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Full Length Research Paper

Determinants of the place of sell and price of kale for Kiambu, Kenya

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Kale is a major source of cash for many households in Kenya. A study of households in Kiambu district revealed that kale made the highest contribution to household income among the crops. The farmers of Kiambu sell their kale either in Nairobi, at farm gate, or at the local market and fetch different prices. The farm gate price is highest when Kale is sold in Nairobi, but only a small fraction of the farmers sell kale in Nairobi. This paper endeavored to know what influenced the decision of where to sell the kale, and why the prices were so variable between destinations. The results showed that the price of kale was influenced by the place of production and distance to a local market. The results further showed that the decision to sell kale in Nairobi where the price was highest depended on labor availability, the household's wealth status and transport access to the market. Poorer households were more likely to seek higher prices in the city than the wealthier households. Improving marketing of Kale could be a way of targeting the poorer households and improving their welfare.

Key words: Kale, market outlets, price, Kiambu.

INTRODUCTION

The livelihood of many households the world over depends on the sale of agricultural commodities. Horticultural crops such as kale are particularly beneficial to smallholders because the benefits can be ripped within a short time. Indeed the role of horticultural crops in improving the welfare of rural households has received a lot of emphasis in Kenya and else where (Swernberg, 1995; Kimenye, 1995; Minot and Ngigi, 2002). Kale, a popular green vegetable consumed by almost every household in Kenya has been shown to be a major source of cash for many households. For example, results of a study in Kiambu district, which neighbors Nairobi city, revealed that kale made the highest contribution to household income among the crops and also had the highest returns to variable inputs among the crops (Salasya, 2005). However, even though kale made the highest contribution to household income, not all the farmers sold kale in the city where prices are highest. Neven and Reardon (2005) found that smallholder farmers sell to brokers and get a price that just lets them break-even at best. The farmers in Kiambu and other areas that surround Nairobi city can utilize their proximity to the urban market to increase their income from kale by increasing the sales made directly to the city. It has been noted that smallholders need dynamic markets to enable them escape from poverty, and urban markets are at present the most dynamic food markets due to increasing urban population and incomes (Weatherspoon and Reardon, 2003). But as Neven and Reardon, 2004 observed, smallholders are squeezed out as indirect suppliers and are left to operate in the traditional system, which fetches lower prices. In the dataset used in this study there is a large variation in the price of kale, with the price ranging from less than 2 Kenya shillings (ksh) per kilo to 15 ksh per kilo. The farmers sold their kale either in Nairobi, at farm gate, or at the local market and received different prices, with some farmers getting better prices than others. The farm gate price was highest when kale was sold in Nairobi, and lowest when kale is sold at the local market. A disturbing question then is why not all the farmers in Kiambu sell their kale in Nairobi where prices are highest. Are there barriers preventing some farmers from accessing the Nairobi market? If as Fafchamps and Hill (2005) found, poor farmers receive lower prices because they cannot access markets with

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Table 1. Descriptive statistics for variables used in the analysis.

Variable description	(n = 296)			
	Mean	Standard deviation	Maximum	Minimum
Kale output price (ksh./kg)	7.11	3.77	1.30	15.0
Kale output (kg)	3038	3092	25000	15
Farm size in hectares (ha)	0.88	0.93	0.05	8.10
Education of household head (years in school)	8.68	5.08	0.00	16.0
Age of household head (years)	53.5	15.0	18.0	100
Number of adult males	1.93	1.37	0.00	9.00
Number of adult females	2.02	1.62	0.00	6.00
Number of children below 14 years	2.03	0.17	0.00	10.0
Cattle in tropical livestock units (TLU)	1.29	0.12	0.00	13.7
Distance to the nearest market (km)	2.11	1.63	0.01	10
Area under tea and/or coffee (hectares)	0.09	0.23	0.00	2.41
Dependency ratio (children to adults)	0.62	0.65	0.00	3.33
Gender of the household head (% female headed)	22.3			
Membership of organizations (% members)	87.1			
Percentage owning a bicycle	30.4			
Percentage owning a donkey cart	19.3			
Percentage owning a car	13.9			
Main occupation of household head (% farming)	64.9			

better prices, then their welfare can be raised by offering institutional alternatives that enable them to access markets with better prices.

