Chapter 11

SUPPLY CHAIN FROM PRODUCTION AREAS TO ADDIS ABABA

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The importance of cities is rapidly growing. It is estimated that more than half of the world population was living in cities in 2010; this is up from 30 percent in the 1950s (UN Population Division 2010). Given this rapid urbanization, especially so in developing countries, and the increasing importance of the manufacturing and service sectors in these countries' economies, more people are making a living outside agriculture. As part of this change, many more people do not grow their own food and rely on market purchases for their food needs. This results in rapidly increasing agricultural market flows, especially from rural to urban areas, with a high number of people on the production and consumption side depending on the functioning of these value chains. This dynamic has profound implications on people's food security in developing countries.

Separate to these observed global changes in urbanization, Africa's urban population is also rapidly increasing. The urbanization rate is projected to be as high as 60 percent by 2050 (UN Population Division 2010), and there are growing concerns by local policy makers about the increasing dependence of people in African cities on imported foods.[1] This increasing dependency is often blamed on uncompetitive local value chains (for example, Rakotoarisoa, Iafrata, and Paschali 2011). However, few studies have scientifically examined the functioning of domestic food value chains in developing countries, especially so in Africa. This lack of scientific research leads to a policy debate that might not be well informed. A number of common perceptions on food value chains in developing countries exist.

1 Christiaensen and Devarajan (2013) found that since the mid-2000s, Africa converted from a net exporter of agricultural products to a net importer. Much of the growth in imports concerns staples for the rapidly expanding urban populations. They state that "except for wheat, which is a temperate-zone crop, these are all products in which Africa enjoys a comparative advantage" (Christiaensen and Devarajan 2013, 185).

First, it is often assumed that farmers only obtain a small share of the final retail prices. However, few systematic recent reviews based on solid surveys have been done on this issue. Ahmed (1987) compared producer shares in final retail prices in Asia and Africa in the 1980s.[2] They showed that producer shares in final consumer prices were as high as 75 to 90 percent in Asia but as low as 35 to 60 percent in Africa. Barker, Herdt, and Rose (1985) looked at the producer share of rice in Asia and found similar orders of magnitude. Gollin and Rogerson (2010) found in Uganda that farmgate prices for cassava and maize were often significantly less than half of wholesale prices, across many crops and regions. The World Bank (2008) estimates the share that farmers receive of the final retail price of maize in Ghana to be 56 percent.

Second, another perception is that these value chains are characterized by many layers of traders between producers and consumers, making the process inefficient (for example, Masters 2008; Mondal 2010; World Bank 2009). The World Bank states that "in agriculture-based and transforming countries . . . layers of intermediaries are common in the marketing of food staples and other agricultural commodities" (World Bank 2008, 119). Mattoo, Mishra, and Narain (2007) and Landes and Burfisher (2009) argued that in the case of India most agricultural trade is mediated by a large number of intermediaries. This system not only inflates prices but also takes time to move products from farmers to consumers, which leads to large transit costs. Trienekens (2011) argues that local value chains in developing countries are long in contrast with modern supermarket channels and export markets. Examples documented in Ghana (World Bank 2008) and Ethiopia (Rashid and Negassa 2011; Rashid and Minot 2010) illustrate how staple cereal chains are often long and complex.

Third, smallholder farmers are often driven to distress sales just after harvest when prices are low (Grootaert, Oh, and Swamy 2002; Prasad and Prasad 1995). This is linked to high seasonality in agricultural production in developing countries, with important vulnerability implications of producers that mostly depend on this production for their livelihood (Dercon and Krishnan 2000; Devereux, Sabates-Wheeler, and Longhurst 2012). Moreover, given farmers' vulnerable situation, traders are believed to typically prey upon them by offering exploitative interlinkage contracting where farmers are offered advances in exchange for securing supplies at low prices at harvest time (Crow

2 While producer shares are an imperfect indicator of marketing performance, this is used throughout the chapter given that it is commonly used in the debate and that there are no other easy indicators readily available.

and Murshid 1994; Bell 1988) or traders hoard agricultural products as to obtain high prices in the off-season. In some cases, it has been shown that, given imperfect credit markets and urgent liquidity needs, farmers are obliged to sell products at low prices and then they buy back the same product at high prices in the lean period (Barrett 1996; Barrett and Dorosh 1996; Stephens and Barrett 2011).

The impact of these common perceptions is not to be underestimated. Government and other stakeholders often try to intervene in these markets, assuming that they are not functioning well. The following examples illustrate this. First, cooperative marketing is often promoted on the assumption that it increases the bargaining power of farmers, solves some of the economies-of-scale issues that farmers face in the market, and thereby help to improve the prices smallholders receive for their produce (Bernard et al. 2010; CTA 2012; UK, DFID 2004). Second, modern commodity exchanges are increasingly established in Africa to improve objective grading, transparency, as well as competition in agricultural markets (Gabre-Madhin 2012). Third, credit schemes (for example, warehouse receipt systems or communal storage schemes) are being promoted to reduce the impact of distress sales (World Bank 2012; UK, DFID 2004; Alavi et al. 2012). In such schemes, farmers use their unsold produce as collateral to obtain credit to meet immediate expenditures. This enables them to retain their produce to sell later in the off-season when they can benefit from higher prices.

There are, however, issues with the evidence base on the functioning of these staple food markets. First, the common practice in food value-chain analysis is that it does not rely on representative surveys and often only uses anecdotal or qualitative evidence (for example, Webber and Labaste 2009; Nang'ole, Mithöfer, and Franzel 2011; World Bank 2009). Moreover, there is often a lack of reliable data on a larger scale in Africa (Jerven 2013), making credible inferences difficult on the state of agricultural marketing. Second, most of the recent studies on food value chains are focused on emerging high-value products, while surveys that study staple crops are often outdated (Ahmed 1987). Third, in the case that surveys were fielded, these typically focus on randomly selected farmers, who might not be representative of farmers who effectively participate in value chains of specific crops (Alavi et al. 2012; World Bank 2009) and are less important in major food supply areas.

In this chapter, the value-chain structure, price formation, and the importance of distress sales in rural–urban staple food value chains in Ethiopia are analyzed. This analysis is based on an innovative survey design involving detailed primary surveys at different levels in the value chain from major production areas to a major urban center. In particular, the focus is on the marketing of teff from the most important production zones (representing 42 percent of the commercial surplus nationally and more than 90 percent of the supply to Addis Ababa) to the biggest city in the country, Addis Ababa. This city is estimated officially to be home to four million people, although this is likely an underestimate.

In this chapter the specific areas studied are threefold. First, information on prices for a major staple in major production zones to the final terminal market are collected. Second, data on the structure of value chains is gathered by carefully investigating procurement and sales practices by these value agents. The rural–urban value chains are found to be relatively short. Consistent with this structure, the margins in these major commercial domestic staple value chains are surprisingly small, and the average share of the final retail price that the producer receives reaches about 80 percent. Third, the producer prices are found to decline over space in line with transportation costs. Also, releases by the producer of teff stocks in storage over the year is rather smooth over time, and distress sales are of minor importance.

These findings point to some important policy implications. First, given the lack of good data on food value chains and the often rapid changes that occur in such value chains globally (for example, Reardon et al. 2012), the collection of reliable primary data is essential. Such data might fuel the policy debate in order to make more informed decisions to address policies, specifically on the extent different constraints have on the functioning of these food value chains. Second, policies aimed at improving market efficiencies—such as stimulating the involvement of cooperatives in output marketing (CTA 2012), the establishment of modern exchanges (Francesconi and Heerink 2010; Gabre-Madhin 2012), or warehouse receipt systems (World Bank 2009, 2012)—should be carefully evaluated to assess where these policies are expected to improve market functioning, especially of staples, and what the expected benefits would be compared to the costs. The structure of the chapter is as follows: The data are presented first, followed by some basic descriptives of the teff value chain. Further on, the structure and price formation in the chain is explored. In the final sections the spatial and temporal concerns are discussed, followed by the conclusion.

Data

The study relies on data from major teff-producing areas and follows the value chain from there to Addis Ababa, the capital of Ethiopia. To obtain this information, two types of activities were organized. Interviews were conducted with key informants in the value chain in September and October 2012, which in turn was used to design questionnaires for each level in the value chain. Surveys using these questionnaires were fielded at the end of 2012. They were fielded upstream in the value chain with teff producers and communities, midstream with rural and urban wholesalers and truckers, and downstream with cereal shops, mills, and cooperative retail. We decided to rely on these particular datasets as no other data of this nature—where large samples of agents were interviewed along the value chain—are available in Ethiopia.

