5 Policies and Performance of Ethiopian Cereal Markets

SHAHIDUR RASHID AND ASFAW NEGASSA

Cereal is the single largest subsector of Ethiopia's agriculture. It dominates in terms of its share in rural employment, agricultural land use, and calorie intake, as well as its contribution to national income. The subsector accounts for roughly 60 percent of rural employment, about 73 percent of total cultivated land, more than 40 percent of a typical household's food expenditure, and more than 60 percent of total calorie intake.[1] The contribution of cereals to the national income is also large. According to available estimates, cereals' contribution to agricultural value-added is 65 percent, which translates to about 30 percent of gross domestic product (GDP).[2]

Thus it is no surprise that, despite differing political ideologies, all agricultural production and marketing policies since the 1960s have focused on the cereals subsector. Since 1991, both growth strategies and poverty reduction strategies have placed a heavy emphasis on cereal production and marketing. The Agricultural Development–Led Industrialization strategy, the Sustainable Development and Poverty Reduction Plan, and the Plan for Accelerated and Sustained Development to End Poverty all highlight the importance of cereals in Ethiopia's overall economic development. The Participatory Demonstration and Training Extension System, instituted in the mid-1990s, was specifically designed to increase cereal production through demonstration of seed–fertilizer technology. As part of these strategies, the Government of Ethiopia has undertaken substantial market reforms, accelerated investments in road and communication networks, and initiated programs to increase cereal production.

The structure of Ethiopian cereal markets has undergone massive changes due to these shifts in government agricultural production and market policies along with vast improvements in marketing infrastructure and major increases in domestic production. This chapter documents these experiences. It begins by giving a historical overview of policies that have directly or indirectly affected cereal production and marketing, followed by a discussion of public invest-

1. These numbers are estimated from Ethiopia, CSA (1998, 2001, 2003, 2007).
2. This calculation is based on the fact that agriculture accounts for 47 percent of GDP.

ments in infrastructure and information. Analytical results on market structure and performances are presented next. The chapter concludes with a summary of key results and their policy implications.

Evolution of Cereal Market Policies

The structure of Ethiopian cereal markets has undergone dramatic changes over the past several decades. To a large extent, these shifts mirror the underlying ideological positions of successive governments, from the feudalistic system of the 1950s and 1960s to the pervasive state interventions under the Derg regime to an extended period of major investments in road and communication infrastructure, accompanied by considerable liberalization of markets, under the Meles government. This section describes these policy shifts, highlighting changes in the roles of the state and in the size and structure of cereal markets over time.[3]

The Imperial Regime (1960–74)

Under Emperor Haile Selassie in the 1960s, Ethiopia's cereal markets were characterized by a high share of marketed cereals in total production, limited government intervention, and very high transport costs because of the minimal road and telecommunication infrastructure. During this period, most land cultivated by small farmers was leased from large landholders or from local political and religious authorities. Because rents to landlords and tributes to the state or the church were paid in kind, the marketed "surplus" of cereals is estimated to have been fairly high (25–30 percent of production), even though the production of most farmers was near subsistence levels (Ghose 1985).

Government interventions in this period centered on the Ethiopian Grain Board (EGB), established in 1950, which was reformed and renamed the Ethiopian Grain Council in 1960.[4] The EGB was given the mandate to perform a wide range of activities, including the export licensing of oilseeds and pulses, quality control, the supervision of marketing intelligence, and the regulation of domestic and export purchases and sales. Available studies suggest that it did not live up to expectations in performing all of its mandated activities. The agency was plagued with inefficiencies due to its low capital base and inadequate storage network, and its interventions were geared almost exclusively toward providing services to feudal landlords, private exporting organizations, and private traders (Lirenso 1987; Gutema 1988).

The EGB was able to control and set prices for exported grains, oilseeds, and pulses but failed to stabilize domestic prices because it did not hold stocks

3. See the appendix for a summary of major government policy measures related to cereal markets from 1950 to 2007.

4. Ethiopian Grain Board Proclamation 113/1950.

and was thus unable to buy and sell significant quantities in domestic markets. To correct these institutional drawbacks, the government established the Ethiopian Grain Council (EGC) in 1960.[5] The objectives of the EGC were to hold stocks, stabilize grain prices (particularly in urban areas), and improve the production of cereals, oilseeds, and pulses for export. However, the EGC was ultimately ineffective in achieving this wide range of objectives. Furthermore, EGC interventions were concentrated in a limited number of production regions and urban areas but neglected in much of the country (particularly remote areas). As a result, as Holmberg (1977) argues, the policy interventions did not contribute to the development of interregional grain trade.

State-Controlled Markets (1975–90)

Consistent with its ideology, the socialist government of Ethiopia (1975–90) instituted a wide range of controls over all grain production and marketing. These included determination of annual quotas, restriction of private grain trade and interregional grain movement, determination of days on which the local markets were to be held, and rationing of grain to urban consumers.[6] Wholesale prices of cereals were administratively set for many provincial markets and changed little between 1976 and the late 1980s (Webb and von Braun 1994).

Land reforms under the Derg regime had assigned ownership of land to the state but operational control to smallholders, who were no longer obligated to pay large rents in kind. When this system failed to generate sufficient marketed surplus to supply urban consumption needs, the government established the Agricultural Marketing Corporation (AMC) in 1976 to procure grain for public distribution and price stabilization.[7] The agency was made responsible for handling almost all aspects of agricultural input and output markets. It was involved in exporting and importing agricultural products, buying and selling inputs, and processing and marketing finished products. In addition, the AMC was engaged in the construction of storage facilities, such as silos, and other structures and machinery. By 1987, the AMC had 104 purchase and sales centers, 630,000 tons of storage capacity in 81 locations in the country, and a fleet of 225 trucks that handled 25–30 percent of its annual transport.[8] However, cereal procurement by the AMC was concentrated in the major grain-producing regions. For example, more than 80 percent of the AMC's grain supplies came from three grain-producing areas, Shewa, Gojam, and Arsi (Lirenso 1987; Gutema 1988).

There is a large body of literature documenting various negative consequences of these policies on the grain markets' structure and performance.

5. General Notice 267/1960.

6. For details, see Lirenso 1987; Franzel, Colburn, and Degu 1989; Lemma 1996.

7. Agricultural Marketing Corporation Establishment Proclamation 105/1976.

8. In subsequent years, the resources and the extent of activities of the AMC increased. During the period from 1989 to 1990, the AMC had 8 regional offices, 27 branch offices, 121 purchasing or selling centers, and 2,013 grain collection points (Lirenso 1994).

Small farmers were badly affected by the delivery quota, because the quota set by the peasant associations often did not take into consideration the capacity constraints and consumption requirements of the poor peasants. Farmers allegedly had to buy from the market to meet the quota requirement. Moreover, the forced delivery of a quota at a fixed price had other negative impacts on farmers, reducing their production and incomes (Taffesse 1997),[9] promoting the marketing of low-quality produce, increasing farmers' dependence on local markets, and decreasing regional grain market integration (Franzel, Colburn, and Degu 1989).

Trading was also hampered by a plethora of government restrictions. Although grain traders were allowed to operate, they had to sell a significant proportion of their purchases to the AMC at prices that were substantially lower than open market prices for both purchases from farmers and sales to consumers. Individual traders were also not allowed to transport more than 100 kilograms of grain; this was strongly enforced until the area's quota had been fulfilled (Franzel, Colburn, and Degu 1989). Public grain marketing also hindered spatial arbitrage, adversely affecting the efficiency of the grain trade. Regional governments were considerable impediments to the interregional grain trade. In some regions, the private sector was completely banned from engaging in trade. Whenever private-sector businesses were allowed to operate, they were asked to meet several conditions in order to stay in the grain marketing business. These conditions included meeting licensing requirements, delivering quality grain to the AMC under a quota (accounting for at least 50 percent of traders' purchases), meeting the quota within a specified time limit, respecting fixed producer prices, not engaging in hoarding, and avoiding the illegal movement of grain (Lirenso 1987).

The socialist government started introducing changes in its grain marketing policies in 1987 due to pressure from international donors for reforms, internal political pressure, worsening economic conditions, and ideological and economic policy changes in the former USSR and Eastern European countries (Lirenso 1994; Amha 1999). The AMC was revamped in 1987, giving it a new organizational structure and removing its mandates for direct export of grains, import of agricultural products, and purchase and sale of inputs.[10] In 1988, the government allowed private traders to acquire permits to move grain as long as the traders agreed to sell half of their grain to the AMC at AMC-specified prices

9. The quota assigned to each farmer could be adjusted according to the farmer's level of production, however. Because an increase in production could lead to an increase in the amount a farmer was required to sell to the peasant association, a profit-maximizing farmer could, in theory, base his production decisions on a weighted average of the quota sales price and the market price, not simply on the market price, as in the case of an inframarginal quota. Econometric estimates for the 1980s suggest that, because of these disincentive effects of the quota system, teff production was reduced by about 4 percent (Taffesse 1997).

10. Legal Notice 103/1987.

(Franzel, Colburn, and Degu 1989). In March 1990, the government undertook major grain-marketing policy reforms that included the removal of movement restrictions, the abolition of forced quota delivery, and the elimination of the AMC's monopoly power. The Derg regime fell soon after that.

Liberalization and Rapid Growth (1991–2009)

After the Derg regime was overthrown in May 1991, various economic reform programs were launched, including major cereal market reforms. As part of the reorganization and restructuring of government parastatals that began in 1992, the AMC was reorganized as a public enterprise and allowed to operate in the open market in competition with the private sector.[11] The name of the agency was changed to the Ethiopian Grain Trade Enterprise (EGTE), and its mandates included (1) stabilizing prices with objectives of encouraging production and protecting consumers from price shocks, (2) earning foreign exchange through exporting grains to the world market, and (3) maintaining a strategic food reserve for disaster response and emergency food security operations.

However, the EGTE encountered at least three major problems in subsequent years. First, there was a constant tension between fulfilling its mandate of price stabilization and fulfilling that of competitiveness and profitability (Bekele 2002). Second, the EGTE was not effective in stabilizing grain prices due to its limited grain purchases and sales network and its shortage of working capital. The closure of branch offices and procurement and sales centers resulted in shrinkage of the EGTE's grain-marketing network, which reduced public procurement and led to underuse of the EGTE's resources (Lirenso 1994). Finally, the EGTE was often unable to guarantee purchases at preannounced prices due to logistic and capital constraints, which led to a decline in farmers' confidence and a loss of policy credibility (Rashid and Assefa 2006).

