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MAIZE MARKETING IN ETHIOPIA: LIBERALIZATION AND PRICE INTEGRATION ISSUES

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ABSTRACT: *The objectives of the paper were to (a) assess the effect of market liberalization process in the grain sub-sector; (b) study the maize marketing system; and (c) estimate the maize price integration and its dynamic impact on various markets in Ethiopia. The analysis was based on the rural household survey of the Grain Marketing Research Project (GMRP) in 1996 and wholesale price data of Ethiopian Grain Trading Enterprise (EGTE). The results indicated that there were clear policy decisions to transform the entire economy into market-led economic system. The reform process improved the efficiency and flow of grain into markets. Maize production variability has been very high in Ethiopia in the last 36 years, particularly after the reform. The distribution of marketed maize by households was highly skewed and about 30 percent of the maize was marketed in 1996. The results of the co-integration test indicated that there was short-run integration between Addis Ababa (central market) and the rest of the markets in the study. The long-run and short-run co-integration test indicated that maize markets were strongly integrated. Although the significant reduction of government intervention enhanced the efficiency of marketing, the government should selectively intervene by developing market centers, disseminating price and production information, implementing quality and grade standards, improving the legal system and infrastructure, and supporting the development of private grain trade.*

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The implementation of grain market liberalization has been influenced by the reforms and restructuring process in the rest of the economy. These reforms included price deregulation, financial liberalization, fiscal policy reform, institutional reforms, particularly in the agricultural sector, and trade policy reform. An attempt is made here to briefly discuss the impact of these changes (after May 1991) on the marketing efficiency of the grain sub-sector.

Price deregulation: As a result of the pricing policy of the *Derg*, consumers, particularly the urban ones, were subsidized at the expense of tax payers. Under the new policy, the government virtually deregulated the prices of all goods and services with few exceptions such as the prices of petroleum as well as utilities related to water, electricity, etc. The role of the former AMC, currently EGTE, was radically re-defined with its legal monopoly in the food market entirely removed. All restrictions on grain movements were abolished, fertilizer marketing was liberalized while improved seed marketing was partially liberalized. Fertilizer subsidies were entirely removed in 1997and the private sector was allowed to be involved in the fertilizer market, including import. Moreover, the transitional government deregulated and partly privatized the public transport sector thus ending the government's previous quasi-monopoly in the road transport sector.

Monetary and financial liberalization: The monetary and banking Proclamation No. 83/1994 was introduced to regulate government expenditure and money supply and to keep monetary stability and balance of payment equilibrium. Formerly government-owned banks (Development Bank of Ethiopia, Construction and Business Bank, and Commercial Bank of Ethiopia) were the only financial institutions which provided loans to various activities, including short-term input loans to farmers. The government issued Proclamation No.84/94 and allowed the

domestic private sector to enter into the banking business. As a result, private banks such as Abyssinia, Awash International, Dashen, Wegagen and United have started operation. The proclamation does not allow foreigners to invest in the banking sector. The state-owned banks were reorganized by Proclamation No. 86/1994 in order to ensure competitive operation. A new legislation (Proclamation No. 40/1996) on Licensing and Supervising Micro-Financing Institutions which provides credit and saving services to peasant farmers and others engaged in small-scale production and service activities was announced in 1996. About 11 micro-finance share companies have been legally registered until the end of May 1999.

The overvalued exchange rate of the Birr contributed to the reduction of real agricultural prices and affected the balance of payment of the country. In order to correct price distortions, the government devalued the official currency (Birr) from 2.07 Birr to 5.00 Birr per one US dollar in 1992 and thereafter adjusted to the rate through the auction market for foreign exchange. Starting February 1995, the auction market for foreign exchange, with a negative list of goods, was opened for all imports with the exception of second hand clothing. Foreign exchange for importing essential goods was made available at the marginal rate, i.e., the minimum rate at which foreign exchange was sold at a given market.

The frequency of auction markets increased from a biweekly to a weekly operation in July 1996. In the auction market in August, 1999, one US dollar was exchanged for Birr 8.10, which was almost equal to the parallel market price. Franco valuta imports were disallowed on account of the lifting of the negative lists of imports and the opening of foreign exchange auction to all imports.

Moreover, the National Bank of Ethiopia increased interest rates by Proclamation No.29/1992. The new interest rate for depositors was raised from 6 to 11 percent and lending rates varied from 11 to 15 percent. In September 1996, the NBE reduced the ceiling on lending rates from 15 to 10.5 percent and the floor on deposit rates to 7 percent.

