

HAS TRADE LIBERALIZATION IMPROVED FOOD AVAILABILITY IN DEVELOPING COUNTRIES? AN EMPIRICAL ANALYSIS

MESFIN BEZUNEH AND ZELEALEM YIHEYIS*

Clark Atlanta University, USA

It has been over two decades since governments of many developing countries have undergone the process of structural adjustment and trade liberalization. Trade liberalization has been promoted by the World Bank, International Monetary Fund, and World Trade Organization based on the argument that openness to trade will contribute to economic growth and development and with it, a reduction in poverty and, by extension, improvement in food security. Despite the lack of consensus, such argument prevailed over those which were cautious. As a result, most developing countries took the challenge to liberalize their economies. This paper examines empirically the effect of trade liberalization on food availability in developing countries using alternative estimation methods. An econometric analysis of panel data drawn from 37 countries seems to suggest that trade liberalization exerted a negative short run effect on food availability in the sample countries. The delayed outcome is found insignificantly positive, and the sum of the two differing outcomes fails to support the view that the medium to long run effect of trade liberalization on food availability is favorable.

Keywords: Trade Liberalization, Food Availability/Security, Dietary Energy Supply, Developing Countries

JEL classification: F13, O1, O13

1. INTRODUCTION

Almost all developing countries have carried out some form of trade liberalization over the last several decades due to both internal and external forces facilitated through structural adjustment programs and trade agreements (Sachs and Warner, 1995; Sharer

* The authors thank Carl Mabbs-Zeno for his comments on the draft of this paper. We have also benefited from the anonymous reviewer's comments. The usual disclaimer applies. An earlier draft of this paper was presented in a contributed paper session at the 27th International Conference of the Association of Agricultural Economists, Beijing, China, August, 16-22. 2009.

et al., 1998; FAO, 2003). Trade liberalization is a process of becoming open to international trade through a systematic reduction and eventual elimination of tariffs and other barriers between trading partners. Trade liberalization measures may include, among others, reducing or eliminating trade barriers such as tariffs, quotas, import and export licensing requirements, foreign exchange control, export subsidies and taxes. The rationale for trade liberalization, which derives from “conventional” theory (e.g., Heckscher-Ohlin theorem), is its presumed favorable effect on economic growth, mainly through induced efficiency gains in the allocation of resources, as nations produce and trade on the basis of comparative advantage. However, whether trade liberalization promotes economic growth and improves overall societal welfare remains a controversial issue. A case in point is its effect on food security.

The conceptualization of food security has evolved over the years ranging from “the volume and stability of food supplies” at the global and national level to “adequate nutrition and wellbeing” at the individual level (FAO, 2003, p.3). According to the prevailing view, food security is said to be achieved “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO, 2003, p.29). This definition of food security encompasses four dimensions: availability, stability and utilization of food as well as access to it.

As indicated above, most developing countries have implemented outward-oriented (liberalized) trade policy regimes/strategies over the last three decades, with a number of countries receiving external assistance on implementation in targeted sectors.¹ Despite progress in some countries, the degree of food insecurity in the developing world remains high. Estimates for the period 2010-12 put the number of undernourished people at about 870 million, 98% of whom live in developing countries where the average undernourishment rate is 14.9% (FAO, 2012). The question is: Can the progress or lack thereof in food security in developing countries be attributed partly to trade liberalization? More specifically, does trade liberalization help improve or worsen food security? There appears to be no consensus in the existing literature, both at the theoretical and empirical levels, in answering this question. Most of the empirical analyses on the subject are country case studies a significant portion of which involve comparing food-security indicators before and after liberalization events (before/after approach) without statistical validation of the underlying hypotheses. Fewer studies use computable general equilibrium (CGE) models calibrated under certain assumptions

¹ For example, the World Wildlife Fund-Macroeconomics Program Office and the World Bank have been assisting selected countries to implement trade liberalization policies in selected sectors of the economy (Brazil: soybean, Chile: plantation and industrial production, India: forests and mangroves, Madagascar: sisal and maize production, Mexico: livestock production, Vietnam: coffee and rice production) for the purpose of understanding and measuring the level as well as the degree of impacts of trade liberalization on economic development in general, and poverty and food security in particular. (www.panda.org/mpo; www.worldbank.org)

about the effects of trade policy reforms. Direct evidence predicated on cross-country econometric studies is rather thin, which furnishes the motivation for this paper.