The EGTE's mandates were substantially revised through a series of proclamations and regulations in 1999 and 2000. These proclamations and regulations required the EGTE to gradually move away from price stabilization and focus on promoting exports, facilitate the development of emergency food security reserves, and help national disaster prevention and preparedness programs. At the same time, the EGTE was also merged with the Ethiopian Oilseeds and Pulses Export Corporation in 1999 in order to increase its logistical capability.[12] With these reforms, the public sector's market shares diminished from about 40 percent (purchased by the AMC) in the 1980s to about 4 percent (purchased by the EGTE) in the early 2000s as the EGTE greatly diminished its efforts at price stabilization.

With increasing adoption of new technology and favorable rainfall, Ethiopia enjoyed two consecutive years of bumper crops in 2000/01 and 2001/02.

11. Council of Ministers Regulation 25/1992; Council of Ministers Regulation 104/1992.
12. Council of Ministers Regulation 58/1999.

But the blessings of technology and good weather did not translate into improvements in maize farm households' well-being. The farmgate price of maize declined by an unprecedented 80 percent in early 2002, making maize farming highly unprofitable—so much so that some farmers allegedly did not find it worthwhile to harvest their maize crops. The ratio of input prices to producers' prices increased from 1.7 in 2000 to about 9.0 in 2002, and fertilizer application declined by 22 percent in the next cropping year.[13] Although price stabilization was no longer part of its mandate, the EGTE was directed to buy maize in order to boost farmers' confidence. The EGTE procured 18,000 tons of maize, of which 11,000 tons were exported. The situation took a turn for the worse in mid-2002, however. When expected rains did not come in time for the main cropping season (*meher*), farmers reduced their application of modern inputs, and it became evident that cereal production would be significantly lower than the previous year. The production forecasts for maize were revised downward by as much as 52 percent, making both the government and its development partners nervous about a looming food security crisis, with potentially 15 million people facing food shortage. The crisis was eventually averted by generous donor support that included more than 1 million tons of food aid.

The EGTE faced quite the opposite challenge in 2005–08. Despite consecutive years of reported good harvests, the prices of major cereals started rising sharply in late 2005, as did overall macroinflation. Local grain procurement by the World Food Programme (WFP) and the EGTE fell to almost zero, and strategic cereal reserves declined to an unprecedented low level of only 17,000 tons in the third quarter of 2008 (Rashid and Lemma 2011), posing a significant risk of increased vulnerability for poor households. Furthermore, although many rural households had access to the large-scale Productive Safety Net Programme, there was no such program for urban households. Therefore, rising nominal prices in the main urban centers became a major policy concern, leading the government to implement an urban food rationing program in April 2007. Actual distribution of wheat under this program began in Addis Ababa in June 2007; 11 other urban centers were added by August 2008. Between June 2007 and June 2008, the program distributed about 249,000 tons of wheat at a subsidized rate of Ethiopian birr (ETB) 1,800 (or about $180) per ton, which was 41 percent lower than the wholesale price in June 2007 of $308 per ton and 76 percent lower than the wholesale price in June 2008 of $763 per ton in the Addis Ababa market.[14]

13. These are the authors' estimates based on Agricultural Input Supply Enterprise data.

14. Because of the high price differentials, urban food rationing served as an income transfer program. According to data from an urban household survey administered by the World Food Programme in June and July 2008, about 93 percent of recipient households immediately sold their ration on the open market, either to buy other cereals or to meet other consumption needs.

Public Investments in Infrastructure and Information

Efficient functioning of commodity markets depends on the adequacy of infrastructure, information, and institutions. Most of the market studies in Ethiopia in the 1980s highlighted the inadequacy of rural infrastructure as a fundamental reason for interregional price spikes and inefficient price formation, as well as a main cause of famine (Webb and von Braun 1994). In the 1980s, more than 90 percent of the country's population lived more than 48 hours' walk from a paved road (WFP 1989); transport was largely controlled by the government, telecommunication was thin, and mobile phone technology was nonexistent. Since the early 1990s, however, there has been significant improvement in physical infrastructure in Ethiopia, with implications for growth, poverty reduction, and functioning of markets. A summary of historical data regarding the indicators of development of key infrastructure are presented in Table 5.1; each of these is discussed in further detail below.

The Road Network

Given the country's wide dispersion of production and consumption centers, the development of roads is critical for the interregional grain trade. However, public investment in developing roads, especially rural roads, was limited for a long time. As shown in Figure 5.1, the road network in Ethiopia expanded substantially after 1951, with the most rapid growth occurring after 1990. The total length of roads (asphalt and gravel) was 6,400 kilometers in 1951, growing to only 9,100 kilometers by the early 1970s and to about 16,100 kilometers by the mid-1980s. There was no official figure on rural roads until about 1976. The Derg regime focused on rural roads but added only about 5,500 kilometers by the time the regime was overthrown. When the transitional government came to power in 1991, the country had about 4,100 kilometers of asphalt roads, 9,300 kilometers of gravel roads, and about 5,600 kilometers of rural roads. Things then started changing quite rapidly—the length of rural roads jumped from about 5,600 kilometers to 15,500 kilometers by 2000, while gravel and asphalt roads grew by about 36.6 and 8.0 percent, respectively. In 2008, Ethiopia had almost 24,000 kilometers of rural roads, almost five times the length of rural roads that had existed in 1992 (excluding Eritrea). Understandably, asphalt and gravel roads did not increase as quickly, though they registered growth rates of 71 and 60 percent, respectively, between 1992 and 2008.[15]

Although focusing on rural infrastructure in the early 1990s was necessary, cereal marketing will continue to face problems unless these rural roads are converted into modern, all-weather roads. Three issues are worth noting. First, because rural and gravel roads are the major road types across the country,

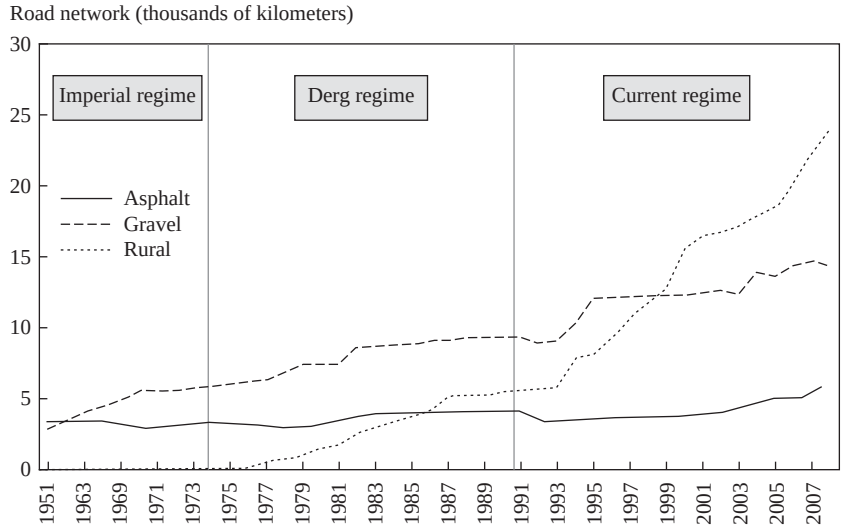
15. As discussed in Chapter 2, these road investments resulted in substantial reductions in travel time.

TABLE 5.1 Number of trucks and telephone subscriptions and kilometers of road network, by type (thousands)

Year	Number of trucks			Number of subscriptions			Kilometers of road network		
	3–7 metric tons	7–18 metric tons	Trailer	Landline	Mobile	Internet	Asphalt	Gravel	Rural
Average 1993–99	10.42	10.67	4.81	153.80	6.74	1.76	3.68	11.41	9.40
2000	24.42	10.11	5.60	231.95	17.76	2.46	3.82	12.25	15.48
2001	27.07	10.52	5.67	283.68	27.53	4.07	3.92	12.47	16.48
2002	25.33	12.91	5.65	353.82	42.91	6.74	4.05	12.56	16.68
2003	25.39	13.82	6.13	404.79	51.23	9.53	4.36	12.34	17.15
2004	32.52	10.72	6.01	484.37	155.53	12.16	4.64	13.91	17.96
2005	32.60	11.28	7.13	610.35	410.63	17.71	4.97	13.64	18.41
2006	39.72	11.38	6.89	725.05	866.70	25.72	5.00	14.31	20.16
2007	43.96	11.57	7.31	880.09	1,208.50	31.40	5.45	14.63	22.35
2008	48.20	11.76	7.73	897.29	1,954.33	34.11	6.07	14.36	23.93
Average 2000–08	33.25	11.56	6.46	541.26	526.12	15.99	4.70	13.39	18.73
Average 1993–2008	21.89	10.52	5.40	349.91	431.13	11.48	4.00	11.79	13.79
Yearly growth (percent)	14.16	0.82	4.27	14.39	64.06	32.76	3.26	2.33	8.50

SOURCE: Trucks, Ethiopia, MoTC (2008); subscriptions, Ethiopia, ETC (2009); roads, Ethiopia, ERA (various years).

FIGURE 5.1 Trends in road development in Ethiopia, 1951–2007



SOURCE: Ethiopia, ERA (various years).

the majority of grain transport from production areas to consumption centers can take place only during the dry season. This prevents producers and regional grain traders from taking advantage of higher prices during the lean season. Second, with the shortened time period for road access, there is increased pressure on the limited marketing infrastructure to transport grain to consumption centers, which might increase the demand for marketing services and hence increase marketing costs. Third, the cost of operating trucks on gravel and rural roads is also higher than operating them on all-weather roads, which in turn results in an increase in transportation cost. Thus, converting many of these rural roads into all-weather roads can be an important part of the country's long-term strategy for market development.

Telephone and Telecommunication Services

The availability and quality of telecommunication services affects marketing costs by influencing market agents' access to price information and by enhancing their ability to find and negotiate transactions with trading partners. During the socialist regime, access to telephone lines was extremely difficult. The waiting time for a phone connection was long. Under the present regime, there has been steady improvement in the number of telephone lines and telephone sets in the country. The number of landline telephones has increased more than eight-fold, from 148,739 in 1988 to 897,000 in 2008.

