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Trade, Uncertainty and New Farm Programs

by

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Luther Tweeten*

I have contended for some years that the principal economic problem facing commercial agriculture is instability (Tweeten 1989, p.30). Instability potentially threatens not only farmers' financial viability but also consumers' food security, given the desire for stable food consumption in the face of production destabilized by man and nature.

Some observers expect instability to be a more pressing food security problem because of global farm policy liberalization (see Johnston and Schertz, p.24; for an alternative view see Collins and Glauber). Trade policy and farm commodity policy are inextricably linked. This paper recognizes that both types of policies are causes and cures for economic instability.

The paper begins with an examination of the contribution of two key variables, yields and exports, to economic volatility in agriculture that could influence the need for commodity program stabilization policies. Trends in annual yield volatility give clues whether changing technology is affecting food system stability over time. The second section of the paper quantifies sources of food system variability in the United States. Emphasis is on the role of exports as a stabilizer or destabilizer of that system.

Finally, the paper expands its scope to examine instability and public policy considerations within the new paradigm for American agriculture which I have outlined in another paper with Carl Zulauf (Tweeten and Zulauf). The concluding section raises serious

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concerns over consequences of political pressure for higher commodity loan rates and for crop and revenue insurance programs featuring larger public income transfers from taxpayers to farmers.

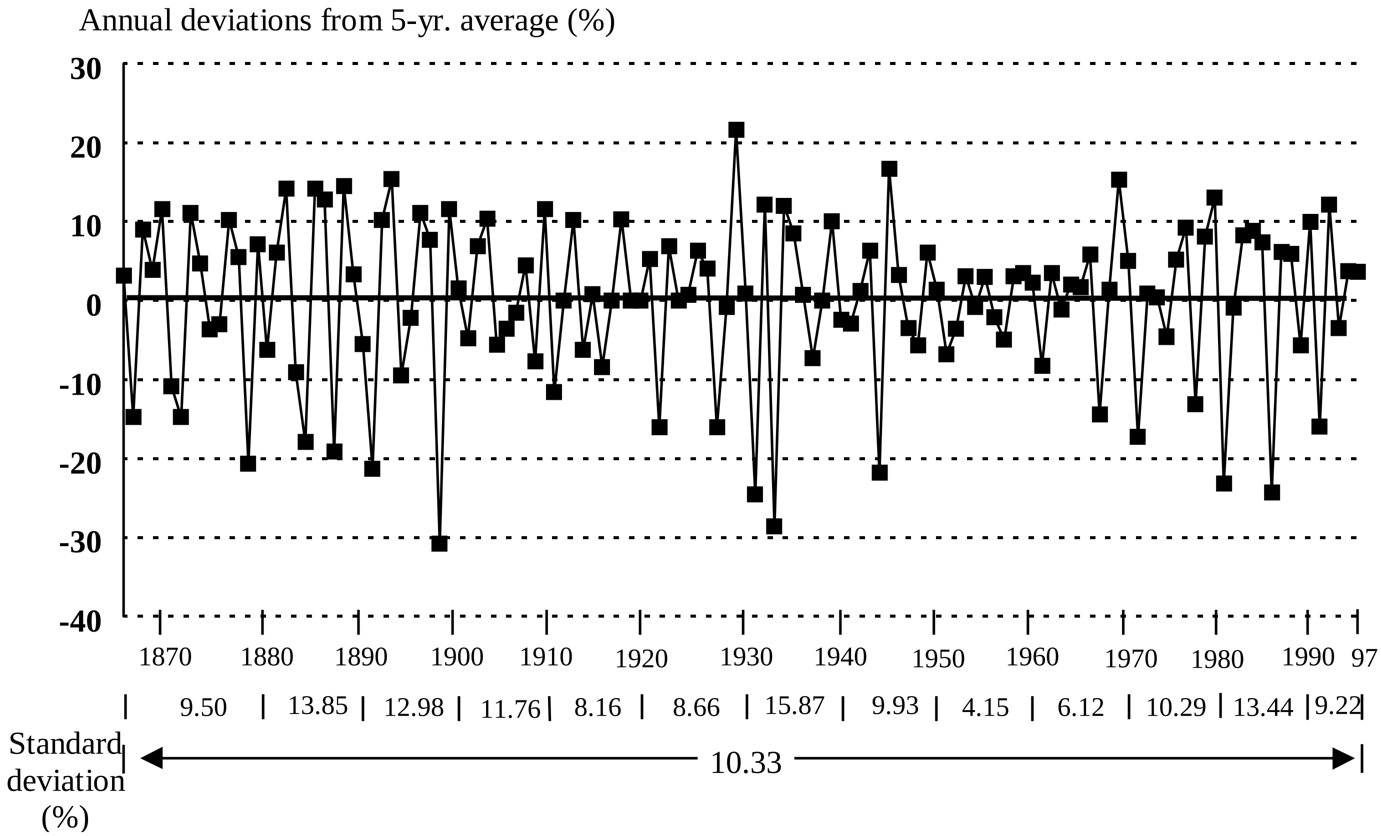
Are Yields Becoming More Unstable?

