Chapter 2
The Maize Farm-Market Price Spread in Kenya and Uganda

Takashi Yamano and Ayumi Arai

Abstract In this chapter, we analyze the farm-market price spreads of maize in Kenya and Uganda to examine how agricultural sectors are integrated with local markets. The farm-market price spread is calculated by subtracting the farm-gate price from the market price at the nearest maize market. We find that the farm-market price spread of maize is about 15% and 33% of the market price in Kenya and Uganda, respectively. In both countries, the price spread increases by 2% points for each additional driving hour away from the nearest maize market. While the former finding suggests that the overall marketing costs are lower in Kenya than in Uganda, the latter finding indicates that reductions in transportation costs will increase the farmer prices of maize in both countries.

Keywords Price spread • Market • Maize • Kenya • Uganda

2.1 Introduction

A well-integrated market system is considered to be necessary not only for the efficient allocation of productive resources but also for a reduction in price risks by preventing unnecessary price volatility. In developing countries where local markets are fragmented, a localized crop scarcity can lead to famine in the area (Ravallion 1986). The lack of market integration has been a major concern for countries in Sub-Saharan Africa (SSA) where domestic markets are sparsely

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located due to low population densities and are isolated from international markets if the countries are landlocked. Indeed, previous studies find that landlocked countries are vulnerable to domestic production shocks and experience large price volatilities (Byerlee et al. 2006). Because poor people, including the urban poor, spend a large share of their total expenditure on food crops, they would benefit from reduced price volatilities due to market integration. Thus, linkages to marketing centers have been found to contribute to rural households' efforts to escape from poverty (Krishana 2004; Minot 2007).

To integrate markets and enable the markets, not government agencies, allocate resources, structural adjustment programs were implemented in the 1980s and 1990s in many countries in SSA. To examine the impacts of the structural adjustment programs on market integration, there have been many studies that have tested market integration internationally and domestically by using time series data. Some studies find improved market integration after the liberalization (Badiane and Shively 1998), while others find that markets remain poorly integrated even after the introduction of the structural programs (Lutz et al. 2006; Negassa et al. 2004; Fafchamps 2004; Poulton et al. 1998). In Africa, particularly, there are some studies that examined market integration of cereal crops, such as maize (Faminow and Laubscher 1991; Campenhout 2007; Goletti and Babu 1994; Rashid 2004). These studies, however, only examine integration from the perspective of price correlation across markets. Even if markets are well integrated across space, local farmers would not benefit from market integration if their market access is poor. Previous studies find that many small-scale farmers remain at the subsistence level, not selling their crops at markets (Jayne et al. 2006; Barrett 2008).

To examine how agricultural sectors, consisting of small-scale farmers, are integrated with local markets, we analyze the farm-market price spreads of maize in Kenya and Uganda. The farm-market price spread is calculated by subtracting the farm-gate price from the market price at the nearest maize market. Because we think transportation costs contribute to the farm-market price spread significantly, we examine the relationship between the farm-market price spread and the driving time from each sample household to the nearest maize market where we have monthly maize price data. We are able to measure the driving time from each sample household to the nearest maize market from having georeferenced each sample household and the closest major maize markets. By using digitized road maps of Kenya and Uganda, we identify four road types and assign an average driving speed on each road type. To measure the farm-market price spread, we compare the average market price in the 4 month period following harvest at the nearest market with the farm-gate maize price obtained from household surveys. In this chapter, we find that the farm-market price spread of maize is about 15% and 33% of the market price in Kenya and Uganda, respectively. In both countries, the price spread increases by 2% points for each additional driving hour away from the nearest maize market. While the former finding suggests that the overall marketing costs are lower in Kenya than in Uganda, the latter finding indicates that additional transportation cost associated with an increase in driving time affects the marketing cost equally between the two countries.

The chapter is organized as follows. Section 2.2 describes the maize markets in Kenya and Uganda. Section 2.3 explains the market price data and the household panel data used in this chapter and presents descriptive analyses of the farm-market price spreads. The estimation models and variables are explained in Sect. 2.4, while the estimation and simulation results are discussed in Sect. 2.5. Finally, we discuss policy implications in Sect. 2.6.

2.2 Maize Markets in Kenya and Uganda

In 1988, during the structural adjustment period, the Kenyan government liberalized its maize market by allowing private traders to operate legally, instead of illegally as was the case before the liberalization, while keeping the National Cereals and Produce Board (NCPB) active. Before the liberalization, the NCPB was the sole agency that could procure and sell maize at administratively determined prices. Even after the liberalization, the NCPB continued to procure and sell maize at administratively determined prices, and to store maize as a contingency against future shortages. Jayne et al. (2008) find that NCPB activities have stabilized maize market prices in Kenya and raised average price levels roughly by 20% between 1995 and 2004.