The paper investigates the factors influencing the farmers' decisions on where to sell kale, and why different farmers sell in different market outlets and fetch different prices. The paper thus follows the lines of Fafchamps and Hill (2005) to investigate the relationship between the price of kale and the market conditions facing different households. Unlike coffee, which Fafchamps and Hill investigated, kale is highly perishable and hence the produce needs to reach the market within a short time after harvesting. The specific objectives of the paper are: to investigate what influences the farmers' choice of which market outlet to sell the kale to; examine why there is a large price variation in the price offered at the different market outlets and; to identify what characteristics of kale influenced its price. Some of the questions to be answered are: which households are more likely to sell kale in Nairobi where prices are highest and what needs to be done for most households to sell the kale in Nairobi? The remaining part of the paper is organized as follows: Methodology which describes the study area, data collection methods and analytical procedures. The results are presented and discussed and the paper ends with conclusion.

METHODOLOGY

The study area

The study is carried out in Kiambu district, one of the districts in central province of Kenya, located just north of Nairobi City. Kiambu was selected because it is located close to Nairobi city and hence it was expected that farmers could easily carry their produce to the city without fear of spoilage, considering that kale is a perishable commodity, and without incurring high transaction costs. Average annual rainfall in Kiambu varies with altitude between 500 mm in the lower parts up to 2000 mm in the higher forest zones (Jaetzold and Schmidt, 1983). The population density is high with an average of 562 persons per square kilometer (CBS, 2001) but also very variable with some areas having population densities exceeding 1500 persons/km^2. The average household has 3.9 persons living on 0.7 ha of land creating a very high dependency on agriculture (ROK, 2005), which is the main economic base.

Data and data collection

Data collection was through household interviews, conducted in the local language by trained enumerators using a pre-tested structured questionnaire between October and December 2003. Sub-locations (the smallest administrative unit in Kenya) falling within high agricultural potential areas of Kiambu formed the sampling frame. The study was limited to the high potential areas because those are the areas suitable for kale production, and also it is possible to produce kale through out the year and hence can supply the urban market continuously. Nine sub-locations located in Githunguri, Limuru and Lari divisions were randomly selected. Two pairs of major landmarks (permanent features such as a school, a church, a trading centre) in each of the selected sub-locations were randomly selected on a map and transect lines drawn joining each pair. Sampling was thereafter done following as closely as possible the marked transects by a trained enumerator. Every fifth household first on the left and then on the right was selected alternately and in this way, a random sample from all sub-locations was obtained. The number selected from each sub-location was proportional to the population density of that sub-location. In total 297 households from the three divisions (115 from Githunguri; 95 from Limuru and 86 from Lari) were interviewed. Data collected from each household

Table 2. The main destinations and the price of kale for the sample households.

	Number of households selling	Average quantity produced per household (kg)	Average quantity sold per household (kg)	Average retail price (Ksh.)	Average farm gate price (ksh.)
Total	**156**	**3485**	**3191**	**7.21**	**7.09**
Middleman	118		3631	7.06	6.98
Open market	38		1823	7.78	7.42
Nairobi (all)	**33**	**4070**	**3646**	**11.3**	**10.8**
To middleman	15		4897	10.3	9.82
In open market	18		2602	12.2	11.6
Local market (all)	**29**	**2660**	**2488**	**4.36**	**4.23**
To middleman	9		5525	5.61	5.46
In open market	20		1121	3.79	3.69
Farm gate	**94**	**3534**	**3248**	**6.68**	**6.68**

Source: Calculations from household survey data; NB: The quantities and prices for one year.

were: household data including age, gender, education level and occupation of the household head, household size disaggregated by age and gender, farm size and off-farm income sources. Also collected were detailed production data at individual activity level, including use of labor. Institutional data on distance to input and output markets, prices of inputs and outputs, access to credit and extension services and organizational membership were also collected. Descriptive statistics of the data used in the estimations are shown in Table 1.