This paper seeks to empirically investigate the effect of trade liberalization on food availability and, hopefully, contribute to the policy debate and the body of cross-country direct evidence on the subject, since the push for openness and trade liberalization still continues despite the ambiguity of their impacts. Of the four dimensions of food security previously mentioned, this paper focuses on food availability: food available for human consumption at the national level regardless of its source, domestic and imported. While it is more intuitive and relevant to address the issue at the individual and/or household level, the study at a higher level of aggregation is also important in its own right, as the availability of economic resources at the national level and the economic growth that is expected to result from trade liberalization will have implications for the extent of overall food and nutrition security of a nation (FAO, 2003; IFPRI, 2006). For example, an increase in food availability, as measured by per capita dietary energy supply, is found to have a positive impact on child nutrition, especially for countries with low food availability (Smith and Haddad, 2001).

The effect of trade liberalization on food availability is examined on panel data drawn from 37 developing countries. The rest of the paper is organized as follows. The next section provides a brief literature review on the relationship between trade liberalization and food security, followed in the third section by an overview of the sample data on the two variables. An econometric model is specified and the findings are presented and discussed in the fourth section. The last section offers summary and conclusions.

2. TRADE LIBERALIZATION AND FOOD SECURITY: A BRIEF REVIEW OF THE LITERATURE

Trade liberalization is expected to influence food security through a multiplicity of channels with differing effects. Some of the salient channels and arguments at the theoretical level are summarized below.²

Economic growth: Trade liberalization is expected to foster economic growth, reduce poverty, and thereby improve food security through induced changes in the relative prices of traded and non-traded goods that result in more efficient resource allocation based on current comparative advantage. However, in the event of adverse changes in income distribution against the poor due, for example, to induced changes in the structure of production, the poor may, in the short run, experience increased income risks, worsening their food security condition, even in the face of higher aggregate

² For details, see e.g., Madeley and Solagral (2001), Shapouri and Trueblood (2001), FAO (2003), IFPRI (2006), Thomas and Morrison (2006), and McCorrison *et al.* (2013).

income.

Cheaper imports and a fall in domestic prices: Where domestic food price was higher than its world counterpart because of tariffs and other trade barriers, trade liberalization in a small, importing country would lower domestic food prices to the world level and thereby raise the quantity of food consumed. However, the competition from cheaper imports and the fall in domestic food prices would exert a disincentive effect on domestic production and could adversely affect the food security status of the poor whose main source of employment and income is food production. With multilateral liberalization, a removal of farm and export subsidies in exporting countries could cause a rise in world food prices, potentially offsetting the above-mentioned domestic price effect associated with tariff reduction by the importing country.

Increased foreign exchange earnings: As the economy produces according to comparative advantage and becomes more competitive and, with multilateral liberalization, as market access for exports improves, the export sector expands. The resulting increase in foreign exchange earnings enhances the capacity of the economy to finance food imports and augment domestic production. At the same time, however, liberalization could, in the short run, generate higher import bills (for food importers) without an offsetting supply response due to the relative inflexibility of production and trade in the agricultural sector. Also, the role of multilateral trade liberalization in expanding market access is limited for developing countries which already receive preferential trade treatment through multilateral and bilateral treaties.

Reducing uncertainty and variability of food supply: Opening up the economy reduces the variability of staple foods supply by helping offset adverse domestic supply shocks such as droughts. On the other hand, in the presence of less stable and less predictable world markets (than trade under protection), liberalizing the trade regime could worsen the variability of staple food supply.

It is clear from the foregoing that whether trade liberalization improves food security is theoretically ambiguous. The nature and magnitude of the food security effect of liberalization depends on a number of factors including but not limited to the following: the extent of adaptability of the poor (in terms of location and skill and the constraints they face) to changing economic conditions; the degree of exposure of the country to food imports; the presence of favorable initial conditions and accompanying measures, such as adequate regulatory and export capacity, non-trade domestic policies and infrastructure; and the time horizon (short-term versus medium to long term) considered.

The relationship between trade liberalization and food security is, therefore, an empirical question. It has been a subject of numerous empirical investigations, mostly case studies, using different food security indicators, such as per capita food consumption, calorie and protein intake, malnutrition, domestic production (self-sufficiency), food imports, and food prices, as indicators of food security. These studies have been reviewed extensively; and the survey below is, therefore, a selective summary providing a context to the present study.

In a survey of impact assessments on the effects of liberalization from 39 countries

conducted largely by NGOs and related institutions, Madeley (2000) concluded that liberalization measures under World Bank/IMF sponsored structural adjustment programs and under the World Trade Organization's Agreement on Agriculture were making the poor more vulnerable to food insecurity, adversely affecting small-scale farmers who faced, among others and depending on the country studied, competition from cheap imports, increased landlessness, higher farm input prices relative to the prices they received for their produce, and a reduction in government supports provided. Another survey by Madeley and Solagral (2001) of studies inclusive of perspectives from multilateral agencies, such as UN agencies, IMF, World Bank and national governments indicates that the evidence is mixed. Some of these studies find evidence to support the view that trade liberalization contributes to poverty reduction, augments prosperity and accelerates the development process of a country, while others report that trade liberalization has caused many farmers to leave farming and countries to become increasingly dependent on food imports.

