World Wheat Market Instability: An Analysis of EC Price Insulation Effects

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Abstract: Supply variability (due to natural phenomena) and (to a lesser extent) demand variability are the natural causes of market price instability. Standard theory suggests that a country employing a fixed price policy through tariffs and subsidies rather than through buffer stocks will export its domestic price instability to the foreign market. An example is the European Community's (EC) variable levy system, which raises and stabilizes prices in the EC. A stochastic simulation with an econometric model of world wheat markets was used to evaluate the impact of the EC policy on the world price level and stability. In comparison with current policies, the estimated impact of border pricing by the EC was to raise the world market price by 13 percent and reduce its standard deviation by 2.3 percent. The stabilizing effect on prices is smaller than the theory suggests, because EC production variability increases as a result of greater price uncertainty. Theoretical models usually assume supply price certainty with and without the price policy; but, under border pricing, production responds in an adaptive expectations framework. As a consequence, the effects of a price insulation policy on price stability are reduced.

Introduction

Commodity market stabilization has received a great deal of attention in the literature since the first theoretical analysis of market stabilization developed by Waugh (1944). The sources of market instability can be categorized as either trend factors or unpredictable shift factors. Growth in income, technological improvements, or changes in consumer tastes result in gradual shifts in demand and supply, while variations in climate, diseases, pest outbreaks, and (in some countries) input availability lead to sudden supply shifts. The instability resulting from the latter group of shift factors is of major concern to policy makers because of its unpredictable nature. Hence, economic analysis in this area has concentrated on the impacts of instability resulting from these stochastic factors.

In a world of open economies, instability from the above factors can be compounded or moderated through trade. The effects of trade on international market stability are best illustrated by the events that occurred during 1972-74 in the world grain market. Prior to 1972, the world grain market was characterized by large surplus reserves in the major exporting countries, mainly the USA, Canada, and (later) Australia. The USSR and China had little participation in the market. During 1972-74, production shortfalls due to droughts in the USSR, Asia, and the Sahel increased the volume of world grain trade. Import demand from the USSR in particular rose sharply because of its desire to meet production shortfalls as well as build stocks. The enlarged export market depleted reserves in the USA and Canada. Prices increased sharply, and concessional exports to developing countries were virtually eliminated. In addition to the natural factors, OPEC oil price increases and devaluations of the Canadian and US dollars boosted grain prices even further. These events of the 1972-74 period resulted in an awakening of governments to a need to protect their internal markets from shortages as well as from severe internal price variations.

Johnson (1975) recognized that one country can achieve market stability at the expense of more instability in the rest of the world. One reason he cites for the difference in price behaviour between the 1960s and 1970s is that, in the latter period, a larger percentage of the world grain production and consumption occurred under policies designed to achieve internal price stability through the control of imports and exports. For example, the USSR had the same basic policy in 1960 and 1972 in terms of fixing both consumer and producer prices. However, in 1972, greater attempts were made at making the fixed prices effective in the sense of equating supply and demand. The shortfall in supply in that year had to be compensated for through trade. Johnson further notes that, although world prices were more stable in the 1960s than in the 1970s, aggregate world production in the latter period was actually more stable.

Since Johnson's paper, the literature has included several analyses of the impacts of individual country policies on the stability of other markets (e.g., Bale and Lutz, 1979; and Zwart and Meilke, 1979). Although supply variability (due largely to fluctuations in output caused by natural phenomena) and demand variability may be the initial causes of market instability, they may not be the only causes in an interrelated world.

In most grain producing regions, the major objectives of farm policies are to stabilize and support farm income. These objectives have been the principal motivation for the development of current domestic policies of the major participants in the international grain market; i.e., the USA, Canada, Australia, and the European Community (EC). The effects of high domestic price supports are an

increase in production and a decrease in consumption. Trade linkages with the international market provide a means of disposing of any resulting surpluses. Furthermore, variability in production, given fixed internal prices, implies a greater variability in export supplies and import demands and, therefore, a destabilization of world markets. Policies that insulate domestic prices from the unstable world market, such as the EC's variable levy policy, reduce the elasticity of world excess demand, hence increasing the impacts on price variability of supply and demand shocks. Policy-induced market instability is thus a potential problem for the international community.

Method

The objective of this study is to determine how the variability in the world wheat market is affected by price insulation policies in the EC. Market instability is defined as the uncertainty about price for a given year. This objective is achieved through stochastic simulations of an econometric model. Stochastic terms are generated using the distributional properties of the residuals of production or yield trend equations. Zero correlation of residuals across regions is assumed. Twenty simulations are performed for each alternative and the base model.