Cellular phone ownership in Ethiopia has grown from practically zero in 1999 to about 2 million in 2008. This is clearly an indication of progress, but the available data suggest that the country is rapidly falling behind its neighbors in terms of cellular connectivity. Figure 5.2 presents historical data on the ownership of cellular phones per 100 people in Ethiopia and three of its neighbors—Kenya, Rwanda, and Uganda. The figure clearly shows that although all four countries were at the same level in 2000, Ethiopia's neighbors started rapidly outpacing it. By 2008, almost one out of every two people in Kenya, one out of every three people in Uganda, and one out of every seven people in Rwanda had a cell phone. By contrast, the number was only one out of every 50 people in Ethiopia. In other words, only 2 percent of the country's population had access to a cell phone in 2008. This is because, unlike in neighboring countries, in Ethiopia cellular phones continue to be under a government monopoly. Until very recently, although people in most other African countries could obtain a subscriber identity module (SIM) card from kiosks on street corners, Ethiopians required government permission to own a cell phone. That process has become easier now, and the subscription is subsequently picking up. However, the country still lags far behind its neighbors.

Trucks and Transport Services

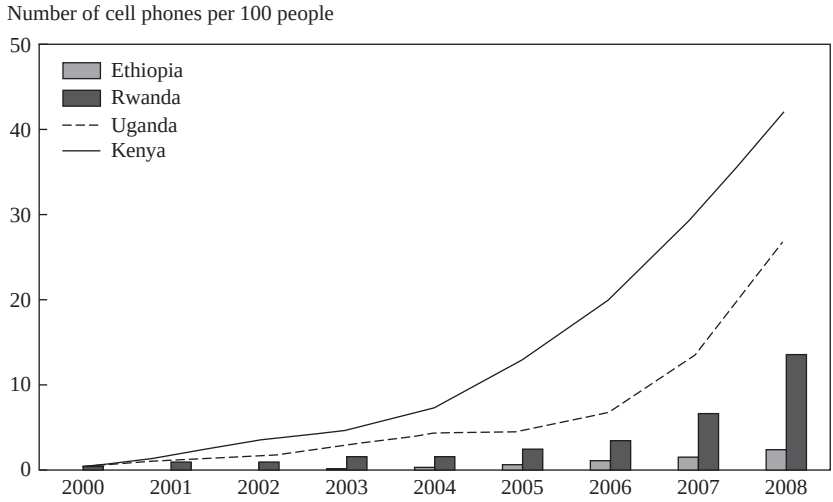
The public sector dominated the provision of transport services during the socialist regime. As the private sector was limited, so was the private ownership of trucks. Since the reforms of the early 1990s, the total number of trucks has steadily increased. The number of small trucks, with a capacity of up to 7 tons, has increased more than eight-fold, from about 5,600 in 1993 to 48,200 in 2008. The number of larger trucks, with a capacity of 7.1 to 18.0 tons, has increased by 10.6 percent, from about 10,600 to 11,800. Overall, the total number of trucks has shown a large increase since 1999.

The increase in the number of trucks does not imply perfect competition in the Ethiopian trucking business. The ownership structure plays an important role as well. Currently, there are several types of firms operating in the transport sector, which include: (1) private limited-liability companies that own trucks and run their businesses independently, (2) share companies that facilitate the process of finding clients (truck users) for their members, (3) share companies that own trucks and rent to others,[16] (4) large endowment transport companies (such as Black Lion, Dinsho, and Trans), and (5) public transport enterprises (such as Bekelcha). In addition, a very small percentage of smaller trucks (2 percent) are owned by private individuals.

The size and distribution of licensed commercial trucks for different operator groups is given in Table 5.2. The numbers show that, with associations (including share and endowment companies) owning 72 percent of all trucks,

16. These companies are owned by former government employees who owned the government's fleets under the scheme of public enterprise privatization.

FIGURE 5.2 Cellular phone ownership per 100 people in Ethiopia and its neighbors, 2000–08



SOURCE: World Bank (2010).

TABLE 5.2 Size and distribution of licensed commercial trucks, by operator groups, 2006

Ownership or operator groups	Types of trucks (thousands)					Share, by ownership types (percent)
	Trucks	Truck/ trailers	Semi-trailers	Others	Total	
Associations	4,729	1,231	310	1,323	7,593	72
Private individuals	123	80	30	20	253	2
Private companies	56	885	239	87	1,267	12
Enterprises	3	32	131	n.a.	166	2
Enterprise affiliates	740	25	8	73	846	8
Government organizations	197	198	46	1	442	4
Total, by type of vehicle	5,848	2,451	764	1,504	10,567	n.a.
Shares (percent), by vehicle type	55.3	23.2	7.2	14.2	100.0	n.a.

SOURCE: Ethiopia, EIA (2008).

NOTE: n.a. = not applicable.

the ownership distribution is highly skewed. Only 14 percent of trucks are owned by private individuals and companies. The transport sector is dominated by large companies that own modern fleets. Independent transporters are limited to old-fashioned trucks and operate in remote areas that the modern fleets cannot access. Most long-distance transport activities are related to food aid

relief operations in which small private transporters with traditional fleets do not have a competitive advantage due to economies of scale. Small private transporters also do not have the capacity to move all the relief items in a short time, as is often required by relief organizations.

Marketing and Pricing Information

Traditionally, grain traders have relied on informal sources of market information, such as friends and neighbors who visited markets, traders in different markets, and personal visits to market centers. A few government organizations, such as the EGTE and CSA, collect agricultural prices around the country. However, the EGTE prices are collected only for that organization's own internal marketing and administrative decisionmaking, and the CSA typically takes several months to make its price data available. Therefore, price information from public sources is rarely analyzed and communicated to the market agents on time. As a consequence, regional wholesale grain traders rely mostly on brokers in central markets for price information. A system of collection and dissemination of price information through radio broadcasts and bulletins was started by the Grain Market Research Project in 1996. When the project ended in 1998, the data collection continued, but the analysis, radio broadcast, and reporting of the market information was either discontinued or continued on a very limited scale.

In addition to price information, actors in the grain market need information regarding food aid pledges and arrivals, planned and actual local grain purchases by donor agencies, planned and actual commercial imports and exports of grains, the expected production situation (surpluses and shortages), stock releases from the food security reserve or intended purchases for the food security reserve, and changes in the demand for grain. Currently, there are no well-coordinated channels through which this information is communicated to various participants. The Ethiopian Commodity Exchange (ECX) may at some point play this role, but as of mid-2011, the volume of trade in cereals was too small for the ECX prices to serve as reliable indicators of overall market conditions.

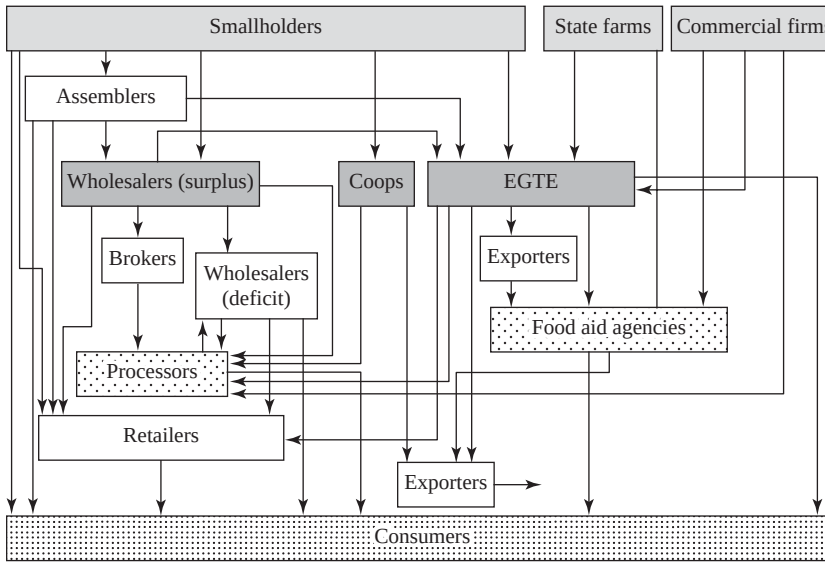
The Structure of Cereal Markets

Wide regional dispersion in cereal production and consumption in Ethiopia provides an opportunity for the interregional grain trade to flourish and reinforces the importance of efficient spatial and temporal arbitrage by the marketing agents. This section discusses the organization of cereal markets, with emphasis on the changing composition of market actors and broad changes in the overall market structure.

The Marketing Chain and the Key Actors

The cereal marketing chain in Ethiopia is long and complex, involving various types of market agents (Figure 5.3). This was not the case in the 1980s, when

FIGURE 5.3 Cereal value chain map involving traditional market channels in Ethiopia



SOURCE: Adapted from Dessalegn, Jayne, and Shaffer (1998) and Gabre-Madhin and Negassa (2006).
NOTE: EGTE = Ethiopian Grain Trade Enterprise.

most of the market actors operated on a limited scale. The cereal market structure in that period was dominated by the AMC, which served urban consumers with supplies from small producers. Official farmgate prices were set by the AMC and remained the same throughout the country. However, open market prices were often much higher and varied across regions. For example, after the major drought in 1984, wholesale grain prices for teff in 1985 were officially fixed at ETB 4.5 per kilogram, whereas open market prices were ETB 7.7 per kilogram in food-surplus Gojjam and ETB 15.7 per kilogram in food-deficit Wello (Webb and von Braun 1994). A major reason for this high interregional variability was government restriction of the movement of cereals.

Today several types of traders of various sizes and scales operate in cereal markets in Ethiopia, with small-scale traders dominating both ends of the marketing chain. These traders and processors can be grouped according to the four major market functions they perform: aggregation, wholesaling, processing, and retailing. The marketing chain starts with smallholder farmers and various buyers (petty traders, farmers-cum-traders, and, more recently, primary cooperatives) that aggregate the small volumes typically sold by individual farmers. The other key actors at this tier of the marketing chain are state and commercial farmers owning more than 100 hectares of land, who account for about 5 percent of maize

and wheat production. Some of these farmers also have cereal trading businesses that supply flour millers, aid agencies, the EGTE, and the wholesalers.

