



**MARKETS, STABILISATION AND
STRUCTURAL ADJUSTMENT IN
EASTERN EUROPEAN AGRICULTURE**

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ABSTRACT

This paper is a reflection on the problems posed by the structural transformation of Eastern European economies. It asks: how can the transformation to a market economy be reconciled with a desire for a stable economic environment? The proposed paradigm is that of multi-market, disequilibrium adjustment. It evaluates trade tools, public stabilisation on domestic markets, and private risk contracts.

In principle, by stabilising border prices variable levies can establish bounds for the fluctuations of domestic prices. However, variable levies are not generally desirable in the current Eastern European context because: (i) the implied distortions may be small in any individual market but could have a large cumulative effect in the convergence to the new equilibrium, (ii) these schemes allocate resources by collective negotiations which can easily be captured by incumbent state enterprises, and (iii) they are unlikely to stabilise domestic prices effectively. Public sector, domestic stabilisation is seen to work principally through the medium of public storage which is a replacement for private storage. Two justifications for such schemes are relevant to Eastern Europe: dislocations of the credit markets and high private risk aversion. However, these schemes are flawed because collective management appears to tend to result in a mean bias and because public sector schemes are likely to be poor forecasters and poor storage cost minimisers. Finally, market tools, in particular forward contracts, are shown to avoid the problems of impeding the process of transformation in the direction of a new competitive equilibrium. The principal reservation is whether they can develop fast enough.

We evaluate the early efforts to create market-based tools for use by the grain sectors of Hungary and Poland. The Hungarian Agricultural Commodities Exchange opened in 1990 and is modeled on the grain futures market in Chicago. The result has been significant commercially but nevertheless is currently very small compared to the size of the sector. In Poland, the initiative has come from a government agency which in its efforts to promote stability has started to purchase grain on a deferred basis and bought about 10% of the commercialised harvest in 1990 only five months after coming into existence. This hybrid institution has the potential for developing into the market maker that would allow liquid forward trading in Poland. However, it is vulnerable in that its contracts can be administered as premium-free put options which are effectively state-guaranteed minimum prices.

Markets, Stabilisation and Structural Adjustment in Eastern European Agriculture¹

1. INTRODUCTION

In this paper we consider issues arising in the development of a market economy in Eastern Europe with particular reference to agriculture. This is intended as a conceptual paper to bring forward ideas that we view as crucial to the problem rather than as an exhaustive review of the current situation or indeed as predictions of patterns of future development. However, we will have occasion to make some particular references to developments in Poland and Hungary.

The basic question addressed by our paper is, to what extent is it possible to achieve the transformation from a planned economy to a market economy while satisfying a desire for a stable economic environment? We must start by recognising that, as is frequently stated, currently there are huge uncertainties for Eastern Europe. These uncertainties stem from both potential changes in the economic environment and also in the institutional environment.

Many of these uncertainties are, to a large extent, exogenous to the economic agents under consideration. For instance the USSR is the major trading partner of all of the countries in the region. Whether the USSR remains as a single entity, whether it will remain an important importer of agricultural goods and whether it will continue to supply energy to the region and at what terms are all crucial ingredients of the uncertainties in the region and to which few ready answers are available.

Moreover, adjustment in the countries of the region themselves could also take many forms. There is significant pressure to cut government subsidies both to consumers and to unprofitable enterprises. There is considerable uncertainty how the proposed privatisation plans will proceed and which industries and which agricultural sectors will be profitable. In itself this question begs further enquiries such as how exchange rates will alter and how exchange rate policy itself will develop. The essential point is that when all of the sectors in all of the countries in this region are undergoing transformation it is unclear where true comparative advantages will lie.

¹We have benefitted from discussions with a very great number of people in Budapest and Warsaw. We also would like to thank Knud Munk of the European Commission and Stefan Tangermann of the University of Göttingen for numerous discussions. The views expressed in this paper are entirely our own and do not reflect those of any other individual or organisation.

In many cases, exogenous uncertainties are likely to result in sharp changes rather than smooth processes of adjustment. For instance, a collapse in the USSR, if it does occur, may be sudden. Changes in exchange rates are also likely to be as a result as a discrete devaluations. Furthermore, these shocks will often represent permanent changes rather than temporary displacements from a long-term trends perceptible in past data. An example of this is the effect on trade of opening of these economies to western imports by changing from strict quotas to a trade regime based on tariffs.

In the face of these large uncertainties, there is an understandable tendency for enterprises and individuals to seek stability. This is particularly marked in agriculture.² Given the traditional reliance on central planning, the call for greater stability has often been in the form of a call for strong state interventions in the economy. Indeed, it is clear that one way of satisfying the desire for stability is simply to stop the process of introducing the market economy. However, such a clear-cut reversal of the process of liberalisation is generally rejected, while at the same time it is suggested that a government can intervene to eliminate "unnecessary" or "excessive" instability. The problem encountered by the advocates of such Third Way solutions is to define a coherent framework for distinguishing unacceptable changes from those that are tolerable or necessary.³

How does one approach these issues? What is the paradigm for understanding Eastern European economies in the coming years? One way of thinking about this is as a process of disequilibrium adjustment. The starting point is set of production and consumption patterns that did not constitute a competitive equilibrium in the economy. This was evidenced by the pervasive, massive taxes and transfers and numerous forms of rationing. Previously, the system of administered prices and quantitative controls prevented any tendency to converge to equilibrium. Price liberalisation and the elimination of most subsidies will mean that the economies will be allowed to adjust to find a competitive equilibrium.

While this characterisation may be too stark or simplistic, it seems at least somewhat convincing in placing the emphasis on disequilibrium adjustment that will proceed in many sectors simultaneously. Furthermore, even accepting the simplifications

²The 1990 presidential election results in Poland were widely interpreted as demonstrating growing discontent with the liberalisation process on the part of rural populations. The return to power of the revamped Communist Parties in elections in Rumania, Bulgaria, and Albania can be credited to the success of these parties in rural areas.

³For a political discussion of this problem see Lesourne and Lecomte [1990].

involved, we immediately recognise that the problem of establishing the basic parameters of the uncertainty represents a daunting task. For example, what is the long-run average price about which plans and perhaps stabilisation programs could be made? What is the area of a country's comparative advantage? These normally difficult questions are even more difficult to assess in the current context of the liberalised economies. In fact, from the perspective of anticipating the new equilibrium, it is even worse than our analogy would suggest. For, not only do we face liberalised markets but also the state enterprises are being privatised. Furthermore, the legal/accounting framework is changing. Consequently, the economic agents, their objectives, the array of exchange goods are all in the process of changing.

This then is the environment where it is hoped to find a response to the strong and growing calls for economic policies to reduce uncertainties or at least make coping with the uncertainties a more reasonable task. The issue is how can this be done in a constructive way? That is, how can uncertainty be reduced without inhibiting constructive change?

To make this concrete consider two firms both of which are loss-making in the current environment. One of them has a product line and technology that will be viable in the future. The other does not. The problem is that in the current environment it is almost impossible to distinguish the two. If there is a functioning financial market, one solution is for investors to extend credit to both at a rate that reflects the unconditional estimates of future profitability. This would continue until such time that it is possible to discriminate good risks from bad. Then the latter would be allowed to fail. In this way, the fixed costs of disinvestment (liquidation of physical capital, loss of human capital, and the loss of client base) would be avoided for the enterprise that will be ultimately viable. In the absence of well developed financial markets, there are at least three possible arguments in favour of public stabilisation of markets as a replacement for credit markets. We consider these in turn.

i. Stabilisation would give time for adjustment.

By slowing the pace at which enterprises were pushed to the point of insolvency, unwarranted disinvestments would be avoided. It would allow some time for information gathering and analysis. Later, when financial markets are developed and the future prospects of enterprises are clearer, enterprises facing short-term difficulties can be left to seek their support from the markets.

A difficulty with this argument is that in a public intervention in the market there may be no automatic incentive to bring about the eventual elimination of stabilisation. Thus, the moment at which the decision about the future existence of an enterprise will be left entirely to financial markets may be indefinitely delayed.

- ii. Stabilisation reducing uncertainty would encourage investments.

It is widely recognised that uncertainty can discourage the production of risky products. This can be particularly true if the production would require a significant fixed investment. For in that case, deferring an investment confers an option value to the enterprise. The increased uncertainty increases the time option value of waiting and hence investment is deterred. This would seem particularly compelling in Eastern European economies where many have stressed the need for significant investments to replace out-dated productive capacity.

The counter-argument is that stabilisation would encourage the wrong investments. If investment decisions are based on a vector of input and output prices that depart from equilibrium values as a result of diverse stabilisation efforts, it would seem that such investments would build vested interests in the preservation of the stabilisation regime. Or, returning to our earlier analogy, if the Walrasian auctioneer chose prices to satisfy a stabilisation criterion (or to solve perceived distributional problems), there may be no convergence to a competitive equilibrium of the market.

- iii. Agricultural market stabilisation should be adopted by Eastern Europe since it is employed in the market economies which Eastern Europe seeks to emulate.

Despite the fact that this argument does not proceed from first principles, it appears to be very compelling for many in Eastern Europe. Clearly, in the developed market economies there are a number of significant interventions in agricultural markets that are nominally made in the name of stabilisation. Thus, for some, "intervention" and "modernity" in agriculture seem to be closely linked.

The general counter-argument to this is that interventionist institutions in developed country agriculture do not reflect an optimal solution to the problems posed by uncertainty. Rather they are often historical artifacts born of short-term political convenience. Once they have been created, they have proved very resistant to change. Nevertheless, it has become increasingly clear that fundamental changes are needed in these institutions.

Beyond this, generally intervention programs in developed agriculture were introduced into a market economy where the private farms and agricultural firms already existed. In the Eastern European context there is a serious issue of the interaction between a process of intervention in the name of stabilisation and the growth of new enterprises. In discussions of privatisation, great confidence has been placed in the development of real competition. Yet often in the region, the central planning system, almost by definition, exhibited a very high degree of horizontal and vertical integration. In these circumstances the potential for entry by new enterprises is

perhaps the most important force to prevent monopolies or cartels developing. The risk is that large state intervention institutions may effectively bar entry of new firms.

In what follows we further develop these issues by considering the major possible approaches to reducing uncertainty with the context of the liberalised economies of Eastern Europe. Three broad categories are considered:

- * trade tools,
- * domestic market stabilisation programs,
- * market-based risk contracts.

There have been some attempts to compare these tools⁴. Generally, past analytical comparisons have been made in the context of smoothing or hedging around some long-run equilibrium. In contrast, we start from the perspective of adjustment to a new equilibrium as we have outlined it above. Thus there are two sets of issues that need to be considered when evaluating an instrument in the context of Eastern Europe. One is the potential effectiveness of achieving some given goal for stabilisation. The second is the implication of using the tool for the adjustment to a new equilibrium.

After examining in sections 2 through 4 the three categories of tools, in section 5 we briefly compare them within the specific contexts of Hungary and Poland. While these countries are similar in that they have important agricultural economies and have taken decisive steps toward adopting market economies, they offer some interesting contrasts. Hungary is recognised as a prominent "gradualist" which has retained some administered prices and many significant trade restrictions. Nevertheless, in 1990 the Budapest Grain Exchange came into existence and introduced exchange-traded futures contracts for the first time in a liberalised economy of Eastern Europe. Poland, on the other hand, is known for adopting a radical shock treatment in trying to approach the market economy as rapidly as possible. However, in this economy the response to the call for stabilisation has given rise to new state organisation that has used a variety of market and intervention tools.

2. Stabilisation by Trade Tools

2.1 The major results of the theory of international trade are derived in a deterministic context and are not concerned in an essential way with the management of risk. (See, for example, Jones and Kenan [1984]). Nevertheless, trade tools are often employed in the name of achieving domestic stabilisation and in policy discussions have found some favour.⁵ At the current

⁴ See, Gilbert [1990] for a survey.

⁵ See for example, Knudsen and Nash [1990].

time, the economies of Eastern Europe are in the process of revising their trade regimes. Starting from a status of centrally planned economies within GATT where guidelines were stated in terms of quantities, they are moving toward greater reliance on price measures. Typically at this stage, they would appear to have considerable liberty of choice in establishing their trade regimes in many cases not having bound GATT tariffs. However, choices about the use of trade tools for policy objectives of the agricultural sector are complicated by more general trade negotiations under way, including negotiations with respect to GATT, in the Uruguay Round, for possible association with EFTA, and with respect to the European Community. We do not consider these broader issues; however, we should bear in mind that the attractiveness of border tools as a means of agricultural stabilisation is only one criterion for their eventual use.

The basic idea of these tools is to stabilise the border price for a country through a progressive system of border taxes and subsidies. Generally, such schemes are called variable levies systems. There are a great many different possible ways of implementing variable levies depending upon whether they apply to imports, exports or both, whether they are symmetric or asymmetric, and how the tax/subsidy rate is calculated with respect to world price and some more stable reference price.

When the levy is applied to exports the objective is to stabilise the price producers receive for their exports. Such schemes are quite widely employed in developing countries.⁶ They can be represented by the expression,

$$E = W - L,$$

where E is the price received for exports, W is the world price and L is the export levy. In a symmetric system,

$$L = A(W - R),$$

where R is the reference price of the system and A is a parameter. For a progressive system, $A > 0$. In that case, when the world price exceeds the reference price, the levy is an export tax (ie., $L > 0$). If the world price is below the reference, exports are subsidised ($L < 0$). The parameter A determines the relative weight of the reference price in the determination of the export price and, on the assumption that the reference price is less volatile than the world price, the degree of stabilisation. Specifically,

$$\text{Var}(E) = (1-A)^2 \text{Var}(W) + A^2 \text{Var}(R) + 2 A (1-A) \text{Cov}(W,R).$$

⁶ See Knudsen and Nash [1990], Gilbert [1990], and many examples in UNCTAD [1987].

Thus when R is fixed, the export price is entirely stabilised by setting $A=1$. Note that (with R fixed),

$$\text{Var}(L) = A^2 \text{Var}(W),$$

so that a greater the degree of smoothing of the export price is obtained only at the expense of increased volatility of tax receipts.

