that coffee may have some beneficial health effects – such as helping to relieve stress, inhibiting viruses that cause cold sores, measles and polio, and preventing some types of cancer. Unfortunately, this positive information fails to gain wide publicity (ICO, 2003). To allay consumers' fears in respect of caffeine, efforts have been made to develop coffee varieties with a low caffeine content in the Democratic Republic of Congo and the Central African Republic, and if successful will make a substantial contribution to the promotion of coffee consumption (Kotecha, 2002). Moreover, recent findings show that certain coffee germplasms among Ethiopian collections are naturally caffeine free (Ewing, 2004). This is a great opportunity for all producers and consumers to acquire naturally caffeine-free coffee and avoid health fears amongst consumers and reduce the cost of decaffeination for processors. Therefore, generic promotion campaigns together with substantial investment in research and the development of coffee from plant-to-cup are extremely important in expanding coffee consumption.

It has long been recognised that tariffs and taxes influence coffee consumption. The progressive nature of tariffs on processed coffee (tariff escalation) applied by the European Union and other importing countries seems to be explained by these countries' need to protect their national roasting industries. This is clearly a limiting factor for the growth of value adding in exporting countries, but it does not appear to be a major obstacle to the rise in coffee consumption. The situation of exporting countries continues to be a matter of serious concern, since they have the highest customs tariffs as a means of protecting the national coffee industry. Such measures are not favourable to an increase in coffee consumption. Moreover, special tariff concessions granted to importing

countries for imports from some developing countries are becoming less and less important as the difference between normal and preferential rates narrows (ICO, 2007).

In most traditional coffee-drinking countries, consumption seems to have reached saturation point. In such a situation a fall in price does not entail an increase in consumption over the short or medium term. Improving cup quality, promoting coffee to non-coffee-consuming regions, differentiating coffee by its origin, developing varieties with low caffeine content, and searching for alternative uses for coffee beans other than for human consumption (e.g. for medicinal or brewery uses) could, however, help to increase consumption. Promoting local consumption has a significant price-stabilising effect, and Ethiopia could be a typical example of a country where high local demand often stabilises even when international prices are not promising for producers.

Finally, a small segment of a market has emerged that focuses on product differentiation, such as organic, gourmet, and shape coffee. The implication of all this is that the demand outlook is likely to be different for different coffee producers. That is, if any expansion in coffee demand takes place, it is likely to be at the two ends of the spectrum, namely lower-quality beans (reflecting improved technology and increased demand for soluble coffee) and specialty coffees (reflecting expansion of niche markets).

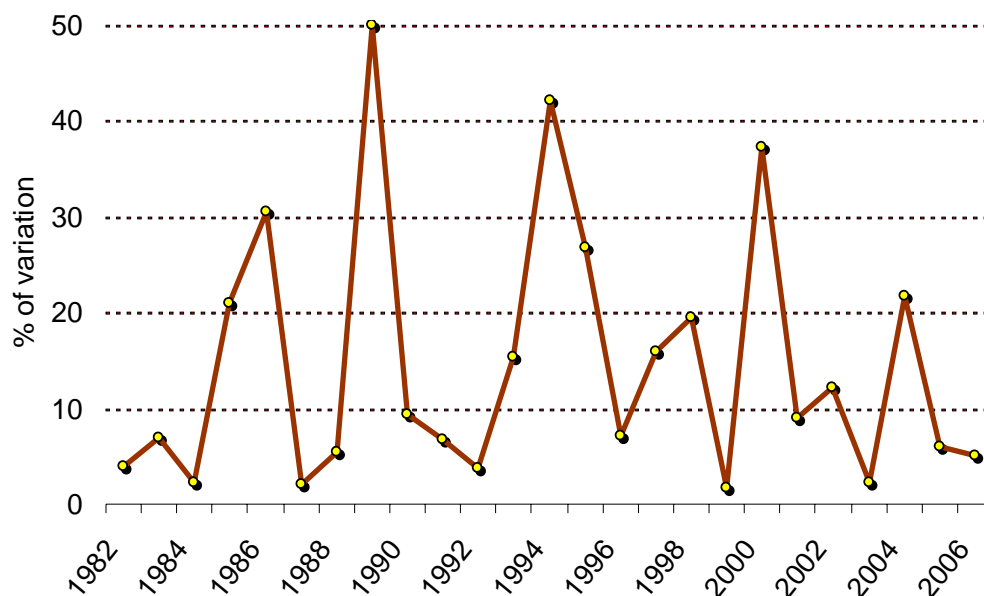
## **3.6 Price volatility**

### **3.6.1 Price volatility and uncertainty**

Price volatility is one of the major concerns of players in the world commodity market, particularly in the case of coffee. For producers it is source of uncertainty to predict ahead how much money they would be earning from their production. For exporters, it affects their decision of how much to purchase, process and export. For traders and stock holders volatility may affect profit margins, making their activities more speculative (ICO, 2005). High price volatility can reduce the welfare of the poor (such as

smallholders and consumers) who have limited price (income) risk management strategies and who spend a large share of their income on food (Karanja, & Kyoro, 2002).

Volatility is a statistical measure of price fluctuations over a given period. It measures the size of increase or decrease over the short term. It does not measure price levels, but rather their degree of variation from one period to the next. Volatility indicates a rapid swing from low to high or high to low prices. Figure 3.7 below depicts annual coefficients of variation for the period 1982-2005. A standard deviation is often used as a simple measure of price volatility. A market without pronounced price fluctuations would be characterised by a low standard deviation and vice versa. The coefficient of variation (CV) is a more appropriate and simple tool for assessing the oscillation of price from average value. CV represents the ratio of standard deviation to the mean and is more useful for comparing the degree of spread between periods.

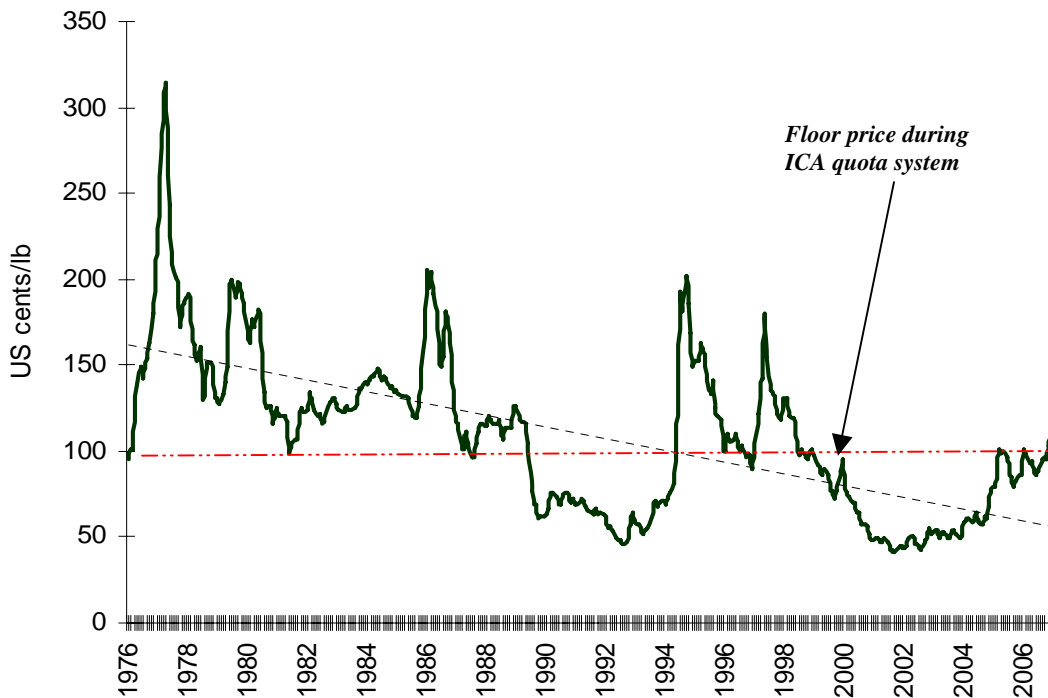


**Figure 3.7: Coefficients of variation of ICO composite indicator price**

Source: ICO database (1982-2006)

The CV for 1989, 1994 and 2000 showed a 50, 43 and 37 percent deviation from the mean price respectively. The simple explanation is that in 1989, for instance, the participants in the sector (producers, traders, and exporters) faced a fifty percent price variation within a single year.

Figure 3.8 illustrates the monthly ICO composite indicator price (CIP) oscillation for the past three decades. In addition to price oscillation, there was a systematic long-term decline in coffee prices for the entire 1976-2006 period and approached its lowest level in 2001/02. For instance, the CIP decreased from US \$6.95 per kilogram in April 1977 to \$2 per kilogram in June 1981. It revived in 1986 and returned to its 1981 level in mid-1989. It remained below US \$2 per kilogram until early 1994 when it peaked to \$4.5 per kilogram. It again experienced a subsequent decline from May 1997 (US \$4.0) to below US \$1 per kilogram in 2001/02. Between January 2001 and December 2003 it reached its lowest level in history (US cents 70/kg or 32 cents per pound), which is often referred to as a period of ‘*coffee crisis*’. The coffee crisis of 2001/02 had serious repercussions. It affected the livelihoods of 25 million coffee producers around the world. The price of coffee fell by almost 50 percent compared to the average price in 1998-2000. It was probably the lowest real price farmers had been paid for coffee in 100 years (Lewin *et al.*, 2004).



**Figure 3.8: Monthly composite indicator price**

Source: ICO database (2006)

The upward pressure on prices during the ICA quota period (1962-1989) was not confined to quota restrictions only, since nature also played an occasional role. Most significant was the frost experienced in Brazil in 1975, after which the CIP reached its highest level in history (339/lb or USD 6.78/kg) in 1979. Similarly, although less severe the 1985 drought in Brazil, also exerted upward pressure. The 1994 frosts in Brazil and the subsequent drought caused an estimated loss of 13 million bags of Brazilian production, resulting in a price rise in 1995, 1996 and 1997. Therefore, historically, a substantial increase in price was caused by frost or drought in Brazil, followed by new cyclic low prices five to seven years later (gestation period for new plantings to bear fruit). The impact of boom and burst cycles is mostly borne by smallholder farmers. In most cases they do not have risk mitigation tools. Over and above, since investment in coffee production is characterised by a high proportion of fixed investment (coffee trees), it is not easy to shift resources to other alternative products.

### **3.6.2 Producer share of export price**

The lion's share of coffee produced by smallholders is located on the four main continents of the world. Such smallholders historically received a very small share of the export price of green coffee. One reason often mentioned in the literature is heavy government intervention in the sector. Government regulation of domestic markets in the form of fixed producer prices and the monopolistic power of marketing boards, which place a substantial wedge between producer prices and the world price of coffee, imposes an implicit tax on producers (Krivonos, 2004). As indicated in earlier discussions, many coffee-producing countries in Sub-Saharan Africa, Latin America, Central America and the Asia-Pacific region undertook market reform during the 1990s as part of the structural adjustment programme (SAP). The outcome of these reforms continues to be debated, but some common trends noted in the literature include a high proportion of export price paid to farmers, increased price volatility following the abolition of price stabilisation mechanisms, more constrained access to credit for farmers and traders, more involvement of the private sector and loss of market share of cooperatives and former parastatals, as well as deterioration of the quality and concentration of market power (Petit, 2006).

Table 3.3 presents the producer share of export or FOB price pre-reform and post-reform and during the coffee crisis (in 2001/02) using ICO's price data for selected coffee-growing countries. In the pre-reform period (1965-1990), producers in Africa received about 50 percent of the FOB price, which was the lowest amongst all the regions. Producers in Latin America were receiving above 70 percent of the export price during that same period, while producers in Côte d'Ivoire, Ethiopia, Uganda and Burundi were receiving 42, 45, 46 and 50 percent of export price respectively, which was lower than their counterparts. Similarly, producers in the Asia Pacific region were also receiving a lower FOB price share, with the exception of Vietnam, which was largely subsidised by the government.

**Table 3.3: Producer share of FOB price (1965-2006)**

Region	Country	1964 -1990			1991-1999			2000 - 2006		
		PRP	FOB	Producer Share (%)	PRP	FOB	Producer Share (%)	PRP	FOB	Producer Share (%)
Africa	1. Ethiopia	47	104	45	84	124	68	48	80	60
	2. Kenya	92	105	88	111	135	82	68	93	74
	3. Tanzania	68	93	74	68	96	71	36	66	55
	4. Burundi	46	92	50	56	92	62	35	53	66
	5. Uganda	35	76	46	101	62	162	63	38	165
	6. Côte d'Ivoire	35	84	42	40	68	58	14	27	50
	Average	54	92	58	77	96	80	44	60	61
North America	1. Mexico	61	96	64	87	108	80	76	90	85
	2. Costa Rica	63	95	66	76	111	69	57	81	70
	3. Dominican Rep.	71	92	78	90	112	80	62	95	65
	4. El Salvador	61	96	63	73	89	81	36	71	51
	5. Guatemala	72	92	77	68	90	75	62	77	80
	6. Honduras	67	93	71	72	101	71	49	71	70
	Average	66	94	70	77	102	76	57	81	70
Latin America	1. Brazil	51	84	61	88	92	96	67	72	93
	2. Colombia	57	104	55	86	116	74	79	102	78
	3. Ecuador	59	75	79	93	76	123	49	68	72
	4. Peru	90	88	102	68	103	66	44	61	71
	Average	64	88	74	84	97	90	60	76	79
Asia Pacific	1. India	63	93	68	79	90	87.6	68	63	108
	2. P. New Guinea	55	95	58	95	110	86.3	46	74	63
	3. Vietnam	107	78	138	57	66	86	27	31	88
	4. Indonesia	44	67	66	54	74	72.7	21	39	53
	Average	67	83	82	71	85	83	41	52	78

Source: ICO database (1964-2006)

In the post-reform period (1991-1999), the producer price share of the FOB price for Africa grew from 58 to 80 percent, while in Latin America it grew from 74 to 90 percent and in Central America from 70 to 76 percent. The change in the Asia-Pacific region remained minimal. This substantial increase could be attributed not only to reform measures alone, but also to the severe frosts in Brazil in 1994 and in 1997, which had a major effect on price hikes. Although such frosts have a negative effect on Brazilian coffee farmers, they are a source of great joy for the remaining coffee producers.

However, a boom in prices in the mid-1990s was followed by a burst in 2000/01. The lucrative coffee prices and changes in policy and the institutional environment in the 1990s stimulated major producing countries (mainly Brazil and Vietnam) to boost their production. This in turn resulted in excess production and supply to the world market. Consequently, prices tumbled to a historically low level. As a snapshot comparison of average producer share of export price show, African growers share still remained far below from American and Asian growers.

### **3.6.3 Impact of price volatility on smallholders**

For many years until the 1990s, coffee was a good source of income for many countries around the world, providing a livelihood for 25 million farmers and countless employees in 50 countries around the world. The coffee market also provided jobs for millions more people employed in coffee-related industries.

Twenty years ago (in the 1980s and mid-1990s) coffee was enjoying a relatively stable market price. However, starting in the late 1990s, coffee farmers around the world witnessed a drop in the prices they were receiving for their crops. The problem has become acute, not just in certain parts of the world, but nearly uniformly around the globe. The prices that farmers are receiving have tumbled to a historically low level and the coffee crisis is claiming lives worldwide, with some farmers and their employees and families dying in quiet desperation from hunger (Lyon, 2005).

Because coffee-growing has been the livelihood of families for generations, many farmers do not know how to do anything else to make money to survive. This has forced people to move from rural farms to cities to look for employment. Villages and small towns have emptied and become ghost towns as people are forced to leave (Oxfam, 2002). Upon moving to cities, new unemployed migrants are only able to finding low-paying, menial jobs. Those that are unable to find jobs are forced to work in the informal sector, doing whatever they can to survive. The vast majority are unable to afford real housing. Many are forced to live in slums between clapboard walls and tin roofs that do nothing to keep out the weather. This has swelled the size of urban slums in cities such as Mexico City and Oaxaca. Urban slums are frequently breeding grounds for disease, crime, and violence. Some of the displaced peoples seek to move to developed countries where they think they can make a living. Increasing numbers of the people found dead in the Arizona desert in recent years have been identified as being from regions of Mexico and Central America that are dependent on the coffee market (Lyon, 2005).

The crisis in terms of coffee prices has a circular effect, affecting farmers, landless traders, landless daily rural labourers, different forms of service providers, processors, exporters, transporters and transistors, and leading to dramatic falls in export revenues, an increase in bank failures and so forth. This crash has sparked considerable human hardship in many producing regions, thus confirming coffee's importance as a primary source of income for producing countries (Oxfam, 2002; World Bank, 2002).

In Ethiopia, some farmers are being forced to grow a mild stimulant known as "chat" in order to make enough money to send their children to school and provide for their families. In many countries around the world, farmers are faced with a harrowing choice: As more and more farmers find that they cannot make a living growing coffee legally, some, if not all, resort to growing mild stimulants like chat (e.g. in Ethiopia) and illegal drugs (CTA, 2002). In some Sub-Saharan African countries, in order to minimise the catastrophic effects of coffee price risk and to maximise the benefits from their plots of land, coffee farmers intercrop coffee with other root-crops. Ethiopia is a typical example in this regard. In Latin American and Asia-Pacific countries, coffee is planted separately.

However, the process of transformation is slow, especially in places where farmers have been growing coffee in their families for generations. This is mainly because coffee is a perennial crop that shows a return on investment only over a long period. Moreover, there is no menu of choices that can substitute for coffee for most coffee producers, since the income unit value for coffee is still higher than for any other product and the farmers simply do not know how to grow anything else (Potts, 2007).

Since January 2005, prices have recovered in comparison with the crisis years of 2000–2004, reflecting a greater balance between supply and demand, likely caused by an increase in consumption in Russia and China. Nonetheless, while conditions have improved for producers, other actors in the coffee export trade and the governments of coffee-producing countries in the short term, price recovery is likely to be only temporary, given the inherently cyclical nature of current coffee markets (Lewin *et al.*, 2004). While the oversupply of coffee was clearly one of the main factors behind the drastic drop in prices, the power imbalance between producers and roasters was another hidden factor, since the weak bargaining position of producers in developing countries means that they take whatever is offered by companies in developed nations.

Price volatility and related risks will remain challenges for coffee-farming households and their governments. This boom-and-burst series of cycles repeats itself about once every seven years. There is no easy solution to this. Market-based risk management approaches are less likely to be applied given the current conditions in Ethiopia. Traditional risk management – mainly the diversification of sources of cash income for smallholders and the diversification of export commodities for the government – might work over the short and medium term. Alternatively, improving the quality of coffee and connecting farmers to niche markets through quality certification could also help to minimise risk (Potts, 2007).

### **3.7 Disparity between producer and consumer prices**

Coffee beans pass through several steps from tree to cup. Coffee farmers sell the wet or dry cherries to their nearest cooperative or private trader. Intermediaries/wholesalers process and deliver cleaned or parchment beans to the auction market where wholesalers sell and exporters buy the beans. Exporters then reprocess the beans and deliver them to ports of export where they are handed over to their importing clients or trading houses. Trading houses sell the beans to a roaster who buys the green coffee beans to be roasted, ground and packed before being delivered to retailers. Retailers sell the final product to consumers through retail stores. This long chain from tree to cup has widened the separation between producers and consumers. Seventy percent of global coffee is grown on farms of fewer than five hectares by small-scale producers who are dispersed and who lack market information and the capacity to cope with changes (Talbot, 2004).

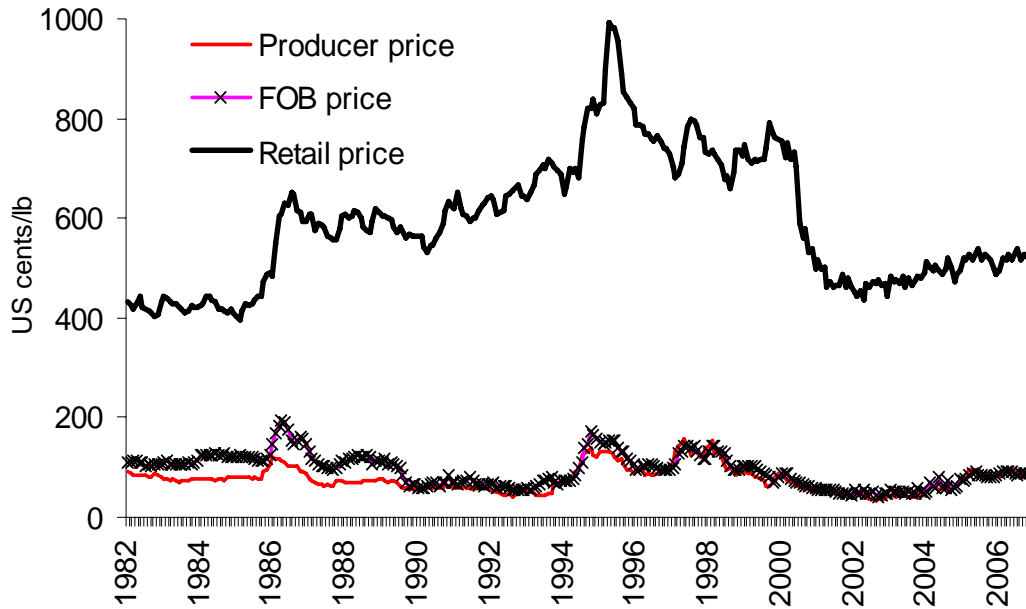
These smallholder producers lack the capacity to secure a proper share of the benefits from trade. In addition, producers and consumers are not organised in the same way as traders. Consumers are dispersed and are relatively less informed about prices in developing countries. It is also difficult to coordinate consumers and producers due to their high numbers. Traders are relatively small in number and therefore easily maintain their benefits and have better access to market information. This institutional and information disparity between consumers, producers and traders is the basis for differences in bargaining power. Producers and consumers have weak bargaining power compared to traders, which partly accounts for the price disparity between them.

Coffee roasters are the most powerful bodies in the coffee marketing chain. As Oxfam (2002) points out, today a significant portion of the world's roasting and processing industry is dominated by just a small number of multinational companies. Four main roasters, namely Kraft, Nestle, Procter and Gamble, and Sara Lee, accounted for about 40 percent of the green coffee roast of 2000 and own the most widely recognised brands, including Maxwell House, Nescafe, Folgers, and Douwe Egberts. In France, of an estimated 2,500 roasters, the top four roasters shared approximately 75 percent of the

market by 2000. The same trend can also be observed in the United States, Germany, Japan and the Scandinavian coffee-consuming countries, where the market share of the top five roasters in selected markets was estimated to be above 80 percent in 2000 (ITC, 2002).

The same can be observed in the world green coffee trade, although to a lesser extent. In 2000 it was estimated that the five leading coffee trade companies accounted for over 40 percent of the total volume of green coffee imports worldwide. A similar trend can also be observed in the retail sector, with growing domination by the large supplier market chains as the number of smaller independent food outlets shrinks daily. The world's top 30 grocery retailers account for 10 percent of the global retail market. The highest degree of concentration in the retail grocery sector is found in Germany, France, Switzerland, Scandinavia and the United Kingdom. In all these countries, the top five supermarket chains account for more than 60 percent of the retail market (ITC, 2002).

As presented in Figure 3.9, the disparity between retail price and producer price and export (FOB) price is unbelievably high. It is developed using an average retail price of the USA, Germany, Japan, and other major consumers. Similarly, to make it more representative, producer and FOB price is the average price of eight major coffee-producing countries (Brazil, Colombia, Vietnam, Indonesia, India, Ethiopia, Kenya and Tanzania). The price disparity partly explains the value adding process which takes place at the roaster level. However, widening gap between producer and consumer price is explained more in market power concentration at the roasting and retail levels. For instance, the average producer share of retail price was 16 percent between January 1982 and June 1989, while in the same period (period of ICAs) the FOB price as a share of retail price was 24 percent. However, following the breakdown of the ICAs and with the introduction of market liberalisation measures in many countries, producer and export price as a share of retail price declined to 12 and 13 percent respectively between July 1989 and December 1999. Producer price as a share of retail price further declined to 11 percent between 2000 and 2005.



**Figure 3.9: Divergence between producer and retail price**

Source: ICO database (1982-2006)

It is important to determine why the level of such concentration is increasing. There are probably several answers, one of them being the growing domination of large retail groups and the resulting increase in specification branding and the vertical integration of roasters and retailers. This has caused roasters, manufacturers and retailers to actively collude to maintain a larger market share. Another possible reason is that concentration is a natural phenomenon resulting from the inevitable globalisation of all business-seeking economies of scale, and there is little doubt that the sheer size of large groups enhances their negotiating power. This trend seems set to continue (Kaplinsky & Fitter, 2004).

In addition to market power concentration, the structure of the world coffee market has undergone radical change with the virtual disappearance of supply and demand intervention mechanisms in the past one and a half decades. Domestic market regulation and stabilisation mechanisms have been scrapped as part of the liberalisation effort, exposing small-scale growers in many exporting countries to fluctuations in their product's selling price. Price fluctuations make the poor in rural areas even poorer, as these small-scale growers are unable to plan ahead and decide how to allocate their

resources, which has remained a concern of many governments of commodity-exporting countries (Potts, 2007).

### **3.8 Future prospects for smallholder coffee marketing**

World coffee production and marketing is dominated by a small number of countries, yet there are about 25 million households producing and exporting coffee. As pointed out by Fitter and Kaplinsky (2001), coffee is characterised by high-power concentration in importing countries imply weak bargaining power of producing countries. Thus, the core development challenge is how to improve producers' bargaining power in order to secure a proper share for producing countries.

As stated by Oxfam (2002) there is overwhelming evidence that patterns of income distribution within and between countries have become significantly skewed. This is partly explained by current inequitable international trade relations. The world coffee marketing environment seems to be a typical example of this phenomenon. For instance, a coffee retailer in the United Kingdom sells one kilogram of soluble coffee for an average of \$26.40, while the Ugandan coffee farmers who are the permanent suppliers of coffee to the UK each earn less than \$0.63 per kilogram (2.5%) for green coffee (Oxfam, 2002). Of course, the retailer's price includes many costs associated with processing, packaging, distributing and marketing the coffee, but this is still an enormous leap in price. What options do smallholder producers have when it comes to staying in the market?

The past few decades have witnessed the emergence of non-traditional channels of production, marketing and consumption of coffee, which are independent of traditional commodity pricing and exchange. Many of these alternatives include differentiation of the coffee, usually by either quality or cultivation processes. These coffees take on many forms, including gourmet (or specialty), organic, fair-trade, eco-friendly (shade-grown or bird-friendly) and other certified coffees (Baffes *et al.*, 2005; Lewin *et al.*, 2004).

According to Lewin *et al.* (2004) differentiated coffees are those that can be clearly distinguished due to their distinct origin, defined processes, or exceptional characteristics such as superior taste or zero defects. In contrast, mainstream coffees are nearly always pre-ground blends that are often unidentified or untraceable in terms of origin. These are usually, though not always, distributed through mainstream channels such as supermarkets, food services and other institutions. Differentiated coffee can help the coffee industry to compete with other beverages by leveraging unique characteristics that include: (1) geographic indications of origin (appellations); (2) gourmet quality and specialty; (3) organic origins; (4) fair trade practices; (5) eco-friendly or shade-grown specifications; and (6) private or corporate standards.

The expansion of differentiated coffee has two dimensions. The first is social in that rising consumption of fair-traded or bird-friendly coffee is driven by social concerns. Consumers wish to ensure that coffee growers receive higher prices (fair trade) or that the effects of coffee growing on the environment are minimised. The second dimension relates to taste or preference in that consumers are willing to pay a premium for unique production or processing characteristics (or attributes) or for superiority. Sometimes these two dimensions overlap in the sense that consumers may demand specialty coffee that also satisfies certain social criteria. This is clearly observed when we compare producer price differences between Jamaican Blue Mountain *C. Arabica* and the average price of all other *C. Arabica*. For instance, for the period 1965-2006, Jamaican producers were paid US \$22 per pound while all other Arabica growers were paid US \$2 per pound. Similarly, the Indonesian Toraja and Kenyan AA also fetch much higher prices than the standard Arabica produced in Latin American countries. What accounts for such an extraordinary difference? The reason lies in the consumers' image of the product and brand name.

Indeed, it is not an easy process for poor coffee growers to meet all requirements for certification, since the process is complicated and often contentious. Currently, no government agency or international organisation has the official mandate to certify non-traditional coffees. With the exception of organic coffee, all certifications come from

nongovernmental organisations. Issues of credibility and the cost of certification are real barriers for many coffee-producing countries.

According to Calo and Wise (2005), in their study on the importance of organic and fair-trade coffee markets in Mexico, the organic premium paid to these producers generally fails to cover the added costs associated with organic certification and maintenance. The large labour investment required by organic production – often as much as three times the labour per hectare – is poorly remunerated by the market return to organic production. The two-year transition period, during which producers received no premium but had to invest significantly more labour in their land, was particularly burdensome. A US \$0.25/lb price premium provides a poor incentive for conversion to organic methods, allowing producers to recover their initial investment only over an unreasonably long period of time. On the other hand, they found fair-trade premiums to be remunerative for those able to sell their coffee in fair-trade markets, with certification costs for fair trade being negligible.

Regarding the market share of differentiated coffee, it is estimated that between 6 and 8 percent of global coffee consumption in the major consuming countries reached 700,000 bags in 2003, which is about 0.6 percent of global coffee consumption. In terms of market share the highest rates of consumption were in Denmark, Switzerland and Australia, each accounting for two to three percent, while Germany, the United States and Japan each has a market share below two percent (Calo and Wise, 2005).

Although differentiated coffee markets are theoretically promising dimensions, in practice there are barriers to accessing such opportunities. Firstly, phenomenal growth of these markets reflects a low base, implying that niche markets' share in global output is small. Secondly, there is increasing evidence of falling premiums for these coffees in some markets, reflecting the fact that demand conditions will soon saturate. Thirdly, there is no clear evidence of whether or not producers are benefiting, since some organisational structures still benefit those who are usually not the poorest. The cost of meeting the standards, particularly for organic certification, can be prohibitive and unaffordable for

resource-poor coffee farmers. Finally, even though these new markets provide an important incentive to producers to organise their activities, the requirements that producers need to meet still serve to omit the majority of growers.

In general, we are faced with opportunities as well as barriers. The question is how these barriers can be removed in order to open doors for poor coffee farmers to access the schemes. Indeed, this requires strong commitment by buying countries (companies) and governments, as well as efforts by producers to meet requirements. Hopefully, this will not be simple rhetoric as usual. For instance, the Ethiopian government's opposition to efforts by the Starbucks coffee chain to secure the licence name for Harar, Yirgacheffe and Sidama is a typical example of half-hearted support from development partners.

### **3.9 Conclusion**

This chapter assesses the impact of policy and institutional change at global and local level in terms of world coffee production, supply and export, as well as producer prices. The analysis is based on monthly data obtained mainly from statistics contained on the International Coffee Organization's website.

The results from chapter three indicate the following facts:

Policy and institutional changes in the international coffee market have increased world coffee production from nearly 90 million bags in the early 1990s to more than 120 million bags in 2006. Most of this increase was accounted for by Vietnam, Brazil and Colombia, which together contributed more than 65% of the world's coffee production between 2000 and 2006.

Production in Latin American countries showed stable growth, while Asia-Pacific production has grown steadily from 10% to 27% of the world share (with the largest increase occurring in Vietnam). Within the same period, Africa's share of world production dropped from 26% to 13%, with little success being observed in the

performance of Africa's coffee industry. This is perhaps due to the current situation of liberalised markets and declining state support for agriculture, which is increasingly leaving poor producers weak compared to powerful international buyers. The gap created by the withdrawal of the state has not been filled in all cases. The quality of public-sector support has deteriorated. This is more severe in countries where there was significant government intervention in the coffee market prior to reform. Mainly services like quality control, input delivery and market information are limited for farmers in remote areas.

Market deregulation measures (1991-1999) have brought about a substantial positive increase in the producer share of FOB price in almost all regions. For instance, the producer share grew from 58 to 80 percent in Africa, from 74 to 90 percent in Latin America and from 70 to 76 percent in Central America and has shown marginal changes in the Asia-Pacific regions.

The reform has also increased price risk due to an increase in coffee price volatility. In addition to occasional price oscillation, there has been a systematic long-term decline in the price of coffee. Price fluctuations make the poor in rural areas even poorer, as these small-scale growers are unable to plan ahead and decide how to allocate their resources. This remains a major concern.

The disparity between producer and retail prices is found to be extremely high. The producer share of retail price was estimated at 10% between 2000 and 2006. This disparity is partly explained by the concentration of market power, i.e. a few roasters account for the world's largest share of green-coffee roasting. All major roasters are also vertically integrated with retailers, and this trend seems set to continue.

The international coffee economy is characterised by a high level of concentration in production, consumption and trade. A few countries dominate production and a few companies dominate the world coffee processing and retail business. This, together with a weakened international body responsible for protecting producing countries, has created a playing-field that is not level. Producers capture a negligible share of the final value of

their product, and a concerted effort by all responsible parties is required to ensure an even distribution of the gains from the industry.

More broadly, governments need to focus on rural development that will improve competitiveness and reduce dependency on a few primary commodities by diversifying the range of products produced by the agricultural sector, improving production and marketing systems, and supporting the creation of non-farm activities. Fostering the necessary research and extension to improve both the productivity and quality of coffee is urgently required. This will enable countries and sectors to more easily adjust to the kind of price swings and structural changes in world markets experienced by the coffee industry.

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## CHAPTER 4

### REVIEW OF THE PERFORMANCE OF THE DEREGULATED ETHIOPIAN COFFEE INDUSTRY

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#### 4.1 Introduction

Coffee is the single most important cash and export commodity in Ethiopia. In the near future it is also expected to remain the dominant export commodity, since diversification that should replace its role is not anticipated. It has been a source of employment and foreign exchange for decades. More than 95 percent of annual production is estimated to be contributed by 1.3 million smallholder farming households (Petit, 2006). About one quarter of the national population is directly or indirectly dependent on coffee as a source of livelihood.

This chapter provides a review of the performance of the deregulated Ethiopian coffee industry. The coffee sector has undergone several deregulation measures since early 1992, which are envisaged to improve its production and marketing performance. Towards this end, the subsequent section reviews the impact of coffee market deregulation on coffee production, supply, export and foreign exchange earnings. The last part deals with the international marketing environment, as well as challenges and opportunities facing Ethiopian coffee auction and export marketing.

The review mainly relies on secondary data collected from several government and private institutions operating in the coffee sub-sector, as well as primary data from a coffee market survey carried out between August and October 2006 in the major coffee-producing zones of Ethiopia and information obtained through discussions with major participants in the sector (farmers, collectors, suppliers (*akrabys*), exporters and agents of trading houses). In addition, the researcher's knowledge and experience gained through his life and work in one of the coffee-growing areas is also employed.

## **4.2 Importance of the coffee industry for the Ethiopian economy**

Ethiopia is probably the oldest producer and exporter of coffee in the world and is the primary centre of origin and genetic diversity of *C. Arabica*, which grows wild in the forests of Kaffa, Illubabore and Wollega. It is the home of unique and world-renowned coffees such as Yirgacheffe, Sidama, Lekemt, Bebeke, Limu and Harar. The existence of a wild coffee population in the natural forests lends credence to the generalisation that Ethiopia is the centre of origin of *C. Arabica*. Currently about 4,500 different finest Ethiopian coffee species are reserved in coffee field gene banks in the Kaffa region, which is a good indication of the rich diversity of the Ethiopian coffee plant population (ITC, 2002). This may account for the diverse natural and physical setting of Ethiopia with its 18 major and 49 minor agro-ecological zones (FAO, 2003). Topography of the country ranges from 110 metres below sea level at the Kobar sink in the Afar depression to a peak of 4,620 meters above sea level at Ras Dashen, giving rise to diverse species and genetic resources (Tewolde-berhan, 1991).

The importance of coffee for the Ethiopian economy is well documented. It has great economic, social and cultural significance. Often it is called the “green gold of Ethiopia”, magnifying its place in the economy. Coffee has long held a central place among Ethiopia's merchandise exports. Historically, it accounts for over 60 percent of Ethiopia's total export earnings, although the proportion declined to 40 percent in the early 2000s due to the world coffee crisis. Coffee export earnings are estimated to account for 6.3 percent of GDP and 12.5 percent of agricultural GDP (Table 4.1). The sub-sector affects approximately one quarter of the population, providing jobs for farmers, local traders, processors, transporters, bankers and exporters. The various taxes on the crop are also important sources of government revenue (EDE, 1997; Oxfam, 2002; LMC, 2003). Smallholder farmers account for 95 percent of production and coffee is a major source of cash income for most farmers in the coffee-producing areas. This shows that any negative shock on the coffee sector can have a significant influence on both the economy of the country in general and on the smallholders in particular.

**Table 4.1: Gross domestic product by sector (at 1980/81 constant factor cost)**

Year by political regime	GDP (million ETB)			Total GDP	Coffee export earnings (mill ETB)		
	Agriculture	Industry	Services		Export	% GDP	% Agri. GDP
1960 -1973	4506	626	1546	6677	151	2	3
1974-1991	5303	1103	3188	9593	467	5	9
1992-1995	6365	1276	4557	12193	764	6	12
1996-2005	7472	1830	7569	16871	1914	12	26
1960-2005	5912	1209	4215	11334	824	6.3	12.5

Source: Ministry of Finance and Economic Development (2005)

### 4.3 Review of coffee marketing policies

This section provides a brief review of policies in the Imperial and Military regimes as a form of background information on government intervention in the coffee sector. The discussion then centres on deregulation measures by the current regime and the impact of these. The current regime came into power in May 1991, which coincided with the launching of market deregulation measures in late 1992. Hence, the review of the post-reform period refers to the current regime, i.e. the Ethiopian People’s Revolutionary Democratic Front (EPRDF) regime.

#### 4.3.1 Coffee sector policies under the Imperial regime

Over the past 50 years, Ethiopia has undergone three ideologically distinct political regimes: the monarchic or Imperial regime (prior to 1974), the central planning Military regime (1974-1991) and the EPRDF regime, which came into power in May 1991 and which introduced a market-oriented economy.

With the Imperial regime, the foreign trade policy of the country was largely characterised by the ‘free trade’ doctrine. Various measures to facilitate trade, such as a chamber of commerce and various boards (National Coffee Board, Grain Marketing Board, and Office of National Standards), were instituted in an effort to control the quality of exports and imports, to facilitate private sector participation, and to plan

economic activities.

Ethiopia initiated a modern economic planning system for the first time in the mid-1950s. Accordingly, the first five-year development plan (FFYP), which covers the period from 1957 to 1961, was designed. This plan gave due attention to the import-substituting industrialisation and expansion of infrastructure, as well as the expansion of the production of high-value agricultural crops like coffee, cotton and fruit (Imperial Government of Ethiopia, 1957).

Towards this end, the National Coffee Board (NCB) of Ethiopia, established in 1957, was a regulatory body of coffee production, internal marketing, quality control and export. The National Coffee Board was involved neither in direct production and processing nor in direct internal marketing and exporting of coffee. The coffee sub-sector was left to the private sector but with strict purchasing, processing, cleaning, grading, inspection, movement and export regulations (Negewo, 1993). It issued licences to coffee processors, collectors, wholesalers, exporters, etc. and also represented the country in international coffee negotiations and meetings. The NCB was also responsible for quality inspection and grading at regional, terminal and before export. In later years, in collaboration with the Ministry of Agriculture (MOA), it was also involved in adaptive research and extension services in coffee-producing areas. The coffee exporters were free to sell rejected coffee to the domestic markets through the licensed wholesalers via retailers (MCTD, 1987).

There was a move towards commercial coffee farming in major coffee-producing areas in general and in Kaffa, Illubabor, Wellega, Sidmo and Arsi in particular. The area under commercial farms was over 30,000 hectares and the yield obtained was close to one ton per hectare, which was more than double that of the peasant coffee farmers. However, the 1974 revolution arrested the momentum of commercialisation of coffee production, which would have increased coffee production and improved the quality of coffee produced in the country. Immediately following the 1974 revolution, all commercial farms were nationalised.

Despite the subsistence nature of the economy, market-based coffee production and marketing structure under the Imperial Government increased coffee production and foreign exchange earnings substantially. The average export reached 65,000 tons between 1961 and 1973 (CTA statistics). However, there were problems faced by small coffee farmers in that they were paid low farm-gate prices for their coffee due to the domination (monopolistic power) and collusion among a few collectors at their designated marketplaces. Coffee traders had a good link with coffee wholesalers and coffee exporters and, in fact, most of them were their agents. Thus farmers had weak bargaining power to secure an appropriate share of the market price.

#### **4.3.2 Coffee sector policies under the Military regime**

The Military regime (the Derg) overthrew the Imperial regime and took power in September 1974, ruling the country until May 1991. It declared socialism as ideology. Economic restructuring was based on central planning and the sweeping nationalisation of large- and medium-scale enterprises (including foreign owned), urban and rural land, and it marginalised the private sector to micro- and small-scale activities. The regime's overall policies were centred on expanding collective and public enterprises and managing the economy through central planning (MEDaC, 1999).

The NCB, in addition to its regulatory duties, was empowered to process, possess, store, transport, purchase, sell and export coffee through the amended Proclamation No. 57 of 1975. Due to serious conflicts between its regulatory responsibilities and direct involvement in the coffee marketing, it was later replaced by two organisations established in mid-1978. The Coffee and Tea Development and Marketing Authority (CTDA) was established as a regulatory body for coffee marketing and at the same time a Legal Notice 59 of 1978 was issued for the establishment of the Ethiopian Coffee Marketing Corporation (ECMC) with the responsibility to “purchase, store, process, possess, transport, sell and export coffee; and strengthen and develop Ethiopian coffee marketing” (MCTD, 1987).

In May 1979 the Coffee and Tea Development and Marketing Authority was replaced by the Ministry of Coffee and Tea Development (MCTD), which took over the regulatory, production and marketing responsibilities of the coffee sub-sector, including establishing and supervising organisations to purchase, process, clean, and store coffee and tea; establishing and supervising coffee and tea export or import organisations; establishing and supervising coffee and tea farm organisations; registering, issuing, suspending or cancelling licences to traders dealing in coffee and tea in the domestic market; exporting or importing coffee; and being a coffee and tea agent. Following on these responsibilities, two coffee and tea production organisations were established. The Coffee Plantation Development Corporation was established in 1984, with the powers and duties to organise and operate state coffee plantations, produce coffee seedlings, and peak, decorticate, wash, dry and store coffee.

Within the above centralised institutional frameworks, the Military government attempted to control both the production and marketing of coffee in the country. Accordingly, there were four modes of coffee production: smallholder coffee production, communal coffee farms controlled by peasant associations, producer cooperatives, and state coffee plantations. Despite the regime's efforts to weaken the private sector, over 95 percent of coffee was produced by private smallholdings. However, the Military government used different methods such as quota setting, administrative measures, etc. to extract coffee from the smallholder. The private commercial coffee farms that were nationalised transformed into state coffee plantations. These included the Bebeka, Tepi and Limu coffee farms, which later expanded. The total area under state farms is now close to 21,000 hectares, with most of the produce being washed coffee (CPDE, 2002).

In an effort to limit the entry of the private sector into the coffee business, the regime made the capital required and the licence issuance and renewal fees exorbitantly high. For instance, the capital requirement and issuance fees for exporters were ETB 500,000 and 20,000 respectively and similarly 100,000 and 10,000 for wholesalers respectively. The Ethiopian Coffee Marketing Corporation is a parastatal organisation that purchases and exports coffee and it played a leading role in coffee marketing in the Military regime. It

owned 55 percent of internal and export coffee, 80 percent of sun-dried coffee and 100 percent of washed coffee. There were also tight control mechanisms for the coffee marketing channels for domestic consumption.

To extract surplus from coffee farmers, smallholders were forced to deliver coffee through the quota system, causing farmers to abandon coffee and shift to grain production for subsistence. Washed coffee showed only a slight increase due to investment in coffee-pulping stations. In addition, overvaluation of the Ethiopian Birr (ETB) indirectly taxed smallholders, and different forms of taxes (surtax, transaction tax, export duty and coffee cess) were levied on coffee exports, estimated to account for 40 to 50 percent of the FOB coffee export price. Hence coffee farmers usually received about 40 percent of FOB price (Gebre-medhin, 1989; Dercon and Ayalew, 1995). The rate of surtax also increased with an increase in the world price, and farmers had no incentive to promote their production and supply.

In general, the Military regime controlled the entire production and marketing structure using their centralised system. Export markets developed by private sectors in the Imperial regime were lost, because exporters left the coffee business (the number of exporters fell from 41 to 14 between 1974 and 1991). The nationalised coffee farms were not efficiently managed and hence did not produce as much as they used to when they were operated by the owners of commercial farms. The peasantry was severely affected by coercive extraction and reduced production. The regime inhibited private initiative by trying to control the system using inefficient and corrupted state parastatals, which, combined with other factors, resulted in weak performance of the sector (Negewo, 1993).

### **4.3.3 Coffee sector policies under the EPRDF regime**

In Ethiopia, the change in regime (from the Military regime to the EPRDF) and the SAP coincided in 1991/92, hence the EPRDF regime is also considered a post-reform period (i.e., 1992-2006). The subsequent section discusses policy reform measures and their impact on coffee production, consumption and export.

In May 1991 the Military government was overthrown by the current EPRDF regime. Since then the Ethiopian economy has been undergoing transformation from a centrally planned to a more liberalised market economy, in line with the neo-liberal perceptions of the IMF and the World Bank. A number of policy measures have been implemented aimed at changing the socialist-oriented economy into a free market economy. Agriculture as the main pillar of development has received special attention, and the long-term development strategy – “Agricultural Development-Led Industrialization (ADLI)” – was designed by the government in 2001 as a means of developing agriculture to support industrialisation by providing a market and source of raw materials and capital accumulation. The ADLI in particular underlines the potential of the domestic market and the important role it can play in terms of the growth of agriculture and industry. It also plays a critical role in exports in terms of both growth and foreign exchange (FDRE, 2000).

The Poverty Reduction Strategy Paper (PRSP) was initiated by both the government and donor communities, taking the ADLI as a building-block, in 2000 and 2001. In July 2002, the government of Ethiopia finalised its first PRSP, known as the Sustainable Development and Poverty Reduction Program (SDPRP), for the period 2000-2005. In December 2005 it presented a draft of the second-generation PRSP, called the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), for the period 2006-2010. However, despite the importance of coffee in economic development and poverty reduction, there are hardly any clearly expressed discussions and plans for development, except for some references under the envisaged plan for diversification. Indeed, coffee is considered a traditional export that can move by itself. Nevertheless, several coffee sub-sector deregulation measures have been pursued since the beginning of the reform in 1992. The subsequent section discusses the coffee sector deregulation measures and their impact.

#### **4.4 Coffee sector deregulation measures**

Coffee market reforms began as a means to increase prices received by farmers in order to promote production and reduce the incidence of coffee smuggling to neighbouring countries (LMC, 2003). Some of the most significant changes in terms of marketing, pricing, taxation, regulation and quality control are presented in Table 4.2. These policy measures were implemented in an effort to achieve the general objectives of the sub-sector, which include maximising foreign exchange earnings from coffee exports, encouraging the development of coffee production and processing, and improving market efficiency, quality and services. Above all, it is to benefit producers through the development of a more competitive marketing system where a large number of buyers and sellers can freely compete for price setting, and price information is easily available.

**Table 4.2: Main features of coffee sector liberalisation in Ethiopia**

Pre-liberalisation (prior to 1991)	Post-liberalisation (after 1991)
<i>Marketing channels</i>	
The Ethiopian Coffee Marketing Corporation (ECMC), a state parastatal, was responsible for most of the domestic and export marketing of coffee, controlling 100 percent of the washed coffee and 80 percent of the sun-dried coffee trade.	The ECMC split into the Ethiopian Coffee Purchase and Sales Enterprise (ECPSE) and the Ethiopian Coffee Export Enterprise (ECEE) in 1992, which were allowed to compete with private traders. They failed to withstand fierce competition and both companies were liquidated in early 2003. Currently private companies, cooperative unions and the state Coffee Plantation and Development Enterprise (CPDE) account for 90%, 6% and 4% of domestic and export coffee trade respectively.
<i>Regulation licensing rules</i>	
Licensing was specific to each marketing activity. Exporters and suppliers were required have registered capital of ETB 500,000 and 100,000 respectively, and the annual licence issuing and renewal fees were 25,000 and 10,000 respectively. Only service cooperatives and the ECMC were free from both.	Licences are still required for every function in the marketing chain. Licence fees for the issue and renewal of licences were reduced in 1993 to ETB 200 for exporters and 150 for suppliers and collectors to encourage private participation. Since 1997 <i>akrabys</i> have been allowed to purchase directly from farmers, bypassing the <i>sebsabys</i> . Private companies are allowed to purchase, process and export washed coffee.
<i>Auction</i>	
All coffee had to go through auction.	Auctions are maintained, but since 2001 cooperative unions, the CPDE and to a lesser extent private investors with coffee plantations have been permitted to bypass auctions and export directly.
<i>Coffee for domestic consumption</i>	
Coffee rejected at auction for being below export standard was released to the domestic market.	Restrictions continue: Coffee can be released for domestic consumption when the inspector proves that it is below export-quality standard and issues a certificate of rejection.
<i>Traders issued with quotas</i>	
Private exporters were not allowed to compete for coffee until the ECMC's quota had been met. Growers were also assigned quotas and forced to sell to the ECMC.	The quota system was abolished in 1993. All private exporters compete to purchase and export. Growers are free to sell to any player in the market.
<i>Distribution of inputs/credit</i>	
Inputs were provided by the Agricultural Inputs Supply Corporation, with subsidised prices for chemical inputs. However, most coffee farmers (except state farms) did not use fertiliser, pesticides or herbicides, due to limited access to credit, amongst other factors. Credit was issued to coffee farmers by service cooperatives.	Input distribution was liberalised in 1993, allowing entry by private companies. Input subsidies were abolished in 1997. Bank lending for investment in processing equipment is available but difficult to access. Coffee farmers have no formal credit access as such, except for piecemeal efforts by micro-finance institutions.