On the second tier of the chain are the wholesalers, including the EGTE, who mainly perform the tasks of temporal and spatial arbitrage. Wholesalers are also the main suppliers of cereals to the flour millers and other processors. Brokers (traders who arrange cereal trades but do not buy or sell grain themselves) also play a key role in the coordination of grain buying, selling, and transporting by matching buyers and sellers, inspecting and witnessing transactions, and providing guarantees to enforce contracts. In general, brokers operate at both the production and the consumption end of the marketing chain. However, the major activities of brokers are concentrated in Addis Ababa, where the brokers receive grain from the regional wholesalers, inspect its quality, determine its price, and sell it on behalf of their clients. The final stage of the marketing chain is retailing to the consumers.

There have been two major changes in the cereal market structure in recent years: the establishment of the ECX and the emergence of aid agencies as important buyers. The launching of the ECX coincided with global price hikes and the balance-of-payments crisis in the country, which led to a rationing of foreign exchange and to further escalation of cereal prices in domestic markets (IFPRI and EDRI 2009; Rashid 2010). The cereal market was quite volatile, and, unlike in the case of coffee, the government did not pass any law mandating cereal traders to trade through the ECX floor. According to available data, from its inception in April 2008 to February 2009, ECX traded only 950 tons of maize and 90 tons of wheat (Rashid, Winter-Nelson, and Garcia 2010). Given the size of the cereal markets, this volume of trade is unlikely to have any significant impact. On the other hand, although it was prohibited from buying during the 2007–09 price hikes, the WFP procured an average of 394,000 tons of maize and wheat from Ethiopia from 2003–04 to 2006–07. One-fifth of this grain was procured through the EGTE. Some large cereal traders have also become regular suppliers to the WFP and other nongovernmental organizations.

Broad Changes in the Cereal Market Structure

Changes in the cereal market structure may mean changes in (1) the number of market actors at both the production and marketing levels, (2) the scale at which market actors operate, and (3) the functions that market actors perform in accord with existing rules and regulations. A systematic assessment of each of these aspects is beyond the scope of this chapter. However, broad changes can be traced based on available surveys and secondary data. That is what we attempt to do in this section.

Table 5.3 presents the general structural changes in Ethiopian cereal markets. Since the 1980s, there have been four major changes at the production level. First, available statistics suggest that the proportion of cultivated lands of less than 2 hectares owned by households has been declining steadily over

the past three decades. In 1982–83, there were about 8 million peasant families and 6 million hectares of cultivated land under crop agriculture, and the proportion of land owned by these peasant families was about 95 percent (Ghose 1985). The land use reports of the CSA, which the agency began publishing in the 1990s, indicate that this share declined to 65 percent in the 1990s and 56 percent during 2000–2008.[17] Given population pressures, these changes are understandable. However, the CSA statistics on the proportion of farmers owning less than 2 hectares of land is puzzling. According to official statistics, the proportion of holdings smaller than 2 hectares declined from 87 percent in the 1990s to 80 percent in the 2000s. The third major change, which began in the past 10–15 years, has been the emergence of commercial farmers. Although they represent less than 1 percent of total holdings, this group accounts for 5 percent of total maize production and a much larger share of marketed surplus. Finally, although coverage is not yet extensive, cooperatives are playing an increasingly important role in cereal markets (Bernard and Spielman 2009; Bernard et al. 2010).

The biggest changes, however, have occurred in the marketing of cereals. These include (1) the diminished role of public food marketing, (2) growth in cereal processing, (3) the increasingly important role of the cooperatives in marketing, and (4) the inception of the commodity warehouse receipt system. Furthermore, although it has not had much impact on the cereal markets, a government proclamation now requires all exports of coffee and pulses to go through the ECX.

The Changing Role of Public Food Marketing

As discussed earlier, the cereal markets went through a dramatic change during the Derg regime. The AMC market share increased from a mere 10 percent during 1960–74 to about 57 percent by the 1980s (see Table 5.3). In the 1980s, public market shares declined to 40 percent, but this decline was due not to reduced public interventions but rather to a decline in production and marketed supplies in the mid-1980s. In the 1990s, the government's market share declined drastically to 4 percent; in 2008 it was less than 2 percent. In other words, the cereal market is now largely dominated by the private traders and processors.

Although the role of the government in cereal trade has declined, the volume of cereal trade and the number of traders have increased. During 1975–80, the average production of major cereals was 4.5 million tons, of which 11 percent was marketed surplus. Given that the government's share was 57 percent, this implies that the government controlled 285,000 tons of the half-million tons of marketed surplus, leaving the rest for the private sector. Smaller assemblers at the bottom of the marketing chain deal in about 100 quintals of cereals per

17. Only three land use reports (for 1995/96, 1997/98, and 1999/2000) are available from the 1990s.

TABLE 5.3 Broad structural changes in Ethiopian cereal markets since the 1960s

Indicators	1961–74 Imperial regime	1975–80 Transition period	1980–90 State control	1991–2000 Liberalization	2001–08 Rapid growth
Cereal production (thousands of metric tons)[a]	4,641	4,527	5,601	7,056	10,672
Marketed (percentage of production)	25[b]	11[c]	19[d]	25[e]	28.10[f]
Public market share (percent)	10[g]	57[h]	40[i]	4	1.87
Marketed (thousands of metric tons)	1,160	498	1,064	1,764	3,000
Public sector (thousands of metric tons)	116	286	426	71	56.0[j]
Population (millions)	28.3	35.6	42.9	57.6	77.4
Marketed (kilograms per capita)	41.0	14.2	24.8	30.6	38.8
Source of market supplies	Farms rents paid to landlords; tribute; private	Collapse of markets after land reform	Compulsory quota for all market actors	Liberalization; increasing trade	Liberalized market; private trade dominates
Percentage of farms holding less than 2 hectares of land[k]	n.a.		98.7	87.0	80.0
Percentage of lands owned by holders with less than 2 hectares[k]			94.7	65.0	56.0

Government intervention and price stabilization	Very limited	n.a.	Yes	Yes	Only during the food crisis
Key market actors	Private sector, limited Ethiopian Grain Board	Agricultural Marketing Corporation (AMC), declining private sector	AMC, limited private trade	Ethiopian Grain Trade Enterprise (EGTE), small traders; small farms, millers	EGTE, traders, coops, Ethiopian Commodity Exchange, processors

NOTE: n.a. = not available.

[a]Production statistics obtained from FAO (various years).

[b]Estimate for 1977–78 is from Ghose (1985), p. 136, assuming 40 percent of the cereal crop area under tenancy with rents equal to 50 percent plus an additional 5 percent to account for sales by other farmers.

[c]Estimate is from the Ministry of Agriculture as cited by Ghose (1985); excludes Tigray and Eritrea.

[d]In 1981–82, peasant farmers accounted for 84 percent of total marketed volume of cereals, of which 60 percent were traded by private traders (Ghose 1985). Thus, peasant sales to AMC were equal to 24 percent (84 – 60 = 24 percent) of the market or 29 percent (24/84 = 29 percent) of the total peasant cereal market. Given that AMC smallholder sales were on average 4.4 percent of total smallholder production in *meher* season (Taffesse 1997), total smallholder sales are 4.4/29 percent = 17 percent, and the total marketed surplus is 17/84 percent = 19 percent of production.

[e]1995–96 estimates are from Negassa, Myers, and Jayne (1997), p. 24.

[f]These estimates are based on the EDRI-IFPRI survey of 2008 (EDRI/IFPRI 2008). The official Government of Ethiopia estimate was 20.6 percent.

[g]1974–75 estimates are from Holmberg (1977), p. 9.

[h]1978–80 AMC estimates cited in Dadi, Negassa, and Franzel (1992), p. 213.

[i]1981–82 estimate from Ghose (1985), p. 137.

[j]Average cereal purchase by the EGTE from 2004–05 to 2007–08.

[k]1980–90 figure is from Ghose (1985), Table 1, p. 131; the other figures are from Ethiopia, CSA (various years).

trader. Assuming that all marketed surplus passes through these small traders, there were a few more than 21,000 traders of this sort in the 1980s. In the 2000s, cereal production averaged 10.7 million tons; of this, 28.1 percent, equivalent to 2.95 million tons, were marketed. Given that the EGTE's share was only 1.87 percent, this implies that the government dealt in only 56,000 tons of cereal and left the rest (about 3.0 million tons) for the private market. Given that a small trader deals in about 10 tons per year, one can conclude that there were about 300,000 traders of this type in the 2000s, which was 14 times more than the number of traders in the 1980s. These statistics suggest a large increase in competition and also indicate that cereal trading is a major livelihood of the rural population.

Cereal Processing

A significant proportion of grain continues to be consumed on-farm in Ethiopia. In very remote rural areas, cereals are still processed manually using mortars and pestles or grinding stones. In relatively accessible rural areas, small-scale water mills, diesel flour mills, and small-scale flour mills are used to process cereals. In these areas, rural households bring their grain to the mills to be processed and pay the processing fee based on the weight of the grain processed. Because manual flour processing is time-consuming, access to reasonably priced flour mills in rural areas represents a great labor-saving opportunity for farms, particularly during peak agricultural seasons. Given that cereals take up a large share of rural households' food budgets and that improved processing can provide cost savings for rural households, the development of processing not only will change the market structure but also has the potential for significant welfare gains for many rural households.

Fortunately, growth in cereal processing has already begun in the country. Until the early 1990s, all commercial flour mills were owned by the government. There were no private-sector-owned flour mills until the mid-1990s. This started changing rapidly in the early 2000s. In 2008, there were 65 large commercial flour mills in the country, with an annual processing capacity of 968,000 tons, which is equivalent to about 30 percent of the market surplus in the country (Table 5.4). Although the processing sector has shown significant growth in a short period of time, the growth in flour mills appears to be highly concentrated. For example, 76 percent of mills are located in Oromiya and Addis Ababa regions, and these two regions account for more than 80 percent of the total processing capacity. Further investigation is needed to determine the extent to which this regional concentration reflects preferences of households for favoring commercial flour meals over custom-made flour meals.

Cooperatives

Smallholder cereal growers face a variety of challenges in accessing markets for both inputs and outputs. Given the small scale and geographic dispersion of

TABLE 5.4 Processing capacity and regional distribution of flour mills in Ethiopia, 2007–08

Region	Number of mills	Average capacity (metric tons per year per mill)	Total annual capacity (metric tons)	Region's share of total capacity (percent)
Addis Ababa	20	31,072	528,228	54
Amhara	7	5,591	39,140	4
Dire Dawa	1	37,397	37,397	4
Oromiya	29	9,380	262,625	27
SNNPR	3	15,000	45,000	5
Tigray	5	11,245	56,224	6
Total	65	15,879	968,614	100

SOURCE: Based on data from Ethiopia, EIA (2008).