Fiscal policy reform: This reform focussed on the elimination of various subsidies and mobilizing new resources through improved tax collection. Measures have been taken to rationalize the tax structure and increase revenues, reduce distortions, broaden the tax base, improve equity, enhance efficiency and ensure adequate incentives for investors. Proclamation No. 68/1993 provided significant tax reductions over the levels in the previous laws (Decree No. 6/90). The tax base was broadened by making more services subject to sales tax, and by introducing the taxation of rental incomes and capital gains. The maximum rates of personal income tax and the business profit tax (both incorporated and unincorporated business) have been reduced to 40 percent. Several measures have also been taken to deregulate foreign trade including reduction of import tariff, elimination of export tax (with the exception of tax on coffee), reductions of custom duties and effective protection rates etc.

In 1992, the government introduced the state enterprise reform to restructure the public sector with the aim of allowing state-owned enterprises to stand on their own feet and operate as commercial units (Proclamation No. 25/1992). This eventually took the form of outright privatization of state-owned businesses. The government also introduced a new labor law (Proclamation No. 42/1993) and implemented management reform programs in the public sector with the objective of raising public service productivity through salary rationalization and

Figure 1 : Maize production of small household farmers in Ethiopia (Main Season) 1960/61 - 1996/97

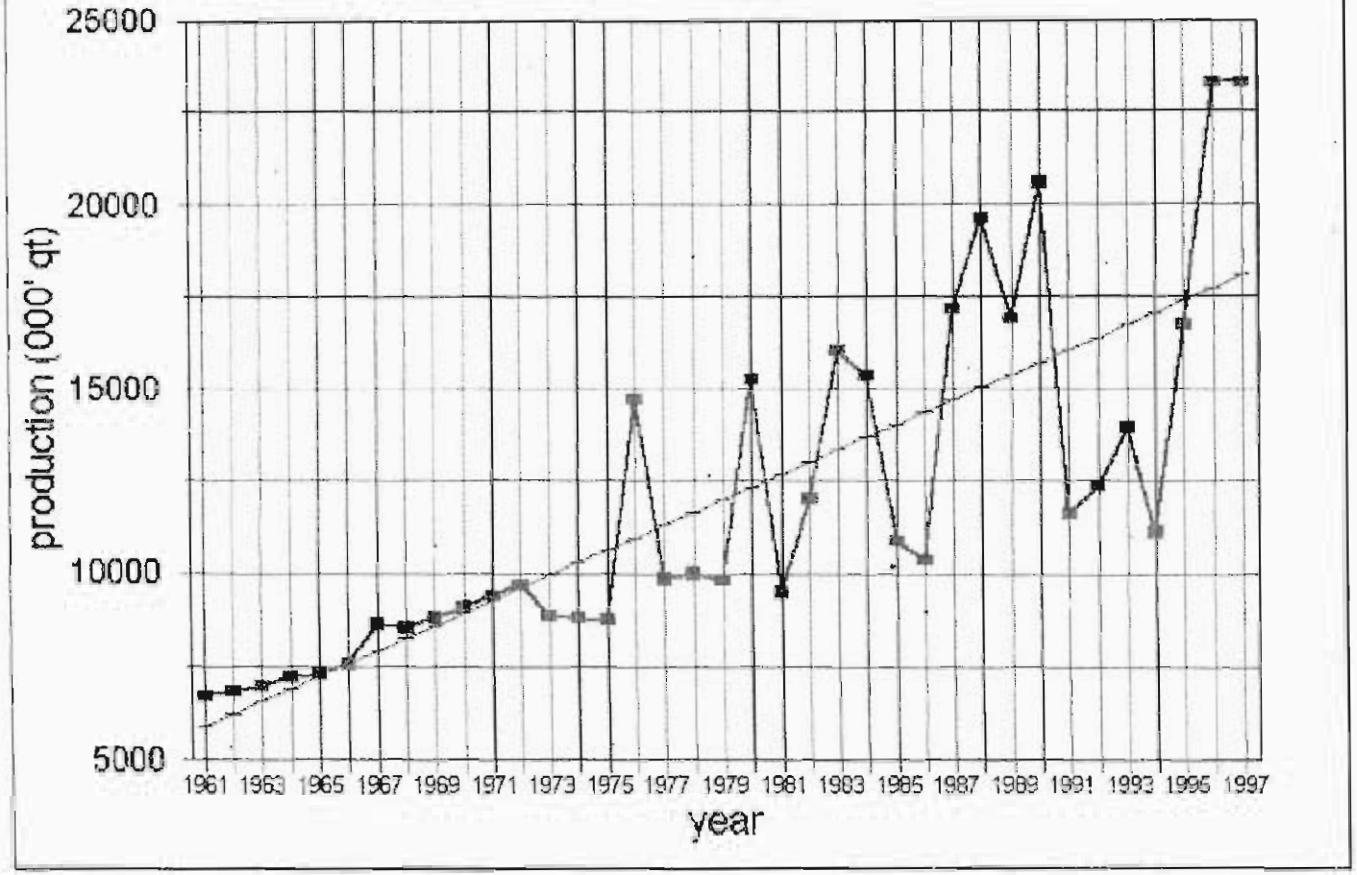


Figure 1 indicates that there is high maize production variability in Ethiopia, mainly due to unstable weather, particularly erratic rainfall. However, man-made sources also exacerbated weather-induced variability. Table 1 shows that there has been significant fluctuations in the quantity produced, area and yield of maize between 1961/62 and 1996/97. The coefficient of variation (C.V) of maize production indicates that the variability has significantly increased particularly after the reform. At the same time, the average annual production of maize, as shown in Table 1, increased significantly after the reform. The area cultivated and maize yield have also increased after