**Table 4.2: Continued .....**

Pre-liberalisation (prior to 1991)	Post-liberalisation (after 1991)
<p><i>Pricing</i></p> <p><i>Export prices:</i></p> <p>Floor prices for exports were set by the National Bank of Ethiopia (NBE). Accordingly, the ECMC set the interior market price by deducting the operating and profit margin from the auction price.</p>	<p>The Coffee Price Differential Setting Committee was established following liberalisation, chaired by the NBE and comprising members of the exporters' association, the ECEE and the Coffee and Tea Authority (CTA). It set daily minimum prices for different grades of washed and unwashed export coffees. Exporters were obliged to register at least this minimum price with the NBE when they made a sale. The NBE abandoned this procedure, hence ending export price control, in November 2002.</p>
<p><i>Grower prices:</i></p> <p>The fixed average price was set by the Ministry of Coffee and Tea Development (MCTD). THE ECMC, as state agent, readjusted the price based on changes in the international price.</p>	<p>Payment to farmers is now determined by market forces. However, farm-gate floor prices were maintained until 1996/97 for red cherry and more recently for dry cherry. Growers have a choice of selling to either cooperatives or private traders.</p>
<p><i>Taxation</i></p> <p>There were four kinds of coffee export taxes: (i) export duty of 150 ETB/ton; (ii) cess of 50 ETB/ton; (iii) transaction tax of 2% of FOB value; (iv) surtax in proportion to export price. In addition, local taxes were levied before delivery to the auction market. These taxes on average accounted for 50 percent of FOB prices.</p>	<p>In 1998, various taxes and duties were consolidated into a single tax set at 6.5 percent of the FOB price. In June 2002 the export coffee tax was suspended temporarily in response to persistently low international coffee prices and has not been re-imposed since.</p>
<p><i>Quality control</i></p> <p>Both washed and unwashed coffee was subject to a number of inspections and quality controls throughout the marketing system. There were stringent quality controls for washed coffee when the cherry was delivered to the washing station, at woreda level prior to dispatch to auction, at the auction market and lastly quality inspection carried out before delivery to the buyer. Unwashed coffee was subject to less-stringent quality control.</p>	<p>The government has maintained the same procedures of quality control at both local and auction level. Moisture levels are still strictly checked. In 1999, the Coffee Liquoring Unit (CLU) also introduced cup tastes for sun-dried coffee prior to auction and export, providing exporters with better information on quality. However, quality control is not as stringent at production, processing and auction levels as it was before, due to exchange based on agent commission, which remains the major challenge for quality improvement.</p>
<p><i>Price information</i></p> <p>The ECMC announces fixed daily farm-gate prices at each purchasing station and marketing centre.</p>	<p>The current popular source of price information is national radio broadcasting where producers may get proxy information.</p>

Source: Compiled from AMPD (2006), Petit (2006) and own experience

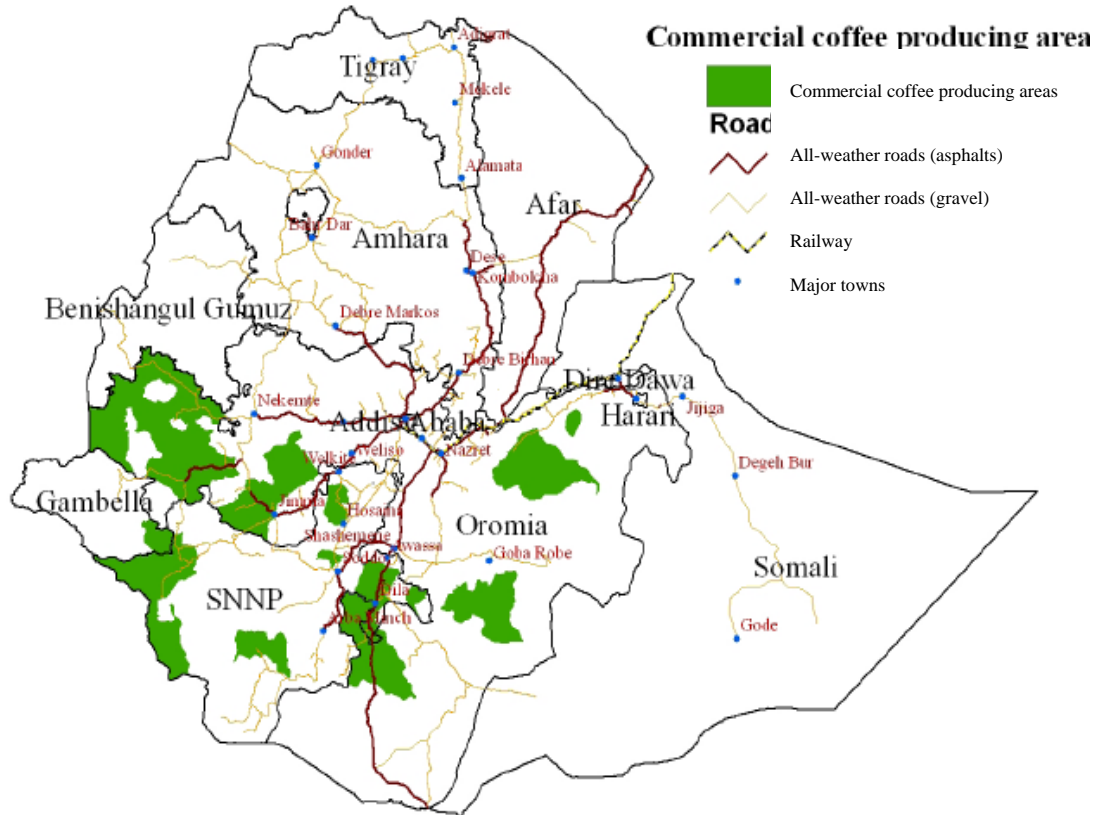
The subsequent section assesses the impact of the above policy measures on the performance of the coffee sector in the post-reform period (1992-2006). The performance of the coffee sector is discussed using proxy indicators: (i) national coffee production trends, (ii) coffee consumption trends, (iii) coffee supply to the auction market, (iv) coffee export trends, and (v) volume of foreign exchange earnings from coffee compared to other merchandise exports.

## **4.5 Coffee production trends**

### **4.5.1 Commercial coffee production areas**

Arabica coffee grows in many parts of the country. However, the major commercial coffee cultivation areas are located in the southern, south-western and eastern parts of the country (Figure 4.1). The south-western coffee-producing regions cover Illubabor, Wollega, Jimma, Kaffa, Shaka and Bench Maji, which are estimated to account for 52 percent of national production. The southern coffee-growing regions include Sidama, Gedio, Borena, Wolayta, Gamo Goffa, Kambata Alaba Tambaro, Gurage and others. These together contribute an estimated 35 percent of national production. Similarly, the eastern coffee-growing regions, namely Hararge, Arsi and Bale, together account for 8 percent of national production. The three major coffee-producing areas account for 90 percent of total national coffee production (CTA, 2003).

Apart from the main coffee-growing regions of the eastern, southern and south-western parts of the country, there are small patches of remnant coffee regions to the west (Gambella and Benishangul Gumuz) and the north (Amhara and Tigray) that grow coffee mainly for consumption. The area covered with coffee plantations is estimated to be about 5 percent of national agricultural land. Coffee-growing regions by order of production volume (highest to lowest) are listed as the Oromiya regional state, Southern regional state, Amhara regional state, and Gambela and Benishangul-Gumuz regional states.



**Figure 4.1: Commercial coffee-producing areas in Ethiopia**

Source: IFPRI's GIS centre in Ethiopia (2006)

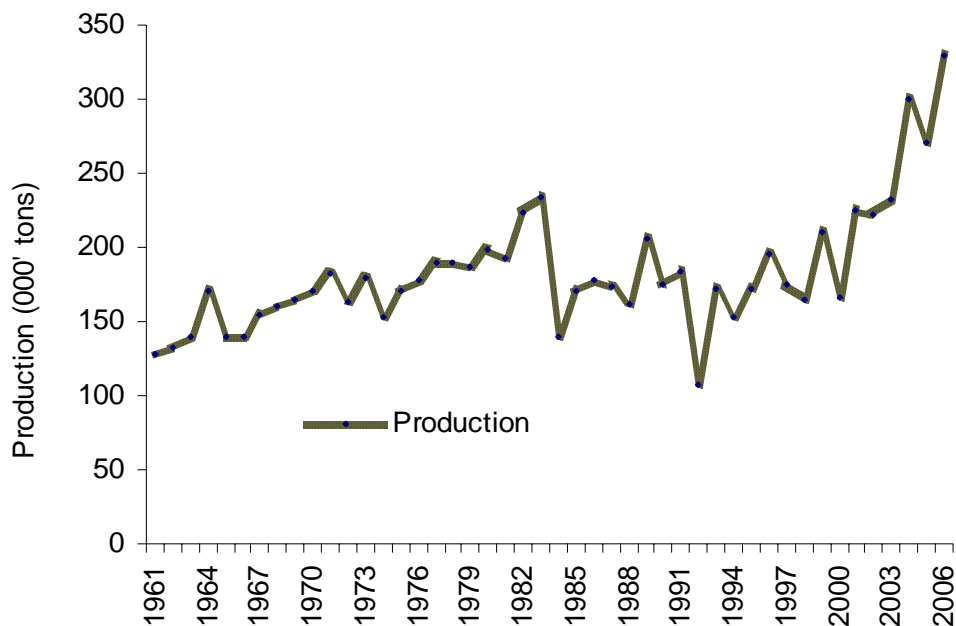
The south-western and eastern coffee regions of Ethiopia are mainly located under the Oromia region. As data from the 2003 agricultural sample enumeration (CSA, 2003) shows, Oromia is estimated to account for 65 percent of the area under coffee and 60 percent of national production. Almost all zones of the region produce coffee. However, four major coffee zones, namely Jimma (27.6%), West Wollega (26.2%), Illubabore (17.9%) and Borena (14.2%), together account for 85.9 percent of regional production. The Hararge zones (both West and East) together account for 5.4 percent of regional production. The three top producing zones of the Oromia regional state, namely Jimma, Wollega and Illubabore, on average account for about 40 percent of national production.

With the exception of a few lowland areas, coffee is produced in almost all areas of the southern region. As indicated by data from the 2003 CSA agricultural sample

enumeration, the two major coffee zones, i.e. Sidama (30.9%) and Gedio (22.7%), together account for over half of the regional production. Wolayta (8.5%), Bench Maji (8.2%) and Shaka (7.2%) together account for 23.9 percent of regional production. Hence these five zones account for about 78 percent of regional production.

#### 4.5.2 National coffee production trends

An accurate estimate of the volume of coffee production in Ethiopia is difficult, because a large proportion of the total harvest is gathered from semi-wild forests and there is a high level of on-farm consumption. Production estimates by the CTA database suggest that the average annual production increased from 2.2 million bags in the early 1960s to around 3.0 million bags in the 1980s. Output peaked in 1983/84 at 3.9 million bags, then declined in the second half of the 1980s before approaching a historically low level of 1.8 million bags in 1991 (Figure 4.2). Coffee production has since been increasing, peaking at 5.5 million bags in 2006, which is the highest level in the history of coffee production in Ethiopia.



**Figure 4.2: Coffee production trends (1960-2006)**

Source: AMPD of MoARD (2006)

The area covered with coffee production was estimated to be large during the Imperial regime (about 600 thousand hectares). During the Military regime (1974-1991) it declined to 420 thousand hectares and with the current regime (1992-2006) the land covered with coffee crops has remained at about 410 thousand hectares, except for the period 2004-2006 when it increased to close to 600 thousand hectares. Accurate yield figures are not known, but according to 2004 estimates by the Ministry of Agriculture and Rural Development, garden coffee produces 450-600 kilograms of clean beans per hectare. The average yield shows large differences between the three regimes; i.e. it was estimated at 262.5 kilograms during the Imperial regime. The survey of coffee-growing woredas during the Military regime (finalised in 1987) estimated the average coffee yield by smallholders at about 450 kilograms per hectare. Data from the CSA's 2003 national agricultural sample enumeration indicated that the national weighed average yield had approached 600 kilograms per hectare.

The yield from semi-forest and forest coffees is not known with any accuracy, but is estimated at an average of 200 to 300 kilograms per hectare. The Coffee Plantation and Development Enterprise (state coffee farm), which uses mono-cultural farming practices, has an average yield level of between 600 and 700 kilograms per hectare, with the yield difference compared to smallholders remaining marginal.

No evidence can be found to substantiate any assertion that the above-mentioned yield increases have contributed to improving productivity in recent years. Perhaps the most important reasons for yield increases are the efforts made by the Coffee Improvement Project (CIP). The CIP is a coffee improvement project financed by the Ethiopian government and the European Union (EU). The emphasis has been on developing cultivars that are resistant to coffee berry disease (CBD). Since the late 1970s, an estimated 100,000 hectares has been planted with resistant varieties and local planting materials (FDRE, 2004). Another reason for increased production is new coffee plant expansion in areas that were underexploited in the past. For instance Bale, a previously non-coffee-producing area, accounts for 4350.4 tons of clean beans (CSA, 2003). In

addition, the lucrative world price situation in early 1994, 1996 and 1997 may have encouraged coffee farmers to plant new plantations expected to bear fruit after 5-7 years.

### **4.5.3 Coffee farming systems**

There are four types of coffee farming systems in Ethiopia: forest coffee farming, semi-forest coffee farming, garden coffee farming, and plantation coffee farming.

#### **4.5.3.1 Forest coffee**

Forest coffee grows in the hot, humid forests of the south-western parts of the country in the zones of West Wollega (e.g. Yayu), Illubabor, Shaka, Kefa and Bench Maji (Figure 4.3). This is the most common system of cultivation used in the zones where coffee grows spontaneously in the forest (see example in Figure 4.3). The surrounding farmers clear away all vegetation other than coffee and leave a few desirable trees to provide shade, which often results in an uneven distribution of trees.



**Figure 4.3: Forest coffee farming system in Wollega, Yayu area**

The soil under this system is more fertile with high humus content due to leaves dropping from shade trees, coffee plants and other bushes. However, due to competition for light,

water and nutrients, the productivity of forest coffee is very low, not exceeding 200 kg per hectare (Wolde-mariam and Demile, 2001). The area covered by forest coffee is estimated to be about 40,000 hectares, 10% of the total area under coffee in the country (Ameya, 2002). However, it is increasingly difficult to know the exact current status due to continuous encroachment by the ever-increasing population.

#### **4.5.3.2 Semi-forest coffee farming**

Semi-forest coffee farming is believed to have evolved from the forest coffee farming system. Some farmers make an extra effort after cleaning the forest to leave spontaneous coffee trees in rows by thinning where they are too dense, transplanting the seedlings where the coffee population is too thin, and filling in the open spaces with local seedlings. Semi-forest coffee farming is commonly found in the Ilubabor, Jima, Kaffa, Shaka, Bench Maji and West Wollega zones (see example in Figure 4.4) and is estimated to occupy nearly 136,000 hectares (34%) of the total area of coffee land in the country (CTA, 2003).



**Figure 4.4: Semi-forest coffee farming system in the Wollega area**

The soil under semi-forest coffee is found to be fertile due to the litter fall from shade and coffee trees, forming a thin layer of mulch. The soil is also naturally protected and conserved from erosion by the forest trees with massive root systems. Coffee berry disease was often observed in these forests. Coffee yield in this farming system is low and ranges from 300-400 kilograms per hectare.

Recent evidence regarding forest and semi-forest coffee farming systems in Ethiopia generally shows that they are under constant threat of decline (FAO, 2003). This is due to a rapid rise in the demand for agricultural land, which has resulted in conversion of the natural habitat of forest coffee into land for other food crops. The pressure on the forest land emanates mainly from high population growth, especially in the rural areas with an estimated annual growth of 3 percent, which puts serious pressure on the forests (Hein & Gatzweiler, 2006). The resettlement policy of the Military regime (1974-1991) resulted in massive destruction of natural forests by settlers and local people. In addition, farmers prefer high-yielding varieties that enable them to generate cash and more income for new and improved coffee or other food crops. Declining coffee prices and the current marketing system are other obstacles for farmers when it comes to protecting their natural coffee trees.

#### **4.5.3.3 Garden coffee farming**

Garden coffee is found in the backyards of farmers' residences. It is planted mainly in the southern and eastern parts of the country (Sidama, Gedeo, Hararge, Wollega, Arsi, Wolayta and Gurage zones). It is planted at low densities ranging from 1,000 to 1,800 trees per hectare, mostly fertilised with organic material and often intercropped with other annual crops. Intercropping coffee with other crops is a common farming system in areas with a high population density where an average holding does not exceed one hectare. The garden coffee production system accounts for about 50 percent of the total national production. This production system is on the increase, as it is currently being introduced in south-western Ethiopia (Kaficho, Shekicho and Bench Maji areas). Often garden coffee is intercropped with food crops like *enset* (*ensete ventricosum*), banana,

maize and cabbage in the southern coffee-growing zones (see Figure 4.5). *Enset* is unique to Ethiopia and one of the common food products in southern Ethiopia. The starchy base of the plant is fermented and eaten in various forms as bread, pancakes or porridge. Enset is related to and resembles the banana plant and is produced primarily for the large quantity of carbohydrate-rich food found in a false stem and an underground bulb. In West Hararge coffee is intercropped with sorghum, maize, beans, sweet potatoes or *chat* (*atha edulis*). Traditional garden coffee farms are weeded 2-3 times or more per year and fertilised with farmyard manure and crop residues. Hoeing is also a common cultural practice to dig out grass weeds and conserve soil moisture.



**Figure 4.5: Garden coffee production in Sidama/Gedio**

The Coffee Improvement Project (CIP) intervention, mainly through the development and distribution of CBD-resistant local cultivars, has contributed to an improvement in garden coffee in Sidama and Gedeo and to a lesser extent in the south-western garden coffee growing areas. As a result, garden coffee has a relatively better yield compared to

forest and semi-forest coffees (450-600 kg per hectare). The entire coffee production from the above three farming systems could be considered organic, since no artificial fertilisers or chemicals are used in production.

#### **4.5.3.4 Plantation coffee**

One of the first advancements in coffee production and processing methods started in the early 1950s with the establishment of the Coffee Development Project of the US Operational Mission (USOM/Eth). The first improved coffee seedling nursery and small-scale coffee processing institution was initiated in the *Limu Seka* in 1956. It was mainly due to the growing possibilities of coffee export earnings and the Imperial government's free landholding proclamation of 1956, and the conversion of all land not claimed by an officially recognised proprietor into state property. Many farsighted individuals who had been more widely exposed to the coffee business started their own private nurseries and modern coffee plantations, either requesting land from state property or purchasing land from lords or local chiefs. As a result, in the south-western part of the country, coffee plantations expanded to a large extent under naturally grown forest areas (Awoke, 1998).

This was encouraged by the Imperial government's first five-year plan (1957-1962), which heavily favoured commercial farms and export crops. Large-scale private farming was considered to be the first step in developing Ethiopian agriculture. Accordingly, greater attention was given to the cultivation of coffee.

During the Military regime, following the rural land proclamation of March 1975, all rural land was declared to be state property. The proclamation also nationalised all private coffee plantations and established large-scale state-owned coffee estates managed by state bodies. The Coffee Plantation Development Corporation (CPDC) was established in 1982 and given the responsibility of managing state-owned coffee farms. With the downfall of the Military regime in May 1991, the CPDC was reorganised and renamed the Coffee Plantation and Development Enterprise (CPDE) by means of Council of Ministers' Regulation No. 151/93. Currently, the CPDE administers the Bebek, Limu,

and Tepi state coffee plantations, which account for about 4 percent of national production and export.

Coffee plantation farming is a modern practice of coffee cultivation (see example in Figure 4.6). Such farmers plant only recommended seedlings, ensure proper spacing, mulching, manuring, weeding, shade regulation and pruning, and use chemical fertilisers and herbicides. The average yield per hectare is marginally higher than the average national production, ranging from 600-700 kg per hectare.



**Figure 4.6: Plantation coffee under shade trees in Bebek**

Following market reform, a few private industrial coffee plantations were established mainly in the south-western regions. For example, the Gemadro coffee plantation is one of the privately owned modern coffee plantations in the Tepi district in the south-western part of the country. Gemadro produces large-scale conservation-based coffee and other commercial agricultural products. It has recorded the highest productivity of 1,200-1,300 kilograms per hectare, which is more than double the national average.

Despite the long history of coffee in the Ethiopian economy and culture, the technological progress and productivity of the sector has remained low over the centuries. The average national yield ranges from 450-600 kilograms per hectare (FDRE, 2004), which is relatively low compared to Kenya, Brazil, Colombia, Costa Rica and El Salvador (IFPRI, 2005). This is partly accounted for by low participation of the private sector in coffee production. A high level of private participation is observed only in the coffee export marketing. Indeed, this alone cannot be considered a significant success compared to the trend in other countries where modern private enterprises actively participate not only in export but also in production. Ethiopia has untapped potential for the expansion of coffee production. As stated by Ameya (2002), there are over 12 million hectares of land suitable for coffee production, yet only about half a million hectares are currently devoted to coffee production and the rest allotted for other purpose.

#### **4.5.4 Constraints to coffee production**

The performance of coffee production has remained unsatisfactory for a number of years. The constraints most commonly referred to include a high incidence of coffee berry disease (CBD) in some of coffee growing zones, with an estimated 20-30 percent production damage; lack of improved cultivars adopted to different localities; poor harvest and post-harvest practices, which reduce coffee quality; weak linkages between research and extension services; and low producer prices. The current coffee marketing structure and organisational structure at government level also has various shortcomings. Producers are located far from consumers in the chain, while the diverse taste profiles of Ethiopian coffees are not fully reflected in the current national coffee classification system (IFPRI, 2005; Petit, 2006; Westlake, 1998). Environmental degradation is a serious concern, with the rate of deforestation estimated at 10,000 hectares per year in the coffee-growing areas of the south-western parts of Ethiopia, threatening its genetic coffee resources (Tesfaye & Thomas, 2004).

During field work and through discussion with coffee-growers, the author came to realise that there are three additional factors contribute to the stagnation of Ethiopia's coffee

production. Firstly, population pressure and inheritance laws have led to fragmented parcels of land on which coffee is grown. Secondly, coffee growing is increasingly seen as being of secondary importance to food security, leading to the marginalisation of the sector. Thirdly, regionalisation of extension services and the assimilation of coffee specialists into general extension programmes have contributed to the current weak and ineffective coffee extension systems. With market liberalisation, coffee extension is weakened. Currently there is no effective private or public extension service for smallholder coffee farmers. Moreover, segmentation of coffee production and marketing management between regional and federal governments has created a vacuum for coordination. Lack of research has led to a loss of variety in Ethiopian coffee plants. Specifically, there have been no new CBD-resistant varieties developed since the late 1970s – and the work at that time was carried out on an emergency basis, with selections restricted to a few landraces.

#### **4.6 Coffee consumption trends**

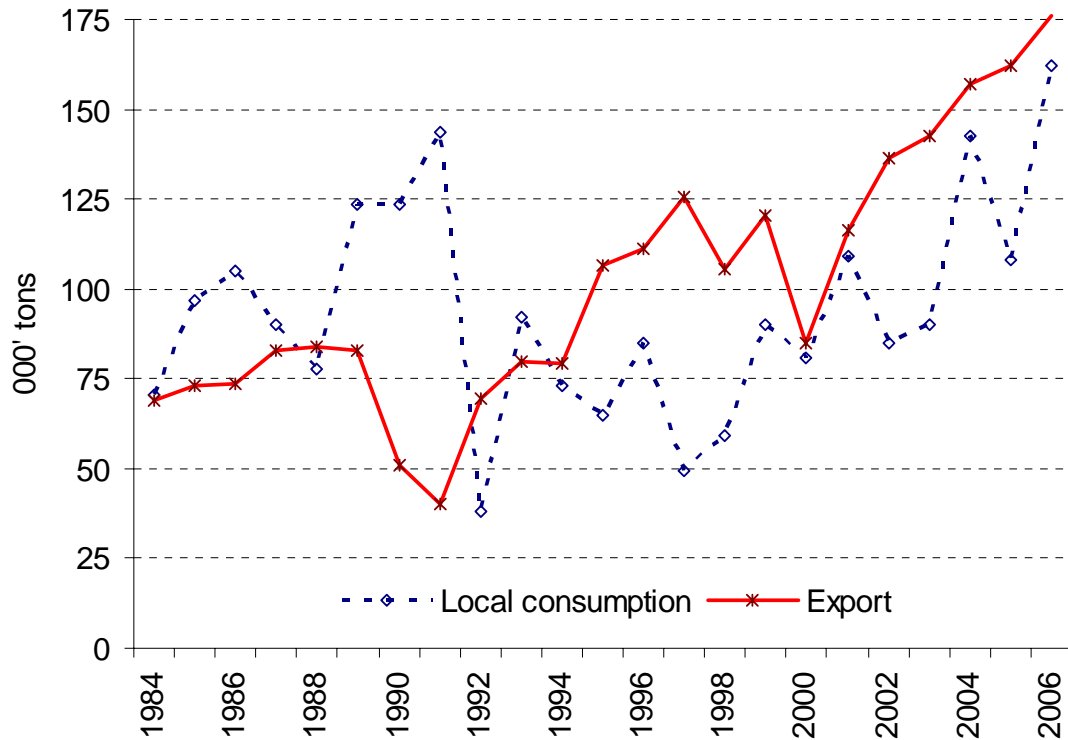
Ethiopia is not only the origin of *C. Arabica* but also seems to be the origin of the dissemination of the coffee-drinking culture. Coffee is not a luxury beverage for Ethiopians, but is rather a basic foodstuff. It is the only nation among the coffee-producing countries that has been consuming 48 percent of its national production as domestic consumption over the past four decades (ICO database, 1965-2006). Coffee is culturally prepared and consumed two to three times per day – together with breakfast, lunch and dinner. In addition, coffee is served with light meals at special social gatherings, for instance weddings, births, holidays, burial gatherings, and many other types of social and cultural events (CTA, 1999).

Coffee in Ethiopia is consumed in different ways. *Buna kella* (coffee beans boiled with butter) is still popular in most coffee-growing areas. Long-distance travellers or hunters in the Gedio and Borena zones mostly consume it, while in Wollega it is prepared for special cultural and family occasions (CTA, 1999). High social value is placed on *buna kella*; it is considered a holy food to be served as the first dish at a birth, wedding or other

celebration. Similar practices are found in the coffee-growing areas of southern Ethiopia. For instance in Sidama, Wolayta, Gamo Gofa, etc. coffee beans boiled with butter are served to visitors and guests and at funeral gatherings, etc. This dish, accompanied by roasted barley, wheat and chickpeas, is still popular in most coffee-growing areas of the country (Ameyya, 2002). In Hararge, an infusion of roasted coffee leaves (*kuti*) and husks mixed with milk (*hoja*) is consumed with salt instead of sugar. In the Kaficho and Shakicho zones, where coffee was first domesticated, coffee leaves collected from wild coffee plants are brewed and spiced with pepper and ginger to prepare *chamo* (CTA, 1999). This is also consumed in Wolayta, especially during the winter season when coffee beans are relatively expensive, and it is also used as a medicine known as *haita tukia*. Although it is often difficult to substantiate, this cultural coffee drinking has social value in that people share ideas, develop friendships and harmony, and consult on solutions to common problems (CTA, 1999).

Figure 4.7 shows the relationship between local coffee consumption and export trends between 1984 and 2006. Domestic consumption competes with exports in that it drops when world prices are attractive and peaks when export prices drop. The figure clearly depicts this relationship. In the post-ICA period (1990, 1991 and 1992) domestic consumption increased drastically before declining in 1994, 1996, 1997 and 1998 when the world coffee price remained lucrative. Similarly, it increased in 2001 and 2002 when the world coffee price dropped.

The coffee consumption figures are not accurate due to a large proportion of on-farm consumption of coffee that does not enter official marketing channels. The average per capita consumption of coffee in Ethiopia was estimated at 2.5 kg in the 1970s. Since then it has declined and the recent estimate using ICO data is about 1.5 kg/head/year. This decline may be partly due to the comparatively high cost of coffee and high population growth. But in absolute terms, national coffee consumption increased from 50 thousand tons in 1997 to 162 thousand tons in 2006 (see Figure 4.7).



**Figure 4.7: Coffee production and export trends**

Source: ICO database (2005)

According to the CSA (2003), in the Oromia region, on-farm consumption is relatively higher in the East, West and North Shewa zones, followed by East Wollega. The remaining zones traditionally consume *kuti* and *hoja*, and often use coffee beans. On-farm consumption in the southern regional states is high in the Gurage zone, followed by the Dawuro, Kaffa and Wolayta zones, where on-farm consumption accounts for more than 70 percent of their production (CSA, 2003).

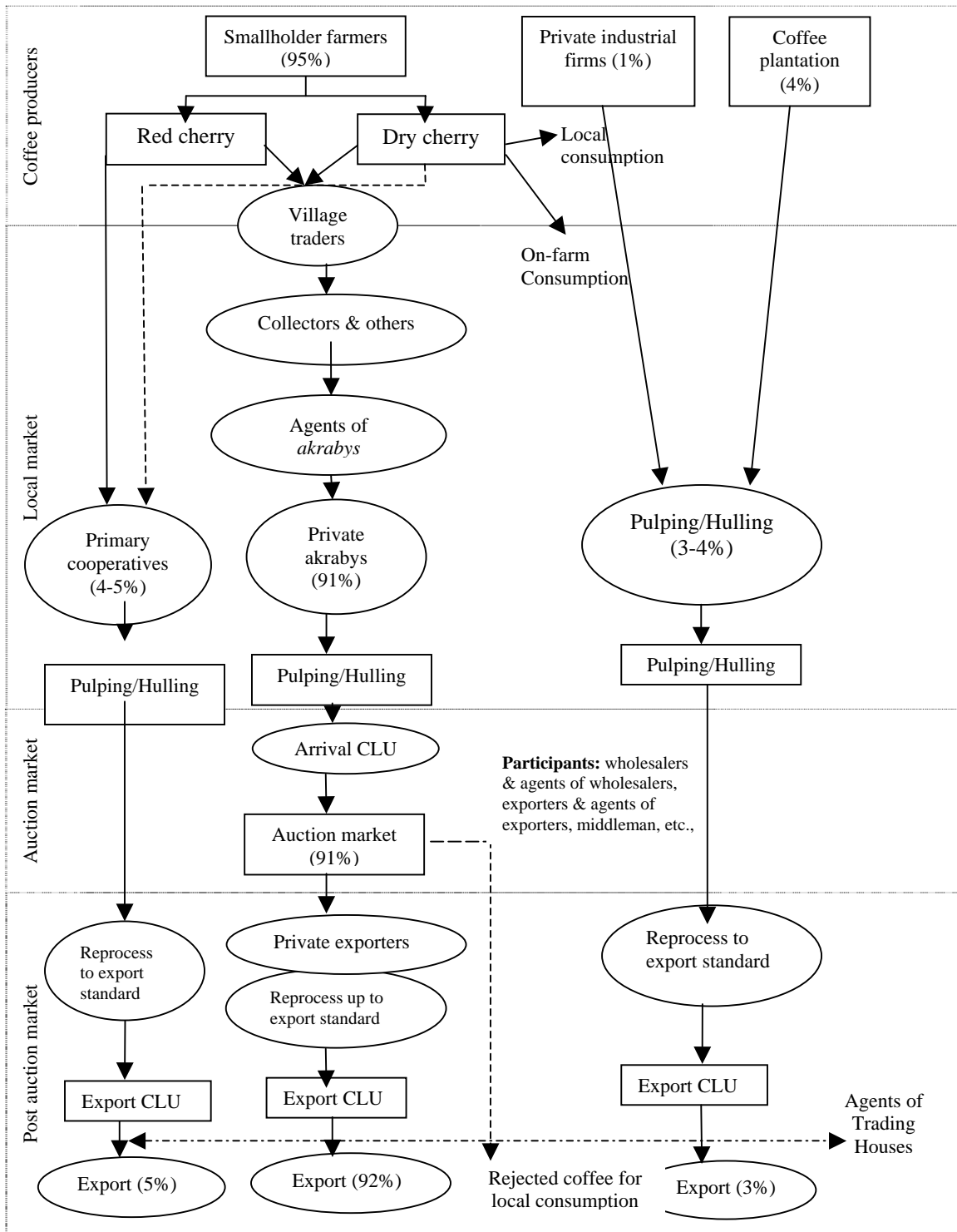
From a foreign exchange earning point of view, high domestic coffee consumption might lower the exportable volume of coffee and thereby reduce the foreign exchange earnings from coffee. However, high domestic consumption also has an advantageous price-stabilising effect – when international prices drop the Ethiopian coffee farmers are compensated by high local demand. For farmers it makes no difference whether or not their coffee is exported, because their ultimate payment is received in local currency.

## 4.7 Domestic coffee marketing

### 4.7.1 Domestic coffee marketing chain

This section reviews the present coffee market structure of the domestic coffee marketing chain (from the point of sale by the producer to the port). The coffee bean passes through the hands of several market players before reaching the auction market and being exported (Figure 4.8). The flow of coffee in the internal market can be viewed as a flow of stream. Small amounts of coffee are produced by many peasants over a wide area. This coffee is then collected at dispersed primary market centres by licensed or unlicensed collectors (*sebsabys*) or village traders and delivered to private or cooperative wholesalers (*akrabys*) or to their agents, where these small lots are bulked and transported to processing centres, from where they are delivered to the central markets of Addis Ababa and Dire Dawa. Exporters eventually purchase the coffee from the auction centre, process it to export standard and then export it to overseas markets.

Coffee is produced by smallholders or by industrial firms or state farms. Pre-auction market participants include smallholders, primary collectors (*sebsabys*), suppliers (*akrabys*) or agents, processors and service cooperatives. Auction market participants include wholesalers (*akrabys*), agents of wholesalers, exporters and agents of exporters, unions, brokers, coffee liquorers, auction coordinators and judges, and coffee warehouse enterprises. In the post-auction market, exporters, representatives or agents of trading houses and various government institutions are involved in facilitating the transaction (see Figure 4.8). The subsequent section discusses the contribution of each key player and institution participating in the marketing chain from production through to port of export.



**Figure 4.8: Domestic coffee marketing chain**

Source: Coffee market survey (2006)

## 4.7.2 Key players and institutions

In this marketing chain from farmgate to export, producers, wholesalers, numerous licensed and unlicensed (illegal) traders and middlemen are involved. The market participants as depicted in Figure 4.8 can be categorised into two main groups: local (domestic) and federal level institutions and players.

### 4.7.2.1 Local institutions and players

In contrast to its competitors such as Brazil, in Ethiopia 95 percent of coffee is produced by smallholder farmers, estimated at more than 1.3 million households, the majority of which are located in the high plateaus of the south-western, southern and eastern parts of the country with an average holding of 0.5-1 hectare. Farmers often sell their coffee in red-cherry form immediately after picking or in the form of sun-dried cherry (*jenfel*) after drying and storing for some time. In the current domestic market, producers can sell *jenfel* or red cherry to illegal traders at the farmgate or deliver it to *sebsabys*, wholesalers (*akrabys*) or cooperatives to be transported to marketing centres or hulling/pulping stations (Shibru, 1998). Producers use hired labour or family labour to pick the cherries when ripe. Hired labour use is common in the western regions where production is relatively higher and farmers own semi-forest and forest coffee systems, which are more prone to loss unless picked immediately after ripening (MCTD, 1987).

Coffee production creates considerable on-farm job opportunities casual labour opportunity for rural landless youths, women and students, as well as migrant casual labourers, who generate some cash by picking, processing (at washing, hulling and pulping stations) or transporting coffee. During the picking seasons, migrant labourers travel to coffee-producing zones for employment and stay in the coffee regions until the coffee harvesting season ends (Amya, 2002).

Primary coffee collectors (*sebsabys*) are locally licensed coffee traders restricted to collecting coffee directly from individual farmers at a specific designated location,

typically at or nearby town or village markets. *Sebsabys* are required to sell their purchases on the same day either to *akrabys* or cooperatives within their woreda. *Sebsabys* are not entitled to hold stock even overnight and are not permitted to transport or sell coffee outside of the woreda where they hold their licence (Westlake, 1998). In practice, currently none of the stipulated rules seem to be adhered to and have rather remained on paper at weak local-level institutions. *Sebsabys* often store coffee sometimes for more than three months for speculative purposes. Though *sebsabys* are licensed to collect dry cherry, in practice they are also collecting red cherry. Indeed, the role of the *sebsabys* is very limited in the current marketing system since the government granted permission in 1997 for *akrabys* to purchase directly from farmers, thus bypassing the *sebsabys*. As a result, less than 5 percent of *sebsabys* renew their trading permits and most work as agents for *akrabys* for a commission without holding any licence.

Illegal coffee traders (unlicensed traders) are village traders who collect coffee door-to-door or in village or primary markets without holding a valid licence. They are usually landless farmers, ex-soldiers, students or women who live with coffee farmers in the vicinity of the market. Although it is difficult to find data on the volume of coffee collected by illegal traders, they account for the lion's share of the collection of dry cherry and more than 50 percent of the collection of red cherry. When prices are attractive, they collect by going door-to-door and also cover remote areas. They are often paid a commission by wholesalers based on the volume of collection. To maximise their commission from wholesalers, they usually mix high-quality and low-quality cherries together to raise the volume. Illegal traders transport coffee from low-premium to high-premium price areas (e.g. Sidama to Gedio). These malpractices have contributed to the current quality problems in the domestic coffee marketing system (AMPD, 2006).

Speculative middlemen are non-*sebsabys* (illegal or legal) who purchase coffee from farmers on market days and sell it to other *sebsabys/akrabys* at the same market on the same day. Sometimes they mediate farmers to sell and *sebsabys* to buy and then get some tips from the *sebsabys*. They make a profit by bringing two parties together without any value-adding activity.

Suppliers/wholesalers (*akrabys*) are the most important players after producers in the marketing chain. In the present domestic coffee market, suppliers purchase coffee in different coffee-growing regions directly from the growers through the village markets, or else via the *sebsabys* (collectors). As Ethiopia's coffee is grown by millions of smallholders on very small lots, they have to engage in a large amount of work to collect sufficient coffee for one truckload. They transport coffee from collection points to stores and process to parchment or clean coffee before delivering to auction. Suppliers are not allowed to export or sell to exporters without being at the terminal market (IFPRI, 2003). By law suppliers (*akrabys*) are not allowed to own a coffee processing licence in the same business name. In practice, most *akrabys* own a coffee processing licence (or hulling and pulping industry) in the name of their family. Indeed, the licensing distinction between *akrabys* and processors (hulling/pulping industry operators) is also blurred. There were about 1,068 registered *akrabys* in the country in 2006 (AMPD, 2006).

Primary coffee-farmers cooperatives are the only public organisations close to coffee farmers. Prior to reform, primary service cooperatives were used to render several services (delivering consumption goods and agricultural inputs, purchasing outputs, providing credit, etc.) to farmers. However, since market deregulation, they are subject to the same laws as any other corporate entities. Under the new law, cooperatives do not have the full government support they previously enjoyed. Local governments provide minimal technical assistance in the area of budgeting and auditing. Primary cooperatives neither distribute basic goods to their members nor do they provide short-term credit to farmers (Kodama, 2007).

At present they have only a marketing role and they compete directly with the private suppliers (*akrabys*), mainly for washed coffee. Most cooperatives own washing facilities, warehouses, drying tables or cemented drying floors. Almost all primary cooperatives are highly indebted and are prohibited from accessing bank loans. Most are weak or non-functional ((Kodama, 2007). As indicated by cooperative agency records, currently about

two hundred primary cooperatives involve in a local coffee marketing. However, their export market share is still very low (about 6 percent of export in 2005).

Ministry of Agriculture and Rural Development (MoARD) branch at woreda level is one of local institutions responsible for raising and distributing seedlings, inspecting washing and hulling facilities, inspecting quality and issuing dispatch letters prior to transportation to terminal markets. In all major commercial coffee-growing woredas, there are marketing and coffee development units.

Coffee Marketing Regulatory Team (CMRT) (*yebuna gibrehaile*) is the second most important local institution. It was established to regulate the compliance of coffee marketing participants with regulations pertaining to quality, processing and waste management. The CMRT structure starts at regional level and descends to peasant association level. The CMRT was established in the late 1990s in the Oromia and southern regional states. However, it is not completely functional in Oromia and operates only in some coffee districts of the southern regional state (i.e. Sidama and Gedio only) as the author observed during his field work.

#### **4.7.2.2 Federal institutions and players**

Ministry of Agriculture and Rural Development (MoARD) is an umbrella organisation responsible for the overall performance of the agricultural sector (especially agricultural production, marketing, natural resource management, mechanisation and modernisation of the sector). The commercialisation of agricultural products and the promotion of high-value agricultural export commodities have been given due attention since its establishment (IFAD, 2004). Agricultural Market Promotion Department (AMPD): AMPD is one of three units (i.e., agricultural marketing, agricultural development and agricultural resources management) currently coordinated by *MoARD*. AMPD is responsible for coordinating coffee marketing, quality control, training and other related services.

Coffee Liquoring Unit (CLU) is a government agency that plays an essential role in maintaining the quality of especially export coffee from Ethiopia. It is responsible for liquoring (classifying by taste and appearance) washed and sun-dried coffee on its arrival at auction and also issuing a quality certification (QC) prior to export.

Jimma Coffee Research Centre (JCRC) is state owned institution responsible for national coffee research and has several sub-research stations in various agro-ecological zones of the country. It has been playing an important role in the development of the sector, primarily in selecting disease-resistant varieties, establishing national coffee collections, and protecting the genetic resources of the crop (IFPRI, 2003). The JCRC is accountable to the Ethiopian Institute of Agricultural Research (EIAR).

Private coffee exporters are among the major players in the coffee market. They purchase coffee from terminal markets, reprocess it to export standard and export it to their buyers. Coffee export licences are issued by the Ministry of Trade and Industry. The licensee is not required to show or explain much about his/her capital, experience or facilities before the licence is issued. The AMPD checks some minimum requirements, but the process is not stringent. This easy licensing procedure increased the number of licensed exporters from 14 (prior to reform) to 240 in the late 1990s (after reform), while in 2006 there were about 187 licence-holders, of which about 90 were active. However, only a handful of them hold the lion's share of the market (Kuma, 2006).

Agents of exporters are legal representatives of exporter who attend regularly the auction bidding process, purchase and sign contract behalf of exporter. According to the coffee marketing survey of 2006, the majority of exporters do not attend auction markets regularly, but instead appoint legal agents from amongst their family members, relatives or friends to regularly participate in the auction market and purchase coffee on their behalf. However, this has created 'back-door marketing' opportunities for the agents of exporters and suppliers in that they negotiate ahead of time on the commission that the supplier (*akraby*) will pay if the agent buys the supplier's coffee, regardless of quality (ECSA, 2006).

Agents of wholesalers are legal representatives of wholesalers who participate in the auction bidding and sales of coffee behalf of his/her respective trader. Most of suppliers travel long distances from the coffee-growing regions to deliver coffee to the auction market and sell it there. Often coffee prices may not be attractive for immediate disposal of the coffee upon arrival at the auction and so they may wait for some days, incurring accommodation, transport and other costs. If prices continue to remain unattractive, these wholesalers usually offload their coffee in state-owned warehouses and return to their places of origin. However, it is difficult to follow auction price situations from home, and so they appoint legal participants to act as agents on their behalf and to regularly follow the price situation and sell when prices are attractive. Nevertheless, as anecdotal evidences from Ethiopian Coffee Suppliers Association (2006), these agents sometimes undervalue the coffee price to sharing the difference between the actual and negotiated price with the exporter's agent.

Middlemen (*delalas*) are unlicensed dealers working on a commission basis. In the case of coffee, middlemen facilitate the exchange of coffee between buyers and sellers. They play an important role when coffee prices start to slide. They go door-to-door with samples of coffee drawn from the supplier's truck and persuade exporters to purchase their product. If the exporter shows an interest, middlemen bring exporter and supplier together to negotiate on price. In such an exchange the suppliers have a weaker bargaining position because of low market price, but when international prices are attractive, the middleman has a very limited role because most exchange takes place formally in the auction market.

Ethiopian Coffee Exporters' Association (ECEA) was formed in 1963 with the primary aim of promoting a better understanding among exporters, helping to develop the coffee trade and liaising between exporters and the National Coffee Board (MCTD, 1987). It has since occupied an import position, representing Ethiopian coffee exporters within and outside the country with the aim of promoting coffee exports. It provides coffee trade information, lobbies on policies and supplies, and provides technical support to its members, which currently number 65 (ECEA, 2006). Similarly, the government has

established the Ethiopian Coffee Suppliers' Association (ECSA) in 2005 and has opened office at auction centre to coordinate and raise bargaining power of the suppliers.

Coffee Farmers' Cooperative Unions (CFCUs) is federal level organization which coordinates its respective primary coffee cooperatives. CFCUs were re-established by the government in 1999 as a strategy to rescue coffee farmers from the auction market post-date cheque scandal that happened then and from world coffee crises in later years. Currently there are six (Oromia, Yirgachefe, Sidama, Kaffa, Tepi and Bench Maji) Coffee Farmers' Cooperative Unions (Kodama, 2007). In 2001 the government granted permission for farmers to bypass auctions and export coffee directly to overseas buyers. The CFCUs have been given a mandate to search market opportunities, provide price information and warehouse services, facilitate bank loans, promote high-quality coffee production, participate in international trade fairs to promote products, and provide training and capacity-building for members (Kodama, 2007). Their market share grew from 0.5 percent in 2001 to 6 percent in 2006.

Oromia Coffee Farmers' Cooperative Union (OCFCU) was the first union to be founded, in June 1999, and includes 34 cooperatives representing 22,734 members estimated to produce around 16,000 tons of clean coffee. Sidama Coffee Farmers' Cooperative Union (SCFCU) was founded in July 2001 and comprises 39 primary cooperatives representing 82,734 farmers producing around 35,000 tons of clean coffee. Yirgachefe Coffee Farmers' Cooperative Union (YCFCU) was founded in July 2002 and has 21 primary cooperative members representing 42,065 member coffee farmers. Kaffa Forest Coffee Farmers' Cooperative Union (KFCFCU) was founded in March 2004 by 26 primary cooperative members representing 6,032 coffee farmers. Tepi and Bench Maji are recently established in 2006 to promote coffee export to fair-trade and organic coffee markets (Kodama, 2007).

Coffee Farmers' Cooperative Unions (CFCUs) are of critical importance in empowering coffee farmers to have bargaining power in both local and international markets in order to secure a reasonably beneficial share of the coffee trade. Prior to the foundation of

CFCUs, primary coffee cooperatives lacked market information, financial and human resources. The establishment of CFCUs not only rescued primary cooperatives from malpractices but also reduced marketing costs (see chapter five for marketing margin estimates). This is because the establishment of coffee unions shortened the marketing chain bypassing coffee auction in which private traders are obliged to participate.

The typical market channel of the coffee cooperatives and unions is that cooperatives purchase coffee from farmers at the market price. The price is determined based on the competition between cooperatives and private traders. The payment by cooperatives is made immediately or some time later depending on the financial status of the cooperative. Coffee purchased is processed up to auction standard and delivered to a union. The union purchases coffee from cooperatives at a price equivalent to the domestic auction price at the time. The payment is usually made immediately or after couple of weeks following coffee delivery (Kodama, 2007). As members of the existing primary cooperatives (mainly from Sidama and Yirgacheffe) expressed their dissatisfaction during the panel discussion held for purposes of this study mainly emanate from delay payment, and failure of unions to consult with primary cooperatives. In some cases, the union suggest cooperatives sell their coffee at auction instead for union. The reasons for this includes when coffee volume exceed the amount the union is able to export, quality of coffee from cooperatives not meet the union standard, auction prices higher than union price and when cooperatives need immediate payment (based on author's interview, 2006).

As sated by Kadama (2007), despite the basic rule which state primary cooperatives to sell coffee for union, the lion's share of coffee purchased by primary cooperatives did not channelled though unions because of the reasons mentioned in the previous section. For instance, in 2004/05, YCFUCU purchased only 1036 tons (13%) out of 7744 tons purchased by its respective primary cooperatives. This means that 87% of coffee purchased by primary cooperatives was sold through auction rout instead of the union route. Besides, the current primary coffee cooperatives cover only about 7-10 percent of the estimated 1.3 million coffee farming households of national level. The major cause of

problem of unions and cooperatives revolves around shortage of funds to purchase coffee and on limited size of fair and organic coffee markets.

Coffee Processing and Warehouse Enterprise (CPWE) cater coffee processing, warehouse and parking service for wholesalers and exporters. It was initially established to process washed coffee in the 1980s and was managed by the Ethiopian Coffee Marketing Corporation. With the change in the policy regime from central planning to a market economy in 1994, it was also re-established as an enterprise in 1994 by means of a regulation issued by the Council of Ministers to meet the country's increasing demand for coffee exports. The CPWE has an annual processing capacity of up to 80,000 tons and has a warehouse capacity of 30,000 tons. Currently there are 23 privately owned coffee-processing plants with an estimated annual capacity of 600,000 tons, whereas the estimated total national yield in 2006 was 312,000 tons.

The Development Bank of Ethiopia (DBE) is one of the most important government owned institutions provide financial service for coffee processing and marketing. The DBE operates in pursuit of the overall economic policy and development strategy of the EPRDF. The bank provides loans to finance the establishment and expansion of agricultural, agro-industrial, transport and other industries through its 32 branches across the country. It provides short-term loans for working capital, seasonal agricultural operations and the marketing of crops like coffee. It also finances medium- and long-term investment projects such as the establishment of coffee hulling and pulping industries. Most coffee industries currently in operation were established using loans from the DBE. During the Military regime (1975-1991) public enterprises such as coffee plantations, state farms and cooperatives were eligible for credit without any collateral (DBE, 2005).

National Bank of Ethiopia (NBE) is responsible for managing the country's foreign exchange flows, including those generated by coffee. According to current regulations, the NBE checks for the transfer of foreign exchange from previous exports before issuing export permits, and exporters are required to submit all required documentation to ensure lawful exchange.

Coffee Plantation and Development Enterprise (CPDE) is a state-owned organization with three branch offices in the Bebeke, Tepi and Limu plantation areas and a main office in Addis Ababa. It has coffee plantations covering about 20,000 hectares, with approximately 8,000 permanent employees, and is responsible for more than 50,000 casual labourers annually. It accounts for about 4 percent of national production and export (CPDE, 2002). It produces coffee on its own farms, processes it to export standard and then export directly to niche markets bypassing the auction.