The major source of annual food production volatility is yields. Nations may be less willing to depend on markets to cope with risk if yield volatility is rising due to high-yielding varieties, monoculture relying on a narrow range of genetic stock, extension of crops to marginal lands, global warming, or El Niño and La Niña cycles. The hypothesis that high-yielding varieties display relatively greater yield variability was rejected in an earlier study by Hazell (1985). Later, he (1993, p.42) concluded, however, that yields have become more variable and more correlated among regions. Correlated yields arose from common genetic stock in high-yielding varieties, similar widespread management practices used to improve yields, and production narrowed to a few crops.

On the other hand, conventional and bioengineered breeding has produced drought, pest, disease, and frost resistant varieties expected to help stabilize crop yields. Whether forces for stabilization offset forces for volatility is an empirical question.

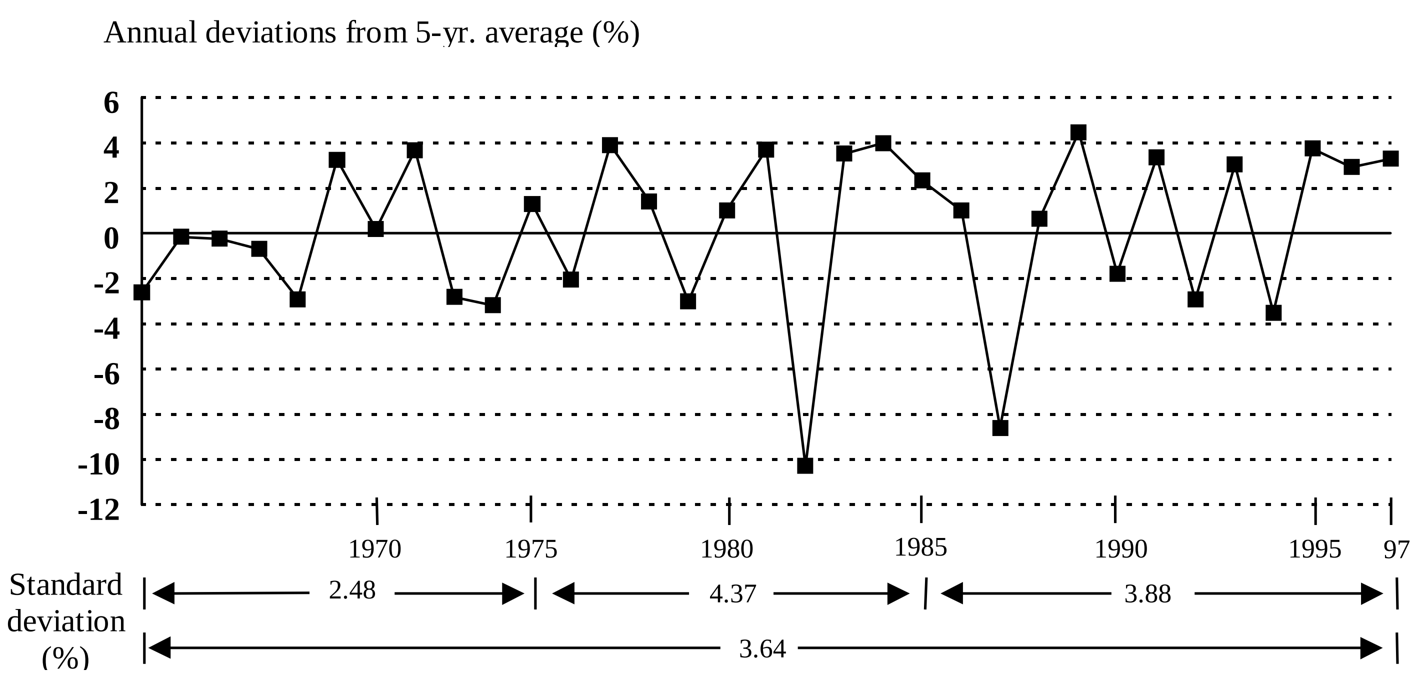
Figures 1 and 2 provide clues. US corn yields shown in Figure 1a have been more volatile since 1980 than in the 1950s and 1960s as measured by standard deviations (in percent) from five-year centered average yields. Standard deviations since 1980 have been similar to those of decades prior to the 1950s, however. Thus the stability of yields in the 1950s and 1960s rather than the volatility of yields in recent years appears to be exceptional.