the reform. The increase in maize production and productivity after the reform was mainly attributed to the relatively favourable weather conditions, partly to the removal of interregional trade barriers, to the effective implementation of the new extension system (where the government took notable steps towards encouraging maize production) and to the increase in area cultivated.

Despite an increasing trend in grain production, the significant variability in production (particularly when the country was affected by drought) forced the country to import food (usually food aid) to meet the increased demand for food. As a result, Ethiopia has remained to be a net importer of grain in the last two decades. However, the situation has changed drastically during 1995/96 and 1996/97 (Figure 1) and the country exported maize for the first time after Haileselassie's period. This indicates that the price deregulation has partly contributed to the increase in grain availability.

Table 1: Production, area, yield variability of maize in Ethiopia, 1961/62-1996/97

	1961/62-1973/74		1974/75-1989/90		1990/91-1996/97		1961/62-1996/97	
	C.V	Mean	C.V	Mean	C.V	Mean	C.V	Mean
Production (000qt)	12.17	8142.9	27.20	13428	31.58	17134	39.07	12029
Area (000 ha)	18.91	7912.5	13.31	13667	12.88	16127	30.80	11889
Yield (qt/ha)	8.73	10.29	21.82	9.8	48.91	10.62	24.9	10.28

The increase in variability of production results from a combination of the variability of area and yield. The decomposition of variance analysis is used to examine the causes of maize production variability[1] in Ethiopia. The entire variability in maize production according to the decomposition of variance is caused by the variability in yield which is the result of a combination of drought followed by relatively favourable weather.

[1](1) Production (Q) = area (A) * yield (Y)
(2) d(Q)/Q = d(A)/A + d(Y)/Y (Percentage change in production is equal to the percentage change in area + percentage change in yields)
(3) Var [d(Q)/Q] = Var [d(A)/A + Var [d(Y)/Y] + 2*COV[d(A)/A, d(Y)/Y]
Var Q = 0.018532 = 0.00002 + 0.018532 + 0.00003
Equation (3) is used to estimate the main cause of production instability of grain between 1980-1996. First we estimated the percentage change in area, yield, and production of each crop and then computed the variance and covariance terms for the whole period.