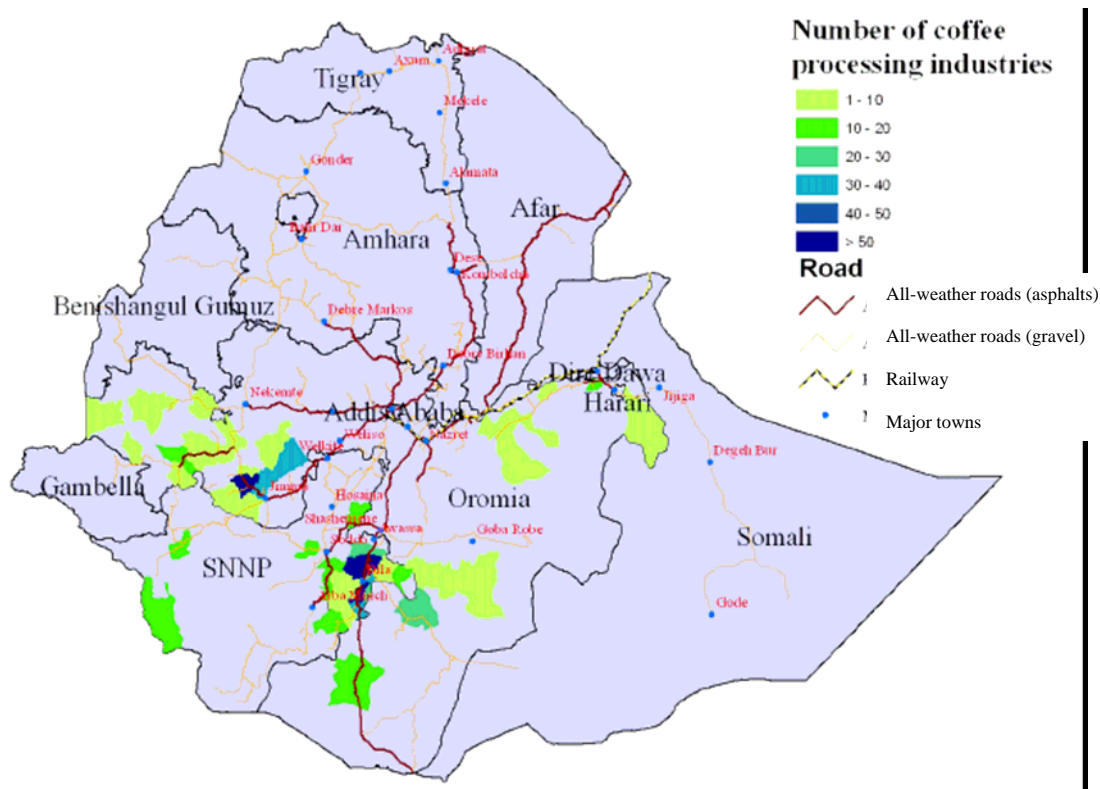
The current coffee marketing regulations prohibit direct involvement by foreign companies in auctions, so major Ethiopian coffee buyer companies from Europe, Japan, the USA and Saudi Arabia have either agent or representative offices situated in Addis Ababa. These offices: (1) provide information on coffee production, prices and marketing; (2) conduct annual crop assessment surveys to estimate new-year production; (3) collect offering prices from reputable exporters, screen and send to their main office; (4) send pre-shipment samples' together with quality inspection taste results; and (5) serve as an intelligence office for their respective main offices. They informally obtain prices of contract sells and assess the stockholding and reputation of each exporter. In general, they assist buyers to make informed decisions. This approach has blocked Ethiopian exporters from directly dealing with buyers. That is, under the prevailing structure, exporters communicate with their buyers through representatives or trading houses.

The above discussion on key players and institutions in the Ethiopian coffee marketing chain mainly aims to indicate the complexity of the domestic coffee marketing chain. There are about 12 players and 10 institutions. Most of the actors are concentrated at primary markets and the institutions at federal level. The most interesting issue of such a long marketing chain is its effect on the marketing margin, especially on producer price. The longer the marketing chain the higher the marketing costs, which will ultimately reduce the market price share of the producer (see Daviron and Ponte, 2005).

### 4.7.3 Coffee processing

Coffee cherries are processed at farm level by two widely applied methods, namely dry and wet processing. Ethiopia on average exports about 70 percent dry-processed or sun-dried coffee and 30 percent wet-processed or washed coffee. The dry and wet processing activities are undertaken in the coffee-producing areas. The production of high-quality washed coffee starts on the coffee farm, where only the ripe and red cherries are picked, then sorted at the factory before pulping, in the process of which over-ripe, under-ripe, diseased and insect-damaged cherries and foreign matter are removed. The clean cherries are then pulped (mechanical removal of the outer skin) on the same day before being fermented for one to two days and washed in clean water to remove mucilage, then dried to standard moisture level before being sent to the warehouse. Due to this extended process, washed coffee is subject to high processing costs (10-15%); however, it also fetches a 30-40% higher premium price compared to dry processed coffee (Westlake, 1998).

Currently there are about 612 coffee-washing stations in the country owned largely by the private sector, cooperatives and state enterprises, with the capacity to process 85,128 tons of washed coffee per annum. However, due to uneven distribution, these industries are underutilised. Most use only about 50 percent capacity. Figure 4.9 depicts the uneven distribution of coffee-processing industries (both dry and wet processing) in the coffee-producing zones of the country. High concentration is exhibited in the Jimma (mainly Agaro, Manna and Limu), Gedio (Yirgachefe, Wonago and Kochore) and Sidama (Dale, Aleta Wondo and Bansa) areas. On the other hand, there are coffee zones with the potential to increase the volume of washed coffee but which lack adequate pulping industries. These zones include Kaffa Shaka, Bench Maji, Illubabore, South Omo, Kambata Tambaro, Alaba, Guji, Bale, and the Borena Kercha woreda. Most of these areas are located in the remote south-western and southern coffee zones (EFDR, 2006).



**Figure 4.9: Production volume and distribution of coffee processing industries**

Source: IFPRI's GIS centre in Ethiopia (2006)

As expressed by industry owners during panel discussion for purpose of this study, the high concentration of processing industries in a few coffee-growing areas has also contributed to unhealthy competition and quality problems. For instance in Yirgachefe during wet coffee-processing seasons (October – December), due to a lack of adequate volumes of red cherry supply to all pulping industries, usually prices shoot up regardless of world coffee price, or some traders illegally transport red cherry from neighbouring districts and less attention is paid to quality inspection by primary market participants. As research realized during his field work, it is major problem mainly in the washed premium coffee producing regions of south and south west.

#### 4.7.4 Quality control

Ensuring the supply of coffee of a reliable quality is a prerequisite for improving the performance of coffee exports from Ethiopia. The quality control procedure has remained

more or less remained similar from the time of NCB (early 1960s) till to date. It has implemented at local and auction market levels.

At local level, in every major coffee-producing district (woreda), there is a quality inspection office under the auspices of the Woreda Agriculture and Rural Development Office that checks the grade and quality of every truckload of coffee before it leaves for auction. Quality inspection is more stringent for sun-dried coffee than for washed coffee, because it is more susceptible to defects than wet-processed coffee. The CMRT also oversees primary coffee markets, illegal movement, as well as quality during processing and marketing periods. Despite the strict rules, there have been cases where, knowingly or unknowingly, some low-grade coffee passes to the auction centre without achieving the minimum quality requirement.

At central level there are two inspections: (1) quality inspection of arrival coffee, and (2) quality inspection of export coffee. For arrival coffee, both visual inspection of bean quality and cup testing are performed prior to auction. In order to bring their coffee to export-standard level, exporters reprocess coffee using coffee-processing plants, then deliver it to the Coffee Liquoring Unit (CLU) for quality checking before dispatching it to the port of export. The CLU issues a quality certification to the coffee that meets the minimum export standard.

Despite the strict quality regulations and control at different levels, several irregularities are prevalent at farm and auction levels. For instance, at farm level, irregularities such as drying coffee on bare earth, re-moistening the dry cherry for the purpose of weight gain and mixing coffees beans with foreign material continue to exist. Picking unripe or over-ripe cherry or even strip-picking are common problems in many coffee-growing areas (Ameya, 2002; IFPRI, 2005).

## **4.8 Auction coffee marketing**

### **4.8.1 Commencement of the coffee auction system**

The Ethiopian coffee auction market was first launched in 1971/72 to solve the then existing problem of quality and supplier difficulties in selling coffee, since there was a limited number of exporters. At the time, exporters were also buying coffee through brokers and were not able to source the coffee directly from suppliers. To solve this problem the NCB established the current auction system where suppliers and exporters meet in one place. Since then all coffee, whether handled by private traders, cooperatives or plantations, has had to go through the auction process (MCTD, 1987).

During the Imperial period, although licensing was specific to each marketing activity (suppliers and exporters), some suppliers worked as agents for exporters, while in practice they were vertically integrated and competition at auction was not genuine (Negewo, 1993). During the Military regime, the coffee auction process was highly regulated and there was no competition between public (ECMC) and private bidders, as participants were issued with a quota. Private exporters were not allowed to compete for coffee purchase until the ECMC's quota had been met. The change in regime, together with the deregulation of the entire economy – including coffee marketing – in 1992 opened up opportunities for private participation in all tiers of markets, including auction.

With the current coffee auction process, all licensed wholesalers (*akrabys*) from coffee-growing areas deliver washed (parchment) and sun-dried (clean) coffee to either the Addis Ababa or Dire Dawa auction centres. Coffee from the south and south-western regions of Ethiopia is delivered to the Addis Ababa auction centre (about 92% of national supply), while coffee from the eastern regions is supplied to the Dire Dawa auction market (about 8%). Auctions are regulated by the AMPD and are held on weekdays (Monday to Friday) at regular times between 14:00 and 17:00 (CTA, 2003). During peak supply seasons (January to March) auctions are held twice daily (morning and afternoon).

## 4.8.2 Coffee supply trend to auction

Coffee supply to or arrival at auction markets (both washed and unwashed coffee) has shown a drastic increase in the past four decades (Table 4.3). As presented in Table 4.3, the average annual arrival during the Imperial regime (1961-1973) was estimated to be 88,799 tons, only five percent of which (4,498 tons) was washed. During the Military regime (1975-1991), due to political instability and civil war, the both average total arrival and sun-dried coffee remained below Imperial level. However, the average arrival of washed coffee grew from merely 4,498 tons during the Imperial regime to 11,865 tons during Military regime, which accounts for 13.6 percent of total arrival.

**Table 4.3: Coffee arrival and export (1961-2006)**

Year	Supply/Arrival (tons)			Export (tons)		Export value (million ETB)	Annual growth (%)	Unit value (ETB/ton)	ICO Indicator price
	Sun-dried	Washed	Total	Export	Annual growth (%)				
1961-73*	84301	4498	88799	74575		155		2060	44
1974-91*	75231	11855	87085	73961	-0.8	454	192.9	6102	121
1992/93	81201	14455	95656	44068	-40.4	285	-37.2	6467	53
1993/94	108296	14750	123046	70007	58.9	647	127.0	9242	62
1994/95	81218	15666	96884	88520	26.4	945	46.1	10676	134
1995/96	132247	18092	150339	76567	-13.5	1704	80.3	22255	138
1996/97	139518	19110	158628	110294	44.0	2541	49.1	23038	102
1997/98	128144	25408	153552	118784	7.7	1760	-30.7	14817	134
1998/99	111045	36475	147520	115025	-3.2	2642	50.1	22969	109
1999/00	124245	46997	171242	109079	-5.2	2066	-21.8	18940	86
2000/01	89281	25863	115144	118911	9.0	2052	-0.7	17257	64
2001/02	145730	51933	197663	99188	-16.6	1552	-24.4	15645	46
2002/03	140339	51377	191716	110036	10.9	1403	-9.6	12752	48
2003/04	143749	56242	199991	126100	14.6	1422	1.4	11273	52
2004/05	143739	64004	207743	144629	14.7	1791	25.9	12387	62
2005/06	161703	59156	220859	159989	10.6	2913	62.6	18209	89
Average	123604	35681	159285	106514	8.4%	1695	22%	20542	84

Source: AMPD of MoARD (2006)

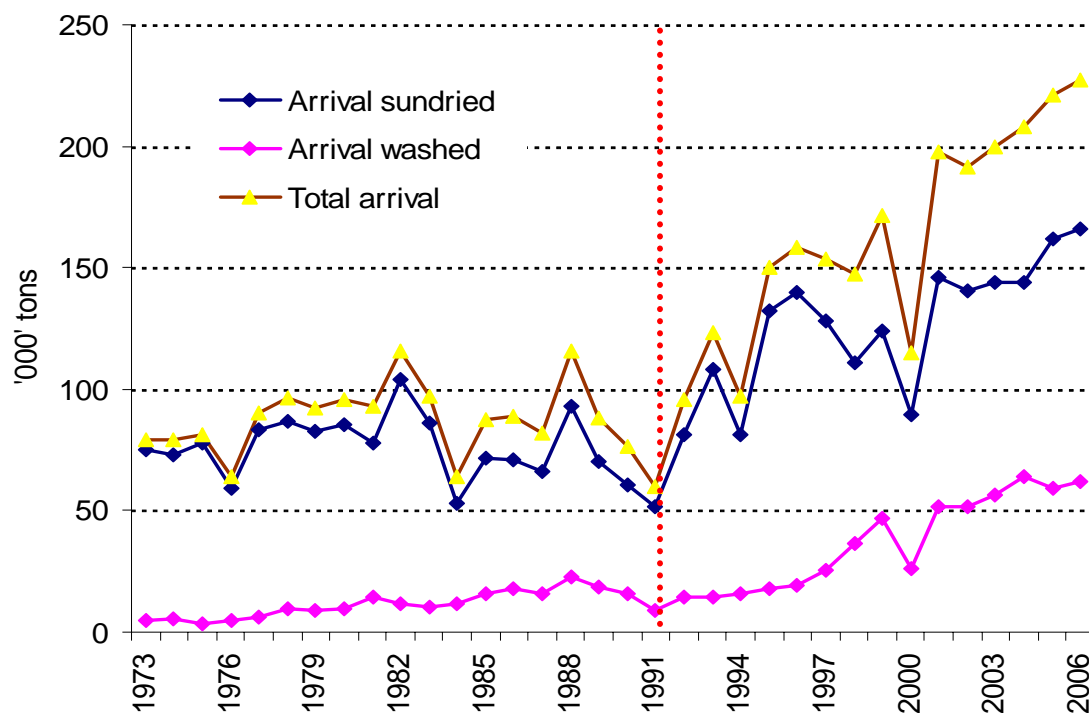
Note: \* refers to the average volume or values of the periods and 'ETB' stands for the 'Ethiopian Birr'

Between 1993 and 1999, the ideal climate conditions and coffee market reform measures, together with lucrative world coffee prices, contributed to a drastic increase in total

arrival from 95,656 tons to 171,242 tons. In later years it rose substantially, except during the year 2000/01. In 2005/06 arrival coffee peaked to 220,859 tons, which is historically the highest record. The average annual growth rate for the entire post-reform period remained at 9.8 percent. This substantial increase in arrival may account for the rewarding prices of the 1990s, which were expected to stimulate coffee farmers to plant new seedlings and allocate more labour for its production. Moreover, a relative improvement in road infrastructure may have pulled a large proportion of production to the export market. Devaluation of domestic currency from Birr 2.07 per USD to Birr 5 is one of the major factors improving incentives to traders to supply to the official market and depressing domestic consumption, because producers and local traders were able to earn more in terms of local currency.

Figure 4.10 illustrates the total arrival trend of sun-dried and washed coffee for the past three and a half decades. The trend has shown a clear leap since the early 1990s. The average arrival of sun-dried coffee grew more than two folds in between 1992 and 2005/06. It grew from merely 81,201 tons in 1992 to 161,703 tons in 2005/06. The share of washed coffee arrival increased from a mere 13.6 percent in 1991 to 27.3 percent in 2006. This is mainly due to high private-sector investment in the wet-processing plants. The number of washing industries increased from 400 (pre-reform level) to 610 in 2006 (AMPD, 2006). Of these washing stations 62.8% are owned by private enterprises and the rest by cooperatives, with 33.9% being located in the Oromia regional state and 66.1% in the Southern regional state (FDRE, 2004).

In the past decade (1996-2005) the Oromia and Southern regional states accounted for 58.2 and 39.8 percent respectively of total coffee arrival at auction markets. During the same period, arrival by major coffee-producing zones, namely Wollega (18.3%), Jimma (16.5%), Gedio (13.8%), Sidama (10.4%), Illubabore (7.8%) and Hararge (7.4%), together accounted for 74.1 percent of national coffee arrival to auction markets (AMPD, 2006).



**Figure 4.10: Coffee arrival at auction market (1961-2006)**

Source: AMPD of MoARD (2006)

National washed coffee processing and supply is dominated by the Sidama (36%) and Gedio (21%) zones followed by the Jimma (15%) and Borena (11%) zones. The four major washed coffee-producing zones together account for 83% of the national washed-coffee supply. In other words, the Southern regional (64%), Oromia (32%) and Gambella zones accounted for 4% of national washed coffee supply/arrival between 1996 and 2005 (AMPD, 2006).

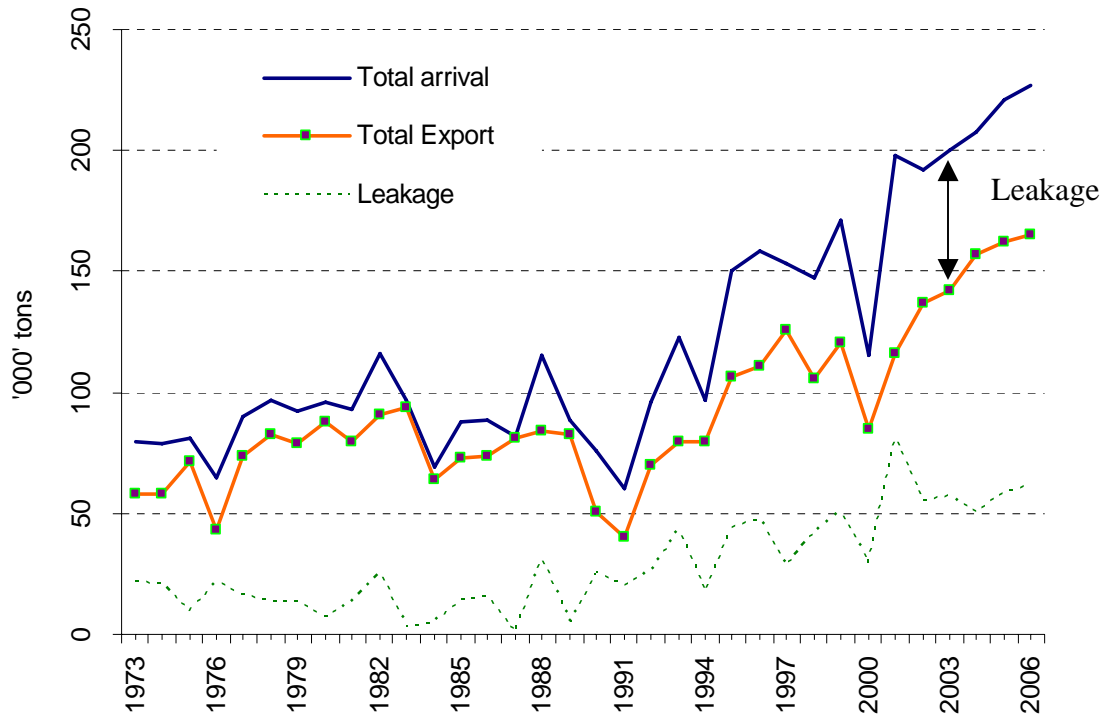
#### **4.9 Export coffee marketing**

The following section investigates coffee export trends, foreign exchange earnings, price divergence between auction and local markets, coffee leakage, price premiums for Ethiopian coffee, export destinations, and power concentration. The final part of this section discusses the major challenges facing export marketing.

#### 4.9.1 Coffee export trends

Coffee purchased at auction by exporters is reprocessed to export standard, packed and then delivered to the Coffee Liquoring Unit for a final quality check and to obtain quality certification (QC) before being delivered to the port of export. As indicated in Table 4.3, an average volume of coffee export during the Imperial regime (1961-1973) and the Military regime (1974-1991) was 74,575 and 73,961 tons respectively. The export of coffee has shown a sharp increase since 1994 and reached a high of 118,784 tons in 1997/98 due to better private sector participation and relatively high world coffee prices. There was then a sudden decline of over 10 percent in 1999. During later years (1998/99-2001/02) the export of coffee was exposed to continuous decline due to the drastic drop in world prices. This was the result of supply-and-demand imbalances in the world coffee market influenced by growing world coffee production, especially in countries such as Brazil (in the case of Arabica) and Vietnam in the case of Robusta (Oxfam, 2002). The volume of coffee exported in 2003, 2004 and 2005/06 was impressive, peaking at 126.1, 144.6 and 159.9 thousand tons respectively. The average annual growth for the entire post-reform period is 8.4 percent, implying substantial overall growth in the volume of export following reform (see Table 4.3).

Figure 4.11 shows coffee arrival, export out of arrival and leakage. Leakage refers to the difference in the quantity of arrival and exported coffee. This is usually known as rejected coffee due to its failure to meet the minimum standards required for export, allowing it to be sold only for local consumption. However, here it refers to the amount of coffee leaked from the export line to local consumption mainly due to high local demand. The volume of coffee export increased from a mere 80,000 tons in the early 1990s to over 160,000 tons in 2006, meaning that it almost doubled since the reform. However, during this time, the volume of coffee leakage also increased. The average leakage between 1961 and 1973, between 1974 and 1991 and between 1992 and 2005/06 is estimated to be 18, 16.5 and 28 percent respectively during the three different policy regimes.



**Figure 4.11: Coffee arrival to auction, export and leakage**

Source: AMPD of MoARD (2006)

Leakage increased from 30 percent (about 50,000 tons) in 1999 to 41 percent (70,000 tons) in 2001/2002 during the period of collapse of the international coffee price. The worth of this leakage of 50,000 and 70,000 tons is estimated at USD \$100 to 140 million if it had been exported. The 15-20 percent of coffee leakage prior to reform is usually considered acceptable, so why is the level so high in the post-reform or current regime?

As explained during the panel discussions with wholesalers and exporters, price differences between international and local markets play a major role in increasing the volume of leakage. As mentioned earlier, coffee is not as luxury beverage for Ethiopians, but is rather considered a basic item in their basket of consumption. The domestic price of coffee has never been as low as that of any other commodity, even when international prices fall. Sometimes local prices outweigh international prices by a considerable margin. In such instances, traders are inclined to sell a portion of the coffee in hand at local markets, violating current marketing regulations in an effort to make their fortunes.

According to current marketing regulations, no licensed processor or exporter is allowed to sell at the local market unless he/she holds a certificate of rejection from the CLU.

However, as stated by ECSA (2006), when prices are more attractive in the domestic market, some suppliers deliver their coffee to auction, complete all quality inspections and participate in the auction for the first one or two days in order to pretend that they are seeking to sell their coffee. They then withdraw from the auction centre, filling in the necessary forms to allow them to store their coffee in private warehouses to speculate for better prices. They then violate the rules by selling to private dealers at the *Markato* (main open marketplace in Addis Ababa). Similarly, some exporters also purchase coffee from the auction centre to export it, but when they secure lucrative local prices they sell a part of their purchase locally for export and then export the rest. In April 2006, certain exporters were caught red-handed while selling at the *Markato* and were prosecuted and jailed for selling to private dealers (AMPD, 2006).

For any rational thinker, it is justifiable for traders and producers to sell to whoever offers the best price. Table 4.4 shows the price divergence between official auction prices and prices charged at twenty selected town centres between January and February 2006. For instance, Gidame is one of the coffee-producing districts of the West Wellega zone adjacent to Sudan, about 710 kilometres from the Addis Ababa auction centre. The price at the Gidame town centre was ETB 19,000/ton whereas the auction price was ETB 16,647/ton even without accounting for marketing costs. When marketing costs are accounted for, the net price is only ETB 15,000/ton, which is 26.4 percent lower than the local price. In other words, if the trader or producer sells at the closest market, he/she can earn 26.4% higher than at auction. Indeed, the western coffee-producing zones adjacent to Sudan have a choice to sell either at auction or through unofficial routes.

The price difference between the Addis Ababa retail market and the auction market is extremely wide; i.e. the retail price at Addis Ababa (at the time) was 57.9 percent higher than the auction price (see Table 4.4). This seems to be one of the major reasons for the high leakage indicated above. Whenever local price is found to be more attractive,

traders, instead of delivering to auction, sell to illegal coffee dealers who transport the coffee to major coffee-consuming regions of northern Ethiopia (Gojam, Goder, Wello, Tigray, etc.). According to current estimates by the AMPD (2006), about 15% of coffee produced in the south-western and western zones is smuggled via Sudan. Average annual smuggled coffee via Djibouti was estimated to be more than 1,000 tons in the 1990s (EDE, 1997).

**Table 4.4: Divergence between local and auction prices (ETB/ton)**

Market centre	Local Price	Auction price	Marketing costs (ETB/ton)			Auction – costs (2 - 5)	Divergence between 1 & 6 in %
			Transport	All			
				others	Total		
1	2	3	4	5	6	7	
1. Awassa	17000	15706	353	453	806	14882	14.2
2. Jimma	17000	15941	471	453	924	15000	13.3
3. Bench Maji	16000	15647	941	453	1394	14235	12.4
4. Gidame	19000	16647	1176	453	1629	15000	26.7
5. Begi	19000	16647	1176	453	1629	15000	26.7
6. Mendi	18000	16647	1059	453	1512	15118	19.1
7. A. Ababa	26000	16471	0	0	0	16471	57.9
8. Others*	1700	16029	647	453	1100	14912	14.0
Average	17588	16176	706	476	1182	15059	16.8

Source: Author's own coffee market survey (2006).

Note: 'Others' refers to average price for the Bale, Alaba, Wolayta, Kaffa, Gore, Bedele, Bench Maji and Gimbi town centres.

It is not easy to estimate the exact amount of illegal internal trade and flow through borders to neighbouring countries. Most of this leakage results from inefficient marketing amongst growers who, if underpaid, seek better prices outside the formal channels. High levels of domestic consumption and smuggling may have a negative effect on the progress of official exports, yet it would be unreasonable to expect that coffee farmers would not consume their own produce, particularly when prices are low. High domestic consumption rather has a price-stabilising effect when international prices fall. However, there is no evidence to suggest that smuggling or an unusually high degree of domestic consumption has recently damaged Ethiopian exports.

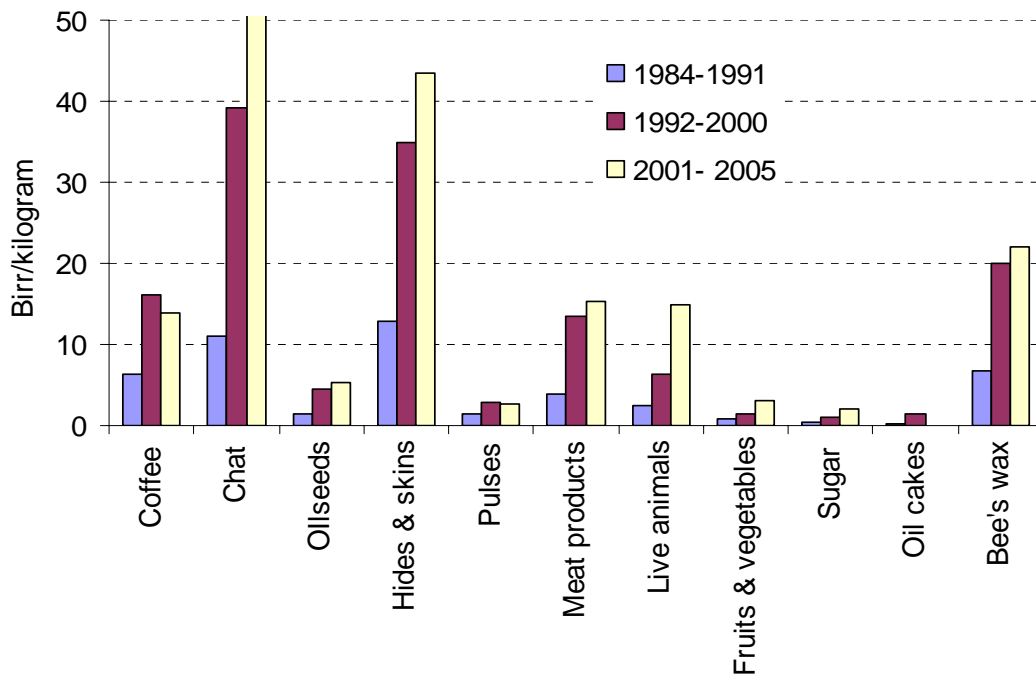
#### **4.9.2 Coffee export earnings**

Coffee export earnings has fluctuated drastically over the years, mainly due to demand and supply imbalances in the international coffee trade. In 1974/75 (in the year of transition from the Imperial to the Military regime) coffee export earning was registered to be a mere ETB 152 million. It then started to increase and approached ETB 604 million in 1979/80 before showing a constant decline until 1986/87, when it revived to ETB 734 million, which is also the highest earning recorded in the regime. It dropped to ETB 239 million in 1991/92 on the eve of transition from the Military regime to the EPRDF era; after which it increased steadily from ETB 289 million in 1992/93 to ETB 2612 million in 1998. Export earnings dropped again since 1998 due to the world coffee crisis that was in effect since early 2000, with the export earning declining to ETB 1403 million in 2002/03, which is about half the 1998 level. This had an adverse effect on the Ethiopian export, imposing serious hardships on coffee farmers, suppliers, cooperatives and exporters. However, it once again started to revive and recorded its highest level ever of ETB 2,913 million in 2005/06.

Until the drastic fall in the international coffee price since late 2000, coffee export on average accounted for more than 60 percent of merchandise export; however, the relative importance of coffee in the total merchandise export has declined significantly on average to about 37 percent in recent years. This is largely due to the deteriorating terms of trade of coffee on the world market since 2000. At the same time, the relative shares of chat, pulses/oilseeds and hides and skins have increased considerably from below 10 percent in 1995 to roughly 20 percent each in 2006 (NBE, 2006). The current efforts by the government to diversify and mechanise export away from the high dependency on coffee may have contributed to coffee's declining share in export earning. The government has initiated efforts to strengthen some of the existing export items and has also introduced new non-traditional export items since early 2000, including tantalum, cotton, textiles and textile products, cereals, flowers, natural gum, natural honey, marble and beverages, which together account for about 7-14 percent of export earning. Flower export is one area that has received due attention by the government, with its export to

EU countries having grown from a negligible amount to ETB 190.4 million in 2005/06. However, when the long-term (1960-2005) history of Ethiopian export items, coffee, chat, oilseeds, hides and skins and gold is considered it can be seen that they count for 47, 10.5, 9.8, 9.6 and 7 percent respectively, together accounting for about 84 percent of merchandise export (NBE, 2006).

Considering the relationship between the volume and the value of export gives an indication of the extent to which the product can be considered a relatively high-value export. The evolution of the export value-to-volume ratio (VVR) indicates whether the product is either gaining or losing value from movement in world prices. In other words, VVR is the amount of local currency (e.g. Birr) earned from a kilogram of export item over time and calculated by dividing total value (in Birr) by total volume (in Kgs) of export item. Figure 4.12 shows the average VVR (Birr/kg of item) for three different periods (1984-1991, 1992-2000, and 2001-2005).



**Figure 4.12: Value-to-volume ratio (VVR) of major exports**

Source: National Bank of Ethiopia (2005)

Coffee exports experienced a downward trend in relative value during the 2001-2005 period. It is somewhat surprising that fruits and vegetables have a much lower VVR than a traditional export like coffee. As expected, flowers and meat products have a relatively strong VVR, although the ratio has declined somewhat for meat products, which signals a cause for concern in the export sector. Finally, the VVR for hides and skins and chat far surpasses that of other high-value products, and both these products have experienced increased ratios in recent years.

### 4.9.3 Price premium over different groups

Value may be added to the sector as a whole if a greater proportion of coffee can be fully washed. Table 4.5 was constructed using data from the AMPD of MoARD and depicts the ratio of a unit value of washed coffee to sun-dried coffee when sold at auction and exported. The FOB price ratio for washed over unwashed coffee varies drastically from year to year. It was about 1.43 in the 1960s (i.e. washed coffee earned 43 percent more) when the proportion of washed coffee in total sales was small. The premium remained negligible in the 1970s and 1980s, until 1991/92. The ratio of unit value between 1992 and 2005 washed coffee over sundried remained at 1.47 percent (i.e., washed coffee fetched 47 percent more). Although the overall premium for washed coffee is promising, it remains quite volatile. However, as the average price premium indicates, for the period 1982-2005 washed coffee fetched about 14.7% in a and 31.7% premium price at auction and export markets respectively (Table 4.5).

**Table 4.5: Premium of washed coffee over sun-dried coffee**

Year	Auction market (USD/Ton)				Export price (USD/Ton)			
	Sun-dried	Washed	Ratio	Premium (%)	Sun-dried	Washed	Ratio	Premium (%)
1982-1991	1999.3	2058.9	1.00	5.03	3435.8	3342.8	-0.019	-1.9
1992-2000	2094.8	2562.7	1.21	20.93	2669.9	3762.8	1.436	43.6
2001-2005	1379.3	1673.8	1.18	18.09	1711.5	2544.7	1.534	53.4
Average	1824.5	2098.5	1.1	14.7	2605.7	3216.8	1.00	31.7

Source: AMPD of MoARD (2005)

As export data from the AMPD shows, sun-dried coffee accounts for more than 70 percent and washed coffee for about 30 percent of total export over the past decade. Export coffee (both washed and/or sun-dried) is expected to meet the standard of ‘fair and average quality (FAQ)’. FAQ is further divided into washed coffee of FAQ (+), sun-dried coffee (Sidama, Lekemt & Harar) of FAQ, and Jimma of FAQ (-).

Accordingly, the price premium also varies significantly. Jimma is usually classified as low-quality FAQ (-). Between 1981 and 1991, Jimma accounted for more than 54 percent of sun-dried coffee; however, this has dropped since 1994 to about 34 percent. Jimma 5 in 2005/06 accounted for 35.9 percent of sun-dried coffee. Lekemt 5 is also close to Jimma 5 and had a 23.3 percent share. These two together (low-grade coffee) add up to 59.2 percent of the export of sun-dried coffee (see Table 4.6). The export of washed coffee is dominated by Sidama 2, which accounted for 57 percent of total washed coffee export, followed by Yirgachefe and Limu, which account for 12 and 11 percent respectively. Yirgachefe is a world-class premium coffee, and its unit value exceeds the average export price of all coffee by more than 16 percent (see Table 4.6).

**Table 4.6: Export of coffee by origin and quality (2005/06)**

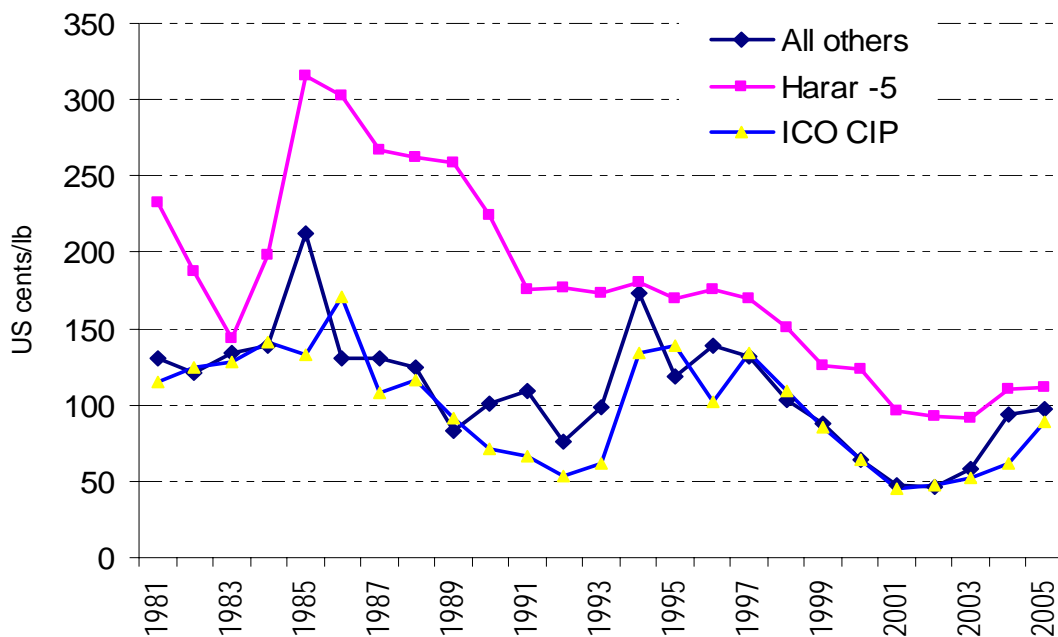
Coffee type	Volume: in 000' tons; value: in million USD; unit price: in USD/ton										
	Sun dried coffee					Washed coffee					
	Volume	% share	Value	% share	Unit price	Coffee type	Volume	% share	Value	% share	Unit price
Jimma 5	40.2	35.9	87.2	35	2170	Sidama 2	25.3	57.0	70.1	57	2770
Harar 5	14.1	12.6	34.1	14	2423	Limu 2	4.9	11.0	13.0	11	2674
Harar 4	1.4	1.3	4.0	2	2809	Yirgachef 2	6.8	15.3	22.1	18	3244
Lekemt 5	26.1	23.3	56.7	23	2169	Bebeka 2	0.5	1.1	1.2	1	2531
Lekemt 4	7.5	6.7	17.4	7	2308	Tepi 2	0.8	1.7	1.9	2	2573
Sidama 4	18.8	16.8	43.4	17	2308	Others	6.2	12.9	15.3	12	2472
Others	3.9	3.5	9.1	4	2345	Sub-total	44.4	1.00	123.7		2784
Sub-total	112.0	100	251.84	100	2248	G. Total	156.4	100.0	375.5	100	2401

Source: AMPD of MoARD (2006)

When the monthly average FOB price of all Ethiopian coffees is compared with the ICO composite indicator price, the FOB price of Ethiopian coffees has remained above CIP for the past three and a half decades – implying a premium price for high quality. The

Ethiopian coffee FOB price surpasses all other coffees prices, with the exception of some world premium coffee beans like Jamaican Blue Mountain coffee, Indonesian Toraja coffee and Kenyan AA coffee.

The Harar sun-dried coffee price exceeded the average price of all other sun-dried coffees by 80.1, 42.2 and 48.5 percent between 1981 and 1991, 1992 and 2000, and 2001 and 2005 respectively. The high premium price can be attributed to the coffee's extraordinarily high quality. Harar coffee is internationally known as a premium blending coffee. Over the past four to five decades, more than 80 percent of Harar coffee has been destined for Saudi Arabia. Consumers in this region are well acquainted with its flavour and aroma and are willing to pay a relatively fair price. This may be the reason for less oscillation in its price compared to the others (see Figure 4.13).



**Figure 4.13: FOB price trend for sun-dried coffee by coffee type**

Source: AMPD of MoARD and ICO database (2005)

Ethiopian washed coffee is mainly classified as Yirgacheffe, Sidama, Limu, Bebeke and Tepi grade-2 coffees. Simple trend analysis indicates that for the entire 1981-2005 period, Ethiopian washed coffee lay above the ICO indicator price, implying the overall

superiority of the quality of Ethiopian coffee. Among washed coffees, Yirgachefe surpassed all other during the same period, followed by Sidama and Limu washed coffee. Indeed, Yirgachefe is recognised worldwide as a premium bean and is usually exported to high-premium coffee-consuming countries. In 2001/02 and 2002/03, when the average price of all types of coffee dropped below US 50 cents per pound, its price remained at almost one dollar per pound.

It can be deduced from the above price trends of washed and unwashed coffee that the consumers of Ethiopian coffee around the world respect and acknowledge the quality of such coffee by paying premium prices, even in the doom-days of coffee prices. It is the responsibility of the government, producer, traders and other participants to maintain this reputation by designing policies that improve the performance of the sector.

#### **4.9.4 Export destinations**

Ethiopia's export destinations are characterised by high concentrations. Of about sixty importing countries, the top four countries (Germany, Japan, USA and Saudi Arabia) have imported 71 percent of total exports over the past three decades (1979-2005). The top 10 importing countries together absorb on average about 91.7 percent of Ethiopia's exports (Table 4.7). The remaining 9 percent of export is distributed among 50 countries, implying high concentration of Ethiopia's export. The market is said to be highly concentrated when the sum of the percentage share of the top four countries exceeds 40 percent (rule of thumb for concentration ratio).

The EU remains the largest importer of coffee and Germany has traditionally been the main destination for both washed and sun-dried coffee export. For instance, average exports to the German market accounted for 25.6 percent of washed and 49 percent of sun-dried coffee between 1995 and 2005. Saudi Arabia has become an important destination for mainly sun-dried coffee, especially Harar sun-dried coffee. The USA, France, Belgium and Italy have been importing about 5-10 percent of both washed and sun-dried coffee over the past decade.

**Table 4.7: Major Ethiopian coffee buyers' import in tons (1979-2006)**

Country by rank	Average import (ton) (1979-2006)	Percentage of Import (1979-2006)	Cumulative % share
1 Germany	27023	30.21	30.21
2 Japan	15759	18.72	48.93
3 USA	11045	13.12	62.05
4 Saudi Arabia	8309	9.87	71.91
5 France	5152	6.12	78.04
6 Belgium	4167	4.95	82.98
7 Italy	3553	4.22	87.21
8 USSR	1482	1.76	88.97
9 Denmark	1296	1.54	90.51
10 Holland	1027	1.22	91.73
11 Others	5371	9.27	100
Average export	84185	100	100

Source: AMPD of MoARD (2006)

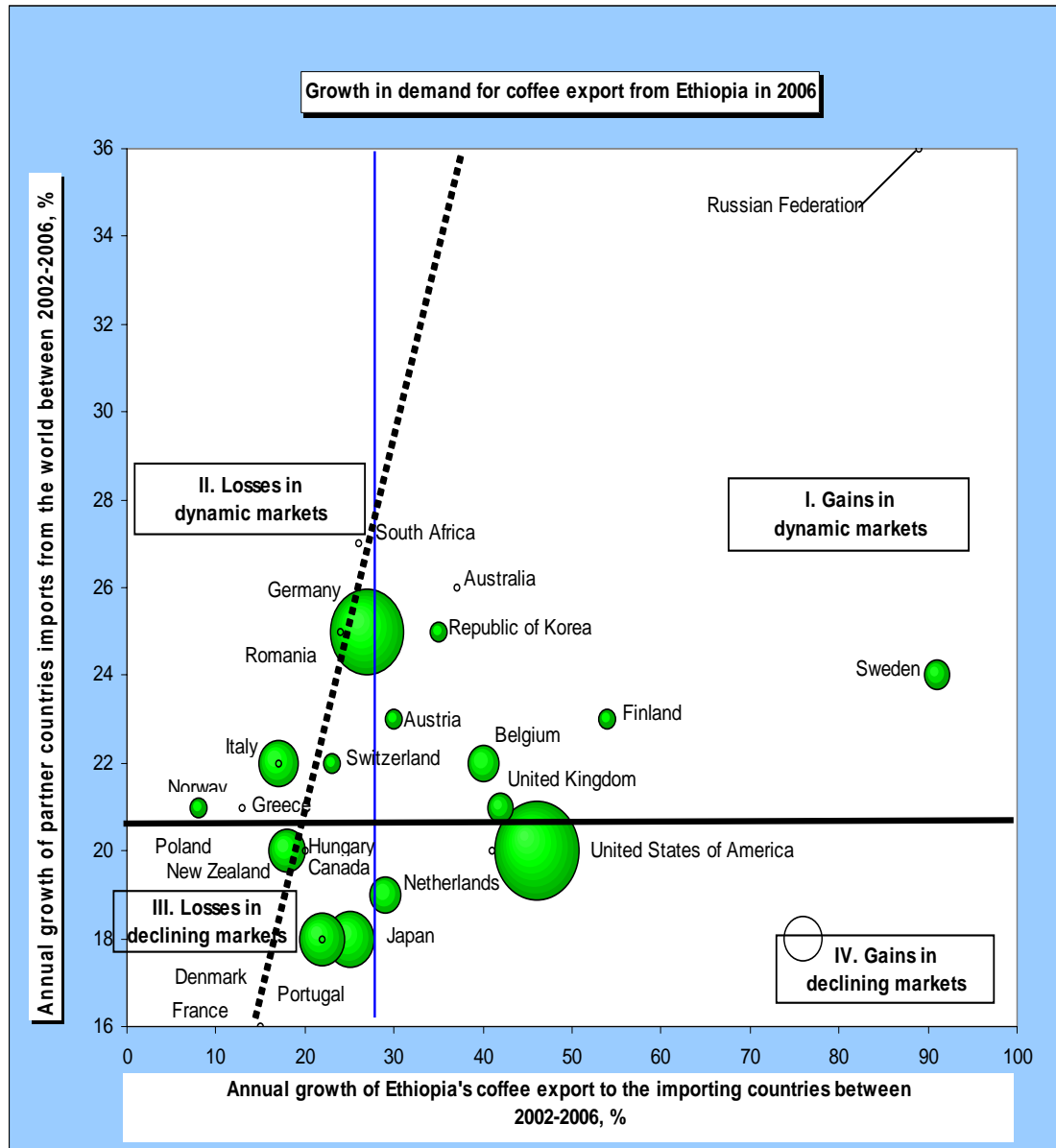
In addition, almost all the Ethiopian coffee is exported in green-bean form to roasters in the importing countries. There have been attempts by private traders to export roasted coffee. Currently there are about 15 small-scale roasters catering to domestic hotels, supermarkets and coffee shops (EEPA, 2004). The world roasted and processed coffee trade is dominated by a few companies from developed countries and it is not easy for traders from developing countries to penetrate the market for value-added coffee. The import tariffs on roasted and processed coffee are high in the major importing countries so as to protect their companies. It is therefore not an easy to enter the markets for roasted coffee.

#### **4.9.5 Opportunities for market expansion**

Trade maps were developed by the International Trade Centre (ITC) with the explicit aim of facilitating strategic market research. The trade maps assist in identifying countries competing with regard to a specific product, identifying opportunities for market or product diversification, and creating awareness of tariff and non-tariff barriers. They also assist in gauging the competitiveness of national and sectoral trade performance.

In this section the Ethiopian coffee export markets are analysed using the trade maps and data from the International Trade Centre (ITC). The bubbles in a trade map represent the

target markets, with the size corresponding to the size of the import markets under review (see Figure 4.14).



**Figure 4.14: Growth in demand for coffee export from Ethiopia**

Source: International Trade Centre (2007)

The diagonal line represents the line of constant world market share and divides the chart into two parts, with Ethiopia's export of the product to the right of this line indicating growth in market share, and world imports to the left indicating erosion of market share.

The horizontal lines indicate the annual growth of Ethiopia's coffee export to partner countries between 2002 and 2006. The vertical axis indicates the annual growth in the partner countries' import from the world over the corresponding period.

The diagonal and horizontal reference lines are of particular importance from a trade development perspective, since they divide the chart into four quadrants with different characteristics. The first quadrant (upper right) shows gains in dynamic markets that are growing at a faster rate than world trade in general and where Ethiopia has been able to outperform world market growth and increase its share in world exports. The major importing countries like Australia, the Republic of Korea, Belgium, the United Kingdom, Finland, Sweden, and partly Germany and the USA fall into this category.

The second quadrant (upper left) illustrates losses in dynamic markets. These markets present particular challenges for trade promotion. While international demand has been growing at above-average rates, the Ethiopian market share has declined or has shown less dynamic growth. For instance, Germany is a historical Ethiopian coffee importer, importing on average 30 percent of the Ethiopian coffee export, and its world coffee import has increased while its share of the Ethiopian export has decreased. Italy is also an important Ethiopian client that has reduced its share in Ethiopia's coffee export.

The third quadrant (lower left) shows losses in the declining markets. The export prospect for these markets tends to be bleak. World imports of the product concerned have increased at below-average rates or have actually declined, with the exporting countries' market share also declining. Poland, Hungary, New Zealand, Canada, Denmark, Portugal and partly Japan fall into this group. The fact that Japan, the most important bulk importer of Ethiopian coffee, falls into this quadrant implying substantial losses for the market.

The fourth quadrant (lower right) represents gains in the declining markets. Within this quadrant Ethiopia is increasing its market share in world imports, which are growing at a below-average rate or declining. For instance, Ethiopia is increasing its share in the USA

export, with regard to which it has been recording losses since the late 1990s. Although the volume of import by the Netherlands is relatively low, it remains one of the most important of Ethiopia's clients, and Ethiopia is increasing its share of export to this country. From a trade promotion perspective, niche-marketing strategies are required to isolate positive trade performance from the overall decline in these markets. The bubble chart also provides information on concentration of export when the location of large bubbles in one locality indicates that exports are highly concentrated.

The opportunity for market expansion lies in three quadrants (Q1, II and IV). In quadrant I, countries like South Africa import only a negligible amount of coffee from Ethiopia. South Africa could be one of the countries offering the potential for market expansion of Ethiopia's coffee export through a bilateral trade arrangement. Germany and the USA are historically bulk importers of Ethiopian coffee, and strengthening the existing relationship by evaluating the current weaknesses and market opportunities would make an immense contribution to future market development. There are a number of extremely important countries for market expansion, such as the Russian Federation and China, which are traditionally not coffee consumers. Within quadrant II, in addition to seeking new markets, raising the market share from total imports of each country is extremely important. Within quadrant IV, Ethiopia has recently seen a reduction in its share of coffee exports to Japan, which is a potential target market for Ethiopian coffee exports due to its population size, income level and historical trade relationship. In addition, Ethiopia is not securing access to the fast growing giant Chinese market.

#### **4.10 Challenges of auction and export marketing**

##### **4.10.1 Challenges of auction marketing**

As per the current market regulation (theoretically), the exporter is not allowed to be a supplier to the auction. Likewise, the supplier (*akraby*) is not allowed to participate in the export business. All participants (collectors, *akrabys*, hullers, pulpers and exporters) are expected to have separate licences. In practice, suppliers own the licences to hulling and

washing stations indirectly in the names their relatives and have collectors as agents. Exporters also own licences to supply, hulling and washing industries indirectly in the names of family members, friends or relatives – i.e. one exporter owns several different licences (IFPRI, 2003). In other words, coffee lots that are brought to the auction by processors are referred to as ‘captive’ or ‘private’ supply. Captive supply occurs when the coffee is already in an exporter’s possession prior to supply to auction. These captive supplies are usually brought to the auction by the same firm that purchased the cherry from farmers before processing it and delivering it to auction. Exporters bid to buy their coffee supplied by their firm at the auction. Indeed, all participants (exporters and *akrabys*) informally know who is a captive supplier and who is not. This vertical integration of some of wholesalers and exporters has created power imbalance and unhealthy competition in primary and auction markets.