Figure 1a. US corn yield deviations from five-year centered averages from 1868 to 1997.



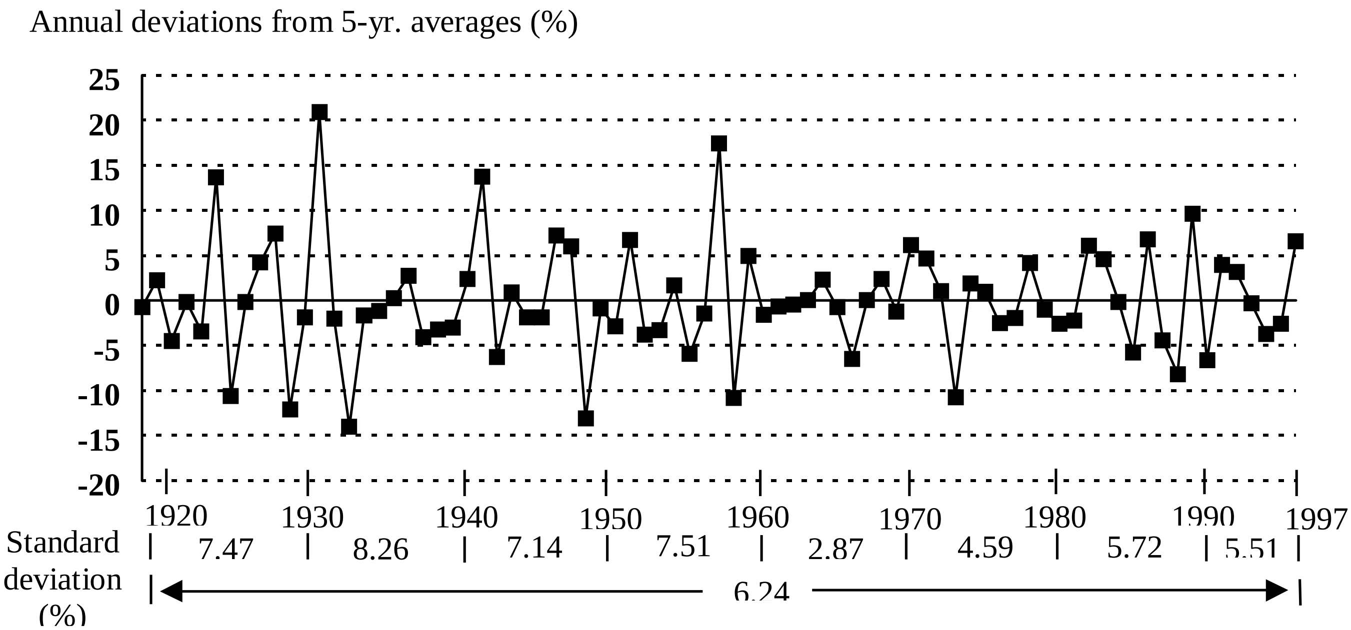
Source: FAO

Figure 1b. World coarse grain yield deviations from five-year centered averages from 1961 to 1997.