The wheat trade model specified for this purpose includes 16 regions, 5 net exporting and 11 net importing. The model is nonspatial and represents only a partial equilibrium because it involves trade in wheat alone. It is a nonlinear system of demand and supply behavioural equations and market clearing identities and is estimated by two-stage least squares, using annual data for the 1966-80 period. Because of the small number of observations relative to the number of exogenous variables in the model, 10 principal components of the exogenous variables are used for the first-stage estimation.

Internal supply and demand equations are estimated for the USA, Canada, Australia, India, and the EC. Stock equations are also specified for the USA, Canada, and Australia. Only an area equation is estimated for "other Western Europe" as a region, while demand equations are estimated for all other regions. Estimates of the behavioural parameters are reasonable in general. Demand equations for the USSR, China, and Eastern Europe do not contain price variables because of lack of price information. In those regions, demand is a function of production and income.

Alternative Policy Simulations

An alternative EC policy is simulated and compared with the base simulation, the latter representing the current wheat market structure. The alternative allows for border pricing and perfect price transmission into the EC.

The simulation, which involves lowering the EC price level while making it more responsive to world price changes, is expected to affect price and quantity levels as well as their stability. The new EC price level is the Rotterdam price, which assumes zero levies or export restitutions and results in a 56 percent reduction in EC prices and a 150 percent increase in the variability of annual expected prices. Results of this simulation are presented in Table 1. EC production falls by an average of 22 percent, corresponding to the yield price elasticity of 0.4. Within-year average production variability is higher than the base simulation, which increases the variability in net trade, therefore offsetting gains in stability of US net exports, and therefore world price.

US net export demand increases by an average of 10.3 Mt because of a shift of the EC from a net export to a net import position. To account for differences in levels between the base and alternative models, the coefficient of variation (C.V.)—the ratio of average standard deviation to average means—is used as the measure of variability. By this measure, US net trade instability is lower in all years under the border pricing option.

The US Gulf Port price level increases by an average of 13 percent as a result of the higher net export demand. The standard deviation (S.D.) of the US price declines by an average of 2.3 percent. The C.V. is 13 percent lower on average than the base simulation price variability, largely the result of a higher mean price. The world price in this scenario would be more stable without the offsetting effects of increased production instability introduced because of increased price uncertainty in the EC. Production responds to a lagged price while consumption adjusts to current price. Theoretically, the stabilizing effects of adjustments in consumption and production, where production responds to a lagged price, depend on relative elasticities of supply and demand. In this analysis, the adjustments to uncertain prices increase the variability in the net exports and hence the world price.

Table 1—Current Policy (CP) Versus Border Pricing (BP)

Year	CP Mean	CP S.D.	CP C.V.	BP Mean	BP S.D.	BP C.V.
			--- EC price (1975 ECU) ---			
1975	247.0	0	0	137.1	1.5	1.1
1976	243.5	0	0	75.6	9.2	12.1
1977	236.3	0	0	125.7	10.7	8.5
1978	228.1	0	0	106.7	6.8	6.4
1979	224.8	0	0	109.1	8.4	7.7
1980	224.2	0	0	70.4	7.8	11.0
			--- EC production (Mt) ---			
1975	41.6	1.6	3.9	34.0	1.6	4.7
1976	42.8	1.7	4.0	30.7	1.9	6.2
1977	38.9	1.6	4.1	31.2	1.8	5.6
1978	43.7	1.5	3.4	34.1	1.6	4.7
1979	46.2	2.0	4.3	36.9	2.0	5.4
1980	52.2	1.4	2.8	38.8	1.6	4.0
			--- EC food demand (kg per capita) ---			
1975	109.1	0	0	108.7	0.1	0.7
1976	109.0	0	0	113.4	0.9	0.8
1977	108.5	0	0	109.5	0.6	0.6
1978	108.1	0	0	110.0	0.5	0.4
1979	108.4	0	0	109.3	0.6	0.5
1980	108.8	0	0	112.5	0.8	0.7
			--- EC net exports (Mt) ---			
1975	5.6	1.6	28.9	-0.9	1.6	-173.3
1976	2.2	1.7	77.7	-19.1	2.8	-14.8
1977	0.3	1.6	584.1	-10.1	2.8	-27.6
1978	0.4	1.5	400.0	-13.8	2.2	-15.9
1979	6.5	2.0	30.6	-5.1	2.5	-49.1
1980	9.9	1.4	14.6	-10.4	2.3	-22.5
			--- US net exports (Mt) ---			
1975	6.2	5.2	83.0	11.2	5.0	44.2
1976	37.3	7.6	20.4	52.9	7.7	14.5
1977	30.8	5.8	18.9	36.3	6.5	17.8
1978	48.0	5.9	12.4	58.6	6.3	10.7
1979	23.9	5.6	23.5	32.7	6.0	18.3
1980	45.4	7.3	16.0	61.3	7.6	12.5
			--- US Gulf Port price (1975 $) ---			
1975	90.9	15.6	17.2	104.1	15.0	14.5
1976	130.2	20.4	15.6	172.5	20.1	11.6
1977	128.4	14.6	11.4	141.1	14.5	10.3
1978	156.0	17.6	11.3	163.2	18.1	11.1
1979	98.0	19.5	19.9	100.8	18.1	18.0
1980	135.4	15.3	11.3	153.3	14.8	9.4