In an asymmetric system,

$$L = A \text{Max}(W-R, 0).$$

That is, only taxes are taken. Equivalently, the producers have granted the government a call option on exports with an exercise price equal to the reference price. Assuming that the government does not pay a premium to producers, the asymmetric export levy is a tax whose present value is the fair premium of this option. Standard option theory tells us that this value is increasing in the volatility of the world price and decreasing in the reference price. A number of nominally symmetric export levy systems have a reference price that is set so low that they are indistinguishable from asymmetric ones.

A variable levy on exports raises a problem of tax avoidance. Enforcement inevitably involves conferring a degree of monopoly power for exports on some institution. The precise forms that this takes in practice seem to be as various as there are individual cases.⁷ It is difficult to view these forms as reflecting only or even primarily the appropriate risk-sharing techniques for the societies in question. At least as important appears to be an implicit definition of property rights. For example, in the case of African export marketing boards there appears to a strong element of transferring a surplus from the nominal owners of the resources to the state.⁸ In the case of certain South American systems, (eg. coffee in Colombia), the systems appear to be more nearly neutral from the producer perspective with export taxes providing some income smoothing over periods of low world prices. We return to this theme of property rights below.

A variable levy to stabilise import prices is conceptually analogous. In that case the import price follows,

$$I = W + L,$$

where I is the price paid for imports. The import levy can be symmetric,

$$L = A(R - W),$$

⁷ See Gilbert [1990] for a discussion.

⁸ See Knudsen and Nash [1990].

which involves a tariff when the world price is below the reference and an import subsidy when the world price is relatively high. Alternatively, it can be asymmetric,

$$L = A \text{ Max}(R - W, 0) ,$$

in which case only tariffs are paid. Our interpretation of this case is one where the government on behalf of consumers has written put options to domestic producers where the strike price is the reference price. The value of these options is an increasing function of the reference price and the volatility of the world price. In contrast with the export levies, variable import levies are much more common with agricultural products of developed countries. In particular, it is an important part of the Common Agricultural Policy (CAP) of the EC. As we suggested in section 1, this fact probably means that variable import levies will be considered seriously in Eastern Europe. We now turn to an evaluation of variable levies schemes from the perspective of their potential use in that region.

2.2 At a conceptual level there would seem to be very little difficulty with simultaneously introducing symmetric variable levies systems for both import and export prices. In reality, the operation of the schemes and their enforcement require a heavy institutional apparatus. Consequently, there are considerable practical advantages to deciding which parts of a full-blown system are really required. Thus a first issue that would confront a liberalised economy in Eastern Europe would be to determine whether it is an importer or exporter of a particular good. That is, is the domestic autarchy price, D , (the price where the domestic supply and demand curves cross) exceed or fall short of the world price. In the context of Eastern Europe, this is a nontrivial problem since domestic supply and demand are being submitted to large and various shocks. Past trading patterns will often be no guide.

In assessing the desirability of variable levies it is important to not gloss over the obvious fact that these are distortionary taxes and subsidies that will involve an efficiency loss. Furthermore, to be implementable, such schemes are applied to highly specific goods. This goes squarely against the precept of attempting to minimise distortions by applying a tax to the broadest base possible. Consequently, even though the systems may be designed in the hope that on average the same level of protection will be afforded to all sectors, at any given time there will typically be very different degrees of distortions applied across products.

A reflection on the historical context of Eastern European trade suggests that the efficiency costs of applying variable levies systems throughout Eastern Europe could be very great. In the past, trade among the economies of Eastern Europe was determined as an adjunct of the ruble trade which was primarily concerned with the commerce between an Eastern European country and the Soviet Union. Thus past trade between any two of the recently liberalised economies in the region was very likely a very poor

reflection of comparative advantage at that time and surely no guide to comparative advantage after liberalisation. It seems reasonable that with totally free trade in Eastern Europe the cheapest foreign source for many goods will be from a neighbour in the region. At this time, there is no prospect of a customs union within the region. Thus it is quite conceivable that the same logic could lead to variable levies schemes being applied to all these countries individually. The effect of this would be to tend to preserve current exportables as exportables and current importables as importables in each country. It will maintain the status quo and would seriously undermine the process of adjustment to a new competitive equilibrium. This would constitute an example of the spectre, evoked in section 1, of cumulative distortions which appear individually small at the margin which nevertheless lead to an equilibrium that is very distant from optimal.

It is sometimes argued that efficiency costs will be small with a variable levies system because no permanent deviation from long run world price is intended so that there would be no continual subsidy or taxation of any particular product. Rather the concern is stabilisation of the domestic price of the commodities in question. That is, the variable levies policy will affect the variance of the price distribution but not the mean. Even assuming that a variable levies system is mean-neutral, there are some quite fundamental objections to this type of policy.⁹ For example, stabilising at the long-term mean will lead producers to equate marginal costs and long-term price rather than short term price as required for efficiency. To argue that these are small costs implies that supply and demand elasticities are small. Indeed, it is often stressed by advocates of variable levies that short-term supply and demand curves are inelastic. However, there is no serious empirical evidence to support this contention within Eastern Europe. Furthermore, as we argue below, if world commodity prices are stationary at all, the rate of mean reversion must be very low indeed. This means that a wedge between the world price and the long-term mean can persist for a very long time and certainly routinely beyond the horizon of a single crop year. If distorted prices are allowed to affect decisions about acreage cultivated, varieties planted, and level of chemical treatments employed, the effect on supply would clearly be non-trivial.

Moving beyond these objections, we would argue that the most of past experience suggests that these schemes generally are not mean-neutral even over relatively long horizons of ten years or more.¹⁰ One evidence of this fact is that asymmetric schemes are more common than are symmetrical ones. Thus these schemes are on average net producers of tax revenue, and the granters of the implicit options in question (the consumers for import levies

⁹See Walters [1987] for a discussion.

¹⁰ See Knudsen and Nash [1990] for a survey and Helleiner [1964] for a case study.

and the producers for export levies) find themselves with the values of the fair premium appropriated by the state. In our view, the desirability of variable levies systems should then be viewed as essentially an issue about the assertion of property rights. In these systems, market exchanges are forced to pass through an intermediary (eg., a marketing board or customs office) endowed by the state with monopoly power. Furthermore, the design of the system (the choice of A, the definition of R, the measurement of the world price and so on) are not decided by negotiation among individuals. Rather, there is mandatory participation in the systems, and the parameters of the design are negotiated collectively. Bargaining theory leads us to expect that in this case the incidence of the systems will vary significantly across cases. It likely will be a clearer reflection of the ability of the interested parties to form powerful political coalitions than of any consideration of their risk preferences.

This issue of the mean bias of variable levy systems is related to the question of whether the system parameters should be set by rules rather than discretion. The most important system parameter is the reference price, R. In many systems (eg. the CAP or in Sweden's variable levy system) the reference price is determined by a committee including producer group representatives. In such committees one of the principal considerations invoked in support of a particular reference price is its relation to producer cost. Within the Eastern European context, the traditional approach to the formation of prices is on a historical cost-plus basis. Consequently, there will be a very strong tendency for any political determination of reference prices to be based on costs. Given the rapid rate of change in Eastern Europe, historical costs are almost surely very poor indicators of economic marginal or even average costs. Even if they were accurate, it is clear that stabilisation around average costs would constitute an extreme impediment to the process of transformation. It would delay exit in sectors which should be contracted, and it would discourage entrance in sectors which should be expanded.

In light of these considerations, economists often recommend that variable levies be designed around a rule that will not be changed on the basis of political convenience.¹¹ This advice appears to be usually, but not always, ignored in practice. The exceptions are a number of systems that are based on moving averages of historical prices. We will address the issue of the desirability of such stabilisation rules in subsection 2.4. Before doing so, in the next subsection we consider the relationship of the world price and the domestic price.

2.3 We now address three related questions involved in the use of variable levies to achieve stabilisation: What is the proper definition of the world price in terms of units of foreign

¹¹ For example, Gilbert [1990] and Knudsen and Nash [1990].

exchange (say dollars)? How should the world price be expressed in units of local currency? And, what is the effectiveness of a variable levy in stabilising domestic prices when there are transportation costs?

From a theoretical perspective the appropriate definition of the world price is relatively clear. The world price for exports is the highest available price at the border for goods destined abroad. The world price for imports is the lowest price at the border of goods originated abroad. Since we typically do not have prices observed at auction markets for imports and exports at border destinations, these definitions are not immediately implementable. One solution would be to define the world price as the border price obtained for an individual cargo. The problem with this is that if it were applied in the definition of a variable levy it would remove the incentive of the exporter to find the highest possible export price or of the importer to find the lowest available import price. Consequently, for the purposes of a variable levy it is desirable to rely on prices which emerge from relatively deep markets which are insensitive to the individual transactions for which the levy is to be assessed.

In many primary commodities a deep, public market is clearly discernible. For instance, in metals the London Metal Exchange sets prices (spot and forward) three times a day for five metals (Copper, Aluminium, Nickel, Lead and Tin). These prices refer to standard qualities of metal deliverable in a number of locations worldwide and are accepted widely as indicator world prices. In sugar the aptly named, "world sugar" contract in New York is accepted widely as an indicator of the world price. Similarly, New York futures prices are also dominant for coffee and cocoa, although there is some competition from the London and Paris. In grains the Chicago futures market (CBOT) provide the most commonly used benchmarks.

Note that the prices quoted on a futures exchange reflect the cheapest to deliver good that is allowed under the futures contract. For example, in a Chicago wheat contract this could be any of number of types of wheat at any of a number of possible delivery locations in the U.S. These prices naturally carry no concessionary terms. Transport costs and quality differences make other prices relevant in other areas of the world. Thus if the world price were taken to be the Chicago futures price, in principle one could convert this to an import price at, say, the Polish border by determining the cheapest to deliver grade/location pair implicit in the Chicago futures, add or subtract a differential for quality, subtract any border concessions granted by the U.S. on its wheat exports, and add transport costs from the futures delivery point to the Polish point of entry.

This example brings out some important details which show that the determination of a border price by adjusting a centralised world market price involves judgements which could affect the calculated price significantly. First, it is clear that with

substantial costs of international transportation, even if the U.S. is routinely a wheat exporter, the result of this calculation may not be the lowest import price from the Polish perspective.¹² This tends to undermine the correlation between the calculated import price and the theoretically correct one.

A second point is whether the border price reflect concessionary export terms applicable to the goods traded in the centralised market. It should be noted that however this issue is decided, the rule should be applied consistently to both the calculation of the world price (W) and in the calculation of the reference price (R). Thus, if W includes export concessions and the reference price is a five-year moving average, then R should be a five-year average with of the world price including concessions. The choice of including or excluding concessions is likely to be a reflection of a judgement about whether they are permanent or temporary. In practice this can have important implications. For example, suppose that concessions are deemed permanent and the reference price is calculated as a moving-average of past prices including such concessions. If then the concessions are reduced or abandoned, the calculated world price of imports would be increased so that the variable import levy ($A(R - W)$) would be reduced. Conversely, if the levy is based on the assumption that concessions are temporary, they will be ignored in the calculation of W and R. However, this would imply that if concessions were to be introduced, there would be no effect on the levy and the effective price reduction would be passed on fully to the import price.¹³

These issues represent significant obstacles to designing variable levies systems that are based fully on preset rules. There are often unforeseen developments which seem to give compelling justification for modifying the rules. Again, these renegotiations are conducted collectively.

Let us now consider the second question detailed above, namely that of converting border prices onto a domestic currency basis. In Eastern Europe exchange rates have not yet attained full convertability. There is "domestic convertability" in many countries but the government intervenes in most cases to defend particular levels of the the exchange rate for certain objectives, including a stance against rising inflation in the region. Within a variable levies scheme there are a number of possible solutions depending upon whether the exchange rate used is the nominal rate or a real rate (by which we mean a Purchasing Power Parity (PPP) rate) and whether reference prices are

¹² Recently, transatlantic freight rates for wheat have been about \$20 per ton which is in the neighborhood of 20% of the North American prices.

¹³ Things become still more complicated when we realise that concessions offered on goods that are not deliverable in the central market can at times be the ones that are relevant to country in question.

converted at current rates or historical exchange rates.

An argument for adopting current nominal exchange rates is that this imposes the current opportunity cost. There would be no stabilisation of changes in exchange rates. The use of real exchange rates tends to include some degree of exchange rates stabilisation already. In a freely floating world, it might be assumed that divergences of the nominal exchange rate from the real exchange rate would be temporary and thus using a real exchange rate would cut out some short term nominal exchange rate fluctuations. In Eastern Europe, where exchange rates are not freely floating one would have to argue that government intervention forcing a divergence between the nominal and real exchange rate is only temporary in nature ! This may be the case but is perhaps difficult for a government to recognise. Furthermore, if these deviations are significant, then this policy may have severe budgetary implications. If a nominal exchange rate is maintained that is significantly higher than a PPP rate then this implies much larger subsidies or lower tariffs. However, note that if the current rate is used then it is likely that shocks to the exchange rate will take the form of devaluations which are likely to be large jumps and are likely to be permanent in nature.

We now turn to the question of the relationship of border prices and domestic prices. It is sometimes argued that the degree of domestic price stabilisation achieved by stabilising border prices through variable levies is relatively high.¹⁴ We have some reservations about such a conclusion for bulk agricultural goods in Eastern Europe where a given country may shift from importer to exporter and back to importer repeatedly in coming years.

The issue revolves mainly around the transportation and handling costs between the border and the centers of production or consumption. Transport costs within Eastern Europe can be very considerable indeed. Shipping grain across the Atlantic is relatively cheap (for instance \$20/ton from the US to the Black Sea or Rotterdam) is commonly quoted. However, loading/unloading and transporting grain across land using the railways of Eastern Europe is very expensive (\$8/ton from producing areas in Hungary to the USSR border and as much as \$35/ton from the producing areas through Yugoslavia to port and loading - or vice versa - or \$10 to \$15/ton across Poland including loading or unloading are typical figures).

The implication of this is that even if border prices are stabilised at some long-run average, domestic prices can vary within a considerable range. To take a concrete, partially hypothetical, example, suppose that the same North Atlantic port constituted for Poland the cheapest source of imports and the highest price destination for exports, that wheat transport cost

¹⁴Knudsen and Nash [1990] quote evidence to this effect drawn from the case study of rice in the Philippines.

from that port to the Polish border were \$10 and domestic transport \$15. In this case, stabilised import prices would tend to exceed stabilised export prices by \$20. Thus if Poland were to adopt asymmetric variable levies on both wheat imports and exports, domestic prices could then vary in a \$50 band. (By comparison the five-year average of Chicago wheat prices is currently about \$120). It is clear then that a variable levies stabilisation may not translate into highly stable domestic prices in practice.

