

FOOD AID: HELP OR HINDRANCE?  
THE CASE OF EASTERN EUROPE  
AND NEW INDEPENDENT STATES

by

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Abstract

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Lately the international community is increasingly worrying about the impacts of the food aid on the agriculture development of the recipient. At the same time, 90's were characterized by increasing food aid flows to the transition economies. This research aims to investigate the impact of the food aid in this region. Food aid represents an income transfer and increases food supply. However, food has elasticity of demand less than one, thus increase in the consumers income generated less than one-to-one increase in demand. Thus, when food aid is delivered, the magnitude of the supply increase is greater than that of the demand. This results in the downward pressure on the prices and creates price disincentive for agriculture producers. Additionality is defined as a situation, when food aid does not drive out usual supplies. This research empirically testes additionality of the food aid. Regarding endogeneity of the food aid flows, the identified (restricted) panel VAR model with innovation accounting was estimated. The results show that 1 kg per capita of food aid displaces 0.7 kg per capita of commercial food imports and 0.2 kg of food production. Impulse response function implies that displacement dies out at around 6<sup>th</sup> year. The additionality can be guaranteed by proper targeting and design of the food aid.

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## GLOSSARY

**Additionality.** Additionality is a case when food aid (surplus agricultural commodities) are given in such a manner as to increase consumption without restricting supplies (domestic production and commercial imports).

**Food Aid.** Provision of food commodities as a form of international assistance, on grant or concessional terms (FAO).

**Usual Marketing Requirements (UMR).** A commitment by the recipient country to maintain a normal level of commercial imports of the commodity concerned, in addition to the commodity supplied in the concessional transaction (i.e. food aid) (FAO).

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## INTRODUCTION

One of the important issues at the Johannesburg world summit on sustainable development 2002 was the evaluation of the importance and consequences of the food aid. This question was brought about by growing concerns that food aid comes from the subsidies in the donor country, and then, being delivered to the recipient, depresses domestic agriculture market.

The common view of food aid is that it is a humanitarian aid. However, it is not the whole true. Rather, it presents a mixture of self-interest and altruism. Food aid originated in the USA (which was until recently the main donor of the food aid globally) as a surplus disposal tool. Indeed, an attempt to establish high domestic prices on farm products leads to the agriculture surpluses, which can be bought by the government and used as food aid. Further, food aid can substitute export subsidies or hide price discrimination.

On the other hand, food aid the effect on the recipient economy does not have to be positive. The main flaw is the downward pressure on the local prices due to the increased supply, which is not matched by increase in demand. For example, some recipients of program food aid could have no need in it and sell on the domestic market.

The importance of food aid increasing supply but not restricting demand is captured by the concept of additionality. Additionality is a situation, when food aid adds to the existing food supply (production and imports) but is not a substitute for it.

The interesting fact is that until recently the issue received little attention, although “the WFP [World Food Program] has emerged as the second largest source [globally] of development funds after the World Bank” (Charlton, 1992).

The evident lack of research on the issue was the main motivation for this study. Moreover, no study focuses on this issue in the former USSR and Eastern Europe, though this region has become one of the main recipients of the food aid, as can be seen from Appendix 1.

The research will try to investigate the impact of the food aid in the region. Specifically, it will investigate empirically the contraction of the existing food supply channels (production and imports) caused by food aid. Chapter 1 gives the exposition of the history, existent theory and empirical research in the field. Chapter 2 describes the data used. Chapter 3 introduces the econometric model, while numerical results and their interpretation are given in the chapter 4. Chapter 5 expands on the policy implications aimed to reduce negative food aid effects.

## *Chapter 1*

### ISSUE OVERVIEW

#### *Definitions*

Food aid relates to the transfer of food on concessional terms from one country to another. Alternatively, food aid can be regarded as the supply of imports to developing countries at a reduced price (Braun and Huddleston, 1988). FAO (1996) gives the following definition: “Food aid is a provision of food assistance to improve nutritional well being of people who otherwise would not have access to adequate food for a healthy and active life”. Gillis et al. (1996) defined it as a kind of bilateral program loan since it provides commodities that would otherwise have to be provided with the countries’ own foreign exchange earnings.

#### *Types of food aid*

*Project food aid.* Food is usually used as a means of paying very poor and disadvantaged groups in recipient countries for work performed on social or economic development activities such as rural road construction, or to encourage attendance at schools or health clinics, or participation in training activities which will help them to increase future incomes. When well designed, these projects can be both effective and efficient forms of assistance for such groups. The food is less likely to be diverted than is cash. Payment in food is only attractive to those in greatest need. These activities also appear to provide a reserve of food and an infrastructure which enables a rapid response to be mounted to new emergency situations requiring food aid. (AusAID, 1997).

*Emergency (humanitarian) food aid.* Targeted and freely distributed to the victims of natural disasters or those caused by humans. National governments often in collaboration with NGOs and members of civil society are responsible for distributing the food to the target population (FAO, 1996).

*Program food aid.* This type is essentially a budgetary support for the recipient country, provided as food which is monetized. The food increases the food supply while the cash raised from its sale (“counterpart funds”) is usually intended to be directed towards development activities agreed between the donor and recipient governments (For example, meeting balance of payments requirements or budget support). Frequently, the food is sold for a price lower than the cost of purchasing and transporting it. It is often difficult to monitor the use of the resultant cash in the development activities. In a way program food aid is invariant to usual (monetary) foreign aid. Donor support for this form of food aid assistance has declined, largely because of these difficulties. (WFP (1996), AusAID (1997)).

According to UN FAO, program aid constitutes up to 60% of world food aid flows. Please, refer to Appendix 9). Key theoretical and empirical ideas presented in this work must be regarded with recognition of this fact. Note, however, that the volumes of humanitarian and project food aid flows have increased lately.

#### *Institutional framework*

The institutional framework for the food aid distribution is formed by Food Aid Convention (FAC) and WTO agreements.

FAC is negotiated by the members of the Food Aid Committee (Argentina, Australia, Canada, the European Community and its member States, Japan, Norway, Switzerland and the United States of America).