Analytical tools

Two analytical approaches were followed. First the determinants of the price of kale were examined by applying the hedonic hypothesis, and then the factors influencing the choice of where to sell the kale was investigated using a Probit model.

Determinants of the price of kale

The Rosen's hedonic pricing model, was employed which is based on the hedonic hypothesis that each good is characterized by the set of all its characteristics $x = (x_1, x_2, ... x_k)$. It is assumed that the preferences of economic actors with respect to any good are solely determined by the corresponding characteristics vector of that good and that for any good, there is a functional relationship between the price p and its characteristic vector x (Rosen, 1974) so that;

$$p = f(x). \quad (1)$$

This function specifies the hedonic relationship or the hedonic regression typical for any good. Hedonic models have been widely used to evaluate the implicit prices of many agricultural commodities, e.g. (Bailey and Peterson, 1991 and Lansford et al., 1998). Based on the functional relationship hedonic prices can be calculated by taking the partial derivatives of the hedonic function (Rosen, 1974). Hedonic regressions have also been applied on durable goods such as automobiles (Couton et al., 1996) where various technical characteristics of the car are included in the hedonic price equation. It has also been applied on non durable goods with identifiable characteristics such as wine e.g. (Combris et al., 1997). However in this study we estimate the hedonic function to identify how the different characteristics of kale, that are not necessarily inherent in the product itself, influence its price (significance and direction of effect). In the estimation we assume the ordinary linear approach which takes the form:

$$\boldsymbol{p} = \beta_0 + \sum_{k=1}^{k} \beta_k \boldsymbol{x_k} \quad (2)$$

Where $\boldsymbol{p}$ is the price of kale and β_k are coefficients to be estimated and reflect the absolute price of $\boldsymbol{x_k}$, and $\boldsymbol{x_k}$ are the characteristics of kale hypothesized to influence its price. The characteristics hypothesized to influence the price include, the place of sale, distance to the nearest market, to whom kale is sold (middleman or open market), and the location where it is produced. Results of the hedonic estimation are presented in Table 4.

The Probit model

Binary choice models also called univariate dichotomous models are the most commonly used to analyze decisions for or against a particular practice (Verbeek, 2003). These models essentially describe the probability that $y_i = 1$ directly, although they are often derived from an underlying latent variable model. The general form of the model may be stated as follows:

$$\boldsymbol{p}(\boldsymbol{y_i} = 1 \setminus \boldsymbol{x_i}) = \boldsymbol{G}(\boldsymbol{x_i}, \beta) \quad (3)$$

This equation says that the probability of having $y_i = 1$ depends on the vector $\boldsymbol{x_i}$ containing individual characteristics e.g. income,

Table 3. Determinants of the price of kale – results of the hedonic equation estimation.

Variable	Coefficient	Std. error
Constant	9.38***	0.90
Where sold dummy (1 = Nairobi; 0 = elsewhere)	3.24***	0.71
Where sold dummy (1= Local market; 0 = elsewhere)	-2.48***	0.95
To whom sold (1 = middleman; 0 = open market)	-1.19	0.78
Distance to the nearest market (km)	-0.51***	0.18
Division dummy (1= Githunguri; 0 = Lari and Limuru)	-2.10**	0.84
Division dummy (1= Limuru; 0 = Githunguri and Lari)	-1.25**	0.55
Adjusted R-squared	0.45	
N	152	
Dependent variable = Farm gate price of kale in ksh./kg.		