Vertical integration is clearly visible in premium and high-quality coffee-producing zones in Gedio (Yirgachefe, Wonago and Kochore), Sidama (Dale, Aleta Wondo and Bansa), Jima (Manna and Agarao) and Wollega (Gimbi, etc.). According to information from the 2006 coffee market survey, about 55 percent of total washed coffee arrival from the above zones is captive or owned by vertically integrated exporters. The main draw back is fake competition in the auction place where the exporter buys his/her own coffee from the supplier (who works for the same firm). During the bidding process, exporters sometimes offer extraordinarily high fake prices to take their own coffee back. This distorted auction price which might be used as a reference price in the local markets for purchasing red and dry cherry. In light of this, terminal auction markets may have diminished importance in the price-discovery process.

Traceability of origin of production and type of coffee has an important market value in the coffee marketing chain. Yet in the current coffee marketing system auction lots were often mixes from various locations and even different types (origin). Tracing the origin (type) of coffee, even that delivered by cooperatives, is at best impractical and in most cases impossible (Dempsey, 2006). Buying coffee with an original and true flavour to meet specific international buyers’ cupping requirements is becoming difficult.

The current auction system allows exporters into the auction room just one hour before auction to examine the product being sold. The buyer is able to assess the displayed samples by appearance and aroma only, and for all other information on bean quality they must rely on a descriptive card. This information is totally inadequate for the exporter's buying decisions.

With the current auction system, suppliers (*akrabys*) are unable to hedge their price risk. There is no mechanism whereby the supplier can protect himself/herself from movements in the market price of coffee between the date of purchase and the date of sale at auction. There may be some informal arrangements between suppliers and exporters in this respect, but the fact that this is not officially supposed to be the case makes it difficult to estimate the extent of any such practices. The non-captive suppliers have weak bargaining power in the current auction system, because potential exporters informally collude and set prices. If a particular price is quoted by one export firm, the other export firms are reluctant to exceed the offer. They have a common saying, “*yezaren gebeya lene likekilign*” meaning “please leave today's market for me”. In other words, do not compete with me in today's market by offering a higher price than I do, so that I can leave tomorrow's market for you. This unhealthy competition and price setting has forced suppliers (*akrabys*) to face unnecessary costs. In times when world coffee prices are not promising, suppliers are forced to accept whatever prices are offered by exporting firms (ECSA, 2006).

The lack of transparency in the sample drawing is another critical problem for suppliers. As evidenced from discussions with suppliers (*akrabys*), sample drawers (*wogiwoch*) are sometimes lobbied by suppliers to draw an unrepresentative sample from only the best lots. This usually results in a difference between what is specified on the CLU display sheet and the actual quality delivered to the exporters. Only 2-5 percent of complaints are conveyed from the exporters to the CLU. Most disagreements are resolved through mediation by friends and renegotiation for prices.

Lack of capacity to cater effective services by auction market centre is one of the critical problems. Trucks loaded with coffee which arrive from coffee growing areas first have to find a parking space, make payments for quality inspection and then a sample drawn for inspection. Both physical appearance and liquor taste are then examined and graded before the supplier is allowed to participate in the auction. In the peak season there can be as many as 150-400 trucks parked at the auction at any one time, and sometimes trucks have to wait in a queue for on average for 3 to 4 days to obtain grade for their lots and to be able to participate in the auction; forcing suppliers to incur additional costs for trucks, drivers, warehouses, hotels and so on. Lack of third parties for arbitration is another critical problem, because when suppliers are dissatisfied with quality inspection and grading, there is no third party for arbitration purposes. The only place for appeal is the same institution (CLU).

#### **4.10.2 Challenges of export marketing**

Coffee is produced and exported by more than 50 developing countries. Buyers have a choice as to which country they will buy from and which not, based on quality and price and marketing costs. In this regard there are several areas in which Ethiopia can improve.

Market deregulation measures brought many new intermediaries – i.e. a large number of wholesalers (*akrabys*), hulling- and washing-station operators and exporters – into the coffee marketing system. The number of licensed exporters has increased from 14 in 1991/92 to over 200 in late 1990s. The proportion of coffee handled by private traders has increased to 95 percent of export, compared to 10 percent prior to reform. Within the current export market, although the number of participants ranges from 70 to 90 depending on the world market situation, the market is dominated by only a few exporters (AMPD database, 2005).

One of the concerns raised by critical analysts of Ethiopia's liberalisation is the possibility that market domination by a few large-scale players will result in non-competitive behaviour at the expense of producers (Ponte, 2001). Market concentration is

one such obstacle prohibiting the emergence of fair and sound trade in agricultural commodities. Market power is the ability to affect price-setting (above or below open market), reduce competition (keeping out new entrants) and sometimes block the transmission of price signals between or among vertically or horizontally related markets. Farmers are inherently disadvantaged, because they are too small individually to affect prices. Producers and consumers are not only numerous but are also not organised, and institutions designed to protect them from unfair market exchange are either weak or non-existent (Murphy, 2006).

Economics has several ways of measuring market power. One common measure is the concentration ratio (CR), which measures the share controlled by the firms (typically the top 3, 4 or 5). Often the share of the top 4 firms ( $CR_4$ ) of the industry is used as the standard measure. If the  $CR_4$  measure is less than about 40 percent, then the industry is considered to be competitive with the other firms competing. While useful, CR paints an incomplete picture of the concentration of firms in an industry, because by definition it does not use the market share of all the firms in the industry and it also does not provide information about the firm size. The Hefendahl-Herschman index (HHI) paints a more complete picture of the industry concentration than does the concentration ratio. The HHI uses the market share of all firms in the industry, and market shares are squared in the calculation to place more weight on the large firms. An HHI less than 1,000 represents a relatively competitive market, while an HHI between 1,000 and 1,800 represents a less competitive or moderately concentrated market. An HHI greater than 1,800 is considered to be a highly concentrated market.

Table 4.8 shows the concentration ratio of the top four ( $CR_4$ ) and the top ten ( $CR_{10}$ ) export firms from 1994-2005. Both HHI and CR witnessed the existence of high concentration in 1994 when market liberalisation was not fully implemented. In this period the four top firms accounted for about 65 percent of total export share, while the top ten firms accounted for about 78 percent of total exports during that year. In later years, with deepening market deregulation measures, the market concentration ratio remained within relative competitive boundaries. However, it is extremely difficult to

conclude that the marketing system is competitive when the top ten exporters on average accounted for 57.4 percent of total export for the period 1994-2006 (Table 4.8). Hence, deregulation of the coffee export market has somehow resulted in dominance of the market by a few traders with better access to financial resources, market information, and human capital.

**Table 4.8: Market power concentration in the coffee export market (1994-2005)**

Ratio/index	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
No. of active exporters	52	67	74	74	67	59	70	64	71	68	69	85
CR <sub>4</sub>	65	32	45	40	33	30	25	29.6	28	29	33	32
CR <sub>10</sub>	78	57	61	62	56	54.6	53.4	57	51	51.1	54	54
HHI	3005	273	937	452	286	248	160	226	205	224	310	290

Source: Author's own calculations based on data from AMPD of MoARD (2005)

Terms of payment is one of the challenges in the current export coffee marketing. All coffee exports at present have to be covered by a letter of credit (LC), opened by the international buyer in favour of the Ethiopian exporter. The LC provides a guarantee of payment for the exporter. However, this approach has certain advantages and disadvantages in that it protects the seller from the risk of non-performance of the buyer, but for the buyer the cost of opening and then negotiating a letter of credit can be extremely high. This is due in part to the low value of coffee today, as well as the practice of many banks to charge a minimum fee on any transaction. Thus, for a contract involving a shipment of 2 containers of coffee, the cost of opening and negotiating a letter of credit can be as high as 2-3 percent of the value of the goods. If any modifications are needed to the LC, the cost can be even higher (IFPRI, 2003). If, instead of the payment being based on a cash-against-document (CAD), the documents are sent directly from the exporter's bank to the buyer or even directly from the exporter to the buyer without going through the bank at all, there is a very significant cost saving in terms of handling the transaction. Despite the advantages of the CAD, in Ethiopia all terms of payment are based on the LC, which affects the country's position in respect of competitiveness.

The absence of entry barriers into the export of coffee has resulted in a significant increase in the number of exporters in Ethiopia. However, this has not improved competition among export firms, as was initially expected, mainly because the large majority of exporters have very limited experience in the coffee trade, as well as low working capital and a lack of basic marketing infrastructure (e.g. human networks, internet access, websites, storage space, etc.). This in turn has resulted in a concentration of market power by a few export firms. As anecdotal evidence from discussions with exporters indicates, some coffee export licence holders perform unlawful activities such as purchasing from auction and selling at *Markato* to retailers, thus violating the rules. In the early 2000s, there was a major scandal in the Ethiopian coffee export market when suppliers lost about 60 million ETB due to post-dated cheques, resulting in the revision and amendment of the auction system (IFPRI, 2003). Exporters are now required to deposit money into a “block coffee account” before participating in the auction market. In order to create a healthier and more competitive export coffee marketing system, it is extremely important to improve the *licensing requirements* and performance evaluations of each exporter.

As indicated during the discussions with coffee exporters and the ECEA, the number of *weight-loss* claims from buyers has been mounting over the past three to four years. As anecdotal evidence indicates, such loss mainly occurs on the way to the port of Djibouti, mainly due to a lack of transparency in respect of drivers and weighbridges at the point of delivery. This has resulted in loss of both foreign exchange and reputation between exporter and importer companies. Unless some remedial measures are taken, this may lead to total distrust by buying companies.

In general, as it could be deduced from previous discussions, the current coffee auction system and export procedure that prevail in Ethiopia is inefficient in terms of service delivery and transparency. Most victims are suppliers who suffer through high physical and marketing costs.

#### 4.11 Conclusion

Chapter four has discussed and reviewed the performance of the deregulated Ethiopian coffee industry, with the Ethiopian coffee sector having undergone several deregulation measures since early 1992, which are regarded as having improved production and marketing operations. The post-reform performance of the coffee industry has been discussed using proxy indicators like national coffee production and consumption trends, coffee supply to the auction market, as well as coffee export and foreign exchange earnings from coffee compared to other merchandise exports.

Chapter four has presented the followings:

Coffee production has shown steady growth in the post-reform period, growing from about 150,000 tons in 1993 to more than 300,000 tons in 2000, which implies that the production of coffee in the post-reform period has nearly doubled. This is perhaps due to increased private sector participation, which improved competition and collection, coupled with a lucrative world coffee price between 1994 and 1998. This prompted farmers to establish new plantations and expand coffee production in areas that were underexploited in the past. Another factor is the declining effect of CBD infestation,

Domestic consumption has remained high (on average about 48% of annual production). However, this varies according to the world price situation, i.e. when prices are more attractive in the world market, local consumption falls and vice versa. Coffee consumption between regions and cultural groups and between urban and rural communities varies greatly. In general, high domestic consumption is also found to contribute positively to coffee production and price stabilisation in Ethiopia,

Coffee supply to the auction market has shown a sharp increase in the post-reform period, growing from 150,000 tons to 220,859 tons in 2005/06. Ethiopia's share of washed-coffee supply also grew from a mere 10% in 1992 to 30% in 2006. During the same period the volume of coffee export doubled from a mere 80,000 tons in the early 1990s to

over 160,000 tons in 2006. Surprisingly, coffee production, coffee supply to the auction market and the volume of export have remained steady and even increased after 2000 when the world coffee price dropped to its lowest level ever.

Foreign exchange earnings from the coffee trade fluctuate drastically depending on the world coffee production and supply situation. Coffee export earning was registered at ETB 152 million in 1972 before increasing to ETB 604 million in 1979/80 and rising further to ETB 734 million in 1986/87. It then declined to ETB 239 million due to national instability, but again increased to ETB 2,612 million in 1998 due to devaluation of the local currency and the lucrative world coffee price. It dropped to ETB 1,403 million in 2001/02 due to the world coffee crisis, but it then revived and recorded its highest historical level of ETB 2,913 million in 2006 and ETB 3,690 in the 2007.

There have also been some negative outcomes since market deregulation, since auction lots often consist of mixes from various locations and even different types. Tracing the origin of coffee (traceability), even that delivered by cooperatives, is at best impractical and in most cases impossible. Buying coffee to meet specific international buyers' cupping requirements in terms of original and true flavour is becoming difficult. In addition, market power concentration in the auction and export market is another growing concern in the Ethiopian coffee industry. Only 10 exporting firms (out of 75) account for 55-60% of the export trade. Most of these potential exporters are also vertically integrated with wholesalers (*akrabys*) and own coffee-processing industries within the coffee-producing regions. Hence, it is difficult to expect there to be a reasonable level of competition in the current coffee auction and export market.

In general, market deregulation has brought about visible growth in Ethiopia's coffee production and supply and the volume and value of export earning (in nominal terms). Yet there are several malpractices and weaknesses that need to be addressed, mainly quality problems at production and marketing levels, lack of strong institutions to coordinate and regulate the private sector, shortage of basic coffee extension and credit services, trans-shipment of coffee beans from low-premium to high-premium areas, as

well as market power concentration.

Ethiopian coffee occupies a special place in the world coffee industry, and different analysts agree that there is no deficit in demand provided that quality and consistency are guaranteed. The path to success lies in exploiting the unique aspects of Ethiopian coffee, combined with the expansion of original Arabica landraces and improvements in harvest and post-harvest practices, in order to ensure the supply of high-quality coffee and to maintain or improve Ethiopia's competitiveness in the world market. However, several problem areas must be addressed in order to encourage further production and exports.

The first issue is increasing production, which in turn requires progress in the mode of production rather than simple area expansion. As is common in all sectors, some of the problems in the coffee sector can be blamed on technology. There is clearly a need for research to develop disease-resistant coffee plants suited to the various agro-ecological conditions from local races. Expansion is recommended not only to increase export but also to meet increasing domestic consumption. Coffee extension is currently extremely weak. Farmers have attempted to maintain their production based on their traditional knowledge and experience, and so designing a system that can support coffee farmers in terms of the provision of input, credit and technical advice is extremely important when it comes to moving the sector forward.

The second issue is raising the profitability of coffee production for smallholders by raising quality and reducing current marketing costs. This can be achieved by encouraging farmers to adopt better post-harvest processing practices and gradually increase the proportion of washed coffee. The potential for reducing marketing costs lies in grading coffee nearer to the point of production and shipping it to the exporter's warehouse or directly to the point of export, which would reduce transaction and handling costs and raise producer margins for the benefit of smallholder producers. Furthermore, improving trust between buyers and sellers through forward contracts coupled with better market information can be expected to increase the efficiency of marketing and thereby increase the scope for raising producer margins.

Market performance depends integrally on the existence of strong market-supporting institutions at each market tier to provide market information, enforce laws and regulations, supervise the behaviour of individual participants, and design and implement incentives or disincentives. Such institutions are completely lacking in Ethiopia's current coffee marketing system, while liberalisation in some instances has opened loopholes for lawlessness. Primary and secondary coffee farmer cooperative unions are extremely important to raise bargaining power of producer, control quality, to deliver information and credit services. A more transparent and accountable management system is among the first and most important issues for future sustainability of the system.

Heavy dependence upon the exportation of a single crop has placed the Ethiopian economy in a precarious (insecure and dangerous) position. If annual production declines as a result of a bad harvest (due to natural factors, such as drought), export earnings will suffer considerably, exacerbating the country's already negative balance of trade. There is no guarantee that international coffee prices will remain attractive or the reverse. Hence, long-run developments should place greater emphasis on the diversification of export earnings.

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## CHAPTER 5

### PRODUCER PRICE AND MARKETING COSTS IN A DEREGULATED COFFEE MARKET

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#### 5.1 Introduction

Since the early 1990s, dramatic policy changes have taken place in coffee marketing in Ethiopia. The reforms have significantly reduced government participation in the marketing and pricing of coffee. The measures were envisaged to improve the prices received by producers and thereby stimulate production and development in the sector. Hence, the major aim of this chapter is to examine whether the reform has improved the producer share of export price compared to the pre-reform level. Monthly price data from the Central Statistical Agency, the Agricultural Market Promotion Department of the Ministry of Agriculture and Rural Development, and cross-sectional data from a coffee market survey conducted in 2006 are used.

Market reforms undertaken in most developing countries in the past two decades have sought to present agricultural producers with the ‘right prices’ as a means of stimulating productivity and growth. The reforms were envisaged to improve the agricultural sector’s terms of trade and the prices received by producers as a means of stimulating production and development. At the macro-economic level, proper dissemination of positive price signals to producers affects the level of economic growth, as well as socio-political stability (Collier & Gunning, 1999; Deaton & Miller, 1996). Furthermore, higher farm prices relative to those of other sectors can increase the profitability of agriculture, thereby encouraging investment and growth in the sector. As the majority of the population in most African countries is engaged in agriculture, the growth of the sector will not only translate into general macro-economic growth but will also contribute towards poverty reduction (Karanja, 2002). Indeed, recent evidence has led to the

conclusion that broad-based growth driven by agricultural sector growth contributes more to poverty reduction than does expansion in industrial output (Hanmer and Naschold, 2000; World Bank, 2002). Thus, the effect of market reforms on the price structure has important implications for development policy.

This part of the study analyses the effects of market reforms in Ethiopia on producer prices for coffee and marketing costs. It compares the FOB producer price share in the pre-reform (October 1981-September 1992) and post-reform (October 1992-September 2006) periods by major coffee type and also draws a comparison between producer price in Ethiopia and that in competing countries. It also examines major obstacles to the raising of producer price. In other words, major cost components from farmgate to auction market incurred by wholesalers (*akrabys*) and costs incurred by exporters from auction to port and their contribution to the prevailing problems in the current coffee marketing system are discussed.

## **5.2 Producer share of FOB price**

In the past four and a half decades, there have been several policy and institutional changes in the country, which have either positively or negatively affected the producer share of coffee. In the past three to four decades several researchers have made attempts to estimate the producer share of the FOB price. However, estimating the producer share of export price has remained difficult in Ethiopia for several reasons. Firstly, there is no regular measurement or records of price series in Ethiopia since the current CSA launched the monthly average “Rural Agricultural Product Survey” in May 1981. Secondly, coffee from different regions of the country tends to command different prices, and the available statistics do not allow for accounting for this difference. Thirdly, due to high institutional instability in the sub-sector, existing information was not recorded and properly preserved for use. Consequently, previous estimates have depended on infrequent attempts by planners, fieldworkers and researchers using piecemeal price information. Despite these limitations, several researchers have attempted to indicate the

farmers' share of the export price of coffee. The subsequent section discusses the producer share of FOB in the three distinctive regimes.

### **5.2.1 Producer share of FOB price: 1961-1974**

During the Imperial regime (up until 1974), coffee processing and trade was dominated by the private sector. There was almost no state involvement in coffee purchasing, processing, cleaning, grading and exporting. By law these activities were supposed to be carried out by separate entrepreneurs with appropriate licences for each activity. The National Coffee Board (NCB) was responsible for issuing coffee licenses and inspecting and grading the coffee. The internal traders (coffee collectors and suppliers) were allowed to purchase coffee at a designated market. Although licensing was specific to each marketing activity, suppliers and exporters could appoint their own agents to purchase coffee in the interior and could also have own hulling stations around the country (Negewo, 1993). In other words, although the regime was declared to be market based, the export and interior markets are dominated by a few vertically integrated large traders.

Early work by Haile-mariam (1973) indicated that producer prices had been fluctuating between 40 and 65 percent of the FOB value for the period 1961-1971. He also estimated exporters' and wholesalers' margins as 12 and 9 percent of FOB price. In 1975 the Coffee Improvement Project calculated that the farm-gate price of coffee would be about 40 percent of the FOB price even with the implementation of the Coffee Improvement Projects (Mulat, 1979).

Table 5.1 presents the relative producer share in coffee export income, as well as deductions. These deductions include government tax, marketing and processing costs and traders' margin. Mulat (1979) considered the share of FOB value going into farmers' pockets for the period between 1961/62 and 1971/72 and estimated that the producer share ranged between 61 and 69 percent.

**Table 5.1: Producer share of FOB price (1961-1975)**

Year	FOB price (Birr/ton)	Tax share		Other deductions		Income to farmers	
		Birr/ton	%	Birr/ton	%	Birr/ton	%
1961	1710	239	13	445	26	1040	61
1962	1659	249	15	398	24	1004	61
1963	1658	264	16	390	24	1004	61
1964	2213	378	17	482	22	1353	61
1965	2153	391	18	386	18	1376	64
1966	2119	355	17	370	17	1394	66
1967	1935	319	16	382	20	1234	64
1968	1903	306	15	320	17	1277	67
1969	1962	314	16	445	23	1203	61
1970	2463	491	20	282	11	1690	69
1971	2218	414	19	426	19	1378	62
1972	2204	412	10	383	17	1409	64
1973	2460	692	28	305	12	1463	59
1974	2688	788	29	206	8	1692	63
Average	2096	401	18	373	18	1323	63

Source: Mulat (1979) extended by author including 1973 and 1974 data

Note: Other deductions refer to marketing and processing costs (e.g. transportation costs, operating costs, and other transaction costs)

According to Negewo (1993), despite the positive achievements of the coffee sector in terms of production and private sector participation in the Imperial era, smallholder coffee farmers faced several problems. Firstly, coffee farmers were paid low farm-gate prices for their coffee due to domination and collusion by a few collectors at their designated market places. Farmers transported their coffee over long distances to the marketplace on market days with the intention of disposing of it there and then, with no intention of returning with their coffee. Under the circumstances, the farmers were price takers. These collectors were also dependent on the few wholesalers who provided the capital, weighing scales, and sacks. Secondly, small farmers were cheated at the market place by collectors using inaccurate weighing scales. Usually in remote areas, semi-elite urban-based traders sometimes threatened illiterate coffee farmers not to bargain too much with them on price. In addition, farmers lacked information and access to major

markets. Thirdly, credit arrangements for smallholder coffee farmers were non-existent. Lastly, smallholders did not receive sufficient extension services and technical packages appropriate for coffee production. On the other hand, the Imperial government provided subsidies to commercial farmers in terms of duty-free tractors, fuel and chemicals, and such farmers had access to short-term and long-term credit facilities.

### **5.2.2 Producer share of FOB price: 1975-1991**

The period of Military regime (1975-1991) was characterised by a centralised economic planning system where the state played a significant role in all spheres of economic activity. The private sector played a very limited role in the production and marketing of coffee. Despite the fact that 95 percent of all coffee production comes from small coffee farmers, the Military regime policy only directed heavy investment to state farms, producer cooperatives and common farms, thus disregarding smallholder producers. The government used different methods such as quota-setting, administrative measures, etc. to extract coffee from smallholders.

As presented in the Table 5.2, the major part of export revenue (i.e., on average 37 percent of FOB price) was channelled to the state treasury in the form of four types of coffee export taxes, namely export tax, cess tax (flat-rate tax levied on coffee exports to finance operation of Coffee Board), transaction tax, and surtax (MCTD, 1987). Hence, coffee farmers usually received about 43 percent of the FOB coffee price. The surtax rates were typically increased as coffee prices increased or showed a progressive tax rate. Subsequent regulations (Legal Notice No. 66 of 1979) amended the system of calculating the rate, further increasing the share of the tax and reducing the share of the producers (Provisional Military Administrative Council, 1979).

Several studies have substantiated the facts that producer prices were not determined with reference to border prices, but were rather determined by deducting all costs and the wholesaler margin from farmgate to auction (Gebre-mariam, 1989). For instance, a study by Gebre-mariam (1989) estimated the producer share of FOB price by deducting

government taxes and other marketing costs, amounting to only 41 percent of FOB price received by farmers. This happened after the imposition of the surtax (1979-1989).

**Table 5.2: Producer share of FOB price (1979-1991)**

Year	FOB price	Tax share		Other deductions		Income to farmers	
		Birr/ton	%	Birr/ton	%	Birr/ton	%
1975	2657	791	30	663	25	1703	64
1979	6249	2594	42	2594	20	2435	39
1980	7901	3427	43	3427	17	3115	39
1981	5766	2116	37	2116	21	2464	43
1982	5973	2193	37	2193	20	2575	43
1983	5682	2188	39	2188	21	2319	41
1984	6136	2679	44	2679	20	2250	37
1985	5892	2234	38	2234	20	2463	42
1986	8932	3457	39	3457	16	4028	45
1987	7914	2770	36	1504	19	3524	45
1988	7778	2722	35	1556	20	3478	45
1989	5999	2100	35	1260	21	2618	44
1990	6398	2047	32	1408	22	2970	46
1991	6454	1936	30	1549	24	2978	46
Average	6409	2375	37	2059	20	2780	43

Source: Gebre-mariam (1989) and extended by the author

In its coffee market study, the MCTD (1989) indicated that the producer price paid in the 1980s was too low to provide adequate incentives to maintain and develop the smallholder coffee sector at the level desired for its future sustainability. Coffee farmers had no choice but to sell to cooperatives or the ECMC. The government intervention in the interior coffee marketing was accompanied by increasingly stringent controls on private trade and more specifically on the movement of coffee out of the producing regions. The implication of this control was that producers were denied the right to transport and sell their coffee at a better price in non-coffee-producing regions.

As stated by EDE Consulting for Coffee (1997), coffee areas often do not produce sufficient food grain for family consumption that they are more or less dependent on grain imported from other producing regions. Usually during the rainy seasons, the prices of grain go up and coffee farmers' experience an increasing need for cash to buying grain

for consumption. Under these circumstances, framers had no choice but to sell their coffee well in advance of harvest to money-lenders, traders and commercial farmers for very low price. In general, producers were denied the opportunity to claim an appropriate share of their product's value in the regime.

### **5.2.3 Producer share of FOB price: 1991-2006**

Since 1991, a number of policy measures have been implemented with the aim of changing the socialist-oriented economy into a free market economy. Some of the deregulation measures taken to open the domestic and export coffee markets were envisaged to present coffee producers with the 'right prices' as a means of stimulating productivity and growth, i.e. bringing producer prices closer to international levels and reducing disincentives emanating from policy and non-policy imperfections at the production and marketing levels (see Table 4.2 for detailed deregulation measures).

Indeed, the deregulation measures taken in the coffee marketing system brought many new coffee exporters and intermediaries into the coffee marketing system. As a result, the proportion of coffee handled by private traders increased to 95 percent of deliveries at auction and export market. The number of private exporters increased from a mere 14 before 1991 to more than 200 in 2003. Similarly, in the same period the number of licensed wholesalers (*akrabys*) increased from less than 200 to 1080. Similar changes have occurred in the interior market participation of private traders. The volume of production and export has doubled in between 1992 and 2006(AMPD, 2006).

However, it is more important to assess whether the reforms have increased the producer share of FOB price. There have been some piecemeal attempts to evaluate the impact of market reform on producer prices. A study by ICO/ CFC (2000) estimated the share of the FOB price going to the grower as 60 percent, citing the devaluation of the Birr as a major reason for the increase in producer price.

None of the above calculations were able to use actual producer price data on farm-gate prices for the estimates, which were based upon generated data by deducting marketing costs and profit margins from FOB and auction prices. For instance, auction prices were generated by deducting all post-auction marketing costs and trader profit margins from FOB prices and similarly all costs and trader margins were deducted from auction prices to generate producer (farm-gate) prices. Such estimations ignore the effects of local consumption and parallel market demand on producer prices. It also may underestimate producer share. In this regard, this study is the first of its kind to use relatively broader and more reliable price data obtained from a single official published source – from CSA.

Table 5.3 presents average producer price share of FOB price in the post reform period (1992-2006). Tax deductions from FOB prices dropped from an average of 37% to below 10% and the government totally removed them since 2002. The producer price share in this period increased on average to 58.3% from about 43% in the post deregulation period.

**Table 5.3: Producer share of FOB price (1992-2006)**

Year	FOB price (ton)	Tax share		Other deductions		Income to farmers	
		Birr/ton	Tax (%)	Birr/ton	Others (%)	Birr/ton	FOB share (%)
1992	6467	453	7.0	2199	34	3816	59
1993	9242	647	7.0	3604	39	4991	54
1994	10676	2242	21.0	3203	30	5231	49
1995	22255	1602	7.2	5564	25	15133	68
1996	23038	1244	5.4	7372	33	14284	62
1997	14817	1482	10.0	5334	36	8001	54
1998	22969	1217	5.3	6202	32	14470	63
1999	18940	1326	7.0	6250	33	11364	60
2000	17257	863	5.0	5177	30	11217	65
2001	15645	313	2.0	5319	46	8135	52
2002	12752		No tax	5611	44	7141	56
2003	11273		No tax	4171	48	5862	52
2004	12387		No tax	4707	43	7061	57
2005	18209		No tax	7284	40	10925	60
2006	20542		No tax	7395	36	13147	64
Average	15764.6	2659	7.6	5292.8	32.5	9385.2	58.3

Source: Author's estimations using data from AMPD (2006)

As we can deduce from Table 5.1, 5.2 and 5.3, the increase in producer price share even after market deregulation has remained marginal.

### **5.3 Producer price by coffee type in Ethiopia**

Ethiopian coffee varieties are often differentiated by altitude, region, locality, shape, acidity, body, flavour, aromas, the way the coffee beans are processed, the situation of demand in the importing countries, and so on. These characteristics symbolise the peculiarity of each coffee type that it is auctioned and exported separately on the basis of its origin. Some of these types are known as world-class premium coffees, attract higher prices over and above the average price for a given unit of volume. These types are broadly categorised into Yirgachefe (washed), Harar (sun-dried), Sidamo (washed and sun-dried), Wollega (washed and sun-dried) and Jimma (washed and sun-dried).

Due to these inherent differences, the price paid for each type varies significantly. Prior to deregulation (1975-1991) the farm-gate floor price set by the government used to vary substantially for each coffee type. For instance, Harar, Wollega, Sidama, Illubabore and Jimma were priced at Birr 9, 7, 6.5, 4.20 and 4.20 respectively. Given this reality, the average producer price of each coffee type is assessed separately.

Table 5.4 shows the average producer, auction and FOB prices for the pre and post-reform periods by coffee type. The absolute prices received by producers vary with coffee type in both the pre- and post-reform periods. During both periods, the nominal average price received by producers of Harar coffee remained high. However, it dropped from 141 cents per pound in the pre-reform period to 80 cents per pound in the post-reform period. Wollega coffee producers used to obtain the second highest price, followed by Sidama, Yirgachefe and Jimma coffees. With the exception of Yirgachefe coffee, the absolute producer price has declined in the post-reform period compared to the pre-reform level. The national average price indicates the average price of all coffees, with the price having declined by 21 percent in the post-reform period compared to the pre-reform period. The decline in the post-reform period compared to the pre-reform

period is consistent with international coffee price trends, which have been in a state of constant decline since the late 1970s (see Figure 3.9).

**Table 5.4: Average producer, auction and FOB prices before and after reform**

	Before deregulation (US c/lb) (Oct. 1981 – Sep. 1992)				After deregulation (US c/lb) (Oct. 1992 – Sep. 2006)			
	Mean	Max.	Min.	Std Dev.	Mean	Max.	Min.	Std Dev.
<b>Producer price</b>								
Sidama coffee	57	115	41	17	53	86	20	16
Yirgachefe coffee	57	87	32	8	64	146	25	22
Wollega coffee	79	129	51	17	56	119	19	21
Jimma coffee	54	89	37	12	48	112	23	18
Harar coffee	141	243	59	40	80	126	38	18
National average	70	96	51	9	62	117	29	19
<b>Auction price</b>								
Sidama coffee	72	99	48	12	82	145	52	20
Yirgachefe coffee	73	129	45	15	91	245	52	39
Wollega coffee	85	132	53	18	78	160	28	30
Jimma coffee	65	110	42	12	71	169	24	27
Harar coffee	159	219	61	43	102	253	59	30
National average	91	119	58	15	85	142	47	24
<b>FOB price</b>								
Sidama coffee	128	203	73	22	101	205	47	37
Yirgachefe coffee	131	264	71	30	102	229	47	38
Wollega coffee	138	239	77	30	103	200	43	40
Jimma coffee	116	228	56	35	93	203	40	35
Harar coffee	236	352	122	54	141	213	48	36
National average	150	242	111	28	109	195	47	35

Source: Author's own estimations using data from CSA and AMPD (2006)

Auction price also exhibits a similar pattern to that of producer price. Harar coffee still fetches by far the highest price, followed by Wollega, Sidamo, Yirgachefe and Jimma. With the exception of Wollega and Harar coffees, which have shown a marginal decline in their auction price in the post-reform period, all others (Sidama, Yirgachefe, and Jimma) have shown a marginal increase in the post-reform period. The average national auction price has declined by 7.1 percent in the post-reform period compared to the pre-reform period. When this 7.1 percent decline in wholesalers price compared with 21 percent decline in producer price, wholesalers are less affected in general price level decline in the post-reform periods.

FOB or export price has also exhibited similar patterns to producer and auction prices. Harar still fetches the highest FOB price followed by Wollega, Yirgachefe, Sidama and Jimma. In the case of producer and auction prices, Sidama coffee fetches the third highest price, but with regard to FOB price, Sidama's position is replaced by Yirgachefe. This may send a pertinent message that even though Yirgachefe coffee fetches a higher FOB price, this is not reflected in the auction and producer prices.

The variability of price for each type of coffee during the pre- and post-reform periods is indicated by its standard deviation. The volatility seems to be higher for all prices in the post-reform period than in the pre-reform period. In other words, the price risk has increased for participants in a deregulated market.

As an extension of Table 5.4, producer share of the FOB price for each coffee type estimated for the pre- and post-deregulation periods. The result shows producer share of FOB price increased from 45 to 51 percent for Sidama, 44 to 63 percent for Yirgachefe, 57 to 54 percent for Wollega, 47 to 52 percent for Jimma and declined from 60 to 57 percent for Harar. The producer share of FOB price for Sidama, Yirgachefe and Jimma has remained consistent with what was estimated in earlier works, while Wollega and Harar have revealed a different result than expected.

Historically, substantial portion of coffee produced in the eastern part of the country flows to the parallel market, especially when prices at the official market are not attractive or are not expected to cover all marketing costs. Moreover, there is high local demand for coffee in both producing and non-producing regions. Due to these factors, coffee farmers located in the south-western and eastern parts of the country are expected to earn higher prices even when international prices are low. This could be one of the reasons why the producer price for Wollega coffee was higher in the pre-reform period, contrary to all earlier reports (see table 5.1 and 5.3).

The producer share of the FOB price for Harar coffee has also shown unexpected patterns compared to the other types. As indicated in Table 5.2, the average share of FOB price received by the producer prior to reform remained at 43 percent. However, in the same period, Harar coffee fetched about 60 percent. Conversely, in the post-reform period, while all producer prices have shown a marginal increment, the producer share of Harar coffee has dropped by 5 percent.

Although it is difficult to point out exactly the factors that are responsible for the decline in the producer share of the Harar coffee price, it is possible to speculate some of the factors that have contributed to the decline in producer share. Firstly, as indicated in chapter four, illegal movement of coffee from low-premium to high-premium areas is a common phenomenon in the domestic coffee marketing system. Harar coffee is one of the victims of this problem. As repeatedly mentioned, Harar coffee is a premium coffee with a taste that is well recognised by international buyers and consumers. Traders of other lower premium coffees try to obtain favourable prices by moving their coffee into the Hararghe coffee-producing area and mixing it with some genuine Harar coffee beans. They then try to sell this coffee mixture at Harar auctions, claiming that it is from Hararghe. Exporters indicated during the interviews that there is a rising number of quality complaints from importing companies due to mismatches with the original taste of genuine Harar coffee in the post-reform period, which in turn has affected producer and export prices. The problem of adulteration and traceability, although a national problem, is more critical for Harar coffee.

#### **5.4 Producer share in Ethiopia vs. competing countries**

Table 5.5 compares the Ethiopian coffee producer price share with the producer share in competing countries. At present there are 50 coffee-exporting countries that are members of the International Coffee Organization (ICO). The producer and FOB prices are the averages prices over the past four decades. The prices of each country are categorised into pre- and post-reform periods based on the year of reform.

**Table 5.5: Producer share of FOB price in selected countries (1965-2006)**

Name of country	Year of reform	Year	Producer price	FOB price	Producer share (%)	Std Dev.
1. Brazil (A/R)	1990	1965 – 1989	49.0	84.6	57.9	24.4
		1990 – 2006	71.9	76.4	94.1	16.1
2. Colombia (A)	1995	1965 – 1994	58.3	101.4	60.0	15.3
		1995 – 2006	79.4	108.6	73.1	8.7
3. India (A/R)	1993	1965 – 1992	76.3	104	73.4	18.3
		1993 – 2006	71.26	79.3	89.4	21.4
4. Ethiopia (A)	1992	1965 – 1991	47.7	103.2	46.2	12.9
		1992 – 2006	61.3	101.1	60.6	16.3
5. Kenya (A)	1993	1965 – 1992	88.4	103.3	85.6	26.9
		1993 – 2006	100.6	123.9	81.2	28.9
6. Tanzania (A)	1994	1965 – 1993	64.9	88.8	73.1	20.4
		1994 – 2006	58.7	88.3	66.5	18.4
7. Uganda (R)	1993	1965 – 1992	29.4	68.2	43.1	38.4
		1993 – 2006	48.9	52.2	92.8	43.6

Source: ICO database (2006)

Even before market deregulation in the early 1990s, producers in most coffee-producing countries, with the exception of Uganda, fetched higher prices than producers in Ethiopia. Although there have been wide variations in price, after market deregulation in most countries the price received by the producers have improved. For instance, in the post-reform period, producers in Brazil, Colombia, India, Kenya, Uganda and Tanzania have received 94.1, 73, 89.4, 81, 92 and 66.5 percent of FOB price respectively. However, the Ethiopian producers' share remains the lowest (i.e. 60.9%) compared to competing countries. In other words, if we consider the difference between FOB and producer price as the marketing margin, Ethiopia is the country with the highest gross marketing margin. For instance, the marketing margin is estimated to be 5.9 percent of FOB price for Brazil, while it is about 40 percent for Ethiopia.

The evidence as shown by the standard deviation of the producer share of FOB price for the pre- and post-reform periods indicates that in most of the relatively important coffee-exporting countries like Brazil and Colombia, farmers' income from coffee has remained less volatile, even in post-reform periods, compared to countries like Ethiopia, Uganda and India (see Table 5.5). Similarly the Kenyan producer income has also remained relatively stable. What accounts for the high or low volatility of producer income from

coffee is beyond this research. However, the anecdotal evidence indicates that in those countries where a fairly advanced and effective institutional setting exists, the producer income will be less volatile compared to countries with weak institutional settings (Ponte, 2001).

## **5.5 Factors accounting for low producer prices**

The growth in producer income from coffee marketing could be affected by both internal and external factors. Internal factors affecting producer price include marketing costs (physical and transaction costs), quality, transparency in the auction system, existence of strong legal institutions for contract enforcement, and so on. Since coffee is traded internationally, what happens in the international market directly affects the producer income or price. Hence, external factors like price volatility, market power and concentration, demand situation and technological changes in processing may directly or indirectly affect producer price (Ponte, 2005).

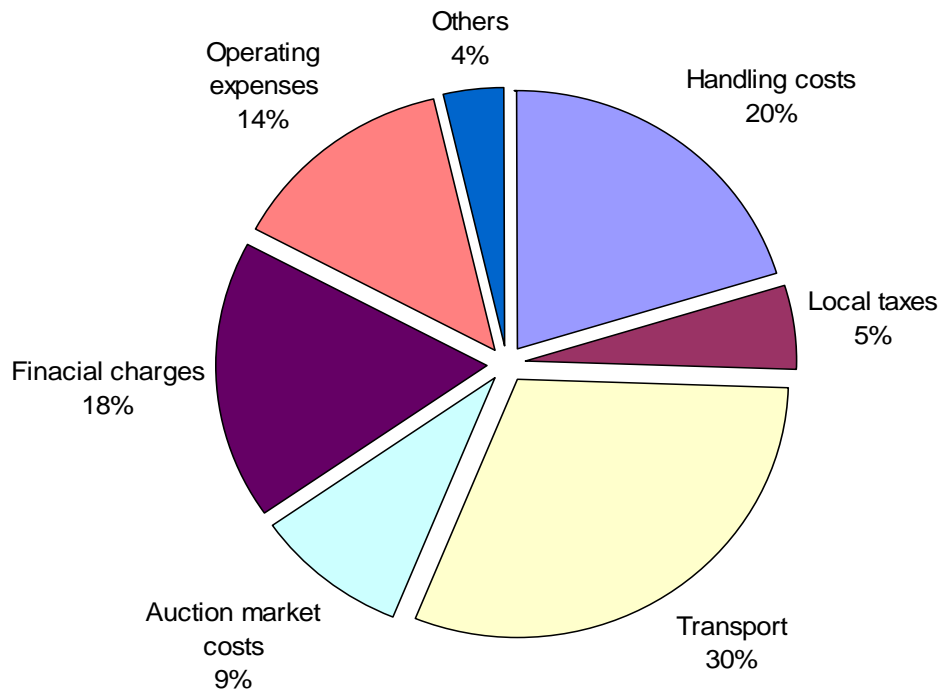
### **5.5.1 Marketing costs**

Marketing costs could be high or low based on the internal efficiency of the firm, quality of infrastructure, government policies (i.e. tax policy, service efficiency), and financial sector competitiveness. The major cost components for wholesalers (private and primary cooperatives) and exporters (private, union and state plantation) are separately evaluated below.

#### **5.5.1.1 Costs of wholesalers**

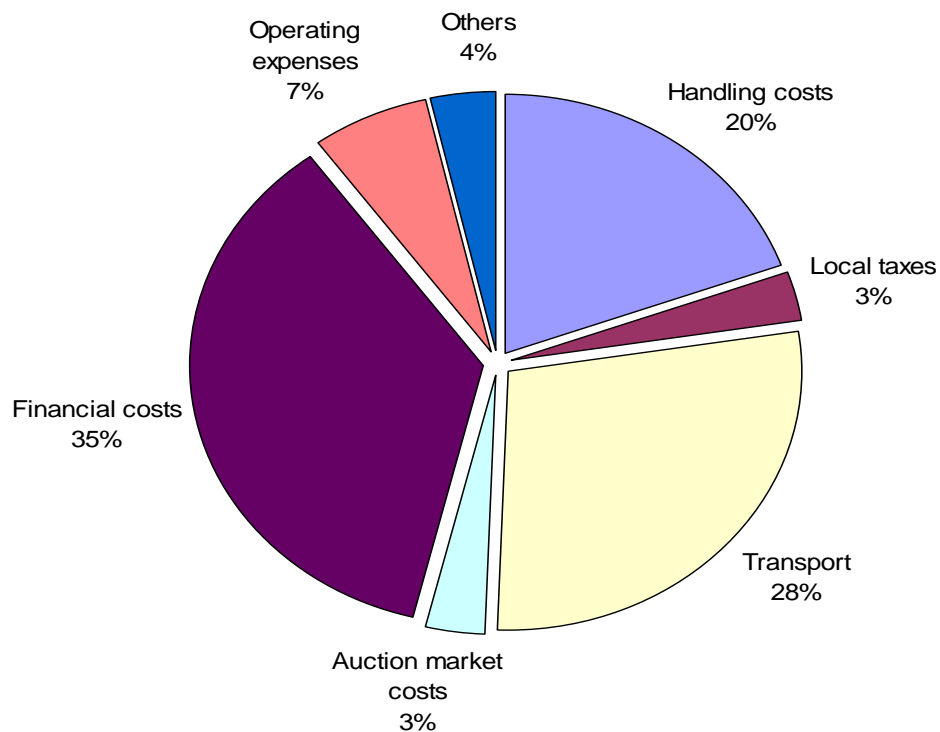
Wholesalers (*akrabys*) play the most important role in the domestic coffee marketing chain. They collect small lots of coffee from highly dispersed smallholders, transport coffee beans to processing centres, process the beans up to auction standard, and deliver the beans to the auction market. Meanwhile coffee wholesales face high prices and quality and financial risks. In addition, they face numerous direct and indirect costs after

delivery to the auction market. As illustrated in Figures 5.1a and 5.1b, the major cost components of private and cooperative coffee wholesalers (*akrabys*) can be categorised into seven major components. According to their importance they are listed as transport costs, handling costs, financial charges, operating expenses, auction costs, local taxes, and others.



**Figure 5.1a: Average processing and marketing costs of private wholesalers**

Source: Coffee market survey by author (2006)



**Figure 5.1b: Average processing and marketing costs of primary cooperatives**

Source: Coffee market survey by author (2006)

**Transport costs:-** In Ethiopia, although the government has placed a high investment priority on road infrastructure, a large part of the country still lacks good road networks. Coffee-growing regions are mainly located in the highlands of the country where road infrastructure and transport services are hardly available. Transport services can be classified in four categories: farmgate to primary marketing centre, primary market to processing centre, processing centre to auction markets and auction to port.

It is extremely difficult to find reliable information on transport costs from farmgate to primary marketing centre. As anecdotal information from discussions with coffee farmers indicates, on average it costs about Birr 0.75 per kilometre to transport 100 kilograms of cherry. This estimate is based on the local cost of hiring mules, horses or donkeys to transport coffee beans to primary marketing centres. According to this estimate, a farmer

seeking to transport about one quintal (100 kg) of cherry over a distance of 20 kilometres will incur a cost of Birr 15 or USD \$1.76 which is extremely expensive for producer to finance. As anecdotal evidences from the fieldwork shows, under current conditions producers opt to sell at the farmgate due to the high transport and transaction costs involved in delivering to primary markets, especially in inaccessible coffee-producing areas. As stated by coffee farmers in Tepi district (Shaka), transporting coffee to major marketing centres is costly and they prefer to sell to commuting village traders at a cheaper price.

The major transport costs of wholesalers include the cost of transporting coffee from primary market to processing centres and from processing centres to the auction market. Some of processing-industry owners have light trucks to transport coffee from the collection centre to the processing centre. Alternatively, collectors may hire trucks or pack animals and deliver the coffee to the processing industry. Table 5.6 shows the average distance from collection markets to processing centres and then to the auction market, as well as the respective cost of each. The average cost of transporting one ton of coffee over a distance of one kilometre from primary markets to processing centres is estimated at Birr 4.1 (USD 0.48), but from processing centres to the auction the average cost is Birr 1.08 (USD 0.13) – implying high transportation costs at farm level due to either supply of transport shortages or the nature of the road infrastructure.

**Table 5.6: Transportation cost by coffee-producing area (2006)**

Zone	Average transport cost (primary market to processing centre)			Average transport cost (processing centre to Addis Ababa and Dire Dawa)			# of observation
	Average distance (km)	Transport cost (Birr/ton)	Birr/ton/km	Average distance	Transport cost (Birr/ton)	Birr/ton/km	
W. Hararghe	16.7	63.0	3.8	298.8	299.0	1.00	66
W. Wollega	23.2	71.0	3.1	583.1	707.0	1.21	36
Jimma	10.2	49.0	4.8	386.9	493.0	1.27	64
Sidama	8.6	32.0	3.7	344.3	336.0	0.98	39
Gedeo	9.2	47.0	5.1	385.7	367.0	0.95	34
Average	13.6	52.4	4.1	399.8	440.4	1.1	48

Source: Coffee market survey by author (2006)

The cost of transporting processed coffee beans/parchment from producing zones to the auction market depends on the effective distance by road, road conditions, weather, and seasonal demand and supply in terms of transport services. During peak coffee supply seasons, trucking demand is so high that transport charges double. As traders indicated during the group discussion, it is mainly the distant coffee zones like the southern and south-western regions that face critical transport shortages during the peak supply seasons. Another factor influencing truck transport charges between months and regions is the availability of freight. For those trucks stationed in Addis Ababa that have goods to be transported to coffee regions, the cost of transporting coffee in the reverse direction may be lower.

The transport component's share of the total processing and marketing cost varies significantly between coffee zones. For instance, it accounts for 21.7, 27.5, 33.6 and 36.4 percent for Harar, Sidama/Gedio, Jimma and Wollega respectively. On average it accounts 30 percent for private and 28 percent for cooperative wholesalers (see Figure 5.1a & 5.1b). This marginal difference in transport cost may account for the reason that most of cooperatives have their own light trucks for transport service compared to private wholesalers. The distance between production area and auction market is among the major causes of variation. In general, transport cost accounts for the largest share of marketing cost. These costs escalate when we account for transaction costs related to identifying, negotiating and signing contracts with truck owners.

During the pre-reform period, in an effort to ease the transport problem for producers and wholesalers, the ECMC operated in 52 main stations, 127 sub-stations and several mobile coffee-purchasing stations to facilitate effective collection in more remote locations (MCTD, 1987). Market deregulation has replaced the state monopoly (ECMC) with a large number of private traders at different levels. However, these private traders are concentrated mainly in the areas where there is better infrastructure (transport and communication). Although the dismantling of state monopolies has some benefits, failure to establish institutions that can provide similar services has left a vacuum in current coffee marketing chain; specially, for the remote producing areas.

**Handling costs:-** Handling cost is one of the major cost components and includes processing, labour, storage, bags, weight losses and quality inspection costs at local level. Processing cost refers to the cost of pulping (red cherry) or hulling (dry cherry). In other words it includes all essential functions like sorting before processing, pulping/hulling, drying, sorting broken and defective beans, and removing external materials until the coffee achieves the quality standards set by the CTA. Hulling and pulping costs vary depending on the state of the industry, source of power, distribution of pulping and hulling industries, and so on.

As data from coffee market survey (2006) shows, labour cost is the second most important component within handling costs. Labour requirements and costs also vary substantially for the processing of dry and washed coffee. Washed coffee requires more than 40 percent additional labour time to complete processing compared to dry-processed coffee. Before pulping, labourers sort the red cherry and then pulp, ferment, dry, sort out broken and defective beans, pack, stitch bags, load and unload. The cost of labour also varies between peak and slack processing seasons, as well as between regions.

**Financial charges:-** Financial charges include interest on working capital and service charges by banks. The interest rate for most export trade is 7.5 percent per annum as set by the Commercial Banks of Ethiopia, which covers the lion's share of trade and investment financing in the country. It is the only source of loans for primary cooperatives. Almost all primary cooperatives owe huge arrear amounts accumulated over many years. As indicated in Figure 5.1b, the percentage share of financial charges in the total marketing cost for primary cooperatives is 35 percent, while it is 18 percent for private wholesalers. The high costs for primary cooperatives are due to internal inefficiency and high overhead costs of primary cooperatives compared to private wholesalers. For instance, as information from the coffee market survey indicates, private traders on average supplied 15 times more processed coffee to the auction market in the 2006 coffee year, whereas cooperatives on average supplied only 8 times more. The simple explanation for this is that the rate of money circulation in primary cooperatives is lower compared to private suppliers, implying a low rate of return. In addition, most

primary cooperatives have accumulated debts, with the bank charging interest on the total amount of the outstanding loan, which in turn affects the liquidity of most primary cooperatives.