Upstream in the value chain, 1,200 teff farmers were selected, which involved several steps as follows. First, the five zones with the highest commercial surplus of teff in the country were chosen. In 2011/2012 these five zones combined represented 38 percent and 42 percent of the national teff area and commercial surplus, respectively. Second, within each production zone the woredas were ranked from smallest to largest producer (in terms of area cultivated). These woredas were then divided into two groups, the least productive (cultivating all together 50 percent of the area in the zone) and the most productive (also cultivating all together 50 percent of the area in the zone). Two woredas were randomly selected from each group. Third, a list of all the kebeles of the selected woredas was obtained. Two kebeles were randomly chosen from the top 50 percent producing kebeles and one from the low 50 percent producing kebeles. Fourth, a list of all teff producers in the preceding season in the selected kebeles was then made. They were ranked from small to large teff producers (based on the area cultivated). The farmers were then divided into two groups, the small production farmers (cultivating all together 50 percent of the area) and the large production farmers (cultivating all together 50 percent of the area). Next, 20 farmers were selected: 10 from the small production farmers and 10 from the large production farmers. In total, 240 farmers were interviewed per zone.

Midstream in the value chain, this strategy was followed. First, 40 rural wholesalers were interviewed in each rural zone. For each woreda the major trading town or temporary wholesale market used by farmers in that woreda was selected. A census of all traders in that market/town was made. As the focus of the study was to understand the value chain from rural areas to Addis Ababa, 10 traders that ship teff to Addis Ababa were randomly selected from this list in these towns/markets. Four such towns/markets were selected for each zone. Second, in Addis Ababa, 75 wholesale traders and brokers were interviewed in total. One-third was interviewed in the Ehil Beranda wholesale market and two-thirds in the Ashwa Meda market, reflecting the relative shares of teff wholesale marketing for Addis Ababa that each market handles. In Ehil Beranda, 25 wholesalers were randomly selected (13 without and 12 with shops), and 50 (25 with and 25 without shops) in Ashwa Meda. Also interviewed were 90 truck drivers transporting teff (one-third in Ehil Beranda and two-thirds in Ashwa Meda).

Downstream in the value chain, a stratified sampling scheme was adopted to select a representative sample of teff retail shops in Addis Ababa. Using the map of the city, five geographical strata were created with two neighboring similar subcities in each stratum. Then one subcity from each stratum was randomly selected, giving a total of five subcities to work with. Next, information was collected from the city's Trade and Industry Office, which provided the complete lists of teff outlets in each subcity. Following this, outlets were randomly selected for them to be interviewed. First, those surveyed were all the consumer cooperatives selling teff at the subcity level. Second, in each selected subcity, four kebeles were selected randomly, and in each of these selected kebeles, all the flour mills were surveyed and five cereal shops were randomly selected and surveyed. In total, staff at 282 retail outlets were interviewed.

Table 11.1 gives an overview of the sample and some basic characteristics of the different value-chain agents. With regard to the gender balance within the value chain, this is heavily dominated by men: 15 percent of the retail outlets are managed by women, but their contribution to other functions in the value chain midstream is limited. In fact, 95 percent of the rural wholesalers and all the truck drivers and urban wholesalers are men. Female-headed teff-farming households make up 5 percent of our sample. The level of education is slightly higher for value-chain agents midstream, with average years of education between eight and nine years, although it is lowest for the farmers at five years. The average years of experience in the teff business is around eight and ten years for all agents.

Description of the Teff Value Chain

Marketing Upstream

Table 11.2 presents some basic descriptives of teff marketing upstream (that is, by farmers). An average teff producer sold 507 kilograms in the year prior to the survey. The majority of this teff sold was white teff, which makes up two-thirds of all teff sold. The quantities of mixed and red teff sold are rather

TABLE 11.1 Sample setup and basic descriptives

Observations and variables	Unit	Mean	Median	Standard deviation
Farmers				
Number of observations		1,200	n.a.	n.a.
Gender head of household	share male	95.3	n.a.	n.a.
Level of education	years of schooling	4.6	4.0	2.9
Experience in teff business	years	9.6	10.0	1.5
Rural wholesalers				
Number of observations		205	n.a.	n.a.
Gender	share male	94.6	n.a.	n.a.
Level of education	years of schooling	7.9	9.0	3.9
Experience in teff business	years	9.5	8.0	7.8
Truck drivers				
Number of observations		90	n.a.	n.a.
Age	years	29.7	29.0	7.1
Gender	share male	100.0	n.a.	n.a.
Level of education	years of schooling	9.4	10.0	1.8
Urban wholesalers and brokers				
Number of observations		75	n.a.	n.a.
Brokers	share	65.3	n.a.	n.a.
Traders	share	64.0	n.a.	n.a.
Gender	share male	100.0	n.a.	n.a.
Level of education	years of schooling	8.7	8.0	3.4
Experience in teff business	years	8.9	7.0	6.7
Urban retailers				
Number of observations		282	n.a.	n.a.
Mills	share	83.3	n.a.	n.a.
Cereal shops	share	9.9	n.a.	n.a.
Consumer cooperatives	share	6.7	n.a.	n.a.
Gender	share male	84.7	n.a.	n.a.
Level of education	years of schooling	7.7	8.0	4.4
Experience in teff business	years	8.2	5.0	7.8

Source: Authors' calculations.

Note: n.a. = not applicable.

small.[3] Minten et al. (2013) showed that the shift from red and mixed teff to white teff varieties is a major change over the past 10 years in these production areas: 36 percent of all teff produced is sold, but there are large differences in qualities. While 58 percent of the production of magna ("superwhite") teff is sold, only 13 percent for red teff is marketed. The number of marketing transactions by these teff farmers is rather limited. The median number of transactions per year is 1 and the average is 1.75.

For each marketing transaction, farmers were asked to give details on their modalities.[4] The majority of the sales are to traders at local wholesale markets or to traders with a fixed shop, often in regional markets. Farmers traveled on average 1.5 hours to get to the place of sales. On-farm sales or sales in the village are relatively less important, in contrast with other countries in Africa (Chamberlin and Jayne 2012). Direct sales to consumers make up 7 percent of all transactions. Sales to cooperatives or government institutions (such as the Ethiopian Grain Trade Enterprise) are rather limited: they make up less than 1 percent of the sales transactions. While cooperatives are very important in input distribution in Ethiopia, they are not a significant participant in cereal output markets (Minten, Stifel, and Tamru 2012). An average sales transaction encompasses 300 kilograms of teff for a value of 3,776 birr (or about US$200). In 84 percent of the sales transactions, this was handled by a male member of the household. Interlinked transactions with traders are of very little importance upstream; 99 percent of the transactions were paid immediately and in cash. In only 2 percent of the transactions did the farmer receive an advance from the buyer.

Marketing Midstream and Downstream

Table 11.3 presents descriptives of marketing agents midstream and downstream. These agents' yearly teff turnover varies between 36 metric tons for urban retailers to almost 700 metric tons for urban wholesalers and brokers, and very few report the use of long-term storage options. The traders were asked about details on the different types of services provided to suppliers and clients. The data indicate significant transaction costs between different layers

3 The most widespread quality distinction used in the teff value chain in Ethiopia relates to the color of the grain. The distinction between magna ("superwhite"), white, mixed, and red teff is widely used and well known by farmers as well as traders, and therefore it is used as a measure for quality throughout this chapter. Teff quality is also often evaluated by origin. While the quality of teff is judged by a number of other factors—such as physical appearance, impurities, aroma, texture, and nutritional quality—these are often difficult to measure objectively.

4 In the case that farmers had more than five transactions (which was rare), they were only asked questions on the five most important ones.