2.4 We now take up the evaluation of moving average variable levies. At this point it is important to consider the nature of international commodity price movements. There is considerable recent evidence for (a) a high degree of serial correlation in commodity prices and (b) the existence of sharp jumps in commodity prices.¹⁵ In other words commodity prices may exhibit problems of non-stationarity or if they are stationary in the long run there may be important structural breaks in long run means.

This is true of oil, metals and agricultural commodities. It is perhaps fair to say that agricultural commodities exhibit a greater component of cyclical variation, due to seasonal factors, but these commodities do certainly suffer from sharp jumps in prices and reversion towards the long run mean tends to be very weak. One symptom of price jumps is that agricultural commodity price changes (in common with other commodity price changes) exhibit excess kurtosis. As a case-study we conducted an analysis of monthly maize prices from 1967 to 1988. The econometric results are included in Appendix 1. The results of this study show (i) maize prices are highly serially correlated and indeed are non-stationary over this period and (ii) maize price changes are not normal since they exhibit significant excess kurtosis.

Non-stationarities and jumps create significant problems for moving average type rules. An alternative is to adopt a partial adjustment technique with the same average lag. Note that the problems encountered with moving average rules are identical whether stabilisation is achieved through the use of trade tools or through the use of stabilisation measures as discussed in Section 3. We present an analysis of this problem through a simulation study in Appendix 2. The particular method to effect stabilisation is through a government agency but the results are also of relevance to this section.

In short relative to the partial adjustment technique adopting a moving average rule may yield a higher degree of stabilisation (dependent on the measure used) but at a significant extra cost. The cost is in terms of an increased maximum amount of resources required to run the scheme. Alternatively, for any fixed amount of resources deployed there is a greater probability of the

¹⁵ See for instance Deaton and Laroque [1990] and Cuddington and Uzua [1990].

scheme becoming insolvent. The problems with moving average schemes increase as the jump component of the process increases.

These problems occur because the moving average takes a longer time to adjust to the new mean than the partial adjustment (which can also be considered as an averaging scheme but with exponentially decreasing weights). In short the danger is that moving average schemes tend to preserve the status quo. This is especially evident when there are sharp jumps in the process generating prices. In the context of Eastern Europe we regard this as a poor property of such measures.

3. Public Stabilisation through Domestic Markets

We now turn to forms of market intervention that would specifically aim at stabilising domestic prices. Such methods already have been proposed in certain Eastern European contexts (discussed partially in section 5 below). They are relevant to the extent that a country's trade regime is not fully open or to the extent that transport costs create a band for domestic price fluctuations.

There are a great many possible schemes, many of which have been implemented in practice. The essential operation of stabilisation is for a public authority to purchase at a time demand is thought to be inadequate and sell when demand is excessive. Typically the proposed solution to the problem of disposing of the goods purchased and the acquisition of the goods sold is to maintain a buffer stock. Thus domestic price stabilisation requires the good be storable either directly (eg. dry grain) or in processed form (eg. milk powder or butter).

Buffer stock programs have been subjected to repeated economic analyses and have been criticised on a number of grounds. At a conceptual level they are flawed if the underlying market demand or supply is non-stationary (see Townsend [1977]). As we argued in section 1, the shocks to the liberalised economies of Eastern Europe are likely to be precisely of this type. Such schemes are vulnerable to speculative attacks (see Salant [1983]). Thus they either tend to fail rapidly, or, in the name of protecting the scheme public authorities attempt to prohibit certain types of transactions which appear to be against the public purpose. Furthermore, systems based on public storage tend to be very costly both in the form of direct storage costs and in the effect on the efficiency of the economy (Knudsen and Nash [1990]). We will not elaborate these criticisms (which we tend to find rather convincing) but instead focus on their use within in Eastern Europe in the process of adjustment to a market economy.

The hallmark of a buffer stock operation is the public supply of storage. Thus for us the fundamental question, which dominates the detailed consideration of system design, is the establishment of control and property rights. One of the overriding desires of reformers in Eastern Europe is to shift ownership and control of the productive capacity out of the public domain and into the private. Thus from a purely political perspective, public buffer

stocks may be an indirect way for the state to retain control of the means of production while appearing to adapt to a market economy. However, they have a purely economic dimension as well.

Private merchandising firms store and transport goods and tend to stabilise prices through arbitrage over space and time. If left to private decisions, goods will be stored when the anticipated price will rise sufficiently to cover the economic costs of storage. In the Eastern European context, private storage may be inadequate if the appropriate firms do not exist or if the private sector would apply incorrect costs in making its storage decisions. The cost of storage is composed of physical storage costs (including deterioration and insurance against loss), credit, and the risk premium.¹⁶ With respect to cost of physical storage there is no obvious externality involved so that it would appear that private storage would apply the correct costs.

Matters are somewhat less clear with respect to credit costs. There are currently only rather crude capital markets in Eastern Europe. Furthermore, the banking system has retained its segmented nature and has tended to maintain the credit relations from the past. Beyond this there are numerous signs of significant credit rationing. Thus it is difficult to know what is the correct cost of capital or to be sure that any private storage company has access to credit at this rate. In fact, there is some evidence that short-term credit crunches which have been part of macroeconomic stabilisation programs have destabilising effects on certain agricultural markets. For one of the activities most sensitive to credit is stock-holding; a credit crunch quickly translates into a liquidation of stocks. In the case of Poland, this has meant that for certain goods, eg. butter, there have been sharp drops of nominal prices at times of high general inflation. Later, after stocks have been liquidated, general inflation also has lessened and cheaper credit becomes available. Then prices of the commodity start to rise rapidly as stock rebuilding begins.

Public buffer stocks have been proposed as solutions to these problems. Indeed, if public funds are committed to this activity, they may be able to function smoothly even though severe credit problems would upset private storage. Implicitly, the advantage of public storage is that it has access to a regular source of credit. However, if this is true, it seems that a solution that would hit at the heart of the matter would be to improve credit markets. Public buffer stocks would be needed only as a temporary solution until credit problems would be brought under control. Even this temporary role may be unnecessary if there were a public program of assuring access to credit, possibly at subsidised rates, for storage. Furthermore, it is far from clear that public buffer stock operations would apply the correct rate for the time value of its funds. Evidence

¹⁶We leave aside the slippery concept of the convenience yield, see Brennan [1958].

of a number of public funds has shown a tendency to eliminate interseasonal price differences for seasonally harvested goods. Taking into account the costs of physical storage, the implicit nominal interest rate used therefore is negative !

This leaves the matter of the costs associated with the risk of holding stocks of commodity products. This depends upon the risk aversion of the storing agent and the variance of the price at which goods will be sold from stocks. It is clear in the Eastern European context that, if a private storage company has no assurance about price of ultimate sale, the perceived riskiness may be very high indeed. Thus even if credit is available at reasonable rates, the costs of private storage will still be very high. Consequently, the amount of storage will be less, and the degree of expected price fluctuations relative high. That is, instability breeds more instability. Thus we are led to the perception of a external effect to risk-bearing which might justify storage being undertaken by a relatively less risk averse public entity.¹⁷ We recognise this as a potentially legitimate argument. However, we must point out that there may an alternative solution to the problem in the form of creating instruments for risk-shifting which will lessen the costs of private storage. This will be explored at length in section 4.

The heart of the storage decision, whether private or public, is the balancing of costs with the expected price appreciation of the good. Thus the public/private comparison must also address which form of organisation has the superior ability to forecast eventual market developments. Some maintain that public buffer stocks are better forecasters because they will draw on the superior information compiled from all the various information sources available to the government. This argument sounds hollow in the current Eastern European context; if the state were an effective processor of information, central planning would have been more successful. Furthermore, if the state has access to information sources that would materially improve price forecasts, why does it not simply make this available to the public. The model for this would be the crop forecasts of the U.S. Department of Agriculture. Finally, even if the state has some relevant information, it would not seem to have a monopoly. Markets are a device for information aggregation which have the advantage of drawing upon all the information sources available to participants.¹⁸

Finally, we address the question of whether public intervention schemes encourage the development of the market economy. Even though private merchandising firms can undertake stabilising

¹⁷This perspective is consistent with the analysis presented by Arrow and Lind [1970].

¹⁸Note that this argument does not state that the market price necessarily is a totally efficient aggregator of information in the sense that it is a sufficient statistic for the large information set.

storage activities, on balance it must be said that such firms are not currently well-developed in Eastern Europe. If there is to be private storage on a commercial basis, either existing firms such as state farms or rural cooperatives will have to undertake this activity or new firms will have to enter. The question is whether or not the emergence of a public buffer stock activity will help or hurt this process. To a certain extent, a public buffer stock would stimulate private merchandisers. It would become a recognisable counterparty for trading. Furthermore, it could be helpful in establishing commercial standards with respect to contract forms, product grading and so on. On the other hand, public storage would compete with private storage. If public storage had access to credit at implicit rates that were always lower than those available to private firms, entry of merchandisers would be foreclosed. This is a very serious worry. The past practice in Eastern Europe was for the state to announce, "the" price for the year. It is a serious possibility that managers of public buffer stocks would carry-over this practice. If so, all commercial incentive to store would be removed.

To summarise, public buffer stocks have a number of well-known drawbacks. These would be particularly telling in Eastern Europe where supply and demand shocks are likely to be permanent. Nevertheless, the lack of regular credit to private storage and the externality which would accrue to bearing the risks of stock-holding are legitimate grounds to consider some temporary forms of buffer stocks. However, in Eastern Europe public buffer stocks would pose additional problems by returning significant elements of resource allocation to collective choice-making and by raising significant barriers to entry by private merchandisers. Thus it is important to examine whether there may be market-based solutions which can stimulate stabilising, private storage.

4. Market Tools for Risk Management

4.1 Our exploration of the problem of managing uncertainty while at the same time adjusting the Eastern European economies to the market has started with public sector tools for stabilisation. We have found a clear tension between the goals of stabilisation and adjustment to the market. It is natural that we do. They represent essentially statist solutions to the perceived problems posed by the crude workings of a budding market system.

We now adopt the alternative perspective, that is, of looking for solutions to inadequacies of the market in the form of extensions and improvements of the markets. As a general matter we think this is sensible. The approach to a market economy will involve considerable learning-by-doing. If the object is to create the market, a good starting point is to develop the habit for thinking hard for market solutions before one calls for the intervention of the state.

We have seen in our discussion of public versus private storage, problems of the credit market can impede the functioning of

private merchandising thus decreasing the effectiveness stabilisation from these sources. The reform of the banking system and the development of capital markets are clearly important to the transformation of agriculture. However, a discussion of this issue naturally would extend beyond agriculture and would take us far afield from our main subject. Thus we will focus our attention on risk management.

4.2 The first line of defense of a farm or processing firm working in an uncertain environment is to diversify its activities. The aim of diversification is to reduce the overall uncertainty about an individual producer's income. For example, if the prices of wheat and barley are uncertain, a farmer, with the technical possibility of producing either, will produce both even if recent prices would indicate planting only wheat would be more profitable. Alternatively, an enterprise may decide to invest its capital in a smaller scale combined feeding and slaughtering operation rather than to build a large-scale slaughter house because the diversified operation would involve less risk.

Of course, the diversified operation may not be able to realise all the possible economies of scale, and in a more stable environment the producer would have an interest in specialising. Thus there is often a trade-off between diversification to reduce risks and specialisation to maximise anticipated profits. In Eastern Europe a number of state enterprises are already highly diversified. In the long-run the transformation of such organizations is likely to be in the direction of greater specialisation.

Generally, a government has little role to play in determining the degree of diversification selected by private enterprises. Nevertheless, in Eastern Europe a government may help in two respects. First, it can encourage intelligent evaluation of risks and selection of diversified strategies through its discussions with farm groups and ultimately through extension services. Second, it can assure that its own proposals to give tax or credit incentives to the agricultural sector are general in nature and do not give a bias to a specialised activity even if there may be some evidence that this would maximise returns near-term.

4.3 A second, more sophisticated means of managing risks is through contracts which shift risks from one party to another. The principal risk management contracts relevant to agriculture are forward, futures and options contracts. Futures can be viewed as highly formalised forward contracts; both are similar in that they represent the unconditional agreement to exchange at a later time goods for money at a price determined at the outset. In contrast, an option contract gives the buyer the option, but not the obligation, to buy or sell a specified quantity of a commodity during a specified time period. Thus, a call option gives a potential buyer the right to buy at a specified price (the strike price) and a put option gives the option buyer the right to sell at the strike specified. However, the owner of the

option may simply let the option expire without exercising the right to buy (for a call) or to sell (for a put) if it is not in the owner's interest to do so. In other words, at most, the option purchaser can only lose the premium (cost of purchase) of the option. However, if prices move in the right direction (up for a call and down for a put) there is the potential for unlimited gain.

It is often recognised that options provide attractive hedges. For example, a farm with crops planted but not harvested may prefer to buy put options since the size of the harvest is uncertain. Indeed the repeated calls by Eastern European farm groups for guaranteed minimum prices constitute an indication that there are many potential buyers of put options in the region. The problem is that there are not natural sellers of such options, ie., there are not many agents whose underlying risk is that they will make exceptional profits when agricultural prices are low. This need not be a problem if there are very liquid cash or forward markets for the good, for if there are, conventional option theory provides a standard method for hedging through a dynamic trading strategy. It is natural then to think about the creation of forwards and futures in Eastern Europe before thinking about options.

For some purposes it is possible to consider forward and futures contracts as equivalent. In practice there are a number of important differences which are relevant to our discussion. A forward contract is simply a standard merchandising contract adapted to allow the delivery of the good to be deferred to a later date. Generally, no money changes hands until delivery occurs. One problem with these contracts is that of default risk. If prices rise the seller has an incentive to default; if they fall the buyer will be tempted to default. This problem is dealt with by enquiring about the credit-worthiness of your counterparty, by requiring a collateral, or by adding a third-party credit enhancement.