According to Jayne et al. (2006), only 30% of their nationwide sample households in rural Kenya are net sellers of maize, and roughly 50% of all the maize sold is from fewer than 3% of households. Thus, the increased maize price due to the NCPB activities has benefited a small number of small-scale maize farmers who are net sellers of maize, as well as large-scale commercial maize farmers. The increased maize price, however, is like a tax imposed on urban consumers and small-scale maize farmers who are net buyers of maize. Indeed, these groups have opposed NCPB activities that raise maize prices. Thus, the Kenyan government faces a classic "food price dilemma," where it is pressured to keep the maize price high for net maize sellers while it is pressured to do the opposite for urban consumers and net-maize-buyer farmers.

Regarding trade policy, the Kenyan government imposed various tariffs on maize imports at border crossings to support domestic maize prices until January 2009.[1] However, because the Kenya–Uganda border is wide and difficult to monitor, informal cross-border trade occurred regularly. According to the Regional

[1] In 2008, after poor maize harvests and restrictions on maize imports, the maize price increased dramatically. The food crisis deepened with allegations of corruption over the issuing of import licenses and a lack of transparency over the sale of subsidized NCPB grain (Ariga et al. 2010). The allegations have led to the sacking of most of the NCPB Board of Directors and 17 senior managers. In January 2009, responding to the food crisis and allegations, the Kenyan government lifted the import duty on maize, allowing importers to buy maize from the international market. Note, however, that the analyses of this chapter use data taken in the period from 2003 to 2007 when the Kenyan government imposed import duties on maize.

Agricultural Trade Intelligence Network (RATIN)[2], which monitors regional agricultural commodity trade flows at selected border crossings between countries, the average amount of maize export from Uganda to Kenya was about 160,000 tons in the 3-year period of 2005–2007 (Benson et al. 2008). As a result, Kenya imported about 5% of its maize consumption from Uganda during this period. It was argued that the NCPB support price policy encouraged maize imports from Uganda at the same time that the official trade policy attempted to suppress it.

In Uganda, maize is the third most important staple crop, after plantain and cassava, in terms of caloric intake and is widely produced nationwide, especially in eastern region toward Kenya. Although the Ugandan government currently does not impose export duties on maize exports to Kenya, informal interviews with Ugandan traders suggest that the Ugandan government has prohibited maize exports at border controls after major drought seasons in the country. Like Kenya, Uganda also cannot escape from the food price dilemma.

One way to address the food price dilemma is to reduce the farm-market price spread, which measures the price gap between the farm-gate price that farmers receive and the market price that consumers pay. If the farm-market price spread is reduced, maize farmers can receive a higher farm-gate price, while keeping the market price constant. The farm-market price spread can be reduced by reducing the transportation and transaction costs of trading maize through investing in transportation infrastructure and developing competitive market institutions. In the following sections, therefore, we focus on the farm-market price spread and examine its determinants.

2.3 Price Data and Driving Hours

2.3.1 Market Price and Household Data

The monthly market data used in this chapter come from RATIN. RATIN has monthly maize market price data from nine major markets in Kenya, but only four markets (Mombasa, Nairobi, Eldoret, and Kisumu) have relatively adequate monthly data with fewer missing months than the other five markets. Among the four markets with adequate data, we choose three markets (i.e., Nairobi, Eldoret, and Kisumu) that are located near our sample households that live in Central and Western Kenya. In Fig. 2.1, we present the locations of the maize markets where we have monthly maize price data and the sample households. In Uganda, only Kampala has adequate monthly price data of maize in the RATIN data set. As a result, we use the RATIN monthly maize price data from four cities in Kenya and Uganda. As one can see in the figure, some households in Uganda are located closer to Kisumu than to Kampala. As mentioned earlier, RATIN data on regional trade