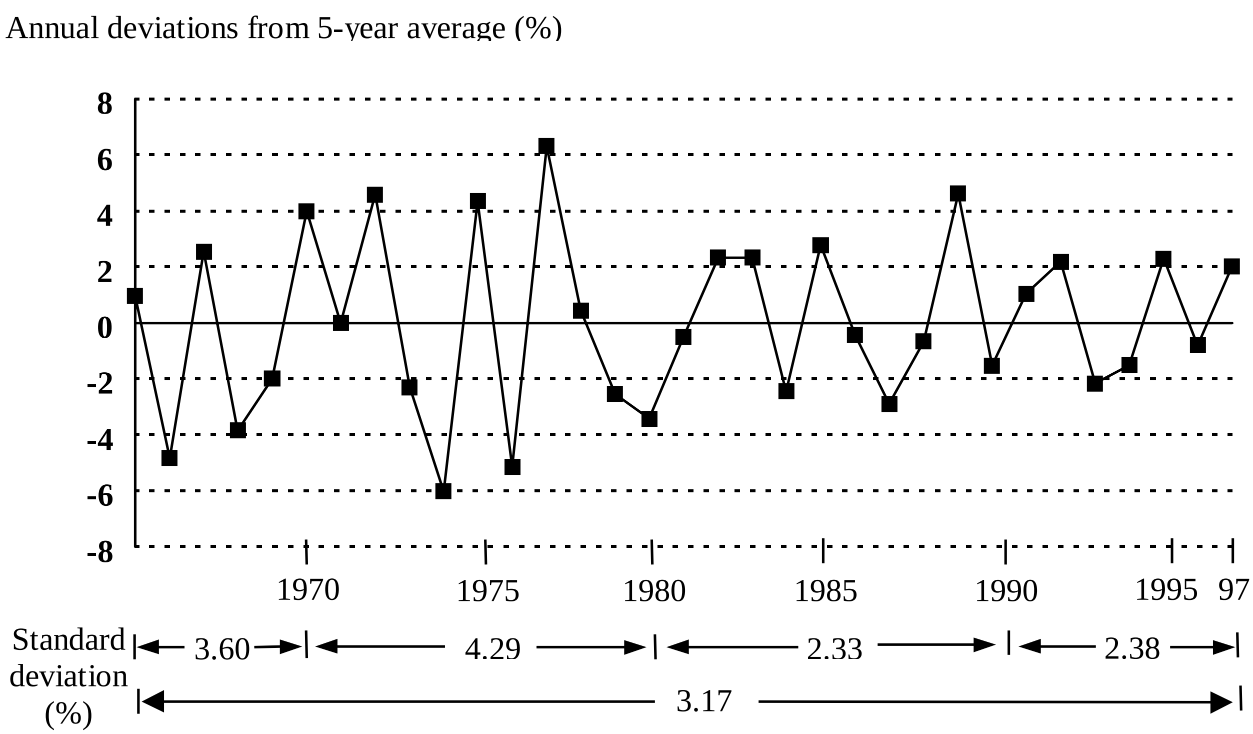
Source: FAO

Figure 2a. US wheat yield deviations from five-year centered averages less from 1919 to 1997.



Source: FAO

Figure 2b. World wheat yield deviations from five-year centered averages from 1965 to 1997.



Source: FAO

World coarse grain yields were available only since 1961, but show no patterns of rising variation in recent years (Figure 1b). Major deviations occurred in 1983 and 1988 mainly due to drought in the United States which is the major global coarse grain producer.

US wheat yield variation has been less since 1980 than in previous decades with the exception of the 1960s and 1970s (Figure 2a). At the global level shown in Figure 2b, wheat yield variation seems to be declining, with the decline most pronounced compared to the 1970s.

FAO data indicate that annual global aggregate food production is remarkably stable, with a coefficient of variation from trend of approximately 1 percent--a number that has not varied much over several decades. Thus open trade to extend this global stability to individual countries can go far to mediate the need for stable food consumption in every country in the face of unstable annual food production. More open trade may compensate in part for falling global commodity stocks in recent years especially because of reforms in US and EU agricultural policies.[1] Many view open trade as economically destabilizing and a threat to food security. This issue is addressed for the US in the next section.