*, **, *** indicate significance levels of 0.1, 0.05, and 0.001 respectively.

education level, age and marital status. The common models that emerge are either the Probit or the Logit models depending on the distribution function chosen for the stochastic term. The two distribution functions are similar so that if one corrects for the difference in scaling, the Logit and Probit models typically yield very similar results in empirical work. In this paper we use the Probit model to analyze farmers' decisions to sell kale at the different destinations. The farmers could either sell kale at the local (nearest market), at farm gate, or in the city (Nairobi). Following Verbeek (2003), the model is specified as:

$$y_i^* = \boldsymbol{x}_i'\beta + \varepsilon_i, \ \varepsilon_i \sim \text{NID}\ (0,1) \qquad (4)$$

y_i^* Is unobserved and is referred to as a latent variable. The assumption is that an individual farmer chooses to sell at a particular destination when the utility difference of selling there and not selling there exceeds a certain threshold, zero in this case, so that

$y_i = 1$ (Sell at destination $\boldsymbol{i}$) if and only if $y_i^* > 0$

$y_i = 0$ if $y_i^* \leq 0$

The choice to sell at destination $\boldsymbol{i}$ is affected by the variables $\boldsymbol{x}_i'$ whose coefficient vector β, are the subject of estimation; as usual the error term ε_i is assumed to be independent of all $\boldsymbol{x}_i$. The parameters are estimated by the method of maximum likelihood. The independent variables in the empirical model ($\boldsymbol{x}_i$ s) consist of different sets of data hypothesized to influence the farmer's decision to sell at destination $\boldsymbol{i}$ (y_i). These variables are described in Appendix 1.

RESULTS AND DISCUSSION

Determinants of the price of kale

Table 2 summarizes the quantity of kale produced and sold at the different destinations and the prices received. The three main destinations where kale is sold are Nairobi city, the local market and farm gate. When the destination is Nairobi and/or the local market, kale is either sold to a middle man, or in the open market, whereas when the destination is farm gate it is always to a middleman. It is obvious from Table 2 that the price of kale varies mainly based on where it was sold. The highest price is paid when kale is sold in Nairobi, whereas the lowest price is paid when kale is sold at the local market. A t–test comparing prices at one destination with prices at the other two destinations combined confirm that prices in Nairobi are significantly higher and prices at the local market significantly lower both at ($P<0.001$) and the prices when sold at farm gate are significantly lower at ($P<0.1$). Results of the hedonic estimation in Table 3 confirm that the price of kale is significantly higher in Nairobi and is significantly lower at the local market. The results further reveal that distance to the nearest market has a significant negative influence on the farm gate price, the nearer the market the higher the price. Although kale is not necessarily sold at the nearest market, distance to the nearest market is an indication of accessibility e.g. to where public transport can be available and thus has an influence on the transaction costs involved. There is no significant price difference between selling in the open market and selling to a middleman. The results of the hedonic regression (Table 3) also show that the price of kale is significantly higher for households located in Lari division than for those located in Githunguri or Limuru divisions. From the data, households in Lari mainly sell their kale either at farm gate or in Nairobi whereas those in Githunguri sell mainly at the local market and surprisingly none sells in Nairobi. Those in Limuru sell mainly at farm gate with a few selling in Nairobi and at the local market. Why then this observed scenario, that for example the household in Lari division should sell in Nairobi and fetch higher prices and those in Githunguri sell at the local market and fetch lower prices? Results of the Probit model in Table 3 shade more light. The Probit model results in Table 4

Table 4. Probit results on factors influencing the choice of where to sell kale.