[2] RATIN data are available from http://www.ratin.net/

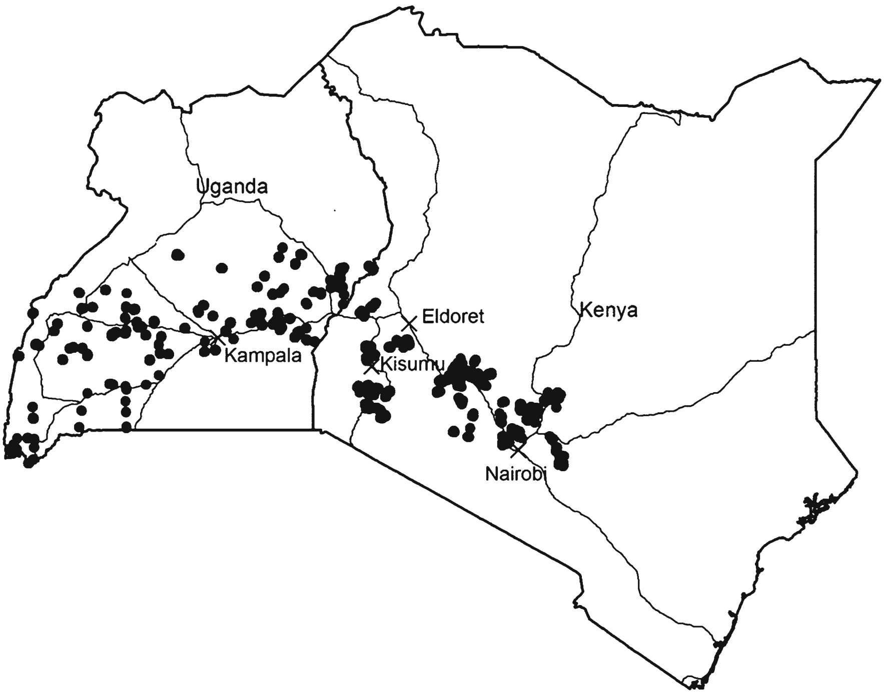

Fig. 2.1 Map of four maize markets and sample households in Kenya and Uganda

indicate significant maize exports from Uganda to Kenya. Thus, for some maize producers in Uganda, the maize market prices at Kisumu are more important than the Kampala maize price. Thus, we calculate the driving time from each household in Uganda to the two maize markets, i.e., Kampala and Kisumu, and choose the closest maize market for each household. Later in this section, we explain in detail how we select the nearest market for each household and calculate the driving time.

The household data used in this chapter come from household-level panel surveys in Kenya and Uganda, collected as part of the Research on Poverty and Environment and Agricultural Technology (R*e*PEAT) Project. All surveys employ comparable questionnaires across countries and time. In addition, soil samples were collected from maize fields when the first rounds of the surveys were conducted. The surveys in Kenya were conducted in 2004 and 2007. The first round of the surveys covered 899 randomly selected households located in 100 sub-locations scattered in the central and western regions of Kenya.[3] In the second round, seven sub-locations in Eastern province were dropped because of the scale reduction of

[3] These two waves of surveys in Kenya were conducted by Tegemeo Institute, with financial and technical help from National Graduate Institute for Policy Studies (GRIPS).

the survey project. Thus, in this chapter, we drop the samples from Eastern province in Kenya for the analysis below since we apply statistical methods relying on the longitudinal features of the data. In addition, attrition also reduced the number of households interviewed. As a result, out of the 777 targeted households, 725 households were revisited for the survey, resulting in an attrition rate of 6.7%.[4]

The surveys in Uganda cover 94 rural Local Council 1 areas (LC1s) that are located across most regions in Uganda, except the North where security problems exist.[5] From each rural LC1, 10 households are randomly selected, resulting in a total of 940 small farm households. The second round was conducted in 2005, and 895 households out of the 940 original households visited in the first round were interviewed. Thus, the attrition rate was low at 4.8%.[6]

2.3.2 Driving Time to the Nearest Maize Market

To measure market access in Kenya and Uganda, we first locate all the sample households and the four maize markets, where we have the RATIN monthly maize price data, by using GIS position coordinates. We overlayed their positions on digitized road maps and selected the shortest route from each household to the maize markets by using ArcGIS. We classify roads into four groups: trekking paths (no vehicles allowed), dirt roads (or dry-weather only roads), loose-surface roads (all-weather roads), and tarmac roads (all-weather roads, bound surface). Except for the trekking paths, we apply an average driving speed on each of the three road types and calculate the driving time from each household to each of the three markets. On the trekking paths, we calculate the walking time and add the walking time to the driving time. By comparing the driving time to the three maize markets from each sample household, we select the one that is quickest to reach in time as the nearest maize market for each household in Kenya. The computation results are likely to be longer than the actual travel time since walking speed is assigned to all paths except for roads. Additionally, the types of land cover and the slope of the land are taken into account so as to deflate the driving and walking speed.

