

Information Service and Price Dispersion in Togolese Maize Markets

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Abstract: This paper assesses the effect of the dissemination of prices' information on the maize prices dispersion in Togo with Lomé as reference market. The maize is the main stuff food among cereals marketed in Togo. To this end, the monthly retail maize prices collected from fifteen markets for the period without service (2000-2007) and the period with service (2008-2015) are considered. The results show that despite the price dissemination, the difference between Lomé and the other markets is still large. The result suggests that the wholesalers who are the intermediaries between Lomé, the central market and other markets, may exert some power which dampens the prices dissemination effect. However even though the overall effect is mitigated, the results suggested that the market information services are not useless. They need to be improved in order to increase the efficiency of the functioning of the grain markets.

Keywords: Market information services, price dispersion, Maize market, Togo.

INTRODUCTION

It is recognized that, even though grain markets operate competitively in developing countries, excess spatial price dispersion due partly to costly information is a common occurrence and is especially acute in Sub Saharan African countries [1,2]. It is also assumed that in agricultural sector, the intermediaries, because of the information they hold over the entire channel, enjoy a relative privileged position.

They raise the consumer's price, lower the producer's price, in doing so, they realize excessive profit that they draw from the under-information of the latter. In this context, the excess price dispersion can be interpreted as a consequence of the intermediaries' behavior seeking to realize a lot of profit [3]. To deal with the issue of price dispersion and getting prices right, the agricultural policies in developing countries have promoted the creation of market information system (MIS) in order to improve the availability and the accessibility of small farmers to market information [4]. In the case of Togo, two MIS are operating and cover all over the country: the public market information system created in 2008 and the private market information system set up in 2012 by grain producers' corporation.

These public and private services entrusted in collecting and disseminating information about the mercurial of agricultural products aim to improve the spatial agricultural prices transmission between markets through the development of efficient arbitrage in Togo. This paper assesses the impact of price dissemination on the price dispersion in maize market. More precisely, the article tries to answer the following question: did the weekly dissemination of information on the maize prices reduce the price dispersion in maize market in

Togo? To respond to this query, the article begins with a literature review related to the effect of information on the price dispersion (section 2). Section 3 presents the methodology and data used to analyze the impact of MIS on the price dispersion. Section 4 discusses the results and draws a conclusion.

LITERATURE REVIEW

How has the dissemination of price information by market information system affected traders' behavior and grain market performance? Since Stigler [5], a large literature on consumer search theory has emerged, in an effort to explain how changes in search costs affect market actors' behavior and equilibrium price dispersion. The consumer search literature is dominated by two approaches. The "search-theoretic" approach assumes that it is costly for consumers to collect information about prices [1,6,7]. A second approach minimizes the role of marginal search costs, assuming that a subset of consumers can access price information by consulting an "information clearinghouse" [8-10].

While most search-theoretic models have been used to explain the existence of price dispersion for homogeneous goods, the comparative static predictions of these models is ambiguous. The sequential search

models of Reinganum [6] and Stahl [8] predict that a reduction in search costs due to information effect will decrease the variance of equilibrium prices; while MacMinn [7]) shows that a reduction in search costs can increase price dispersion. These contrasting theoretical predictions are due to different assumptions with respect to consumers' demand functions, the fixed or sequential nature of search and firm cost heterogeneity [8].

A common assumption in this literature is that some consumers do not know the price distribution, while other consumers do. Under this assumption, equilibrium price dispersion can arise in a homogenous goods market with symmetric firms. Varian [10] finds equilibrium price dispersion in the context of sales: stores randomize prices in an attempt to price discriminate between informed and uninformed consumers. Stahl [8] "endogenizes" the consumers' decision to be informed or uninformed by assuming that some consumers have positive search costs, while others have zero search costs. Under a sequential search game, price dispersion arises as an equilibrium outcome.