Variable	Nairobi	Local market	Farm gate
Constant	-0.20 (1.07)	1.40 (1.35)	-1.43 (0.92)
Number of adult males	0.29** (0.14)	-0.20 (0.26)	-0.17 (0.12)
Number of adult females	0.36*** (0.14)	-0.05 (0.19)	-0.22* (0.12)
Dependency ratio (children to adults)	0.44* (0.25)	-0.17 (0.30)	-0.14 (0.20)
Division dummy (1= Lari; 0 = Githunguri and Limuru)		-2.64*** (0.64)	-0.63 (0.41)
Division dummy (1= Limuru; 0 = Githunguri and Lari)	-0.89*** (0.36)	-0.94* (0.55)	-0.61 (0.44)
Education of farmer (years in school)	-0.03 (0.04)	0.03 (0.05)	0.02 (0.03)
Main occupation of household head (1 = farming; 0 = non-farming)	0.40 (0.38)	0.06 (0.43)	-0.12 (0.30)
Age of the household head	-0.03** (0.01)	-0.03* (0.02)	0.04*** (0.01)
Farm size (ha)	-0.20 (0.30)	0.02 (0.25)	0.19 (0.20)
Membership to organization (1 = is a member of an organization	-0.29 (0.39)	0.05 (0.72)	0.20 (0.35)
Distance to the nearest market (km)	-0.08 (0.14)	0.22 (0.15)	-0.08 (0.10)
Off-farm income ('000s of ksh.)/year	-0.01** (0.003)	0.001 (0.003)	0.003 (0.002)
Gender of farmer (1= female)	-0.06 (0.39)	0.37 (0.55)	-0.24 (0.34)
Area under tea and/or coffee	-7.65* (3.95)	4.63* (2.60)	-2.41 (1.70)
If a car is owned (1=yes)	0.19 (0.40)	-0.24 (0.62)	-0.15 (0.31)
If a bicycle is owned (1 = yes)	0.17 (0.39)	-0.32 (0.59)	-0.17 (0.34)
If a donkey cart is owned (1 = yes)	-0.12 (0.37)	0.05 (0.59)	0.02 (0.32)
McFadden R-squared	0.27	0.53	0.18
N	149	149	149

NB: (.) = Standard errors, *, **, *** are significance levels of 0.1, 0.05, and 0.01 respectively.

show that households in Lari are more likely to sell their kale in Nairobi than households in the other two divisions. Moreover, the results show that households with many adult members irrespective of their gender are more likely to sell kale in Nairobi than do households with fewer adult members. On the contrary households with fewer adult female members are more likely to sell kale at farm gate. Apparently availability of labor for marketing has an influence on the decisions of where to sell kale. More time is required to take kale to Nairobi rather than farm gate or the local market, and hence households with many adult members (proxy for labor), are the ones likely to sell in Nairobi. This of course implies a labor market imperfection so that sufficient labor cannot be hired in for marketing purposes. There is a significant positive relationship between the dependency ratio (number of children to adults) and the choice to sale in Nairobi. A high dependency ratio implies that more support is required from the adult members, and hence they seek to sell kale where maximum returns are anticipated.

The Probit results also show that households with higher off farm income and households with a larger area under tea and/or coffee (cash crops) are less likely to sell their produce in Nairobi. This result implies that the relative importance placed on a commodity as a source of income may determine the choice of where to sell. Households having alternative sources of income (off-farm income and/or cash crops) may put less effort in seeking higher prices for kale, than households that do not have alternative income sources. As already mentioned, the farmers in Lari division were more likely to sell kale in Nairobi and fetch higher prices and those in Githunguri division were the least likely to sell in Nairobi. An examination of the farm activities practiced by the households in Lari and Githunguri divisions reveal that in Githunguri, 67% of the households grow cash crops (tea and/or coffee), whereas in Lari only about 2.3% grow either tea or coffee or both. Similarly, using a t-test to compare the level of off-farm income in one division with the combined level in the other two divisions, we found that households in Githunguri had a significantly higher ($P<0.05$) level of off-farm income compared to those of Lari and Limuru combined. Households in Lari on the other hand had significantly lower ($P<0.01$) off-farm income compared to those in Githunguri and Limuru combined. The off-farm income of Limuru was not significantly different from that of Lari and Githunguri combined. Additionally, over 38% of households in Lari did not have access to any off-farm income, whereas only 20% in Githunguri did not have access to off-farm income. The influence of off-farm income and area under a cash crop (tea or coffee) combine to show that households in Githunguri had more alternative sources of income compared to those in Lari. It becomes apparent that households in Lari division were more in need of income from kale, and therefore went to the trouble of supplying it to Nairobi in order to fetch higher prices, because it is their major source of income. Households in Githunguri have alternative sources of income and hence