In Uganda, there is only one maize market (i.e., Kampala) where we have adequate monthly price data. In eastern Uganda, however, maize farmers export maize

[4] We estimated the determinants of the attrition from the surveys and found that none of the independent variables is significant at the 5% level. Thus, we think that the attrition mostly occurred randomly and do not expect serious attrition biases.

[5] The surveys in Uganda were conducted jointly by Makerere University, Foundation for Advanced Studies on International Development (FASID), and National Graduate Institute for Policy Studies (GRIPS).

[6] The attrition rate is less than 5%. None of the independent variables in the determinants of the attrition model is significant even at the 10% level. Thus, we do not think that the attrition biases are serious.

to Kenya. Thus, the nearest market in the area may not be Kampala but Kisumu, which is the third largest city in Kenya and is located near the Kenya–Uganda border. Indeed, preliminary analyses indicate that the regression models, which are presented later in this chapter, perform better if we match the Ugandan farmers in the eastern regions with the Kisumu market rather than the Kampala market. Thus, we select Kisumu as the nearest maize market for some Ugandan households that live closer to Kisumu than to Kampala.

In almost all of our Kenya and Uganda sites, there are two cropping seasons. For each cropping season, we need to identify the monthly market prices that are comparable to the farm-gate prices that the maize farmers received after each harvest. From our own surveys, we know that most of our sample households sell their maize within 4 months after their harvests. Thus, after matching our sample households with the nearest maize market, we calculate the average market price during the 4 month postharvest season and match them with the maize farm-gate price data obtained from the household surveys. Note that in our surveys we have asked our respondents about the previous two cropping seasons. In Kenya, we conducted our surveys during the January–March period in 2004 and 2007. Thus, we have price data pertaining to two cropping seasons in the previous year of each survey, i.e., 2003 or 2006. In Uganda, we conducted our surveys during the August–October period in 2003 and 2005. Thus, the cropping seasons that are covered in our surveys are the first cropping season of the survey year and the second cropping season of the previous year of each survey. Note that because survey years are different in Kenya and Uganda, the corresponding market maize prices are different in the two countries.

2.4 Descriptive Analyses

To begin our analyses, we first look at the monthly maize price data in the four maize markets in Kenya and Uganda shown in Figs. 2.2 and 2.3. In Fig. 2.2, we present the monthly maize price data in Nairobi and Eldoret from January 2001 to January 2007. Nairobi is the capital and the largest city in Kenya and, therefore, is the largest maize deficit city in the country. Eldoret, on the other hand, is located in Rift Valley, which is the main maize producing area. Many medium and large-scale commercial maize farmers are located in Rift Valley Province. Thus, Eldoret is one of the largest maize surplus markets in the country. In Fig. 2.2, therefore, we can clearly see that the monthly price at Eldoret tends to be lower than the monthly price at Nairobi. We also notice a seasonal pattern in the figure: the gap tends to be large during the period from October to January, which follows the maize harvest season in Rift Valley. In Fig. 2.3, we compare the monthly maize prices at Kisumu in Kenya and Kampala in Uganda. We can clearly see that the maize price is higher in Kisumu than in Kampala. The gap between the two prices was larger than $70 per ton in 2003 and 2004 but has shrunk in recent years. Ugandan farmers who are located in between these markets can benefit from the higher maize price at Kisumu

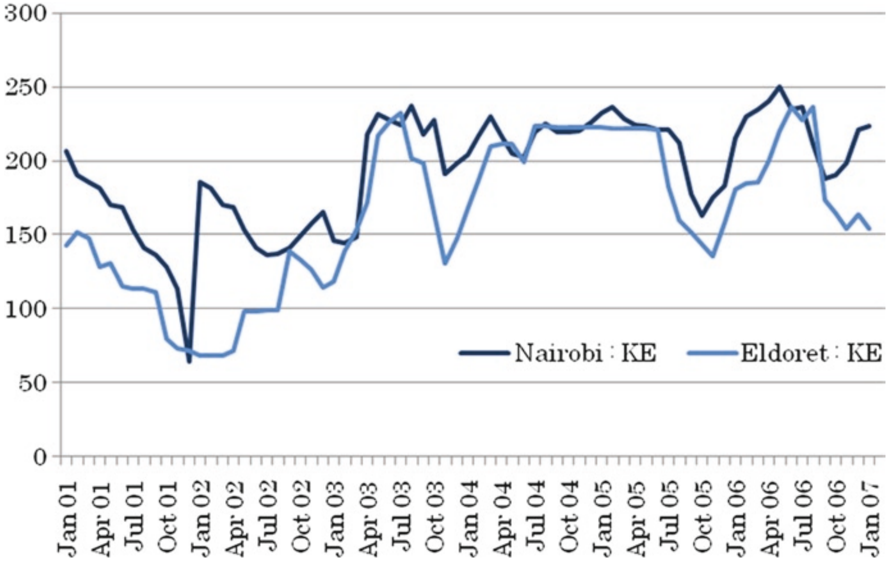

Fig. 2.2 Monthly maize price at Nairobi and Eldoret from January 2001 to January 2007