NOTE: SNNPR = Southern Nations, Nationalities, and People's Region.

cereal production in Ethiopia, cooperative marketing can, in principle, play a significant role in promoting smallholders' market participation through improving the economies of scale in collection, storage, transportation, and marketing of grains and farm inputs. Cooperatives can vertically integrate smallholder farmers, eliminating some of the middlemen and thereby reducing the length of the value chain and increasing margins for smallholders. This is the logic behind the government's heavy emphasis on promoting agricultural cooperatives in recent years. Given the dismal history of cooperatives during the Derg era, many have considered this policy move surprising.

However, the government appears to be committed to cooperative-led agricultural commercialization. Since the inception of the policy, cooperative membership has been rapidly rising in Ethiopia. The share of households participating in agricultural cooperatives has increased in all major regions of the country (Table 5.5). In 2005, only 9 percent of total smallholders in Ethiopia participated in a cooperative; this number jumped to 36 percent by 2008. More importantly, growth in cooperative membership is higher in regions that grow cereal—that is, Amhara, Oromiya, and the Southern Nations, Nationalities, and People's Region (SNNPR). In Amhara, smallholders' membership in cooperatives almost quadrupled, from 14 percent in 2005 to 54 percent in 2008. Although overall smallholder membership was 31 and 21 percent in 2008 in Oromiya and the SNNPR, respectively, growth in membership was also remarkable in these two regions. For all regions, in 2008, on average, 28 percent of cooperative members sold grains through their cooperative. In 2005, fewer than 40 percent of households had access to a cooperative in their peasant association, and only 17 percent of them participated in the cooperative if they had access to it.

TABLE 5.5 Cooperative membership and use of cooperatives for cereal sales, 2005 and 2008

Year	Participation, marketing indicators	Region (percent)				Total
		Tigray	Amhara	Oromiya	SNNPR	
2005	Smallholders participating in a coop	21	14	7	4	9
	Smallholders with access to a coop in their peasant association (PA)	88	46	42	18	39
	Smallholders participating when they have access to a coop in their PA	22	4	12	9	17
2008	Households that are members of cooperatives	33	54	31	21	36
	Cooperative members that sell grains through cooperatives	8	38	25	19	28
	Share of other households that sell grain through cooperatives	3	21	8	4	10

SOURCE: Bernard et al. (2010).

NOTE: SNNPR = Southern Nations, Nationalities, and People's Region.

The Performance of Cereal Markets

Assessment of market performance requires analyses of prices (over time and space) and the process that influences price formation. This follows from the simple fact that the price of a commodity is the outcome of an exchange process. In the absence of public interventions, three important determinants of an efficient exchange process (market fundamentals) are infrastructure, institutions, and information.[18] If there are inadequacies or incompleteness in these fundamentals, it will be reflected in the prices. For instance, if the markets are not connected with adequate infrastructure and efficient information flow, price shocks in one market location may not get transmitted to the other, which can be detected through spatial integration of market locations. Similarly, if farmers do not have access to credit or risk-mitigating institutions, they are compelled to sell immediately after harvest when prices are low. The presence of such institutional incompleteness can be detected though analysis of price seasonality.

18. Two examples can help make the point clear. First, the results of the "getting-prices-right" campaign of the 1980s, which involved dismantling marketing boards and allowing market forces to determine prices, varied widely across countries. Although liberalization led to higher price variability (Barrett 1997) and subsequent policy reversals in some African countries (Jayne et al. 2001), it was remarkably successful in Vietnam (Goletti and Minot 1998), arguably because that country had better infrastructure and institutions. Second, famines and acute food insecurity have historically been localized phenomena; in fact, many are named after a specific region of a country. The classic example is the Bengal Famine of 1943, which tragically demonstrated how a small decline in food production can trigger a massive food security crisis in the absence of infrastructure, information, and risk-mitigating institutions (Drèze and Sen 1989).

However, price analysis over time and space does not provide direct information about market fundamentals and hence misses some critical aspects of market performance. For example, prices between two locations can be integrated even when transaction costs are high due to high search costs (finding buyers and sellers) or high transport costs due to poor infrastructure. This can be detected by estimating the costs and margins of trade between two locations. Thus, in this section we present analyses of both prices and costs and margins.

Price Analyses

A REVIEW OF AVAILABLE MARKET INTEGRATION STUDIES. Under the assumption of competitive markets, spatial market equilibrium requires that the price differentials between two market locations be equal to transfer costs, including the opportunity costs of capital, labor, and risk. Empirical analyses of market integration can explain the extent and degree of market integration across various market locations. However, when the market is controlled by the government, as was the case in Ethiopia during the socialist regime, such analysis is essentially meaningless. This is the reason that policy analysts never embarked on such analyses in Ethiopia when grain markets were controlled by the AMC.

With the advent of structural adjustment programs and the dismantling of marketing boards, there was increased interest in market integration analyses; such analyses provided evidence as to how markets were evolving following liberalization. Growing interest in the topic led to substantial improvements in the methods of analyzing market integration as well, with more recent applications relying on variants of parity-bound models (PBMs) and threshold cointegration methods.[19] There have been a number of studies, using a variety of econometric methods, on Ethiopian grain markets. The key results, geographic coverage, and methods of a set of studies are presented in Table 5.6.

A central message from all these studies is that the integration of markets across various market locations has improved over time. Using price data from the 1970s and 1980s, the authors of one of the studies, Dadi, Negassa, and Franzel (1992) concluded that the spatial arbitrage was seriously flawed in those decades. Things started changing following liberalization. Using a more robust econometric method, Dercon (1995) concluded that liberalization in the 1990s has had important effects on both the short-run and the long-run integration of teff markets. In other words, compared to earlier decades, more teff markets became integrated following the liberalization. Except for the study of Negassa and Myers (2007), which examined the effects of the 1999 reforms and reported mixed effects, all other studies reported improved market integration across space in recent years.

19. For further details on the methods, please see Barrett (1996), McNew and Fackler (1997), Barrett and Li (2002), and Campenhout (2007).

TABLE 5.6 Summary of cereal market integration studies in Ethiopia, 1992–2007

Author(s)	Commodities	Geographic coverage and time period	Method of analysis	Key findings
Dadi, Negassa, and Franzel (1992)	Maize and teff	Bako area of Western Shoa and Eastern Wollega (1985–89)	Price correlation analysis	Private-sector marketing of maize and teff is characterized by high risk and variable gross margins; spatial arbitrage is seriously flawed, and correlations are very weak for most locations.
Dercon (1995)	Teff	Ethiopia (1987–93)	Modification of Ravallion's method	Liberalization in the early 1990s had important effects on the long-run and short-run integration of markets in that most teff trading market locations were integrated with the Addis Ababa market.
Getnet, Verbeke, and Viaene (2005)	Teff	Ethiopia (1996–2005)	Autoregressive distributed lag model	A long-run and short-run relationship was found between producer prices and the wholesale price in the major terminal market (Addis Ababa).
Negassa and Myers (2007)	Maize and wheat	Ethiopia (1996–2002)	Extended parity bounds model	Grain market reform in 1999 improved spatial market efficiency in a few markets, worsened it in a few others, but generally had little effect on spatial efficiency.
Rashid (2011)	Maize, wheat, and teff	Ethiopia (1996–2007)	Common trend and multivariate co-integration analyses	Most market locations, except Mekelle in the north and Dire Dawa in the eastern part of the country, are integrated. Analyses further suggest that shocks to maize markets have the most persistent effects on all major cereals.

SOURCE: Constructed by the authors.

SEASONALITY OF MAJOR CEREAL PRICES. Seasonality is a fact of life in any agrarian production system. Prices of agricultural crops typically fall immediately after farmers harvest their crops and rise gradually thereafter. In a competitive market (and in the absence of new shocks such as large-scale government interventions), the difference between the harvest-time price and lean-season price should reflect the costs of storage, which consist of opportunity costs of holding stocks (interest charges), storage losses, the costs of labor and capital, and a normal profit (see Timmer, Falcon, and Pearson 1983). Drawing conclusions about whether seasonality is consistent with competitive markets is difficult. However, any changes in the price seasonality are indicative of improvement (or deterioration) of market performance. An improvement in credit access can alleviate farmers' liquidity constraints and hence reduce distress sales and market supply, resulting in an overall increase in postharvest prices. Similarly, improved storage and credit access can lower the cost of storage and hence result in lower lean-season prices. We try to capture these intrayear price changes by estimating the seasonality indexes of four major cereals for three time periods.[20]

Using the seasonality indexes by decade, one can draw two sets of broad implications about whether there are (1) changes in the pattern of seasonality and (2) changes in the magnitudes of indexes. The pattern of seasonality can change, especially if a commodity is nontradable, only if there are changes in the cropping season.[21] Given that the farming season in Ethiopia has not changed over the past three decades, we cannot expect a significant change in the overall pattern of seasonality without large-scale public intervention. The estimates in Table 5.7 appear to be consistent with this idea—that is, prices go up after harvest and rise thereafter—in the cases of maize and teff. This is not the case for wheat, because the seasonal minimums have varied widely across decades. This may be an outcome of a combination of several factors, such as the thinness of wheat markets, the timing of food aid distribution, and the low level of wheat production in the country.

In addition to helping us determine seasonality patterns, these estimates can also be used to draw implications about the improvement in seasonality by checking whether there have been upward movements in the seasonal minimums over time. The estimates for wheat are not conclusive in this regard. However, both maize and teff have exhibited improvement over the past three decades. The seasonal minimums for these two cereals have moved up one month each decade, from December in the 1980s to February (maize) and March (teff) in the 2000s. On the other hand, the seasonal maximums have stabilized in the

20. Given the existing evidence on the spatial integration of markets, seasonality patterns should be similar across various market locations. However, we also recognize that there is evidence that retail cereal prices between 2005 and 2006 rose sharply in some locations (see Sabates-Wheeler and Devereux 2010).