**Operating expenses:-** Operating expenses are usually incurred to facilitate coffee exchange. These include en-route expenses like hotels, food, driver allowances, car maintenance and others. As indicated in Figure 5.1a and 5.1b, operating costs account for 14 percent of total costs incurred by private wholesalers and 7 percent of costs incurred by primary cooperatives. Primary cooperatives have the advantage due to their institutional arrangement whereby they deliver to their respective Coffee Farmers' Cooperative Union and collect payment afterwards once sales have been concluded. Indeed, cooperative unions are responsible for facilitating and coordinating coffee for export from primary cooperatives. This has minimised the operating costs of primary cooperatives while making things extremely difficult for private wholesalers (*akrabys*). This is mainly because in the current coffee marketing system, the production centres and terminal coffee marketing system are located far apart. Hence, private wholesalers have to travel long distances to reach the auction centre. On average it takes 7-15 days to conclude the exchange process and collect payment. This in turn increases the operational costs of private traders.

**Auction costs:-** Auction costs are costs incurred by wholesaler from the time of arrival at the auction centre until the exchange has been concluded. These costs include parking fees, quality inspection fees, tips for samplers (*yewogiwoch gursha*), agent commissions, and contributions to coffee sports clubs. Auction costs account for 3 and 9 percent of the costs incurred by primary cooperatives and private wholesalers respectively. Such costs are much lower for primary cooperatives and extremely higher for private wholesaler for the reasons mentioned above.

It is worthwhile to discuss the costs related to commissions paid to agents and samplers at auction market. Most private wholesalers have agents at the auctions, who are either paid on a monthly basis or who earn commission from each round of effected sales. As

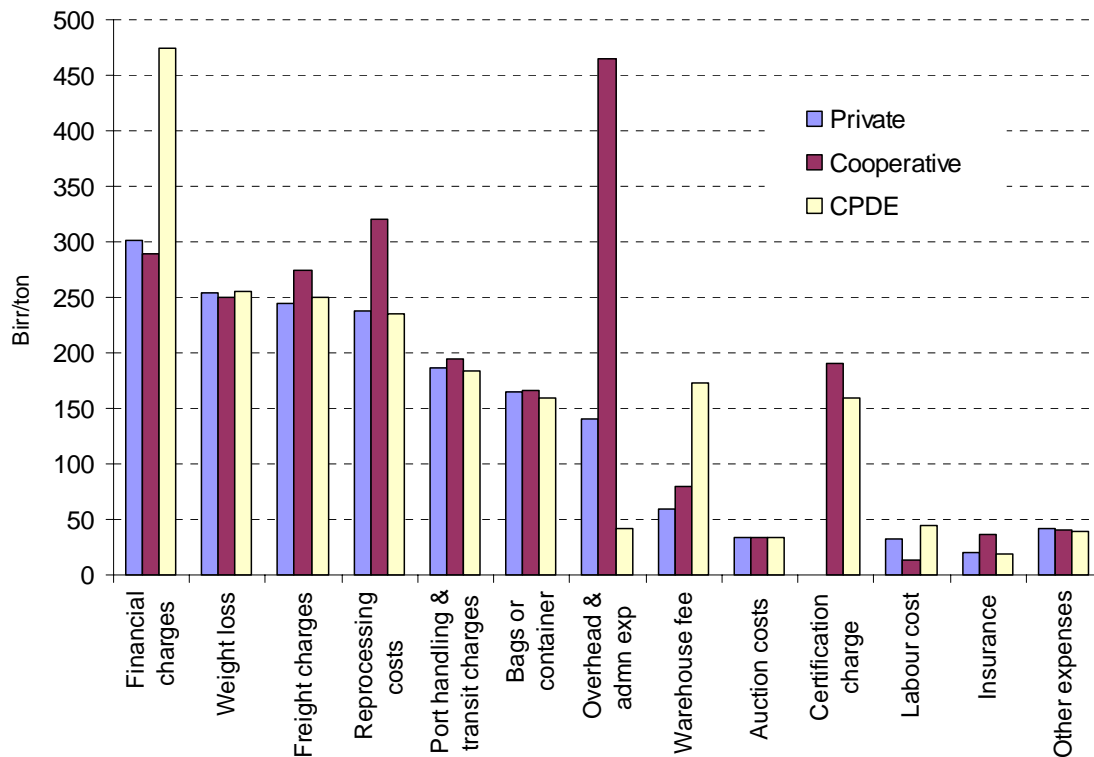
pointed out earlier, most traders travel long distances to reach the auction market. Often prices may not be conducive to completing the sales immediately and so it is inevitable that traders must wait there for several days, which has immense cost implications for wholesalers. This also delays the collection and processing of coffee for the next round, ties up capital circulation, and has an effect on quality. To avoid this problem, wholesalers, especially those from distant coffee-growing regions, assign agents who are authorised to participate on their behalf in the auction market. As wholesalers stated during the panel discussions, commission on about 12 tons of clean coffee sold ranges from Birr 1,000 to 1,500 for agents at the Addis Ababa auction and Birr 500 to 1,000 for agents at the Dire Dawa auction which account for a substantial portion of the marketing cost.

**Local taxes:-** Revenue from coffee tax is among the main income-generating sources for local as well as federal governments. Following market deregulation at federal level, different taxes on coffee exports were harmonised into a single tax unit (6.5 percent on export revenue). Since 2001/02, tax has been temporarily waived at federal level following the world coffee price collapse in 2001/02. However, local taxes on coffee trade are still levied, with the municipality tax on coffee being common to all coffee zones. Over and above this, the Sidamo, Gedio and Jimma zones levy development taxes on coffee supplied to auction. Local taxes account for 5% of the total marketing costs incurred by private wholesalers and 3% of that incurred by primary cooperatives.

#### **5.5.1.2 Costs of exporters**

In this section the marketing costs of exporters (post-auction marketing costs) in three exporter groups (i.e. private exporters, Unions, and state plantation) are discussed. According to current regulations, exporters are allowed to purchase coffee from the auction market and reprocess it to export standard, and are required to obtain quality certification before delivering the coffee to the port of export. Between auction and port they incur substantial costs. As depicted in Figure 5.2, the major costs for exporters include financial charges (16.9%), reprocessing costs (12.5%), freight charges (12.2%),

weight loss (12%), overhead and administrative costs (10.2%), port handling and transit charges (8.9%), certification (8.3%), bags and/or containers (7.8%), and other costs (auction-related costs, labour and insurance, which together account for less than 6%).



**Figure 5.2: Processing and marketing costs of exporters (2006)**

Source: Coffee market survey by author (2006)

Private exporters and the state Coffee Plantation and Development Enterprise (CPDE) have similar cost structures for most cost components, with the exception of the high financial charges for the CPDE. The cost structure of cooperatives unions' shows great variability compared to that of private exporters and the CPDE. Unions incur extremely high overhead costs (19.6%) and reprocessing costs (13.6%) as a proportion of total marketing costs. This might be due to internal inefficiency of cooperative unions compared to private traders.

Exporters' transport costs are lower than those of wholesalers. This is because trucks transport coffee to the port of Djibouti in the reverse direction, pick up the freight of

imported goods to be transported inland, and charge a relatively higher price for transporting imported goods. Due to this, exporters on average pay Birr 200-250 to transport one ton of coffee from Addis Ababa to Djibouti, which is a distance of about 910 kilometres, while wholesalers on average pay Birr 400-500 to transport one ton of coffee over a distance of about 450 kilometres. As coffee traders from Wollega (Gimbi) stated, in the peak supply season they are charged about Birr 100 for 100 kilograms of coffee. In other words, at worst, the transport cost could be Birr 1 for 1 kg (or 0.11 USD per kg).

In general, when exporters (both private and cooperative unions) pay Birr 0.25 per ton per kilometre, wholesalers pay between Birr 0.75 and Birr 1 for the same volume and distance. In the current marketing system, exporters are free from any taxes while wholesalers are facing several local taxes. This may be so because exporters are better able to lobby and convince decision-makers to cooperate in the coffee marketing system compared to wholesalers (as representatives of farmers) who are dispersed and large in number.

Moreover, most exporters own either their own trucks or joint transport companies or have tight social networks with other transport companies, meaning that it is much easier for them to arrange transport compared to wholesalers who are based in the regional/zonal or district town centres. Indeed, some wholesalers who have vertical relationships with exporters face fewer problems than those who do not.

Weight loss is the second most important cost component for exporters. There are three different components of weight loss: Firstly, weight loss occurs when parchment or clean beans of coffee are purchased from the auction market and cleaned to export standard. Secondly, weight loss occurs due to differences in moisture in the exporter's warehouse and during transport to port. The estimated weight loss for the latter ranges from 0.5 to 2 percent for sun-dried and 0.5 to 1 percent for washed coffee. The third type of weight loss occurs due to malpractices when coffee is transported to the port for export. There is a minimum acceptable level of weight loss mainly due to change in moisture content and

leakage, estimated at 0.5 percent. However, as most exporters stated during the group discussions, current weight loss is beyond the acceptable range. This is difficult to substantiate with supporting evidence due to exporters' reluctance to disclose information, but it is quite substantial. As revealed by data on the payment of weight-loss claims by only six government banks, USD 175 (211.9%) was repatriated for importers between 2003 and 2006. This figure would have been much higher if full information had been obtained. This has not only monetary cost implications, but also results in a loss of reputation between seller and buyer companies.

Anecdotal evidence suggests that the loss occurs mainly on the way to the port in Djibouti. Some truck drivers who deliver coffee are dishonest and may sell to dealers involved in such activities on their way to the shipping point. As exporters stated, the lack of a weighbridge at the destination is one of the major factors contributing to this malpractice. This is a typical example of institutional failure to regulate the behaviour of individuals in the marketplace.

Coffee Farmers' Cooperative Unions and Coffee Plantation and Development Enterprise (CPDE) export certified coffee for organic, fair-trade and specialty coffee markets. However, it must be certified by special certifying agencies assigned by the buying countries. Current certification costs are substantially high (i.e., account for 8.3 percent of the total marketing costs of the exporter).

'Other costs' incurred by coffee exporters include pre- and post-shipment sample costs, communication costs, and advertisement and other miscellaneous costs. Pre- and post-shipment samples are samples of coffee beans drawn from the coffee for export and sent to the buyer. The value of sample coffee and mailing and communication costs accounts for some part of the costs listed under 'others'.

As has been discussed above, transport costs are generally higher for wholesalers than for exporters. This is mainly due to two reasons: Firstly, according to the current domestic coffee marketing system, the production centre and auction markets are located far apart.

This is partly the reason for high transport and overhead costs for both private and cooperative wholesalers. Secondly, the transaction cost of arranging transport and negotiating and signing contracts is another vital problem.

### **5.5.1.3 Marketing margins**

Marketing margins are computed as the difference between the average price paid by the consumer for a finished product with an agricultural raw material base and the payment received by farmers for equivalent quantities of raw material products. The difference between the retail and producer price represents marketing costs such as transport, storage, processing, advertising and mark-up prices of participants. It is important to recognise that as the product moves from the hands of the producer until it reaches the consumer, there is a change in form, time, place and possession that is sometimes incomparable. Failure to pay attention to this results in under- or over-estimation of marketing margins. In the case of coffee, most of the marketing margin studies conducted on the same form of coffee bean (green bean) prices show that comparison of marketing margin at different levels of marketing is relatively easy, because the coffee beans at farmer level and export level are similar in form. The total marketing margin in the coffee marketing system constitutes the marketing costs plus the profit margin (mark-up price) of the different participants in the system.

The following section estimates the marketing costs and profit margins of exporters (private and cooperative unions) and wholesalers (private and primary cooperatives) by deducting all estimated costs from FOB price down to producers (Tables 5.7 and 5.8). As indicated in Table 5.7, exporters purchase coffee from the auction market and reprocess it to export standard before delivering it to port. During the process they incur costs for processing, handling, transporting, storage, interest on capital, port handling and transit charges, and other miscellaneous expenses. In addition to these costs, cooperative unions incur certification charges in order to secure a licence to sell in organic, fair-trade or speciality coffee markets. As a result, the total post-auction costs of cooperative unions

are higher compared to those of private exporters. Profit margins are generally higher for cooperative unions (i.e. 15% of FOB price) compared to private exporters (12.6%).

**Table 5.7: Marketing margins of private and union coffee exporters (2006)**

Marketing costs and margins	Private exporters		Union exporters	
	Birr/kg	Birr/ton	Birr/kg	Birr/ton
1. FOB price	23.02	23020.5	25.61	25605.6
2. Post-auction costs				
Reprocessing costs	0.24	238.00	0.32	320.00
Labour costs	0.03	33.00	0.01	14.00
Weight loss	0.25	254.00	0.25	250.00
Bags or containers	0.17	165.00	0.17	167.00
Warehouse fees	0.06	59.00	0.08	80.00
Auction costs	0.03	34.00	0.03	34.00
Insurance	0.02	20.00	0.04	37.00
Transport	0.24	244.00	0.27	274.00
Financial charges	0.30	302.00	0.29	289.00
Port handling and transit charges	0.19	186.00	0.19	194.00
Overhead & administrative costs	0.14	140.00	0.47	465.00
Certification charges	NA	NA	0.19	190.00
Others	0.04	42.00	0.04	41.00
3. Total post-auction costs	1.72	1718.00	2.30	2354.00
Auction price (paid to <i>akrabys</i> )	18.41	18405.00	19.41	19405.00
Grand total	20.12	20123.00	21.76	21759.00
Exporter profit margin	2.90	2898.00	3.84	4846.00
	(12.6%)	(12.6%)	(15%)	(15%)

Source: Coffee market survey by author (2006)

This difference in profit margin is due to the fact that private exporters sell in conventional markets while cooperative unions sell in niche markets (organic, fair-trade, organic-fair-trade and speciality coffee markets) where they fetch premium prices. The post-auction processing and marketing cost of private exporters is estimated at 7.5 percent of FOB price and their profit margin is estimated at 12.6 percent, implying that 80 percent of FOB is the price paid to wholesalers at the auction market. The interior marketing costs (farmgate to auction) and profit margin of wholesalers are estimated at about 10 and 6.84 percent of FOB price respectively. Hence about 63 percent of FOB price is paid to the producer which is more or less consistent with earlier findings.

Table 5.8 illustrates the marketing margins of private and cooperative wholesalers. The profit margin for both is about 7 percent of working capital, while the exporter's profit margin is 15 percent. Indeed, exporters have relatively better market information, a stronger financial base and storage facilities, which in turn allow them to bargain for better prices compared to wholesalers.

**Table 5.8: Marketing margins of private cooperative wholesalers (2006)**

Marketing costs	Private wholesaler		Cooperative wholesaler	
	Birr/kg	Birr/ton	Birr/kg	Birr/ton
4. Auction price	18.41	18405.00	19.41	19405.00
Handling costs	0.33	326.00	0.31	306.00
Local taxes	0.08	85.00	0.05	45.00
Transport	0.49	490.00	0.45	446.00
Auction costs	0.15	146.00	0.05	53.00
Financial charges	0.28	282.00	0.56	564.00
Operating expenses	0.22	218.00	0.10	103.00
Others	0.10	100.00	0.06	55.00
5. Total interior costs	1.65	1647.00	1.57	1569.00
Producer price	15.50	15500.00	16.55	16545.00
Grand total	17.15	17147.00	18.11	18114.00
Wholesaler profit margin	1.26 (6.84%)	1258.00 (6.84%)	1.29 (7.1%)	1291.00 (7.1%)

Source: Coffee market survey by author (2006)

As discussed earlier, primary cooperatives that deliver export coffee to the respective coffee farmers' cooperative unions and collect payment when sales are concluded have an advantage in obtaining market information and somehow credit services. These advantages are expected to benefit primary cooperatives rather than private traders. However, in reality, the profit margin of primary cooperatives is not much different from that of private wholesalers.

### 5.5.2 Institutional instability

'Getting prices right' or market deregulation alone is not a sufficient condition for success. What is more important is 'getting institutions right'. Developing efficient marketing systems requires appropriate institutions to guide the behaviour of market

participants in the production, marketing and distribution components of the marketing chain, to provide the appropriate services, and to design and implement appropriate incentive systems for participants in the market (World Bank, 2002).

In this regard, the coffee sector has received due attention during the different regimes. In 1957, the National Coffee Board (NCB) was established to regulate quality and the coffee marketing system. With the regime change in 1975, the Ethiopian Coffee Marketing Corporation was established in 1977 to regulate the industry and replace the NCB of Ethiopia. In 1979, the Ministry of Coffee and Tea Development (MCTD) was established and was given the power to regulate the production and marketing of coffee. In 1992, the Ministry of State Farms, Coffee and Tea Development (MSFCTD) was created to replace the MCTD. In 1995, the MSFCTD was replaced by the Coffee and Tea Authority (CTA). In 2006, CTA was replaced by Coffee, Tea, Spice and Cotton Marketing Departments of MoARD. In 2007, the coffee marketing responsibility handed for the current AMPD of MoARD which replaced CTA.

From the establishment of the National Coffee Board in 1957 until present, coffee production and marketing has been managed at ministerial level. The recent reform measures have squeezed services and the distribution of professional distribution in the sector. The coffee extension and marketing professionals are assimilated under general agriculture. These changes have resulted in a high rate of turnover of employees and professionals. During the fieldwork the author came to realize that at micro level, services like coffee extension, credit, quality control, price information and so on are highly weakened. Primary coffee markets lack appropriate institutions to regulate the behaviour of market participants and to prevent wrong doing and enforce contracts.

### **5.5.3 Quality problems**

As pointed out in chapter four, the heterogeneous characteristics of Ethiopian coffee are unique amongst the coffee-producing countries of the world. This variability in coffee type and taste is a considerable asset if properly managed and can be translated into

additional foreign exchange earnings. However, the country presently lacks appropriate institutional and incentive structures to exploit this potential. Most importantly, producers lack incentives to maintain high quality standards because of the marketing system's failure to reward them for better quality.

As a result, at producer level, strip picking and drying on bare soil are common practices. At the primary markets there are flourishing numbers of unlicensed traders (illegal traders) who often engage in mixing red or dry cherry with foreign materials, re-moisturising dry cherries for the purpose of weight gain, and adulterating different coffee beans at the auction market. Transporting clean coffee beans from low-premium areas to high-premium areas is another one of the malpractices that prevail in the current Ethiopian coffee marketing system (Kuma, 2006).

Due to the problems stated above, importing companies are lodging more and more complaints with their exporters regarding loss of original flavour, mainly in premium coffees. Due to business secrets no exporter wishes to disclose such complaints; however, it is worth mentioning the following comment on quality evaluation by an American company called "Sweet Maria's Coffee Cupping" ([www.sweetmatias.com](http://www.sweetmatias.com)) regarding quality problems related to Harar sun-dried coffee in 2007:

..... I honestly thought we would stock no Harar this year. It's no more a Harar coffee, there are tons of lots available from the usual coffee brokers. But the samples have been dismal for the new 2007 crop; it is musty, dirty, moldy, fungusy, or just plain flat. And equally surprising is that it came from our old supplier Mohammed Ogsadey under his Horse mark, a source that has, in recent times, tasted a bit more like a horse than anything. Some Ethiopian dry-processed coffees are dried in the sun - so watch out for rocks! There can be small stones and dirt clods in the coffee that you need to cull out before roasting and definitely before grinding as these can jam a grinder. A ground up dirt clod can foul an otherwise lovely pot of coffee. In wet processed coffees the stones fall out in the water channel but in dry processed coffees, small stones can escape detection and make it all the way through to the final bag.

The ultimate cost of such adulteration and quality problems is borne by coffee farmers. When international buyers and consumers fail to trust the quality of coffee from a given source, they either shift to consuming other brands of a relatively better quality or start to pay low prices for the product. This in turn may affect the profitability of coffee cultivation and may result in resource shifts to other alternative production in the long run.

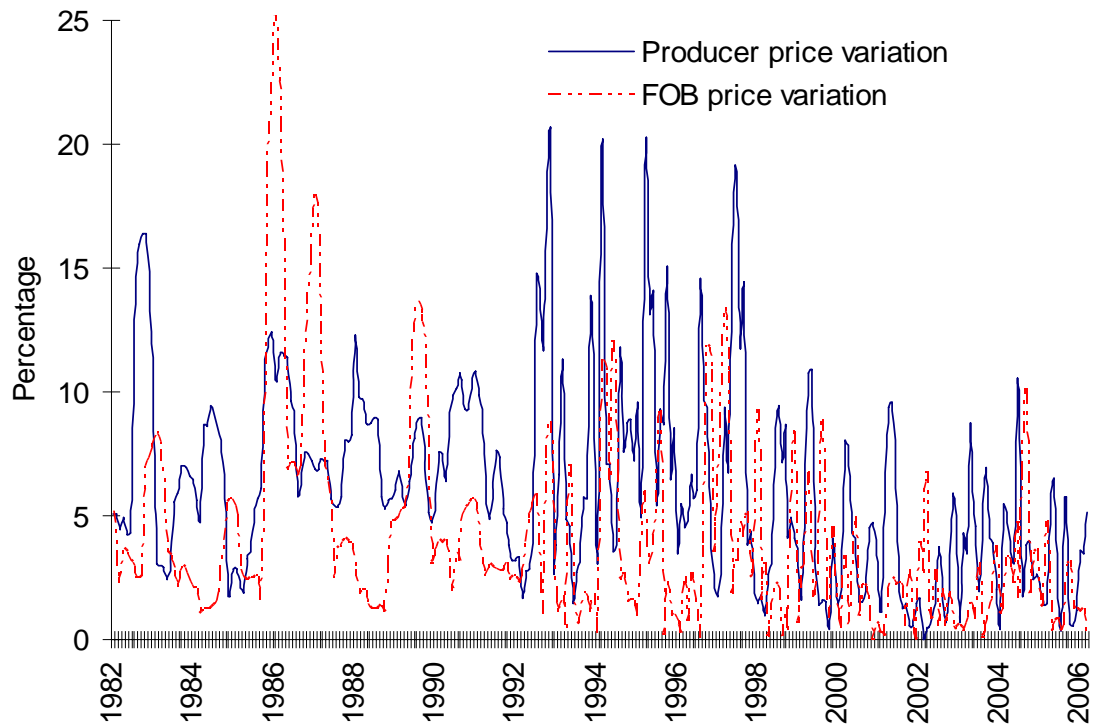
#### **5.5.4 Price volatility**

Since the lion's share of production is accounted for by smallholders, this has a substantial impact on agricultural income and welfare (DFID, 2004). At the farm level, price volatility affects the livelihoods of the farmers due to the fact that coffee accounts for the largest proportion of farm cash income in most areas. When prices are low, they sacrifice a lot in not being able to purchase clothing, food and off-farm consumption goods. At the macro level, volatility has an adverse effect on government revenues and spending.

Coffee farmers' incomes have continued to decline to the extent that farmers can no longer cover their production costs and sustain their livelihoods. In years when prices are low (e.g. 2001/02) farmers receive prices that do not even compensate for their production costs (CTA, 2002). According to an estimate by the CTA, the average production cost for a kilogram of red and dry cherries for Sidama and Yirgacheffe coffees was between Birr 1.62 and 4.39 respectively; while the average sales price for the same year was Birr 0.75 and 1.40, respectively.

Figure 5.3 shows the percentage deviation from mean prices using coefficients of variation for the past three and a half decades. The extent of deviation of producer and FOB prices is plotted to compare whether there is any significant difference between the two. As we can see from the figure, producer price is much more volatile from the mean price compared to FOB in the post-reform period. The study on the effects of coffee price volatility on the Ethiopian coffee producers by Kuma, Van Schalkwyk and

Jordaan (2008) using the ARCK/GARCH approach revealed similar results showing that producers face higher price volatility (price risk) compared to wholesalers and exporters.



**Figure 5.3: Coefficients of variation (CV) of producer and FOB prices**

Source: Author's own computation using data from AMPD (2006)

In general, the impact of boom and burst cycles is mostly borne by smallholder farmers. In most cases they do not have risk mitigation tools. Some possible solutions from a long term perspective may include, amongst others, forward contracting, participating in fair trade, organic and other non-conventional marketing, and the establishment of direct trading relationship between producers and consumers. The effectiveness of these solutions, however, depends on the institutional environment within which it operates.

### **5.5.5 Market power concentration by roasters**

The global coffee trade is characterised by high market power concentration at the level of roasters. For example, four large multinational companies provide more than half the coffee consumed by the 25 major coffee-consuming countries. These companies are Jacobs/Kraft General Foods, Nestle, Proctor & Gamble, and Sara Lee/De. Vertical integration between these multinationals, roasters and supermarkets chains is also becoming a common phenomenon (Oxfam, 2002). The consumer market, on the other hand, is highly differentiated by type and the way in which coffee is processed. These features of international coffee trade in the main consumer nations have resulted in considerable barriers to entry for producer countries (Daviron & Ponte, 2005). The governments of major consuming nations also impose various taxes on processed coffee imports which limits value adding in producer countries (Watkins and Fowler, 2004).

The primary producers and the final consumers of coffee have been put at the mercy of roasters who take the lion's share (almost 80-90 percent) of the total income accruing out of a kilogram of instant coffee (Oxfam, 2002). Hence, both the local and international coffee marketing environments do not provide incentives for producers to invest in more productive technologies. In order to cope with these problems Ethiopia recently moved up the industry ladder with a new tactic, namely trade-marking its specialty coffees (Yirgachefe, Harar and Sidama). Ownership rights to its two specialty coffees, Harar and Sidamo, are fully protected in the global coffee trading regime (Reuters, Dec. 20, 2007). No company unless permitted here-to-forth will trade with Ethiopian coffee names as it's trade mark and the country had signed agreements with 60 global firms to distribute its coffees. Securing trademarks allows Ethiopia to identify the distributors to which it will grant licences to sell those specialty coffees, and under what terms. With this initiative, a network of licensed distributors will sit down with producers and exporters and discuss common interests. This will benefit everyone in the coffee chain, from the farmer to the end distributor. If a 20% increase in average annual export value is anticipated as a result of this, Ethiopia could earn \$80 million USD more per year. If this amount is directly transferred to the pockets of coffee farmers, it would improve their lives immensely. In

general, trade-marking has the capacity to bring in more money for farmers than fair-trade or organic coffee, because the country has control over its product marketing chain.

Indeed, trade-marking is important for the country as a whole, but this is not enough. The government needs to pay special attention to ensuring the quality of coffee in order to maintain the reputation of specialty coffees; mainly the current false labelling of beans and the mixing of inferior beans into bags of premium beans has series negative effect in the future the sector.

## **5.6 Conclusion**

This chapter reviewed the trends in the producers' share of the export price for Ethiopian coffee growers over the past half a century compared with competing countries, and also explored factors affecting producer prices. The assessment has shown that producer prices for Ethiopian coffee farmers have improved moderately in the post-deregulation period but still remain far below those of competing countries. The price spread between producers and exporters accounts for about 37 percent of the FOB price. Of this, transport alone accounts for the lion's share of costs, followed by financial charges and operational expenses.

High transport costs are partly explained by the current coffee marketing system where coffee produced in the southern and south-western parts of the country is auctioned at Addis Ababa, meaning that a distance of more than 500 kilometres on average must be travelled from the production areas. This divergence between production and marketing centres, combined with the poor quality of the road networks and transport services, are some important causes of the high cost of marketing. Other costs like high overhead costs, agents fees and auction costs are directly or indirectly related to distance. Costs related to transport and the auction markets together account for about 40% of marketing costs from production to auction.

Hence, in order to raise the price that small-scale farmers receive for their coffee, there is a need to improve quality and reduce marketing costs. This can be achieved by encouraging farmers to adopt better post-harvest processing practices and gradually increase the proportion of washed coffee, which attracts a higher price premium on the world market. The potential for reducing marketing costs exists in grading coffee nearer to the point of production and shipping it to the warehouse of the exporter or directly to the point of export, which would reduce transaction and handling costs and raise producer margins to the benefit of smallholder producers. Furthermore, improving trust between buyers and sellers by improving the traceability of the product and reducing the current malpractices in the market is equally important to develop an efficient marketing system in the long run.

In general, dismantling market parastatals is a necessary but insufficient condition for efficient private markets to evolve. In the absence of appropriate infrastructure and institutions, at grassroots level, smallholders remain at the mercy of traders. Hence it is important to shift from merely 'getting prices right' to 'getting institutions right' so as to address market failures arising from imperfect information, contract enforcement and property rights, as well as insufficient provision of public goods, in order to improve the lives of primary producers.

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## CHAPTER 6

### DATA AND MODEL SPECIFICATION FOR MEASURING COFFEE PRICE INTER-RELATIONSHIP

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#### 6.1 Introduction

As presented in the earlier chapters, the Ethiopia's coffee industry has undergone numerous deregulation measures and structural changes since early 1992. Mainly, the state-controlled marketing system has been replaced by markets run by private agent. This deregulation measure envisaged to bring clear benefits to producers by improving transmission of price signals between vertically and spatially related coffee markets. Indeed, integration of inter-related agricultural commodity markets is a precondition for effective reform in formerly regulated economies (Barrett, 1996; Baulcha, 1997) and measuring the impact of deregulation on transmission of price signals among related markets is inherently empirical issue.

There has been a radical changes in methods used to analyse market integration or price transmission (see chapter 2, section 2.4). On the basis of review of development in methods, this study chosen to employ threshold cointegration methods introduced by Balk and Fomby (1997); in particular, threshold vector error correction model (TVECM) specification of Hansen (1999) was followed. Hansen approach extended to test for the presence of heteroskedasticity in error variances and to decide on number of regimes that best fits the data using techniques developed for threshold autoregressive (TAR) models. In addition, Impulse Response Function (IRF) is applied to evaluate the response of one price to change in prices in the different levels of the market.

There are several steps involved to measure price inter-relationship. The first step is assessing the statistical properties of individual price series. The second step to determine cointegration (long-run relationship) among the prices studied using Engle and Granger (1987) and/or Johansen approach. Thirdly, once the long-run relation is confirmed the next step assesses whether the dynamics of the long-run relationships among price series are linear or whether they exhibit a threshold-type relationship. This involves several steps to define threshold effects, its value and significance testing. Finally, the error correction model, regime switching and impulse responses are estimated conditional to the threshold parameters. The above sequential approach follows major existing literatures on market integration (e.g., Balke and Fomby, 1997; Goodwin and Harper, 2000; Goodwin and Holt, 1999; Serra and Goodwin, 2003).

Given the introductory statements regarding the methods to be applied and procedure of application, the rest of the chapter organized as follows. Section 2 presents the data type and its sources. Section 3 provides overview on statistical properties of time series data, informal and formal testing procedures. Section 4 discusses threshold model specification for both vertical and spatial market integration and procedures of estimating and testing linearity of TVEC model<sub>3</sub>. Section 5 provides model specification for impulse response function and regime switching. Section 6 devoted for concluding remarks.

## **6.2 Data and sources**

The producer, auction and free-on-Board (FOB) prices are the three major time-series prices on which the analysis centres. Each price series is based on monthly prices that extend from October 1992 to September 2006. The price data include five major coffee types of Ethiopia by origin of growing region (Sidama, Yirgachefe, Harar, Wollega and Jimma) each have three distinct price series (producer, auction and FOB), including national average price (average of all coffee prices).

### 6.2.1 Producer price data

Producer price is the cornerstone of the study. Reliable data sources for rural prices are difficult to find. Most of earlier reports on producer prices use prices generated by deducting marketing costs from auction prices. However, since May 1981, the Ethiopian Central Statistical Agency (CSA) has been conducting a monthly survey of producer prices, published as “Average Producer’s Price of Agricultural Commodities (APAC)”. This is based upon a two-stage stratified sample design using a small sample of farmers from each of a number of enumeration areas (EAs) drawn from a given group of zones, *woredas* and peasant associations. Its coverage has increased drastically over time. In the case of coffee, it probably provides a good indication of relative magnitudes. Due to coffee’s economic importance, all the survey reports regularly cover price information in this regard.

Producer prices for the period October 1981 to September 2006 were compiled from published survey reports (36 Bulletins in between No. 44 and 374 are used). These prices may not correspond to farm-gate prices, since farmers usually sell their product at places outside farms. Therefore, producer prices here refer to the prices at which producers sell coffee at their closest markets. The CSA collects producer prices from private farmers and cooperatives from each (EA). A maximum of three price quotations are collected from different producers and the average is reported. The CSA reports these prices in two forms: (1) ‘coffee whole’ and (2) ‘coffee bean’. ‘Coffee whole’ refers to the sun-dried, not decorticated bean (locally called ‘*jenfal*’), and ‘coffee bean’ refers to the ungraded green bean, which is often called ‘*morbush*’ or ‘*clean coffee*’. The majority of the coffee farmers in Ethiopia sell their coffee in the form of dry cherries (*jenfel*). These cherries are then hulled by wholesalers or suppliers who buy the coffee. Milling involves separating the cherry from its husk. The cherries are then sorted and cleaned to the auction standards set by the former CTA.

However, since all the later stages of coffee trade are based on clean coffee beans (used as a benchmark), the local producer price for dry cherry is converted to the green coffee

equivalent using standard conversion rates from ECMC and other literature. Price data on coffee harvesting season (September to mid-January) is usually reported in red cherry form. Based on information from coffee pulping industry owners, 5.6 to 6 kg of red cherry on average gives one kilogram of clean coffee. For dry cherry there are well-known conversion rates used in the literature; i.e. one kg of dry cherry yields on average 0.47 kg of clean coffee with fair and average quality (FAQ). One kilo of dry cherry on average is equal to 2.5-3 kg red cherry. Moreover, clean coffee at the local markets of coffee-growing areas is not as clean as in the auction market – rather it is *morbush* with impurities. The weight loss due to cleaning from one kg of *morbush* is estimated to be 8 percent. That is, 1 kg of *morbush* coffee equals on average 0.92 kg of clean coffee (based on information from *akrabys*). Coffee prices in the international trade and by ICO are reported as US cents per pound. Hence, for later analysis, producer prices are converted to US cents/lb using the official exchange rate from the National Bank of Ethiopia (NBE).

### **6.2.2 Auction and FOB price data**

Auction and FOB prices are obtained from the AMPD of MoARD official unpublished coffee statistics compiled for the period 1972-1982/83 and 1983-2006. To facilitate the comparison, all price data is converted to US cents per pound, which is the standard international unit of measurement used by the ICO and others. The official exchange rate is used to convert auction prices that are reported in terms of local currency.

### **6.2.3 Missing observation**

During the transition period May 1991 to June 1992, the APAC producer price survey was suspended for about thirteen months. In addition, there were missing observations here and there. However, in all the periods, auction and FOB prices were consistently available without any significant missing observations. Thus, the above missing observations were filled in by deducting all marketing costs from farmgate to auction

from the auction prices. A small number of missing auction and FOB prices were replaced using the 12-month moving average price method.

All the variables are transformed to natural logarithms in order to mitigate the fluctuation of individual series and to increase the likelihood of stationarity after first differencing. From an economic point of view, this transformation allows for interpreting the results in terms of percentage change, i.e. prices are related in terms of percentage variations (prices oscillate around a stable mean) instead of absolute changes. For these reasons, the empirical analysis is based on logarithmic transformation of prices.

#### **6.2.4 Validation of time series data**

Data validation or triangulation is the most important part of research. It is critically important to check whether the data at hand reflects reality. Towards this end, information on the actual prices paid to producers was collected from selected primary coffee cooperatives located in major coffee-producing areas (Yirgachefe, Sidama and Jimma) and who have historical price records. This price data was used to validate the comparison of producer price data from the CSA's monthly agricultural price survey. Similarly, the FOB price, production, consumption and export data from the AMPD of MoARD was compared with the ICO price data on Ethiopia coffee. Price data consistency is checked by plotting whether it is in line with expectations, and reasons for some disparities are justified through discussions with experienced traders, officials and experts.

#### **6.2.5 Coffee market survey data**

Cross-sectional data was collected by means of coffee market surveys in five major coffee-growing zones (Jimm, Lekemt, Hararghe, Sidamo and Gedio). The survey has two parts: The first part took the form of panel discussions with coffee collectors, suppliers, exporters and organisations. The second part of the survey served to collect information using structured questions posed to suppliers (*akrabys*) and exporters. A total of 260

suppliers and 28 exporters were interviewed. The questionnaire was designed to gather information on direct and indirect marketing costs, marketing services and institutions.

In addition, secondary data was obtained from International Coffee Organization (ICO), International Trade Centre (ITC), Ministry of Rural Development and Agriculture (MoRDA), National Bank of Ethiopia, Ministry of Finance and Economic Developments and from Southern and Oromia regional Agricultural and Rural Development Bureaux.

### **6.3 Statistical properties of time series data**

#### **6.3.1 Stochastic process**

From a theoretical point of view, a time series variable is a collection of random variables ordered in time through a stochastic process. Unlike the analyses of random samples of observations (cross-sectional) statistics, the analysis of time series is based on several assumptions. Firstly, it assumes that successive values in the data are taken at equally spaced time intervals. Secondly, empirical works based on time series data assume that the underlying time series is stationary. Thirdly, it assumes no serial or autocorrelation in the series in use. However, the series may suffer from an autocorrelation problem, which may result in non-stationarity, which could be a cause for nonsensical or spurious relationships between variables (Maddala and Kim, 1998). In turn, forecasting using random walk (non-stationary) variables may result in misleading inferences or may invalidate the standard tests (Gujarati, 2003). For this reason, checking for the stationarity of each series expected to be included in the estimation process is the first and most important part of analysis.

#### **6.3.2 Tests for stationarity**

The tests for stationarity are broadly categorised as informal and formal stationary tests. The informal tests are tests that provide clues as to whether or not a series is stationary. These include visual inspection (graphical tests) and correlogram tests. The correlogram tests in turn include the evaluation of the autocorrelation function (ACF),

partial autocorrelation function (PACF) and Q-statistics. The formal tests include unit root tests based on Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) procedures.

### 6.3.2.1 Informal tests

Before one peruses formal tests, it is always advisable to first conduct graphical tests by plotting the time series under the study. Such a plot gives an initial hint about the likely nature of the time series. For instance, if a plot shows an upward trend, it suggests that the mean and variance are changing i.e. the series is not stationary. This is a starting point for more formal tests of stationarity. A non-stationary time series variable may contain either a deterministic (predictable) or stochastic (non-predictable) trend (Gujarati, 2003). The series with stochastic trend may be made stationary through differencing one or more times, while a series with deterministic trend is made stationary by detrending.

Correlerogram tests is one of the methods of testing a series for stationarity by plotting the *sample* autocorrelation function (ACF), which graphs the values of autocorrelation (at successive lags) against the lag length using Eviews (econometric) software. Sample ACF is simply the ratio of covariance (at lag  $k$ ) to sample variance. The autocorrelation function at lag  $k$ , as denoted by  $\rho_k$ , is defined as:

$$\rho_k = \frac{\gamma_k}{\gamma_0} = \frac{\text{covariance at lag } k}{\text{variance}}$$

Since in practice we only have a realisation (i.e. sample) of a stochastic process, we can only compute the sample ACF,  $\hat{\rho}_k$ . To compute this we must first compute the sample covariance at lag  $k$ ,  $\hat{\gamma}_k$ , and sample variance,  $\hat{\gamma}_0$ , which are defined as:

$$\hat{\gamma}_k = \frac{\sum (Y_t - \bar{Y})(Y_{t+k} - \bar{Y})}{n} \quad \text{and} \quad \hat{\gamma}_0 = \frac{\sum (Y_t - \bar{Y})^2}{n}$$

where  $n$  is sample size and  $\bar{Y}$  is sample mean. A plot of  $\hat{\gamma}_k$  against  $k$  is known as the sample correlogram.

Partial autocorrelation function (PACF) is another informal measure for stationarity of price series. For a given stochastic process one is often interested in the connection between two random variables of a process at different points in time. One way to measure a linear relationship is with the ACF, i.e. the correlation between these two variables. Another way to measure the connection between  $Y_t$  and  $Y_{t+r}$  is to filter out of  $Y_t$  and  $Y_{t+r}$  the linear influence of the random variables that lies between  $Y_{t+1}$  and  $Y_{t+r-1}$  and then calculate the correlation of the transformed random variables. This is called the *partial* autocorrelation. If a lag of 1 is specified (i.e. there are no intermediate elements within the lag), then the partial autocorrelation is equivalent to autocorrelation. In a sense, the partial autocorrelation provides a ‘cleaner’ picture of serial dependencies for individual lags (not confounded by other serial dependencies)

Box-Ljung (BL) Q statistic used to test the joint hypothesis that all sample ACF ( $\rho_k$ ) up to certain lags are simultaneously equal to zero. In other words, given in the AC table, we test the null hypothesis that the first  $m$  autocorrelations are jointly zero, i.e. that the series is white noise or stationary. This can be done by using Q statistics developed by Box and Pierce (1970), defined as:

$$Q = n \sum_{k=1}^m \hat{\rho}^2 k$$

where  $n$  is sample size and  $m$  is lag length. The Q statistic is often used as a test of whether a time series is white noise. In an application, if the computed Q exceeds the critical Q value from chi-square distribution at a chosen level of significance, one can reject the null hypothesis that the first  $m$  autocorrelations are jointly zero, implying that the series is random walk.

### 6.3.2.2 Formal tests

Unit root test is a test of stationarity that has become widely popular over the past three to four decades. Dickey and Fuller (DF) proposed a simpler test for unit root. It is formulated with the following: AR (1) as  $Y_t = \rho Y_{t-1} + u_t$ , where  $u_t$  is white noise error term. To test for stationarity, we regress  $Y_t$  on its one lag value (i.e.,  $Y_{t-1}$ ) and test whether the  $\rho$  coefficient is significantly different from one. If the null hypothesis of unit root is not rejected (i.e.  $\rho = 1$ ), then it indicates that  $Y_t$  is non-stationary. Conversely, if  $\rho = 0$ , then the series is purely white noise. DF tests were designed to test the null hypothesis that a series is I(1) against the alternative that is I(0), meaning stationary.

However, the DF test has serious limitations in that it suffers from residual autocorrelation. Autocorrelation of the error terms results in failure to adequately specify the dynamic structure of  $Y_t$  (Harris, 1995). To amend this weakness, the DF model is augmented with an additional lagged first difference of the dependent variable to avoid autocorrelation problems between residuals. Then the equation  $Y_t = \rho Y_{t-1} + u_t$  is modified by adding lagged difference terms, and the test is known as the augmented Dickey-Fuller (ADF) test:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Rejection of the null hypothesis i.e. I(1), provides evidence that the series is stationary, i.e. I(0). However, these tests are not reliable if the data-generating process has moving average terms, if residuals are heterokedastic, or if the residuals are serial correlated. In such cases, tests may lead to under-rejection of the unit root null. This is also true in the presence of structural breaks. To address these shortcomings of the ADF tests, Philips and Perron (1988) developed tests that are more general than the ADF, namely the Philips and Perron (PP) tests for unit root. The PP tests are considered more appropriate when serial correlation and heteroskedasticity are present. They allow for drift and trend in the series. However, it has a serious weakness in that it requires previous knowledge of

the time of structural break, which in practice is difficult. Although it has some limitations, ADF is widely applied for its simplicity, because DF and ADF assume that the series is free from a structural break.

It is important to note that in conjunction with the unit root test, researchers usually test for the presence of structural break(s) in variables by applying either the Chow test or the recursive least square (RLS) test. The Chow test assumes that a structural break is known; however, its significance is required to be tested. In contrast the RLS test assumes that the structural break is unknown. It attempts to detect for the presence of significant structural break(s). After the presence of a structural break has been identified by means of the RLS technique and confirmed by Chow test, the effect of the significance of the structural break captured by dummy variables corresponding to the date of the structural break is identified.

### **6.3.3 Transforming non-stationary series**

In the earlier sections, we have assessed problems associated with random walk time series. This is to avoid spurious regression problems that may arise from a regression of a non-stationary time series on one or more non-stationary time series. Once the data-generating process of a time series has been determined, the next step is transforming it into a stationary process. The transformation method to be applied depends on whether the time series undergoes a difference-stationary process (DSP) or trend-stationary process (TSP). The next section discusses the transformation process of such data.

#### **6.3.3.1 Trend-stationary process (TSP)**

A time series process is said to be trend stationary when it is stationary after trends are removed. TSP is stationary around the trend line. Hence the simplest way to make such a time series stationary is to regress it on time (i.e. including a time trend variable as one of the regressors), and residuals from this regression will then be stationary (e.g.,

$Y_t = \beta_1 + \beta_2 t + u_t$ ). The residual obtained from this regression (i.e.  $\hat{u}_t = Y_t - \beta_1 - \beta_2 t$ ) is stationary.

### **6.3.3.2 Difference-stationary process (DSP)**

Before the early 1980s, economic time series were generally assumed to be characterised as stationary fluctuations around a deterministic trend. Many studies on the measurement of business cycles were based on this assumption. Nelson and Plosser (1982) criticised Sargent (1978), Taylor (1979), Hall (1980) and Kydland and Prescott (1980) for their studies based on linear detrending of time trends for the measurement of a business cycle. That is, prior to Nelson and Plosser (1982), researchers believed that macro-economic data was characterised only as TSP and they had no knowledge of DSP or stochastic trend series.

The ADF test regression is convenient for distinguishing between TSPs and DSPs because it nests both possibilities in the test regression. In short, when we test for the presence of a unit root in a series, we are testing against the alternative of trend stationarity.

### **6.3.3.3 Misspecification problem**

It should be noted that if we treat DSP series as TSP it is called under-differencing. Conversely, if we treat TSP as DSP series it is called over-differencing. The consequences of these types of specification error can be serious, depending on how one handles the serial correlation properties of the resulting error terms (Gujarati, 2003; Maddala & Kim, 1998). According to Diebold and Senhadji (1996), difference-stationary and trend-stationary models of the same time series may result in very different predictions. Deciding which model to use is therefore extremely important for researchers.

In general, it is not an easy task to produce reliable inference using time series econometrics. Yet it is possible to minimise the level of error by understanding the nature of the series under consideration and selecting appropriate models. In the case of the selection of TSP or DSP, if we are in doubt it is advisable to choose a general specification (with both deterministic terms and several lags) and test down using the output generated (note that the reported p-values should be valid for all the coefficients except  $\delta$  and the Durbin-Watson statistic should be at an acceptable level).

## 6.4 Model specification

### 6.4.1 Stationarity test in level

Among the formal tests, the standard ADF test for unit root was applied for individual price series on levels as follows:

$$P_t = \rho P_{t-1} + u_t \dots\dots\dots [6.1]$$

where  $P_t$  and  $P_{t-1}$  are the prices of coffee at time  $t$  and  $t-1$  respectively,  $\rho$  is the coefficient of lagged coffee price and  $u_t$  is *i.i.d*  $\sim N(0, \sigma^2)$  error term. If the null hypothesis of unit root is not rejected  $\rho = 1$ , then the time series is nonstationary. It becomes stationary when absolute value of  $\rho$  is less or equal to ( $|\rho| < 1$ ). The price differences of each price series are tested for short- and long-run relationships between prices.

The long-run price relationship is usually evaluated using either a linear combination of the price pairs following the two steps of the Engle and Granger approach or the simple price differences of related market prices (Goodwin & Harper, 2000). In this regard, the author followed the same approach as Goodwin and Harper. The ADF test for simple price difference (6.1) is required to have the same order of integration (i.e. cointegrated of order I(1) for evaluating the long-run relationship. A price difference I(1) may be non-

stationary in the short run, but in the long-run it may be stationary; i.e. I(0). The long-run relationship was tested using the Johansen test.

### 6.4.2 Cointegration test

The Johansen test takes into account the number of cointegrating relationships amongst cointegrating variables. The test is based on the notion that economic variables are much more likely to be endogenously interdependent. Determining the number of cointegrating vectors will provide insight into the number of estimation equations to be fitted. Even though more than one cointegrating relationship might exist, at least the presence of one cointegration relationship is necessary for the analysis of the long-run relationship of the prices to be plausible.

The Johansen test utilises two test statistics formulations, namely eigenvalues and trace statistics. It is a maximum likelihood ratio test involving a reduced rank regression between two variables, say I(1) and I(1) providing  $n$  eigenvalues  $\hat{\lambda}_1 > \hat{\lambda}_2 > \dots > \hat{\lambda}_n$  and corresponding eigenvectors  $\hat{V} = (\hat{v}_1, \dots, \hat{v}_n)$ . Where the  $r$  elements of  $\hat{V}$  are the cointegrating vectors. The magnitude of  $\lambda_i$  is a measure of the strength of correlation between the cointegrating relationship for  $i = 1 \dots r$ . The test of null hypothesis that there are  $r$  cointegrating vectors present can be stated as:

$$H_0 : \lambda_i = 0 \text{ where } i = r + 1, \dots, n .$$

The max-eigenvalue ( $\lambda - \max$ ) statistics are given by:

$$\lambda_{\max} = -T(\log(1 - \hat{\lambda}_{r+i})) \quad r = 0, 1, 2, \dots, n - 1 \dots\dots\dots [6.2]$$

where  $T$  is the sample size, and  $(1 - (1 - \hat{\lambda}_{r=1}))$  is the max-eigenvalue estimate. The trace statistics are computed as:

$$\lambda_{trace} = -T \sum_{i=r+1}^n \log(1 - \hat{\lambda}_i) \quad r = 0, 1, 2, \dots, n-1 \dots\dots\dots [6.3]$$

testing the null hypothesis of  $r$  cointegrating vectors against alternative of  $r + 1$ .

After it has been confirmed that the series is cointegrated with a known cointegrating vector, the next step is to determine whether the dynamics in the cointegrating relationship among the prices are linear or whether they exhibit threshold nonlinearities. Several approaches are used in the literature to test for the presence of threshold effects (see for detail chapter 2, section 5).

### 6.4.3 Threshold model

This section discusses the methods followed to measure market integration in both vertically as well as spatially related markets. In addition, it discusses the procedures followed to conduct specification of the linearity tests and regime selection.