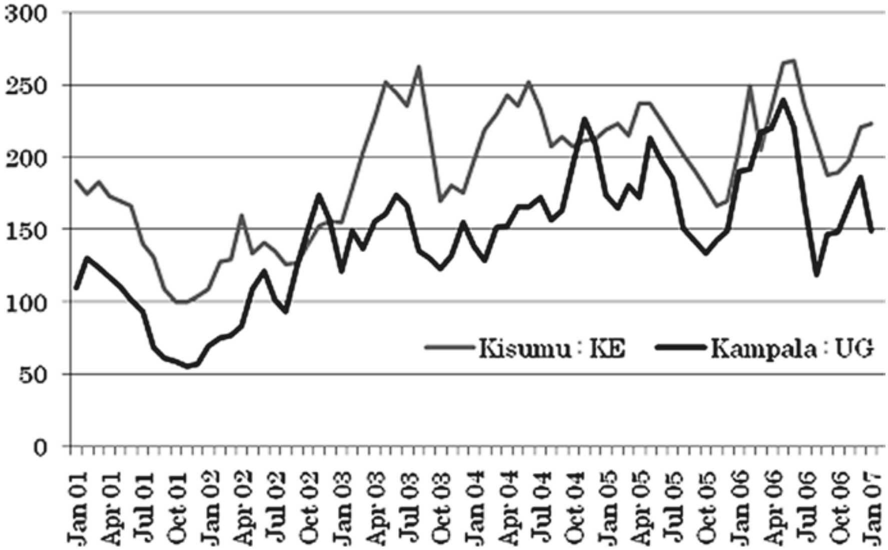

Fig. 2.3 Monthly maize price at Kisumu and Kampala from January 2001 to January 2007

than at Kampala. The shrinking price gap indicates the greater integration of the two markets over time due mainly to the marketing behavior of Uganda farmers.

In Table 2.1, we find that the average maize market price in the two harvest seasons in 2004 is about $215 per ton in Nairobi. During the same period, the average

Table 2.1 Farm-market price spreads of maize in Kenya and Uganda

	2003/2004			2005/2007		
	Market price	Farm-gate price	Price spread % of (1)	Market price	Farm-gate price	Price spread % of (1)
Nearest market	(1)	(2)	(3)	(4)	(5)	(6)
Kenya						
Nairobi	215.4	162.6	24.7	203.7	168.2	17.4
Eldoret	211.0	145.6	31.0	161.4	153.4	4.9
Kisumu	227.5	174.2	22.5	211.2	194.5	7.3
All	217.9	160.6	26.1	195.3	171.9	11.4
Uganda						
Kisumu	188.1	106.4	43.4	187.2	98.4	47.4
Kampala	135.2	104.5	22.7	158.1	104.1	34.2
All	148.0	105.4	27.2	164.5	104.0	37.0

Survey years in Uganda are 2003 and 2005. Survey years in Kenya are 2004 and 2007

farm-gate maize price for farmers, who live closer to Nairobi than the other two maize markets in Kenya, is $163 per ton. Thus, the farm-market price spread is about $52 per ton, which is about 25% of the market price. In 2007, the average maize market price is $204, and the farm-gate price is $168. Thus, the farm-market price spread is about 17% of the market price.

As discussed earlier, Eldoret is located in a maize surplus area and usually has lower maize prices than in Nairobi. In Table 2.1, we find that the average maize price is $211 per ton in 2004 and $161 in 2007. These prices are lower than the Nairobi prices in both years, especially in 2007. Because the 2006 maize harvest was especially good in Rift Valley, the maize price declined in Eldoret, as we can see in Fig. 2.2. The farm-gate price remains at just below the market price and the price spread is only 5% of the market price.