Similarly, a synthesis of findings by Thomas and Morrison (2006) of 15 country case studies launched by FAO in 2003 and conducted by national consultants shows that the food security outcomes of liberalization varied by country and the food security indicator used. The empirical examination included quantitative and qualitative analysis of the impact of policy reforms on prices, production, and trade flows in the agricultural sector and on target variables, such as real incomes of farmers. By this indicator, seven of the study countries reportedly experienced an improvement in food security, while the outcomes for the rest were negative or ambiguous.

As well, a before/after study of agricultural trade policy and food security in the Caribbean indicates that policy reforms introduced in the 1980s and 1990s were associated with increased food insecurity and loss of rural livelihoods for several countries in the region, as traditional export crops lost access to markets, domestic food was crowded out by cheaper imports, and as consumption patterns and diets changed and health problems worsened (Ford and Rawlins, 2007).

Examples of studies using the CGE model include a more recent study of India's experience by Panda and Ganesh-Kumar (2009) and that of China by Chen and Duncan (2008). The former reported that an increase in real GDP or poverty reduction that might result from trade reforms in India would not necessarily improve the food security and/or nutritional status of the poor. In the case of China, trade reforms adopted to accede WTO are found to worsen food insecurity in the sense of reduced income (viewed from a partial equilibrium perspective in the context of agriculture) and in terms of self-sufficiency when analyzed from an economy-wide perspective. On the other hand, a multi-country study by Shapouri and Trueblood (2001), under scenarios of rising food prices and impact of full agricultural trade liberalization on foreign exchange earnings, indicates that global market liberalization would have a small but positive impact in reducing the food gaps in the study sample which included 67 low-income, food-deficit economies.

A multi-equation econometric model estimated for two distinct trade regimes

(regulated/restricted versus more open trade regime) in Nigeria finds that trade reforms may have induced reliance on food imports, failing to address the fundamental problem of food production in that country. Likewise, Bezuneh and Yiheyis (2012), in a panel data econometric analysis of liberalization episodes in the 1980s and 1990s in 11 African countries, reported the typical effect of liberalization on food security, as measured by per capita daily energy supply, to have been unfavorable.

Clearly, the evidence on the nature of the relationship between trade liberalization and food security is mixed and inconclusive; and this conclusion is also reached by a recent comprehensive and an in-depth review and synthesis of 34 relevant studies by McCorrison *et al.* (2013). They found 13 studies suggesting a positive outcome, 10 negative, and the remaining 11 mixed. As the authors observe, this may have arisen partly from the different types of food security measures utilized, since some of the indicators could move in opposite directions.³ Another major difference is the estimation methods employed, each with its own merits and shortcomings.⁴ Results based on the before-after approach do not typically control for other changes that might have occurred during the process of liberalization, unjustifiably ascribing observed differences in food security indicators solely to a given policy reform. Estimates of CGE models crucially hinge on assumptions made about how the policy reform is expected to influence the response variable of interest, while problems such as coefficient instability in the presence of structural breaks arising from large policy changes become an issue for econometric results.

In view of the paucity of cross-country econometric evidence and the inconclusiveness of the empirical evidence in general, this paper investigates the said relationship by taking stock of the experiences of 37 developing countries where some form of trade liberalization occurred during the 1980s and 1990s. The empirical analysis is conducted by employing a mix of estimation methods including the *before/after* approach with a statistical validation of observed differences and by specifying and estimating an econometric model in which liberalization events are represented by a dummy variable (thereby somewhat eschewing the aforesaid weakness), and cognizant of its redeeming features, such as allowing statistical validation of hypothesized effects while controlling for other relevant factors.

³ For example, total food availability may increase, while at the same time domestic production is declining (the case of self-reliance versus self-sufficiency).

⁴ See e.g., dell'Aquila *et al.* (2007), McCorrison *et al.* (2013), and the references therein for details.

3. TRADE LIBERALIZATION AND FOOD SECURITY: AN OVERVIEW OF THE DATA

As mentioned, national food security in this study is measured in terms of overall food availability. Consistent with the related literature (e.g., Smith and Haddad, 2001), food availability is represented by per capita daily dietary energy supply (DES). Per capita daily energy supply is derived from food balance sheets using country-level data on domestically produced and imported foods including food aid, available for human consumption minus nonfood use. Trade liberalization episodes examined in this study are those that occurred in the 1980s and 1990s in the sample countries (listed in the appendix), drawn from the list of trade liberalization episodes compiled by Li (2003). Depending on the country, the policy measures included: reducing or removing tariff, duty, surcharges, tax, quota, prohibition, license, import deposits; abolishing exchange controls; and other trade reforms.