#### 6.4.3.1 Vertical market integration

Let  $x_t$  be a two-dimensional  $I(1)$  time series variable  $x_t = (P_t, A_t)'$ ,  $\hat{x}_t = (P_t, A_t, W_t)'$ . Where  $P_t$  is the producer price of coffee at time  $t$ ,  $A_t$  is the auction price of coffee at time  $t$ , and  $W_t$  is the world or FOB price of coffee at time  $t$ . The linear form of the vector autoregressive (TVAR<sub>1</sub>) model is given by:

$$x_t = \lambda_0 + \lambda_1 \hat{x}_{t-1} + \lambda_2 \hat{x}_{t-2} + \dots + \lambda_k \hat{x}_{t-k} + \varepsilon_t \dots\dots\dots [6.4]$$

where  $t = 1, 2, 3 \dots T$ ,  $k$  is the lag length. It is assumed unknown. It is determined using available lag length selection criteria. Vector error correction representation of [6.4], in other words  $TVECM_1$ , is given by:

$$\Delta x_t = \lambda_0 + \hat{\Pi} \hat{x}_{t-1} + \sum_{i=1}^{k-1} \rho_i \Delta \hat{x}_{t-i} + \nu_t^{(j)} \dots\dots\dots [6.5]$$

Where,  $\hat{\Pi} = \sum_{i=1}^k \lambda_i - I_2 = \nabla \beta' = \begin{pmatrix} \nabla_1 \\ \nabla_2 \end{pmatrix} (1, \alpha_1, \alpha_2)$ ,  $\beta' = (1, \alpha_1, \alpha_2)$  is a cointegrating vector,

$\nabla = \begin{pmatrix} \nabla_1 \\ \nabla_2 \end{pmatrix}$  is a vector of adjustment coefficients, and  $\rho_i = -\sum_{l=i+1}^k \lambda_l$ .

The three-regime threshold vector autoregressive representation of [6.4], i.e.,  $TVAR_3$ , may be given by:

$$x_t = \mathcal{G}_0^j + \mathcal{G}_1^j \hat{x}_{t-1} + \mathcal{G}_2^j \hat{x}_{t-2} + \dots + \mathcal{G}_k^j \hat{x}_{t-k} + \varepsilon_t^j \text{ for } \gamma_{(j-1)} \leq z_{t-d} \leq \gamma_{(j)} \dots [6.6]$$

Where t is defined as before;  $j=1,2,3$ ;  $-\infty = \gamma_{(0)} < \gamma_{(1)} < \gamma_{(2)} < \gamma_{(3)} = \infty$ ;  $\varepsilon_t^j \sim IN(0, \Sigma^j)$ , for a three-regime  $\gamma = (\gamma_1, \gamma_2)$  is threshold value delineate regimes;  $z_{t-d}$  is threshold variable and 'd' is delay parameter. The threshold variable is assumed known, but the threshold values  $\gamma = (\gamma_1, \gamma_2)$ , the delay parameter 'd' and the lag length 'k' are assumed unknown.

If the general form of three-regime threshold vector error correction representation of [6.6] is considered,  $TVECM_3$  is given by

$$\Delta x_t = \mathcal{G}_0^j + \Pi^j \hat{x}_{t-1} + \sum_{i=1}^{k-1} \theta_i^{(j)} \Delta \hat{x}_{t-i} + \varepsilon_t^{(j)} \text{ for } \gamma_{(j-1)} \leq z_{t-d} \leq \gamma_{(j)} \dots\dots\dots [6.7]$$

Where  $\Pi^j = \sum_{i=1}^k \lambda_i^j - I_2 = \nabla^j \beta'^j = \begin{pmatrix} \nabla_1^j \\ \nabla_2^j \end{pmatrix} (1, \alpha_1, \alpha_2)$  and  $\theta_i^j = -\sum_{l=i+1}^k \mathcal{G}_l^{(j)}$ , 'j' is defined as before.

From [6.7], a two-regime threshold vector error correction model ( $TVECM_2$ ) could be defined by allowing ‘j’ to take values  $j = 1, 2$  and making  $\gamma_{(2)} = \infty$ .

### 6.4.3.2 Spatial market integration

Let  $y_t$  be a two dimensional  $I(1)$  time series variable  $y_t = (P_t^1, P_t^2)'$ . Where  $P_t^1$  and  $P_t^2$  are producer prices of coffee at time  $t$  in market 1 & 2. The linear form of vector autoregressive ( $TVAR_1$ ) model is given by

$$y_t = \phi_0 + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_k y_{t-k} + \varepsilon_t \dots \dots \dots [6.8]$$

Where  $t$  &  $k$  are defined as before. It is assumed unknown. Vector Error Correction representation of equation [6.8], in other words  $TVECM_1$  is given by

$$\Delta y_t = \phi_0 + \hat{\Pi} \phi_{t-1} + \sum_{i=1}^{k-1} \mu_i \Delta y_{t-i} + \psi_t^{(j)} \dots \dots \dots [6.9]$$

Where,  $\hat{\Pi} = \sum_{i=1}^k \phi_i - I_2 = \sigma \kappa = \begin{pmatrix} \sigma_1 \\ \sigma_2 \end{pmatrix} (1, o_1, o_2)$ ,  $\kappa = (1, o_1, o_2)$  is a cointegrating vector,

$\sigma = \begin{pmatrix} \sigma_1 \\ \sigma_2 \end{pmatrix}$  is a vector of adjustment coefficients, and  $\mu_i = -\sum_{l=i+1}^k \phi_l$ .

The three regime threshold vector autoregressive representation of [6.8] i.e.  $TVAR_3$  may be given by

$$y_t = \eta_0^j + \eta_1^j y_{t-1} + \eta_2^j y_{t-2} + \dots + \eta_k^j y_{t-k} + \omega_t^j, \text{ for } \hat{\partial}_{(j-1)} \leq z_{t-d} \leq \hat{\partial}_{(j)} \dots \dots \dots [6.10]$$

Where  $t$  is defined as before;  $j=1,2,3$ ;  $-\infty = \partial_{(0)} < \partial_{(1)} < \partial_{(2)} < \partial_{(3)} = \infty$ ;  $\varepsilon_t^{(j)} \sim IIN(0, \Sigma^j)$ , for a three regime  $\partial = (\partial_1, \partial_2)$  is threshold value;  $z_{t-d}$  and 'd' are defined as before. The general form of threshold vector error correction representation of [6.10]  $TVECM_3$  is given by

$$\Delta y_t = \varphi_0^j + \Pi^j y_{t-1} + \sum_{i=1}^{k-1} \zeta_i^{(j)} \Delta y_{t-i} + \varepsilon_t^{(j)} \quad \text{for } \partial_{(j-1)} \leq z_{t-d} \leq \partial_{(j)} \dots [6.11]$$

Where  $\Pi^j = \sum_{i=1}^k \phi_i^j - I_2 = \sigma^j k = \begin{pmatrix} \sigma_1^j \\ \sigma_2^j \end{pmatrix} (1, \alpha_1, \alpha_2)$  and  $\zeta_i^j = -\sum_{l=i+1}^k \varrho_l^{(j)}$ , 'j' is defined as before.

From [6.11], a  $TVECM_2$  could be defined by allowing 'j' to take values  $j=1, 2$  and making  $\partial_{(2)} = \infty$ .

### 6.4.3.3 Estimation procedure

An extension to Hansen's (1999) approach was applied to test for linearity using Sup-LR statistics given by [6.12]. That is, the null hypothesis of  $TVECM_1$  against its alternative hypothesis of  $TVECM_m$  for  $m=2,3$ . After threshold nonlinearity was confirmed, the number of regimes was determined by testing the null hypothesis of  $TVECM_2$  against its alternative of  $TVECM_3$ . To do this, a non-standard test procedure was applied. The author simulated 2000 Sup-LR statistics ( $LR_{1m}$ ), which were then used to calculate p-values. This was calculated by counting simulated values exceeding actual or computed values as a percentage of the total. See Hansen (1999) for a detailed discussion within a threshold autoregressive (TAR) context.

According to Hansen (1999), the sampling distribution of the simulated Sup-LR, i.e.  $LR_{im}$  in [6.12], depends on whether error variances in  $TVECM_i$  are heteroskedastic. This was tested by the regression of squares of residuals from  $TVECM_i$  on squares of the variables and the dummies identifying regimes and testing for the joint significance of the variables. Where heteroskedastic error variances were found, the necessary corrections were made (see Hansen (1999) for the method). The Sup-LR was computed using [6.12] below.

$$LR_{im} = T * (\ln(|\hat{\Sigma}|) - \ln(|\hat{\Sigma}_m(\hat{\gamma}, \hat{d})|)) \text{ for } i = 1,2 \text{ and } m = 2,3,\dots [6.12]$$

For spatially separated markets, replace  $\hat{\gamma}$  by  $\hat{\partial}$ . Where  $LR_{im}$  represents the test statistics,  $\hat{\Sigma}$  and  $\hat{\Sigma}_m(\hat{\gamma}, \hat{d})$  or  $\hat{\Sigma}_m(\hat{\partial}, \hat{d})$  for spatially separated markets) respectively stand for variance covariance matrix of residuals obtained from  $TVECM_i$  and  $TVECM_m$ .

The parameters  $\mathcal{G}_0^{(j)}, \Delta^j$ , and  $\theta_i^j$  in the vertically related markets and  $\varphi_0^{(j)}, \sigma^j$ , and  $\zeta_i^j$  are estimated after a two-dimensional grid search is applied to determine  $\gamma$  and  $\partial$  by selecting those values of  $\gamma$  and  $\partial$  which minimize the log determinant of the variance covariance matrix of residuals  $\hat{\Sigma}_m(\hat{\gamma}, \hat{d})$  for vertically related markets and  $\hat{\Sigma}_m(\hat{\partial}, \hat{d})$ . The search was restricted to a minimum of 20 observations in a regime.

### 6.5 Regime switching and impulse response function

The regime switching model portrays the degree to which deviation from the equilibrium falls persistently within and outside the equilibrium or neutral band. It also gives information about the time of switches between regimes, which might assist in identifying the underlying causes contributing to the switch in regime. The estimation of regime switching is carried out by identifying frequency of observations falling in each regime from the error correction model representation. It is calculated conditional to

whether the error correction term is less than or equal to the threshold in the first regime or greater than the threshold in the third regime. The second regime corresponds to the errors that are between the thresholds that define regimes 1 and 3. Observations falling in each regime are calculated for the entire time path and for each year from 1992 to 2006 and presented graphically.

The dynamic relationships among prices at alternative market levels are best perused through a consideration of the impulse response functions. In contrast to the linear model case, here the response to a shock is dependent upon the history of the series. An impulse response function traces out the response of a variable of interest to an exogenous shock. Often the response is portrayed graphically, with horizon on the horizontal axis and response on the vertical axis. The nonlinear impulse response approach of Potter (1995) is defined as:

$$I_{t+k}(v, Z_t, Z_{t-1}, \dots) = E[Z_{t-k} | Z_t = z_t + v, Z_{t-1} = z_{t-1}, \dots] - E[Z_{t-k} | Z_t = z_t, Z_{t-1} = z_{t-1}, \dots].$$

..... [6.13]

Where  $I_{t+k}$  is the impulse response,  $(Z_t, Z_{t-1}, \dots)$  are observed data,  $v$  is the shock and  $E[.]$  is the expectation operator. The impulse is produced by estimating  $E[.]$ . The procedure can be described as follows: A single observation corresponding to the last observation in the two alternate markets is chosen. The response to one-half standard deviation positive and negative shock at leading market prices is then evaluated.

In this study, an impulse response function is considered to evaluate the response of both producer and auction prices to shocks in FOB prices by coffee type. Similarly, the responses of produce prices to shocks on its counterpart producer market (i.e., spatially separated) are also assessed.

Moreover, the speed of adjustment to deviation is calculated using the formula  $\ln(0.5)/\ln(1 + \lambda)$ . This formula  $\ln(0.5)/\ln(1 + \lambda)$  was also employed by Goodwin and Piggott (2001) and Obstfeld and Taylor (1997).  $\ln$  represents the natural

$\log$  and  $\lambda$  represents the coefficient of adjustment in the outer regime from parameter estimates of the TVEC model. Speed of adjustment measures the number of months (for monthly data) required for half-life of the deviation from long-run equilibrium to be eliminated.

## **6.6 Conclusion**

The multivariate threshold vector error correction model (TVECM<sub>3</sub>) with three regimes is chosen in this study to analyse vertical and spatial price transmission in the Ethiopian coffee marketing chain. The specific estimation procedure discussed above can be summarised as follows: Firstly, in order to determine whether the price series are stationary, standard DF and ADF unit root tests are used to evaluate individual data series. Secondly, the author tests for cointegration among the prices studied using ADF and Johansen cointegration tests. Thirdly, the cointegration tests are carried out using price differences (residuals) obtained by deducting one long-term series from the other. Fourthly, once cointegration is confirmed, the next step involves conducting linearity test which consists of determining whether the dynamics of the long-run relationships among price series are linear or whether they exhibit a threshold-type relationship. Fifthly, price differences (residuals) are then used to define the grid searches and error correction terms. A two-dimensional grid search is then conducted to define two thresholds. Sixth, after locating threshold values the significance of differences between alternative regimes is tested using Hansen's approach. Finally, the error correction model, impulse response function and regime switching are estimated conditional to the threshold parameters.

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## CHAPTER 7

### MEASURING VERTICAL PRICE TRANSMISSION IN A DEREGULATED ETHIOPIAN COFFEE MARKET

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#### 7.1 Introduction

As pointed out in the previous chapters, Ethiopia's coffee industry has undergone numerous deregulation measures and structural changes since early 1992. Mainly, the state-controlled marketing system has been replaced with markets run by private agents. This deregulation measure is envisaged to bring about clear benefits for producers by improving the transmission of price signals between vertically and spatially related coffee markets (Daviron and Ponte, 2005; Krivonos, 2004; IFPRI, 2003; Ponte, 2002a).

Towards this end, vertical and spatial price transmissions are measured in the two separate chapters (in chapter 7 and 8) of the study. The first part (i.e., chapter 7) measures the vertical interrelationship among producer ( $P_t$ ), auction ( $A_t$ ) and world or ( $FOB_t$ ) prices in order to analyse the extent to which market deregulation efforts have resulted in a closer relationship among prices, as well as a direction flow of information between different levels of markets. The analysis of vertical price transmission is carried out by considering six separate markets, each of which has producer, auction and FOB prices. Five major categories of Ethiopian coffee types are considered based on their origin of production (Sidama, Yirgachefe, Jimma, Wollega and Harar). In addition, national average prices are used as representatives of all the coffee types in the country, thus accounting for coffee types not included in the study.

The study utilises the threshold cointegration approach introduced by Balke and Fomby (1997) to measure the price relationship between vertically and spatially related coffee

markets. In particular, the threshold vector error correction (TVEC) model is employed to account for a neutral band representing transaction costs. The TVEC model is a multivariate version of the threshold autoregressive (TAR) model. It allows one to investigate the adjustment process of individual prices and provides more information on short-run price dynamics and asymmetric adjustment of prices. With the aid of the impulse response function (IRF), it also provides information on the rate of adjustment of prices in order to normalise shocks originating from different sources.

This chapter consists of eight sections. The first section provides an overview of the study. The second section presents the results of the data-generating process. The third section discusses the Johansen cointegration test results among six coffee types. The fourth section discusses the results of the linearity tests. Section five presents the results from the threshold values and regime-switching model. Section six discusses the parameter estimates of the TVEC model and adjustment coefficients to deviation from the long-run equilibrium. Section seven discusses the results of the impulse response function. The last section is devoted to the conclusion.

## **7.2 Data-generating process**

Before implementing the Johansen test procedures for cointegration analysis among the price series, the time series property (i.e. stationarity) of the individual price series was first examined using the augmented Dickey Fuller (ADF) test. The order of integration of each individual series is calculated using the ADF procedure. The unit root tests are conducted on level with constant and with first difference. Special attention is paid to lag length and the existence of a deterministic trend in the series. Tables 7.1-7.3 present the ADF test results for the stationarity of individual price series in the three categories (i.e. producer, auction and FOB prices).

Some of producer prices are found to be stationary on level. According to the results, the null hypothesis of the unit root is rejected at an acceptable level of significance for most price series. Next the same hypothesis was tested after prices were differenced only once,

but this time the null hypothesis could be rejected at 1% level of significance (Tables 7.1-7.3). The appropriate lag length was determined with the aid of Eviews 5.2 statistical software, which automatically selects the appropriate lag length. Table 7.1 presents the ADF test results of producer prices. As results show, Jimma, Sidama and Harar producer prices are found to be significant at 1% in level with a constant. However, all producer price series are found to be strongly stationary after the first difference.

**Table 7.1: ADF test statistics for the stationarity of produce prices**

Producer price of ...	In level/first difference	Lag length	t-statistics	DW	P-value
Sidama coffee	in level	0	-3.069**	2.151	0.0309
	first diff	0	-15.036*	1.979	0.0000
Jimma coffee	in level	0	-4.0893*	2.256	0.0013
	first diff	2	-11.356*	2.0384	0.0000
Wollega coffee	in level	0	-2.7876	2.2676	0.0622
	first diff	0	-15.499*	2.0358	0.0000
Harar coffee	in level	1	-2.779**	2.0168	0.0637
	first diff.	0	-18.569*	2.0146	0.0000
Yirgachefe coffee	in level	0	-2.7951	1.9119	0.0611
	first diff .	0	-12.8648*	1.9973	0.0000
Average producer prices	in level	0	-1.9860	2.2325	0.2325
	first diff .	0	-14.8286*	2.0106	0.0000

Source: Own computation based on data from AMPD (2006)

Note: Single, double and triple asterisks indicate statistical significance at 1, 5 and 10 percents respectively

The ADF test for auction price series also exhibits a similar order of integration to that of producers (see Table 7.2). The auction prices of Sidama and Harar coffee reject the null hypothesis of unit root at 5% level of significance. However, all six series of auction prices uniformly confirm stationarity with first difference and reject the null hypothesis of unit root at 1% level of significance.

**Table 7.2: ADF test statistics for the stationarity of auction prices**

Auction prices of ...	In level/first difference	Lag length	t-statistics	DW	P-value
Sidama coffee	in level	0	-3.3744**	1.9656	0.0132
	first diff	0	-13.4429*	2.0066	0.0000
Jimma coffee	in level	0	-1.7627	1.8449	0.3980
	first diff	0	-12.0974*	1.9994	0.0000
Wollega coffee	in level	0	-2.25717	2.3261	0.1873
	first diff	0	-15.7037*	2.0071	0.0000
Harar coffee	in level	0	-3.1056**	2.0403	0.0280
	first diff.	0	-13.5983*	1.7388	0.0000
Yirgachefe coffee	in level	0	-2.5518	1.8529	0.1053
	first diff .	0	-12.3955*	1.9985	0.0000
Average auction prices	in level	1	-2.1269	1.9416	0.2345
	first diff .	0	-10.8963*	1.9352	0.0000

Source: Own computation based on data from AMPD (2006)

Note: Single, double and triple asterisks indicate statistical significance at 1, 5 and 10 percent respectively

Table 7.3 reports the ADF test results for FOB price series. None of the FOB price series are found to be stationary on level. However, at the first difference, the null hypothesis of unit root is rejected at a 1% level of significance for all prices. The lag length of the series remains at 0 and 1.

**Table 7.3: ADF test statistics for the stationarity of FOB prices**

FOB prices of ...	In level/first difference	Lag length	t-statistics	DW	P-value
Sidama coffee	in level	0	-1.61461	1.8683	0.4729
	first diff	0	-12.1997*	2.0102	0.0000
Jimma coffee	in level	1	-2.18460		0.2128
	first diff	0	-11.2600*	1.9864	0.0000
Wollega coffee	in level	1	-1.3806		0.5908
	first diff	0	-17.0221*	2.0140	0.0000
Harar coffee	in level	2	-0.81012		0.3637
	first diff.	1	-15.1168*	2.0215	0.0000
Yirgachefe coffee	in level	1	-1.4769		0.5429
	first diff .	1	-10.7433*	2.0138	0.0000
Average prices	in level	1	-1.3522		0.6045
	first diff .	0	-10.3838*	1.9602	0.0000

Source: Own computation based on data from AMPD (2006)

Note: Single, double and triple asterisks indicate statistical significance at 1, 5 and 10 percent respectively

In general, after first difference, the unit root tests for the 18 price series confirm that all single price series are integrated of order one, i.e. they are  $I(1)$  processes. Given that the entire price series under study is integrated of the same order, cointegration tests are conducted to measure long-run relationships between price series.

### **7.3 Cointegration**

After determining the statistical properties of the price series, an attempt can now be made to explore the long-term relationship between producer, auction, and world or FOB prices in vertically related coffee markets. If markets are cointegrated there is evidence that the markets have a long-run relationship and that their prices in the long run will not diverge from one another. Even if there is divergence in the short run, the prices will converge to their long-run equilibrium.

Towards this end, standard Johansen cointegration test procedures are applied. The existence of single or multiple cointegrating vectors is assessed using the Johansen multivariate cointegration test. Using eigenvalue, the hypothesis that  $r = 0$  is tested against the alternative  $r = 1$ . In the trace, the hypothesis that  $r = 0$  is tested against the alternative of  $r+1$  cointegrating vectors. For more than one cointegrating vector, a combined test of null hypothesis  $r=1$  against the alternative of  $r >1$  using eigenvalue and trace statistics is conducted. To identify appropriate lag length, the lag length criteria such as likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwartz information criterion (SIC) and Hannan-Quinn criterion (HQ) are used with help of Eviews 5 software. The majority of test statistics identify a VAR order of two. Accordingly, the long-run relationship among the variables is tested by fitting a vector autoregressive (VAR) model with two lags. No intercept term is included in the VAR, because the first difference of each variable is found to be close to zero.

The Johansen test for cointegration among producer, auction, and world or FOB prices is reported in Table 7.4 in six categories (i.e. for Sidama, Jimma, Wollega, Harar, Yirgachefe, and national average price). All the Johansen test results reject the null

hypothesis  $r = 0$  (no cointegrating vector) unanimously and accept the alternative hypothesis of at most one cointegrating vector or cointegrating equation (CE).

**Table 7.4: Cointegration testing results**

Coffee prices	Trace and eigenvalue	Hypothesised no. of CE(s)	Statistics	Critical value (at 0.05% sig)	# of CE (s) (at 0.05% sig)
Sidama coffee	Trace statistics	None *	61.410	35.192	2
		At most 1 *	22.860	20.261	
		At most 2	2.7412	9.1645	
	Max eigenvalue	None *	38.550	22.299	
		At most 1 *	20.119	15.892	
		At most 2	2.7412	9.1645	
Jimma coffee	Trace statistics	None *	45.598	35.193	2
		At most 1 *	22.317	20.262	
		At most 2	2.611	9.165	
	Max eigenvalue	None *	23.281	22.300	
		At most 1 *	19.707	15.892	
		At most 2	2.611	9.165	
Wollega coffee	Trace statistics	None *	69.670	35.193	1
		At most 1	18.411	20.262	
		At most 2	1.946	9.165	
	Max eigenvalue	None *	51.258	22.300	
		At most 1 *	16.466	15.892	
		At most 2	1.946	9.165	
Harar coffee	Trace statistics	None *	50.151	35.193	2
		At most 1 *	22.166	20.262	
		At most 2	4.397	9.165	
	Max eigenvalue	None *	27.985	22.299	
		At most 1 *	17.769	15.89	
		At most 2	4.397	9.165	
Yirgacheffe coffee	Trace statistics	None *	50.554	35.193	1
		At most 1	16.670	20.262	
		At most 2	2.054	9.165	
	Max eigenvalue	None *	33.884	22.300	
		At most 1	14.616	15.892	
		At most 2	2.054	9.1650	
Average prices	Trace statistics	None *	47.093	35.193	1
		At most 1	17.180	20.262	
		At most 2	1.543	9.165	
	Max eigenvalue	None *	29.913	22.299	
		At most 1	15.637	15.892	
		At most 2	1.543	9.165	

Source: Own computation based on data from AMPD (2006)

Among the six categories, in three price categories (Wollega, Yirgachefe and average price) maximum eigenvalue statistics and trace statistics indicate the existence of one cointegrating equation, while other (Sidama, Jimma and Harar) results show the existence of two cointegrating relationships. However, in all cases, the first cointegrating equation is used to estimate residuals of the linear combination of three variables used to estimate short-run dynamics.

In all, the simple inference drawn from this result (Table 7.4) is that producer, auction and world prices of vertical coffee marketing chains show a considerable cointegrating interrelationship in the long run.

#### **7.4 Linearity test**

Once it has been confirmed that the series is cointegrated with known cointegrating vectors, the next step is to determine whether the dynamics in the cointegrating relationship among the prices are linear or whether they exhibit threshold nonlinearities. Several approaches are used in the literature to test for the presence of threshold effects. Tsay (1989) developed a method to test for threshold effects in univariate autoregressive models. Tsay's F-test is one of the most popular residual-based tests in the literature. The test is based on arranged autoregression and predictive residuals. If the F-statistic of the resulting regression rejects the null hypothesis of linearity, it implies the presence of nonlinearity in the series. Balke and Fomby (1997) extended Tsay's non-parametric test to a cointegration framework combining nonlinearity and cointegration.

Hansen (1999) illustrates another method for testing the null hypothesis of TAR (1) or linearity versus the alternative of a TAR ( $m$ ) model, where  $m$  denotes the number of regimes. Hansen provides a series of tests to determine whether the time series under consideration is linear or has a threshold effect. His test is carried out on three levels: null of *TVEC model*<sub>1</sub> against alternative *TVEC model*<sub>2</sub> (LR<sub>12</sub>) or null of *TVEC model*<sub>1</sub> against alternative *TVEC model*<sub>3</sub> (LR<sub>13</sub>), as well as null of *TVEC model*<sub>2</sub> against alternative *TVEC model*<sub>3</sub> (LR<sub>23</sub>). The first and the second levels correspond to the hypothesis of

linear versus nonlinear cointegration. However, they do not provide information on the number of regimes. In this study a linearity test was conducted using Hansen's (1999) procedure, which is similar to that of Lo and Zivot (2001). In addition, certain procedures of Hansen were used to decide on the number of regimes after nonlinearity was confirmed.

Due to the fact that the parameters needed to test linearity are identified only in the alternative hypothesis and not in the null hypothesis, the test was conducted using a non-standard test procedure, which made use of bootstrap distributions from which p-values were computed. In other words, instead of asymptotic distribution, bootstrap distribution was used in this study to calculate p-values. This is because bootstrap distribution is more powerful than asymptotic distribution (quoted in Hansen, 1997). Table 7.5 shows the linearity and number of regimes test results using Hansen's (1999) procedure. The experiment bootstrap distribution was done as follows: Firstly, random samples (with replacements) were generated from residuals obtained from the *TVEC model<sub>1</sub>*. Next, using the initial sample values and parameters obtained from the *TVEC model<sub>1</sub>*, a sample of variables was simulated from dependent variables. The simulated values were used to calculate the  $LR_{im}$  statistics (see equation 6.12 in chapter 6). This was repeated 2000 times. Finally, the p-values were calculated by counting the number of simulated values  $LR_{im}$  (out of 2000) that exceeded the actual or computed value  $LR_{im}$  as % of the total.

The bootstrap distribution is sensitive to conditional heteroskedasticity in error (Hansen, 1999). The problem was dealt with firstly by testing for the presence of heteroskedasticity in the errors and then correcting for it where necessary. Table 7.5 presents test results for linearity and number of regimes. Conditional heteroskedasticity was found in non of errors in the *TVEC models*. The errors in the *TVEC model<sub>1</sub>*, *TVEC model<sub>2</sub>* and *TVEC model<sub>3</sub>* were found to be homoskedastic (see columns 4 & 5). Therefore, in this study, bootstrap distributions were computed taking heteroskedasticity into account when the null hypothesis of the *TVEC model<sub>1</sub>* was tested against its alternatives of *TVEC model<sub>2</sub>* and *TVEC model<sub>3</sub>*.

**Table 7.5: Test for linearity and number of regimes**

Market/prices	Hypothesis	Likelihood ratio	Bootstrap p-value	
			Homoskedastic	Heteroskedastic
Sidama	LR12	97.17	0.0000	0.0000
	LR13	175.96	0.0000	0.0000
	LR23	78.79	0.0000	0.0000
Jimma	LR12	99.76	0.0000	0.0000
	LR13	204.00	0.0000	0.0000
	LR23	104.24	0.0000	0.0000
Wollega	LR12	114.05	0.0000	0.0000
	LR13	217.81	0.0000	0.0000
	LR23	103.76	0.0000	0.0000
Harar	LR12	152.95	0.0000	0.0000
	LR13	218.73	0.0000	0.0000
	LR23	65.32	0.0000	0.0000
Yirgachefe	LR12	118.56	0.0000	0.0000
	LR13	214.99	0.0000	0.0000
	LR23	96.42	0.0000	0.0000
Average price	LR12	73.56	0.0000	0.0000
	LR13	138.00	0.0000	0.0000
	LR23	65.16	0.0000	0.0000

Source: Own computation based on data from AMPD (2006)

The linearity test was conducted in two steps. In step one, the linearity of the series under consideration was tested, i.e. the hypothesis *TVEC model<sub>1</sub>* versus *TVEC model<sub>2</sub>* and *TVEC model<sub>1</sub>* versus *TVEC model<sub>3</sub>* was tested. The results reject the null hypothesis of linearity at 1% level of significance (see Table 7.5). In step two, after nonlinearity was confirmed, an attempt was made to ask whether a two-regime *TVEC model<sub>2</sub>* or a three-regime *TVEC model<sub>3</sub>* best fits the data, assuming that error variances are homoskedastic. The test rejects the null hypothesis of the *TVEC model<sub>2</sub>* at 1% level of significance (Table 7.5). Based on this finding the study fitted the *TVEC model<sub>3</sub>*.

### 7.5 Threshold values and regime switching

This section discusses the results of the threshold estimates ( $\gamma_1$  &  $\gamma_2$ ) and regime-switching indicators. Table 7.6 reports the results of threshold values delineating the lower and upper regimes for six groups of vertically interrelated coffee markets. With

regard to national average price, the two thresholds with values  $\hat{c}_1 = -0.28$  and  $\hat{c}_2 = 0.36$  were estimated. These values indicate that deviations from the equilibrium are somehow symmetrically distributed within the three regimes, with 24% of the deviation from the equilibrium falling within regime I, 55% within regime II, and 21% within regime III for the period 1992-2006 (see Table 7.7). Similarly, Wollega, Yirgachefe, Harar and Jimma also show deviation from the equilibrium symmetrically distributed within three regimes ( $\hat{c}_1 = -0.062$  and  $\hat{c}_2 = 0.087$ ) with on average 28% of the observations falling in regime I, 48% in regime II, and 24% in regime III (Tables 7.6 and 7.7). The results of Sidama show a slight divergence compared to others where deviation from the equilibrium is asymmetrically distributed with unexpected sign. Regimes I and III represent regimes in which producers are less than and greater than the equilibrium price respectively. On the other hand, in regime II, producer price is different from equilibrium price only by threshold values. Regime II could then be considered as the equilibrium regime or neutral band.

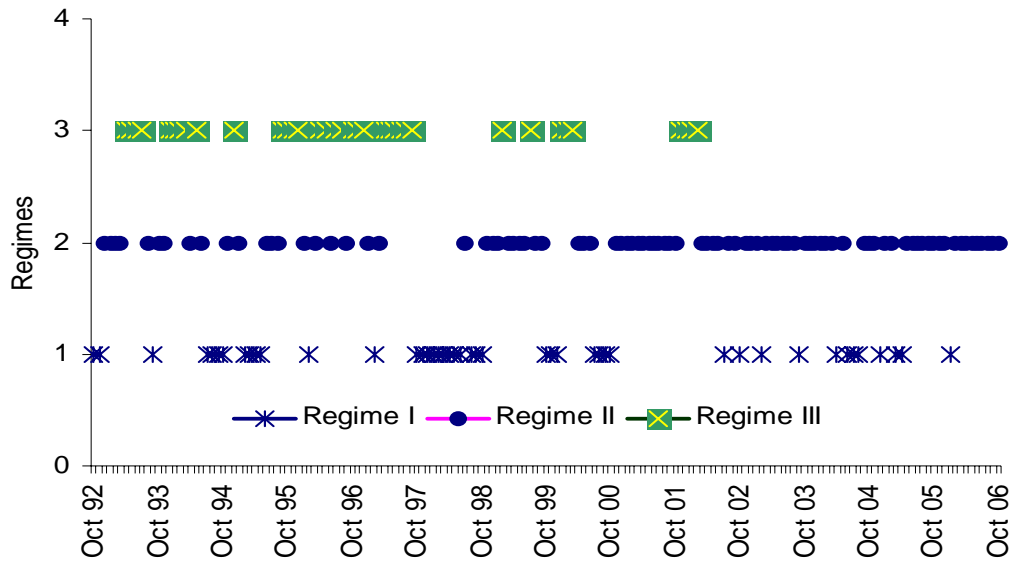
**Table 7.6: Threshold values for major markets**

Coffee markets	Negative threshold value	Positive threshold value
Sidama	0.418965	-0.240855
Jimma	-0.070359	0.100686
Wollega	-0.076352	0.071978
Harar	-0.032374	0.054968
Yirgachefe	-0.070084	0.099260
National average	-0.283165	0.363530

Source: Own computation based on data from AMPD (2006)

Figure 7.1 shows the degree to which deviation from the equilibrium or observations falls persistently within and outside the equilibrium (i.e., regime I&III). The equilibrium here refers to regime II or neutral band. It also gives information about the time of switches between regimes, which might assist in identifying the underlying causes contributing to the switch. For the period 1992 to 1998, as average national coffee price shows majority of observations were persistently falls under regime III. This means that producers were paid higher than equilibrium prices (see Figure 7.1 and Table 7.7). This may account for

lucrative coffee market situation of the period. On the other hand, when each market is evaluated separately over the same period (1992-1998), only Jimma producers were paid higher than equilibrium prices, while Sidama, Harar, Yirgachefe and Wollega producers were paid equilibrium prices (see Table 7.7). This difference may attribute for the uniqueness of transaction costs that each coffee type faces.



**Figure 7.1: Regime-switching estimate for average price**

Source: Own computation based on data from AMPD (2006)

However, for the later period (i.e. 1999-2006), as shown by the results depicted in Figure 7.1 and Table 7.7, producer prices fell persistently within the equilibrium band. For instance, the average observation fell in the neutral band in the same period an estimated 69, 46, 60, 60 and 71 percent of the time for Sidama, Jimma, Wollega, Harar and Yirgachefe respectively (Table 7.7). Surprisingly, in 2005 100% observation for Sidama, and in 2006 100% observation for Harar, fell in the equilibrium band. Indeed, this does not mean that producers were paid fair prices during that period compared to the preceding period. The world coffee crisis occurred during this period. As stated by Daviron and Ponte (2005), it was period of unfair price because price paid to producers in real terms were the lowest in 30 years.

**Table 7.7: Summary of regime switching: % of observation falling into each regime**

Year	Sidama			Jimma			Wollega			Harar			Yirgachefe			Average price		
	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII
1992	0	0	25	10	5	85	58	25	17	25	17	58	8	67	25	17	58	25
1993	25	50	25	0	0	100	17	8	75	25	8	67	25	75	0	8	50	42
1994	33	33	33	33	25	42	42	50	8	42	8	50	25	75	0	33	25	42
1995	25	42	33	25	50	25	8	67	25	75	17	8	0	100	0	33	33	33
1996	75	17	8	25	58	17	50	25	17	25	75	0	58	25	17	8	33	58
1997	50	42	8	50	42	8	50	17	33	33	42	25	50	33	17	33	17	50
1998	17	67	17	17	75	8	33	58	8	25	42	33	33	33	33	75	25	0
1992-1998	38	42	21	23	36	41	36	37	26	36	30	34	28	58	13	30	34	36
1999	25	50	25	58	33	8	25	42	33	17	67	25	0	58	42	25	58	17
2000	25	75	0	33	50	17	8	67	25	58	33	8	8	92	0	33	42	25
2001	75	17	0	42	50	8	33	50	17	33	67	0	17	67	0	0	100	0
2002	25	75	0	42	25	33	0	42	58	42	42	17	0	100	0	17	67	17
2003	8	92	0	50	33	17	33	58	8	25	67	8	17	75	8	17	83	0
2004	0	42	58	42	50	8	25	58	17	67	33	0	0	83	17	42	58	0
2005	0	100	0	0	75	17	33	67	0	17	67	17	75	25	0	17	83	0
2006	0	100	0	8	50	42	8	92	0	0	100	0	8	67	25	8	92	0
1999-2006	20	69	10	34	46	19	21	60	20	32	60	9	16	71	12	20	73	7
1992-2006	26	53	15	29	41	29	28	48	23	34	46	21	22	65	12	24	55	21

Source: Own computation based on data from AMPD (2006)

The reason for the falling of a larger proportion of observation could be explained by dividing the period into a period of price decline (1999-2002) and a period of recovery (2003-2006). In the first sub-period, world price declined faster until it reaches its trough in 2002 and local prices (producer and auction) responded to the changes accordingly, but at different paces. Producer price fell at a speed lower than that of auction and world prices. In the second sub-period (a period of recovery) the world price started to recover, but it was only producer price that was more rapidly able to recover to its pre-1998 level.

This asymmetric response of producer price to world price might have caused a drop in the equilibrium price at a rate proportionately higher than producer price, causing deviation from the equilibrium to fall within the neutral band. This asymmetry in price transmission could be the result of the higher demand in the domestic market. Ethiopia is not only an important world producer of coffee but also a major consumer of coffee. On average, between 1960 and 2006, 48% of national coffee production in the country was destined for domestic consumption. Over and above, coffee smuggling to neighbouring countries might have also played a compensatory role by subsidising producers to be paid better prices in times of low world coffee prices. There were times when Ethiopia's non-coffee-producing neighbours (Eritria, Djibouti and Sudan) were listed in world trade statistics as coffee exporters. In 2006, the Agricultural Market Promotion Department in the Ministry of Agriculture and Rural Development estimated that about 15% of the total coffee produced in the western part of the country (Wollega, Keffa and Illubabore) was smuggled illegally to neighbouring countries. In general, producer prices fell persistently within the equilibrium band between 1999 and 2006. This can be attributed to asymmetries in price transmission and adjustment, which in turn are mainly due to high local demand and illicit trading, which have a hidden role in stabilising coffee producer prices in Ethiopia.

## **7.6 Results from threshold vector error correction parameters**

The subsequent section focuses on the short-run dynamics by utilising the results of the threshold vector error correction (TVEC) model as presented in Tables 7.8-7.10. The

results are used to measure the direction of causality, i.e. whether it runs from world (FOB) price to auction price and then to producer price or vice versa. However, causation is needed regarding the way in which parameters should be interpreted, because the level of significance is affected by the threshold values estimated and by the assumption of homogeneity in residuals. Care was taken to deal with the latter by testing for homogeneity in the errors and making the necessary adjustments. As stated earlier, this is one of many aspects making this study different from earlier studies by Goodwin and Harper (2000) and others who merely assumed homoskedasticity in the error variances. With regard to measuring the significance of parameter estimates, this study follows the approach of Goodwin and Harper (2000) by considering only those parameters with t-ratios closer to and above two.

The subsequent sections attempt to analyse the direction of causality for six different categories of coffee markets (Sidama, Jimma, Wollega, Harar, Yirgachefe, and average price), each of which has three different prices (i.e. producer, auction and world or FOB prices). The analysis is disaggregated by coffee type for the reason that Ethiopia produces widely differentiated coffee beans with distinctive flavours, in geographically separate regions which are then individually auctioned and exported. Thus, the study disaggregates the analysis into major commercial coffee types to evaluate whether there are differences in price transmission and level of integration. Besides, since Ethiopia is too small a country to affect world prices, FOB price is assumed to be exogenous (not affected by price changes in Ethiopia).

As pointed in the earlier discussion, the estimation of this study is based on three regime TVEC model<sub>3</sub> and the results are also reported accordingly. The regime I, II and III presents the bands where the price difference is less than, equals to and greater than transaction costs respectively. This means that under first and second regime, the speed of adjustment for deviation from long-run equilibrium is expected to be lower. The opposite holds true for the Regime III where price difference expected to be higher than transaction cost where speed of adjustment is faster

Table 7.8, columns 3 and 4, presents the results of the TVEC model estimate for Sidama coffee. The results show the presence of a strong and dynamic interrelationship between producer price and lagged price difference. That is, the producer price of Sidama is affected by a lagged price difference of its own. The results portray that the direct interrelationship between Sidama producer and world prices is weak. It was found that producer price is only affected by world price indirectly through auction price, but auction price is directly affected by world price (Table 7.8, columns 3 and 4). This implies that auction price is more responsive than producer price to shocks in world price. The rate of adjustment to deviation from the long-run equilibrium is more rapid in regime III (outer band) than in other regimes. This finding is consistent with the theory, which states that shocks in the outer band are greater than the threshold values and lead to greater adjustment towards equilibrium.

Table 7.8, columns 5 and 6, present the results of the TVEC model estimates for Yirgacheffe coffee. As shown by the results in regime I, both the producer and auction prices of Yirgacheffe are affected by the lagged price difference of producer price, while auction price is affected by its own lagged price difference. This implies that previous producer and auction prices have a significant effect on the price discovery of current prices. In addition, the direction of causality indicates that the auction price of Yirgacheffe is directly affected by world price (see regime I), but producer price shows no dynamic interrelationship with world price in the outer band. Rather it shows a weaker interrelationship inside the neutral band, which is theoretically unexpected. In all, the results indicate that causality flows from world market to auction directly, but no evidence exists of indirect flow causality from auction to producer market, which still indicates that auction market price is more interrelated with world price than with the producer price of Yirgacheffe.

**Table 7.8: Producer, auction and world price interrelationship for Sidama and Yirgachefe coffee markets**

Variables		Sidama		Yirgachefe	
		Producer price ( $P_t$ )	Auction price ( $A_t$ )	Producer price ( $P_t$ )	Auction price ( $A_t$ )
Regime I	Intercept	-0.019 (0.016)	-0.058* (0.007)	-0.128* (0.010)	-0.006 (0.014)
	$dP_{t-1}$	-0.071 (0.146)	0.040 (0.061)	0.302* (0.101)	0.287** (0.138)
	$dA_{t-1}$	0.123 (0.243)	0.045 (0.101)	0.216 (0.182)	0.982* (0.250)
	$dFOB_{t-1}$	-0.338 (0.246)	-0.084 (0.102)	0.078 (0.200)	-1.054* (0.276)
	$\varepsilon_{t-1}$	-0.017 (0.028)	-0.088* (0.012)	-0.791* (0.069)	-0.131 (0.095)
Regime II	Intercept	0.018** (0.009)	0.005 (0.004)	0.009** (0.004)	0.003 (0.005)
	$dP_{t-1}$	-0.212** (0.103)	0.056 (0.043)	0.018 (0.061)	-0.018 (0.083)
	$dA_{t-1}$	0.375 (0.202)	0.031 (0.084)	-0.005 (0.065)	0.015 (0.089)
	$dFOB_{t-1}$	-0.087 (0.224)	0.025 (0.093)	0.280** (0.127)	0.130 (0.175)
	$\varepsilon_{t-1}$	-0.055 (0.047)	-0.071* (0.020)	-0.461* (0.084)	0.015 (0.115)
Regime III	Intercept	0.0217 (0.019)	0.095* (0.008)	0.093* (0.012)	-0.042** (0.017)
	$dP_{t-1}$	-0.144 (0.196)	-0.095 (0.082)	0.918* (0.195)	0.097 (0.269)
	$dA_{t-1}$	0.496 (0.249)**	-0.064 (0.104)	0.134 (0.249)	0.018 (0.342)
	$dFOB_{t-1}$	-0.795 (0.442)	0.318** (0.184)	0.100 (0.323)	-0.316 (0.445)
	$\varepsilon_{t-1}$	-0.110* (0.032)	-0.108* (0.013)	-0.804* (0.081)	0.190 (0.112)

Source: Own computation based on data from AMPD (2006)

Adjustment coefficients for the producer price of Yirgachefe have shown much faster adjustment (80.4%) in the outer band compared to the auction price (19.0%). This is perhaps for three major reasons: Firstly, Yirgachefe is well known in the international market for its high quality and flavour. Secondly, the government recently secured a

licence for the brand name and only licensed dealers may buy and sell this coffee at premium prices. Thirdly, local as well as international traders appreciate its top flavour and general quality level and often use Yirgachefe beans to upgrade other low-quality beans by mixing some Yirgachefe into lower quality coffee as a spice. It is well known by domestic and international buyers and consumers.

Table 7.9 presents the results from the TVEC model estimates for Jimma and Wollega coffees, which account proportionately for the lion's share of national production and export. Results indicate the presence of a dynamic interrelationship between lagged producer and auction prices. As the results of Jimma coffee indicate, the auction price of Jimma is directly affected by world price, while producer price of Jimma is indirectly affected by auction price (see Table 7.9, regime III).

The results of Jimma are also similar to those of Sidama and Yirgachefe where producer prices are not directly interrelated or affected by shocks in world price, but auction price is directly connected to world price and is more responsive to shocks in the world market. In other words, after almost two decades of reform efforts, evidence indicates that producer markets remain segmented from world markets. The adjustment coefficients computed also support this finding. The auction price adjusts faster (59%) to deviation from equilibrium in the outer band compared to the producer price (10%) of Jimma. This also supports the earlier finding of strong responsiveness of auction price compared to producer price.

The results of the TVEC model estimate for Wollega coffee are presented in Table 7.9, columns 5 and 6. The results of the TVEC model estimate for Wollega show the presence of a dynamic relationship between lagged price differences of producer and auction and FOB prices. In other words, the auction price of Wollega is affected by the lagged price difference of producers, and similarly the producer price is also affected by the lagged price of auction price in the outer regime (regime III) – implying that neither the producer price of Wollega nor the auction price of Wollega are exogenous to each other.

**Table 7.9: Producer, auction and world price interrelationship for Jimma and Wollega coffee markets**

Variables		Jimma		Wollega	
		Producer price ( $P_t$ )	Auction price ( $A_t$ )	Producer price ( $P_t$ )	Auction price ( $A_t$ )
Regime I	Intercept	-0.019 (0.016)	-0.128* (0.011)	-0.054* (0.011)	0.042* (0.008)
	$dP_{t-1}$	-0.071 (0.146)	-0.105 (0.080)	-0.142 (0.132)	0.019 (0.102)
	$dA_{t-1}$	0.123 (0.243)	0.073 (0.149)	-0.122 (0.217)	-0.154 (0.168)
	$dFOB_{t-1}$	-0.338 (0.246)	0.639* (0.222)	0.007* (0.200)	-0.029 (0.155)
	$\varepsilon_{t-1}$	-0.017 (0.028)	-0.767* (0.084)	-0.245* (0.097)	0.235* (0.075)
Regime II	Intercept	0.018** (0.009)	0.0002 (0.008)	0.010 (0.008)	-0.001 (0.006)
	$dP_{t-1}$	-0.212** (0.103)	0.043 (0.079)	0.012 (0.110)	0.019 (0.085)
	$dA_{t-1}$	0.375 (0.202)	0.164 (0.166)	0.170 (0.186)	0.050 (0.144)
	$dFOB_{t-1}$	-0.087 (0.224)	0.538* (0.223)	-0.599* (0.240)	-0.574* (0.186)
	$\varepsilon_{t-1}$	-0.055 (0.047)	-0.473* (0.164)	-0.474* (0.190)	0.094 (0.146)
Regime III	Intercept	0.022 (0.019)	0.146* (0.013)	0.053 (0.012)	-0.044* (0.009)
	$dP_{t-1}$	-0.144 (0.196)	-0.077 (0.084)	-0.122 (0.131)	0.190** (0.102)
	$dA_{t-1}$	0.496** (0.249)	0.134 (0.260)	-0.432* (0.175)	0.014 (0.135)
	$dFOB_{t-1}$	-0.795 (0.442)	-0.125 (0.149)	0.142 (0.219)	-0.149 (0.169)
	$\varepsilon_{t-1}$	-0.100* (0.032)	-0.590* (0.062)	-0.420* (0.073)	0.168* (0.057)

Source: Own computation based on data from AMPD (2006)

Regarding the direction of causality flow, the producer price of Wollega is directly affected by world price in regime I, but not by the auction price. Results show that in regime II (neutral band), causality flows from world price to auction price and producer price. However, this is theoretically inconsistent, because not much adjustment is

expected in regime II. Producer price adjusts much more rapidly (42%) than auction price (16.7%) in the outer regime (regime III). In general, the finding from this estimate is that both prices respond to deviations from long-term equilibrium, but it is difficult to confirm the direction of causality flow. Producer price is directly affected by world and auction prices, but auction price is not directly affected. However, as in all earlier cases, auction price responds more rapidly to producer price. The weak interrelationship of Wollega auction price with world price may be ascribed to mounting cross-border coffee smuggling, which may isolate the effect of the official world (FOB) price on auction price.

Table 7.10 depicts the results of the TVEC model estimate for Harar, as well as national average price. As the estimated coefficients for the Harar coffee market show, there is a dynamic interrelationship between auction price and the lagged price difference of the producer price. Similarly, producer price is also affected by its own lagged price difference. With regard to causality flow, neither auction price nor producer price has shown a direct and strong interrelationship with world price. In other words, the interrelationship between world price, auction price and producer price is not revealed clearly. This unexpected result may be due to the following: (1) High market power concentration in the Harar auction market, which delineates this market from the world market (for instance, between 2000 and 2006, of the 24 licensed exporters participating in the Harar auction, only 4 accounted for more than 55 percent of coffee traded in the auction and also exported); (2) Harar coffee is historically susceptible to smuggling due to its location, with a substantial amount of production flowing into a parallel channel; (3) The proportion of cash income that producers generate from the sale of coffee is much lower for Harar farmers compared to other coffee-producing zones, because farmers in Harar have '*chat*' and other vegetables exported to Djibouti and other countries; and (4) Current malpractice by some traders (mixing Harar coffee beans with other low-quality beans) has also affected its reputation (see chapter 5, section 4). These factors together might segment the dynamic interrelationship of Harar coffee from the world market.

