

Urbanization and food imports in sub-Saharan Africa

James Tabi, Wayne H. Howard and Truman Phillips

*Department of Agricultural Economics and Business, Ontario Agricultural College,
University of Guelph, Guelph, Ont. N1G 2W1, Canada*

ABSTRACT

The Granger statistical test of causality was used to examine the relationship between total food imports and urbanization and between food aid and urbanization. Urbanization appears to have caused total food imports to increase in 13 of the 24 countries. Food imports appear to be a cause of urbanization in three countries. Food aid, however, apparently was a cause of urbanization in 16 of the 24 countries used in the analysis.

URBANIZATION AND FOOD IMPORTS IN SUB-SAHARAN AFRICA

Food aid from developed to developing countries has been criticized for depressing prices and hence production in the recipient countries. Since Schultz (1960) first identified this agricultural disincentive effect in 1960, several authors have explored how food aid can also distort a country's balance of payments and exchange rates, reduce the urgency of food security problems, distort labour markets, and even shift demand towards imported non-traditional foodstuffs (Isenman and Singer, 1977; Bhagwati, 1983). However, one aspect of food aid that has received little attention is the relationship between food aid and urbanization.¹ That relationship is the focus of this study.

¹ Urbanization in this paper refers to the percentage increase of population in urban centres, as reported in the *U.N. Demographic Yearbook*. The definition of urban centre varies across countries. A population of 20000 may be an urban centre in one country and a medium-sized town in another.

This study was funded in part by a grant from the Centre for Food Security, Univ. Guelph.

Rapid urbanization has been the rule in post-World War II sub-Saharan Africa. There are several factors that draw people to cities: urban–rural wage differentials and employment opportunities, educational opportunities, medical services, and cultural and entertainment opportunities (Todaro, 1976). The post-war period has also seen a large increase in food imports, both in food aid and commercial imports. Have the increased imports been in response to urbanization, or has urbanization been in response to increased imports and availability of food in the cities? It may be reasonable to assume that the food imports have been demand-driven, in that only imports could meet the increased demand for food in the cities. Conversely, it may be reasonable to assume that urbanization has been supply driven, in that imported food increased the availability and lowered the relative prices of food in the cities, thus drawing people into those cities, especially in times of drought and/or rural famine.²

The objective of the research project the results of which are reported in this paper was to examine the direction of causality between urbanization and food imports in 24 sub-Saharan African countries. Simply put, the questions are: do total food imports cause greater urbanization or vice versa, and does food aid cause urbanization or vice versa? The answers to these questions can contribute to the debate on whether food aid is an ‘additional’ import or does food aid substitute for commercial purchases (Maxwell and Singer, 1979). If food aid constitutes additional imports, then food aid programs have consequences for the recipient’s rate of inflation, balance of payments, and other macroeconomic indicators. However, if food aid substitutes for commercial imports then in effect it is untied financial aid, perhaps releasing pressure on foreign exchange, and is not necessarily disruptive to the recipients economy and domestic production.

The following sections contain discussions of the methods employed in the analysis in this study, a description of the data used, and the results of the analysis. Implications of those results and a summary end the paper.

METHODS

Causality test

The relationship between food commodities unloaded at a port and the effect of those commodities on a country’s economy and migration is

² This assumption is consistent with Todaro’s migration model, which postulates that migration is in response to expected rather than actual differences in economic well-being.

difficult if not impossible to explain. However, Granger's causality test (1969) can be employed to indicate if changes in one variable are indicated as causally prior to changes in another variable. The Granger test is used to indicate (1) if changes in food imports were causally prior to urbanization, (2) was the direction of causality from urbanization to food imports, or (3) was there no statistically significant relationship between imports and urbanization.

Measures of current food imports were regressed against measures of lagged food imports and lagged urban population. A similar equation was estimated for food aid. Measures of current urbanization was regressed against measures of lagged urbanization and lagged food imports (commercial imports and food aid). The estimation equations were:

$$F_t = A'F_{-i} + B'U_{-i} + C + e \quad (1)$$

$$U_t = A'F_{-i} + B'U_{-i} + C + e \quad (2)$$

where F_t is current food imports (commercial and/or food aid), U_t is current level of urbanization, the subscript $-i$ indicates a vector of lagged values, i.e., $F_{-i} = [F_{t-1}, \dots, F_{t-i}]$, A and B are conformable vectors of non-zero values, C is a scalar, and e is a random error to account for errors in measurement.