Figure 1 depicts the profile of per capita DES in the study countries over the study period. The sample mean level of DES during this period ranges between 1979 kcal (Zambia) and 3392 kcal (Turkey), averaging 2475 in the pooled data. The level of per capita DES exhibited an upward trend during the study period, but its growth rate was subject to frequent and wide swings.

How was the profile of DES before, during, and after liberalization episodes? Although inferences cannot be made about the causal relationship between the two variables, the exercise will nonetheless be useful to characterize the profile of DES during the process of trade liberalization. Constructing a seven-year profile of mean DES (three years before and after liberalization episodes, averaged across countries) shows marginal improvement from one year to the next relative to the year of liberalization episodes (Figure 2). A similar pattern emerges where the profile of DES before and after liberalization is compared by calendar year (Figure 3). Comparing three-year averages, it is observed that the level of mean DES was higher following liberalization episodes (2566 kcal versus 2508 kcal). However, a t-test of the difference in means between the two groups (before and after) shows that the observed differential is statistically insignificant even at the 10 percent level.

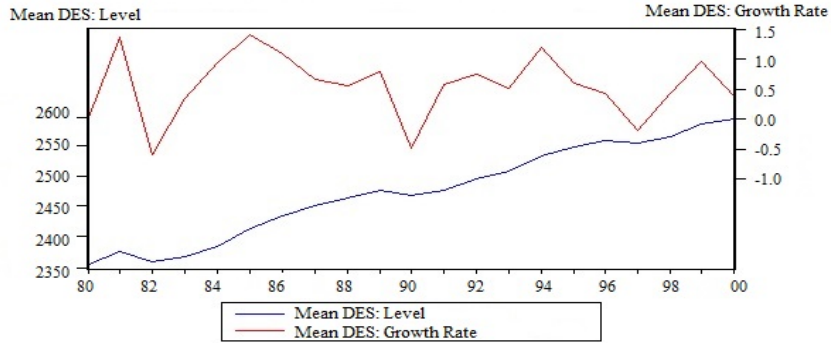


Figure 1. Level and Growth Rate of DES: 1980-2000

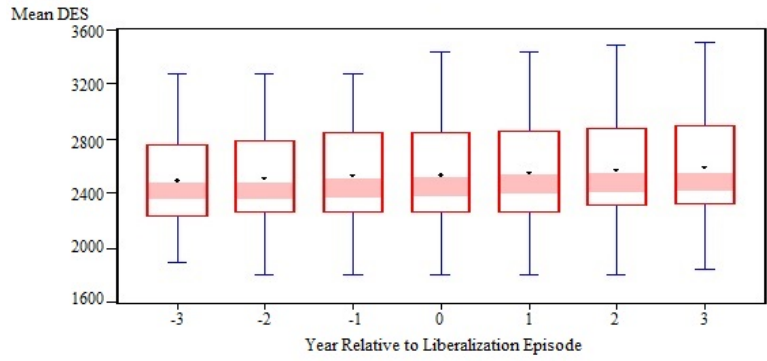


Figure 2. Profile of DES before and after Liberalization Episode

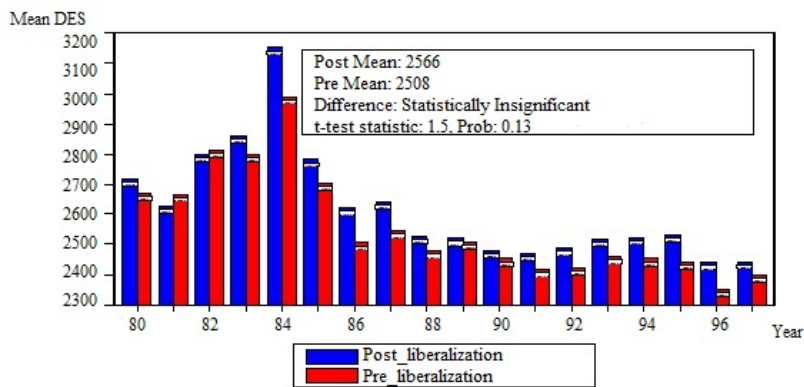


Figure 3. Three-Year Average of DES before and after Liberalization

4. ECONOMETRIC MODEL AND ESTIMATION RESULTS

As mentioned, the validity of results based on the before/after approach is questionable. Therefore, the relationship between the two variables was further explored by holding on some of the other factors that are expected to influence DES. In line with Bezuneh and Yiheyis (2012), we estimate a model that distinguishes between contemporaneous and delayed effects of liberalization with the following control variables: GDP per capita in constant 2000 US\$ (RGDPPC), irrigated land as a percentage of crop land (IRG), the price of imported foods (MFPRICE), foreign reserves in months of imports (RESVM), and political instability (POL).⁵

A positive association between DES and real GDP per capita is expected through the favorable impact of increased income on food expenditure. The percentage of crop land irrigated is expected to contribute to food security via its positive impact on domestic food production. The foreign price of imports and foreign reserves are relevant as they affect the availability of food from imports. Rising prices of imported food and dwindling foreign reserves are expected to lead to a decline in DES by restricting access to food imports. Political instability negatively affects food availability through its impact on food supply from domestic production. The impact of liberalization is examined by using liberalization episodes which are represented by a dummy variable owing to paucity of time series data on other more direct liberalization indicators such as tariff rates.