are less careful on where to sell kale. Households who were more likely to sell their produce at the local market were those from Githunguri, those who were younger and those with a relatively larger area under tea and/or coffee. Carrying produce and spending time at the market is a tedious job and requires the energy of younger household heads. Only two variables are significant for the choice to sell at farm gate. They are age of the household head and number of adult females both with a negative influence. As discussed above, older household heads that presumably have less energy will tend to sell at farm gate. The result again confirms that availability of labor was an issue in the decision of where to sell, and it appears that female labor was more important for this decision. It was expected that ownership of a bicycle and/or a car/truck will significantly influence the point where kale is sold, but apparently they do not. None the less they have the correct signs for the different market outlets. That ownership of a car/truck was not significant for the decision to sell in Nairobi may be because, from the results its ownership was associated with wealthy households and as we have seen it is the less wealthy households who are more likely to sell in Nairobi.

DISCUSSION

Price of a commodity is essentially a result of the forces of supply and demand. That the highest price was received when kale was sold in Nairobi is thus a reflection of increasing urban demand. Indeed as Tiffen (2003) observed, a larger, more productive sector enlarges the market for farmers and stimulates them to invest in improvement. Most people in Nairobi are in off-farm employment and in most cases do not produce their own kale, hence relatively higher demand and hence higher prices. Having the lowest prices paid at the local market on the other hand reflects the narrowness of local markets (Sadoulet and de Janvry, 1995). Most households in the neighborhood produce the same crop and supply the same market and as Tiffen, 2003 notes, farmers are unable to sell any surplus they produce if all near them are similarly engaged and have no access to other centers of demand. It was the farmers who did not have permanent cash crops and/or those with little or no off-farm income that were more likely to sell in Nairobi. If we take the presence of permanent cash crops combined with access to off-farm income to be an indication of wealth, then the findings of this study are in line with the findings of Fafchamps and Hill (2005) who analyzed the decision to sell coffee either at farm gate where prices are lower or travel to the market and fetch higher prices, and found that wealthy farmers are less likely to travel to the market. Fafchamps and Hill (2005) in their study explained the lower likelihood of wealthier farmers to sell on the market where prices were higher by the fact that the shadow value of their time was high. Explained in another way, and probably more plausible for the current study, the utility of extra income from kale is higher for the poorer households so that selling in Nairobi is a survival strategy for them. For the wealthier households, the opportunity cost of their time is higher than the extra earnings from higher prices paid in Nairobi. Public investments that aim at increased efficient market opportunities will thus promote the welfare of the poorer farmers.

Distance to the market came out as an important determinant of price. Distance to the market affects the price through the transaction costs incurred in transferring the produce from the farmer to the purchaser. Transaction costs are the embodiment of barriers to market participation by resource poor smallholders (Holloway et al., 2000). They include searching costs of; bargaining with potential trading partners, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Staal et al., 1997). Differential transaction costs among households thus stem from asymmetries in access to assets, information, services and remunerative markets. Distance from the market and poor infrastructure increase the cost of transferring the product, which are essentially transportation cost. The result of this pervasive existence of transaction costs is that, even if perfect markets exist in a particular distance location, agents have to incur high costs to access these markets, creating wide bands between the market price and the farm gate price. The consequence is that each decision making unit faces a unit specific set of effective prices. Optimum resource allocation will consequently differ for each farmer according to the transaction costs-determined effective prices that characterize it. The average quantities sold to middlemen were much higher compared to those sold at the open market for any given destination. This could imply that households are not able to handle large quantities of kale at the open market. Kale being perishable, it is risky to handle large quantities at the open market particularly because they do not have cooling facilities to store what is not sold. The households therefore choose to transfer part of the risk to middlemen who possibly have better transport and cooling facilities to keep the kale fresh longer. This again is in agreement with the findings that smallholders are squeezed out as indirect suppliers and are left to operate in the traditional system, which fetches lower prices (Neven and Reardon, 2004). This study did not capture kale sells to super markets which is increasingly becoming important because at the time of data collection, sells to supermarkets were not there. A follow up study to include supermarkets is necessary.