Experience has shown that there are important benefits to developing standardised and formalised forward trading. Through standardisation it is easy to arrange for secondary trading. For example, a producers who initially sold a good forward may have found an attractive alternative use of the good. To pursue it, he needs to buy-back his forward contract. If there is a regular flow of sellers and buyers of the same formal contract, recontracting is easy. This liquidity of the contract means that more and more participants will want to concentrate their trading in a particular contract. If so, this liquid contract will draw upon a large pool of information about supply and demand.

One route to a liquid forward market is for a large dealer on the market to become a market maker. This involves the dealer standing ready to buy or sell standard amounts at prices it announces. It is a principal in every trade. The matching of supply and demand is accomplished by the dealer in the process of balancing his book of trades. If he sees that forward sales are exceeding forward purchases, he will lower his forward price

to bring about a balance. When purchases exceed sales, he will raise his price. Typically, in a well-developed market there will be more than one dealer who acts as market maker. This allows them to cover their trades with one another when they find their books getting out of balance. Among many others, liquid dealer-operated forward markets exist in gold bullion, Brent oil, protein feedstuffs, and foreign exchange. This last market is the biggest and deepest market in the world.

Futures markets are the alternative means of achieving a liquid market for deferred delivery contracts. The essence of futures contracting is a system of payments known as margins which are designed to control for default risks. Margins are normally arranged through an exchange or associated clearing house. In general an initial margin is paid by both buyer and seller as the deal is struck (the initial margin may be related to the value of the trade and the volatility of the commodity price in question), and then buyer and seller each pay or receive variation margin depending on price movements. On most exchanges margin is calculated on a daily basis such that buyer and seller receive their winnings or post their losses on a future transaction each day.

4.4 We now turn to the purposes of forward and futures contracts with particular emphasis on their potential role in the transformation of Eastern European agriculture. We will speak of futures markets, but all of the discussion applies to liquid forward markets as well.

It is generally recognised that futures markets serve two purposes. The first function is that of price discovery. In brief, a futures market allows agents (producers, consumers, traders and speculators) to make transactions based on their expectations. Hence futures prices reflect the "market's" view as to the likely course of future events. For instance for an agricultural good if a drought is predicted, futures prices will be high but if a very good harvest is predicted the futures prices may be low.

When futures prices emerge from a market with wide participation, they often become a standard reference for making plans and engaging in transactions. Thus producers will tend to produce more of the crop whose futures price is relatively high at the time of planting. Or merchandisers will negotiate the price of a cash transactions in relation to the futures price. Indeed, this practice can become highly developed; for many goods it is common to sign forward merchandising contracts with the price quoted as a specified "basis" above or below a futures price selected as a reference. At the time of delivery the price paid is the current reference price plus the pre-negotiated basis.

In Eastern Europe one of the signs of the underdeveloped nature of the market system is the fact that it is not often easy to discern what the price is for any given good or whether prices in general are tending to rise or fall. Consequently, it is clear that a viable futures market would fill an informational

void and would for that reason alone would make a very positive contribution to market development. The effect of this can be almost immediate. No complicated legal contracting or banking relations are necessary for people to learn that the market is trending up or down.

The second function of a futures market is risk shifting or hedging. A farmer or other commodity producer can sell a proportion of the harvest forward using futures contracts in order to gain more certainty about future incomes. Given knowledge of the joint distribution of price and quantity then the commodity producer can calculate an optimal hedge. In special cases (eg. no quantity uncertainty, no basis risk and no price bias) this will lead to the hedging of 100% of production. However, this does not necessarily imply that incomes, year to year, are stabilised. Indeed, if commodity prices exhibit non-stationarity or revert to a long-term mean slowly, then we would not expect incomes to be stable. However, although incomes remain unstable, in this example, incomes are fixed in advance. Thus, although futures may not automatically stabilise incomes, they do reduce uncertainty.

This characteristic of futures serves to illustrate the difference between instability and uncertainty. An unstable but certain income path refers to one which will change through time but one which is deterministic. An uncertain income implies that although there is an expected income for each period, income is a random variable. Futures may transform an uncertain income stream to one that remains unstable yet is more certain.

In our introduction, we emphasised that the countries of Eastern Europe could be considered as moving from a disequilibrium position with quantity rationing to a more market orientated position where prices are given more freedom to bring supply and demand into equality. The consensus is that this adjustment is required. Instability is therefore necessary, even desirable. The trade tools and stabilisation measures discussed in the previous two sections appear to hinder this process. They tend to upset market signals and preserve the status quo. It is possible that they may reduce uncertainty but at the same time they stifle change. Futures markets, on the other hand, reduce uncertainty and at the same time may even encourage the adjustment process. The hedging role allows uncertainty reduction and the price discovery role allows expectations of future changes to be readily observed by all the relevant actors. Futures contracts therefore appear very appropriate instruments to manage uncertainty in the context of this adjustment process.

In our view there is a third role for futures trading. This role would be especially useful in the current, drastic disequilibrium of Eastern Europe. Specifically, we believe that such instruments can serve to reduce barriers to entry of new merchandisers. Such entry would be very useful both as a means of reducing price divergences both in space and in time and as a competitive discipline for the powerful, if lethargic, remnants of state-owned enterprises.

There have been recent examples where futures contracting has appeared to aid the development of competition in certain international commodity markets. Sectors of the oil market have become more competitive in recent years and this has been accompanied by a growth in futures trading in the oil complex. Secondly, aluminium production and trading has become rather less concentrated and this has also been accompanied by greater trading in futures. The causality in the relationship between the extent of competition and the amount of futures trading may run in both directions. However, the existence of liquid futures can be an important contribution to the growth of competition in such markets.

This would likely to be true also in Eastern Europe. For example, consider the activities of grain purchase, storing and trading. Under the central planning system, these activities were in the hands of government grain companies that often had a monopsony on grain purchase and displayed a very high degree of horizontal and vertical integration. In some countries (in particular in Poland and Hungary) grain companies are being privatised on a regional basis. This gives each regional grain company a high degree of monopsony power in its particular region especially as limited storage capacity and processing facilities tend to be concentrated in their hands. In this context, the potential for entry to the grain trading business would be important to control this monopsony power.

A considerable deterrent to entry in this business, especially for a small company, is risk. Only large, diversified companies would be able to bare merchandising risks based on internal capital. Most potential entrants would likely be relatively capital-poor. Futures markets can reduce the risk involved in grain trading and thus ease the entry into these activities. In this sense futures markets are pro-competitive. By reducing uncertainty they can enhance the growth of competition. We view this role of futures as an extremely important one in the context of Eastern Europe during the current phase of market development. Unlike trade tools and stabilisation measures, futures markets can actually aid the growth of competition and the development of markets.

4.5 Modern futures exchanges exist in London, Paris, Frankfurt, New York, Chicago, Singapore, and Sidney to name only some prominent examples. Futures contracts are routinely used in the merchandising of grain, protein and oil seeds, livestock, coffee, sugar, cocoa, and potatoes. Thus in many situations, futures markets are regarded as an important and normal component of the agricultural merchandising system. This may not be widespread in European agriculture. Indeed there some tend to view futures markets as rather marginal institutions. In part this view may stem from the experience of highly interventionist agricultural systems such as the ECs' CAP where the need for private risk management instruments is severely reduced. It may also stem from perceived problems in the operation of futures. We now consider some of the problems, perceived or real, that can arise.

i. Complexity.

To some the world of futures trading appears arcane. Most contracts do not result in the exchange in goods. Trading often takes place in confusing noisy surroundings. The counterparty to a large industrial user may be an amateur who is simply making a forecast about the direction of prices. Nevertheless, there is nothing inherently more complicated about hedging than about, say, ordering a journal subscription by mail and paying by credit card. That is, if the functioning of the system has been designed properly, the individual user goes through a learning experience once after which the process becomes routine.

Lack of familiarity with the functioning of the market is clearly an impediment to the growth of the market in Eastern Europe. It is clear that there is underway already a tremendous process of learning by doing. In this regard, the emergence of futures trading would require some learning; however, the difficulties involved seem surmountable.

ii. Inadequate banking and credit.

As outlined above, an essential difference between forwards and futures contracts is that futures contracting involves an organised system of margining, designed to control for default risk. Margin payments are generally calculated and payable or receivable on a daily basis. In order for this system to work smoothly a relatively efficient system of credit is required. Indeed, lack of credit is often cited as a reason why developing country institutions do not use international futures exchanges.

There are a number of points to be made here. First of all in cases where the credit system really has little chance in operating to the required level of efficiency, forward contracting might be considered, at least as an initial stage. Dealer-based forward trading can be restricted only to credit-worthy counterparts. Alternatively, an organised exchange and a system of names can be employed as measures against default risk. However, the experience of exchanges in developed economies does suggest that futures contracting has tended to dominate forwards. A recent example is that of the London Metal Exchange (LME) which used to operate as a forward market. However, after the tin crisis a system of margining was developed. A second example is the recent success of London's International Petroleum Exchange (IPE), a futures market for gas oil. The IPE has seen volumes rising significantly at the expense of a telephone, forward market. Hence, we conclude that although forwards markets may be useful at an initial stage if there are severe credit market problems, we feel there may be a natural development towards futures contracting.

As discussed above, imperfection in the credit market gives some theoretical justification for the implementation of a stabilisation program. An interesting question is why do these imperfections occur? If there was full information and all

prices were deterministic we might expect that credit markets should work smoothly and there would be no default. With the introduction of uncertainty the possibility of default becomes a reality and the positive probability of default will increase the cost of borrowing. However, if there were comprehensive insurance markets the problem of default in this instance would be mitigated. Good insurance markets allow credit markets to work more smoothly. Introducing problems of moral hazard and adverse selection gives rise to the possibility of credit rationing. These problems are likely to get worse when uncertainty is high. Insurance markets, that reduce the variability of outcomes, should continue to make credit markets work more smoothly and also mitigate problems of moral hazard or adverse selection.

Futures can be viewed as types of insurance contracts. By allowing farmers to hedge crops in the ground or traders to hedge stocks in store, the uncertainty in the value of those assets is reduced and hence these agents should be able to obtain credit (a) more easily and (b) on better terms. In brief there is a very strong interaction between credit markets and futures markets. Futures contracting requires a credit market to work fairly efficiently but also the existence of futures should smooth the workings of the credit market. In many developing countries there may be a vicious circle. Poor insurance markets lead to an increased probability of default. This leads to greater problems in the credit market which, in turn, denies the possibility of insurance markets, like futures, developing. The cycle needs to be broken and a virtuous set of interactions developed. Aiding the development of futures has the potential of solving the perceived fundamental problem, imperfection in credit markets.

On a more practical level the type of credit required for conducting futures margining is actually quite special. Consider a farmer who has hedged 50% of his or her production by selling futures contracts (going short). Margin finance is required on the farmer's position when the price of the crop rises as this is when the futures position loses money relative to the case of not hedging. But, naturally, this is when the farmer is doing rather well on the portion of the crop that has not been hedged. Thus, for sensible hedging strategies (eg: so long as the farmer has not over-hedged) margin finance is required in the good times ! Thus, banks who are knowledgeable about futures trading - and the farmer's futures market activities - may be more lenient about granting margin credit than other forms of credit.

iii. Abusive trading practices.

Organised futures markets have at times given rise to bitter, public legal disputes concerning possibly abusive trading practices. One such potential problem is that of the manipulation of the futures market by a large buyer or, less frequently, seller. Concern for the possibility of manipulations has given rise to a considerable regulatory apparatus to detect, prevent, and eventually prosecute manipulations. This has been

particularly true in the United States.¹⁹ This experience has given rise to the following understanding of manipulations:

(a) Manipulations are seldom alleged and very rarely proved. That is, the vast majority of futures contracts never are remotely touched by any apparent or real manipulation.

(b) It is relatively easy to prevent manipulations by specifying the delivery terms of the contract broadly enough to make it difficult to gain monopoly power over deliverable supply.

(c) Both the perpetrators and the harmed parties in alleged manipulations are generally large commercial hedgers with considerable experience and expertise in the markets. In effect, if they ever occur, large price movements occur in the final stages of the life of a contract where a dominant short is engaged in strategic interaction with a dominant long.

In light of these observations, it is difficult to perceive manipulations as sufficiently important problem to warrant not introducing futures trading in Eastern Europe.

A somewhat different class of trading abuses involve direct fraud. Experience elsewhere has shown that futures trading can create a problem of asymmetric information between the principal (the exchange customer) and the agent (the exchange member). This can give rise to problems of excessive trading, front-running (trading ahead of a client's order), or trading at prearranged prices.²⁰ In the absence of an effective regulatory apparatus, the burden of dealing with this problem falls upon the legal system, which is not generally found to be an effective threat in deterring such practices. Thus there is a concern that the emergence of such practices could undermine the legitimate purposes of trading futures. Or worse, scandals involving trading abuses could give rise to a general mistrust of the functioning of market institutions. We view this as a legitimate concern. In absence of a sophisticated set of investor protections, we would think that it would be quite reasonable in Eastern Europe for futures and forward trading initially to be limited to commercial participants.

iv. Inflation.

It is often stated that if inflation is very high then futures contracts, which are generally quoted in nominal terms, will not be prove popular. This is not necessarily the case. First of all, if inflation is high but is stable then this will simply

¹⁹See Edwards and Edwards [1984] for a general discussion of manipulations.

²⁰See Anderson [1984] for a discussion of these issues.

imply that nominal interest rates will be high and the nominal level of carry (ie., the rate of return that must be paid for stock-holders) will be high. By itself, this should present few problems. However, high inflation is often accompanied by a high variance of inflation and this can, indeed, be problematic. If the concern of hedgers is to insure real returns and inflation is uncertain, then contracts expressed in nominal terms may not be as useful. An alternative is not to hedge in nominal domestic currency but rather to develop contracts expressed in some other currency unit. For instance on the Buenos Aires grain futures market, quotes are all in US dollars. Of course, this may imply that basis risk is increased and a suitable currency unit should be chosen to minimise the joint problem of inflation uncertainty and basis risk.

v. Inadequate legal environment.