According to the International Grains Council and Food Aid Commission the main features of the current Food Aid Convention are (adopted from IGC, 1999):

- **Objective:** "To contribute to world food security and to improve the ability of the international community to respond to emergency food situations and other food needs of developing countries." FAC members will make quality food aid available to developing countries with the greatest needs on a predictable basis, irrespective of fluctuations in world food prices and supplies. Particular importance is attached to ensuring that food aid is directed to the alleviation of poverty and hunger of the most vulnerable groups.
- **Impact and effectiveness:** As a framework of international co-operation between food aid donors, the new FAC aims at achieving greater efficiency in all aspects of food aid operations. FAC members will put greater emphasis on the monitoring and evaluation of the impact and effectiveness of their food aid operations. They are also committed to support the efforts of recipient countries to develop and implement their own food security strategies.
- **Recipients:** When allocating their food aid, FAC members will give priority to Least-Developed Countries and Low-Income Countries - many of which are on the WTO list of Net Food-Importing Developing Countries (NFIDCs). Other eligible food aid recipients include Lower Middle-Income Countries and all other NFIDCs, when they are experiencing food emergencies or when food aid operations are targeted to vulnerable groups.
- **Eligible products:** Cereals will continue to represent the bulk of aid under the 1999 Convention. However, the list of products which may be supplied has been broadened beyond cereals and pulses to include edible oil, skimmed milk powder, sugar, seeds and products, which are a component of the traditional diet of vulnerable groups in developing countries or of supplementary feeding programs (e.g. micro-nutrients).
- **Terms and Forms of Aid:** All food aid to least-developed countries covered by members' minimum annual commitments will be in the form of grants. Overall, grant food aid will represent not less than 80 per cent of each member's contributions and, to the extent possible, members will seek progressively to exceed this percentage. Members will not tie the provision of their FAC food aid to commercial exports of goods or services to recipient countries.

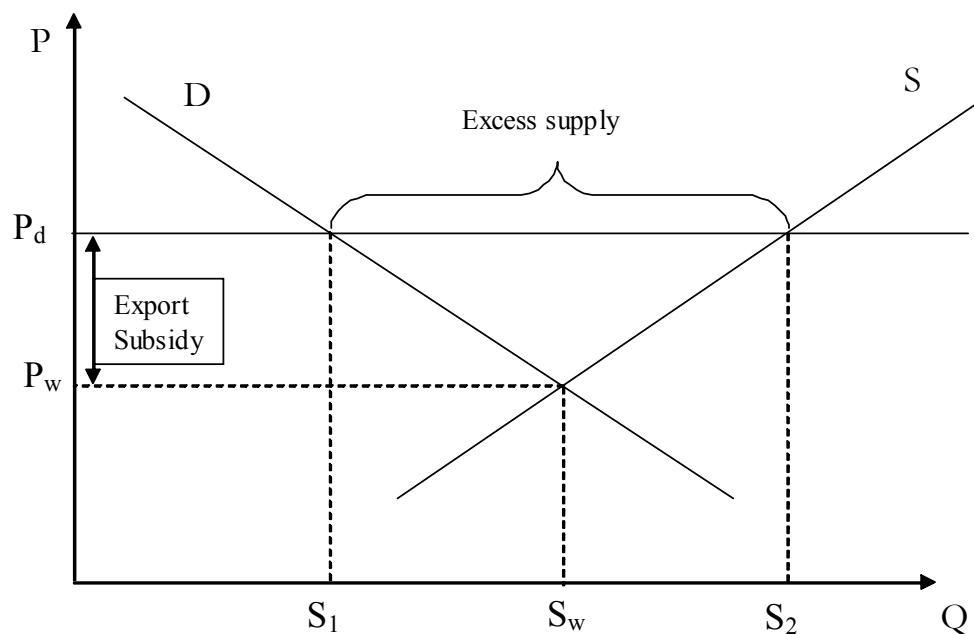
- **Local agricultural development:** In order to promote local agricultural development, strengthen regional and local markets and enhance the longer-term food security of recipient countries donors are urged to use their cash contributions for "triangular transactions" (i.e. purchasing food from developing countries for supply to a recipient country) or for "local purchases" (i.e. purchasing food in one part of a developing country for supply to a deficit area in the same country).

Further, Article 10 of the WTO Agreement on Agriculture (Please, refer to the Appendix 4 for the corresponding Article) prohibits the use of non-commercial transactions (including food aid) which might circumvent commitments on export subsidies (Article 9). Donors must assure that food aid is not tied to commercial exports and that food aid transactions are carried out in accord with the FAO principles on surplus disposal and consultative obligations. Food aid should also be provided, to the extent possible, in fully grant form or on terms no less concessional than those provided for in Article IV of the Food Aid Convention of 1986. (AusAID, 1997).

*Food aid as surplus disposal and export subsidy substitute*

Generally, food aid serves certain donors interests. Originally it developed as a surplus-disposal tool. For example, in the United States Agricultural Trade Development and Assistance Act, it is stated that food aid has the following goals: disposal of surpluses generated by domestic farm support programs, and promotion of international demand for agricultural exports from the United States (Barrett, 2002).

Figure 1. Food Aid as an Equivalent of the Export Subsidy



*Adopted from Gaisford and Kerr, 2001*

Further, “[d]eveloped countries may have an incentive to provide unnecessary food aid as a substitute for export subsidies to support domestic producer interests” (Gaisford and Kerr, 2001).

Food aid can be shown have effect which closely resemble export subsidy. Gaisford and Kerr (2001) provide the following exposition to illustrate this idea (Please, refer to Figure 1). Assume for simplicity that originally the country does not export. Let the donor country use policy measures to keep the domestic price above the world (i.e.  $P_d > P_w$ ). This price restriction leads to the excess supply in the amount  $S_2 - S_1$ . The government of the donor country can impose export subsidy equal  $P_d - P_w$ . However, it also can buy the excess supply at the domestic

price. Government can use this excess stock as food aid or export it. Thus, food aid could hide export subsidies.

It is found empirically that donor's food aid supply is determined by the government stocks of the commodity and its price, which is in line with the theoretical reasoning presented above. In particular, wheat prices and government held commodity stock were found the main determinants of the food aid volumes delivered from Canada, European Community, and the United States (Shapouri and Missaen 1990). Qualitative results show that higher world food prices and lower government surplus stocks result in lower food aid flows. (Taylor and Byerlee 1991, Ruttan 1993).

Particularly, this relationship implies mistiming of food aid. Indeed, it is reasonable to suppose that countries need more food aid when prices are high, but not vice versa, as it is on practice. Further, higher volumes supplied during the periods of low prices gives rise for claims that food aid destabilize food prices (food aid increases supply and drives price down even more). (Tschirley et al. 1996 and Donovan et al. 1999). Barrett (1998) also notes that since mistimed food aid increases both volumes and unit price of the food imports it implies possible aggravation of the business cycle volatility on the recipient countries.