21. This was the case when a winter crop was introduced in Asia during the Green Revolution.

TABLE 5.7 Summary of wholesale price seasonality indexes of staple cereals over time, 1980–2010

	1980–90			1991–2000			2001–10		
Month	Teff	Maize	Wheat	Teff	Maize	Wheat	Teff	Maize	Wheat
January	0.978	0.931	0.964	0.930	0.888	0.947	0.913	0.923	0.910
February	0.951	0.953	0.972	0.933	0.920	0.948	0.894	0.916	0.950
March	0.969	0.949	0.953	0.936	0.978	0.947	0.889	0.919	0.937
April	0.967	0.950	0.980	0.957	0.973	0.969	0.933	0.925	0.979
May	0.963	1.033	1.014	1.009	1.041	0.998	0.992	0.977	0.996
June	1.004	1.027	1.007	1.047	1.101	1.021	1.040	1.100	1.032
July	1.018	1.077	1.031	1.041	1.083	0.907	1.044	1.097	1.046
August	1.058	1.106	1.022	1.049	1.135	1.039	1.090	1.146	1.070
September	1.078	1.119	1.053	1.040	1.063	1.064	1.073	1.093	1.037
October	1.099	1.140	1.109	1.040	0.963	1.067	1.047	0.983	1.014
November	1.119	1.110	0.845	1.027	0.911	1.006	1.031	0.978	0.971
December	0.883	0.919	0.866	0.981	0.913	0.964	0.996	0.912	0.940
				Seasonal maximums					
Index	1.119	1.140	1.109	1.049	1.135	1.067	1.090	1.146	1.070
Month	November	October	October	August	August	October	August	August	August
				Seasonal minimums					
Index	0.883	0.919	0.845	0.930	0.888	0.907	0.889	0.916	0.910
Month	December	December	November	January	January	July	March	February	January
Maximum/ minimum	1.267	1.241	1.313	1.128	1.277	1.177	1.226	1.305	1.175

SOURCE: Authors' calculations based on data from Ethiopia, EGTE (various years).

NOTE: The results for all three major cereals—teff, maize, and wheat—are presented here.

month of August. However, the ratio of seasonal maximums and minimums indicates that the gap between maximum and minimum increased in the 2000s, reflecting unusual price hikes during 2007–09.

VARIABILITY IN GRAIN PRICES. Because of its inherent economic and political implications, managing food price instability has attracted the attention of almost all actors in the food policymaking world over the past few decades. Politicians want food price stability irrespective of their ideology, public administrators have struggled to make food price policies work, and researchers have debated the ways and means of ensuring food price stability. However, all actors agree on the fact that food price instability can have detrimental consequences for consumers, producers, and overall economic growth.[22] This is perhaps the reason that governments across developing countries have repeatedly reverted to some form of price stabilization. Despite officially withdrawing from market intervention, the Ethiopian government had to intervene twice in its grain markets in extraordinary situations in recent years: once in 2002–03, when cereal prices collapsed, and again in 2007–08, when prices skyrocketed.

There is no quantitative guideline as to what level of price stability is desirable for a given country. That level is essentially a political decision that generally depends on country-specific realities. In this section we examine how domestic grain price variability in Ethiopia changed over time by comparing various measures of price variability. The simplest measure of variability is the coefficient of variation (CV), which expresses standard deviation as a percentage of means. This measure is not appropriate when there is a trend in the price data or when the data contain high seasonal or irregular fluctuations. The trend component of the data can be eliminated from the CV by using the Cuddy La Valle index (CLVI).[23] Although it accounts for the trend, the CLVI still contains seasonal and irregular components. Therefore, a moving average is used to calculate the CV.

All three estimates are presented in Table 5.8. The results suggest that cereal prices were more stable in the 1990s than in any other period and that in the years following complete withdrawal of the EGTE from cereal price stabilization there has been higher price variability. These results give rise to two obvious questions: (1) Why was cereal price variability high in the 1980s despite tight government control? and (2) Why did price variability increase in the 2000s despite an overall improvement in market infrastructure? The answer to the first question lies in the famine and production shocks in the 1980s. Marketing restrictions that impeded cereal flows across administrative boundaries undoubtedly also played a role (Webb and von Braun 1994).

22. For further details, see Newbery and Stiglitz (1981), Timmer (1989), William and Wright (1991), and Fafchamps (1992).

23. The CLVI is expressed as $CLVI = CV\sqrt{(1 - R^2)}$, where CV is the standard deviation as a percentage of the mean and R^2 is obtained by regressing the log of prices on a time trend.

TABLE 5.8 Cereal price variability over time, 1983–2008

Time period	Measures of variability	Cereals				
		Maize	Wheat	Sorghum	Barley	Teff
2000s	Coefficient of variation	71.33	53.45	59.82	60.95	51.27
	Cuddy La Valle index	36.37	24.40	29.35	23.05	28.48
	Coefficient of variation (based on a MA series)	50.17	40.96	43.68	46.59	37.45
1990s	Coefficient of variation	23.01	16.81	20.05	17.75	16.00
	Cuddy La Valle index	22.59	11.45	18.67	15.06	9.49
	Coefficient of variation (based on a MA series)	17.07	13.79	14.23	15.18	13.29
1980s	Coefficient of variation	41.91	31.95	31.54	28.45	24.67
	Cuddy La Valle index	41.79	31.18	30.07	28.37	24.39
	Coefficient of variation (based on a MA series)	34.72	24.54	26.66	21.14	18.92

SOURCE: Authors' calculations based on price data from Ethiopia, EGTE (various years).

NOTE: MA = moving average.

On the other hand, high price variability in the postreform period has been caused by production shocks in 2002–03 and by very unpredictable market behaviors during 2006–08, when domestic prices went above import parity for several months. A few in-depth studies have attempted to understand reasons behind sharp increases in cereal prices despite consecutive years of bumper harvests during 2006–08 (World Bank 2007; IFPRI and EDRI 2009; Rashid and Lemma 2011). These studies conclude that the sharp price increase in that period did not result from structural problems in the market; it was rather an outcome of a set of information failures and macroeconomic policy responses. In particular, these studies argue that the price increase resulted from a series of events, including an overestimated production forecast, a balance-of-payments problem that prompted the government's decision to ration foreign exchanges and restrict private imports (IFPRI and EDRI 2009; Rashid and Lemma 2011), and a disproportionate increase in the money supply relative to overall economic growth (World Bank 2007).

Marketing Costs and Margins

Analyses of marketing costs and margins can reveal important information about the functioning of a market. In many developing countries, marketing margins, the difference between farmgate price and consumer price, are large; this can be due either to high transaction costs or to some kind of market imperfection. When the large margin is due to high transaction costs, it can be reduced by appropriate government investment in infrastructure. On the other hand, if the margin is excessively high compared to carefully collected data on total

transaction costs, it would imply the presence of monopolistic behavior in the market. In this section we compare costs and margins of the cereal trade from two different traders' surveys—one conducted in 2002 and the other in 2008, respectively. The first survey was conducted by IFPRI and the International Livestock Research Institute, and the second was conducted by IFPRI and the Ethiopian Development Research Institute. Four important points need to be highlighted about the comparability of the results: (1) both surveys included the same set of questions regarding costs and margins; (2) only the samples of markets that were included in both surveys are used; (3) due to wide dispersion, both mean and median values are reported; and finally, (4) the estimated nominal numbers are deflated by the general consumer price index (CPI).[24]

Table 5.9 presents the summary of components of transaction costs and trade margins from this analysis. The estimates suggest that, since 2002, there have been sizeable declines in most components of transaction costs and margins, especially if the mean values are considered. In 2006 prices, the mean transaction cost per ton of traded volume in 2002 was ETB 176, which declined to about ETB 66 in 2008; that is, the real price in 2008 was far less than half of 2002 prices. When median values are considered, the estimate drops from ETB 53 per ton in 2002 to ETB 22 per ton in 2008, which translates to a decline of about 59 percent. In other words, total transaction costs in 2008 were less than half of what they were in 2002. Looking at the components of these costs, we see very sharp declines in three large cost components: transport costs, handling costs, and brokerage costs. Compared to 2002, the average handling and transport costs per ton in 2008 were about 32 and 27 percent, respectively. The brokerage fees declined even more dramatically, with 2008 costs 8 percent of those in 2002.

Changes in trade margins tell a similar story. The average price differential —the difference between sales and purchase price—declined from ETB 141 per ton in 2002 to ETB 102 per ton in 2008. There were similar declines in both gross and net margins, although the magnitudes were smaller if the median values are considered. The gross margin, defined as the ratio of sales price to purchase price, declined from 7 percent in 2002 to only 4 percent in 2008, if the mean values are considered, and from 4 percent to 3 percent if median values are considered. The net margin, defined as sale price minus purchase price plus transaction costs, also declined from ETB 132 per ton to ETB 37 per ton.

The impacts of these changes on grain prices are substantial. To demonstrate, consider the share of transaction costs in maize prices. In 2002, the wholesale price of maize was ETB 553 per ton, and the transaction cost was ETB 100 per ton, or 18 percent of the price. In 2008, the wholesale price of maize was

24. In an earlier version of this chapter we also reported Gabre-Madhin's (2001) results based on her 1996 survey. Those estimates are now dropped because they are not strictly comparable. Regarding the use of deflators, one can argue that the transaction costs are nonfood in nature and hence should be deflated by the nonfood CPI. However, a large share of transaction costs are labor related and are thus influenced by food inflation rather than nonfood inflation.

TABLE 5.9 Changes in the real costs and margins of the grain trade since 1996

	2002		2008		Absolute change since 2002	
Costs and margins	Mean	Median	Mean	Median	Mean	Median
A. Transaction costs						
Total transaction costs (ETB/ton)	176.4	52.91	65.7	21.90	110.7	31.01
Handling	54.7	10.58	17.7	5.91	36.9	4.67
Sacking	56.4	24.29	21.0	6.94	35.4	17.34
Transport	37.0	6.88	9.9	3.28	27.2	3.59
Storage	1.8	0.05	0.7	0.22	1.1	0.17
Road stop	0.0	0.53	0.0	0.07	0.0	0.46
Brokers	15.9	4.76	1.3	1.09	14.6	3.67
Travel	1.4	0.53	0.7	0.22	0.8	0.31
Others	9.2	5.29	14.5	4.16	5.3	1.13
B. Trade margins						
Price difference (ETB/ton)	141.0	88.2	102.2	73.0	38.9	15.19
Gross margin rate (percent)	7	4	4	3	3	1
Net margin (ETB/ton)	132.3	52.9	37.0	43.8	95.3	9.11

SOURCE: The estimates for 2002 and 2008 are calculated by the authors from IFPRI-ILRI and IFPRI-EDRI surveys conducted in 2002 and 2008, respectively. Their calculations are based on the samples that match in both rounds.