TABLE 11.2 Characteristics of marketing transactions by teff farmers

Characteristics	Unit	Mean	Median	Standard deviation
Commercial surplus				
Teff sold per household, quantity	kilogram	507	250	1,130
Magna teff sold per household, quantity	kilogram	134	0	441
White teff sold per household, quantity	kilogram	318	100	1,028
Mixed teff sold per household, quantity	kilogram	22	0	128
Red teff sold per household, quantity	kilogram	33	0	149
Teff, commercial surplus for producing households	%	36	33	26
Magna teff, commercial surplus for producing households	%	58	58	26
White teff, commercial surplus for producing households	%	41	40	28
Mixed teff, commercial surplus for producing households	%	24	17	28
Red teff, commercial surplus for producing households	%	13	0	21
Characteristics of marketing transactions				
Transactions per teff farmer for producing households	number	1.75	1.00	1.52
Type of buyer:				
Farmers	%	0.6		
Farmer-assembler (farmer trader)	%	5.2		
Assemblers from outside village	%	5.5		
At wholesale market: traveling trader going to Addis Ababa	%	17.5		
At wholesale market: traveling trader going elsewhere	%	16.3		
Trader with fixed shop, selling teff to Addis Ababa	%	29.8		
Trader with fixed shop, selling teff elsewhere	%	17.4		
Consumer	%	7.0		
Other (miller, cooperative, EGTE/government)	%	0.7		
Total	%	100.0		
Sale location:				
On the farm or home	%	3.1		
Trader shop (fixed)	%	60.3		
Local (weekly) market	%	34.7		
Other (roadside, cooperative, at mill)	%	1.9		
Total	%	100.0		
Travel time between departure and arrival sales location	minutes	92.0	80.0	65.3
Time spent at location of sale before sale	hours	0.9	0.5	1.0
Total quantity sold per transaction	kilogram	299	200	685

(continued)

TABLE 11.2 Continued

Characteristics	Unit	Mean	Median	Standard deviation
Type of teff sold:				
Magna	%	22.4		
White	%	60.3		
Mix	%	7.2		
Red	%	10.2		
Total	%	100.0		
Total amount received	birr	3,776	1,800	18,082
Price received	birr per quintal	1,065	1,000	232
Person that sold the teff	% male	84.0		
Payment in cash	%	99.6		
Input advances received from buyer	% yes	1.9		
Payment in cash and immediately	%	99.1	100.0	9.1

Source: Authors' calculations.
Note: EGTE = Ethiopian Grain Trade Enterprise.

of the value chain. Weighing happens at every level, at the time of purchase as well as sales. Quality assessments are also done for each transaction. This is usually done through visual checks or by rubbing the teff. Some of the agents report to even chew the teff to determine its quality (47 percent, 28 percent, and 20 percent of the urban traders/brokers, rural traders, and retailers respectively). Family, kin, and ethnic relationship are often presumed to be important in agricultural trade (Gabre-Madhin 2001; Fafchamps and Minten 1999). Table 11.3 shows that urban brokers/traders work with a rather limited number of suppliers—7 on average over a 12-month period—and that they procure almost two-thirds of their supplies from the zones from which they originate. This suggests indeed tight, and often family, networks at that level. On the other hand, only 7 percent of the retailers work with suppliers that are originally from the same zones as theirs.

In contrast with the farm level, credit is much more prevalent in the value chain midstream and downstream. Included in the survey were questions on the importance of credit as well as cash advances. While few of the rural traders pay their suppliers on credit, this is much more important for urban wholesalers (60 percent) and urban retailers (45 percent). However, the credit provided is mostly of short duration, with average duration varying between

TABLE 11.3 Descriptives of marketing agents

		Rural traders		Urban traders and brokers		Urban retailers	
Variable	Unit	Mean	Median	Mean	Median	Mean	Median
Value assets	1,000 birr	242.4	71.5	122.4	8.9	337.4	78.7
Yearly turnover of teff	metric tons	252.6	134.3	694.1	585.0	35.9	25.0
Do storage of teff for longer than a month	share (%)	13.7		21.3			
Services for suppliers							
Picked up teff in own or rented truck	share (%)	44.9		9.3		31.1	
Teff is weighed when bought	share (%)	93.2		40.0		98.4	
Teff quality is sampled when bought	share (%)	100.0		100.0		99.3	
If yes, visually checked	share (%)	97.6		100.0		100.0	
If yes, rubbed teff by hand	share (%)	68.3		88.0		62.3	
If yes, chewed the teff	share (%)	28.3		46.7		20.4	
Bags are provided to suppliers	share (%)	23.4		1.3		23.5	
Services for clients							
Deliver to clients	share (%)	91.7		46.7		67.1	
Grade and sort to sell to clients	share (%)	85.9		90.7		-	
Teff is weighed when sold	share (%)	94.6		100.0		99.2	
Teff quality is sampled when sold	share (%)	88.3		100.0		97.1	
Provide bags to clients	share (%)	71.7		98.7		25.2	
Credit							
Suppliers that are paid on credit	share (%)	8.5	0.0	60.5	60.0	45.5	50.0
If yes, number of days before payment	number	11.1	7.0	6.7	5.0	16.6	15.0
Suppliers that were given advances	share (%)	8.7	0.0	1.1	0.0	20.9	20.0
Clients that pay on credit	share (%)	39.0	25.0	47.9	50.0	30.2	30.0
If yes, number of days before payment	number	17.7	15.0	8.0	7.0	20.5	20.0
Clients that gave advances	share (%)	2.5	0.0	0.0	0.0	4.3	5.0
Relationships							
Number of suppliers worked with in last 12 months	number			6.7	4.0		
Trader or broker is originally from Addis Ababa	share (%)			15.0			
Procurement from trader's zone of origin	share (%)			65.0	100.0		
Broker that retailer works with is from same zone	share (%)					7.2	

Source: Authors' calculations.

7 and 17 days. Advances are sometimes given to ensure teff supplies—20 percent of the urban retailers reported giving advances. However, no urban traders reported providing advances.

Structure and Price Formation

Structure of the Value Chain

To unravel the structure of the value chain, rural and urban wholesalers and urban retailers were asked from whom they obtained supplies and to whom they sold. The importance of each type of buyer and seller in total supplies was requested for each three-month period over fifteen months prior to the survey. Given that there was no clear seasonal pattern over time, Table 11.4 presents only the averages over that period.[5] The results illustrate the surprisingly short supply chain that is in place to bring teff to Addis Ababa: 85 percent of the teff supply is directly from farmers to rural traders who are based in the wholesale markets or regional towns in these five major production zones that were visited. A full 76 percent of the teff that they procured is directly sold to traders or brokers in wholesale markets in Addis Ababa; 77 percent of the sales of these urban brokers or traders goes to mills and cereal shops in town; and 86 percent of teff sold in these retail shops is directly procured by consumers.

This illustrates that the prevalent structure of the value chain from these major production zones to the urban city is rather short, from producer to regional trader to urban trader/broker to urban retailer. Commonly, three intermediaries are found between farmers and urban consumers. This finding is against conventional wisdom.[6] Notably 32 percent of the urban retailers obtain their products directly from rural areas (bypassing the urban wholesale markets), making the value chain even shorter. But the value chain can also be longer. Rural traders procure 13 percent of their produce not directly from producers but from rural assemblers or farmer-traders, and 10 percent of the urban wholesalers/brokers obtain produce not from regional traders but from other urban wholesalers/brokers.

5 No weighted averages for the turnover of the traders are shown (they would show the importance for the whole urban–rural value chain). No significant differences were noted with simple averages.

6 Fufa et al. (2011, 2) state "the teff value chain is fragmented and involves many players. Most farmers sell to assemblers individually, who then sell on to traders and wholesalers. Most teff is sold at harvest when prices are low."

TABLE 11.4 Procurement and sales patterns (averages over traders and for past 15 months)

Variable	Rural traders		Urban traders and brokers		Urban retailers	
	% bought from	% sold to	% bought from	% sold to	% bought from	% sold to
Procurement sources and sales destinations						
Farmers	84.9		4.5		9.8	
Farmer-traders or rural assemblers	13.3		2.5		4.3	
Traders in wholesale markets and wholesalers	1.3	8.1		5.8		
Cooperative unions	0.3	0.0	0.0	1.3	0.1	
Brokers		76.3				
Traders or brokers in Addis Ababa					68.3	
Mills or cereal shops		13.2				
Traders located outside Addis Ababa			83.2		17.6	
Traders in Addis Ababa			9.8			
Injera wholesalers				0.8		1.3
Injera wholesale companies				0.2		0.0
Injera retailers with fixed shops				4.4		4.8
Injera retailers without fixed shops				1.7		5.2
Institutions				1.8		0.2
Restaurants				1.4		2.1
Mills				69.8		
Cereal shops				6.8		
Consumers				5.7		85.7
Supermarkets				0.1		0.4
Others	0.2	2.4	0.0	0.3	0.0	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of observations	188	185	74	72	238	222
% sold to						
Addis Ababa		92.8		91.8		
Rural zone where trader was interviewed		4.6		n.a.		
Other zone		2.4		8.2		
% procured from						
Five major production zones				91.2		
East Gojjam				34.8		
West Gojjam				2.1		
West Shewa				44.8		

(continued)

TABLE 11.4 Continued

Variable	Rural traders		Urban traders and brokers		Urban retailers	
	% bought from	% sold to	% bought from	% sold to	% bought from	% sold to
East Shewa				2.0		
South West Shewa				7.5		
Other				8.8		

Source: Authors' calculations.
Note: n.a. = not applicable.

At the bottom of Table 11.4, the statistics on procurement areas and destination of sales are presented. From the information supplied by urban wholesale traders, 92 percent of all the teff sales was destined for Addis Ababa. In the past Addis Ababa was regarded as a clearinghouse for national cereal trade—that is, the national cereal trade went through Addis Ababa as all major traders were stationed there (Gabre-Madhin 2001). However, this role seems to have diminished. The larger agricultural marketing flows in the country, as well as improved communications, might have contributed to this change (Minten, Stifel, and Tamru 2012). Further to the investigation on procurement of teff in this survey, urban traders were also asked to indicate from which zone they procured teff. It is worth noting that the five production zones where the survey was fielded comprise 91 percent of all the teff coming to Addis Ababa.