**Table 7.10: Producer, auction and world price interrelationship for Harar and national average price**

Variables		Harar		National average	
		Producer price ( $P_t$ )	Auction price ( $A_t$ )	Producer price ( $P_t$ )	Auction price ( $A_t$ )
Regime I	Intercept	-0.057* (0.007)	0.013* (0.006)	-0.001 (0.008)	0.036* (0.004)
	$dP_{t-1}$	-0.455* (0.106)	-0.235* (0.089)	-0.274* (0.144)	-0.074 (0.073)
	$dA_{t-1}$	-0.031 (0.172)	0.007 (0.143)	0.102 (0.198)	0.237* (0.100)
	$dFOB_{t-1}$	0.080 (0.086)	-0.020 (0.072)	-0.006 (0.319)	0.080 (0.161)
	$\varepsilon_{t-1}$	-0.358* (0.070)	0.262* (0.059)	0.001 (0.013)	0.052* (0.007)
Regime II	Intercept	0.002 (0.005)	-0.008 (0.004)	0.005 (0.005)	-0.004 (0.002)
	$dP_{t-1}$	-0.035 (0.093)	0.038 (0.078)	-0.191 (0.115)	0.070 (0.058)
	$dA_{t-1}$	-0.012 (0.124)	-0.051 (0.103)	0.636* (0.192)	0.131 (0.097)
	$dFOB_{t-1}$	-0.082 (0.144)	-0.080 (0.120)	-0.077 (0.170)	0.077 (0.086)
	$\varepsilon_{t-1}$	-0.201 (0.187)	0.429* (0.156)	-0.0135 (0.023)	0.029* (0.012)
Regime III	Intercept	0.036* (0.009)	-0.036* (0.008)	-0.001 (0.009)	-0.035* (0.005)
	$dP_{t-1}$	-0.111 (0.157)	-0.042 (0.131)	-0.068 (0.184)	0.090 (0.093)
	$dA_{t-1}$	-0.119 (0.168)	0.201 (0.140)	-0.184 (0.244)	0.251* (0.123)
	$dFOB_{t-1}$	0.074 (0.207)	-0.018 (0.173)	-0.015 (0.276)	-0.352* (0.140)
	$\varepsilon_{t-1}$	-0.241* (0.080)	0.332* (0.067)	-0.013 (0.014)	0.050* (0.007)

Source: Own computation based on data from AMPD (2006)

The results of the national average coffee price are reported in Table 7.10, columns 5 and 6. This price takes into account the prices of all other coffees (e.g. Illubabor, Gambella, Bale, Borena, Wolayta, Goffa). In general, the national average price shows clear and valuable results. As in the earlier sections, a dynamic interrelationship is found between

auction price and lagged price differences of producer price and world price, but there is a weak interrelationship between producer and world or FOB prices. As indicated in the Table 7.10, producer price is affected by world price only indirectly through auction price, but auction price is directly affected by world price. Therefore, the results imply that the direction of causality flows from world price to auction price and then to producer price.

The adjustment coefficients computed for national average price also support the above finding that auction price is more responsive to shocks than the producer price. In addition, the results are in accordance with the prior expectation that the adjustment coefficient computed for the equilibrium band is lower in magnitude and in level of significance than similar coefficients computed for the same outside of the equilibrium band (see auction equation). This indicates that the adjustment is not uniform, i.e. shocks greater than threshold values result in greater responses than smaller shocks.

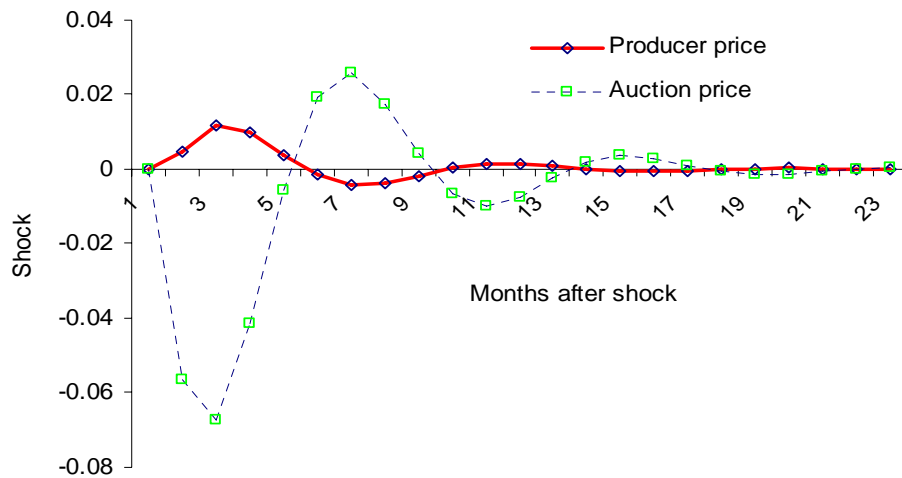
To summarise, the above TVECM estimate attempts to measure the direction of causality, i.e. whether price signals flow from world market to auction to producer. Accordingly, the results clearly show that four of the six categories (i.e. national average price, Sidama, Yirgachefe and Jimma) confirm that auction price is directly affected by world price, while producer price is only indirectly affected by world price through auction price. In other words, producer price is only connected to the world market through the auction market, meaning that auction price is more responsive than producer price to changes in world price, as confirmed by the adjustment coefficients. The adjustment coefficients of the Yirgachefe producer price surprisingly show more rapid adjustment than other producer and auction prices. This high responsiveness may be due to its high quality and good reputation. For Harar coffee, neither producer nor auction price shows a direct relationship with world price, which may be ascribed to the current market power concentration.

## 7.7 Impulse response

The short-run dynamic interrelationship between markets can be better observed by computing the impulse response function, which shows the persistent effect or asymmetric effect of shocks between related market prices. In addition, the size and sign of the shock will influence the response function (Goodwin & Harper, 2000; Goodwin & Piggott, 2001). This section discusses the results of the impulse response function for six groups of coffee markets. The impulse response is estimated by selecting a single observation corresponding to the last month in the data series (i.e. September 2006 or 168<sup>th</sup> observation) to evaluate the response of the follower market to one-half standard deviation positive and negative shocks in leader coffee markets. According to Porter (1995), responses are defined on the basis of actual data  $(z_t, z_{t-1}, \dots)$  while a shock  $(v)$  is defined as follows:

$$I_{t+k}(v, Z_t, Z_{t-1}, \dots) = E[Z_{t+k} | Z_t = z_t + v, Z_{t-1} = z_{t-1}, \dots] - E[Z_{t+k} | Z_t = z_t, Z_{t-1} = z_{t-1}, \dots].$$

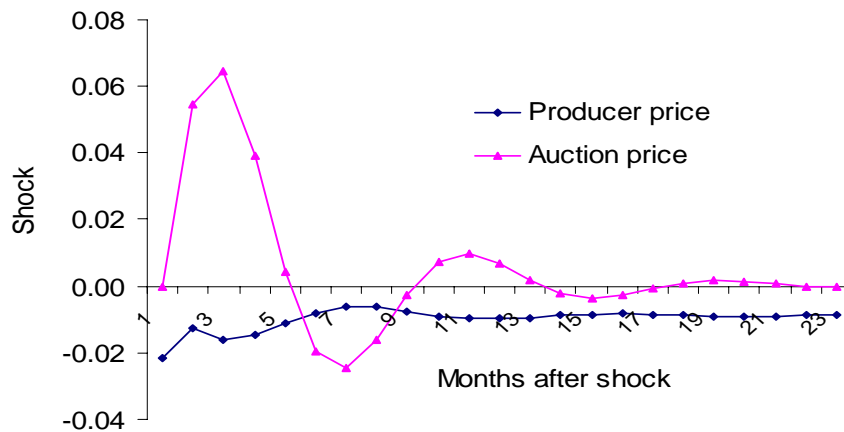
Figure 7.2 exhibits the response of Sidama producer and auction prices to one-half life standard deviation positive shock in the world price. A positive shock in the world price evoked an equilibrating response in both producer and auction prices, which eventually converged to long-run equilibrium. Producer price converged after 9 months while auction price took about 18 months (Figure 7.2). The responses are asymmetric in that the positive shock did not create an equal response for producer and auction prices. Producer price showed a minimal increase in response to a positive price shock in the first 3 months before starting to converge to equilibrium. However, the same shock evoked a major leap in auction price. This result is consistent with the earlier TVEC model results, which show that auction price is more responsive than producer price to shocks occurring in world prices.



**Figure 7.2: Response of producer and auction prices of Sidama to positive shocks in the world price**

Source: Own computation based on data from AMPD (2006)

Figure 7.3 shows the response of Sidama producer and auction prices to one-half life standard deviation negative shocks in the world price. A negative shock in the world price resulted in a considerable swing in auction price initially and a substantial decrease in price. It took about 17 months to normalise the effect of the shock on the auction price.

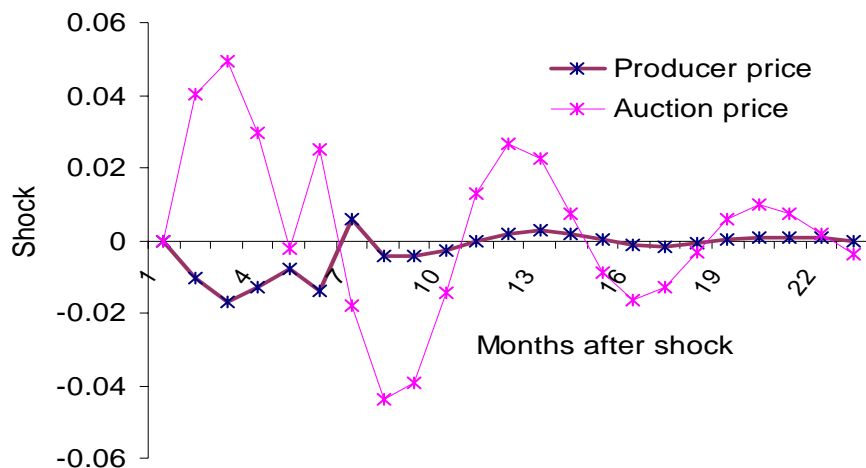


**Figure 7.3: Response of producer and auction prices of Sidama to negative shocks in the world price**

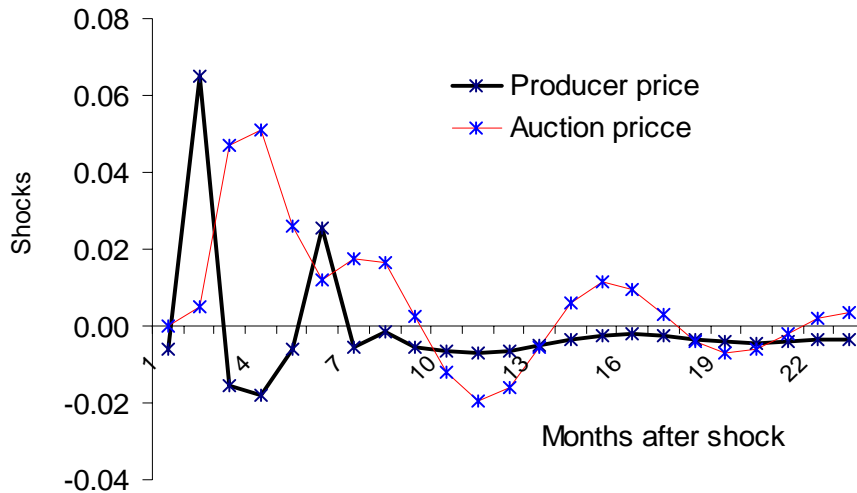
Source: Own computation based on data from AMPD (2006)

However, the negative shock evoked a marginal effect on producer price, i.e. producer price remained unresponsive to the negative shock. This may be ascribed to the high local demand for coffee, which has a stabilising effect, as well as the storability of coffee beans for longer periods without a considerable loss of quality, meaning that producers can wait until prices improve. Similar to earlier cases, the auction price is found to be more responsive than producer price to negative shocks (Figure 7.3).

Figures 7.4 and 7.5 depict the response of national average producer and auction prices to one-half standard deviation positive and negative shocks to world or FOB price. As depicted in both figures, auction price responded differently than producer price to one-half positive and negative shocks. Auction price seemed to respond positively to the price increase for the first 4 months, and it took more than twenty-three months to normalise the effect. However, instead of increasing in response to the positive shock, producer price showed a slight decrease in the first four months and then returned to equilibrium after 11 months. The major conclusion that can be drawn from this is that a price increase in the world market does not result in an equal increase in producer price. This result is consistent with the results from the TVEC model.



**Figure 7.4: Response of producer and auction prices of average national price to positive shocks in the world price**



**Figure 7.5: Response of producer and auction prices of average national price to negative shocks in the world price**

Source: Own computation based on data from AMPD (2006)

Why did the producer price fail to respond to shocks in the world price? There are several major reasons for this. Firstly, in the current marketing chain, producers have no strong institutional arrangement (or cooperatives) to enhance their bargaining power and to secure a proper share. Secondly, evidence indicates that there is market power concentration at the intermediary market level, which might block the flow of positive price signals from the world to the producers. Finally, even if shocks from the world market are negative, producers are insulated from this negative effect by either withholding their supplies or supplying coffee for local consumption (see Figure 7.5).

To summarise, in almost all of the impulse-response cases, there are similarities in the response of producer and auction prices to one-half standard deviation shocks to world price. Producer price is less responsive to both positive and negative shocks, while auction price is more responsive in both cases. In some instances, auction price responds more abruptly to negative shocks than to positive shocks. In other words, auction market participants are more informed and well connected in the vertical coffee marketing chain than producers. These results are consistent with the results from the TVEC model estimates.

## 7.8 Conclusion

The primary objective of this study is to measure whether the deregulation of the Ethiopian coffee industry since 1992 has improved long- and short-run price interrelationship and transmission between vertically related coffee marketing chains. This study specifically analyses the interrelationship between producer, auction and world markets for six different, vertically related coffee categories grouped by their origin of production. The study also criticises previous studies on the topic done for Ethiopia on methodological grounds and extends the technique of Hansen (1997), which was originally developed within a threshold autoregressive (TAR) context to test for the presence of threshold effect, to handle heteroskedasticity in the error variances and to decide on the number of regimes that best characterises the responses. The method applied in this study tackles specification and thus inferential biases that previous studies in the field have thus far overlooked. Most of the earlier studies that made use of the TVEC model merely assumed constant error variance without validating their assumptions and commonly fitted a TVEC model<sub>3</sub>, ignoring the possibility of fitting other alternative TVEC models. Monthly price data from October 1992 through September 2006 is used to analyse price interrelationships in the post-deregulation period.

This study reveals the following important results from the model specification exercise: Firstly, all price variables are exhibited I(1) and vertically related markets of each coffee type confirm strong long-run cointegrating relationships in all cases. Secondly, nonlinearity tests unanimously confirm the existence of threshold effects for all cases. Thirdly, the test for hetroskedasticity detected a problem in TVEC model<sub>1</sub>. Fourthly, the author corrected for the hetroskedasticity problem and ran simulations with 2000 replications to calculate p-values on the basis of calculated and simulated Sup-LR statistics to decide on the number of thresholds in the TVEC model. Finally, based on the test results of TVEC model<sub>2</sub> versus TVEC model<sub>3</sub>, the author selected TVEC model<sub>3</sub> to estimate both vertical and spatial price interrelationships.

The above exercise yielded the following findings from the vertical market analysis (producer-auction-world/FOB): Firstly, producer prices for all six groups (Table 7.7) fell persistently within the equilibrium band between 1998 and 2006. This can be attributed to asymmetries in price transmission and adjustment. This finding is supported by the estimate of the three-regime threshold vector error correction model (TVEC model<sub>3</sub>) and by the impulse response function. These asymmetries in price transmission and adjustment can mainly be attributed to the increased use of the domestic market as a major outlet by coffee suppliers at the time of lower prices, as well as high local demand and elicited trading, which have a hidden role of stabilising the coffee producer price in Ethiopia.

Secondly, the study revealed unidirectional transmission of shocks from world to auction price and then from auction to producer price for four of the six categories (i.e. Sidama, Jimma, Yirgacheffe, and national average price). In other words, auction price is directly affected by world price (exhibiting a dynamic interrelationship), while producer price is affected by world price indirectly through auction price (i.e. weak interrelationship with world price). Hence the causality flows from world to auction price and then from auction to producer price. In general, producer price lacks a direct interrelationship with world price and is weakly responsive to shocks in world price, whereas auction price is highly interrelated with world price and is more responsive to shocks in world price. The segmentation of producer price from the world market could be partly explained by the organisational characteristics of the Ethiopian coffee market. The lack of coffee farmers' cooperatives limits the market power of farmers and weakens their capacity to bargain for better prices compared to wholesalers and exporters who are better informed and have strong ties with downstream and upstream marketing chains.

Thirdly, in the case of Harar coffee, neither producer nor auction price has shown interrelation with world (FOB) price, which may be partly due to the high concentration of market power and malpractices in the Harar coffee auction and export markets. Fourthly, as shown by the results of the impulse response function, auction price is more responsive to negative shocks than to positive shocks in world price and takes up to 19

months until it converges to long-term equilibrium (equilibrium band). Producer price, on the other hand, is less responsive to both positive and negative shocks and takes a shorter time (up to 7 months) to converge to equilibrium.

Given the above findings, one can ask whether the coffee farmers are benefiting from the Ethiopian government's market deregulation efforts and even from current trademark licensing efforts for speciality coffees. The results suggest that they will, but to a far lesser extent than the intermediaries (i.e. exporters and wholesalers) who operate in the auction and export markets. The results clearly show that producers benefit only indirectly through the exporters and wholesalers (see TVEC model<sub>3</sub> results), while intermediaries are directly connected with the world market.

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## CHAPTER 8

### SPATIAL PRICE TRANSMISSION IN A DEREGULATED PRODUCER COFFEE MARKETS

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#### 8.1 Introduction

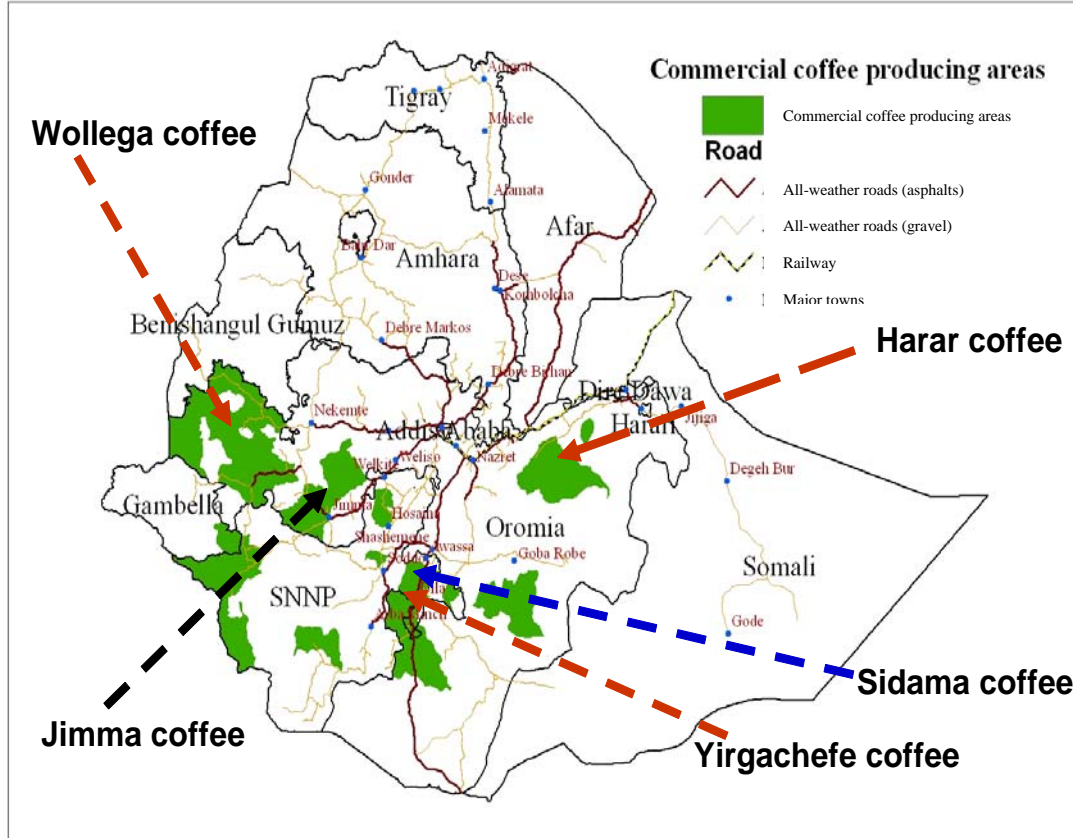
The issue of spatial market integration lies at the heart of many contemporary debates concerning market deregulation, price policy and parastatals reforms in developing countries. Integration of agricultural commodity prices, rural and urban food markets is also a precondition for gauging successful deregulation. Without spatial integration of market, price signals will not be transmitted among spatially separated markets, i.e., from surplus to deficit markets or vice versa (Goletti, Ahmed and Farid, 1995; Barrett, 1996; Baulcha, 1997). Market based policies for poverty alleviation and food security could be more effective if markets are integrated. Besides, if markets are integrated, the effect of policy intervention in one market would be transmitted to other markets that it avoids duplication of intervention and, as a result, decreases the fiscal burden on the budget (Baulch, 1997).

The data source, model specification and procedures of estimation applied for spatial price transmission remained similar as presented in the chapter 6. The subsequent section presents analysis of the results in six major sub sections. Firstly, the long-run relationship (cointegration) between major spatial coffee market pairs is measured. Secondly, the linearity of the price series in use is tested and the effect thereof on threshold values is discussed. The third section deals with the short-run dynamics based on the TVEC model estimate. The fourth part attempts to evaluate the integration between selected markets using a regime-switching model. The fifth section evaluates the responsiveness of one market to positive and negative shocks in another market. The section devoted for conclusion.

## 8.2 Homogenous commodities and arbitrage

In a competitive market structure, the price difference between any two regions with regard to homogeneous commodities is expected to be equal to the transaction cost at equilibrium level. When the price difference exceeds the transaction cost between the two markets, arbitrage opportunities will be created and profit-seeking traders will exploit such opportunities by transporting coffee from a low-price to a high-price area. Although there are differences in the quality of the coffees produced in different regions, they are homogenous and a perfect substitute for one another. Hence, any price increase or decrease due to demand or supply shocks has an effect on all coffee types regardless of their quality differences. In addition, given the current marketing situation, most exported coffee beans are blended (adulterated) and it is almost impossible to observe single origin- or area-based production and export. Hence, in this regard, the assumption of homogeneity is stronger, which in turn leads one to question whether the government's market deregulation efforts in recent years have brought about any improvement in the integration between spatially separated producer coffee markets. The subsequent section attempts to measure whether deregulation has improved integration between producer prices/markets.

It also important to note that the spatial analysis of this study only explores the relationship between the producer market prices of the major commercial coffee-growing regions as indicated in Figure 8.1 below. Contrary to the vertical price analysis between producer, auction and FOB prices, which aims to identify price symmetry, the direction of information flow and the factors accounting for this, here we measure long- and short-run integration between producer markets, as well as short-run dynamics.



**Figure 8.1: Spatial distribution of commercial coffee production areas**  
 Source: IFPRI's GIS centre in Ethiopia (2006)

### 8.3 Cointegration between producer markets

Stationarity of individual price series and order of integration calculated on the basis of the ADF test and all price series are found to be stationary with the first difference. Unit root tests for individual price series indicate that all price series exhibit I(1) process. With the assumption that all the price series under study are integrated of the same order, the ADF and the Johansen procedure are used to test for cointegration amongst these series. Table 8.1 shows the results of the ADF and Johansen likelihood ratio tests for cointegration.

**Table 8.1: ADF and Johansen test results (spatial price transmission)**

Producer market price pairs	Test	Test statistics
Sidama and Yirgachefe	Max eigenvalue test $r = 0$	23.58 <sup>**</sup>
	Trace test $r = 0$	27.93 <sup>**</sup>
	Max eigenvalue and trace test: $r = 1$	4.35
	ADF test price differential	-4.90 <sup>*</sup>
Jimma and Yirgachefe	Max eigenvalue test $r = 0$	26.34 <sup>**</sup>
	Trace test $r = 0$	32.04 <sup>**</sup>
	Max eigenvalue and trace test: $r = 1$	5.70
	ADF test price differential	-5.52 <sup>*</sup>
Wollega and Yirgachefe	Max eigenvalue test $r = 0$	29.25 <sup>**</sup>
	Trace test $r = 0$	32.47 <sup>**</sup>
	Max eigenvalue and trace test: $r = 1$	3.21
	ADF test price differential	-5.05 <sup>*</sup>
Harar and Yirgachefe	Max eigenvalue test $r = 0$	14.91
	Trace test $r = 0$	20.55
	Max eigenvalue and trace test: $r = 1$	5.64
	ADF test price differential	-4.19 <sup>*</sup>
Jimma and Sidama	Max eigenvalue test $r = 0$	47.58 <sup>**</sup>
	Trace test $r = 0$	53.97 <sup>**</sup>
	Max eigenvalue and trace test: $r = 1$	6.39
	ADF test price differential	-8.22 <sup>*</sup>
Jimma and Wollega	Max eigenvalue test $r = 0$	47.50 <sup>**</sup>
	Trace test $r = 0$	52.25 <sup>**</sup>
	Max eigenvalue and trace test: $r = 1$	4.75
	ADF test price differential	-8.02 <sup>*</sup>

Source: Own computation based on data from AMPD of MoARD (2006)

Note: Single, double and triple asterisks indicate statistical significance at 1, 5 and 10 percent respectively

At 5% level of significance the Johansen test rejects the null hypothesis of zero vector ( $r = 0$ ) for all pairs of producer prices except Harar and Yirgachefe producer market prices where it accepted that  $r = 0$ . Similarly, the ADF test also rejects the null hypothesis of unit root at 1% level of significance for all price pairs of producer market prices. Both results illustrate strong long-term integration between spatially separated producer coffee markets.

#### 8.4 Linearity test, number of regimes and threshold values

The time series properties of price variables were studied and cointegration confirmed (Table 8.2) for selected spatial coffee market pairs, followed by a linearity test using Hansen's (1999) procedure. The same procedure is used to decide on the number of regimes after confirming nonlinearity. As mentioned in section 7.4, this method uses Sup-LR statistics. The hypothesis of linearity tests for six pairs of producer markets – *TVEC model<sub>1</sub>* versus *TVEC model<sub>2</sub>* and *TVEC model<sub>1</sub>* versus *TVEC model<sub>3</sub>*. All six pairs reject the null hypothesis at 1% level of significance, confirming the nonlinearity of all the series. The hypothesis *TVEC model<sub>2</sub>* versus *TVEC model<sub>3</sub>* is used to decide on the number of regimes, and all pairs confirm that the series exhibits 3 regimes.

The threshold values reported in Table 7.12 below are equivalent to transaction costs. The table indicates the percentage difference by which prices in other markets should exceed to trigger symmetric or asymmetric adjustment. When the price difference is less than or equal to the first threshold value, it falls under regime I. Regime II in the three-regime model is considered a neutral band or the equilibrium where there is no incentive for arbitrage between markets. In this case, regime III (upper regime) refers to the regime where price difference is greater than transaction cost. Indeed, in order to trigger arbitrage between two markets, the price difference must be sufficient.

The threshold value depends on the availability of road networks, market information systems and other related market support services. As indicated in Table 7.12, threshold value varies between pairs of producer markets. The lowest estimated threshold value is for Sidama and Yirgachefe producer prices (i.e. at least 5.7%). This may be due to the fact that the two coffee zones are adjacent to each other. The highest threshold value (18.6%) is between Harar and Yirgachefe, which may be ascribed to the bunching of transaction costs, which affects arbitrage opportunities between these two major coffee zones located about 900 kilometres apart. Similarly, the price difference required to trigger arbitrage between Wollega and Yirgachefe is 13.7%, while for Jimma and Sidama

it is 12.5%. These percentages are positively related to the distance between the two markets in each case.

**Table 8.2: Test for linearity and number of regimes**

Producer market pairs	Hypothesis	Likelihood ratio	Bootstrap p-value		Threshold value	
			Homoskedastic	Heteroskedastic	Lower band $\varepsilon_{t-1} \leq c_1$	Upper band $\varepsilon_{t-1} > c_2$
Sidama & Yirgachefe	LR12	49.97	0.0000	0.0000		
	LR13	217.32	0.0000	0.0000	-0.1614	0.1037
	LR23	88.12	0.0000	0.0000		
Jimma & Yirgachefe	LR12	47.41	0.0000	0.0000		
	LR13	238.13	0.0000	0.0000	-0.1687	0.0232
	LR23	190.73	0.0000	0.0000		
Wollega & Yirgachefe	LR12	58.57	0.0000	0.0000		
	LR13	239.34	0.0000	0.0000	-0.0404	-0.1765
	LR23	180.77	0.0000	0.0000		
Harar & Yirgachefe	LR12	135.15	0.0000	0.0000		
	LR13	221.80	0.0000	0.0000	0.0966	0.2828
	LR23	86.63	0.0000	0.0000		
Jimma & Sidama	LR12		0.0000	0.0000		
	LR13	265.84	0.0000	0.0000	-0.0326	0.1571
	LR23	157.25	0.0000	0.0000		
Jimma & Wollega	LR12	81.49	0.0000	0.0000		
	LR13	279.94	0.0000	0.0000	-0.2884	-0.1493
	LR23	110.04	0.0000	0.0000		

Source: Compiled from TVEC model<sub>3</sub> estimation result by author (2006)

## 8.5 Short-run dynamics

The existence of cointegration and nonlinearity alone says nothing about the short-run dynamics of the series in terms of change. In other words, adjustment to deviation from long-run equilibrium, responses to changes in spatially related market prices, adjustment to deviation from long-run equilibrium and direction of causality are essential when it comes to evaluating short-run dynamics. Information on such features can be generated from an estimation of the short-term dynamics or error correction models. Table 8.3 presents short-run dynamics between pairs of spatially related markets for TVEC model<sub>3</sub>. The table presents coefficients of error term (i.e.,  $\varepsilon_{t-1}$ ) and lagged price differences of variables under consideration. The larger the coefficients of error term (in absolute value), the faster the adjustment to long-run equilibrium. In the estimation of error correction parameters, Yirgachfe and Harar coffee types are considered price leaders due to their superiority in price and quality compared to other coffee types.

As the short-run relationship between Sidama and Yirgachefe producer market prices indicates, neither Sidama nor Yirgachefe prices are exogenous or neither is a price leader. This may be attributed to the fact that both are premium coffees and their prices thus adjust to each other. Due to the proximity of their production areas, they have close price information exchange and are equally respected as brands in the world coffee market. They also have access to relatively better road networks and communication services. The estimated adjustment coefficients of Sidama adjust faster in regime I (44%) and regime III (33%) compared to regime II (24%), which is consistent with theory and is as expected, while the producer price of Yirgachefe shows unexpectedly faster adjustment in the neutral band (regime II) than in the outer band – which is theoretically inconsistent.

The estimated adjustment coefficients for Jimma and Yirgachefe producer market prices in the outer regimes (regimes I and III) are found to be insignificant, which perhaps indicates a lack of a dynamic short-run relationship between the two pairs of markets or prices. This may be because these two coffee zones are situated far (about 700 km) apart and the coffee brands have considerable differences in quality.

**Table 8.3: Threshold vector error correction (TVEC) model parameter estimates**

Producer price pairs	DV	Variables	TVEC model <sub>3</sub>		
			Regime I	Regime II	Regime III
Sidama & Yirgachefe	<i>dPS</i>	<i>dPS</i> <sub><i>t</i>-1</sub>	0.009 (0.096)	-0.124 (0.109)	-0.043(0.154)
		<i>dPY</i> <sub><i>t</i>-1</sub>	-0.35(0.148)**	-0.140(0.109)	0.033(0.138)
		$\varepsilon_{t-1}$	-0.44(0.060)*	-0.24(0.130)***	-0.33(0.140)**
	<i>dPY</i>	<i>dPS</i> <sub><i>t</i>-1</sub>	-0.023(0.087)	-0.013(0.098)	0.057(0.139)
		<i>dPY</i> <sub><i>t</i>-1</sub>	0.129(0.133)	-0.019(0.099)	-0.081(0.125)
		$\varepsilon_{t-1}$	0.370(0.05)*	0.440(0.120)*	0.370(0.131)**
Jimma & Yirgachefe	<i>dPJ</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.085 (0.082)	-0.202(0.104)	-0.073(0.144)
		<i>dPY</i> <sub><i>t</i>-1</sub>	0.091(0.130)	0.046(0.160)	-0.280(0.230)
		$\varepsilon_{t-1}$	-0.520(0.070)	-0.560 (0.800)	-0.740(0.180)
	<i>dPY</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.102(0.64)	-0.143(0.08)***	0.005(0.112)
		<i>dPY</i> <sub><i>t</i>-1</sub>	0.220(0.100)**	-0.010(0.124)	-0.536(0.178)*
		$\varepsilon_{t-1}$	0.25(0.05)*	0.140 (0.140)	0.040(0.142)
Wollega & Yirgachefe	<i>dPW</i>	<i>dPW</i> <sub><i>t</i>-1</sub>	-0.41(0.117)**	0.044(0.099)	-0.21(0.102)
		<i>dPY</i> <sub><i>t</i>-1</sub>	0.137(0.178)	0.009(0.10)*	-0.061(0.980)
		$\varepsilon_{t-1}$	-0.400(0.060)*	-0.310(0.080)*	-0.310(0.090)*
	<i>dPY</i>	<i>dPW</i> <sub><i>t</i>-1</sub>	-0.36(0.122)*	-0.001(0.103)	-0.166(0.106)
		<i>dPY</i> <sub><i>t</i>-1</sub>	0.112(0.186)	0.254(0.105)**	-0.204(0.102)
		$\varepsilon_{t-1}$	0.060(0.340)*	0.370(0.080)*	0.270(0.090)*
Jimma & Sidama	<i>dPJ</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.06(0.089)	-0.031(0.112)	0.23(0.185)
		<i>dPS</i> <sub><i>t</i>-1</sub>	-0.228(0.128)	-0.026(0.141)	-0.527(0.259)
		$\varepsilon_{t-1}$	-0.680 (0.11)*	-0.91(0.310)*	-0.90(0.160)*
	<i>dPS</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.14(0.084)***	-0.062(0.107)	0.280(0.175)
		<i>dPS</i> <sub><i>t</i>-1</sub>	0.018(0.121)	-0.005(0.134)	-0.48(0.245)***
		$\varepsilon_{t-1}$	0.10(0.28)**	-0.03(0.29)	0.002(0.163)
Jimma & Wollega	<i>dPJ</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.189(0.133)	-0.194(0.113)***	0.081(0.086)
		<i>dPW</i> <sub><i>t</i>-1</sub>	-0.170(0.167)	0.278(0.167)***	-0.158(0.110)
		$\varepsilon_{t-1}$	-0.590(0.090)*	-0.780(0.140)*	-0.540(0.120)*
	<i>dPW</i>	<i>dPJ</i> <sub><i>t</i>-1</sub>	-0.372(0.124)	-0.240(0.106)***	-0.004(0.080)
		<i>dPW</i> <sub><i>t</i>-1</sub>	0.039(0.156)	0.223(0.156)	-0.295(0.103)*
		$\varepsilon_{t-1}$	0.420(0.080)*	0.180(0.130)	0.150(0.120)

Source: Compiled from TVEC model<sub>3</sub> estimation result (2006)

Note: Harar and Yirgachefe prices pairs lack long-run relation and are excluded.

Neither Wollega nor Yirgachefe is a price leader in terms of producer price and neither is exogenous in that one market responds to price shocks in the other (i.e. endogenous). The coefficients of adjustment for Wollega prices to deviation from long-run equilibrium are faster and more significant in the outer regimes (regimes I and III). Similarly, the producer prices of Harar and Yirgachefe exhibit the same tendency. Indeed, three of the coffee brands (Wollega, Harar and Yirgachefe) are high-premium coffees that compete in terms of price on the international market. Both price pairs exhibit bidirectional causality. The speed of the Jimma producer price adjustment to deviation from its long-run equilibrium is much faster in regime II (91%) and in regime III (90%).

The Jimma and Wollega coffee zones are located in the south-western part of the country and are adjacent to each other. The trader's movement and information flow is expected to be high, which might account for the more rapid adjustment of the Jimma producer market price to deviation from its long-run equilibrium. However, the producer price of Wollega is the price leader and is exogenous. This is consistent with prior expectations due to substantial differences in quality.

In general, three of the producer price pairs (i.e., Sidama & Yirgachefe, Wollega & Yirgachefe and Harar & Yirgachefe) show a bidirectional flow of price signal changes which entails one market price being able to affect another at a particular time and vice versa. On the other hand, two of the pairs (Jimma & Yirgachefe and Jimma & Wollega) indicate unidirectional causality, i.e. the price signal usually flows from leader market to follower market or the dominance of one price. As our result indicates, the changes in the Yirgachefe price affect Jimma but not vice versa. Similarly, change in Wollega price affects Jimma but not the reverse. The difference in direction of flow of information perhaps depend on quality and transaction cost each market faces.

The speed of adjustment varies significantly between pairs of prices. For instance, in most cases, the Jimma producer price has recorded much more rapid adjustment to deviation from the long-run equilibrium compared to any other prices. In general, prices

exhibit more dynamic relationships today, although they are affected by high transaction costs between regions to conduct effective arbitrage.

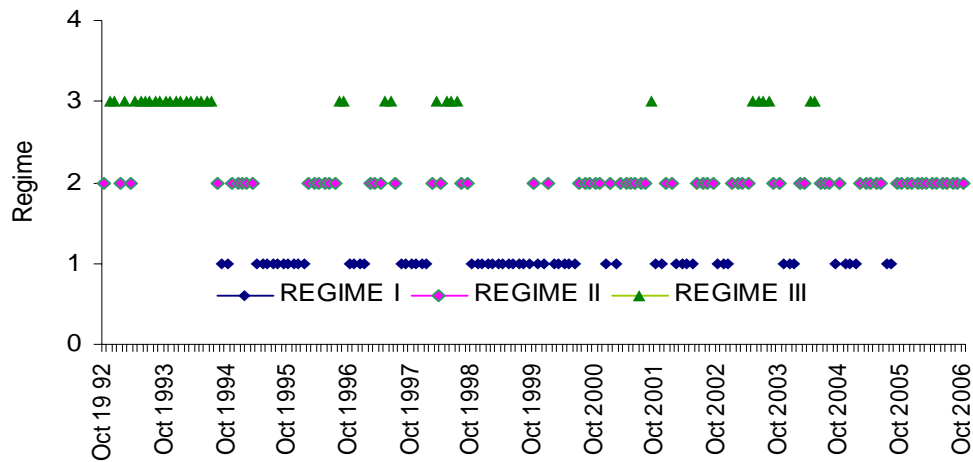
## **8.6 Regime switching**

As pointed out earlier, the regime-switching model is used to investigate market integration and the timing of the switching of observations among the regimes. In the three-regime model, if the price differences persist in regime II (neutral band) the prices/markets are considered to be cointegrated. Otherwise, if the price differences consistently fall within regimes I and III, it is suggested that the price differences are lower than equilibrium prices or that the price differences exceed transaction costs. In other words, it shows a lack of integration between pairs of spatially separated markets. Market integration implies that price differences between trading markets (regions) should be less than or equal to transaction costs in order to trigger arbitrage. However, when price difference equals transaction cost there is no incentive for traders and hence the persistent occurrence of observation in the second regime is consistent with market integration.

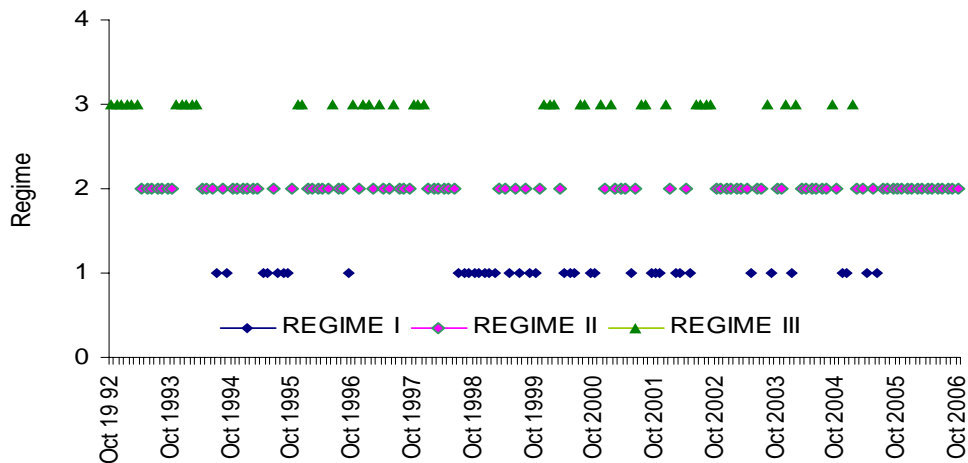
The subsequent section investigates the results from the regime-switching model, exploring whether the timing of regime switching (or jump) and other factors contribute to the jump from one regime to another. Figures 8.2 - 8.4 illustrate that selected producer market pairs (Sidama & Yirgachefe, Jimma & Wollega and Jimma & Sidama) and observations of each pair persistently fell in regimes I, II and III for the period 1992 to 2006. The results show that monthly price differences persistently occurred in regime II in most cases.

The persistent occurrence within an equilibrium band was stronger in the post-2002 period compared to the early and mid-1990s. This does not mean that producers benefited much. Indeed, the Ethiopian and world coffee sector experienced a serious price decline in 2001/02 due to a substantial increase in world coffee production. The coffee price situation in the period 1998 through 2006 was characterised by two sub-periods. The first

period (1998 to 2002) corresponded with a period of rapid price decline and the second period (2003 to 2006) was characterised by price recovery. In the first sub-period all local prices declined rapidly together with world prices but at different rates. Producer price declined at a rate lower than auction and FOB prices. In the second period (period of recovery) all prices recovered, but producer price recovered more rapidly to its pre-1998 level. Figure 8.2 and 8.3 witness this fact. As we can observe in the figures, in these periods most of the observations fell persistently in the regime II.



**Figure 8.2: Integration between Sidama and Yirgachefe producer markets**



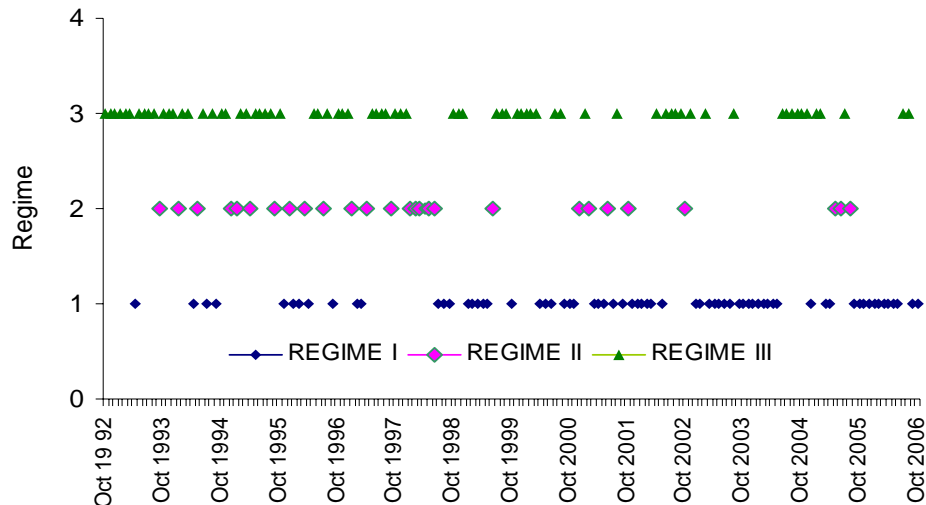
**Figure 8.3: Integration between Jimma and Wollega producer markets**

Source: Own computation based on data from AMPD (2006)

This producer price response may be ascribed firstly to the high local demand for coffee. As indicated in chapter 4, section 4, Ethiopia was the first country among the top world coffee-producing countries to consume 48% of its average production between 1960 and 2006. This in turn served as a natural price stabilisation mechanism for Ethiopian coffee producers. Secondly, a substantial amount of the coffee produced in the south-western part of the country (i.e. Jimma, Wollega, and Illubabore) is smuggled via Sudan (AMPD, 2006) and similarly a large amount of coffee from Harar is smuggled via Djibouti and Somalia. This in turn also has a stabilising effect when world prices decline. Thirdly, coffee beans are storable for much longer periods of time than other food grains, and relatively rich farmers store their beans for longer periods until the price is more attractive. These factors together contributed to the fact that the producer price fell persistently in the neutral or equilibrium band.

In the case of some other pairs of producer prices, the results observed differ from those reported earlier. For instance, according to Figure 8.4, the Jimma and Sidama producer prices lacked considerable integration in the period 1998 to 2006, and observations largely fell below the equilibrium (regime I). This result is confirmed in table 8.4 where 55 percent of observation fell under regime I. With regard to reasons for time switching between regimes there is no adequate evidence to confirm that it is due to structural change. Perhaps the government has since early 1998 imposed strict quality inspection procedures for all export coffee that is dry processed prior to export. Jimma coffee is one of the coffees subject to such quality inspection procedures since 1998. Prior to 1998, quality inspection and grading (mainly for dry-processed Jimma coffee) was carried out by means of physical inspection. However, since 1998 it is required to pass through a strict cup-testing procedure in addition to physical inspection before grading to participate in auction. This might have resulted in wholesalers and farmers seeking out alternative markets that are less concerned about quality (e.g. parallel markets and local markets). In addition, the Jimma and Sidama coffee zones are on average far apart (about 700 km). As stated by Goodwin and Piggott (2001), there is generally more extensive switching between regimes for those markets that are most distant from one another. This implies that some producer market pairs lack noticeable cointegration. In other words,

strong spatial coffee market integration is still lacking between some producer markets that are located far apart.



**Figure 8.4: Integration between Jimma and Sidama producer markets**

Source: Own computation based on data from AMPD (2006)

As pointed out earlier, observation falling in regime II is consistent with market integration. Table 8.4 provides a summary of the integration of the six pairs of major selected producer markets for the period 1992-2006. The period is split into two sub-periods, namely 1992-1998 and 1999-2006. During the first period, coffee prices were relatively lucrative due to frosts in Brazil in 1994 and 1997, while in the latter period prices dropped to historically low levels, reaching their lowest level in 2001/02 due to an increase in world production. Prices later revived in early 2003. Hence, the average percentage of observation provides more solid evidence. For the period 1992-1998, of the six pairs of producer coffee markets, it was only in two market pairs that the percentage of observation fell in the neutral band (regime II) or was found to be higher (49–50%) or displayed integration. In the later period (1998-2006), three market pairs out of six exhibited a larger number observations persistently falling in the neutral band (regime II), implying integration of three of the six producer market pairs (Table 7.14). The simple deduction is that in the later period (1999-2006) the level of integration improved slightly compared to the period immediately after reform. The three market

pairs lacking integration were Jimma and Sidama, Harar and Yirgachefe, and Jimma and Yirgachefe.

Why did these producer markets fail to show integration in the post-deregulation period? Although it is inconclusive, there are two expected reasons that may account for the lack of integration between these market pairs. Firstly, the three coffee market pairs are located far apart from each other and price differences between these market pairs are unlikely to be higher than transaction costs. Moreover, current government regulations strictly prohibit the free movement of coffee beans from one region to another unless the beans have been rejected at the auction market and subsequently released for local consumption. Secondly, Yirgachefe and Harar coffee brands are almost equally respected in the international market due to their high quality, and traders might not have an incentive for arbitrage.

**Table 8.4: Summary of regime switching: % of observation falling into each regime**

Year	Sidama & Yirgachefe			Jimma & Yirgachefe			Wollega & Yirgachefe			Harar & Yirgachefe			Jimma & Sidama			Jimma & Wollega		
	Regime I	Regime II	Regime III	Regime I	Regime II	Regime III	Regime I	Regime II	Regime III	Regime I	Regime II	Regime III	Regime I	Regime II	Regime III	Regime I	Regime II	Regime III
1992-1998	31	30	39	24	49	27	12	25	63	29	12	60	18	25	57	17	50	33
1999-2006	38	55	7	49	43	7	20	60	19	51	39	10	55	9	32	26	42	32
1992-2006	34	42	23	37	46	17	16	43	41	40	25	35	37	17	45	21	46	33

Source: Author's computation based on results from TVEC model estimate (2006)

As evident from the results of the TVEC model estimate reflected in Table 8.5, of the six producer market pairs only three market pairs showed relatively large numbers of observations in the equilibrium band but not in the other bands. These market pairs were Jimma and Yirgachefe, Harar and Yirgachefe, and Jimma and Sidama. Perhaps the lack of integration may be due to high transportation and transaction costs, because these producer markets are situated far apart from each other. This finding is also consistent

with the results of the regime-switching model (see Table 8.4) and insignificant adjustment coefficients of the TVEC model<sub>3</sub> (Table 8.3) for Jimma and Yirgachefe.

**Table 8.5: Number of observations falling in regimes and threshold value**

Producer market prices	Market integration (observations falling under each regime)			Threshold value	
	Regime I	Regime II	Regime III	Lower	upper
Sidama & Yirgachefe	61	73	34	0.02	-0.17
Jimma & Yirgachefe	67	64	37	-0.004	-0.21
Wollega & Yirgachefe	30	76	62	-0.03	-0.21
Harar & Yirgachefe	82	47	39	0.10	0.23
Jimma & Sidama	69	51	48	0.03	-0.09
Jimma & Wollega	39	88	41	0.01	-0.14

Source: Author's computation based on data from AMPD (2006)

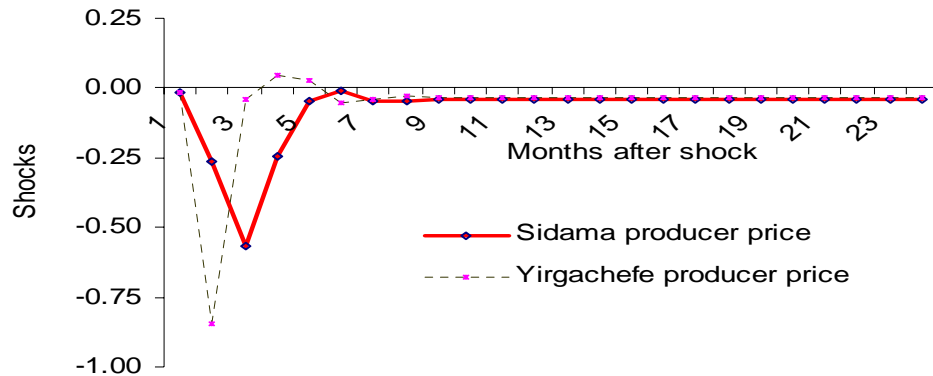
To summarise, almost all price pairs reveal a long-term relationship (cointegration), but in the short run some producer markets lack considerable relationships. This lack of short-run integration between pairs of producer coffee markets may be partly due to their physical separation and resulting high transportation costs.