The estimating model takes the following form, with expected signs indicated in parentheses beneath slope coefficients:

$$\begin{aligned} \log DES_{it} = & \alpha_0 + \alpha_1 LIBZ_{it} + \sum_m \alpha_{2m} LIBZ_{i,t-m} + \alpha_3 \log RGDPPC_{it} + \alpha_4 IRG_{it} \\ & \quad (?) \quad \quad (?) \quad \quad (+) \quad \quad (+) \quad \quad (1) \\ & + \alpha_5 \log MFPRICE_{it-1} + \alpha_6 \log RESVM_{it-1} + \alpha_7 POL_{it} + \varepsilon_i + \nu_t + \mu_{it}, \\ & \quad (-) \quad \quad (+) \quad \quad (-) \end{aligned}$$

where

LIBZ = Trade liberalization dummy variable which equals one where/when liberalization occurred and zero otherwise,

POL = Political instability dummy variable which equals one when/where political instability (such as adverse regime changes, ethnic and revolutionary wars, and genocides/politicides) occurred and zero otherwise,

ε = country-specific, time-invariant fixed effects,

⁵ These controls can be thought of as some of the variables that would appear in a reduced-form equation derived from the supply and demand sides of DES.

ν = period-specific, individual-invariant fixed effects,
 m = order of lag up to three years,
 μ = stochastic error term,
subscripts i and t denote country and time (year), respectively,
others: as defined above.

The data used for this study comprise cross-sectional and time series observations. Thus, the basic model incorporates unobservable country -and period- specific effects to account for differences among the sample countries and over the study period not accounted for by the included variables, allowing the intercept to vary across countries and over time. The model is estimated with alternative methods using the Eviews econometric software. Table 1 records the results obtained from estimating the basic model. Column I results are obtained by estimating the basic model on levels of variables with three lags of liberalization using the fixed-effects procedure (with country -and period- specific fixed effects included).

Table 1. Econometric Results: Basic Model
(Dependent Variable: logDES in level and Δ logDES in first difference (FD) versions)

Explanatory Variables	I: Level (Panel LS)		II: FD (Panel LS)		III: FD (Panel EGLS)	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
<i>LIBZ</i>	-0.0049	0.670	-0.0038	1.001	-0.0044	1.993**
<i>LIBZ</i> ₁	0.0012	0.142	-0.0012	0.315	-0.0001	0.046
<i>LIBZ</i> ₂	-0.0014	0.164	-0.0017	0.438	-0.0000	0.034
<i>LIBZ</i> ₃	0.0087	1.217	0.0041	1.083	0.0033	1.537
log(<i>RGDPPC</i>)	0.0444	2.492**	0.0908	3.169***	0.0909	4.619***
<i>IRG</i>	-0.0003	0.468	0.0032	2.317**	0.0026	2.981***
log(<i>MFPRICE</i> ₁)	-0.0153	1.426	-0.0151	2.341**	-0.0109	2.396**
log(<i>RESVM</i> ₁)	0.0038	2.648***	0.0016	1.434	0.0019	1.845*
<i>POL</i>	-0.0189	2.066**	-0.0052	0.702	-0.0044	1.004
<i>N</i>	746		740		740	
<i>SER</i>	0.056		0.034		0.034	

Notes: 1) FD= first difference, LS=least squares, EGLS=Estimated generalized least squares, N=number of observations, SER=standard error of regression. Intercept terms were included during estimation. 2) The t-statistics are absolute values of t-ratios. Triple, double, and single asterisks denote significance at the 1%, 5% and 10% levels, respectively.