In western Kenya, Kisumu is the largest city where a large quantity of maize is traded. In Kisumu, the average maize market price is higher than the one in Nairobi in the harvest seasons of 2004 and 2007: it is $228 in 2004 and $211 in 2007. The farm-gate price is higher in this area also: it is $174 in 2004 and $195 in 2007. The price spread in 2004 is 22.5% of the market price. As in the Eldoret area, the price spread declines considerably in 2007, to 7.3% in 2007. As a result, the average price spread for the whole sample in Kenya declines from 26.1% in 2004 to 11.4% in 2007.

In Uganda, the market maize price is much lower than in Kenya, as we have already discussed in Sect. 2.2. The average maize price in Kampala is $135 in 2003 and 158 in 2005. The corresponding farm-gate price for maize farmers, who live closer to Kampala than Kisumu, is $105 in 2003 and $104 in 2005. Thus, the price spread is about 22.7% and 34.2% in 2003 and 2005, respectively. For those Ugandan farmers who live closer to Kisumu than Kampala, the farm-gate price is $106 in 2003 and $98 in 2005. Thus, compared with the market price in Kisumu, the price spread is about 43.4% and 47.4% in 2003 and 2005, respectively. Therefore, while

Kenyan farmers who live close to Kisumu are receiving farm-gate maize prices that are about 3–19% lower than the Kisumu price, Ugandan farmers across the border are receiving farm-gate prices that are more than 40% below the same Kisumu price. Since Ugandan farmers are located far away from Kisumu, the difference in distance to Kisumu may explain much of the difference. In order to examine the price spreads across countries and regions, we need to control for the driving hours to the nearest maize market from each household.

To analyze the relationship between the farm-market price spread and the driving time to the nearest maize market, we first draw a simple plot between the price spread, expressed as the percentage of the market price, and the driving time to the nearest maize market. To smooth the measurement errors over the years, we pool the data over the years for each country. According to Fig. 2.4, the farm-market price spread is lower in Kenya than in Uganda. In Kenya, the farm-market price spread is about 10% if maize farmers are located within two driving hours to the nearest maize market. The farm-market price spread starts increasing gradually to about 20% at five driving hours. In Uganda, even within one driving hour, the farm-market price spread is already about 30%. As the distance becomes longer, the price spread increases gradually to about 35% of the market price. The price spread increases only by 5% points over the five driving hour distance in Uganda, while it increases about 10% points in Kenya over the same distance.

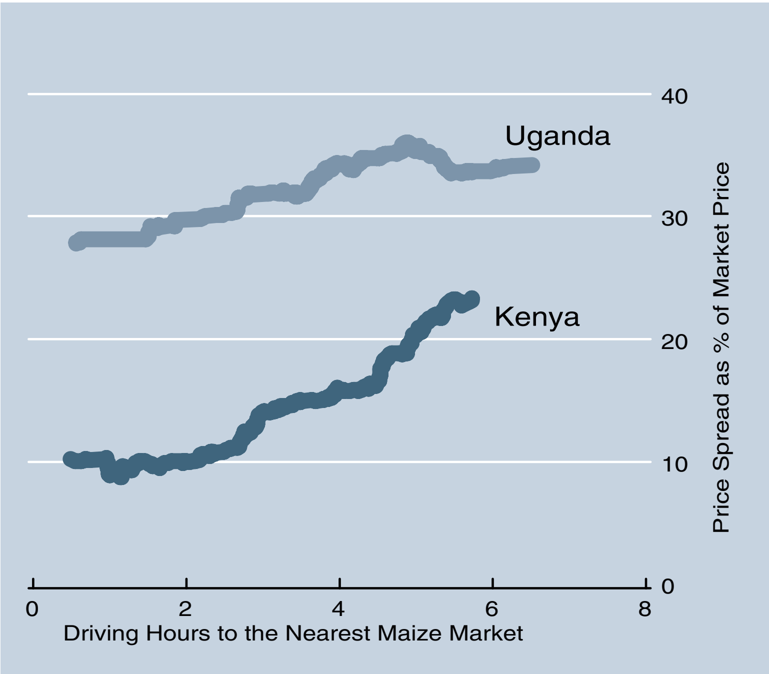

Fig. 2.4 Farm-market price spread as a percentage of market price by the driving time to the nearest marker in hours in Kenya and Uganda

Table 2.2 Maize price spreads by driving time to the nearest maize market

		Driving hours to the nearest maize market		
	All	0–2 h	2–4 h	Over 4 h
	(1)	(2)	(3)	(4)
Kenya				
Nairobi	20.4	15.6	14.0	28.1
Eldoret	19.7	15.4	18.8	22.1
Kisumu	15.4	21.4	11.5	39.2
All	18.7	17.6	13.1	25.8
Uganda				
Kisumu	45.2	n.a.	49.5	43.0
Kampala	29.2	25.3	29.8	29.3
All	32.7	25.3	32.9	33.6