NOTES: All nominal values are deflated by the April consumer price index (December 2006 = 100) because the surveys were conducted during March–May of the respective years. ETB/ton = Ethiopian birr per ton. *Gross margin* is defined as the percentage difference between sale and purchase price. *Net margin* is defined as the difference between sale price and the sum of purchase price and out-of-pocket transaction costs.

ETB 4,170 per ton, while the transaction cost was ETB 90 per ton, or about 2.2 percent of the price. If the transaction costs had remained at the 2002 level, prices would have been more than 15 percent higher. In other words, the wholesale price of maize would have been ETB 4,796 per ton, and market conditions would have been far worse than what was observed in 2008. Thus, although other factors might have played roles, these numbers are indicative of an overall improvement in Ethiopian cereal market efficiency.

Conclusions

Cereal production and marketing play vital roles in Ethiopia's economy. Major changes in the ideology of the Ethiopian government have contributed to several key shifts in Ethiopian cereal markets and policy structure. The imperial regime under Emperor Haile Selassie was characterized by limited government interventions and minimal rural infrastructure. The state-controlled markets under the Derg regime introduced a period of significant government involve-

ment, setting prices through the AMC. The recent period has been characterized by a series of reforms and investments in improving market fundamentals, which have triggered increasing competition in the country's cereal market. Since the early 1990s, the government has gradually withdrawn from the market by limiting the roles and responsibilities of the EGTE, the national food logistics agency. These policy reforms have resulted in major changes in the structure of Ethiopian cereal markets, including an increase in the number of all types of market actors, the emergence of cooperatives in both production and marketing, and growth of the grain processing sector. However, the EGTE has continued ad hoc market interventions in recent years, including domestic procurement in 2003 and international procurement and domestic distribution in 2007–08. This chapter argues that, in order to avoid market actors' loss of policy credibility, it is important to make EGTE interventions rule-based, transparent, and predictable.

Great strides have been made in terms of improving market fundamentals such as roads, telecommunications, and market institutions (including commodity exchanges and warehouse receipts systems) in the past 10 years. These improvements have contributed to reducing transaction costs and improving market efficiency. However, this chapter argues that two issues need further policy attention. First, Ethiopia still lags far behind its neighbors in terms of cellular phone ownership. Only 2 percent of the people in Ethiopia owned a cell phone in 2008, compared to more than 40 percent in Kenya and more than 30 percent in Uganda. Yet, all three countries were at the same level of cell phone ownership only about 8 years ago. Second, although there was much hope and optimism during the inception and launch of the ECX, the exchange has not lived up to expectations in terms of promoting cereal market development. In fact, given the size of the country's cereal markets, the cereal trade volume at the ECX will have to increase many times to influence prices and to pass other anticipated benefits to the market actors.

The performance of the Ethiopian cereal market has greatly improved, particularly in terms of increased market integration and reduction in marketing costs and margins. However, price variability has worsened in the past decade. This is partly due to the unusual circumstance of 2003 and just before and after the cereal price spike in 2007 and 2008, when policy interventions were ad hoc and unpredictable. Almost all existing studies find that cereal markets are spatially integrated, suggesting that there are no abnormalities in price transmission. Furthermore, contrary to the common perception that the seasonality of grain markets is changing, this study finds that seasonal variations in prices tend to follow the country's production cycles. Price stability varied in both the 1980s and the 2000s, most likely stemming from famine conditions in the 1980s and the recent food price crisis. Thus, there is substantial evidence that cereal markets in Ethiopia have matured over the years. Continued progress is not automatic, however, and will depend much on government policy and investments in market infrastructure.

Appendix

TABLE 5A.1 Chronology of government grain market interventions in Ethiopia, 1950–2007

Proclamation, notice, or regulation number and year	Relevant institution directly affected	Stated objectives of policy intervention
Ethiopian Grain Board Proclamation 113/1950	Ethiopian Grain Board	To license grain export and control quality To oversee marketing intelligence To regulate domestic and export purchases and export sales prices
General Notice 267/1960	Ethiopian Grain Corporation	To purchase and sell grain in local and foreign markets To establish grain purchase and sales outlets throughout the country To hold stocks to stabilize prices
Agricultural Marketing Corporation Establishment Proclamation 105/1976	Agricultural Marketing Corporation (AMC)	To purchase agricultural products for export or sale in the domestic market To import agricultural products To purchase and sell inputs within Ethiopia or abroad To purchase, process, mill, transport, sell, or store agricultural products and inputs for profit or otherwise To construct, equip, and maintain buildings, silos, storage facilities, grain elevators, and other structures and machinery To maintain a national grain reserve
Legal Notice 103/1987	AMC	To buy grain from suppliers and sell to (a) mass organizations and other organizations engaged in retail trade, (b) public enterprises engaged in export trade, and (c) government offices To supply grain to government, mass organizations, and private factories that use it as a raw material

		To maintain a national emergency grain reserve To construct, equip, and maintain, for its own use, buildings, silos, storage facilities, grain elevators, and other structures and machinery To sell or otherwise dispose of any grain prone to deterioration or unfit for human consumption in accordance with directives from the minister
Council of Ministers Regulation 25/1992	Ethiopian Grain Trade Enterprise (EGTE)	To stabilize markets and prices in order to encourage producers to increase their output and protect consumers from unfair grain prices To export grains to earn foreign exchange To maintain a grain buffer stock for market stabilization To engage in any other related activity for the attainment of its objectives
Council of Ministers Regulation 58/1999	EGTE	To purchase grain from farmers and sell it in local and mainly in export markets To contribute to the stabilization of markets for farmers' produce to encourage them to increase their outputs To engage in other related activities conducive to the attainment of its purposes
Proclamation 67/2000	Emergency Food Security Reserve Administration	To provide adequate capacity to prevent disasters on the occurrence of slow- and fast-onset disasters through the provision of loans to the Disaster Prevention and Preparedness Commission and organizations engaged in relief activities until additional relief food can be mobilized through other mechanisms
Proclamation 212/2000	National Disaster Prevention and Preparedness Fund Establishment	To maintain a readily available cash reserve to combat disasters that are likely to threaten the lives of people and livestock until such time as other resources can be mobilized locally or from abroad To assist the implementation of employment generation schemes that would support the achievement of national food security

(*continued*)

TABLE 5A.1 Continued

Proclamation, notice, or regulation number and year	Relevant institution directly affected	Stated objectives of policy intervention
Warehouse Receipts System Proclamation 372/2003	Warehouse operators	To put in place a legal framework creating a warehouse system in order to help farmers cope with price fluctuations
Proclamation 380/2004	Ethiopian Grain Trade Enterprise (EGTE)	To change the accountability of the EGTE from the public enterprise authority to the Ministry of Agriculture and Rural Development
Ethiopian Commodity Exchange Proclamation 550/2007	Ethiopian Commodity Exchange (ECX)	To create an efficient, transparent, and orderly marketing system that serves the needs of buyers, sellers, and intermediaries and promotes the increased market participation of Ethiopian small-scale producers To provide an automated back-office operation to record, monitor, and publicly disseminate information on ECX transactions
Ethiopian Commodity Exchange Authority Proclamation 551/2007	ECX	To ensure the development of an efficient modern trading system and to regulate and control the secure, transparent, and stable functioning of a commodity exchange and to protect the rights and benefits of sellers, buyers, intermediaries, and the general public

SOURCES: Various issues of *Negarit Gazeta* (Imperial Ethiopian Government 1950, 1960); Provisional Military Administration Council of Ethiopia (1976, 1987); Transitional Government of Ethiopia (1992a, 1992b); FDRE (1999, 2006).

References

Amha, W. 1999. "Maize Marketing in Ethiopia: Liberalization and Price Integration Issues." *Ethiopian Journal of Development Research* 21 (1): 79–120.

Barrett, C. B. 1996. "Market Analysis Methods: Are Our Enriched Toolkits Well Suited to Enlivened Markets?" *American Journal of Agricultural Economics* 78 (3): 825–829.

———. 1997. "Food Marketing Liberalization and Trader Entry: Evidence from Madagascar." *World Development* 25 (5): 763–777.

Barrett, C. B., and J. R. Li. 2002. "Distinguishing between Equilibrium and Integration in Spatial Price Analysis." *American Journal of Agricultural Economics* 84 (2): 292–307.

Bekele, G. 2002. "The Role of the Ethiopian Grain Trade Enterprise in Price Policy." In *Agriculture Technology Diffusion and Price Policy in Addis Ababa*, ed. T. Bonger, E. Gabre-Madhin, and S. Babu. Proceedings of a Policy Forum in Addis Ababa: 2020 Vision Network for East Africa Report 1. Addis Ababa, Ethiopia, and Washington, DC: Ethiopian Development Research Institute and International Food Policy Research Institute.

Bernard, T., and D. J. Spielman. 2009. "Reaching the Rural Poor through Producer Organizations? A Study of Agricultural Marketing Cooperatives in Ethiopia." *Food Policy* 34 (1): 60–69.

Bernard, T., D. J. Spielman, A. S. Taffesse, and E. Z. Gabre-Madhin. 2010. *Cooperatives for Staple Crop Marketing.* Research Monograph 164. Washington, DC: International Food Policy Research Institute.

Campenhout, B. V. 2007. "Modeling Trends in Food Market Integration: Method and an Application to Tanzanian Maize Markets." *Food Policy* 32: 112–127.

Dadi, L., A. Negassa, and S. Franzel. 1992. "Marketing of Maize and Teff in Western Ethiopia: Implications for Policy Following Market Liberalization." *Food Policy* 17 (3): 201–213.

Dercon, S. 1995. "On Market Integration and Liberalization: Method and Application to Ethiopia." *Journal of Development Studies* 32: 112–143.

Dessalegn, G., T. S. Jayne, and J. D. Shaffer. 1998. *Market Structure, Conduct, and Performance: Constraints of Performance of Ethiopian Grain Markets.* Grain Market Research Project Working Paper 9. East Lansing, MI, US: Grain Market Research Project, Michigan State University.