The estimated coefficients of real GDP per capita, foreign reserves and political instability are signed as expected, and these variables appear to significantly influence food availability, unlike the other slope coefficients which are imprecisely estimated. However, an examination of residuals obtained from the regressions on levels shows the

presence of serial correlation.⁶ As a remedy for serial correlation, the model was re-estimated on first differenced data. First-differencing Equation (1) yields:

$$\Delta \log DES_{it} = \beta_0 + \beta_1 \Delta LIBZ_{it} + \sum_m \beta_{2m} \Delta LIBZ_{i,t-m} + \beta_3 \Delta \log RGDPPC_{it} + \beta_4 \Delta IRG_{it} + \beta_5 \Delta \log MFPRICE_{it-1} + \beta_6 \Delta \log RESVM_{it-1} + \beta_7 \Delta POL_{it} + \Delta v_t + \Delta \mu_{it}. \quad (2)$$

Country-fixed effects are differenced away, and a common intercept term is added.⁷

The estimation of Equation (2) generates results appearing in the last two sets of columns of Table 1. The results in column II are pooled OLS estimates based on the transformed data. The estimates are generally consistent, in terms of signs, with their counterparts from regressions on levels with the exception of the irrigation variable. The coefficients on liberalization episode, both current and lagged, remain statistically insignificant. The first-differencing enhanced the statistical significance of the majority of the regressors. The major exceptions are the coefficients on foreign reserves and political instability which are now statistically less significant.

While panel data have the advantage of increasing the number of observations and the degrees of freedom compared to a time-series data of a single country, this type of data introduces the possibility of cross-sectional heteroscedasticity, with implications for the efficiency of the estimators and the validity of hypothesis testing and inference. The results of the Breusch-Pagan test for heteroscedasticity indicate that its presence cannot be ruled out at the conventional level of significance.⁸ As a remedial measure, the model was re-estimated using the estimated generalized least squares method with cross-sectional weights and White cross-section standard errors and covariance. The estimates thus obtained are reported in the last column of Table 1. Apparently, the correction for heteroscedasticity improved the statistical significance of most of the regressors. The contemporaneous effect now emerges statistically significant at the five percent level, and the coefficient of the three-time lag is positive with lower standard errors than in the previous case. On the other hand, the effects of the first two lags of the liberalization variable remain imperceptible regardless of the estimation method employed.

⁶ A first-order autocorrelation test in the context of a panel data setting, which involves an auxiliary regression with the lagged residual series included as an additional explanatory variable (see e.g., Wooldridge, 2002, p. 176-177), fails to reject the null of no autocorrelation at the one percent level. The coefficient of the lagged residual is estimated to be 0.753 with a t-ratio of 33.8.

⁷ An F-test of the significance of the fixed period effects in the differenced data fails to reject the null that they are redundant: $F(20, 710) = 0.635$, with $p\text{-value} = 0.89$. Therefore, the period fixed effects are dropped from the regression.

⁸ Regressing the squared residuals from the regression of column II on the explanatory variables of the model yields the following statistics: $LM = 16.5$ ($p\text{-value} = 0.06$) and $F = 1.8$ ($p\text{-value} = 0.06$).

Dropping these variables and re-estimating the model produces the results recorded in column I of Table 2, which leaves the observed effects of the retained variables essentially unaltered. The results seem to suggest that the contemporaneous impact of liberalization is negative, while the effect with a longer lag is likely to be positive. However, a Wald test fails to reject the null hypothesis that the sum of the two effects is zero, suggesting that the short-run adverse effect is hardly reversed during the time horizon considered in the analysis.⁹

Table 2. Econometric Results: Modified Model

(Dependent Variable: $\Delta \log DES$)

X variables	I		II		III	
	Coeff.	t-Statistic	Coeff.	t-Statistic	Coeff.	t-Statistic
$\Delta LIBZ$	-0.0044	2.102**	-0.0042	1.983**	-0.0044	2.060**
$\Delta LIBZ_{-3}$	0.0033	1.584	0.0033	1.653*	0.0033	1.586
$\Delta \log(RGDPPC)$	0.0908	4.514***	0.0978	4.745***	0.0978	4.986***
ΔIRG	0.0026	2.885***	0.0026	2.589***	0.0026	2.919***
$\Delta \log(MFPRICE_{-1})$	-0.0109	2.349**	-0.0111	2.448**	-0.0095	1.960**
$\Delta \log(RESVM_{-1})$	0.0019	1.840*	0.0018	1.777*	0.0016	1.598
ΔPOL	-0.0044	1.004	-0.0042	0.924	-0.0057	1.308
$\Delta \log DES_{-1}$	-	-	-	-	-0.1249	3.127***
Asia	-	-	0.0000	0.057	-	-
Latin America	-	-	0.0021	1.612	-	-
North Africa	-	-	0.0053	1.462	-	-
Sub-Saharan Africa	-	-	0.0028	1.418	-	-
N	740		740		740	
SER	0.034		0.034		0.033	

Notes: All estimates in this table are obtained using the feasible GLS method with cross sectional weights. Column I is a re-estimation of the basic model having dropped the highly insignificant two lags of liberalization. Columns II and III, respectively, add regional dummies and the lag of the dependent variable to the estimating model. See also notes to Table 1. The Asia dummy variable includes Turkey.

