Towards Understanding the Ghanaian Farmer's Decision to Enter a Contract with a Buyer

Matthew G. Interis
Department of Agricultural Economics
Mississippi State University
m.interis@msstate.edu
(662) 325-4787

Paula Cordero-Salas
Department of Economics, Finance and Legal Studies
University of Alabama
pcordero@cba.ua.edu

Francis Mulangu
African Center for Economic Transformation
Accra, Ghana
fmmulangu@acetforafrica.org

Selected Paper prepared for presentation at the Southern Agricultural Economics Association's 2016 Annual Meeting, San Antonio, Texas, February 6-9, 2016

Abstract
Ghanaian farmers often engage in formal or informal contracts with buyers of their product. Because the illiteracy rate among farmers is high and because of the appeal of side-selling (where farmers can sell at a higher price to someone other than the contract buyer), these agreements have historically been oral and therefore difficult to enforce. In this study, we use a choice experiment to determine which contract attributes make farmers more or less likely to enter into one. Farmers choose among proposed contracts that vary by whether they are written, the specified pricing structure, one's familiarity with the buyer, whether side-selling is permitted, and whether the buyer provides support in the form of seed, fertilizers, or pesticides. We find that farmers are much more likely to enter written contracts and that they do not appear to prefer contracts that permit side-selling. They will avoid contracts that specify a quality criterion for their product, even if they will be paid more for better quality product. Familiarity with the buyer is also important for entering a contract. This study was funded by the Ghanaian Ministry of Food and Agriculture to inform the establishment of an arbitration mechanism for agricultural contracts.

Introduction

In Ghana, small farmers generally sell their product to traders who then sell the product to retailers, processors, or exporters. This system gives the traders greater profits at the expense of the farmers (Cordero-Salas, Mulangu, Kodam 2015). Relationships between farmers and traders are regulated mostly by verbal agreements. However, there are few clear regulations in place regarding agricultural contracts, and there is very little enforcement of the few regulations that exist. Therefore, agricultural contracts, whether verbal or written, are often violated (Cordero-Salas, Mulangu, Kodam 2015).

A few studies have examined the effect of contract agriculture in developing countries. Bellemare (2012) finds that formal, enforced contracts benefit rice farmers in Madagascar. Vande Velde and Maertens (2014) find that contracts lead to higher incomes, higher yields, greater use of agricultural inputs, and higher farm-gate prices for rice farmers in Benin. On the other hand, because agricultural contracts are often incomplete and only informally enforced, they can leave contract parties vulnerable. For example, many small farmers are illiterate and this can be exploited in written contracts. For their part, farmers often violate contracts by side-selling their contracted product to other buyers who offer a higher price than is specified in the farmer's contract with the original buyer.

In the present study, we examine what attributes of a contract make Ghanaian farmers more or less likely to enter a contract with a buyer of their product. We used a choice experiment survey in which, for each presented choice set, farmers were asked to choose between entering one of two stylized contracts or to enter into neither of the presented contracts. The survey was administered to small farmers in several different regions of the country and whose primary crop of production varied.

Study Design

Prior to administering the choice experiment surveys, the research team conducted a literature review and field interviews with farmers in order to develop a comprehensive assessment of current agricultural contracts used in the study region, with a particular focus on the type of details and the details themselves, that are commonly specified in contracts. The type of details were used to develop the attributes of the stylized contracts used in the choice experiment and the details themselves were used to help determine appropriate levels of each of the attributes used in the studies. The final experiment design used the attributes and attribute levels specified in table 1. We used a fractional factorial design created in NGene with 12 rows and three blocks. Each survey respondent was randomly allocated to one of the three blocks, and answered four choice questions.

Data were collected between April and June, 2015, by The Center for Agribusiness and Research Development in Accra, based in Accra, Ghana. Randomly selected farmers from farmers' associations registered with Ghana's Ministry of Food and Agriculture and who lived in the Greater Accra, Eastern, Volta, and Central regions were visited in person to complete the surveys. Also, the fifth neighbor to the contacted farmer, who also produces the same crop, was also visited to complete the survey. We received 327 completed surveys with 1307 usable choice observations.

Table 1. Attributes and Attribute Levels Used in Choice Experiment Design

Attribute	Levels
Agreement Type	Written contract, No written contract (omitted base category)
Price Agreement	Farmer receives a higher price for better units, Farmer receives the same price for all units, Farmer is paid only for better units (omitted base category)
Support from Buyer	Buyer provides seed, fertilizer, and pesticides, Buyer provides fertilizer and pesticides only, Buyer provides seed only, Buyer provides no inputs (omitted base category)
Quantity Sold To Buyer	Less than 100% of the farmer's yield is sold to the buyer, 100% of the farmer's yield is sold to the buyer (omitted base category)
Relationship with Buyer	Buyer hasn't violated an agreement with the farmer in the past, Buyer has traded with the farmer in the past, Buyer hasn't traded with farmer in the past (omitted base category)

Results

The data were analyzed in a conditional logit model. Demographics were interacted with a dummy which equaled one if the alternative was a proposed contract and equaled zero if the alternative was the "neither contract" alternative. The regression results are presented in table 2.