Diao, X., and A. Nin Pratt. 2007. "Growth Options and Poverty Reduction in Ethiopia—An Economy-wide Model Analysis." *Food Policy* 32 (7): 205–228.

Drèze, J., and A. Sen. 1989. *Hunger and Public Action.* WIDER Studies in Development Economics. Oxford, UK: Oxford University Press.

EDRI/IFPRI (Ethiopian Development Research Institute/International Food Policy Research Institute). 2008. *Cereal Production Survey.* Addis Ababa, Ethiopia.

Ethiopia, CSA (Central Statistical Agency). 1998. *Revised Report on the 1995/96 Household Income, Consumption and Expenditure Survey.* Statistical Bulletin 204. Addis Ababa.

———. 2001. *Report on the 1999/2000 Household Income, Consumption, and Expenditure Survey.* Statistical Bulletin 258. Addis Ababa.

———. 2003. *Statistical Report on Socioeconomic Characteristics of the Population in*

Agricultural Households, Land Use, and Area and Production of Crops: Part 1. Addis Ababa.

———. 2007. *Report on the 2004/2005 Household Income, Consumption, and Expenditure Survey*, vol. 2. Statistical Report 394. Addis Ababa.

———. Various years. *Agricultural Sample Survey: Report on Land Utilization.* Addis Ababa.

Ethiopia, EGTE (Ethiopian Grain Trade Enterprise). Various years. *Market Statistics: Wholesale Price of Commodities for Selected Markets.* Accessed July 2009. http://egtemis.com/pricemany.asp.

Ethiopia, EIA (Ethiopian Investment Authority). 2008. *Annual Statistical Bulletin 2006/07.* Addis Ababa.

Ethiopia, ERA (Ethiopian Roads Authority). Various years. *Annual Statistical Bulletin.* Addis Ababa.

Ethiopia, ETC (Ethiopian Telecommunications Corporation). Various years. *Reports and Bulletins.* Addis Ababa.

Ethiopia, MoTC (Ministry of Transport and Communication). 2008. Unpublished data on truck industry. Addis Ababa.

Fafchamps, M. 1992. "Cash Crop Production, Food Price Volatility, and Rural Market Integration in the Third World." *American Journal of Agricultural Economics* 74 (1): 90–99.

FAO (Food and Agriculture Organization). Various years. Food Production Data Base. Accessed July 2009. http://faostat.fao.org/site/291/default.aspx.

FDRE (Federal Democratic Republic of Ethiopia). 1999. Ethiopian Grain Trade Enterprise Re-establishment: Council of Ministers Regulation 58/1999. *Negarit Gazeta.* Addis Ababa, Ethiopia.

———. 2006. *National Transport Master Plan Study: Existing Road Infrastructure Plans.* Working Papers 9 and 15. Addis Ababa, Ethiopia.

Franzel, S., F. Colburn, and G. Degu. 1989. "Grain Marketing Regulations: Impact on Peasant Production in Ethiopia." *Food Policy* 14 (4): 347–358.

Gabre-Madhin, E. Z. 2001. *Market Institutions, Transaction Costs, and Social Capital in the Ethiopian Grain Market.* Research Report 124. Washington, DC: International Food Policy Research Institute.

Gabre-Madhin, E., and A. Negassa. 2006. "Linking Trading Practices and Arbitrage Behavior in the Ethiopia Grain Market." Mimeo. International Food Policy Research Institute, Washington, DC.

Getnet, K., W. Verbeke, and J. Viaene. 2005. "Modeling Price Transmission in the Grain Markets of Ethiopia with Application of ARDL Approach to White Teff." *Agricultural Economics* 33 (3): 493–501.

Ghose, A. K. 1985. "Transforming Feudal Agriculture: Agrarian Change in Ethiopia since 1974." *Journal of Development Studies* 23 (1): 127–149.

Goletti, F., and N. Minot. 1998. "Export Liberalization and Household Welfare: The Case of Rice in Vietnam." *American Journal of Agricultural Economics* 80 (40): 738–749.

Gutema, D. 1988. "Grain Marketing and Distribution Status and Future Direction." Paper presented at the 19th National Crop Improvement Conference, April 22–26, 1987, at the Institute of Agricultural Research, Addis Ababa, Ethiopia.

Holmberg, J. 1977. *Grain Marketing and Land Reform in Ethiopia: An Analysis of the Marketing and Pricing of Food Grains in 1976 after the Land Reform.* Research Report 41. Uppsala, Sweden: Scandinavian Institute of African Studies.

Imperial Ethiopian Government. 1950. Ethiopian Grain Board Proclamation 113/1950. *Negarit Gazeta.* Addis Ababa, Ethiopia.

———. 1960. General Notice 267/1960. *Negarit Gazeta*. Addis Ababa, Ethiopia.

IFPRI and EDRI (International Food Policy Research Institute and Ethiopian Development Research Institute). 2009. *A Study in Support of the Mars-Food Action of the European Union: The Cereal Availability in Ethiopia.* Report submitted to the Joint Research Centre of the European Commission. Ispra, Italy.

Jayne, T. S., A. Chapoto, J. Nyoro, A. Mwanaumo, and J. Govereh. 2001. "False Promise or False Premise? The Experience of Food and Input Market Reform in Eastern and Southern Africa." *World Development* 30 (11): 1967–1985.

Lemma, S. 1996. "State Agrarian Policies and Periodic Markets in Ethiopia." *Journal of Ethiopian Studies* 29 (1): 78–105.

Lirenso, A. 1987. *Grain Marketing and Pricing in Ethiopia.* Research Report 28. Addis Ababa, Ethiopia: Institute of Development Research, Addis Ababa University.

———. 1994. "Liberalizing Ethiopian Grain Markets." In *Papers of the 12th International Conference of Ethiopian Studies*, ed. H. Marcus and G. Hudson. East Lansing, MI, US: Michigan State University.

McNew, K., and P. L. Fackler. 1997. "Testing Market Equilibrium: Is Co-integration Informative?" *Journal of Agricultural Resource Economics* 22 (2): 191–207.

Negassa, A., and R. Myers, 2007. "Estimating Policy Effects on Spatial Market Efficiency: An Extension to the Parity Bound Model." *American Journal of Agricultural Economics* 89 (2): 338–352.

Negassa, A., R. Myers, and T. S. Jayne. 1997. *The Response of Ethiopian Grain Markets to Liberalization.* Grain Market Research Project Working Paper 6. Addis Ababa, Ethiopia: Ministry of Economic Development and Cooperation.

Newbery, D. M. G., and J. E. Stiglitz. 1981. "Optimal Commodity Stock-piling Rules." *Oxford Economic Papers* 34 (3): 403–427.

Provisional Military Administration Council of Ethiopia. 1976. Agricultural Marketing Corporation Establishment Proclamation 105/1976. *Negarit Gazeta.* Addis Ababa, Ethiopia.

———. 1987. Regulations to Provide for the Re-establishment of the Agricultural Marketing Corporation: Legal Notice No. 103/1987. *Negarit Gazeta.* Addis Ababa, Ethiopia.

Rashid, S. 2010. "Staple Food Markets in Ethiopia." Paper prepared for the COMESA policy workshop on food price variability, January 25–26, in Maputo, Ethiopia. Available at www.aec.msu.edu/fs2/aamp/seminar_3/AAMP_Maputo_27_Ethiopia_ppr.pdf.

———. 2011. *Inter-commodity Price Transmission and Food Price Policies: An Analysis of Ethiopian Cereals Markets.* IFPRI Discussion Paper 1079. Washington, DC: International Food Policy Research Institute.

Rashid, S., and M. Assefa. 2006. "Cereal Price Instability in Ethiopia: An Analysis of Sources and Policy Options." Paper prepared for the Agricultural Economics Association for Africa, Accra, Ghana.

Rashid, S., and S. Lemma. 2011. *Strategic Grain Reserve in Ethiopia: Institutional Design and Operational Performance.* IFPRI Discussion Paper 1054. Washington, DC: International Food Policy Research Institute.

Rashid, S., A. Winter-Nelson, and P. Garcia. 2010. *Purpose and Potentials of Agricultural Commodity Exchanges in African Economies.* IFPRI Discussion Paper 1035. Washington, DC: International Food Policy Research Institute.

Sabates-Wheeler, R., and S. Devereux. 2010. "Cash Transfers and High Food Prices: Explaining Outcomes on Ethiopia's Productive Safety Net Programme." *Food Policy* 35 (4): 274–285.

Taffesse, A. S. 1997. *Government Policy and Dynamic Supply Response: A Study of the Compulsory Grain Delivery System.* Munich Personal RePEc Archive Paper 18674. Munich, Germany: University Library of Munich.

Timmer, C. P. 1989. *Agricultural Prices and Stabilization Policies.* Development Discussion Paper 290. Boston: Harvard Institute of International Development.

Timmer, C. P., W. P. Falcon, and S. R. Pearson. 1983. *Food Policy Analysis.* Washington, DC: World Bank.

Transitional Government of Ethiopia. 1992a. Proclamations on Public Enterprise: Proclamation 25/1992. *Negarit Gazeta.* Addis Ababa, Ethiopia.

———. 1992b. Council of Ministers Regulations to Provide for the Establishment of Ethiopian Grain Trade Enterprise: Council of Ministers Regulation 104/1992. *Negarit Gazeta.* Addis Ababa, Ethiopia: Government of Ethiopia.

Webb, P., and J. von Braun. 1994. *Famine and Food Security in Ethiopia: Lessons for Africa.* International Food Policy Research Institute. West Sussex, UK: John Wiley & Sons.

WFP (World Food Programme). 1989. *Mid-Term Evaluation by a WFP/FAO/ILO/UN Mission of Project Ethiopia 2488/(Exp. II): Rehabilitation of Forest, Grazing, and Agricultural Lands,* vol. 1. Addis Ababa, Ethiopia.

William, J. C., and B. D. Wright. 1991. *Storage and Commodity Markets.* New York: Cambridge University Press.

World Bank. 2007. "Explaining Sources of Food Price Inflation in Ethiopia: A Just in Time Policy Note." World Bank, Washington, DC. Mimeo (draft).

———. 2010. World Development Indicators database. Accessed July 2009. http://data.worldbank.org/data-catalog/world-development-indicators.