#### *Food aid as price discrimination tool*

Food aid can be used to provide discriminatory policy (Srinivisan, 1989). Suppose donor institutionally raises the domestic price over world one. This inevitably results in excess domestic supply. When this volume is damped on the world market, world market price falls and government loses the difference between the domestic price and new (lower) world price on each unit of the surplus sold. The better way to utilize the surplus is to use a part of it as a food aid. Assume the recipient country has two distinct groups of consumers – poor, with fairly

elastic demand with respect to price, and rich, with fairly inelastic demand. Donor country may wish to give part of the surplus as a food aid sold to the poor (with the revenues kept by the government). This allows selling the rest of the surplus to the rich at higher (free trade) price, assuming the transaction costs prohibit reselling from poor to the rich. Thus donor government achieves price discrimination. As compared with no aid now the donor and recipient governments are better off, the poor are better off, while rich are worst off. Also Srinivisan (1989) notes, that in case market segmentation is impossible, but poor are identifiable, the same result can be achieved with the help of income transfer to the poor to shift their demand outwards.

#### *Distribution of food aid*

It is usually assumed that food aid is given as an in kind transfer. However, this is not always so. A large share of food aid, especially of the program type, is sold on the domestic market to generate counterpart funds. They are put into special accounts, and both recipient and donor countries govern the use of these funds, for example for development projects. In case where the countries would have received aid for those projects in the absence of counterpart funds, they lose the amount of foreign exchange equal to the difference between the two. Srinivisan (1989) points out that foreign exchange saved by the recipient to the extent food aid replaced commercial food imports becomes in effect a loan that is repaid later in the sense of the potential foreign exchange inflow foregone.

#### *Disincentive effect of the food aid*

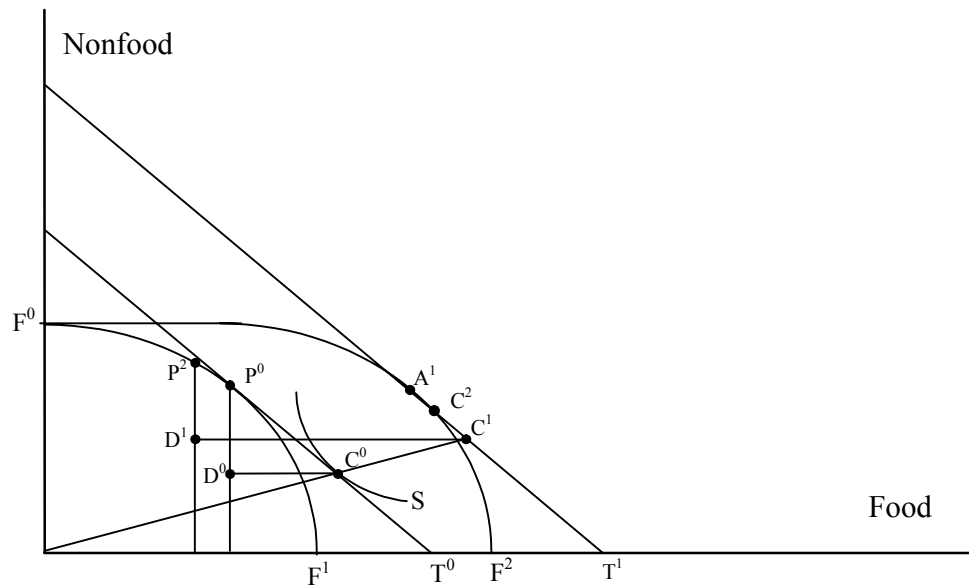
Being delivered to the recipient country, program food aid is sold on the domestic market to raise counterpart funds for the government. Recall that since program food aid constitutes majority of food aid deliveries, this is exactly what usually happens with food aid. Thus, food aid has double effect on the recipient

economy. First, it increases domestic food availability. Second, assuming that counterpart funds are transferred to the consumers as lump sum transfers, it increase their income. This in turn generates income effect. Since food as a necessity good has income elasticity of demand less than one, the additional income produces less than one to one increase in demand. The smaller increase in demand combined with larger increase in supply, drives relative food prices down, creating disincentive for local producers and negatively affecting production. (Srinivasan, 1989). For example, large shipments of food aid to Russia in the 1990s seem to have caused prices to fall well below ex ante market prices (The Economist, 1998).

Furthermore, as will be shown below, in case of open economy, both imports and production fall.

Srinivasan (1989) uses a two-commodity economy model to explain the impact of food aid. The model considers a recipient country, open to international free trade and its economy is a price taker in world markets. The economy is characterized by the production possibility frontier ( $F^0F^1$  and  $F^0F^2$ ), which represents all possible production allocations between food and nonfood commodities (Figure 2). Consumer preferences are represented by Samuelson social indifference curves (S) and assumed to be homothetic, i.e. equal proportions of goods are consumed at all levels of income, given the same relative prices. In the pre-aid equilibrium, production is at  $P^0$  and consumption at  $C^0$ . The slope of  $P^0C^0$  represents the relative price of food on the world market. Food imports are represented by  $C^0D^0$ . Assuming food aid in the amount  $T^0T^1$  becomes available from donor countries, this new addition of resource moves the production possibility frontier (PPF) outward. With prices unchanged (because of

Figure 2. The Relationship between Aid, Imports and Production



Source: Srinivasan (1989)

free trade), production is assumed to remain at  $P^0$ , availability however, increases to  $A^1$  and consumption moves to  $C^1$  (recall the homotheticity assumption). Lack of incentives for food crop farming coupled with institutional constraints reduces food output to  $P^2$ . The total food imports increase to  $C^1D^1$  to complement domestic food availability.

However,  $C^1D^1$  is less than the sum of the pre-aid commercial imports  $C^0D^0$  and food aid  $T^0T^1$ . This will imply that the recipient country has substituted some of the commercial food imports with food aid. Thus, both production and imports could fall. Note, however, that the result could be even more dramatic when the assumption of homotheticity is relaxed. Homotheticity implies that the income elasticity is unity. When given more realistic value, i.e. is less than one, the

consumption moves to the point  $C^2$  rather than  $C^1$ . This implies a further decline in imports.

*Balance of payments effects of the food aid*

Moreover, decreasing imports induce relaxation of the balance of payments constraints, which in turn could lead to real exchange rate appreciation. This may be undesirable in terms of maintaining macroeconomic stability that is critical for the majority of the recipient countries (Mohapatra et al, 1999). Barrett (1998) expands this argument, stating that food aid that relieves foreign exchange constraints may have Dutch disease effects on domestic tradables, hurting the food sector competitiveness in international market.

*Additionality as a safeguarding tool*

The interests of recipient countries are safeguarded by the emphasis placed on the importance of increasing consumption rather than restricting supplies. The mechanism for assuring this is additionality. Additionality is a case where surplus agricultural commodities are given in such a manner as to increase consumption without restricting supplies (Cathie, 1989). Formally additionality is captured by the “usual marketing requirement” (UMR), a concept adopted by FAO in 1970. It is defined as a commitment by the recipient country to maintain a normal level of commercial imports of the commodity concerned, in addition to the commodity supplied in the concessional transaction (i.e. food aid).