Price Formation in the Chain

Prices were carefully collected at each stage of the value chain and for each quality of teff at the time of the survey. Information was also gathered on the origin of the teff (that is, the woreda), as that is often seen as an important associate of quality, although it is difficult to verify objectively. Farmers were asked about prices for the different qualities of teff at the time of the survey at their most common place of sale. While they might not have recently sold teff, farmers are often well aware of current prices for the major crops that they grow. In the case of traders, the prices for all qualities being sold that day or week were explored. One issue with the price collection process was that the surveys were fielded at different periods. The rural surveys were fielded in October–November 2012 (period 1), while the urban surveys were fielded in November–December 2012 (period 2). To address this problem, a daily wholesale market price survey was conducted where prices for different teff qualities and origins were carefully and consistently collected with a large number of traders in three urban wholesale markets during each of the periods. This information allowed for an adjustment in price levels between periods and for a consistent comparison.

Using the prices collected over these two periods, Table 11.5 presents two specifications to derive the price composition in these value chains. In the first specification, prices for each of four different qualities were regressed on value-chain dummies. In the second specification, the same exercise is undertaken but includes woreda dummies as additional controls for quality. Producer price locations were divided in two, depending on whether the farmer chose to report prices at the farmgate or at the rural market. The wholesale urban market price observations are split into two periods. The results in Table 11.5 show the consistency in price composition from these data. Farmgate prices in seven out of the eight specifications are lower than rural market prices, whereas rural market prices are significantly below urban wholesale prices, and urban retail prices are higher than wholesale prices during the same period.

An F-test to measure if prices changed significantly over the two periods is presented below the regression results. For the two specifications and for the four qualities, the prices decreased significantly in the second period compared to the first one, reflecting the downward price pressure from the newly arriving harvest in the second period. A common issue in price analyses in value chains is motivating traders to willingly reveal prices to outsiders, as this information would expose their profits and margins. By using the price statements by farmers in rural markets as well as procurement prices by rural traders during the same period, a comparison can be made using both sources of information. An F-test reported at the bottom of each regression shows that there is no significant difference between the prices reported by farmers and traders for seven out of the eight reported regressions (the exception is white teff in the specification without woreda controls), indicating that prices at the trader level are reasonable and seemingly well collected.

The regression results of Table 11.5 are used to construct an average price composition graph from farmer to consumer for period 1 (October–November 2012) for the four main qualities. As urban retail prices were collected later, when prices had declined, the urban distribution costs are adjusted upward for that period, assuming that absolute margins stayed similar in both periods. Information on the collected average milling and cleaning costs are added to obtain the final price formation of teff flour in retail markets. Figure 11.1 illustrates that the farmers take *(text continued on page 280)*

TABLE 11.5 Price regressions over the teff value chain (price at time of survey; in birr per quintal)

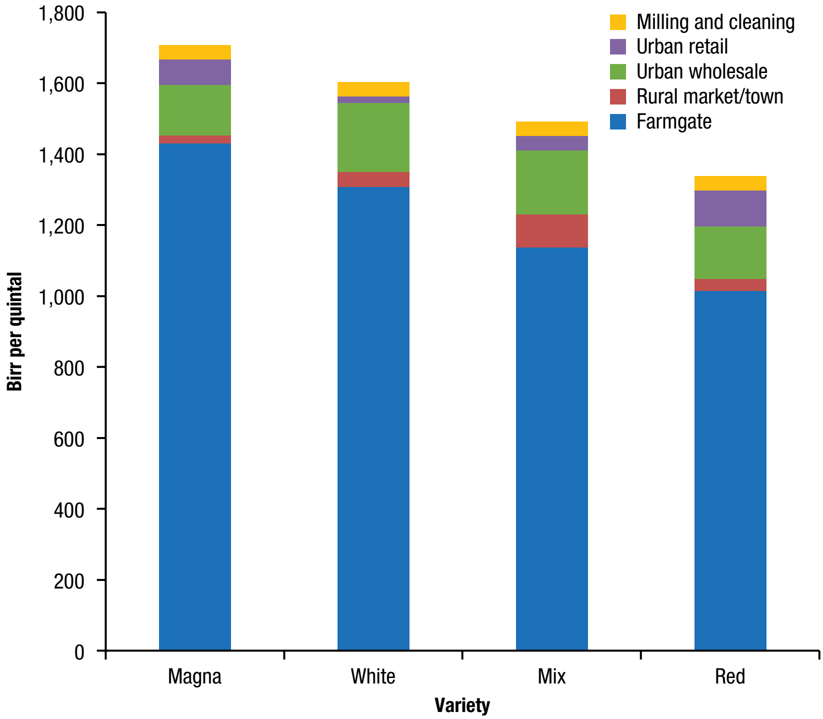
Level	Source	Time of survey	Unit	Magna		White		Mix		Red	
				Coefficient	t-value*	Coefficient	t-value*	Coefficient	t-value*	Coefficient	t-value*
Specification 1: Without woreda (community) controls											
Farmgate	Farm survey	Period 1	yes = 1	−167.2	**−8.1**	−210.1	**−13.7**	−253.2	**−5.6**	−159.3	**−5.4**
Rural market	Farm survey	Period 1	yes = 1	−146.0	**−12.2**	−166.3	**−20.2**	−159.9	**−6.1**	−126.0	**−5.3**
Rural market	Rural trader survey	Period 1	yes = 1	−143.7	**−15.8**	−141.7	**−16.0**	−128.5	**−11.5**	−128.2	**−10.5**
Urban wholesale market	Urban trader survey	Period 1	yes = 1	−2.5	−0.4	28.1	**4.6**	20.1	**2.7**	22.6	**2.3**
Urban wholesale market	Urban trader survey	Period 2	yes = 1	−68.9	**−10.3**	−46.2	**−5.3**	−60.9	**−8.6**	−123.0	**−13.5**
Urban retail (default)	Urban retailer survey	Period 2	yes = 1								
Intercept				1,598.1	**336.7**	1,516.5	**391.3**	1,389.9	**279.1**	1,173.9	**161.9**
Number of observations				859		1,386		1,042		639	
R squared				0.35		0.34		0.28		0.26	
Mean squared error (MSE)				93.28		118.34		103.13		116.31	
F-test if…				F()	Prob>F	F()	Prob>F	F()	Prob>F	F()	Prob>F
… rural market price reported by farmers is equal to reports by traders				0.03	0.87	5.20	**0.02**	1.30	0.25	0.01	0.93
… wholesale market price is equal in period 1 to period 2				101.69	**0.00**	66.78	**0.00**	113.93	**0.00**	284.64	**0.00**

Specification 2: With woreda (community) controls											
Farmgate	Farm survey	Period 1	yes = 1	−145.4	**−7.9**	−166.8	**−11.1**	−227.8	**−5.1**	−79.7	**−2.3**
Rural market	Farm survey	Period 1	yes = 1	−105.8	**−7.5**	−132.0	**−12.5**	−151.6	**−5.4**	−92.9	**−3.8**
Rural market	Rural trader survey	Period 1	yes = 1	−90.8	**−8.8**	−118.6	**−10.7**	−108.2	**−7.4**	−96.2	**−7.0**
Urban wholesale market	Urban trader survey	Period 1	yes = 1	11.0	1.5	16.3	**2.3**	1.9	**0.2**	18.0	1.5
Urban wholesale market	Urban trader survey	Period 2	yes = 1	−58.2	**−7.6**	−62.6	**−8.1**	−81.5	**−8.2**	−140.2	**−14.1**
Urban retail (default)	Urban retailer survey	Period 2	yes = 1								
Intercept				1,649.0	**224.0**	1,433.7	**204.8**	1,451.6	**51.6**	1,054.7	**30.1**
Number of observations				847		1,376		1,031		626	
R squared				0.53		0.52		0.45		0.46	
MSE				80.27		103.00		92.34		102.26	
F-test if…				F()	Prob>F	F()	Prob>F	F()	Prob>F	F()	Prob>F
… rural market price reported by farmers is equal to reports by traders				1.30	0.25	1.20	0.27	1.97	0.16	0.02	0.88
… wholesale market price is equal in period 1 to period 2				160.27	**0.00**	82.35	**0.00**	133.87	**0.00**	286.75	**0.00**

Source: Authors' calculations.

Note: * t-values in **bold** are significant at the 5 percent level.