Modern futures or forward contracting assumes that contracts are legally enforceable. Eastern Europe is living with the legacy of the "socialist contract," in which the terms of economic relationships are often subject to ex post renegotiation. This creates a number of problems for futures contracts. First, it means that defaults are difficult to punish after the fact. This would argue in favor of a margins system; however, we have seen that this would put other strains on the system. Furthermore, it should be recognised that even if futures contracts were strictly enforceable, hedgers may not be able to use them. For if the underlying cash transaction were unenforceable, holding a strictly binding futures position could be very risky. Again, this problem goes beyond futures markets. It is only in the process of making contracts such a futures contracts work legally that the discipline of the market will be learned.

vi. Competition from foreign futures markets.

It might be argued that there is no need to set up futures markets in Eastern Europe when there are liquid markets for the appropriate products elsewhere in the world. For example, for grains Eastern European producers may simply use the Chicago Board of Trade (CBOT) for hedging.

It seems questionable whether agents in Eastern Europe would be able to trade effectively on international exchanges when the currencies of Eastern Europe are not fully convertible. Rapid transfers of funds, for instance to meet margin requirements, may not be possible and this, at the outset, suggests that hedging on Chicago may not be a realistic possibility at present. Secondly, whether a futures market provides a good hedge or not depends largely on the variability of the basis (the difference between the futures and cash price). If the basis risk between futures prices on the CBOT and the price of, say, wheat in Eastern Europe is small then certainly CBOT futures may be a good hedge. However, we have already seen several reasons why the Chicago - Eastern European basis may be volatile. Movements of the exchange rate, of transport costs, of quality differences between contracts all tend to suggest that this basis would be

rather volatile and that Chicago would not provide a good hedge. A further argument is that the trade policy of governments in the region may also change dramatically. In effect this increases quantity uncertainty (agents may not be able to deliver goods when required) and hence lowers the demand for purchasing futures on international exchanges.

Gradually, as the trade regimes are established and the macro-economic relations are regularised, the markets within Eastern Europe may become more integrated. If this occurs, it is likely that there would be a tendency for futures trading to concentrate in a single regional market. This would parallel the experience in the United States where the increased ease in transportation and communication has undermined the position of regional commodities exchanges.

vii. Absence of standards and open trading network.

There goods for which prices are volatile and still no futures market exists. Trading remains rather informal with little standardisation and agents working within a small circle of established trading partners. Ultimately, the greatest obstacle to starting a futures market is the absence of a futures market. That is, there is a great deal of inertia to be overcome, and no one agent may find it worthwhile to bring the market into being. Thus there are important externalities involved in creating a marketplace.

In the Eastern European context this suggests that governments, which for political reasons are being forced to make dealing with risks in agricultural markets a high priority, have a potential role to play in creating the market places. This would require a sufficiently large-scale commitment to the establishment of standards, the drafting of well-designed contracts, the creation of centralised trading mechanisms, and the publication of transaction prices. Were this to occur, much of the difficult task of creating a trading system would be accomplished.

4.6 In this section we have argued that forward or futures contracts are an appropriate tool to manage uncertainties in Eastern Europe during this crucial phase of adjustment. Futures, unlike trade tools or public buffer stocks, manage uncertainty without stifling change. Indeed, by exposing agents' expectations of future prospects they may even encourage adjustment. Furthermore, futures markets, by controlling uncertainty, tend to promote private storage, trade and entry to highly concentrated and vertically integrated industries. They are then very pro-competitive and hence appropriate to the task of developing markets.

Naturally, there may be problems in introducing futures contracting. Some of these problems are discussed above, but none appears so unmanageable as to make us conclude that futures contracting could not be possible. We now turn to actual policy in this regard in two countries in Eastern Europe.

5. Risk Management in the Grain Sectors of Hungary and Poland

5.1 We turn now to the reality of structural adjustment in the agricultural economies of Hungary and Poland. In both countries there is a broad consensus in support of liberalisation of the economies; however, their approaches to liberalisation have been rather different. Hungary has been in the process of liberalising its economy since the early 1980's. While the pace of change accelerated in 1989, the overall the approach has been one of gradualism. In contrast, Poland's move toward the market began only in 1989; however, under the economic program initiated by its finance minister, Lezek Balcerowicz, the speed of change has been very rapid.

Our focus is on the transformation of the grain sector in each country, and in particular, the emergence of methods for managing price risks. We start by giving some background descriptions of these sectors.

5.2 The agricultural sectors are of great importance for both countries. Agriculture and food production accounts for about 20% of Hungary's GDP and about 20% of total employment.²¹ Most of Hungarian agriculture is organised within large state farms or cooperatives. In Poland agriculture accounts for about 12% of GDP and 28% of employment. These figures reflect the facts that in Poland private farms remained very significant throughout the period of central planning and that as much as 40% of the population still resides in rural areas.²²

Hungary produces about 6 million tons of wheat (mostly of a relatively hard variety resembling some North American wheats) and about 8 million tons of coarse grains (mostly maize). All the coarse grains and 2.5 m. tons of the wheat are used for feeding animals. Hungary has been a regular exporter of wheat with exports exceeding 2 m. tons in recent years. The Soviet Union has been by far the largest purchaser of Hungarian wheat, followed by Czechoslovakia, Poland, and Eastern Germany.

In recent years Polish grain production has varied between 25 and 30 million tons. Soft wheat (similar to the type preponderant within the EC) is the principal grain product followed by barley, rye and triticale. Most grains are produced for livestock feeding and are either consumed on the farm where they are produced or are exchanged only through local markets. The commercial grain business merchandises about 5 or 6 m. tons of Polish grain. During the 1980's Poland imported as much as 2 million tons of wheat per year, most of which has been of relatively harder varieties used in mixing with local wheats or in making pastas. An excellent harvest in 1990 combined with a reduction in consumption gave rise to some exports of rye and

²¹See World Bank [1989].

²²See the joint Polish, EC, World Bank Task Force Report [1990].

barley.

5.3 The historical importance of grain production in Hungary and Poland has led some there to hope that their grain exports could become an important growth area. The configuration of wheat prices in June 1990 seemed to suggest this might be the case. At that time North Atlantic wheat CIF Rotterdam was about \$186 per ton and EC Standard FOB Basle was \$122 per ton. In contrast, hard wheat in Budapest was \$100 per ton and wheat in central Poland was about \$70 per ton. Nevertheless, there are a number of reasons why the growth of grain exports for these countries is uncertain:

- i. the purchasing power of the Soviet Union is in doubt,
- ii. the grain marketing structure of the Soviet Union has the potential to be improved substantially in which case it may import far less grains,
- iii. the grain needs of the former GDR will now be met by the EC,
- iv. the agricultural policies of the United States and the EC, in particular with respect to food aid, are subject to change and could lead to abrupt changes in the grain supply available for Eastern Europe and the Soviet Union,
- v. access to the markets of the EC and EFTA countries will be restrained, at least in the short-run, by the tariffs and, in some cases, quantitative restrictions imposed by those organisations,
- vi. the merchandising systems in Hungary and Poland are in a state of flux and are hampered by high transportation costs.

These are some of the concrete factors that illustrate the potential for large, permanent shocks that we emphasised in the section 1.

The trade regime of Hungary has been liberalised for a number of products. However, through 1990 quantitative restrictions were in place for both grain imports and exports. In particular, export licenses, which, formerly had been awarded to the state grain export monopoly, AGRIMPEX, were extended only to one additional firm.

In contrast, with the implementation of the Balcerowicz Plan, Poland adopted a very liberal trade regime. Quantitative import restrictions were eliminated in early 1990 and were replaced by tariffs. Subsequently, many tariffs were eliminated or reduced. Similarly, exports were liberalised; however, grains for human consumption are still subject to export licensing. The former export monopolies have been removed and new firms can compete in

merchandising agricultural products internationally. The foreign trade regime remains somewhat unsettled and could be altered notably through the harmonisation of tariffs with the domestic indirect tax regime or as the result of negotiations underway with respect to GATT, EFTA association, and EC association.

5.4 Under central planning, in both Hungary and Poland, the commercial procurement, storage and processing of grains was managed by a monolithic state grain monopoly. In each case, the central company was organised by province, each provincial company had a local monopoly of grains for human consumption, and acquisition prices were set by the state at the same level throughout the country. Nevertheless, there was some trade of grains for feeding among cooperatives, state farms, and, particularly in Poland, private farms. The state grain companies were highly vertically integrated in operating the local elevators, arranging the transport, milling the grains, and ultimately selling the flour.

The first steps toward transforming grain merchandising have been similar in Hungary and Poland. In each case, the former grain monopoly was broken up into separate provincial grain companies that continued to be state owned. There was generally free domestic trade in the sense that a producer was free to sell to the state grain company of another province or, indeed, to anyone else. The provincial grain companies were free to determine their purchase prices for most grains independently. The exception was that in Hungary the state continues to set an official price of wheat for human consumption. However, in practice this has had little effect since firms are relatively free to classify and declassify human consumption wheat and it is possible to mill into flour wheat that has been sold as fodder wheat.

Since the provincial state grain companies have taken over the storage facilities of the grain monopoly that are located in their province, they have inherited a strong local position. Their main competition comes from grain companies in neighbouring provinces which may be hampered by lack of good transport or by local cooperatives or private firms which are likely to be hampered by a lack of modern storage. The response of the governments to this inherited local concentration of the grain trade has been indicative of the different orientation of the two governments. In the case of Hungary, there is no general antimonopoly law in operation, and no particular steps have been taken to assure competition in the grain trade. In contrast, Poland has passed an antimonopoly law and has created an aggressive antimonopoly office. One of the first targets of this office has been the state grain companies. In the name of reducing the regional concentration, it is dividing some of the provincial companies and at the same time privatising them. It is significant that this office appears to have as its goal the reduction of concentration per se rather than of assuring the contestability of these markets.

While the regional grain company's have the legal freedom to determine prices as they wish, there is evidence that this has not meant that prices were set according to a straight-forward commercial calculation. The company managers often come under a variety of pressures in setting prices, including those from employee management committees and representative groups of local producers. The result has been that a company may agree to set its acquisition prices relatively high to please producer groups but then refuse to buy any grain at those prices. Furthermore, there is evidence that the regional company's have not immediately sought to compete aggressively with their counterparts elsewhere. For example, in Poland in January 1990 the wheat purchase prices varied from \$62 per ton to \$114 per ton in areas separated by about 500 kilometers.²³ While transport costs can easily run to \$15 to transport a ton of grain within Poland, this dispersion clearly indicates a lack of complete arbitrage. It is not clear whether or not competition among the provincial grain companies would eventually eliminate these signs of inefficiency; however, their presence seems to indicate an incentive for new firms to enter the grain trade, providing they could have access to the storage, transport, and credit.

5.5 Since the approaches to liberalisation have been rather different in Hungary and Poland, it is not surprising that the experiences of adjustment led to different types of pressures and problems emerging. In Hungary, the approach has been to liberalise many but not all, of the domestic prices and to prepare the way for privatisation while at the same time keeping a number of controls on foreign trade. In particular, progress toward privatisation has been slowed by the political prominence of the Smallholders Party which is committed to returning the assets of those expropriated under the Communist Party. Potentially this could drastically affect the size and organisation of cooperatives and, to a lesser extent, the state farms. The net result of this is that change has come relatively gradually to the grain sector as has been reflected in relatively small fluctuations of grain prices relative to a broad index of prices. Tensions, if any, have been felt by those who are afraid that the process of transformation of Hungarian agriculture will become stalled.

In Poland the sudden liberalisation of almost all prices in 1989 translated into an immediate burst of inflation that had the effect of rapidly eliminating the cash overhang from the former system. The key aim of the Balcerowicz Plan was to combat inflation by raising interest rates to maintain positive real rates at all times, by retaining certain quantity controls on credit, and by imposing nominal anchors in the form of an excess wage tax and a targetted exchange rate. As a result, monthly inflation went from 79% for January 1990 to 1.8% in August 1990.

²³Source, Polish Government Statistical Office. The low price was for Olsztynskie province in northeastern Poland while the high price was for Rzeszowskie province in the southeast.

The effect of these measures on the grain economy were dramatic. First, the sharp increases of food prices led to a reduction in cereals consumption of about 5%. Demand appeared to drop even more dramatically; however, this reflected the aftermath of hoarding by households in the fall of 1989. Demand for commercial stocks undoubtedly fell somewhat in response to tight credit. Finally, during 1990 Poland received food aid from the EC and elsewhere under arrangements requested by the Polish government at a time that it feared unrest in the event of a too-sharp drop in living standards. The result of these factors was a very weak grain market. The price of wheat, relative to the consumer price index dropped by 40% in the first six months of 1990.

As a result of these development (and also because of similarly dramatic fluctuations in dairy sector) there was a political outcry against the devastation of the agricultural sector by the policy of rapid liberalisation. The rural wing of Solidarity began to increasingly speak with its own independent voice, and various farmers groups led strikes of increasing scale and effectiveness. A widespread demand was that the government set guaranteed minimum prices for major agricultural products and that these prices be based on average costs. These rural Solidarity calculated to be \$90 per ton for wheat.

The political response to the agricultural sectors demands were twofold. First, credits were extended to agriculture at the subsidised rate of 20% per year for loans over the second half of 1990 (at a time when non-subsidised rates were running at 4% per month). Second, the Polish parliament created a new, semi-independent Agency for Agricultural Markets (Agencja Rynku Rolnego). Parliament was vague as to the specific functions of this agency; however, it did charge it with the task of "...stabilising the farm products markets and protecting farm incomes..."²⁴ In the ensuing debate about how the new Agency should accomplish its task, the government insisted that it was not to provide a blanket guaranteed minimum price for agricultural products. In the search to find a way of reconciling the need for stabilisation with the desire to continue the transformation to the market, the government saw that the Agency might be able to promote private storage and therefore the growth of merchandisers outside of the state system through the use of deferred purchase contracts. When farm groups learned that such contracts would provide a basis of securing prices and when a preliminary schedule of forward prices indicated that prices would rise to their calculated costs by the spring of 1991, a compromise was struck. This was the basis of Poland's experiment with the creation of grain forward trading which we describe in the next subsection.

5.6 Prior to the Second World War, Hungary was a major grain supplier throughout central Europe and the Budapest Grain Exchange played a prominent role in that grain economy. In 1989

²⁴ The Law of June 7, 1990.

the Hungarian Agricultural Commodity Exchange (Termenytozsde, Kft.) was founded in the hopes of eventually restoring Budapest to its former position of prominence in the region. The initiative for the exchange came from the two leading agricultural banks and AGRIMPEX. One reason that commodity trading emerged so rapidly after liberalisation was that AGRIMPEX had regularly used the Chicago Board of Trade soybean meal contract for hedging Hungary's protein meal imports. This familiarity and the personal contacts so established were important in setting the initial direction.