However, it is likely that food aid displaces a part of imports or domestic production or both – depending largely on the recipient country’s capacity to use it effectively (Barraclough, 1991). The existence of the contemporaneous displacement is widely supported by empirical studies. Generally, food aid is

found to be only 30-60% additional (Clay et al. 1996, Saran and Konandreas 1991, Barrett et al. 1999).

#### *Positive effects of food aid*

Despite its negative contemporaneous impact, food aid can positively affect the agriculture market in the long run. This can be due to the dynamic income multiplier effect induced by food aid. Further, food aid can improve nutrition of the labor force, and increase labor productivity in the long run. Thus, the overall effect could be J-curve shaped. This result was found for the impact of the United States food aid on the commercial imports in the recipient countries. Food imports were found to fall immediately after food aid inflow due to the income effect and then rise above the ex ante level because of the dynamic income multiplier effect. Namely, the increase was found to take place over longer horizons of 5 to 20 years (Barrett et al. 1999). In case food aid relaxes foreign exchange constraint, it can lower the price for the imported machinery, pesticides and fertilizers, thus improving agriculture productivity. (Barrett, 1998).

#### *Importance of targeting*

The degree of additionality critically depends on the design and implementation of the program, and especially on proper targeting. Proper targeting must ensure that additional income (food aid) comes to the poorest. Income elasticity falls as one approaches the poverty line from above, thus the additional income received increases food demand to a greater extent, which means smaller gap between supply and demand. (Strauss and Thomas 1995). The contraction increases in case the beneficiaries are far from the poverty line. Effective food aid should come directly to people in need, and only in forms and amounts, which do not replace production or commercial imports. This condition is usually satisfied for

the humanitarian and emergency aid, while program aid, as a rule, violates additionality.

## *Chapter 2*

### DATA

The data for this study was obtained from the United Nations Food and Agriculture Organization (UN FAO). The FAO defines food aid as transfer of food commodities from donor to the recipient countries on total-grant or highly concessional basis.

The research is focused on cereals, which include about 95% of wheat and wheat flour and 5% of maize and sorghum. Cereals constitute over 90% of total food aid flows and thus serve a reasonable proxy for the overall food aid trends. Please, refer to Appendix 7 for a graphic depiction.

The focus of the research is the transition countries of Eastern Europe and New Independent States (EE&NIS), which includes 12 countries: Armenia, Azerbaijan, Belarus, Bosnia Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Moldova Rep, Russian Fed, and Ukraine. The time period is 1992-2000, i.e. 9 time points. In total, the sample is a balanced panel with 108 observations. The overall behaviour of the variables is presented in the Appendix 3. The information on the variables is below.

*Aid* - a transfer of cereals from donor to recipient countries which is made on a total-grant basis or on highly concessional terms, in kilograms per capita.

*Production* – production of cereals in kilograms per capita.

*Commercial Imports* – commercial imports in kilograms per capita. FAO defines imports as all movements into the country of the commodity in question (cereals in this case). Thus, the aid flows were subtracted to obtain commercial imports.

### *Chapter 3*

#### EMPIRICAL MODEL

Among the negative implications of the food aid, the most striking potential problem is probably the violation of the additionality. As has been shown above non-additionality potentially reduces the price incentives for local producers and restricts imports.

Thus, the main hypothesis that I test in my thesis is additionality of food aid. If food aid turns out to be non-additional, the point of interest is the quantitative measure of the production and imports displacement. Further, since agricultural production involves remarkable lags in adjusting to the market and environmental conditions, the dynamic impact of food aid is of interest. Namely, the question is how long lasting is any positive or negative effect of food aid?

Obviously, the model must investigate the relationship between the volumes of food aid, commercial imports and agriculture production in the recipient countries. In my research, I will follow the methodology, used by Barrett et al. (1999). The starting point of my model is the structural equation of the form:

$$(1) \quad AX = BX(L) + e$$

$$E(e) = 0; E(e_t e'_s) = 0 \forall t \neq s; E(ee') = \Omega,$$

where X is the dependent variable vector, comprised of food aid, F, commercial food imports, M, and food production, P. Further, e is the mutually orthogonal

white noise structural innovation vector.  $X(L)$  is a matrix lag polynomial. The system is determined by normalizing diagonal elements of  $A$  to unity.

Essentially, structural equation (1) determines the contemporaneous effect, which is captured by matrix  $A$ , and dynamic effect, captured by matrix  $B$  (recall that  $X(L)$  comprises of the lagged values of variables).

The evident difficulty with the estimation of structural equation (1) is a significant endogeneity problem. Indeed, the variables, namely, commercial imports and domestic production, both depend on food aid, and interact between themselves. This lead to the inconsistent and biased OLS estimators of the equation (1).

Consequently, it is necessary to use the Vector Autoregressive Model (VAR). Sims (1980) observes that in the VAR estimation distinction between endogenous and exogenous variables does not have to be made a priori. Thus, the model does not suffer from endogeneity problems.

To use VAR structural equation (1) must be transformed into reduced form as follows:

$$(2) \quad X = RX(L) + \varepsilon,$$

where  $\text{var}(\varepsilon) = \Sigma$ ,  $R = A^{-1}B$ ,  $\varepsilon = A^{-1}e$  and  $X$  is the dependent variable vector, comprised of food aid,  $F$ , commercial food imports,  $M$  and food production,  $P$ .

More explicitly, (2) can be represented as a system:

$$(3) \quad F_{it} = \mu_{0i} + \mu_1 F_{it-1} + \mu_2 M_{it-1} + \mu_3 P_{it-1}$$

$$M_{it} = \gamma_{0i} + \gamma_1 F_{it-1} + \gamma_2 M_{it-1} + \gamma_3 P_{it-1}$$

$$P_{it} = \lambda_{0i} + \lambda_1 F_{it-1} + \lambda_2 M_{it-1} + \lambda_3 P_{it-1}$$

This represents usual VAR(1). Equations are estimated in levels, since the hypothesis of unit root was rejected (Please, refer to Appendix 8 for test details).

The lag length was chosen to be one. Estimating equations with two lags decreased the number of significant coefficients. Higher lags were not tested in order not to shrink sample too much (Recall that there are only nine time points in the sample). At any rate, the resulting matrix A was found to be robust to the specification of the number of lags in (3).

System (3) is estimated with panel data. Thus, to test whether cross section specific effects were present, the joint null hypothesis of equal intercepts in each of the equations in (3) was tested using a Wald test. The null was rejected at convenient levels of significance (Please, refer for the test statistic to the Appendix 6). After that, fixed versus random effects were tested by the Hausman test. The test shows marginal acceptance of the fixed effect model, which was used. (Please, refer for the test statistic to the Appendix 10).