Contribution of Farm Exports to US Agricultural Industry Instability

Expected commodity stock carryout may be the best single predictor of commodity price, hence variation in stocks explain variation in commodity prices. Sources of requirements for buffer stocks indicate origins of instability in agricultural markets. Of particular interest is the contribution of exports to market instability.

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[1]Although there is little evidence that public management of commodity stocks or trade can be more efficient than private market stockholding and trade management in meeting needs of people for food and other goods, some may desire an emergency food reserve such as the 4 million ton US government grain reserve maintained to respond mainly to emergency food needs in developing countries.

The contributions of farm production (O), domestic utilization (D), and net US farm exports (X) to instability are quantified for the nation's total agriculture and for feed grain, soybean, and wheat markets in Tables 1 and 2. Changes in buffer stocks (R) of commodity *i* are defined as

$$Ri = Oi - Di - Xi. \quad (1)$$

Estimated variance in buffer stocks S^2 (R*i*) is thus

$$S^2(Ri) = S^2(Oi) + S^2(Di) + S^2(Xi) - 2S(Oi \cdot Di) - 2S(Oi \cdot Xi) + 2S(Di \cdot Xi). \quad (2)$$

A high $S^2(Ri)$ indicates an unstable system requiring substantial buffer stock (at considerable cost) for stability. The hypothesis that exports destabilize agriculture can be tested from empirical expressions of equation (2). Exports (X) are stabilizing if they increase to offset increased supply (production, O) or reduced domestic utilization (D), other things equal. On the other hand, exports are destabilizing (require more buffer stocks for stability) if increasing exports are associated with lower production or higher domestic utilization. If exports are unrelated to domestic production and utilization so $S(Oi \cdot Xi)$ and $S(Di \cdot Xi)$ are zero, then the contribution of exports to the need for buffer stocks is simply $S^2(Xi)$, the estimated variance of exports. The role of markets in mediating the impact on stock requirements from changing exports and production cannot be fully defined in one equation, hence equation 2 is only a simplified depiction of the market stabilization process.

Clues to the role of exports in stabilizing US consumption can be gleaned from the simple correlation between exports and production. A positive correlation coefficient between exports and production indicated by the negative covariance term $-2S(Oi \cdot Xi)$ in 16 of the 20 scenarios presented in Tables 1 and 2 suggests that on the whole exports helped to stabilize consumption in the face of unstable production, other things equal.

Of the three components (O, D, X) of system instability considered in Tables 1 and 2, the greatest *relative* instability as measured by the coefficient of variation comes from exports with exceptions only for wheat in 1970-79 and 1990-98. Because exports are small relative to domestic production and utilization, however, *absolute* direct variation as measured by estimated variance Si^2 was least for exports for all cases and time periods except for US aggregate markets in 1980-96, for feed grains in 1970-79, for soybeans in 1980-89, and for wheat in 1950-69 and 1980-89.

Interactions between production, utilization, and exports apparent in covariances offset much of the direct contribution of O, D, and X to instability. Hence the estimated variances in buffer stocks in all instances in Tables 1 and 2 are well below the sum of the direct variances Si^2. Much of the reduction in system variation from interactions resulted from the preponderance of negative covariances between production and domestic utilization $S^2(Oi \cdot Di)$ which probably traces to the tendency for high production to generate low prices and high consumption.

To further gauge the contribution of exports versus domestic production and utilization to system instability, the estimated variance of buffer stocks was divided into a component for exports $[S^2(Xi) - 2S(Oi \cdot Xi) + 2S(Di \cdot Xi)]$ and all other sources $[S^2(Oi) + S^2(Di) - 2S(Oi \cdot Di)]$. The results shown in the last two rows of Table 1 and 2 indicate that 61 percent of the system variation measured by $S^2(Ri)$ came from exports for the US aggregate farm economy in the 1950-59 period, and 59 percent of wheat system variability came from exports in the 1960-69 period. For all other periods and crops (18 out of 20 cases), most or all of the system net variation as measured by $S^2(Ri)$ arose from domestic production and utilization.[2]

[2] It is not possible to precisely separate variation in X*i* from O*i* and D*i* due to interactions. For example, shifting the terms $-2S(Oi \cdot Xi)$ and $+2S(Di \cdot Xi)$ from exports to "all other sources" would have changed the numbers in the text.