The model for the Budapest exchange is clearly the grain market at the Chicago Board of Trade. There are two futures contracts traded, one for wheat and one for maize. The contracts call for physical delivery at a location south of Budapest. Prices are determined by open outcry in a pit which is open to exchange members only. Membership is gained by buying a seat on the exchange and is open to individuals only. This restriction is in the hopes of avoiding domination by the state-owned companies and of creating a core group of local floor traders who will provide liquidity. All trades pass through a clearing house. There is a system of initial and variation margins, the latter being assessed after the close of every trading session (weekly).

Trading began in early 1990. By June weekly trading was up to 1000 tons of wheat and maize combined. Volumes during the September harvest rose to about 3600 tons. However, this represented less than 3/100 of a percent of the total harvest. That is, the level of activity was non-negligible commercially; however, it represented only a tiny fraction of the commercial grain trade.

The experience of the Budapest exchange can be qualified a success in two respects. First, its prices quickly established themselves as the best indication of the conditions of supply and demand. They were used as references for off-exchange transactions. They were even used as references by the government office nominally in charge of collecting information about market conditions. Second, there were indications that new private merchandisers were using the futures market. That is, the futures market appeared to already facilitate the process of new entry into the business of storing and shipping grain. The main short-coming of the market was simply that encountered by most new futures contracts. Initially, it did not provide enough liquidity to be of practical use to large commercial users. As a result the market did not yet fulfill a large-scale hedging function. This is the most difficult problem of any new futures contract; at some stage it will be vital for large commercials to enter in order for the market to achieve a critical mass and to become a dominant factor in merchandising.

As described above, in Poland the initiative for forward trading in grains came from the Agencja Rynku Rolnego, a public sector body. It was born of a compromise between the desire to take decisive governmental action to improve the conditions of the grain sector and the equally strong desire to create the market and allow new enterprises to come into being. The result was a

hybrid of a dealer market-maker and a state intervention body that was seemingly without precedent.

In principle, the functioning of the agency's grain contracts is relatively simple. The basic contract is a forward merchandising contract that calls for the purchase of a specified type and quantity of grain at a specified future date. The problem of credit risk is handled by allowing only accredited storage companies to sell to the agency. Thus, sellers are assured of having storage, and grains in store can be taken as collateral to secure the forward trades. The grains plus the agency forward contracts can together provide the collateral which secures bank loans. Thus, the problems of default risk on the forward contracts and the problems of allowing firms with limited capital to have access to credit are solved as part of the same package, at least in principle.

The establishment of prices for the contracts is to be determined by the agency on the basis of three considerations:

- i. Prices for spot delivery should be at a slight discount to those available elsewhere thereby avoiding the problem of the agency holding significant amounts of physical grain;
- ii. Prices for deferred delivery should rise at a rate that reflects the cost of carry. The marginal allowance for carry is reduced progressively within the crop year as an inducement to dispose of grains into consumption channels;
- iii. The size of the carry allowance should be determined by the agency through the process of trying to hedge its book of forward purchases by selling forward to large commercial users, to exporters or possibly to foreign futures markets.

This last element may require a little elaboration. The simplest case would occur when the agency hedges the forward contracts it has purchased with an equivalent amount of forward sales to large processors or exporters. Typically, there will not be a perfect match between the purchases and sales. The agency would be obliged either to store the grains temporarily if the sales contracts mature after the purchase contracts. Alternatively, it may have to transport the grains to destination in the sales contract or to mix them to achieve the specific grade required. However, in any of these cases the agency could obtain an accurate estimate of the proceeds of the sale by deducting its storage, transportation, or processing costs from its negotiated sale price. In this way it can determine whether the net proceeds are above or below its purchase prices. If they are above, the agency deferred prices (but in view of (i) not the spot price) can be raised. If they are below, the deferred prices should be lowered to avoid losses. When hedging is done

in an international futures market, the same principle applies; however, in that case, it is necessary to forecast the expected change in the basis between the foreign futures market and the agency prices. In the absence of a forward foreign exchange market for the local currency, this implies taking a view on changes in the foreign exchange rate.

Through this mechanism, relatively small grain companies such as private farms or rural cooperatives would be provided a hedge that would give them a realistic alternative to simply selling to the provincial state grain company immediately at harvesttime. Furthermore, if the agency permitted the buying back of contracts and the rolling over into new contracts, many of the standard merchandising procedures employed in relation to futures markets would become available to Polish merchandisers. This would increase the flexibility and scope for entrepreneurial activity in this sector.

Beyond this, if proper hedging were implemented, it should be possible to obtain relatively accurate forecasts of the agency operating losses. These losses constitute a subsidy to support the markets involved by encouraging private storage in excess of the amounts that would prevail in a competitive (zero profit) equilibrium. Thus government support for the the operating budget of the agency forward mechanism would represent a subsidy for a sector while still respecting the functioning of the market and encouraging the growth of private merchandisers.

The implementation of this concept was extremely rapid, even by Polish standards. In June 1990 the agency was created. In July forward traded was discussed for the first time and was tentatively accepted. By the end of August, the first contracts forms were ready and the Agency announced its initial prices. By October it had signed contracts for the delivery of about 600,000 tons of wheat, barley, rye and tricale, that is, for about 10% of the commercialised grain in Poland! This demonstrated very convincingly the fact that, in contrast with the evolutionary process typical in the private sector, a government is able to short-cut the process of creating a market place if it makes it a priority to do so.

In other respects, the experience of the agency grain contracts was less successful and illustrates some of the risks of relying on initiative taken by a state institution. First, the agency was constrained in setting its prices by the fact that it was deemed necessary for the Council of Ministers to approve the price schedules. While this rule was in effect, it was virtually impossible for the agency to adapt its prices in light of evolving market conditions. Second, the agency contracts contained a clause that allowed cancellation of the contracts if mutually agreed upon by both parties. The contract itself did not specify the conditions under which the agency would cancel the contracts. If it allowed this only by having the seller buy back its contract at a price that would reflect the then current market conditions, these would become conventional forward contracts with secondary trading. In point of fact, the agency

allowed the cancellation of contracts without any penalty at all. In effect, it converted its contracts into put options for which no premium was charged. In so doing, it provided the sellers a guaranteed minimum price despite the initial decision by the government not to do this. Of course, this feature of the contracts was not fully understood at the time of signing, an example of the heritage of the ambiguities of the socialist contract. However, it now has established a precedent which will require specific action to remedy before a proper forward contract will be in effect.

Third, the agency took no steps to hedge its position as it made purchases through its deferred purchase contract. This was a reflected an anticipation that it would probably have a number of cancellations given the newness the contracting procedures that were employed. While this is reasonable, it illustrates the difference between hedging an unconditional forward contract and hedging a written option when no liquid market for the underlying asset exists. The consequence of not promptly hedging was that it had no assurance it could dispose of the grains without substantial losses. Finally, as the delivery date approached the agency simply took delivery of the grains rather than to change its price schedule to make it attractive either to buy back the contracts and sell grains on the cash market or to roll over into more deferred contracts. In retrospect it appears that the Agency was forced to sell much of the rye and triticale at a loss. Had it attempted to hedge earlier and had it found the market to have been weak, it should have revised its price schedule downward thereby establishing an incentive for merchandiser to buy back their contracts at a profit and to dispose of the underlying grains themselves.

Other initiatives taken by the agency further demonstrate its uncertain commitment to allowing the market to develop. As time has gone on, the potential powers of the agency have been recognised and producer groups are mounting political pressures to obtain greater protections through direct governmental interventions. For example, the agency has engaged in export subsidies for sugar and starch industries. The agency has engaged in buffer stock buying in the butter, wool, and honey spot markets and is planning to extend its buffer stocks to other markets that it feels are weak on a cyclical basis. The agency will likely receive from the former state grain monopoly, one million tons of storage facilities which represents approximately 20% of the modern storage in Poland. Finally, the agency is hoping to obtain government support for allowing it to implement a variable levy that would aim at stabilising the market in domestic currency terms at a level based on historical costs.

5.7 We can summarise these experiences in the management of price risks as follows. In adopting a gradual approach to liberalisation, Hungary has allowed inertia to slow the pace of transformation. The result have been relatively small swings in relative prices and relatively moderate political reaction to liberalisation of agriculture. In this environment, some enterprising organisations have initiated a futures market

closely following the Chicago grain market as a model. The market has made a promising beginning. However, it remains to be seen whether this institution will become the effective hedging vehicle that will be needed if and when the Hungarian agricultural sector is exposed to more substantial supply and demand shocks.

The Polish approach has been to liberalise drastically first and then to proceed in developing the necessary market institutions. This has prompted a significant dissatisfaction with the consequences of liberalisation for the agricultural sector. The government has responded to calls for stabilisation of the agricultural sector by creating a specialised agency with potentially great powers. The desire to promote increased market stability and promote the growth of the market has given rise to the introduction of an original forward contracting mechanism which has the potential to promote private merchandising and to channel subsidies to the market in a measured way. However, the public status of the administering agency has invited pressures from producer groups for using public funds for cruder forms of intervention to protect incumbent agricultural enterprises. It remains to be seen whether stabilisation based on public sector storage will become the dominant tool and whether renewed routine subsidies will slow the pace of adjustment of the agricultural sector. However, the comparison with the Hungarian experience seems to indicate one tentative lesson. Were there a clear consensus to introduce into Poland a futures market using the established markets elsewhere as models, a good deal of the internal conflict about the design of Poland's approach to managing price risks would be avoidable.

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Appendix 1

In this appendix we present some statistics on maize prices as an example of problems of non-stationarities and excess kurtosis in commodity prices.

The data are monthly, Chicago 1st position maize futures prices from 1967 to 1988 (237 observations). In the econometric estimates log prices are used. In the first instance no seasonal dummies were employed and a general to specific modelling process resulted in a final equation with only 1 lag as follows:

$$m_t = 0.177 + 0.968 m_{t-1} \\ (0.793) \quad (0.015)$$

DW = 2.05, $R^2 = 0.949$, $F(1,237) = 4412.46[0.0000]$, $e = 0.07379$ skew = 0.403, excess kurtosis = 3.772, Chi-Squared 2 degrees of freedom normality test = 146.33. Where m is log maize price.

These estimates imply (i) a very high degree of serial correlation and (ii) excess kurtosis. Tests on non-stationarity reveal the DW, Dickey Fuller, (DF) and Augmented Dickey Fuller, (ADF) statistics as follows,

DW	0.0520
DF	-2.2874
ADF	-2.2379

These all fail to find stationarity of log maize prices. An analysis of a possible seasonal representation using monthly dummies showed some evidence of seasonality but the incorporation of these dummies did nothing to diminish the serial correlation nor the excess kurtosis.

Tests on log changes in maize prices reveal the following final equation,

$$dm_t = 0.0033 - 0.966 dm_{t-1} \\ (0.0048) \quad (65.846)$$

DW = 2.00, $R^2 = 0.002$, $F(1,236) = 0.38[0.5368]$, $e = 0.7459$ skew = 0.375, excess kurtosis = 3.798, Chi-Squared 2 degrees of freedom normality test = 147.404. Where dm is the change in log maize price.

These final results show very little serial correlation in log changes of prices and the DW statistic indicates stationarity of log first differences. The standard deviation of the log changes is roughly 8% and there remains significant excess kurtosis associated with these price changes.

Appendix 2

In this appendix we present results from a simulation exercise. We concentrate on the case of a stabilisation program where there is a world price, w , and a domestic price, d , and assume the presence of a government agency that follows a rule to fix the domestic price relative to world prices. For convenience we take the case of an export commodity and hence the agency could be thought of as a marketing board or indeed it could be considered as the government pursuing a policy of variable export taxes and subsidies. To make things simple we ignore the quantity effects. Our focus is then on the price setting rule.

Moving average type rules are often employed in this context and hence this is certainly one rule we wish to simulate. It is often stated that the moving average is a good rule to follow in the case of stationary prices or trend stationary prices. However, as has been emphasised in the text, many commodity prices exhibit non-stationary behaviour (or at least mean-reversion is very weak) and also display excess kurtosis (perhaps due to jumps) see Cuddington and Urzua (1990) and Deaton and Laroque (1990). Here we concentrate on non-stationary behaviour and to make things simple our first assumption is that prices follow a simple random walk. But this does nothing to explain the kurtosis statistics that are normally associated with commodity price movements. Hence we also consider a process that is a random walk plus infrequent jumps. The arrival of the jumps follows a Poisson process with a specified arrival probability. This process is sometimes referred to as the jump-diffusion process.

To fix ideas consider the case where the world price follows a random walk which may be specified as follows,

$$w_t = w_{t-1} + \mu + \phi_t \quad 1$$

where w is the world price in logs, μ is a constant (drift) term and ϕ is a random component with mean zero and standard deviation σ .

Now assume that the government wishes to set the domestic price, d_t , and maintain some stability in price setting. Note that the random walk behaviour of w implies that the best guess of the long term price is always the current w (adjusted for the drift component). If we assume that the drift is zero and there are quadratic costs to adjusting d through time then a partial adjustment updating rule for d can be shown to be optimal.

Namely,

$$d_t = (1-\beta)w_t + \beta d_{t-1} \quad 2$$

Note that this may also be expressed as a type of moving average rule with exponentially decreasing weights,

$$d_t = (1-\beta)(w_t + \beta w_{t-1} + \beta^2 w_{t-2} + \dots + \beta^n w_{t-n}) + \beta^n d_{t-n}$$

Gilbert (1990) notes that a simple moving average might be considered as an approximation to this 'optimal' program and indeed concludes that in most cases this would be satisfactory. Gilbert (1990) also notes that to ensure a good approximation there is a rule about how many periods the moving average should use as a function of the β parameter in the specification above. Namely,

$$n = (1 + \beta)/(1 - \beta) \quad 3$$

Thus, if $\beta = 2/3$, then $n = 5$ and if the period we were considering were in years, then a 5 year moving average should be used. Note that β actually comes from the quadratic adjustment cost specification

In our simulations below we consider the performance of these two rules, (a) the simple moving average rule and (b) the partial adjustment for a random walk process but we add one more complication. We include the possibility of a jump component in the data generation process. In other words, we use a specification,

$$w_t = w_{t-1} + \mu + \phi_t + J_t \quad 4$$

where J is a jump term and, with probability, k , $J = Y$ where Y has a distribution of mean zero and standard deviation of δ and with probability $1-k$, $J=0$. Thus, k controls the probability of a jump occurring and δ the size of the jump. The total variance is calculated as $\sigma^2 + k\delta^2$.