FIGURE 11.1 Teff price structure by quality, October–November 2012



Source: Authors' calculations.

the greatest share of final retail prices of grain—an astonishing 78 percent to 86 percent, depending on the quality. The average picture described is contrary to conventional wisdom that most farmers only obtain a small share of the final retail price. The largest part of the margin between farmers and retailers is the margin between rural and urban wholesale markets. On average for the four qualities, the urban–rural wholesale margin comprises 54 percent of the total margin between farmgate prices and urban teff flour prices. The rest constitute the margin between farmgate and rural wholesale markets, between urban wholesale and retail, and for milling and cleaning—that is, 15 percent, 19 percent, and 13 percent, respectively.

This illustrates the average price composition for the period October–November 2012 when prices are relatively high (just before the new harvest). Producer shares will decrease when prices are set relatively low after the harvest period. This figure also presents an average picture for all farmers combined in the sample. Farmers who live in remote areas obviously obtain a lower share. The issues with spatial and temporal variation are discussed in more depth below.

Variation over Space

Transportation costs and remoteness matter enormously in agricultural markets in developing countries (Teravaninthon and Raballand 2009; Deichmann, Shilpi, and Vakis 2009; Fafchamps and Shilpi 2003; Gollin and Rogerson 2010; Alavi et al. 2012). For this reason the differences on how transportation costs and marketing behavior are affected spatially between Addis Ababa and rural production areas are important, particularly in understanding the link with shipping and with farmers' teff marketing. First, the transport sector is considered. To better understand how this sector for agricultural products in Ethiopia works, a survey was implemented with truck drivers who ship teff from rural areas to Addis Ababa's wholesale markets. The truck drivers were asked about themselves, the owner of the truck, and about the type of trucks used. Detailed questions were also asked about the last roundtrip (traveling from rural areas to Addis Ababa and leaving from Addis Ababa to rural areas). Table 11.6 presents some of the descriptive statistics of transport.

The average carrying capacity of a truck that ships teff to Addis Ababa is rather small—that is, 5 metric tons. This type of truck has been used for about 10 years, and its value is estimated at 0.5 million birr (or about US$25,000). In only 10 percent of cases the driver is also the owner of the truck. Drivers are paid a monthly salary as well as a daily allowance. Most of the businesses involved in the transport of teff are small, shown by the median number of trucks owned being only one.[7] The average distance covered in the last trip made by drivers in the survey was 228 kilometers. A full 20 percent of the trucks drove on nonpaved, bad quality roads during the trip, while 46 percent only drove on paved roads. The cost of transport is 18 birr per quintal per 100 kilometers (or almost US$10 per metric ton per 100 kilometers), significantly lower than recent estimates (US$24 per metric ton per 100 kilometers) on the costs from primary to terminal markets (World Bank 2012). This

7 The World Bank (2012) shows that different types of companies are active in the transport sector in Ethiopia, including private companies with large fleets, transport associations consisting of a group of private operators with a limited number of trucks, government-operated public transportation companies, and enterprises and sole proprietors that involve one or more individuals owning and operating their own trucks. The results indicate that the latter companies take care of most teff transport.

TABLE 11.6 Descriptives of transport

Variable	Unit	Mean	Median	Standard deviation
Characteristics of truck				
Carrying capacity	quintals	51.2	50.0	15.8
Age	years	9.7	7.0	14.1
Value	1,000 birr	500.0	500.0	261.9
Characteristics of truck driver				
Is also the owner	share (%)	10.7		
Is paid a fixed amount per month	% yes	98.9		
If yes, monthly salary	birr	1,183	1,000	514
Is paid a per diem	% yes	96.6		
If yes, daily per diem	birr	90.9	100.0	24.8
Characteristics of owner				
Age	years	39.6	38.5	10.6
Gender	% male	98.1		
Education	years	8.8	10.0	3.8
Trucks owned	number	1.1	1.0	0.6

may suggest that there is significant competition in these commercial agricultural areas, driving down costs compared with other areas in Ethiopia. On the trip to Addis Ababa, transporters shipped goods for two sellers and delivered goods to more than three buyers on average. In 82 percent of the cases a transport broker—a third party that is involved in searching loads for truckers and charging a commission for this service—was used to find a load. Transport charges for the return trip to rural areas are similar to traveling to Addis Ababa. However, in one-quarter of the cases the truck was idle on the return, indicating that it is often more complicated to identify goods to ship out of Addis Ababa than to Addis Ababa. The higher prices that brokers charge for finding loads for trips out of Addis Ababa seem to confirm this.

To understand how distance traveled is related with transport charges, a regression was run where these transport charges per quintal are regressed on different explanatory variables including distance but also the size of the truck, road quality, number of sellers and buyers, and the use of a broker. A quadratic term is included in the distance as to allow for potential curvature in the association with distance, as transportation costs might not increase proportionally with distance covered because of fixed costs that are incurred. Two specifications run—one including data for the trip to Addis Ababa only

Variable	Unit	Mean	Median	Standard deviation
		To Addis Ababa		
Characteristics of last trip		**Mean**	**Median**	**Standard deviation**
Distance	kilometers	228	254	145
Road quality:				
Only paved road	share (%)	45.6		
Drove on nonpaved road but good quality	share (%)	33.0		
Drove on nonpaved, bad quality road	share (%)	21.4		
Time for travel between departure and arrival	hours	6.8	8.0	3.7
Time for unloading/loading/searching	hours	4.7	5.0	2.7
Trucks that were idle	share (%)	0.0		
Capacity of truck used	%	94.9	100.0	13.9
Total value of good transported	1,000 birr	66.8	65.0	23.3
Transport payment	birr per quintal	41.8	40.0	19.5
Transport payment per 100 kilometers	birr per quintal	18.3	15.7	13.4
Transport payment per 100 kilometers	US$ per metric ton	9.7	8.3	7.1
Number of sellers transported for	number	2.4	2.0	5.2
Number of pickup points	number	1.8	2.0	1.0
Number of buyers delivered to	number	3.4	4.0	1.3
Number of delivery points	number	3.7	4.0	1.3
Transport broker used	% yes	82.4		
Payment to transport broker	birr	174	150	104

Source: Authors' calculations.

and a second one where data for the round trip (when mostly no teff is transported)—are added as well. The results are shown in Table 11.7. Distance and the intercept—reflecting the fixed part of the transportation cost—are the only variables that arise as significant in the regression. It is estimated that for every 100 kilometers extra traveled, transport charges go up by about 13 birr per quintal (about US$7 per metric ton per 100 kilometers).

As transportation costs go up significantly with increasing distance to Addis Ababa, this is expected to be reflected in farm prices, assuming that the costs would be transmitted to farmers. Using nonparametric regressions, Figure 11.2 shows the relationship of the reported producer prices at the time of the survey of the four main teff qualities with transportation costs to Addis Ababa. Notably overall, there are clear decreases in teff prices the farther away

TABLE 11.7 **Associates of transportation costs by trucks (in birr per quintal)**

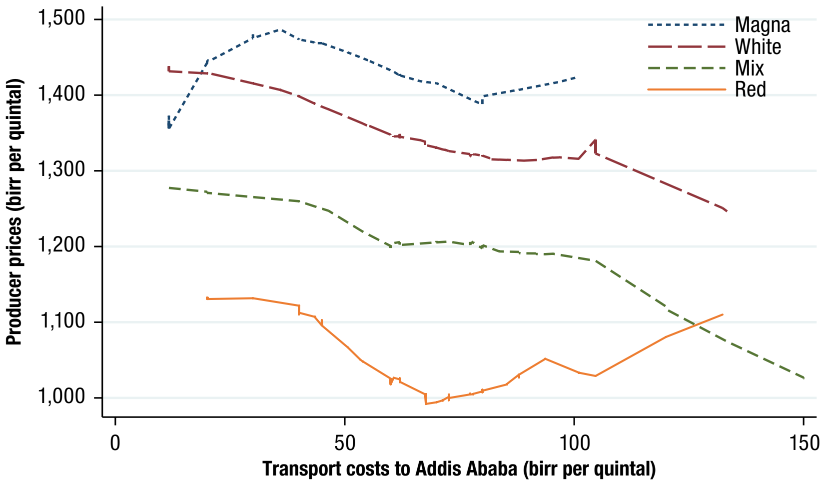
		Trip to Addis Ababa only		Roundtrip	
Explanatory variables	Unit	Coefficient	t-value*	Coefficient	t-value*
Distance	100 kilometers	13.23	**6.97**	12.00	**5.33**
Distance squared	100 kilometers	–0.45	–1.63	–0.35	–1.37
Size of truck	quintals	–0.06	–0.81	–0.05	–0.96
Road quality (default only paved road):					
Drove on nonpaved road but good quality	yes = 1	–0.17	–0.05	3.99	0.84
Drove on nonpaved, bad quality road	yes = 1	3.52	1.21	2.03	0.81
Number of sellers transported for	number	0.09	0.77	0.02	0.10
Number of buyers delivered to	number	0.32	0.37	0.03	0.47
Broker used	yes = 1	3.55	1.56	–0.71	–0.22
To Addis Ababa	yes = 1			1.87	0.53
Intercept		12.68	**3.15**	16.31	**2.56**
Number of observations		101		177	
F()		47.86		44.67	
Prob>F		0.00		0.00	
R-squared		0.69		0.35	
Root Mean squared error (MSE)		11.46		19.37	

Source: Authors' calculations.
Note: * t-values in **bold** are significant at the 5 percent level.

farmers are located from the terminal market. While at the time of the survey the share of the producer price in the final retail price of the most traded teff quality (the white variety) close to the city reaches more than 90 percent, this drops to 80 percent for the most remote farmers. The only exception of the strong influence of transportation costs on producer prices is found in the case of red teff, which reveals this price drop only when the sampling is halfway through. The price increases again when farmers are farther out. It is possible that this is linked with the lower importance of red teff in the major value chain toward Addis Ababa, and price setting in these more remote environments might be driven more by localized demand and supply parameters.