The contemporaneous effects, captured by matrix A of the structural equation (1) enter the reduced form (2) as an innovation accounting element. Indeed, system specification implies particular relationship between error term vector  $\varepsilon$  in (2) and innovation vector  $e$  from (1), namely  $\varepsilon = A^{-1}e$ . As can be shown later, the use of the innovation accounting eases the construction of the impulse responses function.

In general, matrix A is 3x3 matrix with diagonal elements suppressed to be ones:

$$(*) \quad A = \begin{bmatrix} 1 & \alpha_{12} & \alpha_{13} \\ \alpha_{21} & 1 & \alpha_{23} \\ \alpha_{31} & \alpha_{32} & 1 \end{bmatrix}$$

which corresponds to the innovation model with 6 parameters to be estimated ( $\alpha$ 's). However this is not possible, since there are only three vectors of variables (error terms  $\varepsilon$ ) obtained from (2), i.e. there are more parameters than variables. (Notice, that (2) comprises of three equations, each having food aid, imports or production as left hand side variables. Consequently, there are three error vectors from each equation).

Thus, to identify (2) one must consider a restrictions on the contemporaneous coefficients matrix A. The restrictions can be imposed using the theory of food aid (Barrett, 1999). Namely:

- (1) Food aid is effectively exogenous to imports and production shocks. Because: (a) it delivered with sufficient lag after the requisition (For example, the lags for EU food aid is found to be up to two years (Clay et al., 1996)) and (b) the donors are commonly motivated by available surpluses or political motives not by the situation on the recipient agriculture market.
- (2) Commercial imports respond to both food aid and production shocks.
- (3) Production is affected by food aid, because the deliveries are known ahead. On the contrary, commercial import shocks, as a rule, are unexpected and could not affect production.

Thus, matrix A reduces to the form:

$$(4) \quad A = \begin{bmatrix} 1 & 0 & 0 \\ \alpha_{21} & 1 & \alpha_{23} \\ \alpha_{31} & 0 & 1 \end{bmatrix}.$$

Which correspond to the innovation model:

$$(5) \quad \varepsilon_{Ft} = e_{tFt}$$

$$\varepsilon_{Mt} = \alpha_{21}\varepsilon_{Ft} + e_{Mt} + \alpha_{23}\varepsilon_{Pt}$$

$$\varepsilon_{Pt} = \alpha_{31}\varepsilon_{Ft} + e_{Pt}$$

System (5) is identified and can be estimated. Note, that unknown  $e$ 's are the residuals of the system.

Thus, the estimation procedure was as follows: first, system (3) was estimated using weighted LS. After that, residuals were generated and system (5) was estimated, which allowed calculating the contemporaneous effects.

Dynamic effect is estimated by impulse response function, which can be derived from VAR.

Charemza (1992) shows, that VAR process can be represented as vector moving-average representation (VMA). For our model the VMA representation is:

$$(6) \quad X = \sum_{i=0}^{\infty} R^i \varepsilon$$

This could be used to evaluate the time path of responses to a single unitary shock. Indeed, the variation in  $\varepsilon$  is equivalent to the variation in the dependent

variable. Thus, letting one  $\varepsilon$  be unity and others zero, one can explore the response to the unitary shock in the variable. Equation (6) could have been used for this purpose if not for the unfortunate fact that  $\varepsilon$ 's are correlated among equations. Thus, changing one  $\varepsilon$  would alter other two and the estimation would yield systematically misleading. The problem is resolved by orthogonalisation of the  $\varepsilon$ 's.

The model provides easy tool to do this. Indeed, the  $e$ 's, innovation vectors in (1) are orthogonal and are linked to  $\varepsilon$  by the relationship  $\varepsilon = A^{-1}e$  which correspond to the innovation model (5). Thus, unitary shock to  $e$  has no effect on other  $e$ 's, since they are mutually orthogonal. In this case, the impulse response could be traced from the relationship:

$$(7) X = \sum_{i=0}^{\infty} R^i A^{-1} e$$

Each element of the sum in (7) corresponds to the impulse response of the variable to the shock, imposed in  $t-i$  period. The plot of the impulse responses is given in the next chapter, and numerical values are in the Appendix 6).

Chapter 4

ESTIMATION RESULTS

*Contemporaneous effects*

The contemporaneous effects are found from the innovation model 5. They are summarized in the Table below (standard errors are given in the parenthesis, \* denotes significance at 5% level):

Table 1. Contemporaneous effects

Regressors \ Dependent vars	Food Aid	Commercial Imports	Production
Food Aid	1	0	0
Commercial Imports	-0.694* (0.136)	1	-0.0037 (0.0037)
Production	-0.200* (0.096)	0	1

The results show significant negative impact of the aid variable on the commercial imports. This implies that food aid displaces almost 70% of the commercial imports, thus dramatically violating additionality. This result is in the range, found in other studies, i.e. 40-70%. Negative correlation (although

insignificant) between imports and production shows that contemporaneous production also decreases commercial imports.

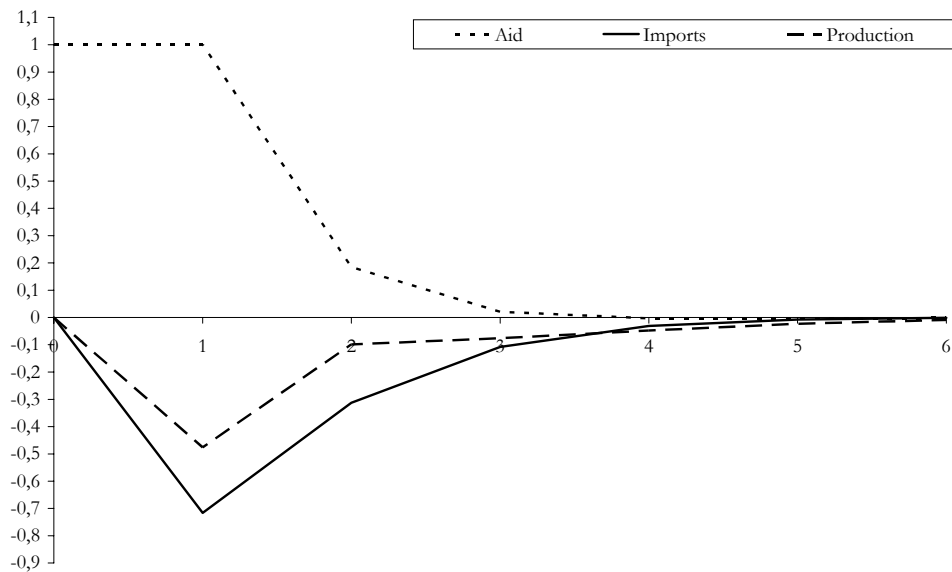
Further, food aid negatively affects production – the model predicts 20% displacement of production by food aid.