In the simulations we employ assumptions that are reasonable for a commodity such as maize. We assume a total variance of 0.01 (and hence standard deviation of 10%) and a value of $k = 0.1$ (10%). We set the adjustment parameter in the partial adjustment to $2/3$ and use a 5 year moving average. We then consider three cases as follows,

- 1 where there is no jump component ($\delta=0$)
- 2 where the jump term accounts for 33.3% of the total variance $\delta^2/(\sigma^2 + \delta^2) = 0.333$
- 3 where the jump term accounts for 66.7% of the total variance $\delta^2/(\sigma^2 + \delta^2) = 0.667$

In each run we simulate 48 periods (which might be thought of as years) and we repeat this 50 times for each case. We concentrate on two types of statistics from our simulations (a) measures of the 'stabilisation' achieved and (b) measures of how likely a stabilisation scheme will run into financial difficulty. For the first type we use the coefficient of variation. The degree of stabilisation achieved is given as the reduction in coefficient of variation divided by the original coefficient of variation. But also we use the standard deviation of price changes. Where the degree of stabilisation achieved is expressed as the difference between

the new and old standard deviation divided by the original standard deviation. Note that strictly the standard deviation of price changes is more meaningful given that w is non-stationary.

For the second type of statistic, consider a government agency buying the export commodity at price d_t and selling at price w_t . Then, assuming a fixed quantity, Q , is always produced, the profit will be related to $Q(w_t - d_t)$. Through time the profit will be related to, $Q \sum (w_t - d_t)$. We refer to this as Q times the cumulative price difference. We can normalise Q to equal 1 or perhaps more simply our results can be expressed per unit quantity of commodity. Through each run the maximum loss to the government agency (the maximum amount of resources that is necessary to keep the agency solvent) is recorded and the average across all runs of this maximum calculated. This represents the expected, maximum amount of resources that would be required to maintain the government agency per unit quantity.

An alternative measure is also used as follows. Assume that there is a fixed maximum amount of resources available (per unit quantity). The number of runs out of the 50 runs in each case that this maximum is violated is also recorded.

Before we move to the statistical results it is, perhaps, possible to predict the results from a number of figures. First of all consider the three graphs Figs 2, 4 and 6. These illustrate one actual run, for each of the assumptions concerning the importance of the jump component stated above. Each figures illustrate one simulation of the world price, w , and the smoothed domestic price, d , calculated as (i) a five year moving average and (ii) a partial adjustment.

The patterns of adjustment of the smoothed domestic price are of considerable interest. Note how in these non-stationary series the moving average always takes a much longer time to catch up to the new level of the world price relative to the partial adjustment. Secondly, note that as the jump component gets more important (it is clear from the graphs when a jump has occurred) this problem gets more and more acute.

Now consider Figs 3, 5 and 7, which graph the cumulative price differences introduced above. Here the main results are amply demonstrated. In particular note that the maximum amount of resources required to run the moving average scheme tends to be greater than that for the partial adjustment. And when the jump component increases in importance then the maximum amount required also increases.

Now we turn to the statistical results which serve to back up these predictions from the graphs of a single run. Table A2.1 gives the results.

Table A2.1 -- Summary of Results

The Degree of Stabilisation Achieved

	Jump Process 0% of Total Variance		Jump Process 33.3% of Total Variance		Jump Process 66.7% of Total Variance	
	M.Avg.	P.Adj.	M.Avg.	P.Adj.	M.Avg.	P.Adj.
Using CVN,	6.9%	2.8%	7.4%	2.6%	8.5%	3.0%
Using STD % CH.	61.0%	29.9%	62.4%	30.7%	64.3%	31.3%

Financial State of Fund

	Jump Process 0% of Total Variance		Jump Process 33.3% of Total Variance		Jump Process 66.7% of Total Variance	
	M.Avg.	P.Adj.	M.Avg.	P.Adj.	M.Avg.	P.Adj.
AVG Max. Required	1.41	0.31	1.86	0.39	3.23	0.69
No of Times Maxium Violated	6	0	12	0	19	2

Referring to the Table a number of observations are of interest. First of all, it is true that the moving average method produces a higher degree of stabilisation. This is true whether measured as a reduction in the coefficient of variation or as a reduction in the standard deviation of the percentage change and is true whether the process has an important jump component or not. Indeed, for the parameter values chosen here about double the reduction in the standard deviation is achieved. However, this is at a significant cost. The expected maximum amount of resources required to run a moving average program is 4 to 5 times greater (per unit quantity). In our runs we set the critical value of maximum resources available as 3 currency units/unit quantity (this might be thought of as \$3/unit quantity). In this case the moving average scheme 'went bust' a startling number of times. However the partial adjustment scheme only went 'bust' twice and both times when the jump component accounted for 66.7% of the total variance.

In brief, moving average schemes may provide more stabilisation than a partial adjustment. But, this is achieved only with a greater degree of resources available or for any fixed amount of resources available are likely to go 'bust' much more frequently.

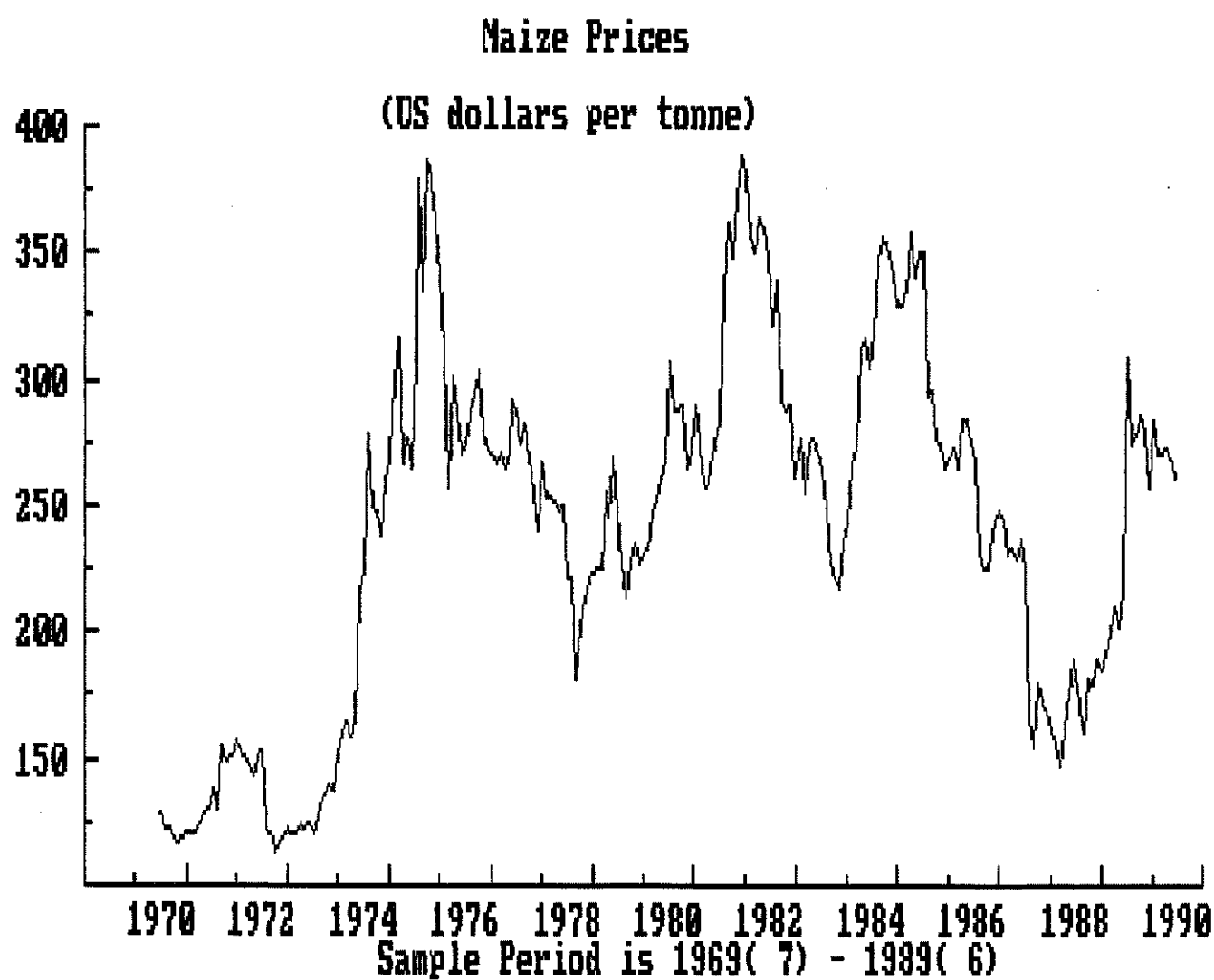


Fig. 1

Fig. 2 World Price and Smoothed Prices

Jump Component is 0% of variance

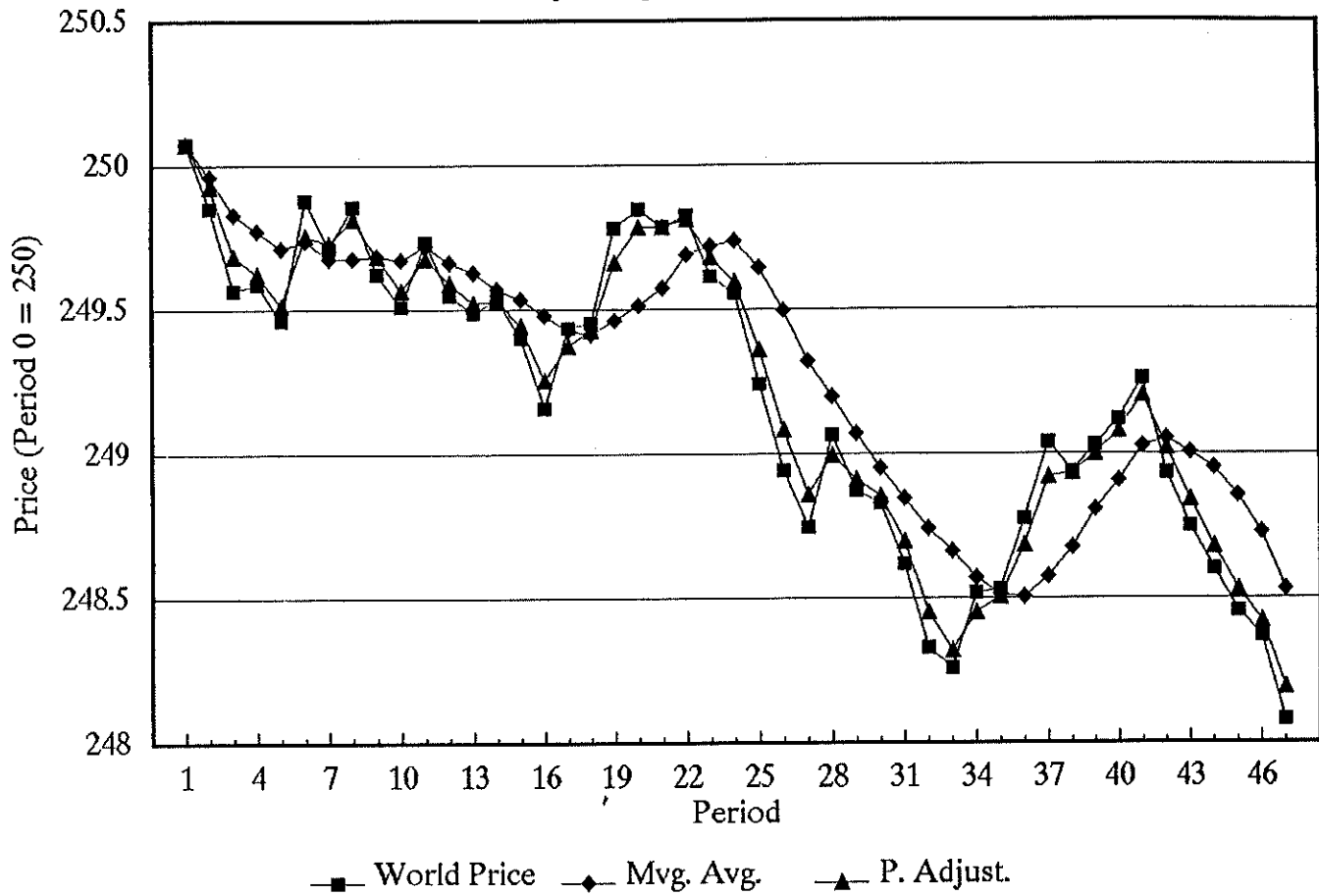


Fig. 3 Cumulative Price Difference

(Resources Required per Unit Quantity)