Maize Marketing

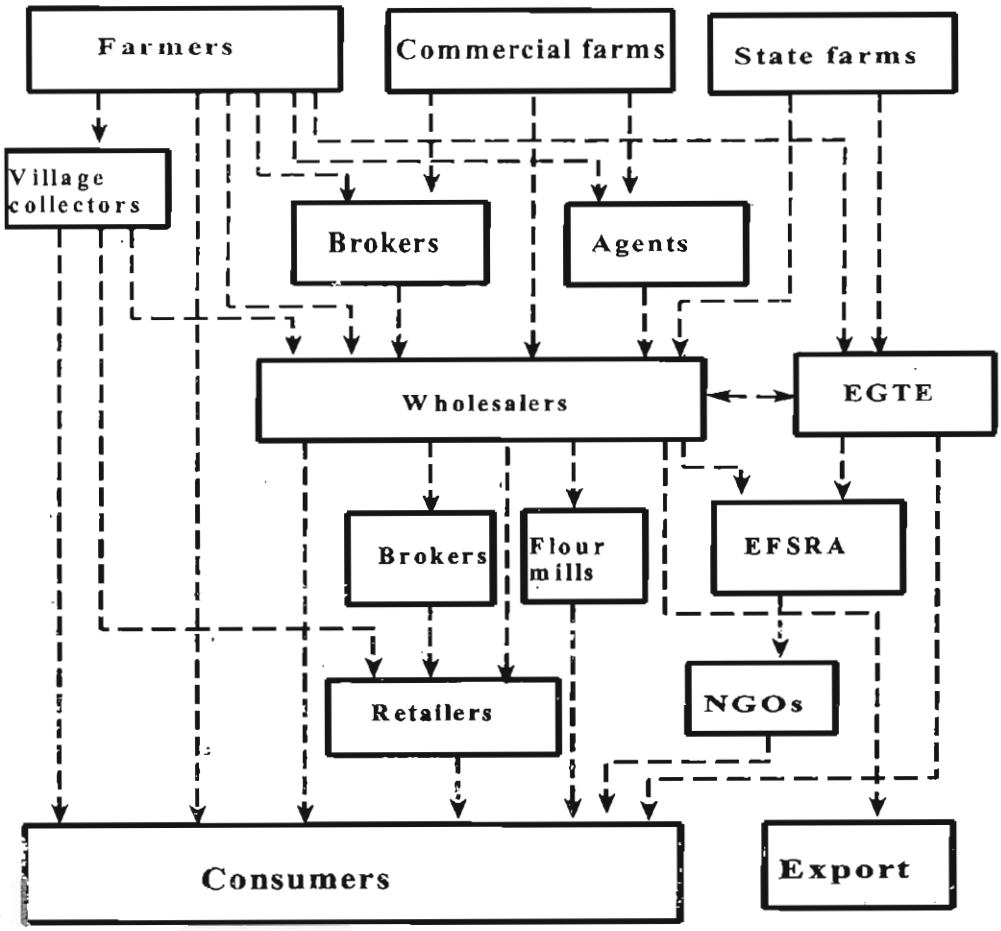
Maize Marketing Behavior of Farm Households

The total production of maize for 1996/97 cropping year by private peasant holdings was estimated at about 23.3 million quintals. Excluding the volume of maize set aside for home consumption, seed and feed, the marketed maize was estimated at about 8.1 million quintals, which was about 30 percent of the total production (GMRP's Rural Household Survey, 1996). In 1996, the share of the major maize growing regions - Oromiya, Amhara and SNNPR was 33 %, 20 % and 34 % respectively. According to the CSA estimates, the production of grain as a whole in 1996/97 increased by about 2.1 percent compared with 1995/96. The total marketed maize in 1996/97 was 10,129,530 quintals. This includes 8,061,550 quintals from private peasant holdings, state farms 746,980 quintals and 1,321,000 quintals from private commercial farms.

commercial farms and state farms. Although small farmers produced maize mainly for household consumption, about 30 percent of the maize was marketed in 1996 (GMRP, 1996). Maize was sold through village collectors, brokers, agents, wholesalers, EGTE, and retailers to the final domestic consumers (figure 2). Export of maize was banned by the *Derg* and it is only in 1996 that Ethiopia started exporting maize to neighbouring countries, mainly to Kenya.

Maize flows from major production areas, i.e., eastern, southern central, southwestern and western (which include Shashemene, Debremarkos, Nekempt, Jima) mid-altitude parts of Ethiopia to principal consumption regions such as the Eastern lowland, Central, Northern, and Southwestern areas (which include Dire Dawa, Afar and Somali region, Addis Ababa, Gonder, Borena, Tigray, etc). Grain traders, particularly after the reform, buy maize from the surplus regions, where maize prices are very low, and then sell it in terminal markets (in the deficit regions), where prices are very high. Transportation costs from surplus to deficit regions are very high; in some cases, they are twice the maize prices in the surplus producing areas.

Figure 2
: Maize Marketing Channels in Ethiopia, 1996



The impact of the Reform on Maize Prices

In almost all markets (Table 3), the price variability for maize has increased after the reform. Moreover, the average wholesale price of maize has increased after the reform. The increase in maize price in surplus producing areas has been considered as a positive improvement which encourages farmers to increase production (productivity) of maize. However, the increase in prices could affect a significant proportion of the rural households who are poor and net buyers; this could aggravate food security problems. The decline in maize prices following good harvest years has a negative effect on future investment on crop production. The Ethiopian government attempted to stabilize the low producer prices of grain after the bumper harvest of 1995/96 cropping season.