Thus, with the violation of the additionality, food aid rather restricts usual supply (in this case both imports and production), but not increase consumption. The finding can be explained when regarding the demand side. Assume the country receives 1kg per capita food aid. The empirical finding suggests that consumer decreases her consumption of imported food by 0.7kg, and consumption of domestic production by 0.2kg. Thus, the net increase in consumption is  $1.0 - 0.7 - 0.2 = 0.1$ kg. This point emphasizes the importance in determination of target and volume of the food aid. Assuming that the poor have less elastic demand food, food aid could be expected to be less dramatically non-additional.

The discussion above regards food aid is in-kind payment. Recall, however, that program food aid constitutes large (around 60%) share of total flows and that this type is sold by the government on domestic market to raise counterpart funds. Thus more realistic assumption is that consumers receive transfer payment from the government. In this case the targeting problem becomes the question of the distribution of those transfers.

*Impulse response analysis*

Figure 3. Impulse responses function to the 1 kg per capita shock in food aid



The dynamics of the food aid impact on imports and production is traced with the help of the impulse response function. Assume 1 kg per capita shock in the food aid in the 0 period. This correspond to the innovation vector  $e'=(1,0,0)$ . Plugging it into (7) allow to extract impulse responses of variables to this shock.

The results (Figure 3) show that food aid has significant adverse effect in the short run, displacing both production and commercial imports. The negative effect only dies out at around 6<sup>th</sup> year. Contrary to the finding of Barrett et al. (1999), J-curve effect is not observable in case of the EE and FSU region. The main reason may be the difference in the sample countries. The sample Barrett at al.'s research consisted of least developed countries, where large share of the population is significantly undernourished and some may be starving. Thus,

significant share of food aid comes to the poorest, increasing the degree of the additionality. Further, for the less developed countries the positive effect of the improved nutrition of the labour force, which in its turn results in higher labour productivity, in particular in the agriculture sector, is more pronounced than in the EE&NIS region. On the contrary, in the EE&NIS countries the situation with respect to food security is considerably better, and chances to reach those in need are lower (by the simple argument that the share of those in need is not so significant as in the less-developed countries).

Thus, the empirical investigation suggests violation of additionality of food aid coming to the region of interest. Contemporaneous analysis suggests that negative effect persists over next 6 years.

## *Chapter 5*

### POLICY IMPLICATIONS

The above discussion suggests that food aid has at least ambiguous (if not negative) impact on the agriculture development in the recipient countries. The main point of concern is the design of the food aid, i.e. commodity structure, project tying, degree of monetization, targeting, timing, evaluation.

Generally, by improving the design of the food aid, it is possible to lower, if not eliminate possible negative effects. The most often referred point when discussing the design of the food assistance is targeting. Indeed, as has been discussed earlier, the degree of additionality critically depends on the income elasticity of demand. Thus, the poorer is the recipient, the less elastic demand she has, and the lesser she substitutes her usual demand (coming from production and imports). In this case, the pressure on prices is lower, and corresponding disincentive effect for producers is lower.

The next issue arises around the proper use of counterpart funds, generated by food aid sale. They can promote agriculture development in case that they are used for the investment into the corresponding projects. The issue here is the feedback and control system, which must ensure transparent distribution of the counterpart funds. Nowadays, with the project aid substituting program aid, the feedback issue is more apparent.

Not only does food aid provide disincentives for producers, but for the governments as well. As in the case of each type of aid, food aid can impose moral hazard problem. Indeed, governments can rely on food aid and disregard

necessary agriculture reforms. This argument is closely connected with food aid dependence issue. Srinivisan (1989) points out that government can develop strategy that relies on continuous inflow of food aid, thus creating adverse shock to the resource allocation, since additional costs of adjustment are incurred in case of unanticipated changes in the food aid flows.

The disincentive effect to the producers could be diminished by appropriate counterstrategy, aimed to keep price from falling (Srinivisan, 1989). This can take the form of production subsidy (to increase incentives for the producers) or food consumption subsidy, allowing the consumers to absorb additional food supply, coming from food aid. Thus, the disincentive effect could be mitigated.

Further, a worthwhile policy for donors is to use "local purchases" (i.e. purchasing food in one part of a developing country for supply to a deficit area in the same country). In this case, the downward pressure on the local prices is eliminated.

To conclude, it is evident that policy and control measures by both donor and recipient government needed to decrease the negative effects of the food aid.

## CONCLUSION

The overall effect of food aid is an ambiguous, yet not fully investigated issue. This research attempts to create a background for the exploration of the food aid effects on the agriculture development in the transition economies of the Eastern Europe and New Independent States.

Among the variety of the effects of food aid this research focuses on the issues of additionality, i.e. it tests whether food aid displaces usual supply (commercial – import and production) and to what extent.

The importance of this concept is obvious, when regarding the demand-supply analysis in the recipient country. Food aid can be regarded as an income transfer. However, food has demand elasticity of less than one. This implies, that when additional income is received, both as an in kind payment or monetary transfer, the resulting increase in food demand is of a lesser magnitude. Thus, when food aid increases supply, it is accompanied by smaller increase in demand. Analytically Srinivisan (1989) shows that this leads to displacement in both imports and production. This leads in its turn to lower agriculture prices and create disincentives for local producers and destroys existing distributional channels.

Moreover, at least officially FAO had adopted a UMR – usual marketing requirements – requirement of the food aid receiver to maintain the usual level of imports and production. This shows an increasing emphasis on the importance of the additionality principle.

The research focuses on the issues of additionality and tests the hypothesis empirically. Specifically, it investigates the relationship between food aid, commercial imports and production. Following Barrett (1999) the VAR model with innovation accounting is used to resolve the problem of endogeneity.

The model allows an analysis of contemporaneous and the dynamic relationships between aid, production and imports. Contemporaneous effects are extracted from the innovation model. In line with common findings, food aid is found to violate additionality principle. Namely, 1 kg per capita of food aid displaces almost 0.7 kg of imports and 0.2 kg of production. The magnitude of displacement is in line with the findings of the other authors.

It appears very likely that the main source of additionality violation is poor targeting. Indeed, the poor have less elastic demand, and would not contract their demand to such extent as a result of income transfer (i.e. food aid).

The dynamic effect is captured by the impulse response function. Following a unitary shock in the food aid, both imports and production fall. The negative effect dies out at around 6<sup>th</sup> year after the shock.

The main limitation of the study is the limited number of lags included into the dynamic specification. This is mainly a result of limited data, since the region became food aid recipient only in 90's.