Conclusions

The high price variable levy policy for grains in the EC encourages more production in the region and lower world price levels. Removal of the levy raises prices and lowers price uncertainty in the external market. These effects are desirable to net exporting regions but may not be to nonproducing importing regions if the latter consider lower price levels more important than reduced price uncertainty. For net importers who also produce wheat, higher world prices are likely to increase their internal production if their internal prices are not insulated.

The theoretical results on the destabilizing effects of price insulation policies suggest larger stability consequences than we have found because the theoretical models assume supply price certainty with and without the price policy. Border pricing increases production instability and somewhat offsets the world market stabilizing effects of the open market policy.

Note

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Discussion Opening – *J.F. Sneessens*

Thomas' paper opportunely reminds us of the complexity and severity of the problem of debtor countries. However, the "Conclusions" section immediately follows the "Methodology" section, so that we miss any information about the results of the study. Also, what are some practical incidences of country debt crises for agricultural markets? Countries facing debt crises will have to export—at any price if necessary—to meet their debt-service obligations. By force of circumstances, these countries will show less sensitivity to the world price level. This means in practice that to make any international commodity agreement with strict economic obligations for them (such as export limitations or stockpiling) will be very difficult or illusory.

In Jesdapipat's paper, why does Japan choose the particular instrument of an import quota to protect its own beef production? This kind of instrument is prohibited by GATT Article 11, which prescribes the overall abolition of quantitative restrictions. (As we know, the USA enjoys a particular treatment in this respect, thanks to a waiver obtained in the 1950s.) The beef import quota is viewed as partly determined by the per capita beef consumption in Japan. Would the opposite not be true (import quota as an exogenous variable determining individual consumption)? Jesdapipat states: "The maize-fed beef from the USA could replace some imports from Oceania due to the import restriction." Is this due to the management of the import quota by the Japanese authorities? Are the conclusions drawn from the results not stronger than the results permit? In particular, I am not sure that one may infer from the study that the "...protectionist beef import policy alone only makes Japan *more vulnerable* . . ." [emphasis added].

In Mahama and Meyers' paper, to what extent can a specific price-insulating policy contribute to increasing the turbulence of the world economy? The phenomenon of increasing instability of the world market after the 1960s is due to several factors, but the *monetary instability* should not be forgotten. How can we expect stable world prices if the measuring standard (i.e., the currency) becomes largely fluctuating? Also, the world market corresponds to a residual market handling only national surpluses and deficits, which results from both the existence of nations and the special importance of agricultural commodities to them. According to what principle should it be possible to deny a nation the right to isolate its agriculture from such an erratic world market? And what gives a nation the right to destabilize this market by expelling surpluses on it in an irresponsible manner? Does the world market define universal price criteria that have to be applied by particular countries?

Mahama and Meyers' study undoubtedly observes the effect under certain conditions of one particular instrument (i.e., the variable levy) utilized by the EC, but in no way does the study measure the effect of the global policy applied by the EC in regards to the world market; i.e., the EC utilizes other policy instruments (like export limitations and stockpiling) and utilizes the variable levy under well-defined conditions, neither of which facts are not taken into account by Mahama and Meyers. Also, the variable levy has two different aspects: import levies and export restitutions. Contrary to the initial plan, no symmetry exists between the two. Import levies are mechanically determined and systematically imposed, so that the European market becomes perfectly isolated from external instabilities. But export restitutions are neither mechanically determined nor systematically accorded, so that internal fluctuations are not automatically transferred to the world market.