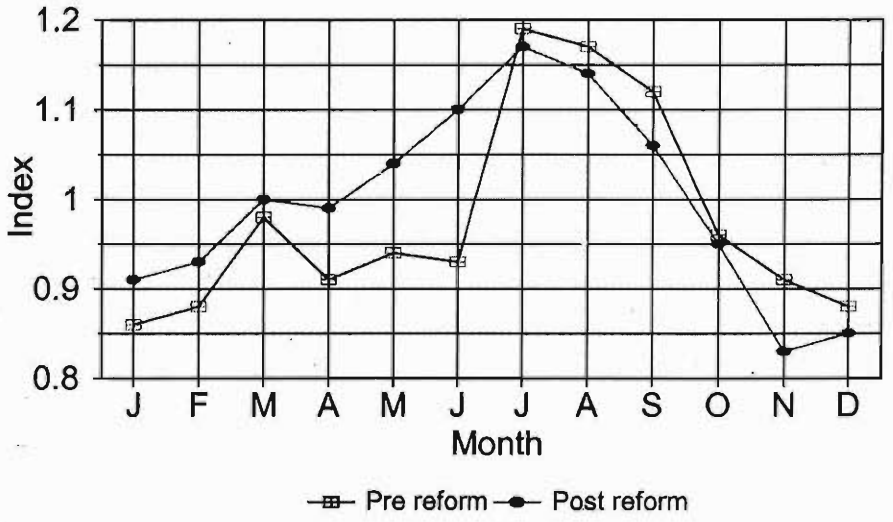
Table 3: Maize Price Variability Before and After the March 1990 Reform

Markets	Before March 1990		After March 1990		Entire period	
	C.V	Mean (Br)	C.V	Mean(Br)	C.V	Mean (Br)
Addis Ababa	17.29	47.96	28.65	91.54	38.86	77.38
Nazreth	12.59	41.27	28.67	91.49	42.33	75.17
Shasemene	26.00	32.61	29.23	80.18	46.20	64.72
Hosaena	9.21	69.00	22.06	120.23	28.81	109.68
Baher Dar	11.32	67.46	35.29	95.04	35.68	86.08
Gonder	12.25	53.60	21.73	102.33	34.13	86.49
Woldia	16.69	58.13	12.12	74.61	16.32	70.72
Dire Dawa	5.59	64.09	24.91	126.20	36.87	106.01

The correlation coefficient as a measure of market integration and marketing efficiency has its own limitations (see details in section 5). However, despite the limitations, the correlation coefficients could provide a good initial measure of integration when quick results are required. In this case, the correlation coefficients are used to compare post-reform with pre-reform conditions. Table 4 shows that the monthly

wholesale prices of maize in all the markets are highly correlated with Addis Ababa market after the reform compared with the pre-reform period, i.e., the correlation coefficients of the prices of maize have increased after the reform.

Figure 3: Seasonal pattern of maize prices (wholesale) In Addis Ababa



Thus, there are indications of improvement in maize marketing system after the reform due to the removal of the barriers such as lifting the quota system in interregional maize trade.

Table 4: Correlation Coefficients of Wholesale Maize Prices (before and after the reform)

Market	Before the reform	After the Reform	The Entire period
Nazreth - A.A	0.4705	0.6605	0.6616
Shashemene -A.A.	0.2569	0.7813	0.8897
Baher Dar – A.A	0.1305	0.2211	0.3765
Gonder - A.A	0.0213	0.5147	0.5698
Dire Dawa – A.A	0.2189	0.7232	0.7900

The estimation of the seasonal index in Figure 3 is based on 10 years monthly prices (5 years before the reform and 5 years after the reform). Figure 3 indicates that the period between October and April is a period of low prices for Addis Ababa market. The remaining period, May to September is a period of high prices in both markets. The highest value of the seasonality factor for maize (Addis Ababa) in both the pre- and post-reform period (Figure 3) occurred in July. The seasonality effect is relatively high for maize and this is explained by storage problems and the consumption of maize by lower income groups (Wolday Amha, 1994). The seasonal low and high prices fit the production pattern of maize in the country.

Comparing the two periods (pre- and post-reform) in Figure 3, it can be seen that there is a clear change in the seasonal price trend after the reform. In the first seven months (January to July), the average prices of maize per 100 kg in pre-reform times were lower than the prices after the reform. However, after July, there was an opposite trend i.e., the seasonal price indices after the reform were higher than the seasonal price indices before the reform. This implies that any intervention to stabilize price should consider the seasonal price pattern of grain in specific markets.

and Fuller (1993); Diakosavvas (1995); Goletti and Babu (1994); Goodwin and Schroeder (1991); Loy et al. (1995); Silvapulle and Jayasuriya (1994); Sinharoy and Sanjith (1994) and many others applied the co-integration method to test the level of agricultural market integration. If markets are efficient, then prices in different markets must be co-integrated.