The number of lags for each equation was selected according to the minimum final prediction error (FPE) (Judge et al., 1982):

$$\text{FPE} = \left[\frac{T + (A + B)}{T - (A + B)} \right] \left[\frac{\text{SSE}}{T} \right] \quad (3)$$

where T is the number of observations, and SSE the sum of squared errors. The FPE balances an increase in the number of estimated parameters with the expected decrease in the SSE. The final estimation equation has the minimum SSE for the number of parameters estimated.

After using the FPE criterion to select the final form for equations (1) and (2), an F -test was used to test the significance of the estimated parameters. In effect there were two joint hypotheses to be tested: (i) that urbanization caused food imports (food aid), i.e., $B \neq 0$ in equation (1) and $A = 0$ in equation (2); and (ii) that food imports (food aid) caused urbanization, i.e., $B = 0$ in (1) and $A \neq 0$ in (2). Direction of causality was indeterminate if (i) and (ii) were both rejected, or both failed to be rejected.

A caveat may be in order. Many economists are concerned about the validity of causality tests, especially two variable tests when there is a lack of a priori information about the relationship between those variables (e.g., Pierce, 1977; Zellner, 1979). However, an a priori link between total food imports/food aid and urbanization is a theoretically plausible hypothesis

calling for empirical analysis to verify the hypothesis. This study is one step in that empirical verification.

Data

Annual data on cereal imports and cereals given as food aid (the primary type of food aid commodity) and the number of people in urban centres were compiled for 24 sub-Saharan African countries for the period 1963–87. Data on cereal imports and cereals given as aid were compiled from the *FAO Trade Yearbook* and *FAO Food Aid Bulletin* from various years. The demographic data were obtained from the *UN Demographic Yearbook*, again from various years.

RESULTS

Total food imports

Application of Granger causality tests for total food imports and urbanization in 24 sub-Saharan countries indicated that past values of urbanization were significant in explaining total food imports in 13 of the 24 countries studied, i.e., urbanization was a cause of increases in total food imports in those countries, as reported in Table 1.³ Total food imports was a cause of urbanization in three countries, and in eight countries causality was indeterminate. Two of the countries reporting food imports a cause of urbanization, Ethiopia and Sudan, have experienced long periods of drought, civil war, and famine. The hypothesis that the availability of food in the urban centres drew people from the rural areas to the urban centres is supported by these results. However, the third country in that group, Zaire, had neither drought nor famine but did experience many social upheavals in the period studied. Angola and Somalia were expected to be with the imports-caused-urbanization countries owing to their wars and droughts, but over the period studied their results were indeterminate.

³ The lag lengths and *F*-values for the estimated equations that exhibited a statistically significant direction of causality are reported in Table 1. Parameter estimates and associated standard errors are not reported, since their values are not of interest. It is the significance of past values of one variable in explaining the current value of the other variable that is of concern. The *F*-values indicate significance of the lagged values in explaining variation in the dependent variable.

TABLE 1

Results of tests of causality between total food imports and urbanization

Countries where urbanization appeared to cause increases in total food imports				
Country	Dependent variable	Lag length		F-value
		F_{t-i}	U_{t-i}	
Benin	F_t	0	1	72.38
Burundi	F_t	0	1	143.80
Congo	F_t	0	1	2764.98
Ghana	F_t	0	1	83.52
Ivory Coast	F_t	1	1	188.00
Kenya	F_t	1	1	21.89
Liberia	F_t	0	1	235.59
Nigeria	F_t	1	1	95.55
Senegal	F_t	2	3	158.17
Tanzania	F_t	0	1	35.85
Togo	F_t	0	1	74.34
Zambia	F_t	0	1	18.59
Zimbabwe	F_t	0	1	52.67
Countries where total food imports appeared to be a cause of urbanization				
Country	Dependent variable	Lag length		F-Value
		F_{t-i}	U_{t-i}	
Ethiopia	U_t	1	2	486.39
Sudan	U_t	1	0	847.90
Zaire	U_t	1	1	433.71
Countries where causality was indeterminant				
Angola				
Botswana				
Burking Faso				
Cameroon				
Guinea				
Malawi				
Sierra Leone				
Somalia				

Food aid

The above results are not strong evidence that total food imports as such contribute to urbanization, but when the models were estimated using food aid rather than total food imports, the results differed significantly. When only cereal food aid was considered, food aid was a cause of urbanization in 16 of the 24 countries studied, as reported in Table 2. The results for the eight other countries were indeterminate. Causality did not change direc-