Statistically Appropriate Stocks

The calculations in Tables 1 and 2 also give insights into statistically appropriate buffer stock requirements over time--which may rise if exports or other variables become more volatile. Volatility as quantified by $S^2(Ri)$ increased in aggregate from $5 billion in 1950-59 to $38 billion (1982 dollars) in 1980-89 due mainly to production and utilization variability. For all items shown in Tables 1 and 2, $S^2(Ri)$ was greatest since 1980.

Two standard deviations ($2S(Ri)$) of buffer stockholdings presumably avoid a shortfall of stocks to protect against high utilization or exports and/or low production except one out of 50 years, assuming a normal distribution, constant economic structure, and market separability. Another standard deviation is added to cover pipeline stocks necessary for markets to function aside from seasonal and buffer stocks. This calculation indicates that statistically appropriate US stocks in 1990-98 for this arbitrarily specified level of food security were 82 million metric tons of feed grains, 527 million bushels of soybeans, and 1,041 million bushels of wheat (Tables 1 and 2). While these stocks were *absolutely* higher than in most previous periods, they were not necessarily higher as a proportion of the mean utilization. The later *relative* value was especially high for feed grains in the 1980-89 decade (107 percent) and for wheat (nearly 100 percent) for the 1980-89 and 1990-98 periods. The percentage was only 9 percent for aggregate agriculture in the 1970s despite the sharp rise in exports.

While numbers varied among the individual commodities in Tables 1 and 2, a consistent pattern of variability in stock requirement related to trade is not apparent. The most notable conclusion is that most system variability traces to production and domestic use rather than to exports.

Economically Appropriate Stocks

The data in Tables 1 and 2 suggest *statistically* appropriate buffer stock levels to avoid shortages 49 out of 50 years, *ceteris paribus*, but of greater interest is *economically* appropriate stock levels. Studies by Makki et al. (1996; forthcoming) of efficient wheat markets provide several conclusions:

1. Under the most reasonable ranges of real interest rates and coefficients of variation in exports and utilization, the economically optimal US carryout of wheat is approximately 400 million bushels--150 million bushels of buffer stocks and 250 million bushels of pipeline stocks. These carryouts are below numbers presented in Table 2 and below actual average carryouts in recent decades which have been inflated by government holdings. Thus market liberalization in farm policy embodied in the Federal Agricultural Improvement and Reform (FAIR) Act of 1996 can indeed be expected to bring lower carryovers and may bring greater variation in grain prices.

2. Optimal US wheat carryout stocks and domestic consumption increase modestly with unilateral and multilateral liberalization of wheat markets including a $.50 per bushel reduction in Export Enhancement Program (EEP) payments. Exports fell because the EEP subsidy ended. A direct payment was estimated to be more cost effective than EEP to raise farm income.

3. According to results of the efficient market model employed by Makki et al. (1996), storage and trade offer tradeoffs in smoothing domestic prices and consumption in response to domestic and foreign supply variation attending a more market oriented agriculture. Rational market agents store more and export less when production

uncertainty increases, and store less and export more when production uncertainty decreases.

4. An optimal balance of two principal buffers--stocks and trade--in a country depends partly on its share of world markets. The small country optimally relies on trade, holding only enough stocks to last until imports arrive when local production falls short. Large "countries" such as the European Union and the United States optimally rely more on buffer stocks. Models show optimal buffer stocks increase as the share of international production variability of the large country increases (Makki et al., forthcoming, Figure 4).

5. The US and EU gain from more open markets even after accounting for the possible need for more buffer stocks with trade liberalization in wheat. Gains to taxpayers and consumers more than offset losses to producers so that annual overall economic gains to the US were $394 million and to the EU were $357 million with multilateral liberalization versus 1989-93 policies (Makki et al., 1996, p.887).

6. Each 1 percentage point increase in the interest (discount) rate reduces optimal buffer stock approximately 11 percent (Makki et al., forthcoming, Table 3). Thus the public sector with a real discount rate on capital of approximately 3 percent has a lower storage cost and price volatility and a higher optimal buffer stock than the private sector which had a discount rate of 7 percent.