In the context of the dissemination of information by Internet, Baye and Morgan [11] show that when information is controlled by a gatekeeper for a homogenous product market, the gatekeeper's profit can be maximized in equilibrium. Iyer and Pazgal [12] also analyze the effect of shopbots¹ on retail competition. Their focus is on the Internet retailers' decision of whether to join a shopbot. Their results indicate that the prices charged by retailers who join shopbots can vary substantially. The average prices charged by these retailers can increase or decrease when more retailers join, depending on whether or not the coverage of the shopbot depends on the number of joining retailers. Other works are considered as major in the comprehension of the relation between price dissemination and price dispersion. Brown and Goolsbee [13] study the impact of the Internet on offline life insurance prices and price dispersion. Their findings indicate that the introduction of Internet shopbots for life insurance reduced the life insurance prices and led to an initial increase in price dispersion, which subsequently fell as Internet penetration increased. Baye and al. [14] find that price dispersion decreases when more firms list prices at a shopping comparison site.

In the context of the dissemination of information by market information system (MIS) in agricultural sector, the works assessing the specific effects of MIS on price dispersion are scarce. Among

these, the most cited study on the topic is Jensen [2]. Jensen studies fisheries in India, where fishermen at sea are unable to observe prices in coastal markets. Fishermen sell their catch almost exclusively in their local market due to high transportation costs and non-existent storage capacity. This induces price gaps across markets in excess of transportation costs, resulting in an inefficient welfare state since fish supply varies across markets. The author shows that the introduction of mobile phone service between 1997 and 2001 led to a considerable reduction in fish market price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price. Abraham [15] reached to the MISilar outcomes by studying on the same issue in the same area.

Aker [16] using a theoretical model of sequential search and a market and trader dataset that combines data on prices, transport costs, rainfall and grain production with cell phone access and trader behavior, provided evidence that cell phones reduce grain price dispersion across markets by a minimum of 6.4 percent and reduce intra-annual price variation by 12 percent. Cell phones have a greater impact on price dispersion for market pairs that are farther away, and for those with lower road quality. This effect becomes larger as a higher percentage of markets have cell phone coverage. In another context, Goyal [17] shows that the introduction of the kiosks leads to 1-3% increase in farmer prices and 33% increase in profit. In this framework, farmers initially sold their soybeans in local wholesale markets to traders who possessed price information across markets, while the farmers did not. This analysis thus highlights the pure market power effect, by which price information increases competition and hence reduces price dispersion.

Even though the relationship between price dissemination and price dispersion is ambiguous in general, we can claim that in agriculture sector, the dissemination of prices information by market information system reduces the search cost and hence squeezes de price dispersion.

METHODOLOGY

The Model

In order to evaluate the effect of the dissemination of price information on the price dispersion, we consider the two MIS disseminating in Togo: the public MIS created in 2008 and the private MIS set up in 2012 by grain producers' corporation. Following Aker [16], the dissemination effect model is formulated as follows:

$$Y_t = \beta_0 + \beta_1 MIS1_t + \beta_2 MIS2_t + \gamma_1 RAIN_t + \gamma_2 RAIN_t^2 + \gamma_3 ROAD_t + \mu_t \quad (1)$$

Where Y_t represents the value of the maize price difference between Lome and the peripheral market i in month t ;

¹ A useful online search tool helps shoppers collect product information

-MIS_{1t} stands for the public MIS, is a dummy variable equal to 1 for the period with dissemination and 0 for the period without price dissemination;
 MIS_{2t} stands for the private MIS, is a dummy variable equal to 1 for the period with dissemination and 0 for the period without price dissemination;
 -RAIN_t is a control variable corresponding to the quantity of the rainfall in the prefecture where the market is located;
 -ROAD_t is a dummy variable with a value of 1 if the access road to the market at time t is good and 0 otherwise;

The quadratic component $\gamma_1RAIN_t + \gamma_2RAIN_t^2$ is introduced in order to take into account the threshold effect of rainfall. The model is estimated by the ordinary least squares (OLS) method.