Two models were estimated. In the "aggregate" model, the parameters are assumed to be the same for all respondents, regardless of the primary product they produce. The estimates for the aggregate model are in the second column of the table. In the "by product" model, the parameters are free to differ depending upon the respondent's primary product. These estimates are in the third column of table 2.

The sign of an attribute parameter estimate indicates its effect on the probability of a respondent choosing a contract with the specified attribute level relative to a contract with the omitted base level of that same attribute, all else equal. In the aggregate model, we see that the parameter on a written contract is positive and significant, indicating that farmers prefer a written contract to a verbal agreement. We also see that respondents prefer a price agreement in which either they are paid a higher price for better units or are paid the same price for all units sold to an agreement in which they are paid only for product that meets a minimum quality standard. Naturally, respondents prefer any type of buyer support to no support. They prefer that the agreement specifies that the buyer will purchase all of the farmer's yield to only a portion of the yield. Lastly, the stronger the history with the trading partner, the more likely the respondent is to enter an agreement.

Table 2. Choice Experiment Estimation Results

	Model: Aggregate			*Model: By Product*		
N=1307[a]	Est.[b]		s.e.	Est.[b]		s.e.
Agreement Type: Written Contract	0.60	***	0.10		--	
Tomato (N=208)		--		0.41	**	0.21
Rice (N=195)		--		0.46	**	0.18
Tilapia (N=28)		--		1.83	***	0.53
Cassava (N=216)		--		0.47	*	0.24
Pineapple (N=152)		--		1.64	***	0.32
Palm Oil (N=176)		--		1.24	***	0.28
Maize (N=196)		--		0.76	***	0.21
Soybeans (N=136)		--		0.45	**	0.20
Price Agreement: Higher Price for Better Units	0.57	***	0.14		--	
Tomato		--		0.62	**	0.26
Rice		--		0.87	***	0.26
Tilapia		--		-2.73	***	1.02
Cassava		--		0.61	**	0.28
Pineapple		--		0.50		0.44
Palm Oil		--		0.68	**	0.29
Maize		--		0.47		0.36
Soybeans		--		1.12	***	0.31
Price Agreement: Same Price for All Units Sold	0.41	***	0.11		--	
Tomato		--		0.37	*	0.23
Rice		--		0.69	***	0.23
Tilapia		--		-1.12	*	0.66
Cassava		--		0.50	**	0.23
Pineapple		--		0.59	*	0.36
Palm Oil		--		0.56	*	0.32
Maize		--		0.34		0.27
Soybeans		--		0.69	***	0.29
Support from Buyer: Seed, Fertilizer & Pesticides	1.24	***	0.19		--	
Tomato		--		1.35	***	0.37
Rice		--		1.18	***	0.33
Tilapia		--		5.46	***	1.72
Cassava		--		1.34	***	0.41
Pineapple		--		2.01	***	0.60
Palm Oil		--		0.76		0.49
Maize		--		2.08	***	0.38
Soybeans		--		1.32	***	0.38
Support from Buyer: Fertilizer & Pesticides Only	1.08	***	0.15		--	
Tomato		--		1.32	***	0.28

Rice		--		0.59	***	0.25
Tilapia		--		3.47	***	1.49
Cassava		--		1.08	***	0.30
Pineapple		--		1.64	***	0.34
Palm Oil		--		1.25	***	0.33
Maize		--		1.74	***	0.31
Soybeans		--		1.54	***	0.38
Support from Buyer: Seed Only	0.46	***	0.14		--	
Tomato		--		0.29		0.26
Rice		--		0.40	*	0.22
Tilapia		--		3.42	**	1.54
Cassava		--		0.72	**	0.35
Pineapple		--		1.09	**	0.46
Palm Oil		--		0.28		0.32
Maize		--		0.95	***	0.29
Soybeans		--		-0.09		0.25
Quantity Sold to Buyer: Some of Yield	-0.30	***	0.10		--	
Tomato		--		-0.57	**	0.29
Rice		--		0.16		0.26
Tilapia		--		-3.89	***	1.30
Cassava		--		-1.00	***	0.26
Pineapple		--		-1.03	***	0.33
Palm Oil		--		-1.30	***	0.37
Maize		--		0.89	***	0.22
Soybeans		--		0.32		0.28
Your contract partner: hasn't violated an agreement in the past	0.40	***	0.13		--	
Tomato		--		0.47	*	0.25
Rice		--		0.60	**	0.28
Tilapia		--		1.37	**	0.76
Cassava		--		0.15		0.28
Pineapple		--		0.87	**	0.36
Palm Oil		--		-0.04		0.29
Maize		--		0.64	**	0.30
Soybeans		--		0.65		0.40
Your contract partner: has traded with you in the past	0.30	***	0.10		--	
Tomato		--		0.18		0.19
Rice		--		0.15		0.21
Tilapia		--		1.59	*	0.88
Cassava		--		0.08		0.21
Pineapple		--		0.76	*	0.43
Palm Oil		--		-0.09		0.31
Maize		--		0.50	*	0.26
Soybeans		--		1.03	***	0.31