### 8.7 Impulse response of producer coffee markets

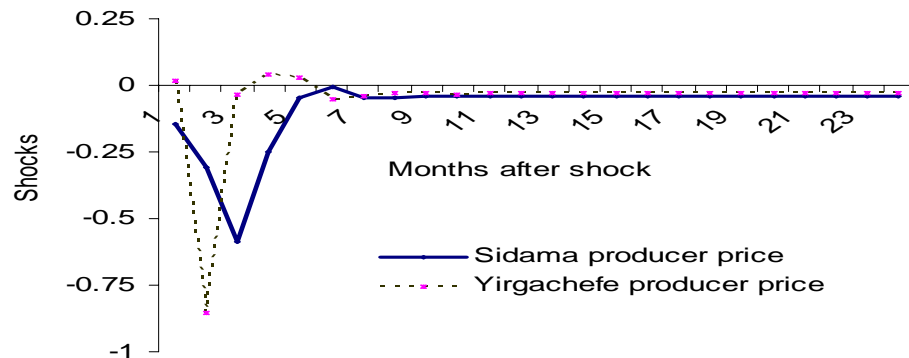
The dynamic interrelationship between two spatially interrelated markets is best explained by evaluating the response of one market to positive and negative shocks in the corresponding market. In this section, the results of the impulse response function for selected pairs of spatial markets are reported. With regard to the nonlinear impulse response function (IRF), the approach of Porter (1995) is adopted.

Figures 8.5 and 8.6 present the response of Sidama producer price response to one-half standard deviation positive and negative shocks in the Yirgachefe producer price. Both positive and negative shocks evoked almost similar responses and eventually led to price convergence to equilibrium after about seven months. In both cases, Sidama price was

equally responsive to shocks in the Yirgachefe price. This may be due to the close interrelationship between these two coffee prices and the proximity in location between the regions.



**Figure 8.5: Response of Sidama producer market to positive shocks in Yirgachefe producer market**



**Figure 8.6: Response of Sidama producer market to negative shocks in Yirgachefe producer market**

Source: Author's computation based on data from AMPD (2006)

Similarly, the response of Jimma producer price to one-half standard deviation positive and negative shocks in the Wollega producer price had an approximately equal effect (in opposite directions) and finally both converged to long-term equilibrium after six months. As the results in both cases indicate, the time of adjustment was the same when positive and negative shocks were introduced. However, the time of adjustment seems to have been longer for market pairs located far apart. For instance, Wollega producer price took 11-12 months to fully adjust to one-half standard deviation shocks in Harar produce

price, which perhaps indicates that the distance between two markets plays an important role in the dynamic interrelationship among prices. Although all prices eventually converged to long-term equilibrium, the time taken for this to happen was too long for the situation to be considered an ideal competitive market.

## **8.8 Conclusion**

In this section the same methodological approach was followed as for vertical price transmission, i.e. Hansen's (1997) procedure for model specification and testing. The major difference is that this section measures long- and short-run dynamics between two spatially separated distinct markets using price series as proxy variable to explore whether the deregulation of the Ethiopian coffee industry since 1992 has improved coffee price relationship between selected markets. To tackle specification and thus inferential biases in the previous studies, tests were conducted on heteroskedasticity of error term and number of regimes. Monthly price data from October 1992 through September 2006 is used to analyse price interrelationships in the post-deregulation period. The spatial integration between six selected pairs of producer coffee markets is analysed.

This study reveals the following important results from the model specification exercise: First, all market pairs confirm a strong long-term cointegrating relationship in that spatial price pairs converge to their long-run equilibrium in the long run even if they exhibit divergence in the short run. Secondly, nonlinearity tests unanimously confirm the existence of threshold effects for all cases. Thirdly, the test results of TVEC model<sub>2</sub> versus TVEC model<sub>3</sub> rejected the null of TVEC model<sub>2</sub> at 1 % level of significance that the author selected TVEC model<sub>3</sub> to estimate spatial price relationships.

The above model specification exercise yielded the following findings: First, the results of regime switching reveal integration of three of the six producer market pairs. This implies that producer market pairs lack noticeable cointegration. In other words, the spatial price integration between producer coffee markets is limited. Strong spatial coffee market integration is still lacking after two and a half decades of market reform. This lack

of short-run integration between pairs of producer prices of coffee markets may be due partly to physical separation and high transport costs. This is evidenced by the fact that adjacent coffee markets, for instance Sidama and Yirgachefe and Jimma and Wollega, are highly responsive to price shocks in one another, while coffee markets located far apart (e.g. Jimma and Yirgachefe, Harar and Yirgachefe, and Jimma and Sidama) lack integration and are less responsive to shocks in their corresponding markets (see results of regime-switching, threshold values in Tables 8.4 and 8.5). Hence, Ethiopian coffee markets are related in the long run, but short-term integration is largely absent between producer markets located far apart.

Second, the results of nonlinear impulse response convey some interesting findings. That is, after a small jump in the initial period, all converge to equilibrium. The number of months required to normalise the effect of shocks ranges from 3 to 12 months for spatial pairs, implying a weak dynamic nature of producer coffee market in Ethiopia. Lastly, our analysis confirms the significance of threshold effects and suggests considering the effect of transaction cost in market integration analysis significantly influence spatial price linkages.

The policy implication of this finding are: liberalization of markets is an important beginning measure but by itself not an element of success. We need second generation policy measures which could level playing field for all market participants. Among others, high transportation, information and other transaction costs still remain the major limiting factors for producer market integration. Besides, producers lack strong grass root level institution which could minimize marketing costs and improve information on price, quality, and other services.

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## CHAPTER 9

### CONCLUSION AND RECOMMENDATIONS

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#### 9.1 Introduction

Since the early 1990s, the Ethiopian government has been implementing extensive market deregulation measures to reduce the role of the state and increase the role of the private sector in the economy. In line with this aim, the coffee sub-sector has been extensively deregulated to improve its performance. These measures are envisaged to improve the transmission of price incentives among vertically related (producer-auction-world) and spatially interrelated producer markets. This study analyses the effect of these policy changes at global and local level in seven major chapters.

#### 9.2 Summary and conclusion

The study is organised into nine chapters. The first chapter provides an overview of the importance of the coffee industry for the Ethiopian economy in terms of employment, foreign exchange earnings and contribution to national income. This chapter also discusses the role of smallholder coffee producers and their share of FOB price prior to reform, as well as factors accounting for their low share of FOB income. It then goes on to discuss the aim of market deregulation measures and the anticipated benefits from market reform for smallholder coffee producers. The objectives of the study are stated with the methodology for measuring whether market reform has improved the performance of the coffee industry in general and price transmission in particular between different levels of coffee markets.

The second chapter reviews the literature on vertical and spatial price transmission and measures of market integration in order to determine a relevant model that fits to the objectives and type of data used in the study. Several methods for measuring market

integration and the limitation of each method are identified. The simple bivariate correlation of approach, correlation of price differences, variance decomposition method, radial market integration approach, cointegration and error correction method, parity-bound model and structural models are discussed separately. These methods are criticised for their failure to take into account transaction costs. Towards this end, the recent generation of time series models, which take into account the effects of transaction cost, are discussed in depth. The univariate threshold autoregressive (TAR) model and multivariate threshold vector error correction modelling approaches and the controversies accompanying these testing techniques are presented. The study extends the Hansen (1997) approach to deal with inferential biases occurring as a result of specification errors. The importance and procedures of application of the TVEC model deemed to be useful for this study are broadly explored. In addition, chapter two also presents the impulse response function and regime-switching models, which measure the rate of adjustment to shocks in related markets and the integration of markets respectively.

Chapter three briefly explores the history of the origin of coffee and its importance to the world economy. It also presents the impact of policy reform measures and the abolition of the International Coffee Agreements quota system on world coffee production, consumption and export. The latter part reviews the volatility of producer price and risk management options, as well as disparity between producer and retail prices. It furthermore explores future opportunities for smallholder coffee growers in developing countries. Coffee is the most important agricultural commodity for many developing countries. Coffee is produced in more than 70 developing countries, and of these about 50 countries produce for export and an estimated 25 million farming households are directly dependent on the income generated from its sale. The cultivation, processing, trading, transportation and marketing of coffee are estimated to provide employment for 100 million people worldwide. It is highly important for many African countries, because coffee is one of the traditional sources of foreign exchange earnings.

The results reported in chapter three indicate the following important facts:

Policy and institutional change in international coffee marketing has increased the annual world coffee production from nearly 90 million bags in the early 1990s to more than 120 million bags in 2006. Most of this increase was accounted for by Vietnam, Brazil and Colombia, which together contributed more than 65% of the world coffee production between 2000 and 2006.

Coffee production in Latin American countries has shown stable growth, while the Asia-Pacific region registered steady growth from 10% in the late 1970s to 27% share of world production in 2006 (largest increased occurred in Vietnam), and in the same period Africa's share of world production dropped from 26% to 13%. Hence, little success is evident in the performance of Africa's coffee industry following the policy change.

The market deregulation measures (1991-1999) brought about a substantial positive increase in the producer share of FOB price in almost all regions. For instance, the grower's share grew from 58 to 80 percent in Africa, from 74 to 90 percent in Latin America and from 70 to 76 percent in Central America, with a marginal change being observed in the Asia-Pacific regions. The effect of reform on producer price is more significant in countries with a high level of government intervention.

Reform has also increased price risk due to an increase in coffee price volatility in the world market. In addition to occasional price oscillation, there has been a systematic long-term decline in the price of coffee. Price fluctuations make the poor rural coffee growers even poorer, as these small-scale growers are unable to plan ahead and decide how to allocate their resources. Price risk remains a major concern.

The disparity between producer and retail price is found to be extremely high. The producer share of retail price is estimated to be 10%, constituting about 1.5% of coffee shops' income between 2000 and 2006. This disparity is partly explained by the concentration of market power, i.e. a few roasters account for the world's largest share of

green coffee roasting. All major roasters are also vertically integrated with retailers and this trend is expected to continue. In addition, the paradox is that the price consumers pay for a cup of coffee is increasing while the producers' share is decreasing.

Chapter four reviews and discusses the performance of the deregulated Ethiopian coffee industry. The coffee sector in Ethiopia has undergone several deregulation measures since early 1992, which are conceived to improve production and marketing operations. The post-reform performance of the coffee industry is discussed using proxy indicators like national coffee production and consumption trends, coffee supply to auction market, coffee export and foreign exchange earnings from coffee compared to other merchandise exports.

Chapter four presents the following salient results:

Coffee production has shown steady growth in the post-reform period in Ethiopia. It has grown from about 150,000 tons in 1993 to more than 300,000 tons in 2000, implying that the production of coffee in the post-reform period has nearly doubled. This is perhaps due to increased private sector participation, which has improved competition and collection, coupled with lucrative world coffee prices between 1994 and 1998 that stimulated farmers to establish new plantations and expand coffee production in underexploited areas, together with the declining effect of CBD infestation.

Domestic consumption has remained high (on average about 48% of annual production), but it varies according to the world price situation, i.e. when prices are more attractive in the world market local consumption falls and vice versa. Coffee consumption between regions and cultural groups and between urban and rural communities varies greatly. In general, high domestic consumption is also found to contribute positively to coffee production and price stabilisation in Ethiopia. This result is further confirmed by the empirical estimation (see chapter 7, section 7.5),

Coffee supply to the auction market has shown a sharp increase in the post-reform period, growing from 150,000 tons in the early 1990s to 220,859 tons in 2005/06. The share of the washed-coffee supply also grew from a mere 10% in 1992 to 30% in 2006. During the same period the volume of coffee export doubled, increasing from a mere 80,000 tons in the early 1990s to over 160,000 tons in 2006. Surprisingly the production of coffee, supply to the auction market and volume of export have continued to increase even in the post-2000 period when the world coffee price dropped to its historically lowest level. This situation violates the traditional economic theory of “supply and price relationship”. Perhaps this may be as a result of the perennial nature of coffee production and structural rigidity in the production system. That is, it is not easy for producers to shift to another production area even if prices are not attractive.

Foreign exchange earnings from the coffee trade fluctuate drastically depending on the world coffee production and supply situation. The coffee export earning was registered as ETB 152 million in 1972. It increased to ETB 604 million in 1979/80 and grew to ETB 734 million in 1986/87. It then declined to ETB 239 million due to national instability, but it grew to ETB 2612 million in 1998 due to devaluation of the local currency and lucrative world coffee prices. It then dropped to ETB 1403 million in 2001/02 due to the world coffee crisis, but it revived and recorded its historically highest level of ETB 2913 million in 2006 and ETB 3690 in 2007. Coffee’s share of total export earnings remained at 60 percent in the 1990s, but it has decreased since 2000 to about 40 percent due to the drop in world coffee prices and the increasing share of other export commodities.

There have also been some negative outcomes since market deregulation, namely the fact that auction lots are often mixes from various locations and even of different types. Tracing the origin of coffee (traceability), even the coffee delivered by cooperatives, is at best impractical and in most cases impossible. Purchasing coffee to meet specific international buyers’ cupping requirements, with its original and true flavour, is becoming difficult. In addition, market power concentration in the auction and export markets is another growing concern in the Ethiopian coffee industry. Only 10 exporting firms (out of 75) account for a 55-60% share of export trade. Most of these potential

exporters are also vertically integrated with wholesalers (*akrabys*) and own coffee processing industries in coffee-producing regions. Hence, it is difficult to expect there to be a reasonable level of competition in the current coffee auction and export markets.

In general, market deregulation has brought about visible growth in Ethiopia's coffee production and supply and in the volume and value of export earnings (in nominal terms). Yet there are several malpractices and weaknesses to be addressed. Quality problems at production and marketing levels, lack of strong institutions to coordinate and regulate the private sector, shortage of basic coffee extension and credit services, trans-shipment of coffee beans from low-premium to high-premium areas and market power concentration are some of the main weaknesses of the current coffee marketing system.

Chapter five attempts to measure whether the reform has improved the producer share of FOB price compared to pre-reform levels. Monthly price data from different secondary sources and cross-sectional data from a 2006 coffee market survey are used. This section also attempts to establish a breakdown of physical marketing costs from producer to port. Marketing costs and the profit margins of wholesalers and exports are estimated separately.

The results indicate that the producer price for Ethiopian coffee farmers has improved moderately in the post-deregulation period, but remains far below that of competing countries. The price spread between producer and exporter accounts for about 36 percent of the FOB price. Of this, transport costs account for the lion's share, followed by financial charges and operational expenses. High transport costs are partly explained by the current coffee marketing system where coffee produced in the southern and southwestern parts of the country is auctioned at Addis Ababa, meaning that the coffee is transported on average more than 500 kilometres from the production areas. The physical separation between production and auction markets, together with poor road quality, results in high marketing costs. In addition high overhead costs, agent fees and auction market costs are directly or indirectly related to the physical separation between markets.

In general, transport and auction market costs together account for about 37% of total marketing costs up to auction market.

The results also pointed out the vital role of the cooperatives participation in the local and export coffee markets in order to raise benefit of producers from coffee trade. The involvement of cooperatives in the local markets has improved the purchasing price offered by private traders because of competition with the cooperatives. In addition, cooperatives supply price information, capital and transportation and assist farmers to access high value over sea markets which small-scale farmers often lack to access individually. However, the current domestic and export market share of cooperatives is very limited (i.e., 4-6%) mainly due to financial and human capital constraints and limited size of fair and organic coffee markets.

Chapter six attempts to present data and specify a model employed to measure coffee price inter-relation among vertically and spatially related coffee markets in Ethiopia. The application of the threshold vector error correction (TVEC) model, which is multivariate version of the threshold autoregressive model, is specified. Specifically, the technique developed by Hansen (1999) is extended to handle inferential biases occurring as a result of specification errors that previous studies have overlooked to date. In addition, the impulse response function (IRF) is also specified to evaluate responses to shocks in related markets.

Chapter seven presents the empirical results of parameter estimates. This section analyses the interrelationship between price and price transmission among producer, auction and world (FOB) prices in the six groups of coffee markets categorised by production area. Similarly, spatial price integration between six selected pairs of producer markets is analysed. The study also criticises previous studies on the topic done for Ethiopia on methodological grounds and extends the technique of Hansen (1999), originally developed within a threshold autoregressive (TAR) context to test for the presence of threshold effect, to handle heteroskedasticity in the error variances and to decide on the number of regimes that best characterises the responses. The method applied in this study

tackles specification biases that applied studies in the field have overlooked to date, since most of the earlier studies that made use of the TVEC model merely assumed homogenous error variance without validating their assumptions. The decision made in terms of model selection and number of regimes is based on the test results of Hansen (1999).

The model specification exercise yielded the following important results: Firstly, all price variables exhibit I(1) and both vertical and spatial market groups of variables confirm a strong long-run cointegrating relationship between all cases. Secondly, nonlinearity tests unanimously confirmed the existence of threshold effects for all cases. Thirdly, the test for hetroskedasticity detected a problem in TVECM<sub>1</sub>. Fourthly, the author corrected for the hetroskedasticity problem and ran simulations with 2000 replications to calculate p-value on the basis of calculated and simulated Sup-LR statistics to decide on the number of thresholds in the TVEC model. Finally, based on the test results of TVECM<sub>2</sub> versus TVECM<sub>3</sub>, the author selected TVECM<sub>3</sub> to estimate for both the vertical and spatial price interrelationship.

The above exercise yielded the following salient findings, and the results of the vertical and spatial market analysis are outlined separately below:

Salient findings from the vertical market analysis:

Producer prices for all six groups (Table 7.7) fell persistently within the equilibrium band between 1998 and 2006. This can be attributed to asymmetries in price transmission and adjustment. This finding is supported by the estimate of the three-regime threshold vector error correction model (TVECM<sub>3</sub>) and by the impulse response function. These asymmetries in price transmission and adjustment can mainly be attributed to the increased use of the domestic market as a major outlet by coffee suppliers at the time of lower prices, as well as high local demand and elicited trading, which have a hidden role of stabilising the coffee producer price in Ethiopia.

The study revealed unidirectional transmission of shocks from world to auction price and then from auction to producer price for four of the six categories (i.e. Sidama, Jimma, Yirgacheffe, and national average price). In other words, auction price is directly affected by world price (exhibiting a dynamic interrelationship), while producer price is affected by world price indirectly through auction price (i.e. weak interrelationship with world price). Hence the causality flows from world to auction price and then from auction to producer price. In general, producer price lacks a direct interrelationship with world price and is weakly responsive to shocks in world price, whereas auction price is highly interrelated with world price and is more responsive to shocks in world price. The segmentation of producer price from the world market could be partly explained by the organisational characteristics of the Ethiopian coffee market. The lack of coffee farmers' cooperatives limits the market power of farmers and weakens their capacity to bargain for better prices compared to wholesalers and exporters who are better informed and have strong ties with downstream and upstream marketing chains.

In the case of Harar coffee, neither producer nor auction price has shown interrelationship with world (FOB) price, which may be partly due to the high concentration of market power and malpractices in the Harar coffee auction and export markets (see chapter 5).

As shown by the results of the impulse response function, auction price is more responsive to negative shocks than to positive shocks in world price and takes up to 19 months until it converges to long-term equilibrium (equilibrium band). Producer price, on the other hand, is less responsive to both positive and negative shocks and takes a shorter time (up to 7 months) to converge to equilibrium.

Given the above findings, one can ask whether the coffee farmers are benefiting from the Ethiopian government's market deregulation efforts and even from current trademark licensing efforts for speciality coffees. The results suggest that they will, but to a far lesser extent than the intermediaries (i.e. exporters and wholesalers) who operate in the auction and export markets. The results clearly show that producers benefit only

indirectly through the wholesalers and exporters (see TVECM<sub>3</sub> results), while intermediaries are directly connected with the world market.

Chapter eight discusses the results of spatial market integration. In this chapter the same methodological approach was followed as for vertical price transmission, i.e. Hansen's (1999) procedure for model specification and testing. The major difference is that this section measures long and short-run dynamics between two spatially separated markets using price series as proxy variable.

The model estimation produced the following results:

All market pairs confirm a strong long-term relationship in that spatial price pairs in the long-run converge to their long-run equilibrium even if they exhibit divergence in the short run. Short-run dynamics are more important to policy than long-run dynamics. Accordingly, the results of regime switching reveal integration of three of the six producer market pairs. This implies that producer market pairs lack noticeable cointegration. In general, as indicated above, spatial price integration between producer coffee markets is limited. Strong spatial coffee market integration is still lacking after two and a half decades of market reform. This lack of short-run integration between pairs of producer prices of coffee markets may be due partly to physical separation and high transport costs. This is evidenced by the fact that adjacent coffee markets, for instance Sidama and Yirgachefe and Jimma and Wollega, are highly responsive to price shocks in one another, while coffee markets located far apart (e.g. Jimma and Yirgachefe, Harar and Yirgachefe, and Jimma and Sidama) lack integration and are less responsive to shocks in their corresponding markets (see results of regime-switching, threshold values in Tables 8.4 and 8.5). Hence, Ethiopian coffee markets are related in the long run, but short-term integration is largely absent between producer markets located far apart.

The results of nonlinear impulse response convey some interesting findings. Firstly, after a same divergence in the initial period, later all converge to equilibrium. Secondly, the number of months required to normalise the effect of shocks ranges from 3 to 12 months

for spatial pairs, while vertical market pairs require up to 17 months to fully return to equilibrium, implying a weak dynamic nature of the coffee marketing chain.

### **9.3 Recommendations**

Despite the significant economic and social importance of coffee, the benefits derived from the sector remain low. It is not too late to change this situation, as Ethiopian coffee continues to occupy a special place in the world coffee industry and there is no deficit in demand, provided that quality and consistency are guaranteed. The following recommendations are based on the above findings.

The path to success lies in exploiting the unique aspects of Ethiopian coffee, combined with the expansion of original Arabica land races and improvements in harvest and post-harvest practices. Expansion is recommended not only to increase the export level but also to meet increasing domestic consumption demands. However, coffee extension is now weak and farmers have attempted to maintain production by relying on their traditional knowledge and experiences. Developing a system to support coffee farmers by means of improved input, credit and technical assistance is extremely important if the sector is to move forward. The role of the state is vital at this point for success. Since maintaining original flavour is a highly valuable marketing asset, it is important to develop CBD-resistant varieties by marking selection within the localities. Moreover, it is imperative to reconsider the current efforts of developing and distributing CBD-resistant varieties to premium coffee areas, which might have serious negative consequences (probability of loss of original taste) in the long run.

As one of the most important findings reveals, producer price is segmented from the world market and producers are not benefiting from positive changes in the world market. Hence, the most important question is how profitability for growers can be enhanced. In order to raise the price received by small-scale farmers for their coffee (i.e. to improve profitability) there is a need to improve quality and unit sales value and to reduce marketing costs. This can be achieved by encouraging farmers to adopt better post-

harvest processing practices and gradually increase the proportion of washed coffee, which attracts a higher price premium on the world market. The key to reducing marketing costs lies in grading coffee nearer to the point of production and shipping it to the exporters' warehouses or directly to the point of export, which would reduce transaction and handling costs and raise producer margins. Furthermore, improving trust between buyers and sellers through forward contracts coupled with better market information can be expected to improve the efficiency of marketing and thereby broaden the scope for raising producer margins. This can be realised only by strengthening coffee farmers' cooperatives in terms of both physical and financial resources. Certification at the point of production and direct delivery to exporters would not only raise the producer share but would also solve the current problems of adulteration and traceability. In order to support the certification process, Ethiopia must establish an institute or group of responsible bodies to facilitate and assist in the process.

Perhaps weak interrelationship and lack of integration between different marketing chains ascribed to high transportation and transaction costs, lack of price information, market power concentration, etc. This may be partly explained by the organisational characteristics of the Ethiopian coffee market. The lack of coffee farmers' cooperatives limits the market power of farmers and weakens their capacity to bargain for a proper share of market price. Hence, strengthening producer-level organisations (i.e., cooperatives) through building institutions and strengthening both human and financial capacity and it is one of important areas of intervention by the government.

In general, market performance depends integrally on the existence of strong market-supporting institutions at each level of the marketing tier to provide market information, enforce laws and regulations, supervise the behaviour of individual participants, and design and implement incentives or disincentives. These aspects are lacking in the current coffee marketing system in Ethiopia, and liberalisation has in some instances opened up loopholes for lawlessness.

Therefore, dismantling market parastatals is a necessary but not sufficient condition for efficient private markets to evolve. In the absence of appropriate infrastructure and institutions at grassroots level, smallholders remain at the mercy of traders. Hence it is important to shift from merely 'getting prices right' to 'getting institutions right' so as to address market failures arising from imperfect information, contract enforcement and property rights, as well as insufficient provision of public goods, in order to improve the lives of primary producers.

#### **9.4 Area for further study**

The future direction of development for coffee industry highly depends on maintaining high quality production and differentiation of coffee marketing through licensing by its origin of production. Ethiopia is supposed to have more than 140 land races, and given the current market opportunity, each type could be marketed separately. A thorough study and delineation of the production area and variety of coffee is extremely important if the prevailing market opportunity is to be properly exploited.

In this study we have tried to explore only the effects of market reform on vertical and spatial integration of Ethiopian coffee marketing chains. However, there are large amount of problem areas in the coffee industry merits more studies. The following topics may be considered for further investigation: (1) the socio-economic situation of coffee growers in Ethiopia; (2) factors affecting the decisions by coffee growers in Ethiopia; (3) untapped international market opportunities for the Ethiopian coffee: branding of Ethiopian coffee; (4) the possible development of a coffee exchange for Ethiopian coffee; (5) the effect of transaction costs on the competitiveness of the Ethiopian coffee industry; (6) the international competitiveness of the Ethiopian coffee industry; (7) competition between local demand and export coffee: policy options; (8) the effect of government regulations on coffee production and export; (9) the role of multinationals in the Ethiopian coffee industry.

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## APPENDICES

### APPENDIX A: COFFEE MARKET SURVEY QUESTIONNAIRE FOR WHOLESALEERS AND EXPORTERS (AUGUST 2006)

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#### ETHIOPIAN DEVELOPMENT RESEARCH INSTITUTE & UNIVERSITY OF THE FREE STATE



#### QUESTIONNAIRE FOR WHOLESALEERS'

Greeting!

We would like to assure you that all information provided will be kept **STRICTLY CONFIDENTIAL**. It is very important to note that the answers given to the questions should be correct since it may affect the results of the study.

RESPONDENT UNIQUE CODE OR QUESTION No. (\_\_\_\_\_)

<b>General Information</b>	
001	Name and signature of enumerator
002	Date of interview (dd/mm/yy)
003	Name and signature of supervisor
<b>Data Entry</b>	
004	Name of data entry clerk
005	Date of entry (dd/mm/yy)
<b>Owner's Address</b>	
006	Name of the owner/company
007	Region
008	Zone
009	District (Woreda)
010	Town

#### SECTION ONE: OWNER'S PARTICULARS

1.1 Age of the owner (\_\_\_\_) Years

1.2 Sex (\_\_\_\_) 1. Male 2. Female

1.3 Highest academic level attained \_\_\_\_\_

- 1.4 Marital status (\_\_\_\_) 1. Married 2. Single 3. Divorced 4. Widowed 5. No response
- 1.5 Religion (\_\_\_\_) 1. Orthodox 2. Moslem 3. Catholic 4. Protestant 5. Atheist 6. others
- 1.6 Number of years of experience as a coffee trader (\_\_\_\_\_).
- 1.7 In which year did you obtain your first coffee trading license? (\_\_\_\_) (EC)
- 1.8 How did the current owner(s) acquire this trading business? (\_\_\_\_) 1. Inherited  
2. Started by himself 3. Bought share 4. Others (specify)\_\_\_\_\_
- 1.9 What was your major (primary) occupation before getting involved in coffee trade?  
(\_\_\_\_/\_\_\_\_) 1. Farming 2. As agent for another trader 3. As broker 4. Shop keeping  
5. Hotel Business 6. Civil servant 7. Other (Specify)\_\_\_\_\_
- 1.10 Currently, do you have any other occupation apart from the coffee trading?(\_\_\_\_) 1. Yes 2. No.

1.11 If yes, are you involved in	If yes = 1 & if no = .2	If yes, are you involve in	If yes = 1 & if no = .2
a. Farming		d. General trading	
b. Agent for another trader		e. Civil servant	
c. Broker		f. Others (specify)_____	

- 1.12 Over the last 12 months, have you received any training (either locally or abroad) with regard to the coffee marketing? (\_\_\_\_) 1. Yes 2. No

## 2. SECTION TWO: PHYSICAL AND SOCIAL ASSET OWNERSHIP

2.1	Please indicate whether you own any of the following:	If yes = 1; if no = 2	If Yes, when did you buy, build or own it for the first time? ( _____ EC)	Do you have plans to invest or expand in this? If yes = 1, If no = 2
A	Scales			
B	Non-motorized transportation equipments	Carts		
		Bicycle		
C	Motorized vehicles?	Motorbike		
		Car(s)		
		Truck(s)		
D	Storage (other than residence)			
E	Office (other than residence)			
F	Coffee pulping plant			
G	Coffee hulling plant			
H	Export coffee reprocessing plant			
I	Office in Addis Ababa			

2.2	What means of communication do you use to get distant market information? (Multiple response is allowed)	If yes=1; if No= 2	If yes, when did you buy, build or own for the first time? ( ___ EC)*	Do you have plans to invest or expand in this? If yes = 1, If no = 2
A	Land line			
B	Mobile telephone			
C	Internet			
D	E-mail			
E	Radio			
F	Friends and relatives			
G	If any other specify			

\* Ethiopian calendar

2.3 Do you have any permanent client(s) in your buying market(s)? (\_\_\_\_\_) 1. Yes 2. No

2.4 If yes, for how long have you known them? \_\_\_\_\_ Years

2.5 Do you have any permanent client(s) in your sales market? (\_\_\_\_\_) 1. Yes 2. No

2.6 If yes, how long have you known them? \_\_\_\_\_ Years

2.7 What is the basis for your permanent relationship in both the purchase and sales market? (\_\_\_\_)

1. Long term business relation/reputation 2. Kinship 3. Financial advances

4. Religion 5. Others (specify) \_\_\_\_\_

2.8 Do you have non-family permanent employees working in your coffee business? (\_\_\_\_)

1. Yes 2. No

2.9 Are you a member of any of traders' association? (\_\_\_\_\_) 1. Yes 2. No

2.10 If yes, in which of the following are you a member? (\_\_\_\_/\_\_\_\_/\_\_\_\_)

1. Coffee Exporters Association 2. Chamber of Commerce 3. Informal coffee traders

association (without legal status) 5. Others \_\_\_\_\_

2.11 If not a member of any of the associations mentioned above, give reasons \_\_\_\_\_

### SECTION THREE: ACCESS TO BASIC MARKETING INFRASTRUCTURES

#### 3A: Storage service

3.1 Do you have one or more storage facilities under your exclusive control?(\_\_\_\_) 1. Yes 2.No

3.2 If yes, what is its maximum capacity (in quintals)? (\_\_\_\_)

3.3 Does your residence serve as purchasing and/or selling point? (\_\_\_\_)1. Yes 2. No

3.4 Does your residence serve as a coffee store? (\_\_\_\_). 1. Yes 2.No

3.5 If yes, what is its maximum capacity (in quintiles)? (\_\_\_\_)

3.6 On average for how long do you store coffee? (a) Minimum \_\_\_days (b) Maximum \_\_\_days.

**3B: Access to credit**

3.7 Indicate the sources of your working capital used over the last 12 months

	Of total working capital how much come from your ...	Amount (in Birr )	% of total
A	Own source		
B	Bank loan		
C	Relatives		
D	<i>Eukob</i> (traditional savings institute)		
E	Other traders		
F	Friends		
G	Microfinance		
H	Saving and credit Association		
I	Money lenders		
J	Others		

3.8 When you have a critical shortage of working capital, where is the first place you go? (\_\_\_\_)

1. Banks 2. Informal lenders, 3. Relatives 4. Friends 5. Other (specify) \_\_\_\_\_

**3C: Transport service**

3.9 How far is the purchasing market place from your residence? (a) The farthest \_\_\_\_\_ kms

(b) The closest \_\_\_\_\_ Kms

3.10 What is the most frequently used mode of transport from the purchasing sites to hulling/washing centre? \_\_\_\_\_ 1) Head loading 2) Pack animals 3) Animal cart 4) Trucks 5) Others (Specify) \_\_\_\_\_

3.11 Average cost of transportation you incurred over the last 12 months to transport coffee from purchasing centre to hulling or pulping centre? \_\_\_\_\_ Birr/100kg/km

3.12 If you use rented trucks, how long does it take to search, negotiate and arrange trucks to transport coffee from hulling/pulping stations to the auction market? (a). In the peak coffee supply seasons (\_\_\_\_\_) days b) in the sluck coffee supply seasons \_\_\_\_\_ days

3.13 Do you pay for middlemen to search for trucks for you ? (\_\_\_\_) 1. Yes 2. No

3.14 If yes, how much do you pay, on average, each time? (\_\_\_\_) Birr

3.15. Do you have permanent suppliers from whom you rent trucks? ( \_\_\_\_\_) 1. Yes 2. No

**3D: Price information and price setting**

3.16 How do you determine or set buying price?	1. Yes 2. No
a. follow price charged by leading buyers	
b. agree with other suppliers	
c. on the basis of instruction from exporter client	
d on the basis of price broadcasted on daily radio	
e. on the basis of information from friends	
f. fixed by collectors	
g. If any other, specify _____	

3.17 How is your selling price determined or set?	1. Yes 2. No
a. fixed by exporters through informal communication	
b. competition between exporters – based on supply & demand	
c. on the basis of daily New York price	
d. by negotiating with exporters	
e. if any other specify _____	

#### SECTION FOUR: MARKET INSTITUTIONS

4.1 Did you face any dispute in the last 12 months in relation to coffee sales & purchases?

(\_\_\_\_) 1. Yes 2. No

4.2 If yes, what was the major cause(s) of dispute?	If Yes = 1 and if No = 2
a. late payment	
b. failure to honour payment obligation	
c. cheating scale	
d. delivery of poor coffee quality	
e. delivery of forged document	
f. failure to deliver coffee purchased for advance payment	
g. failure to deliver within agreed time	

4.3 What was your response to the above malpractice(s)? (\_\_\_\_) 1. took the matter to court

2. informed relatives and friends 3. took the matter to local administrations 4. Others \_\_\_\_\_

4.4 How was it solved? (\_\_\_\_) 1. by court ruling 2. by arbitration of association

3. by elders or clan leaders mediation 4. by religious leaders mediation 5. Others \_\_\_\_\_

4.5 Did you buy coffee from coffee farmers at flowering stage? (\_\_\_\_) 1. Yes 2. No

4.6 How did you inspect? (\_\_\_\_) 1. visual inspection 2. Moisture meter 3. estimate clean coffee content 4. No inspection 5. Others (specify)\_\_\_\_\_

4.7 Did you pay a premium price for better quality coffee (\_\_\_\_)1. Yes 2. No

4.8 If yes, by how much did you increase the price per kg? (\_\_\_\_) Birr?

4.9 Rank the causes of quality problems listed in the table below according to their effects

(the most series problem = 1<sup>st</sup> )

Major expected causes for quality problems	Rank (1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> , .... )
a. Lack of quality based procurement and marketing system	
b. Lack of price incentive for farmers to maintain quality	
c. Participation of sizable number of illegal traders in the market	
d. Lack of facilities required to dry and process	
e. Low awareness about quality importance by farmers and traders	
f. Over concentration of pulping and hulling industries	
g. Weak law enforcement capacity	
h. Others (Specify)	

- 4.9 On average how long does it take for you to collect payment after sales? (\_\_\_\_\_) days?
- 4.10 What is the level of competition between participants in the current primary coffee markets compared to the pre-reform period (\_\_\_\_\_) 1. Stronger 2. Weaker 3. Remained the same 4. The worse
- 4.11 What is the level of competition in the current auction market (\_\_\_\_\_) 1. stronger 2. weaker 3. remained the same 4. the worse 5. Others (specify) \_\_\_\_\_

## **SECTION FIVE: COFFEE AUCTION MARKET AND RELATED COSTS**

- 5.1 How long does it take to get permission from primary coffee quality inspectors at woreda level before transporting coffee to the auction market? \_\_\_\_\_hrs
- 5.2 Total distance from your warehouse (processing centre) to the auction market \_\_\_\_\_kms
- 5.3 Over the last 12 months, what was the average transport cost for 100kg of clean coffee from your warehouse to the auction market? (a) at peak supply season \_\_\_\_\_ Birr/100kg  
(b) at low supply season \_\_\_\_\_Birr/100kg
- 5.4 From your experience as a wholesaler (*akrabys*), on average, how long does quality inspection and grading take from the time of arrival of truck at the liquoring centre: (\_\_\_\_\_) (a) in the peak supply seasons \_\_\_\_\_ days (b) in the low supply seasons \_\_\_\_\_ days
- 5.5 Do you have any permanent agent who participates on your behalf in the auction market? (\_\_\_\_\_) 1. Yes 2. No
- 5.6 If yes, what is the amount of commission paid for each exchange?  
(a) Minimum \_\_\_\_\_Birr/round (b) Maximum \_\_\_\_\_Birr/round
- 5.7 Do you use brokers to assist you to search for buyers at the auction market?(\_\_\_\_\_) 1. Yes 2. No
- 5.8 What is the average commission paid for broker at the auction market? \_\_\_\_\_Birr/truck
- 5.9 Over the last 12 months how much time did it take you to collect payments after sales?\_\_days

**SECTION SIX: MARKETING AND PROCESSING COSTS OF WHOLESALERS FOR  
WASHED AND SUNDRIED COFFEE**

Please complete the following table

No.	Expenses	Washed (Birr/100kg)	Sun dried (Birr/17kgs)	Average (Birr/17kg)
6.1	Average price of red cherry (Birr/kg dry cherry)			
6.2	Transport cost to pulping/hulling centre			
6.3	Pulping/hulling costs			
6.4	Labour cost			
6.5	Storage cost			
6.6	Quality inspection fee at district level			
6.7	Municipality taxes			
6.8	Development taxes			
6.9	Transport cost to auction market			
6.10	Loading and unloading cost			
6.11	License renewal fees			
6.12	Interest on capital			
6.13	Bank service charges			
6.14	Parking fee at auction market			
6.15	Samplers fee at the auction market (fee for <i>Mezo awchiwoch</i> )			
6.16	Quality inspection fee by CLU			
6.17	Government sales tax			
6.18	Agent/ brokers fee (estimate)			
6.19	Repair and maintenance costs			
6.20	Overhead costs			
6.21	Total operating costs of the season			

*Thank you very much for your time and willingness to provide this information  
June 2006*

## QUESTIONNAIRE FOR COFFEE EXPORTER

RESPONDENT UNIQUE CODE OR QUESTION No. (\_\_\_\_\_)

<b>General Information</b>	
001	Name and signature of enumerator
002	Date of interview (dd/mm/yy)
003	Name and signature of supervisor
<b>Data Entry</b>	
004	Name of data entry clerk
005	Date of entry (dd/mm/yy)
<b>Owner's Address</b>	
006	Name of the owner/company
007	Region
008	Zone
009	District (Woreda)
010	Town

### SECTION ONE: OWNER'S PARTICULARS

- 1.1 Age of the owner (\_\_\_\_) Years                      1.2 Sex (\_\_\_\_) 1. Male 2. Female
- 1.3 Highest academic level attained \_\_\_\_\_
- 1.4 Marital status (\_\_\_\_) 1. Married 2. Single 3. Divorced 4. Widowed 5. No response
- 1.5 Religion (\_\_\_\_) 1. Orthodox 2. Moslem 3. Catholic 4. Protestant 5. Atheist 6. others
- 1.6 Number of years of experience as a coffee trader (\_\_\_\_\_).
- 1.7 In which year did you obtain your first coffee trading license? (\_\_\_\_) (EC)
- 1.8 How did the current owner(s) acquire this trading business? (\_\_\_\_) 1. Inherited  
2. Started by himself 3. Bought share 4. Others (specify) \_\_\_\_\_

### SECTION TWO: PHYSICAL AND SOCIAL ASSET OWNERSHIP

	2.1 Please indicate whether you own any of the following	If Yes=1; if No= 2	If Yes, when did you buy, build or own it for the first time? (____ EC)	Do you have plans to invest or expand in this? If Yes = 1, If No = 2
A	Coffee pulping (washing) industry at coffee producing zones			
B	Coffee hulling industry at coffee producing zones			
C	Export coffee reprocessing plant			
D	Office in Addis Ababa			
E	Own tracks to transport coffee			

2.2 Annual achievable capacity of export coffee processing plant

a) \_\_\_\_\_ tons/year      b) realized capacity \_\_\_\_\_ tons/year

2.3	What means do you use to access international market information? ( <i>Multiple response allowed</i> )	If yes=1; if No= 2	If yes, since when did you have access to them? ( _____ EC)	Remarks
A	Telephone			
B	From buying clients			
C	ICO webpage			
D	E-mail			
E	Relay on exporters' associations			
G	If any other (specify)			

2.4 Do you have any permanent client(s) in your buying market(s)? (\_\_\_\_) 1. Yes 2. No

2.5 If yes, for how long have you known them? \_\_\_\_\_ years

2.6 Do you have any permanent buyers (importing companies) or clients? (\_\_\_\_) 1. Yes 2. No

2.7 If yes, how long have you known them? \_\_\_\_\_ Years

2.8 Have you been engaged in any of the following newly emerging marketing opportunities?

a. Sustainable Coffee Marketing Schemes (\_\_\_\_) 1. Yes 2. No

b. Organic Coffee Marketing Schemes (\_\_\_\_) 1. Yes 2. No

c. Fair Trade Coffee Marketing schemes (\_\_\_\_) 1. Yes 2. No

d. Uze Kaffe (\_\_\_\_) 1. Yes 2. No

e. Café practice (\_\_\_\_) 1. Yes 2. No

2.9 If you have not participated in any of the above market opportunities, give reasons? \_\_\_\_\_

**SECTION THREE: ACCESS TO BASIC MARKET INFRASTRUCTURES**

3.1 Do you have one or more storage facilities under your exclusive control? (\_\_\_\_) 1. Yes 2.No

3.2 If yes, what is the total maximum capacity of the store (in quintiles)? (\_\_\_\_)

3.3 On average for how long do you store coffee?

(a) Maximum \_\_\_\_ days (b) Minimum \_\_\_\_\_ days.

3.4 Indicate the sources of your working capital used over the last 12 months

	Of total, how much came from	Amount (in Birr )	% of total
A	Own capital		
B	Bank loans		
C	Relatives		
D	<i>Eukob</i> (traditional saving institute)		
E	Other traders		
F	Friends		

G	Microfinance		
H	Saving and credit Association		
I	Money lenders		
J	Other sources		
		Total	100 %

3.5 When you have a critical shortage of working capital, where is the first place you go? (\_\_\_\_)

1. Banks 2. Informal lenders, 3. relatives 4. friends 5. No place to go for lending 6. Others

3.6 The current collateral requirement by the government banks is ... (\_\_\_\_)

1. Manageable 2. Not manageable 3. No response 4. Others \_\_\_\_\_

3.7 Over the last 12 months, have you been involved in *Ekub*?(\_\_\_\_) 1. Yes 2. No

3.8 What was the average cost of transport incurred over the last 12 months to transport coffee

from your warehouse to port Djibouti? (a) at peak supply season \_\_\_\_\_Birr/100kg

(b) at slack supply season \_\_\_\_\_ Birr/100kg

3.9 If you use rented trucks, how long did it take to search, negotiate and arrange trucks to

transport coffee from your warehouse to port Djibouti? (a). In peak coffee supply seasons

(\_\_\_\_) days (b) in slack coffee supply seasons \_\_\_\_\_ days

3.10 Did you hire any middlemen to search for trucks for you ? (\_\_\_\_) 1. Yes 2. No

3.11 If yes, how much did you pay for each service? (\_\_\_\_) Birr

3.12 Do you have permanent suppliers from whom you rent trucks? (\_\_\_\_) 1. Yes 2. No

3.14 How do you determine or set buying prices? <b>[multiple answer is allowed]</b>	1. Yes 2. No
a. follow price charged by leading exporters	
b. agreed price with other exporters	
c. on the basis of instruction from importing clients	
d. based on daily New York C price information	
e. on the basis of information from friends?	
f. If any other, specify	

3.15 How do you set your selling prices? <b>[multiple answer possible]</b>	1. Yes 2. No
a. fixed by exporters through informal communication	
b. based on competition	
c. on the basis of daily New York price?	
d. by negotiating with importing client?	
e. if any other specify	

**SECTION FOUR: MARKET INSTITUTIONS**

4.1 In the last 12 months, did you face any dispute in relation to coffee purchase from suppliers?  
 (\_\_\_\_\_) 1. Yes 2. No

4.2 If yes, what was the major cause of dispute with coffee suppliers ( <i>akrabys</i> ) and/or importing clients?	With supplier	With importer client
	If Yes = 1; If No' = 2	If Yes = 1; If No' = 2
a. Weight loss		
b. Delivery of poor quality coffee		
c. Late delivery		
d. scale cheating		
e. Failure to deliver in time		
f. Failure by agent to deliver coffee for advance payment		
g. Others (specify)		

4.4 How was it solved? (\_\_\_\_\_) \_\_\_\_\_

4.3 When there is dispute with suppliers where do you usually go? (\_\_\_\_\_) 1. took the matter to court 2. informed relatives and friends 3. took the matter to local administrations 4. Others\_\_

4.4 How do you solve disputes with suppliers (if any)? (\_\_\_\_\_) 1. by court ruling  
 2. by arbitration of association 3. by elders or clan leaders mediation  
 4. by religious leaders mediation 5. Others \_\_\_\_\_

**SECTION FIVE: PERFORMANCE OF AUCTION MARKET AND COSTS**

5.1 What is the level of competition at the present coffee auction market compared to the pre-reform period (\_\_\_\_\_) (1). Fierce 2. Moderate 3. Remained the same 4. Poor

5.2 Over the last 12 months, how long does it take, on average, to open Letter of Credit (L/C) for coffee export (a) minimum \_\_\_\_ hrs (b) maximum \_\_\_\_ hrs.

5.3 Over the last 12 months, how long does it take on average to obtain Quality Certification from Coffee Liquoring Unit for coffee to be exported (a) in the peak supply seasons \_\_\_\_ days (b) in the slack supply seasons \_\_\_\_ days

5.4 Over the last 12 months, on average how long did it take to obtain "Export Permit" from National Bank of Ethiopia? \_\_\_\_\_ days

5.5 What are the most frequent complaints of Ethiopian coffee importers? (\_\_\_\_/\_\_\_\_/\_\_\_\_)  
 1. Weight loss 2. Failure to deliver in time 3. Quality problem  
 4. Failure to supply required volume of coffee in time 5. Others (specify) \_\_\_\_\_

**SECTION SIX: MARKETING AND PROCESSING COSTS OF EXPORTERS FOR  
WASHED AND SUN DRIED COFFEE**

Please complete the following table

Ex penses of exporter	Unit of Birr/ton	Coffee type	
		Washed coffee	Sun dried coffee
6.1 Cleaning and reprocessing costs	Birr/ton		
6.2 weight loss due to reprocessing	Birr/ton		
6.3 Labor cost	Birr/ton		
6.4 Storage cost	Birr/ton		
6.5 Fee for sample drawers	Birr/ton		
6.6 Quality inspection fee	Birr/ton		
6.7 Municipality tax	Birr/ton		
6.8 Contribution for sports club	Birr/ton		
6.9 Export tax	Birr/ton		
6.10 Transport cost	Birr/ton		
6.11 Insurance on capital	Birr/ton		
6.12 Interest on capital	Birr/ton		
6.13 Bank service charges	Birr/ton		
6.14 VAT	Birr/ton		
6.15 Port handling and transit charges	Birr/ton		
6.16 Overhead costs	Birr/ton		
6.17 License renewal fee	Birr/ton		
6.18 Contribution for exporters association	Birr/ton		
6.19 Others	Birr/ton		
Total costs	Birr/ton		

*Thank you very much for your time and willingness to provide this information  
June 2006*

## ISSUES FOR PANEL DISCUSSION WITH COFFEE COLLECTORS

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The panel discussion with collectors is designed to obtain the following information: (i) formal and informal relationships between producers and collectors, (ii) institutions which guide coffee production and exchange and (iii) access to basic market infrastructures.

### *Name and addresses of panel participants*

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Region \_\_\_\_\_ Zone \_\_\_\_\_ Woreda \_\_\_\_\_

Peasant's Association \_\_\_\_\_ Tel \_\_\_\_\_

### **1. Requirements to obtain a license as a coffee collector**

- a. Licensing procedure
- b. Is there any entry barrier? How long does it take to process a license?
- c. Is there any problem for someone to operate without a license?

### **2. Relationship between collectors and coffee farmers**

- a. basis of relationship (friendship, ethnicity, religion, other social attachments)
- b. Do farmers have permanent relationships with collectors? Give reason?
- c. Do collectors lend money to coffee farmers during slack seasons?
- d. What is the role of licensed collectors in the local coffee marketing system

### **3. Micro level organizations and rules guiding coffee exchange**

- a. List of organizations who support local level coffee trade and the effectiveness of their service delivery
- b. How coffee is channelled from the producer to the primary coffee market
- c. Role of unlicensed traders in the local market
- d. Rules and institutions guiding the local coffee exchange
  - i. What are common causes of conflict in the local markets?
  - ii. How are they resolved?
  - iii. Tools of contact enforcement?

**4. Availability of basic market infrastructure:**

- a. Transport service
  - i. Feeder roads to access coffee farmers – radiating from main road
  - ii. Average distant farmers travail to primary coffee marketing centres and the cost of transport
  - iii. Average distance on travelled to purchase red/dry cherry,
  - iv. Mode of transport from purchasing site to processing centre
- b. Price information:
  - i. How price information is channelled
- c. Storage
- d. Quality control
  - i. How do you differentiate quality level during purchase?
  - ii. Do you pay higher price for better quality?
  - iii. Causes for poor quality (farmers, collectors, processors share for defective quality)

**5. Credit**

- a. Source of finance for coffee collector?
- b. Do you have access to bank loan?
- c. Do you work on money transferred by suppliers?
- d. Do you lend money to coffee farmers in the slack seasons?
  - i. Basis for lending (kinship, friendship, religion, others)

6. Indicate four major factors which affect current local coffee market operation:

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*Thank you very much for your time and willingness to provide this information  
June 2006*