In Table 2.2, we divide the samples into three groups according to driving time to the nearest market: 0–2 h, 2–4 h, and over 4 h. As in the previous table, we further divide the samples by the nearest market. In this table, we find that the price spread widens as the distance to the nearest market increases. In the Nairobi area, the average farm-gate price is about 20% below the market price at Nairobi. The price spread is about 16% if maize farmers are located within a 2 h driving distance. The price spread somehow declines slightly to 14% in the next distance group but increases to 28% in the remote group (over 4 h). In Eldoret and Kisumu areas, we also find that the price spread is the largest in the most remote area, even though the second most remote group has the lowest price spread in the Kisumu area. In Uganda, the relationship between the price spread and the driving time to the nearest market is less clear. In the Kampala area, the price spread is larger in the second most remote areas than the least remote area, but the differences are small. In the eastern Uganda area, which is closer to Kisumu than Kampala, there are no households that are within a 2 h driving distance from a market. In the second most remote area, the price spread is about 50% of the market price in Kisumu, implying that the farm-gate price is about half of the market price. This is much lower than what Kenyan farmers who are located within the same time range from Kisumu receive. Their price spread is about 12% of the market price. Among the most remote groups, however, maize farmers in Kenya and Uganda near Kisumu receive about the same level of the farm-gate price, which is about 60% of the market price, as indicated by the price spread of about 40%.

These findings suggest that the low farm-gate price compared with the market price in Uganda is not only because of the long distance to the nearest market but other factors, such as market structure and competition, matter. For instance, the unit price of maize may differ depending on the total volume of sales, where large maize farmers fetch a higher per unit price from maize traders than small maize farmers. Thus, we need to control for household characteristics. As we discussed in Sect. 2.2, there may be more maize traders in Kenya than in Uganda and maize is traded more often. If maize marketing in Uganda improves its efficiency to the

Kenyan level so farm-gate prices would rise by 10% points compared to the market price, then the maize farmers in the country will gain \$14–\$18 per ton. Since the distance to market is not the only factor that affects the farm-gate to market price ratio, we further explore the determinants of the ratio through regression analyses.

2.5 Estimation Models and Variables

To measure the marketing efficiency across countries and over time, we use the farm-market price spread measured as the percentage of the market price. The farm-market price spread has been used in many studies before, as surveyed in Fackler and Goodwin (2002). We use the percentage figure, instead of the price spread itself, because we want to eliminate inflation and exchange factors from our measure of efficiency. Thus, the regression model we estimate is

$$PS_i = f\left(M_i, E_i, H_i, Y, S\right) \tag{2.1}$$

where PS_i is the farm-market price spread measured as the percentage of the market price; M_i is the market access variable measured by the driving time from household i to the nearest maize market; E_i is a set of agroecological variables; H_i is a set of household characteristics of household i; Y is the year dummy for the second round; and S is the season dummy for the second season. PS_i is defined as

$$PS_i = \left[\frac{p_i^{\mathrm{M}} - p_i^{\mathrm{F}}}{p_i^{\mathrm{M}}}\right] \times 100 \tag{2.2}$$

where p_i^{M} is the market price of maize at the nearest maize market for household i and p_i^{F} is the farm-gate price of household i. The dependent variable is always above zero in our data and can be over 100 when the farm-gate price exceeds the market price, which occurs in our data set. Thus, we use the OLS model to estimate the regression function.

The agroecological variables include PPE (precipitation over potential evapotranspiration ratio), altitude, soil fertility, and population density. The PPE is used as an index for agroclimate conditions such as rainfall and temperature (a higher PPE denotes a greater agricultural potential), which is obtained from the database contained in the Almanac Characterization Tool (Corbett 1999). When we conducted community surveys in 2003 and 2005, we obtained the GIS coordinates of each community center. Thus, the altitude is measured at the community level. In addition to these variables, we include a soil fertility variable in the model. As an index of the soil fertility, we use the soil organic matter (SOM) content. Because the SOM is available for just the subsamples, we could estimate the models with the subsamples only. This method, however, may create selection biases because the subsamples with the soil fertility data are not selected randomly.

Instead, we replace all the soil-related variables with zero and include an additional dummy variable for those households without soil data. To assure that our approach provides robust estimates, we estimate the same model for all the households and the reduced sample.