Neither contract	2.25	**	0.90	2.89	***	1.12
Neither contract*number of years farming[c]	0.02	**	0.01	0.02	*	0.01
Neither contract*is married[c]	-0.99	***	0.37	-0.93	**	0.38
Neither contract*has access to irrigation[c]	-1.09	**	0.45	-1.31	**	0.56
Log likelihood value	-1116.04			-998.43		
Wald Chi-sq(13)	340.78***			--		

*, **, and *** indicate significance at the 10%, 5%, and 1% levels.

[a] N is the total number of choices made. Each respondent made 4 choices (1 rice respondent made only 3) so there were 327 total respondents. The table also displays the number of choices by product type.

[b] A positive (negative) estimate means the person is more (less) likely to choose a contract with that level of the attribute relative to a contract with the omitted base level of the attribute, all else equal.

[c] Other demographic variables included in the model but not found to be significant were: sex, age, number of active acres, distance from farm to road, distance from farm to market, whether respondent had a contract last year, and respondents' propensity to trust, be patient, and accept risk.

In order to see if there are relative effects between levels that are not the omitted base levels, we can rerun the model and change the omitted base level. Doing so for the aggregate model (results omitted), we saw that a farmer is more likely to enter a contract if he is paid more for better units than to enter an agreement in which he is paid the same price for all units. That is, from table 2, we see that the estimate on the first type of price agreement (0.57) is greater than the estimate on the second type of price agreement (0.41), and from rerunning the model with the second type of price agreement as the omitted base, we know that this difference is large enough that we can confidently say that a respondent is more likely to enter a contract with the first price agreement than one with the second price agreement, all else equal. Changing the omitted base levels also showed, for the aggregate model, that the effects of the top two levels of support from the buyer in table 2 (All inputs, and Fertilizer & Pesticides only) are statistically different from each other and the levels Fertilizer & Pesticides Only and Seed Only statistically differ from each other. However, we do not find evidence that a farmer is more likely to enter a contract with a buyer who hasn't violated an agreement in the past (0.40) than one with whom the farmer has simply had some trading history (0.30).

The last column of table 2 examines all of the same effects as in the aggregate model, except that the effects are broken down by product type. We see from this column that the effects for "Agreement Type: Written Contract" and "Support from Buyer Fertilizer & Pesticides only" are positive and significant regardless of the product type. For other attributes, there might be some products for which there is no significant effect, or, in the case of "Price Agreement: Higher Price for Better Units" and "Price Agreement: Same Price for All Units Sold" we see that the effect for Tilapia producers is negative whereas it is positive for producers of other products. The parameter estimates on "Quantity Sold to Buyer: Some of Yield" are generally negative except for that on maize. This may be an indication that maize producers are more inclined to side-sell their product.

Interestingly, those who have been farming for more years are less likely to enter a contract (either written or verbal). This may be because of a distrust of contracts based on experience, or it may be because of a lack of experience with contracts. Farmers who are married or who have access to irrigation are more likely to enter a contract.

Conclusions

There is a clear preference of respondents for written agricultural contracts instead of verbal agreements. The findings also indicate that farmers generally prefer a contract in which the buyer will purchase 100% of the product grown. This may be to reduce risk in their expected income. Selling all of their product indicates that farmers are willing to forgo their right to side-sell some of their product if they later get a better price offer from another buyer, however, the desired contract details certainly depend on the farmer's expected level of enforcement of the contract. That is, a farmer might state that he or she prefers a contract in which the buyer purchases 100% of the product, but not actually expect this to be enforced, therefore allowing him or her to side-sell without facing legal consequences. Farmers indicated a preference to receive support from the buyer in the form of seed, fertilizers, or pesticides, however, in an actual contract, this support might come at the expense of, for example, a lower price received per unit. Familiarity with one's trading partner determines the likelihood of entering a contract, however, we might expect this effect to diminish if contract enforcement mechanisms improved in the region.

Works Cited

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