This research provides an overview of the theory pertaining to producer and importers incentives that lead to the violation of additionality and empirically tests the additionality hypothesis. Possible direction for further research is to establish a direct econometric link between prices (i.e. price-incentives) and food aid inflows. This will allow a more complete investigation of the producer disincentives arising from food aid. Furthermore, Russia is an interesting object

for case study, since it was one of the largest receivers of the food aid globally in 90's and seems to suffer pronounced price effect.

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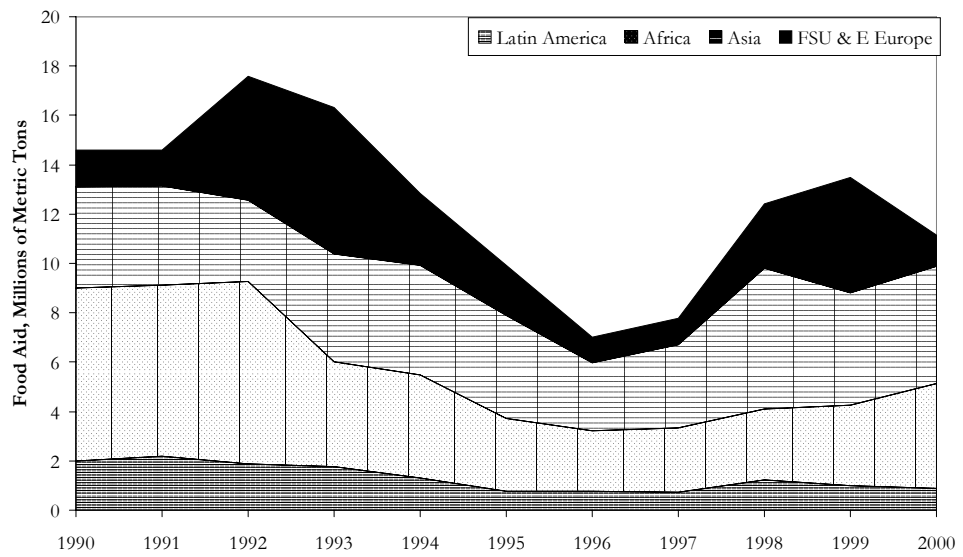
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Appendix 1

FOOD AID FLOWS BY RECIPIENT REGION

Figure 4. Food Aid Flows by Recipient Region

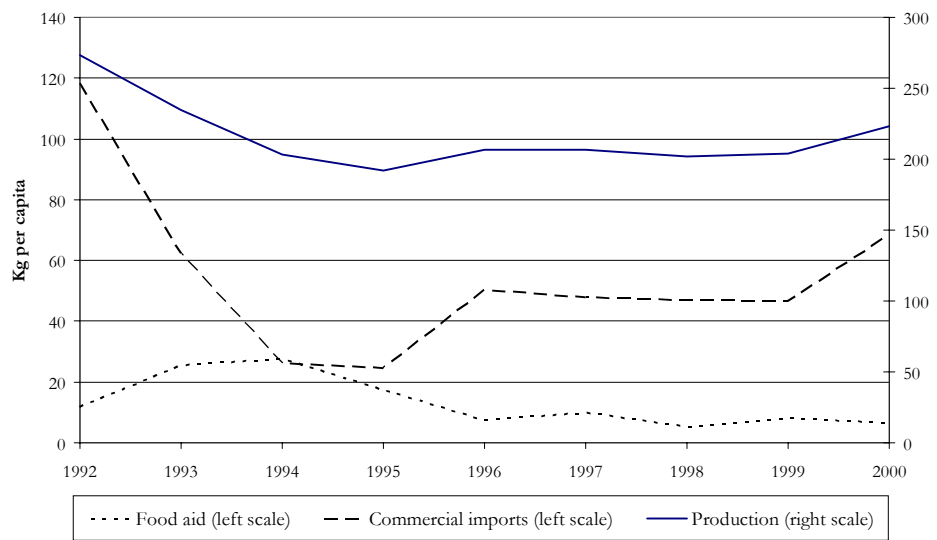


Source: UN FAO

Appendix 2

DATA BEHAVIOUR

Figure 5. Food Aid Flows, Food Production and Commercial Food Imports



Source: UN FAO.

Note: Values shown are annual country means. For countries list, please refer to Data section.

*Appendix 3*

DESCRIPTIVE STATISTICS FOR FOOD AID

Table 2. Descriptive Statistics for Food Aid

<b>Descriptive statistics, kg per capita</b>		
	Mean	Standard Deviation
<b>Armenia</b>	42.01179	32.82647
<b>Azerbaijan Republic of</b>	11.98134	17.59825
<b>Belarus</b>	4.651322	8.348269
<b>Bosnia and Herzegovina</b>	10.49418	10.41719
<b>Bulgaria</b>	2.394561	5.957884
<b>Croatia</b>	1.310953	2.160364
<b>Georgia</b>	46.49785	37.51635
<b>Kazakhstan</b>	0.452789	1.177817
<b>Kyrgyzstan</b>	16.54445	10.83242
<b>Moldova Republic of</b>	16.1177	15.97144
<b>Russian Federation</b>	6.449399	7.394202
<b>Ukraine</b>	0.763691	1.487519

*A p p e n d i x 4*

EXCERPT FROM URAA

Excerpt from

The Uruguay Round Agreements on Agriculture

Article 10

*Prevention of Circumvention of Export Subsidy Commitments*

<...>

4. Members donors of international food aid shall ensure:

(a) that the provision of international food aid is not tied directly or indirectly to commercial exports of agricultural products to recipient countries;

(b) that international food aid transactions, including bilateral food aid which is monetized, shall be carried out in accordance with the FAO "Principles of Surplus Disposal and Consultative Obligations", including, where appropriate, the system of Usual Marketing Requirements (UMRs); and

(c) that such aid shall be provided to the extent possible in fully grant form or on terms no less concessional than those provided for in Article IV of the Food Aid Convention 1986.