The data

The data used are nominal, monthly retail maize prices for the periods from January 2000 to December 2015. These time series are extracted from the price database of DSID, ANSAT and REMISAO. DSID and ANSAT are the two departments of agriculture’s ministry in charge of prices statistics. REMISAO is the network market information system in

West Africa. The study used fifteen markets: Lome, the capital of Togo, is the main consumer market of maize. It records the most important and regular deficits in maize despite the convergence of maize produced in the others regions. This is due to the concentration of the population whose main staple food is maize. Lome stands for central market in the sample. The fourteen others markets are the big rural maize markets. They are selected on the basis of the importance of the maize volume transaction they established with Lome as well as the availability of price series. They are: Ahepe, Assahoun in caostal region, Tohoun and Anie in Plateaux region, Tchamba in central region, Bassar and Ketao, in Kara region, Gando and Cinkasse in Savannah region.

RESULTS AND DISCUSSION

Table 1 provides the spatial price margins between Lome, the central market and the others. The margins vary extremely according to the markets. The comparison of the spatial price differences of the two sub-periods shows that the dispersion of maize prices in reference to Lome did not significantly change with the dissemination of price information.

Table-1: Price difference between Lome and the others markets (unit = F CFA/Kg)

Period 2000-2007								
	2000	2001	2002	2003	2004	2005	2006	2007
Tsevie	6	6	0	7	4	7	8	3
Atakpame	46	47	27	35	45	35	13	24
Sokode	30	31	14	22	29	22	14	23
Kara	39	40	38	46	38	46	16	19
Dapaong	37	38	23	31	36	31	23	24
Ahepe	30	31	4	12	29	12	9	-8
Assahoun	8	9	1	9	7	9	10	5
Tohoun	44	45	33	41	43	41	32	36
Anie	46	47	27	35	45	35	13	24
Tchamba	45	46	35	43	44	43	30	21
Bassar	42	43	-5	3	41	3	20	28
Ketao	38	39	23	31	37	31	-5	22
Gando	54	55	57	65	53	65	32	35
Cinkasse	31	32	13	21	30	21	11	18
Mean of the period =27,00								
Period 2008-2015								
	2008	2009	2010	2011	2012	2013	2014	2015
Tsevie	4	3	9	7	15	8	6	3
Atakpame	45	29	47	36	1	14	33	29
Sokode	29	26	39	22	4	14	30	26
Kara	38	37	10	46	18	16	26	31
Dapaong	36	43	44	31	16	23	37	26
Ahepe	29	16	16	12	-11	9	14	7
Assahoun	7	7	12	9	14	10	9	11
Tohoun	43	51	50	41	15	32	24	16
Anie	45	29	48	35	2	14	33	30
Tchamba	44	51	45	43	16	30	28	15
Bassar	41	40	51	3	33	20	52	48
Ketao	37	17	48	32	27	-5	30	28
Gando	53	58	67	65	50	32	43	51
Cinkasse	30	36	39	21	36	11	30	27

Mean of the period = 27,30

Source: Calculation of the author using data from DSID, ANSAT and REMISAO

To confirm this result, we estimate the dissemination effect model. The estimation results reported in Table 2 indicate that the model is globally significant. The fit of the model provided by R^2_{adj} is at acceptable level. The estimated model does not suffer from the autocorrelation problem.

The analysis of the results shows that the price dissemination did not reduced the price differences between Lome, the central market and the others. The results show that the MIS1 would have contributed to squeeze the margins at Ahepe when it would have had the opposite effect in Anie. Concerning the MIS2, it would have contributed to reduce the margins in Tsevie, Ahepe and Cinkasse whereas it would have had a contrary effect in Ketao. These results call for three

observations: firstly, the combined effect of the two MIS over the 2012-2015 periods appears to be greater than that of the MIS1 considered over the 2008-2012 period. Secondly, the effect of MIS on spatial margins is ambiguous and depends on the localities where the markets are located. Lastly, the variables rainfall and the quality of road access significantly affect spatial margins according to the markets. The ambiguity in the results is MISply due to the fact that the localities where the markets are located are different in terms of rainfall and access road quality.