The regression results are generally robust to the inclusion of regional dummy variables which were included to account for possible differences among regions in the degree of food security, not captured by the included regressors (column II of Table 2). All the regional dummy variables are statistically insignificant and exert no appreciable influence on the coefficients of the other explanatory variables of the model except on

⁹ The Wald test for the null hypothesis that the sum of the two coefficients is zero yields an F-statistic of 0.11 with a p-value of 0.74.

the three-time lagged liberalization variable which now becomes significant at the 10 percent level. The last set of results (column III) is obtained by controlling for the lagged dependent variable to account for the effects of inertia and initial conditions. This variable emerges significantly negative, suggesting that current improvement in DES is partly the result of the initial condition of lower food availability.

With respect to the other explanatory variables of the model, the estimates suggest that per capita real GDP, the proportion of crop land irrigated, and the availability of foreign reserves positively influence national food security.¹⁰ On the other hand, a rise in the price of food imports is found to adversely affect food availability. As expected, the incidence of political instability enters the regression negatively, although the effect is statistically insignificant.

5. SUMMARY AND CONCLUSIONS

The purpose of this paper has been to examine the food-security effect of trade liberalization in developing countries. Representing national food security by per capita daily dietary energy supply and comparing its value before and after trade liberalization seems to suggest a positive outcome. However, the improvement is not only numerically small but also statistically insignificant, not to mention the possibility that the observed improvement may have been caused by changes in factors other than trade policy reforms. Once some of such factors are controlled for, the outcome is found to be negative contemporaneously and weakly positive with a lag. The negative contemporaneous effect provides evidence to the view that trade liberalization could adversely affect food security in the short run. The observed positive effect with a longer lag, although it is not robustly significant at the conventional level, seems to be consistent with the assertion that in time the efficiency gains will accrue as to outweigh the associated costs. However, the finding that the sum of the two effects is not statistically different from zero fails to support the view that the medium to long run effect of trade liberalization on food security is favorable. This could be due to the weak relationship between trade liberalization and economic growth as observed by early studies such as Stiglitz and Charlton (2005).

While the results of this study provide further evidence on how food security responds to trade liberalization, they are best interpreted with caution. First, the dummy

¹⁰ As noted above, trade liberalization is expected to influence food security partly through its effect on income, which is included in our model as per capita real GDP. We re-estimated the model after having removed the effect of liberalization (current and three times lagged) on per capita real GDP. The coefficient on per-capita real GDP thus estimated would capture the latter's effect on food security independent of liberalization. Replacing the actual series of per capita real GDP with the series thus "purged" leaves the inference with respect to the contemporaneous and delayed effects of liberalization unchanged.

variable used to represent liberalization episodes lumps together different kinds of trade liberalization measures irrespective of their scope, pace, sequencing, permanence or reversal, and thereby assumes all to have the same effect. Therefore, the estimated and reported effect is the average effect of different types of liberalization measures, which could have disparate impacts depending on their scope, pace, and other dimensions.

Second, the econometric evidence presented is suggestive of the effect of liberalization, given other determinants of food security and is, thus, more reliable than evidence based on simple descriptive before/after comparisons. However, it is well recognized that the “reduced-form” type of equation used in this paper does not fully capture the complexity of the relationship between the two variables as manifested, among others, in the multiplicity of channels through which the effects under study are transmitted. Data permitting, an empirical investigation of the various channels of transmission within a system of equations would be informative.

Finally, due to paucity of micro data, the study was not conducted at the household or individual level, which is a more useful unit of analysis to determine the effect of liberalization on the more vulnerable groups of society (the issue of availability versus access). Nonetheless, to the extent that the short-run effect at the national level is negative and is not to be reversed in the medium to long run, then it can be justifiably conjectured that the effect on the poor at the household level would not be positively different unless, contrary to some of the evidence previously cited, the distribution of income changed in favor of the poor following liberalization.

APPENDIX

Study Countries (years of liberalization events):

Benin (1992-93), Brazil (1988-93), Cameroon (1990-94), Chile (1974-79), Colombia (1973-79, 1985-89, 1992), Costa Rica (1986-87), Ecuador (1986-92), Gambia (1986), Ghana (1988-92), Guatemala (1987-88), Guinea-Bissau (1987), Guyana (1988-91), Honduras (1990-92), India (1985-88), Indonesia (1985-92), Jamaica (1989-93), Kenya (1988-93), Korea Rep (1978-79, 1981-94), Malaysia (1993-95), Mali (1988-91), Mauritania (1989), Mexico (1985-87), Morocco (1983-89), Nepal (1991-93), Nigeria (1986-87), Pakistan (1989-95), Paraguay (1986), Peru (1979-81), Philippines (1981-83, 1986, 1991-95), Sri Lanka (1989-93), Thailand (1993, 1994-97), Tunisia (1986-93), Turkey (1980-85), Uganda (1993-94), Uruguay (1974-81, 1991-94), Venezuela (1989-92), and Zambia (1992).