However, in spite of the methodological refinements and statistical sophistication, our understanding of agricultural markets, particularly in developing countries, is still limited because it has not been accompanied by conceptual advances which combine transaction costs, price data and trade flows (Barrett, 1996).

Some authors continue to indicate the flaws of the co-integration methodology and its validity in providing reliable information on market conditions (Fackler, 1996 and Baulch,1997). Baulch indicated that it is impossible to test food market integration adequately using price data alone. A more reliable test for food market integration requires explicit consideration of both transfer costs and the simultaneous nature of price formation. One such test according to Baulch (1997) is the stochastic frontier and switching regression model which uses information on mean transfer costs in addition to nominal prices, that is, the parity-bounds model. Fackler (1996) concludes that market integration is neither a necessary nor sufficient condition for market efficiency. He attempted to develop an econometric model by combining the equilibrium price with model of the time series behaviour of the underlying factors affecting prices, the excess demand shocks and transport rates. According to Fackler (1996), tests based on Granger-causality among prices are shown to reveal more about dominant/satellite market relationships than about efficiency or integration.

Newbold, 1974). The interseasonal flow reversals which are very common in the market of developing countries are not properly considered in the methodology.

It should be noted that high price integration may not necessarily indicate a competitive network of traders. It could at the same time indicate stable margins and a monopoly in the marketing system. Two markets in surplus or deficit regions with no trade between them could be highly correlated through a common central market. It must be again emphasized that the statistical estimations of spatial price integration are not proof, but one of the rather rough indicators of pricing efficiency.

Attempts were made by many researchers to improve the method of analysing spatial market integration. Blyn (1973) suggested correcting residuals after de-trending and deseasonalizing the price data. Ravallion (1986) extended the static bivariate model to a dynamic model and distinguished short-run and long-run market integration. Ravallion assumes radial markets where the price shocks originate from one central market. Delgado (1986) introduced a joint test of market integration which eliminates spurious correlation of price movements across markets arising from seasonal influences. Faminow and Benson (1990) assumed that buyers and sellers are both spatially dispersed and interregional transportation costs exist. Their approach only altered the theoretical expectations of price relationships in spatial markets and the interpretation of market integration tests proposed by Ravallion (1986).

Earlier approaches generally ignored or mis-represented the time series properties of the price series, thus imparting possibly serious flaws to the testing and estimation procedures. Today, co-integration analysis has become a widely used technique for the analysis of time series price data. Palaskas and Harriss (1993); Wyeth (1992); Aldermann (1993); Bessler

The measurement of spatial market integration can provide basic data for an understanding of how specific markets work (Ravallion, 1986). However, spatially integrated markets may not guarantee the existence of competitive markets (Harriss, 1979). Moreover, contemporaneous correlation tests may overestimate segmentation if lags in information, delivery, or contract expiration produce a natural lag in the price response between markets (Barrett, 1996). According to Wyeth (1992), market integration deals with one aspect of market performance, and a perfectly competitive market will probably be well integrated, but the reverse need not hold true.

Bivariate correlation and regression coefficients have been used by many researchers as indicators of spatial market integration, and they measured the adequacy of infrastructure, level of competition, the flow of market information, the legal barriers to the movement of agricultural products or negotiated transactions per time period (Jones, 1972; Thodey, 1969; Lele, 1967). The main reason for the wide use of bivariate correlation is mainly its simplicity.

Despite wide application of bivariate correlation as a measure of spatial market integration in many of the agricultural marketing efficiency studies, there is a strong criticism against the approach (Harriss, 1979). This approach is found to be weak because it produces high correlation results for markets with even no physical contact, road or any other means of transport connection. The high correlation among markets could be the result of high inflation, common seasonal variation due to similar climatic conditions, legal factors simultaneously affecting prices, and other common factors (Heytens, 1986). The variance of the product could be hetero-skedastic with respect to the time of the year, violating one of the assumptions of ordinary least squares regression analysis. Moreover, bivariate correlation do not imply causality (Granger and

MARKET INTEGRATION: THE CO-INTEGRATION APPPROACH

Market integration is linked with the free flow of goods and information over space and time. It is thus closely associated with the concept of marketing efficiency. If markets are integrated, small price rises are expected to attract supplies necessary to draw sufficient food to avert what might otherwise have become a famine (Wyeth, 1992). Poorly integrated markets indicate that these regions are more vulnerable to famine. Knowledge of market integration assists in developing a guideline for government intervention. If a national market is physically extensive and not well integrated, it might be necessary for the government to maintain buying and selling facilitates in a large number of areas i.e., higher intervention compared with strongly integrated markets which may need weaker government intervention (Wyeth, 1992).