CONCLUSION AND RECOMMENDATIONS

The main determinants of the price of kale were; the point

of sell (market outlet), distance to the market, and the location of production. The price of kale was highest when it was sold in Nairobi. The decision to sell kale in Nairobi where price was highest was positively influenced by availability of labor (both male and female) and number of dependants, and negatively influenced by age of the farmer, amount of off farm income and area under cash crops. Wealthier farmers (those with permanent cash crops and off farm incomes) are less likely to sell in Nairobi. On the contrary poorer households with no off-farm income or a permanent cash crop are more likely to seek higher prices in the city. This implies that improving marketing of kale, particularly accessibility to the city and providing cooling facilities could be a sure way of targeting the less wealthy households and improving their welfare. There is a need for public investments towards increased efficient market opportunities to avoid decreased commodity prices and farm income especially for poorer households.

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Appendix 1

Description of variables included in the Probit model

Level of education of the household head: This is the number of years spent in school. The level of the farmer's education is hypothesized to be positively related to the decision to sell kale in Nairobi because educated farmers are better able to access market information.

Age of the household head: Older household heads have less energy to transport produce to further markets and hence a negative coefficient is expected for the decision to sell in Nairobi and/or the local market and a positive one for the decision to sell at farm gate.

Gender of the household head: This is a dummy that takes a value of 1 for female farmers and a value of zero for male farmers. Female-headed households are hypothesized to have fewer sources of off farm income and hence should be more motivated to seek higher prices in the city. On the other hand they are less likely to have access to information on prices at different markets outlets. This coefficient could therefore go either way.

Number of adults: It is a proxy for availability of labor. Labor is required to transport kale to the market and a positive sign is expected for the decision to sell in Nairobi and a negative sign is for the decision to sell at farm gate. For more clarity this variable is sub divided into adult females, adult males and the dependency ratio – children to adults.

Occupation of the household head: This is a dummy indicating whether a household head is a full time farmer or not. It is hypothesized that fulltime farmers have a higher utility for farm income and are more likely to sell their produce in Nairobi.

Farm size: Farm size is a proxy for wealth. Households with larger pieces of land are hypothesized to be less likely to sell the produce in Nairobi hence a negative coefficient is expected and a positive one for selling at farm gate and local market.

Membership of an organization: A dummy variable that equal 1 if a farmer is a member of an organization and zero otherwise. Members of organizations such as farmer groups may have better access to information on prices in various markets and may organize themselves to collectively transport produce to where the prices are highest. A positive coefficient is therefore expected for decision to sell in Nairobi.

Distance to the nearest market: Proximity to the market often means proximity it where public transport can be availed. Farmers nearer a local market are hypothesized to be more likely to sell in Nairobi and/or at the local market hence a negative coefficient expected. A positive coefficient is expected for the decision to sell at farm gate.

Area under a permanent crop: If a farmer has permanent cash crops such as tea and/or coffee they are likely to have a lower utility for cash from kale and are thus less likely sell in Nairobi. A negative coefficient is expected for Nairobi and a positive one for farm gate and for the local market.

Off-farm income: This is the amount of non-farm income a household receives in a year. Households having access to higher amounts of off-farm income are expected to have a lower utility for farm income and are thus less likely to seek higher prices in the city. A negative coefficient is expected for the decision to sell in Nairobi and a positive one for the other destinations.

Ownership of a bicycle, a donkey cart, or a car: This are dummies where 1 = owns and zero otherwise. A household owning any of these assets is more able to transport produce to the market. A positive coefficient is thus, expected for the decision to sell in Nairobi.