The influence of transport costs on producer prices is tested further through a multivariate regression framework where other confounding factors in price formation are controlled for. Two measures of producer prices as dependent variable are relied upon. The first is the stated price by the farmer in his most common place of sale at the time of the survey. The second is the price that the farmer received in teff marketing transactions in the last

FIGURE 11.2 Producer prices of teff by transportation costs to Addis Ababa



Source: Authors' calculations.

12 months prior to the survey. On top of transportation costs to Addis Ababa, in the first specification the place of sales is controlled for, and in the second regression, place of sales, quantity sold, as well as the timing of sales are controlled for.

The results of the regression are shown in Table 11.8. It is tested through an F-test if producer prices drop as fast as transportation costs to Addis Ababa increase for all specifications (the stated and the actual price for the four qualities). In all eight cases this hypothesis cannot be rejected, indicating that teff producer prices drop in line with transportation costs.[8] The results further show that prices at the farmgate are mostly lower than prices in markets. However, differences are not significant. Farmers who sell larger quantities are usually able to negotiate higher per unit prices (for example, Fafchamps and Hill 2008). The coefficients of this variable are significant in the case of the two most important qualities (white and magna). As expected, there is strong seasonality in prices, with prices significantly higher in the period just before harvest.

8 This is in contrast to results reported by Minten and Kyle (1999) in Zaire as well as Gollin and Rogerson (2010) in Uganda. They find that producer prices drop much faster, possibly linked with decreasing levels of competition and increasing risk. A specification was also tried where woreda dummies were included to additionally control for quality. In none of the cases was the F-test significant.

TABLE 11.8 Associates of teff prices (in birr per quintal)

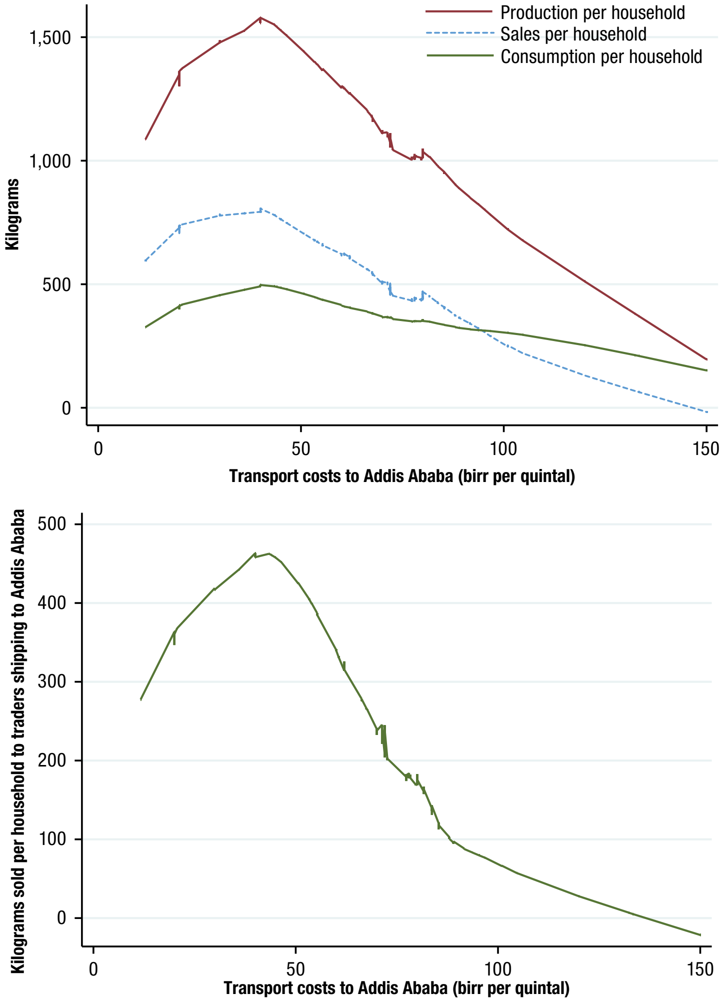
		Magna		White		Mix		Red	
Right-hand variables	**Unit**	**Coefficient**	**t-value****	**Coefficient**	**t-value****	**Coefficient**	**t-value****	**Coefficient**	**t-value****
Stated price at the time of survey*									
Transport costs to Addis Ababa from kebele	birr	−0.71	−0.85	−1.75	**−2.88**	−1.18	−1.75	−1.61	**−2.03**
Farmgate	yes = 1	−31.02	−0.95	−48.68	**−2.21**	−59.54	−1.15	−0.60	−0.02
Intercept		1,488.77	**30.92**	1,467.49	**37.72**	1,304.38	**30.37**	1,141.34	19.50
Number of observations		203		565		76		121	
R-squared		0.02		0.07		0.08		0.03	
Mean squared error (MSE)		140.75		151.17		194.94		197.40	
F-test if producer prices drop as fast as…		F()	Prob>F	F()	Prob>F	F()	Prob>F	F()	Prob>F
… transport costs to Addis Ababa increase		0.12	0.73	1.52	0.22	0.07	0.79	0.59	0.45
Obtained price for transactions over the last 12 months*									
Transport costs to Addis Ababa from kebele	birr	−1.01	−1.27	−0.50	−0.87	−1.39	**−2.51**	−0.81	−1.14
Quantity	log()	18.88	**1.91**	45.23	**4.35**	11.95	0.60	−1.18	−0.06
Farmgate	yes = 1	−14.91	−0.34	−63.89	−1.47	92.42	1.09	68.07	1.05
Monthly dummies (September–October = default)									
October–November	yes = 1	−65.21	−0.95	49.65	0.97	−129.74	−1.16	−177.20	**−2.39**
November–December	yes = 1	−355.17	**−4.75**	−358.28	**−8.15**	−548.55	**−4.20**	−318.22	**−2.60**
December–January	yes = 1	−428.60	**−9.25**	−343.17	**−8.34**	−345.22	**−1.86**	−264.34	**−3.54**
January–February	yes = 1	−396.21	**−8.37**	−321.16	**−8.31**	−490.80	**−5.58**	−199.92	**−3.08**
February–March	yes = 1	−392.15	**−8.54**	−317.37	**−9.24**	−442.90	**−4.77**	−303.36	**−4.30**
March–April	yes = 1	−337.17	**−5.96**	−250.62	**−6.49**	−423.82	**−4.60**	−239.84	**−3.41**

April–May	yes = 1	–300.00	**–6.26**	–201.12	**–5.23**	–361.57	**–4.11**	–247.73	**–4.12**
May–June	yes = 1	–240.59	**–6.09**	–175.82	**–5.14**	–373.35	**–3.87**	–186.46	**–3.20**
June–July	yes = 1	–232.09	**–6.32**	–128.32	**–3.70**	–232.49	**–3.05**	–161.66	**–2.86**
July–August	yes = 1	–102.08	**–2.66**	–65.20	**–2.02**	–212.49	**–3.53**	–188.37	**–2.57**
August–September	yes = 1	–68.15	–1.71	–0.77	–0.02	–112.40	–1.65	–100.41	–1.24
Intercept		1,452.11	34.39	1,277.84	26.27	1,408.31	15.18	1,107.96	14.01
Number of observations		453		1230		166		201	
R-squared		0.33		0.3		0.33		0.15	
MSE		186.11		190.85		202.36		185.55	
F-test if producer prices drop as fast as…		F()	Prob>F	F()	Prob>F	F()	Prob>F	F()	Prob>F
… transport costs to Addis Ababa increase		0.00	0.99	0.73	0.40	0.49	0.49	0.07	0.79

Source: Authors' calculations.