Discussion Opening – *Secondo Tarditi*

Thomas' analysis is theoretical and does not make specific reference to the agricultural sector. In some LDCs, nevertheless, agriculture is directly generating debt crises due to the extreme specialization of agricultural exports and to fluctuations of agricultural export earnings. Some reference to the agricultural factors underlying country debt crises would have been very useful in comparing the outcomes of this paper with other results presented in this conference. In the conclusions, reference is made to results of an empirical analysis of several debtor countries carried out with the described methodology of creditworthiness evaluation. Unfortunately, not a single figure has been given concerning this empirical analysis, reducing the "social utility" of the paper.

Jesdapipat presents an econometric model of the demand relationships of beef, maize, and sorghum imports into Japan by source of supply. The results of this model are used by the author to outline broad trade policy implications concerning both a more liberal trade policy and the establishment of a domestic livestock industry. However, the described import demand analysis does not seem to offer sufficient evidence of the complex interrelationships originating from the

international trade flow of beef, maize, and sorghum, which are equally determined by the supply side. A spatial price equilibrium model would be more useful in providing empirical evidence on the effects of Japan's protectionist policy.

Mahama and Meyers' assumption of zero correlation of residuals across regions could somewhat reduce the overall effects of production instability. Transfer costs are not included in the model. Would their inclusion increase the price variability in each country? Since the objective of the model is the analysis of the EC price insulation policy, the partial equilibrium nature of the model may severely limit the validity of the results. The interrelationships not only among feed grains but also among cereal substitutes (such as cassava, maize gluten feed, and citrus pulp) have become quite relevant in recent years, but are not included in the model. Their inclusion would probably lead to a greater reduction of the wheat price in the EC (due to border pricing) and to higher instability.

The most relevant common feature of the three papers is the objective of evaluating the effects on the economic growth of LDCs of some protectionist policies implemented in developed countries. Price support policies acting as tariffs or quotas on imports (as in the case of beef trade in Japan) or as export restitutions (as in the case of the EC wheat trade) insulate the protected market and distort international trade through lower world price levels and higher world price instability. Such policies reduce the elasticity of world excess demand, creating policy-induced price variability. According to Thomas' financial analysis, this price instability is just another factor that contributes to the destabilization of net foreign exchange earnings of LDCs, worsening their creditworthiness, reducing potential foreign capital inflow, and lowering their rate of economic growth.

While lower average agricultural prices in the world market have a negative effect on exporting LDCs, under specific conditions such prices could have a positive effect on importing LDCs, at least in the short run. The negative implication of destabilizing world agricultural markets seem to involve all LDCs without exception. In order fully to evaluate the effects of price support policies practiced in developed countries, this negative effect of LDCs' economic growth should be added to the various social costs generated both in developing and developed countries. Social costs are not limited to classical allocative costs, as is often assumed in our profession. Social costs also include net public expenditures both in surplus disposal and in the administrative implementation of supply control policies. Moreover, price support policies worsen the interpersonal distribution of income in developed countries, in contrast to fiscal and social policies aimed at a reduction of income disparities. A more detailed analysis of these social costs is needed better to exploit the theory of welfare economics and all other methodological tools that could allow a better analysis and evaluation of sector policies.

General Discussion – *Shahla Shapouri*, Rapporteur

The participants who commented on Thomas' paper generally agreed with his conclusions, but questions were raised on the possible exclusion of relatively important variables influencing growth in developing countries; e.g., whether agricultural growth or general economic growth has been more responsive to trade policies and exchange rates. Uncertainties about the international economic conditions may have affected growth in developing countries. More research on policy choices facing developing countries was recommended. Are import quotas by developed countries always detrimental to developing countries? The US sugar quota being associated with higher prices was cited as an example.

The comments on Jesdapipat's paper were directed to the specification of the model. Specific concern included the endogenization of the import quota as a function of per capita consumption and whether adequate recognition had been given to the direction of the causal relationship. The quality-related price differential related to the supply side and to competition between beef and substitute meats in Japan's meat market were stated to be important aspects of Japan's market.

Mahama and Meyers were asked about the differential effect of variable levies and export restitutions on EC wheat prices. Different opinions were expressed on the relative importance of these two aspects of the EC's agricultural policies. Does the methodology employed adequately recognize substitution between wheat and coarse grains? The effect of the Common Agricultural Policy on world price instability depends on price expectations and the behaviour of buying and selling agencies as well as the mechanism treated in the paper.

Participants in the discussion included R. Bohall, K.Y. Fosu, R. Kada, G. Meester, L. Moore, J. Viaene, and H. von Witzke.