In total, it appears that the spatial margin decreased as the effect of price dissemination only in four (4) cases over fourteen (14). The impact of MIS on spatial margins is therefore mitigated.

Table-2: Results of the estimation of the dissemination effect model

	MIS1	MIS2	RAIN	RAIN ²	ROAD	P(F)	R ² _{adj}	DW
Tsevie	-0,11 (-0,19)	-0,03** (-2,84)	0,31*** (7,24)	-0,09*** (-2,79)	0,07** (2,80)	0,00	0,63	2,04
Atakpame	-0,51 (-1,01)	0,23 (0,82)	0,54*** (9,19)	-0,54*** (-6,33)	0,21 (0,82)	0,00	0,50	2,54
Sokode	-0,39 (-0,40)	0,07 (0,21)	0,01* (2,12)	-0,23** (-3,20)	0,06 (0,25)	0,00	0,49	2,61
Kara	-0,51 (-0,23)	0,05 (1,44)	0,47 (0,13)	-0,47*** (-3,49)	0,04 (1,45)	0,00	0,42	2,03
Dapaong	-0,39 (0,01)	0,24 (0,85)	0,08 (0,11)	-0,08 (-0,13)	0,25 (0,65)	0,00	0,51	2,15
Ahepe	-0,34* (-1,73)	-0,31* (-2,04)	0,61 (5,13)	-0,60*** (-5,11)	-0,31 (0,32)	0,00	0,39	2,52
Assahoun	-0,37 (-1,20)	-0,15** (-3,30)	0,30 (0,20)	-0,31 (0,20)	0,15** (3,30)	0,00	0,48	2,41
Tohoun	-0,31 (0,00)	0,12 (0,51)	-1,22** (-2,59)	-1,20** (-2,76)	-0,12* (-3,50)	0,00	0,36	2,36
Anie	0,08** (2,62)	-0,09 (0,52)	1,20*** (4,19)	-1,07*** (-4,36)	0,09 (0,52)	0,00	0,59	2,57
Tchamba	-0,80 (0,54)	0,08 (0,55)	0,20 (0,21)	-0,20 (-3,21)	-0,08* (-2,01)	0,00	0,48	2,09
Bassar	-0,17 (0,40)	0,56 (0,22)	2,15 (6,23)	-2,10*** (-6,26)	-0,52* (-2,23)	0,00	0,38	2,33
Ketao	-0,01 (0,03)	0,07* (2,08)	-0,03** (-3,15)	-0,03** (-3,15)	0,08 (0,08)	0,00	0,52	2,17
Gando	-0,24 (-0,04)	-0,15 (0,30)	0,47*** (7,29)	-0,45*** (-7,40)	-0,15* (2,05)	0,00	0,60	2,19
Cinkasse	-0,65 (0,31)	-0,12** (-2,71)	0,36 (0,15)	-0,36 (-0,25)	-0,12* (-1,71)	0,00	0,34	2,06

Source: Calculation of the author using data from DSID, ANSAT and REMISAO. Values in parenthesis are t-student. The asterisks *, ** and *** correspond respectively to 10%, 5% and 1% of the significance thresholds. MIS = Market Information System.

Conclusion and Implications for Public Policy

The Market Information System (MIS) in Togo collects data on prices for the main agricultural commodities mainly the maize in major markets and

disseminates the information through radio and television. The aim of this dissemination is to make the markets more transparent, thus improving the arbitrage of the agents. This paper assesses the effect of the

dissemination of prices' information on the maize prices dispersion with Lome as reference market, maize being the main stuff food among cereals marketed in Togo. To this end, the monthly retail maize prices collected from fifteen markets for the period without service (2000-2007) and the period with service (2008-2015) are considered. The results show that despite of price dissemination, the difference between Lome and the other markets is still large. The result suggests that the wholesalers who are the intermediaries between Lome, the central market and others markets, may exert some power which dampens the prices dissemination effect. However even though the overall effect is mitigated, the results suggested that the market information services are not useless. They need to be improved in order to increase the efficiency of the functioning of the grain markets.

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