Data Sources:

DES and unit value of imported food: FAOSTAT (FAO).

Liberalization Episodes: as compiled by Li (2003) from several sources including “Papageorgiou, D., M. Michaely, and A. Choski (1991), (*Liberalizing Foreign Trade*, Washington: World Bank) various editions of Trends in Developing Economies, various issues of Economist Intelligence Unit, various studies on trade liberalizations, country studies, and publications by GATT and WTO.” (Li, 2003, p. 10).

Political Instability: State Failure Taskforce of the Integrated Network for Societal Conflict Research for data on political instability.

Other Variables: World Development Indicators (World Bank) database.

REFERENCES

- Bezuneh, M., and Z. Yiheyis (2012), “The Effect of Trade Liberalization on Food Security: The Experience of Selected African Countries,” *Journal of African Development*, 14, 13-26.
- Chen, C., and R. Ducan (2008), “Achieving Food Security in China: Implications of World Trade Organization Accession,” ACIAR Technical Reports, 69, Canberra: Australian Center for International Agricultural Research.
- FAO, (2003), *Trade Reforms and Food Security: Conceptualizing the Linkages*, Rome.
- ____ (2012), *The State of Food Insecurity in the World*, Rome.
- Ford, J.R.D., and G. Rawlins (2007), “Trade Policy, Trade and Food Security in the Caribbean,” in Ford, J.R.D., C. dell’Aquila, and P. Conforti, eds., *Agricultural Trade Policy and Food Security in the Caribbean*, Rome: FAO.
- IFPRI2 (2006), “How Much Will Trade Liberalization Help the Poor? Comparing Global Trade Models,” Research Brief.
- Li, X. (2003), “Trade Liberalization and Real Exchange Rate Movement,” IMF Working Paper, WP/03/124.
- Madeley, J. (2000), “Trade and Hunger- An Overview of Case Studies on the Impact of Trade Liberalization on Food Security,” A report of Church of Sweden Aid, Diakonia, Forum Syd, the Swedish Society for Nature Conservation and the Program of Global Studies.
- Madeley, J., and Solagral (2001), “The Impact of Trade Liberalization on Food Security in the South: Literature Review,” A CIDSE Background Paper, May.
- McCorrison, S., D.J. Hemming, J.D. Lamontagne-Godwin, M.J. Parr, J. Osborn, and P.D. Roberts (2013), *What is the Evidence of the Impact of Agricultural Trade Liberalization on Food Security in Developing Countries? A Systematic Review*, London: EPPI-Centre, Social Science Research Unit, Institute of Education,

- University of London.
- Panda, M., and A. Ganesh-Kumar (2009), "Trade Liberalization, Poverty, and Food Security in India," IFPRI Discussion Paper, 00930.
- Sachs, J.D., and A. Warner (1995), "Economic Reform and the Process of Global Integration," *Brookings papers on economic activity*, 1, 1-118.
- Shapouri, S., and M. Trueblood (2001), "Impact of Agricultural Policy Reform on Low-Income Countries," in Burfisher, M.E., ed., *Agricultural Policy Reform in the WTO-the Road Ahead, Agricultural Economic Report*, Washington, D.C.:USDA, ERS, 91-100.
- Sharer, R., P. Sorsa, and International Money Fund (1998), *Trade Liberalization in IMF: Supported Programs*, Washington, D.C.: International Monetary Fund.
- Smith, L.C., and L. Haddad (2001), "How Important is Food Availability for Reducing Child Malnutrition in Developing Countries?" *Agricultural Economics*, 26, 91-204.
- Stiglitz, J., and A. Charlton (2005), *Fair Trade for All: How Trade Can Promote Development*, Oxford: Oxford University Press.
- Thomas, H., and J. Morrison (2006), "Trade Related Reforms and Food Security: A Synthesis of Case Study Findings," in Thomas, H., ed., *Trade Reforms and Food Security*, Rome: FAO, 1-116.
- UNDP (1997), "Globalisation and Liberalisation: Implications for Poverty, Distribution and Inequality," Occasional Paper, 32.
- Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge, Mass: The MIT Press.

Mailing Address: Zelealem Yiheyis, Department of Economics, Clark Atlanta University, 223 James P. Brawley Drive, SW Atlanta, GA 30314, USA. Tel: 404 880 6289. E-mail: zyiheyis@cau.edu.

Received February 20, 2013, Revised July 29, 2013, Accepted October 10, 2013.