The prerequisites for spatial price equilibrium are (a) price differences between any two regions or markets that trade with each other will just equal transfer costs, and (b) price difference between any two regions or markets that do not engage in trade with each other will not be less than or equal to transfer costs (Tomek and Robinson, 1981). If this holds true, then the market can be spatially integrated and ensures the existence of free markets and Pareto optimal resource allocation across spaces. However, Newbery and Stiglitz (1984) have shown that the existence of free market alone need not necessarily guarantee the existence of Pareto optimal allocation of resources. Market integration, which is usually used to estimate marketing efficiency, is not sufficient for Pareto optimality of a competitive equilibrium. Thus, the conclusion that markets are well integrated does not by itself imply an optimal and efficient allocation of resources.

In spite of the limitations of the methodology, this study will combine the price level analysis using co-integration approach with the analysis of the marketing behaviour in the previous sections. To study maize price relationship between two markets, we will consider the following basic relationships.

$$Pit=a + b1Pjt + Ut \quad \ldots\ldots(1)$$

Where Pi and Pj are maize price series in two markets i and j ; U is the residual term assumed to be distributed identically and independently; 'a' represents transportation cost, taxes, etc.. and 'b1' is the coefficient, 'a' and 'b' are parameters to be estimated. The test of market integration will be straightforward if Pit and Pjt variables are stationary variables.

(A) Checking for the stationarity of the price series

$$Pit=a1 + b1Pit\text{-}1 + \sum_{k=1}^{n} Pit\text{-}k + Ut \quad \ldots\ldots(2)'$$

Where Pit= Pit-Pit-1

Before regression analysis on a time-series is carried out or before preceding to further analysis, it is important to check for the stationarity and the order of integration of variables. Each series is taken separately and tested for the econometric integration. A series is said to be integrated of order 'd', I[d], if it has to be differenced 'd' times to produce stationary series. The order of integration is tested with an Augmented Dickey Fuller (ADF) test (a unit root test).

(B) Testing for the presence of long-term co-integration

Once the non-stationary status of the variables is determined, the next step is to test for the presence of co-integration. The residual value Ut of the OLS regression in equation (1) between the two series is again tested for stationarity, with the Augmented Dickey Fuller (ADF) test. If the error term Ut is stationary, the price changes in regional market i do not drift apart in the long-run from regional market j. Two maize price series are co-integrated of order (1,1) if the individual series are I(1), and a linear combination of them , called the co-integration regression, is I(1). It must be noted that only variables that are of the same order of integration may constitute a potential co-integration relationships. If two market price series are co-integrated, there must be a long-run equilibrium relationship between them indicating that the markets are integrated.

(C) Testing short-run integration with an Error Correction Model (ECM)

Pit=a + b1Pjt +Ut .....(3)
Pit=a + b1Pjt + (Pit-1 - bPij -1) Ut .....(4)

It can be shown that in the case where the two series are I(1) and are co-integrated, the models can be given an error correction representation. If an error correction model (ECM) provides an adequate representation of the variables, then they must be co-integrated (Granger, 1981, Engle and Granger 1987). The ECM estimates the dynamics in the short-run.

Discussion of Empirical Maize Price Cointegration Results

According to the co-integration methodology, the first step is to determine whether the maize price series are already stationary; if they are not, their order of integration need to be investigated. We used ADF tests to determine the stationarity of each price series with 5 lagged values. The results in Table 5 indicate that all price series are integrated of order one. The study indicates that maize prices are stationary after differencing once (the price series are I(1) processes).

Table 5: Unit Root Test on Price Series

Markets	ADF	DW
Addis Ababa	-4.546	1.99
Nazreth	-4.476	2.00
Shashemene	-5.230	2.01
Bahar Dar	-5.911	1.95
Gonder	-5.103	1.99
Dire Dawa	-4.271	1.99

Note : Critical values used in ADF test are 5% = -1.943
1% = -2.584

After testing that all maize prices are I(1), we then proceed to test their co-integration. The co-integration tests highlight that most of these markets have stable long-term relation over the period of analysis. Five co-integration tests were conducted for the five markets with the Addis Ababa market. The co-integration test results are presented in Table 6.