The household characteristics include human capital and asset variables. The human capital variables include the age, education levels, and gender of the household heads. For household assets, we include own land size in hectares and the value of household farm equipments, furniture, transportation means, communication devices, and other household assets. Because the size and the soil fertility of the land are separately included in the model, we do not add the value of land to the total asset value.

2.6 Results

The estimated coefficient of the driving time in column 1 of Table 2.3 is 2.1 for Kenya, suggesting that the maize price spread increases by 2.1% points against the market price as the driving time increases by 1 h. In Fig. 2.4, we find that the price spread increases from 10% to 20% of the market price as the driving time increases by 5 h in Kenya. Thus, the estimation result is largely consistent with what we find in Fig. 2.1 for Kenya. The estimation result for Uganda is similar to that for Kenya: one additional driving hour increases the price spread by 2.3% points against the market price in Uganda. As we have seen in Fig. 2.4, maize farmers, in Uganda, who are located 5 h away from the nearest market receive at least a 10-percentage-point lower maize price than maize farmers who live near the market. These findings indicate that the marginal transportation cost associated with an increase in driving time affects the price spread equally between Kenya and Uganda, which may be taken to imply that local maize markets function well over the two countries.

None of the agroecological variables has significant coefficients. Thus, the agroecological variables do not affect the price spread between the farm-gate price and the market price, although they may affect the maize output price levels. Moreover, none of the household characteristics has significant coefficients in Kenya. Thus, as far as the maize market in Kenya is concerned, there is no indication of market imperfections, which supports Hypothesis 1, discussed in Chap. 1, that markets function well. In Uganda, young household heads and those who have more households assets have lower price spreads, i.e., higher farm-gate prices than others. One possible way for them to receive a higher price is to transport maize to a market where they can fetch a higher price. This is possible if the maize market is not well developed in Uganda. If the maize market is well developed, individual farmers do not need to transfer maize to a market because traders can do so at a lower cost than individual farmers. Such market imperfections in Uganda may explain why the price spread is much larger in Uganda than in Kenya, which is shown in Fig. 2.4.

Table 2.3 Determinants of price spread ratio in Uganda and Kenya. (Dependent variable = (Market price – Farm-gate rice) × 100/Market price)

	Kenya	Uganda
	(1)	(2)
Market access		
Driving hours to the nearest market	2.099**	2.300***
	(2.78)	(3.95)
Agroecological variables		
PPE	7.508	–5.374
	(1.20)	(–0.50)
Altitude	–0.001*	0.001
	(–1.73)	(0.14)
Soil fertility	–0.727	0.108
	(–1.21)	(0.12)
Population density	0.002	0.005
	(0.84)	(1.35)
Household characteristics		
Household head age	0.092	0.129**
	(1.39)	(2.94)
Household head education	0.177	–0.221
	(0.79)	(–1.28)
Female headed household	–0.095	–3.005
	(–0.04)	(–1.56)
Land size in ha	–0.051	–0.071
	(–0.35)	(–0.92)
ln (household assets)	–0.492	–1.838**
	(–0.73)	(–2.80)
Year dummy	–6.850***	4.906***
	(–12.11)	(8.37)
Season dummy	–21.34***	1.062
	(–9.76)	(0.90)
Constant	13,764***	–9,802***
	(12.13)	(–8.34)

Absolute value of *t* statistics in parentheses
* Significant at 10%; ** significant at 5%; *** significant at 1%

2.7 Conclusions

To reduce poverty in rural areas, rural communities need to be integrated with markets so that they can receive high and stable returns to their agricultural products, thereby becoming less vulnerable to production shocks. Although there have been many studies that test market integration across markets by using time series price data, few studies have examined the price spread between market and farm-gate prices across countries by using panel data. Because poor transportation infrastructure is considered to be a major factor behind the high marketing costs in Africa, we examine the relationship between the farm-market price spread and driving time from each sample household to the nearest maize market where we have monthly maize price data. The findings in this chapter indicate that there are substantial price spreads between farm gates and markets, which strongly suggests that the farm-gate price can be raised significantly by improving road conditions.

We also found that in both countries, the price spread increases equally by 2% points for one additional hour of driving time from the nearest maize market. Furthermore, we found that agroecological variables and household characteristics are generally insignificant in the price spread regressions, except for a few variables in Uganda. Although far from concrete, these findings indicate that local maize markets function well except in Uganda where there still remain some market imperfections. In order to reduce rural poverty, policies to reduce transportation costs and facilitate market competition are called for, particularly in Uganda.

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