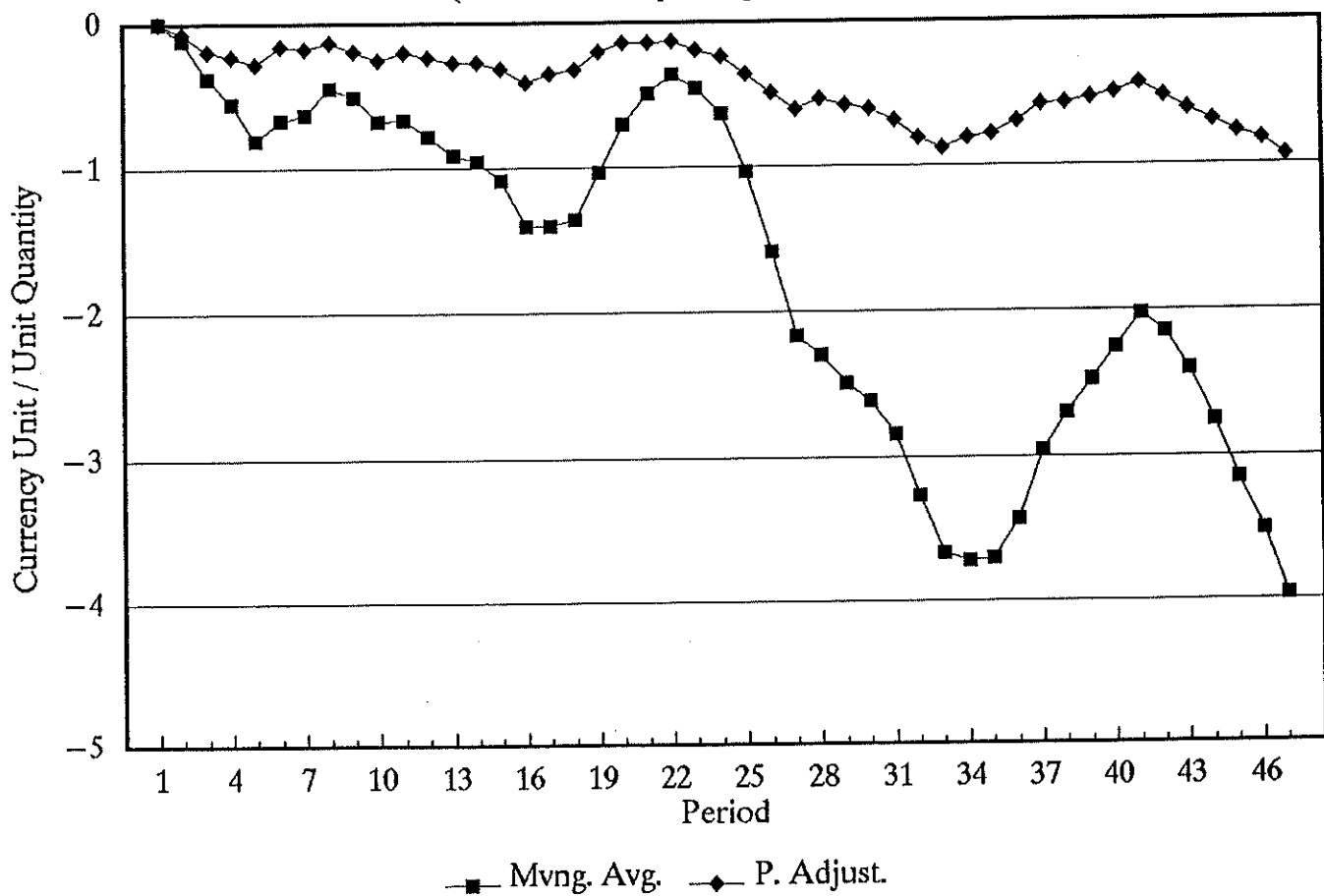


Fig. 4 **World Price and Smoothed Prices**

Jump Component is 33.3% of variance

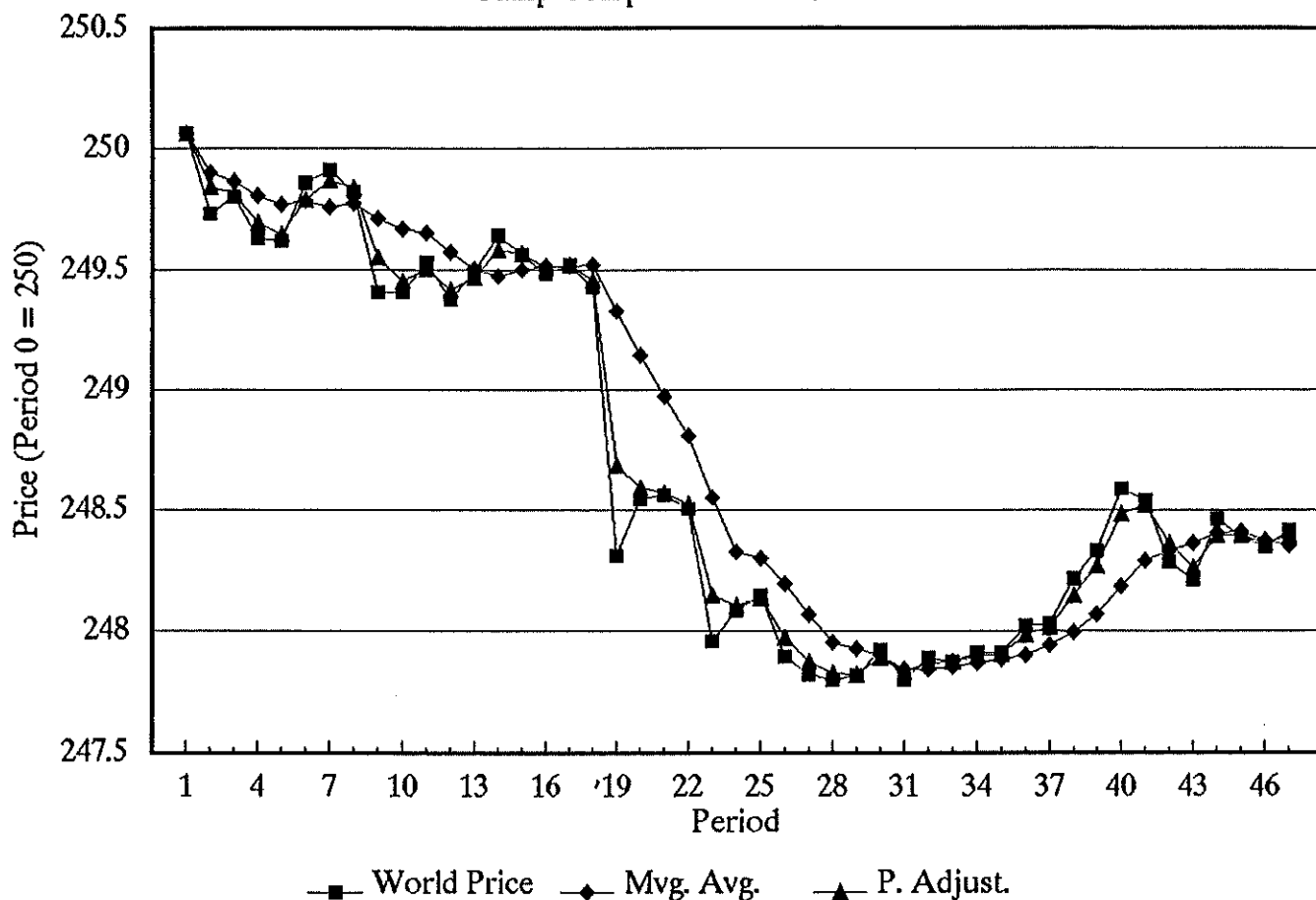


Fig. 5 **Cumulative Price Difference**

(Resources Required per Unit Quantity)

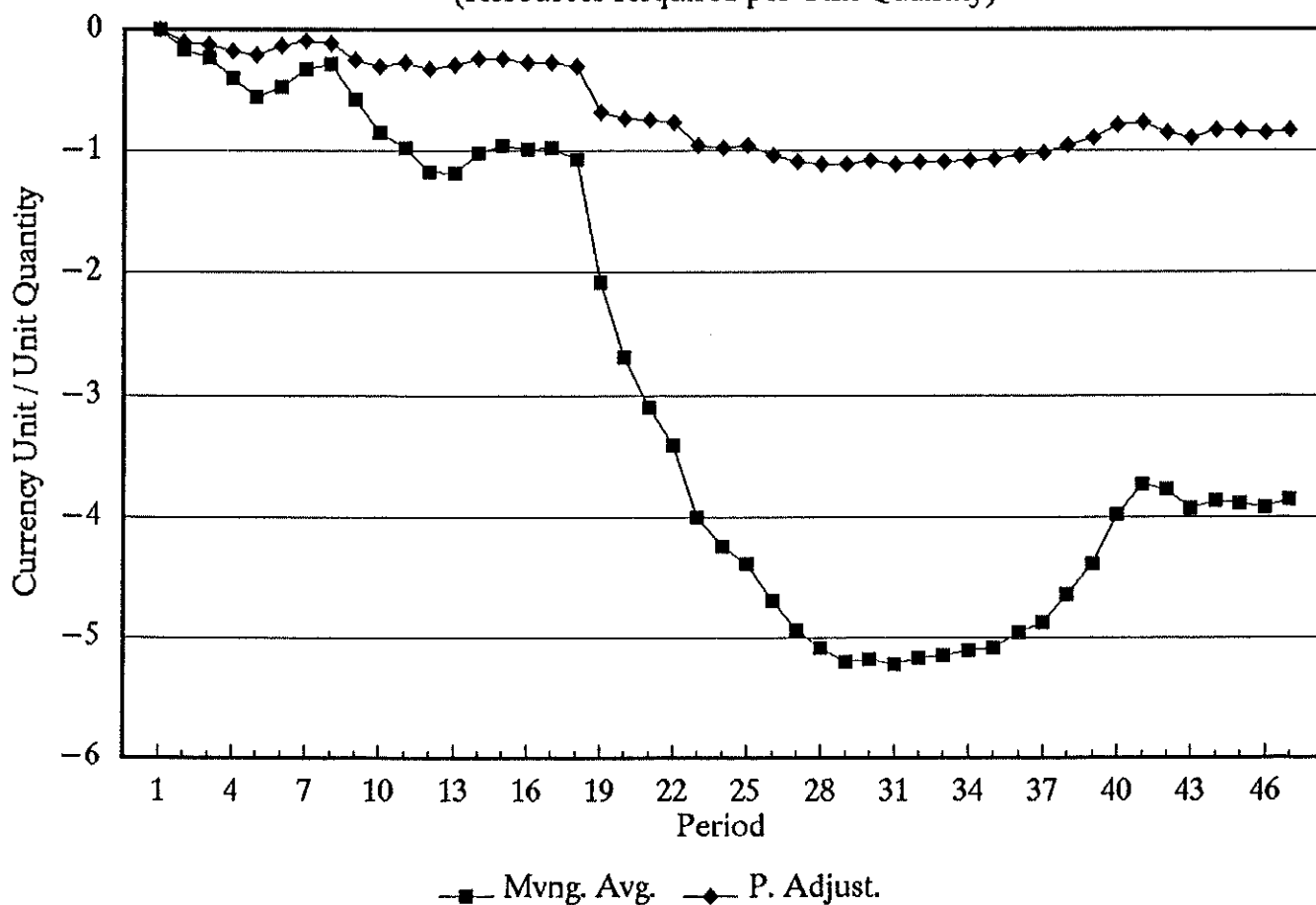


Fig. 6 **World Price and Smoothed Prices**
Jump Component is 66.7% of variance

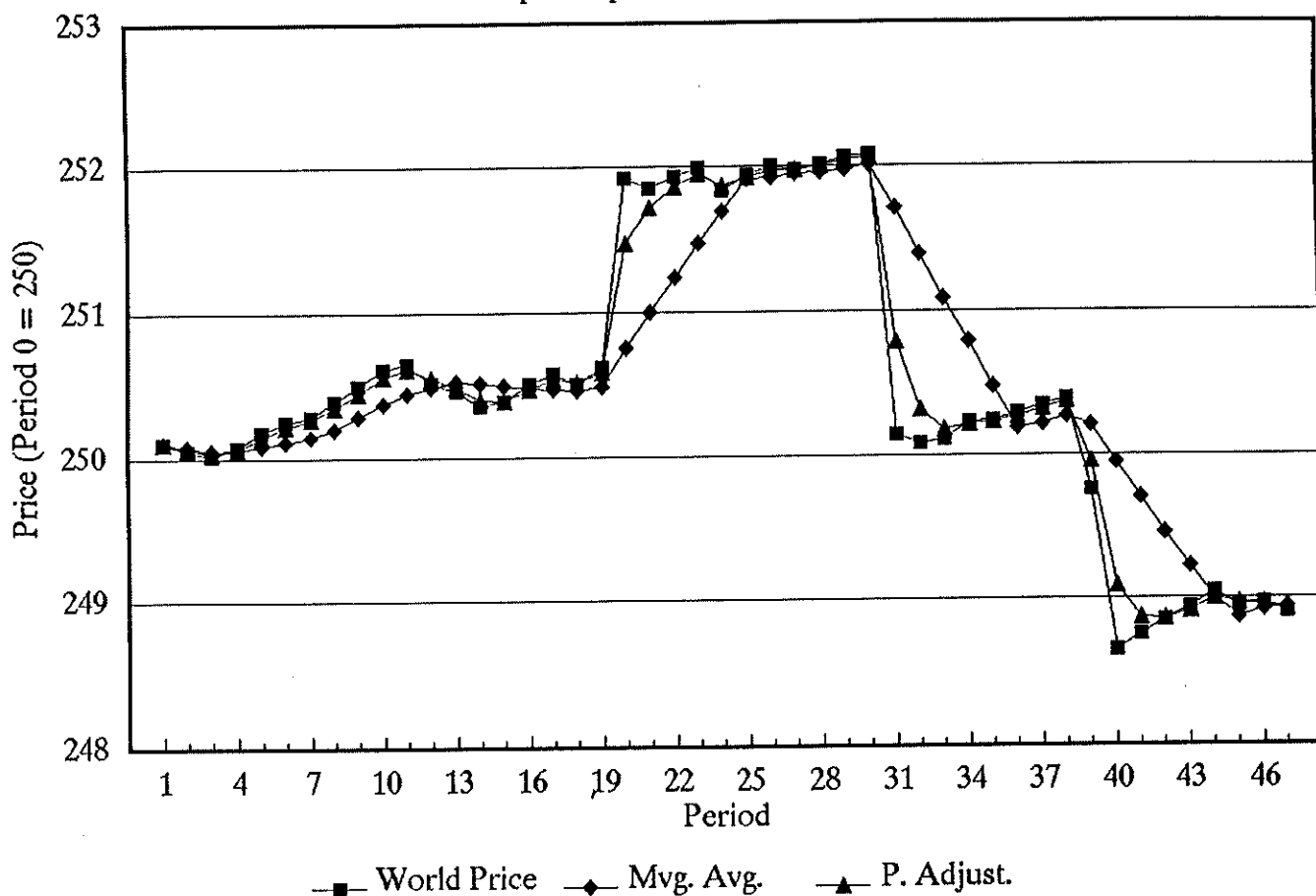


Fig. 7 **Cumulative Price Difference**
(Resources Required per Unit Quantity)