Table 6: Test for Co-integration between Addis Ababa (A.A) and Other Markets

Markets	ADF	B	T.Value
Nazret	ADF (1)	-0.30944	-3.189
Shashemene	ADF (1)	-0.21766	-2.557
Baher Dar	ADF (1)	-0.17486	-2.497
Gonder	ADF (1)	-0.3504	-3.513
Dire Dawa	ADF (1)	-0.3054	-2.578

Note: Critical values used in ADF test are 5% = -1.943 , 1% = -2.584

Since the price series were integrated of order 1 (Table 5) and co-integrated (Table 6), an Error Correction Model (ECM) was specified to estimate the dynamics in the short-run. It should be noted that the error correction term in Equation 3 is interpreted as the mechanism for the equilibrium in the period t-n. Table 7 shows the results of the short-run market integration test. The results indicate that there is short-run integration between Addis Ababa and the rest of the markets. The error correction term is significant in all cases. Results of the long-run and short-run co-integration test indicate that the maize markets are strongly integrated. The influence of the central market (Addis Ababa) on the rest of the markets was strong. This indicates that there is strong flow of maize between the central market and the regional centers.

Table 7: Error Correction Model (ECM) depicting the short -run integration process between A.A and the rest of the markets

Market	R2	B	Coefficient	Constant
A.A.- Nazret	0.65	0.6278	0.6595	31.33
A.A – Shashemene	0.82	0.7378	0.7553	6.597
A.A – Baher Dar	0.77	0.874	0.1418	87.474
A.A – Gonder	0.65	-102.0	-0.01044*	120.83
A.A – Dire Dawa	0.71	0.622	0.8192	56.858

All Coefficients significant at 1 percent level except the one with *

CONCLUSIONS

The study revealed that the policy reform process has positively affected maize production. The number of the licensed and unlicensed grain traders, including exporters and importers and the share of the private sector in the grain market have increased significantly after the reform. However, it is difficult to quantify the degree to which weather or policy reform has affected the performance of the grain sub-sector.

In the last 36 years, maize production in Ethiopia was found unstable. Yield variability caused by weather fluctuations (irregular rainfall), pests, price incentives etc., was found to be the major source of production instability. The study indicated that variability in maize production, area cultivated, yield and price of input, and average wholesale prices were extremely high. There was also seasonal price variability. The volume of maize production increased following growth of yield, input use and area cultivated particularly after the reform. Average maize prices (both nominal and real) of maize have also increased after the reform.

However, price instabilities have been higher after the reform process. Such price instabilities shifted the demand and supply curves of maize. The supply shifts, which were caused by the price instability of maize, were caused by random factors affecting agricultural production as a whole.

About 30 percent of maize in Ethiopia was marketed in 1995/96. The main reasons for selling were to buy food, pay for investment, avoid storage losses, pay loans, pay taxes etc. About 43 percent of the rural households were net buyers of maize whereas about 22 percent were net sellers. These results are hoped to provide a very important signal to policy makers that any stabilization measure will affect the two groups (net buyers and net sellers) differently. Using the price support program to stimulate production raised the cost of food to net-buying households and reduced their real income and food insecurity. Moreover any stabilization policy directly influenced only the maize reaching markets.

The distribution of marketed maize was highly skewed. The study revealed that the Gini coefficient for maize selling rural households was 0.6992. This implies that the benefits of any maize price support program will be distributed to rural household unevenly. About 10 percent of the rural households marketed 65 percent of maize. Thus, if there was a price support program for maize, about 10 percent of maize producers received about 65 percent of the expected subsidy. Thus, the main beneficiaries of the price support program were the relatively rich farmers who could afford to sell their maize in the markets.

Market integration is a necessary condition for market efficiency (however integration is not synonymous with marketing efficiency because the integration of the market might not be a result of competition) and the level of integration affects the decision of policy

makers on stabilization and food security. However, testing only price level market integration was not enough to indicate the efficiency or inefficiency of the maize marketing system. Descriptive analysis was used to support the co-integration analysis and indicated how maize markets really function in Ethiopia. The results of the co-integration test indicated that the hypothesis of long-run price integration between pairs of maize markets were confirmed. The results show that the prices of maize in all markets tend to move together in the long-run.

Although food entitlement is difficult without food availability, efficient food provision systems are needed to produce or import, store and distribute food, at reasonable prices in all parts of Ethiopia, in all seasons and years. Improvements in the transportation and marketing systems in general would reduce marketing costs which could enable producer prices to increase without increases in consumer prices and reductions in profit margin of traders. This would push the production possibility frontier outwards and increases the gains of the producers without consumers incurring losses (the society as a whole will be better off). Moreover, this could even decrease consumer prices. Therefore, the government should support the marketing system by investing in transport and other forms of market infrastructure in order to increase agricultural production, expand markets, and promote specialization.

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