Note: * Standard errors are estimated after accounting for within cluster (kebele) correlations and possible heteroskedasticity. ** t-values in **bold** are significant at the 5 percent level.

FIGURE 11.3 Commercial surplus and quantity sold to traders shipping to Addis Ababa



Source: Authors' calculations.

While producer prices vary over space, other production and marketing measures show strong associations across space as well. The top panel of Figure 11.3 shows how production, commercial surplus, and consumption per teff-producing household vary with transportation costs to Addis Ababa. The highest commercial surpluses are achieved by farmers that face the lowest transportation costs. Commercial surplus decreases to almost 0 for those farmers that are most remote; these farmers drop to subsistence levels. Consumption levels of teff per household show less variation over space. However, the most remote farmers have slightly lower consumption levels of teff.[9] The bottom panel of Figure 11.3 shows how the quantities of commercial surplus that are sold to traders who ship the product to Addis Ababa vary by transportation costs to Addis Ababa. As predicted, a strong relationship is apparent. For those farmers who live close to Addis Ababa, the majority of commercial surplus is sold to traders that ship to Addis Ababa. For farmers who live further out, they ship to other places or to other types of sellers or, more important, they just sell less.

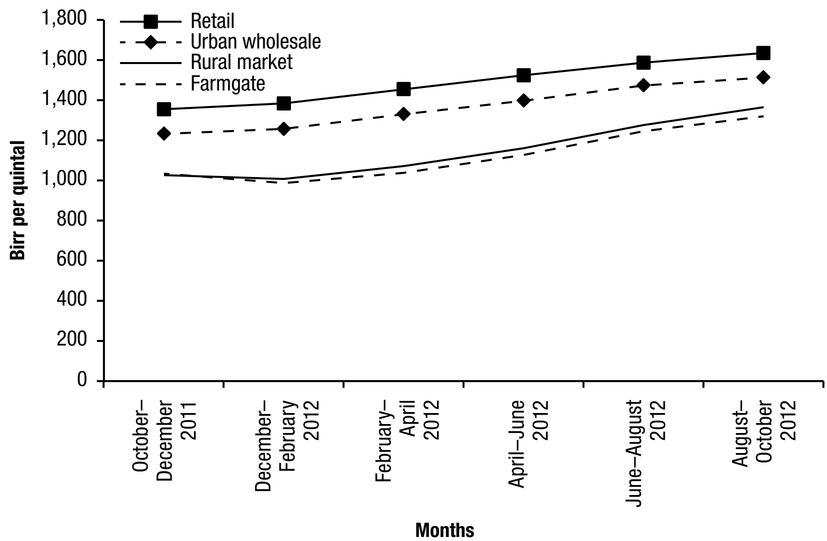
Temporal Variation

Seasonality is important in most agricultural markets but especially in Ethiopia because of a short rainfall season, limited irrigation possibilities, and often the reliance on one crop a year (Dercon and Krishnan 2000; Devereux, Sabates-Wheeler, and Longhurst 2012). In this section, seasonality in price behavior and in use of production is examined, including sales. Prices were asked for from the different value-chain agents for two-month periods over the previous season. These collected prices were used as dependent variables in a regression on seasonal and on quality indicators. The results of the seasonal coefficients are shown in Figure 11.4.

The lowest prices are observed during the harvest period (December–February) and the highest toward the end of the year (August–October). Retail prices increased by 15 percent and producer prices by about 40 percent in the months of August–October compared with the harvest price. Similar seasonal price amplitudes have been found in other studies (Rashid and Negassa 2011; Minten, Stifel, and Tamru 2012), and the survey year thus illustrates a seemingly typical pattern. The share of the producer in the final retail price is significantly lower at harvest time given that retail and producer prices are significantly lower and that marketing margins do not change very much in absolute values. However, producer prices still make up 71 percent of the urban retail price during the harvest period. While urban distribution margins do not change over the year, a slight increase in margins is noted between rural markets and urban wholesale markets during the harvest season

9 Possibly illustrating the superior economic characteristics of teff as more remote households are often poorer (for example, Jacoby and Minten 2009).

FIGURE 11.4 Seasonal average teff prices in the value chain



Source: Authors' calculations.

compared with the off-season period. This might be partly driven by higher transport costs during the harvest period (Minten, Stifel, and Tamru 2012).

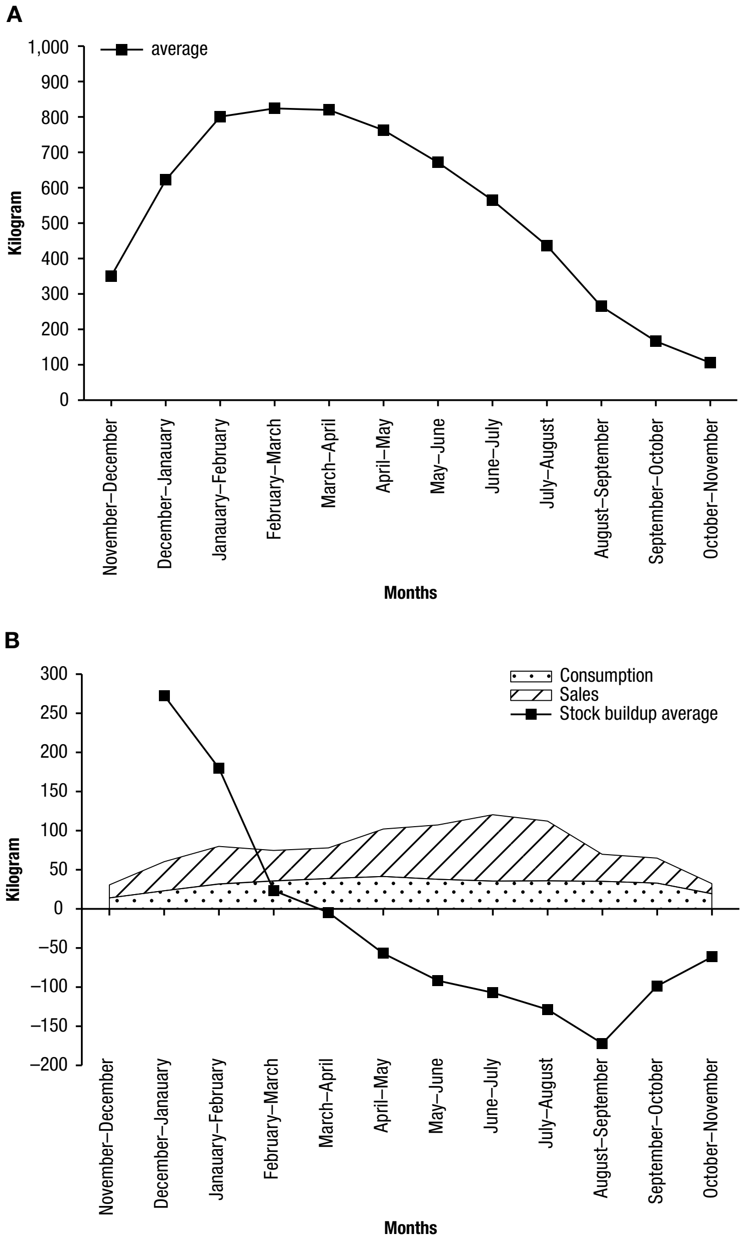
Data were further collected on monthly storage, sales, and consumption of teff. Figure 11.5 shows how these measures change over the year. Panel A of Figure 11.5 illustrates the average smooth withdrawal of teff from peak storage after harvest (approximately 800 kilograms per household in March). This average storage level comes down to about 100 kilograms per household in November.[10] Panel B of Figure 11.5 shows monthly sales, consumption, and stock changes. Stock changes are calculated by comparing monthly changes in stock position—that is, positive values indicate a stock buildup while negative values signal stock release. Stock buildup happens during November through March. Stock withdrawal is mainly done between March and October.

The main uses of teff production are consumption and sales.[11] Teff consumption increases immediately after harvest and stays stable over the year. It

10 Teff can be stored for relatively long periods without quality loss, and the figure suggests that some farmers indeed store across years seemingly using teff as a savings device.

11 Sales and consumption are the most important uses of teff production. They make up 46 percent and 33 percent, respectively, of total use of the production in the year prior to the survey.

FIGURE 11.5 Monthly storage (A) and use (B) of teff



Source: Authors' calculations.

drops to half the level in the months before the harvest. As expected, there are strong seasonal patterns in the sales of teff. Surprisingly, the peak of sales in the survey data is not immediately after harvest, but it is a couple of months afterward. Stock release is highest during July through August, also during the month in which sowing of teff takes place.