TABLE 2

Results of tests of causality between food aid and urbanization

Countries where food aid appeared to be a cause of urbanization				
Country	Dependent Variable	Lag Length		<i>F</i> -Value
		F_{t-i}	U_{t-i}	
Benin	U_t	2	1	245.0
Botswana	U_t	2	1	38.8
Burkina Faso	U_t	3	0	1368.0
Burundi	U_t	1	2	1438.0
Congo	U_t	2	1	252.0
Ethiopia	U_t	2	1	313.0
Ghana	U_t	2	1	338.0
Guinea	U_t	4	0	22.8
Ivory Coast	U_t	2	1	160.0
Kenya	U_t	2	1	245.0
Nigeria	U_t	2	0	826.0
Senegal	U_t	2	0	167.0
Somalia	U_t	2	1	360.0
Sudan	U_t	1	1	1993.0
Zaire	U_t	1	1	1569.0
Zimbabwe	U_t	3	0	101.4
Countries where causality was indeterminant				
Angola				
Cameroon				
Liberia				
Malawi				
Tanzania				
Togo				
Sierra Leone				
Zambia				

tion for any country from the previous specification; i.e., food imports were a cause of urbanization in Ethiopia, Sudan, and Zaire, and food aid was a cause of urbanization in those three countries as well as in an additional 13 countries.

SUMMARY AND IMPLICATIONS

The relationship between total food imports/food aid and urbanization in 24 sub-Saharan countries was explored using Granger's causality test. Total food imports in the form of cereal imports were found to be a cause of urbanization in only three countries, while urbanization was a cause of food imports in 13 of the 24 countries. However, substituting food aid for

total food imports resulted in food aid being indicated as a cause of urbanization in 16 of the 24 countries. Implications are that:

(1) Food aid may have been a significant factor in urbanization in many sub-Saharan African countries in the period 1963–87. The results presented here are only a preliminary step in defining the relationship between food aid and urbanization, but they do indicate that urbanization should not be treated as an exogenous variable, like an on-going technical trend, in future studies of sub-Saharan Africa.

(2) Food aid is different than food imports. Total food imports had little impact on urbanization while food aid had a significant impact on urbanization. These results imply that food aid may be in addition to customary food imports, which indicates that food aid programs may have consequences for the recipient country's rate of inflation, balance of payments, and other macroeconomic indicators.

(3) Food aid may not be reaching the rural areas. These results support the hypothesis that available food is one factor that draws people to the cities; i.e., supply-driven urbanization. Programs that improve transportation and other infrastructure may have a greater impact on food security than will increased commodity shipments. Food aid programs aimed to increase stability in the recipient's country may even be counter productive, if that food aid results in increased urbanization and the problems that accompany urbanization in less developed countries.

REFERENCES

- Bhagwati, J., 1983. *International Factor Mobility: Essays in International Economic Theory*. MIT Press, London.
- Granger, C.W.J., 1969. Investigating causal relationship by econometric models and cross-spectral methods. *Econometrica* 37: 424–438.
- Isenman, P.J. and Singer, H.W., 1977. Food aid: disincentive effects and their policy implications. *Econ. Dev. Cult. Change*, 25: 205–237.
- Judge, G.G., Hill, R.C., Griffiths, W., Lutkepohl, H. and Lee, T.C., 1982. *Introduction to the Theory and Practice of Econometrics*. Wiley, New York, 839 pp.
- Maxwell, S.J. and Singer, H.W., 1979. Food aid to developing countries: a survey, *World Dev.*, 7: 225–247.
- Pierce, D.A., 1977. Relationship – and the lack thereof – between economic time series with special reference to money and interest rates. *J. Am. Stat. Assoc.*, 72: 11–22.
- Schultz, T.W., 1960. Value of U.S. farm surpluses to underdeveloped countries. *J. Farm Econ.*, 42: 1019–1030.
- Todaro, M.P., 1976. *Internal migration in developing countries: a review of theory, evidence, methodology and research priorities*. International Labour Organization, Geneva, 106 pp.
- Zellner, A., 1979. Causality and Econometrics. In: K. Brunner and A.H. Meltzer (Editors), *Three Aspects of Policy and Policymaking: Knowledge, Data, and Institutions*. North-Holland, Amsterdam, pp. 9–54.