*Appendix 5*

IMPULSE RESPONSE FUNCTION VALUES

Table 3. Impulse Response Function Values

Variables Periods	Aid	Imports	Production
0	1	0	0
1	1	-0.716471	-0.47636
2	0.184559	-0.31272604	-0.09862
3	0.020906	-0.1074745	-0.07611
4	-0.002871	-0.0310273	-0.04762
5	-0.002932	-0.00744009	-0.02265
6	-0.001232	-0.00132257	-0.00892
7	-0.000386	-6.6653E-05	-0.00304
8	-9.57E-05	7.9454E-05	-0.00091
9	-1.67E-05	4.8861E-05	-0.00024
10	-3.37E-07	1.9517E-05	-5.1E-05
11	1.35E-06	6.2969E-06	-7.6E-06
12	7.81E-07	1.7029E-06	2.64E-07

*Notes: Unit shock to food aid (1 kg per capita) is given in the zero period. Note also that imports response becomes positive at 8<sup>th</sup> year, and production at 12<sup>th</sup>. Please, refer for further discussion to the main text.*

*A p p e n d i x 6*

WALD TEST

$$F_{it} = \mu_{0i} + \mu_2 F_{it-1} + \mu_3 M_{it-1} + \mu_4 P_{it-1}$$

$$M_{it} = \gamma_{0i} + \gamma_1 F_{it-1} + \gamma_2 M_{it-1} + \gamma_3 P_{it-1}$$

$$P_{it} = \lambda_{0i} + \lambda_1 F_{it-1} + \lambda_2 M_{it-1} + \lambda_3 P_{it-1}$$

Null:  $\mu_{0i} = \mu_{0,12}$  and  $\gamma_{0i} = \gamma_{0,12}$  and  $\lambda_{0i} = \lambda_{0,12}$  for  $i=1, 11$

i.e. common intercept in each of the equations of the system.

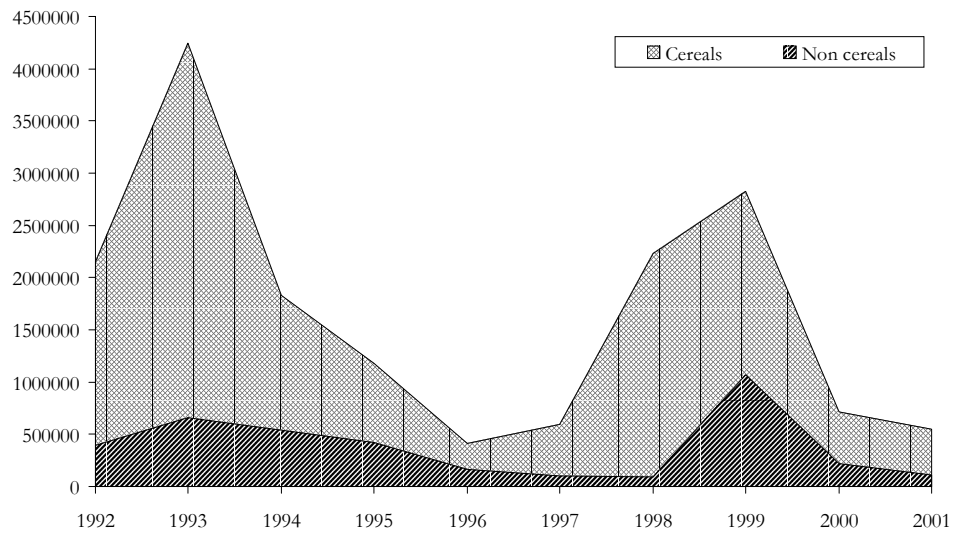
Test statistic:

Chi-square	144.5211	Probability	0.000000
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The null of common intercepts is rejected.

### COMPOSITION OF FOOD AID FLOWS

Figure 6. Composition of Food Aid Flows



Source: UN FAO.

Note: The recipients are 12 countries of the research sample; please refer to chapter 3 for a full list.

## UNIT ROOT TEST

The test is essentially the Levin and Lin test for stationarity in the panel data.

The LL model is given by:

$$\Delta y_{it} = \mu_i + \beta y_{i,t-1} + \sum_{k=1}^p \phi_k \Delta y_{i,t-k} + \gamma t + \varepsilon_{it}, \quad i=1,N; \quad t=1,T.$$

LL test assumes individual specific intercepts but common AR terms.

The null and alternative are given by:

$H_0 : \beta=0$ ,  $H_1 : \beta < 0$ , where  $H_0$  is equivalent to the hypothesis of the presence of the unit root.

The LL statistic is a usual  $t$ -statistic:

$$t_{\beta} = \frac{\hat{\beta}}{\hat{\sigma}_{\hat{\beta}}}.$$

The LL propose the following transformation of the  $t$ -statistic which is asymptotically normally distributed as  $N$  and  $T \rightarrow \infty$ :

$$LL_1 = \sqrt{1.25} t_{\beta} + \sqrt{1.875} N \Rightarrow N(0,1)$$

The following results were obtained:

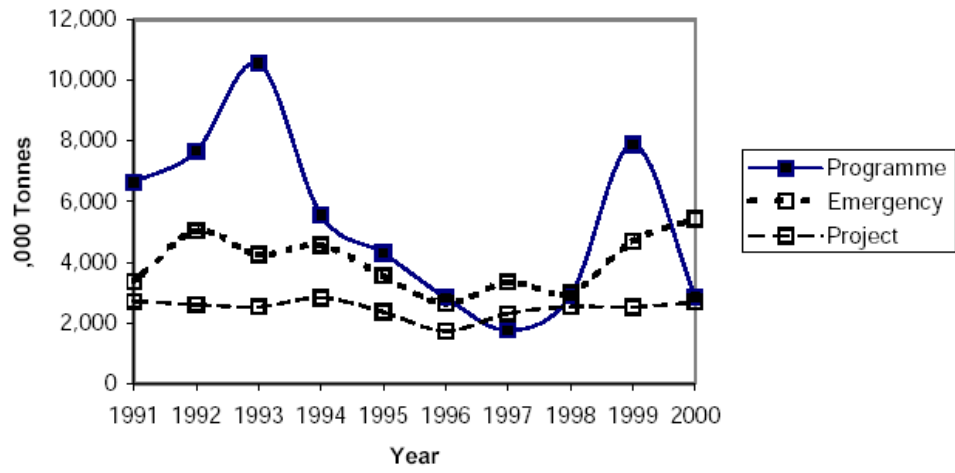
Table 4. Levin-Lin Test Statistics

Variable	Aid	$t_{\beta}$	-5.93079	10% Critical Value	-1.28155
		LL Test Statistic	-1.88741	5% Critical Value	-1.64485
	Imports	$t_{\beta}$	-10.4368	1% Critical Value	-2.32635
		LL Test Statistic	-6.9253		
	Production	$t_{\beta}$	-8.32116		
		LL Test Statistic	-4.55992		

Thus,  $H_0$  of unit root can be rejected at convenient levels of significance in all series.

TYPES OF FOOD AID

Figure 7. Types of Food Aid



Source: WFP, "The Food Aid Monitor – 2000 Food Aid Flows, May 2001"

Adopted from Stuart Clark (2002)

*Appendix 10*

HAUSMAN TEST

$H_0$ : random effects

Table 5. Hausman Test Statistics

Variable	Test statistic	P-value
Food Aid	4.8805224	0.0871381
Commercial Imports	44.12066	2.63E-10
Production	4.8809035	0.0871215

The  $H_0$  of random effects can be rejected at 10% level of significance.