Finally, the incidence of distress sales are considered at the farm. Such sales, usually immediately after harvest, are presumed to be important in these teff markets (Fufa et al. 2011).[12] Two indicators are used as a measure of distress in teff marketing. To measure this in the survey, for each sale transaction farmers were asked to indicate if they would have sold teff at that specific time if the price of teff were 10 percent lower. If they responded with "yes," a follow-up question was asked whether they would have sold at a price 50 percent lower. The positive answers to these questions are used as measures of "distress" and "extreme distress" sales respectively. Using these indicators, it is estimated that 19 percent of the transactions were sold in distress and 10 percent in extreme distress (Table 11.9).

In contrast, in 71 percent of the transactions farmers would not have accepted a lower price of that order of magnitude. It is to be noted that there might be some possible measurement issues with the implemented method for distress sales. First, there are possibly problems with recall periods as the transaction was done long before the survey was conducted and the respondent might not have been able to recollect the exact situation and circumstances of each transaction. Second, if a farmer has been pushed by circumstances to transact at an unfavorable price but is not prepared to accept an even more unfavorable price, he would have answered "no" to the question and the transaction would not be counted as a distress sale. In such a situation we would have an underestimate of distress sales. With this caveat in mind, we proceed with further analysis.

To explore what are the associates of these distress sales, a multinomial model is run with the three categorical variables (normal, distress, and extreme distress) as dependent variables and with characteristics of the transactions and of the household as explanatory variables. Distress sales show a significant seasonal pattern: they are relatively more prevalent immediately after harvest as shown by significant coefficients for the period December–January and January–February for both indicators. Extreme distress sales are

12 "[Teff] farmers usually sell their produce immediately after harvest, resulting in high supply in those seasons, thereby leading to lower farm gate prices. In almost all cases of the focus group discussions conducted, the study noted that the immediate selling behavior of farmers is the result of their immediate liquidity requirements" (Fufa et al. 2011, 26).

TABLE 11.9 Multinomial model of distress sales

Variables	Unit	Distress "would accept 10% lower price"		Extreme distress "would accept 50% lower price"	
		Share		Share	
Descriptives					
Number of transactions sold in distress	%	19.5		10.1	
Quantity of teff sold in distress	%	22.0		6.5	
Regression results*		**Coefficient**	**t-value****	**Coefficient**	**t-value****
Independent variables					
Characteristics of transaction					
Quantity sold (quintals)	log()	–0.030	–0.39	–0.509	**–5.07**
October–November	yes = 1	0.176	0.27	0.988	1.52
November–December	yes = 1	0.929	1.83	1.406	**2.43**
December–January	yes = 1	1.340	**3.56**	1.344	**3.01**
January–February	yes = 1	0.728	**2.01**	0.891	**2.07**
February–March	yes = 1	0.696	1.91	0.545	1.24
March–April	yes = 1	0.172	0.45	–0.177	–0.36
April–May	yes = 1	0.650	1.84	–0.564	–1.15
May–June	yes = 1	0.078	0.22	0.003	0.01
June–July	yes = 1	0.412	1.17	0.253	0.59
July–August	yes = 1	0.350	0.95	0.243	0.55
August–September	yes = 1	0.575	1.44	0.320	0.64
Characteristics of household					
Education head of household	years	–0.011	–1.15	0.017	1.46
Age head of household	years	–0.001	–0.22	0.024	**2.89**
Gender head of household	male = 1	0.443	1.43	0.899	1.90
Size of household	number	–0.088	**–2.76**	–0.007	–0.17
Share of young in household	share	0.444	1.26	–0.163	–0.36
Share of elder in household	share	1.076	1.73	0.688	0.84
Household has off-farm income	yes = 1	–0.472	**–3.13**	–0.853	**–3.88**
Land owned by household	hectares	0.029	0.74	–0.090	–1.86
Value of livestock in birr	log()	–0.070	–1.53	–0.130	**–2.30**
Value of nonland assets in birr	log()	0.004	0.07	0.006	0.07
Distance to market in minutes	log()	0.153	**2.19**	–0.087	–0.91
Transport costs to Addis Ababa	birr	0.008	**3.07**	0.008	2.46
Intercept		–2.035	**–2.52**	–2.466	–2.21

(continued)

TABLE 11.9 Continued

		Distress "would accept 10% lower price"		Extreme distress "would accept 50% lower price"	
Variables	Unit	Coefficient	t-value**	Coefficient	t-value**
Number of observations		2,042			
Wald Chi2(46)		233.35			
Prob>chi2		0.00			
Pseudo R2		0.07			

Source: Authors' calculations.
Note: * robust standard errors. ** t-values in **bold** are significant at the 5 percent level.

characterized by smaller quantities sold, and households seem to be only willing to sell in extreme distress those quantities that are required to satisfy their urgent liquidity needs. Two other variables emerge significant for both measures. First, households that have off-farm income sources are less affected by distress sales. This seems logical as they can rely on other income resources and can thus reduce pressure on sales of teff at periods of low prices. Second, more remote households are affected by more distress sales, possibly because of higher poverty levels as well as lower production levels in the more remote areas (Jacoby and Minten 2009).

Conclusion

The increasing urbanization in developing countries raises important questions on how food value chains function and on how opportunities can be harnessed from these changes to allow for better food security for people in rural areas as well as the urban poor. By examining the rural-urban value chain of teff in Ethiopia, this study offers important new insights on the marketing of this crop. Surveys were fielded at each layer of the value chain from major production areas accounting for 42 percent of national commercial surplus and for more than 90 percent of the supply to the main terminal market in Addis Ababa, the capital of Ethiopia and also its largest city. Almost 1,800 primary survey interviews in total with producers, traders, truck drivers, and retailers were conducted for this study.

These value chains are found to be relatively unsophisticated. At the farm level there are no interlinked transactions with buyers of the produce (which is often seen in other countries, especially in more developed value chains), the role of credit is minor, and most of the transactions are cash transactions.

Owing to the lack of grading and standardization along the midstream and downstream parts of the value chain, significant efforts are observed at ensuring quality and quantity at the time of each transaction. Overall, however, value chains are short and farmers obtain a relatively high share of the final retail price (on average 80 percent). The majority of the farmers would not have accepted a significantly lower price at the time of their sales, indicating that distress sales are of relatively minor importance in farmers' marketing decisions. In contrast with common perceptions, commercialization in these major teff-producing areas of Ethiopia seems fairly well organized.

The results raise questions as to why they are in contrast to conventional thinking. Several reasons can be given. First, the literature on value-chain functioning is heavily dominated by case study research (for example, Dawe et al. 2008; Hayami, Kikuchi, and Marciano 1999), which often raises questions on how representative the findings are.[13] Second, changes happen quickly in these value chains, especially in these zones where much of the teff produced is marketed, driven by improvements in transport infrastructure, better communication, and increasing demand for food choice and quality in cities (for example, Reardon et al. 2012). It is possible that research has not kept pace with these changes. Third, a relatively unsophisticated market was investigated where there is little processing or value addition. The situation might have been different with other products (Miller and Jones 2010). Fourth, as cereals were studied, the assessment of quality and quantity is relatively straightforward and losses in the value chain are relatively small. Value chains of root crops where assessments of quality and quantity are more complicated or of fruits and vegetables where perishability and losses are a significant issue might show a different structure and higher margins. Fifth, a product was studied that has a relatively high price in the urban retail market. For example, the price of teff is on average double the price of maize (Minten, Stifel, and Tamru 2012). As such, even if the maize market in Ethiopia is as efficient as it is for teff, the share of the final retail price that maize producers receive would result in lower producer share. Teff is also a major staple crop. The situation might be different for nonstaples or for products where markets are thin. Finally, the value and services that traders bring to the system are often not well recognized nor appreciated. In the face of increasing or volatile food

13 Such a case-study approach is seemingly often linked with budget and time constraints in value-chain assessments as well as with the difficulty of implementing surveys over different value-chain participants.

prices, traders are often blamed.[14] In consequence, their importance in the value chain may often be overstated.

These findings point to some important policy implications. First, given the difficulty in accurately assessing market functioning, policies aimed at improving market efficiencies—such as stimulating increasing involvement of agricultural cooperatives in output marketing, the establishment of modern exchanges, or warehouse receipt systems—should be closely examined to determine how and where these policies are expected to improve market functioning and what the expected benefits would be compared to the costs of their implementation. Second, increasing investments in road infrastructure to incorporate more remote areas and to lower transportation costs by removing barriers in investments (World Bank 2012) is shown to clearly boost the prices that farmers receive. Third, if the objective of policy makers is to reduce consumer prices in urban areas, relatively more attention should be given to lower farm production costs, given that these costs constitute the biggest part of the final retail price.

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14 For example, India forbade forward trading on commodity exchanges for a number of crops to control food inflation. The increasing global volatility in food prices has been blamed as well on extensive speculation but disproven by some authors (Irwin, Sanders, and Merrin 2009).

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