7. Tyers and Anderson estimate that trade liberalization would reduce the coefficient of international price variation for dairy products to 7 percent from 16 percent and for wheat to 30 percent from 45 percent. Although trade liberalization made possible by the FAIR

Act offers opportunities to reduce volatility of world prices, lower government stocks and set asides may raise domestic price volatility.

8. Developing countries do not necessarily fare well with liberalization of US and EU policies. The US and EU have provided less developed countries (LDCs) with very cheap grain. However, market liberalization providing higher prices to LDC grain producers coupled with liberal access to global markets for many farm and nonfarm products of developing countries could compensate LDCs for losses to consumers.

In concluding this section, I note that the United States bore an inordinate share of the cost of world food market stabilization prior to 1996 (see Sharples and Martinez, p.18), a cost it no longer seems willing to bear. Because of high incremental costs of stabilizing food consumption and prices, complete stabilization of the food economy is not economically justifiable for either the public sector or private sector. The drop in world grain stocks in recent years has generated fears of global food crises under more market oriented agricultural policies. However, it is notable that the most recent world food crises came in 1966-67 and 1972-73 when government interventions were massive. Although reserves and stabilization may be less under the 1996 FAIR Act than under earlier policies, markets may be doing a more efficient job of stabilization—“bending” but not “breaking” into a world food crisis. The situation needs to be monitored for possible improvements, but there is no compelling need to stall trade and farm commodity program liberalization on the grounds that rising yield volatility and freer trade pose food security risks.

The Foundation for New Farm Program Directions

This section examines directions for new farm programs in an unstable world. Before turning to program provisions, however, I review 10 salient characteristics of the American agricultural economy that will influence trade, stability, and policy. They provide a foundation for commodity policy conclusions presented later.

1. ***Farm exports will continue to expand but at a highly uneven rate***. Conclusions from foregoing sections are that volatile yields and exports need not deter efforts for market liberalization. Indeed, more open trade and technological advances raising crop yields can help to stabilize the economy and food supplies.

   With domestic markets for food growing about 1 percent annually and farm productivity growing 1.5-2.0 percent annually, the nation's agricultural plant perennially would have to be scaled back with trauma without export market expansion. Despite advantages for trade, America often treats trade with impunity and illogic. We perceive exports as good and imports as bad. If fact it is imports that raise our living standards; exports are only the means to earn foreign exchange for purchasing imports. The nation's frequent action against countries that "dump" their products in this country below their domestic full production costs is teaching the world a counterproductive lesson that denies low cost imports to our consumers and denies markets to our producers. That is, wide adoption and use by foreign countries of our dumping policies will cause them to reject our farm products which for sound economic reasons often are exported by us below the full cost of production. The big losers from trade barriers are the countries which practice them (Makki et al., 1994). The US gains from *multilateral* *and unilateral* trade liberalization but producers gain most from multilateral liberalization.

2. ***The global food supply-demand balance on average over the next 4 decades likely will be more favorable for producers than over the previous 4 decades*** (Tweeten 1998)**.** Global crop and livestock yields were increasing considerably faster than aggregate demand for food in the 1950s and 1960s. Now yields are increasing at about the same rate as population. I and Carl Zulauf (p.265) contend that the old agricultural policy paradigm of a US farming sector beset by technological change in excess of its ability to adjust has been replaced by a new paradigm recognizing that agriculture can adjust to technological change although annual and cyclical shocks will be painful. Of course, farm productivity gains will continue from science and technology. But few excess resources remain in farming despite the 1998-99 slump in grain and hog prices. The technological treadmill won't stop, but producers can adjust to it.

3. ***The principal economic problem of commercial farmers will continue to be instability***. In response to continuing annual and cyclical instability, farmers will pursue private risk aversion strategies such as flexibility, diversification, liquidity, insurance, buffer stocks, contracting, and forward pricing. The lines between input supply, farm production, and marketing and processing firms will blur to reduce risk and increase efficiency. For example, when commodity supplies are unusually high, commodity producers often experience low (or negative) profit margins while food processors and retailers experience high profit margins. Use of vertical coordination (contracts, integrated ownership) to share returns reduces risk under such circumstances.

Risk is not a *prime facie* case for government intervention or subsidies to agriculture. The nation does not subsidize risk takers in Las Vegas, the futures market, Wall Street, or small businesses—the latter with higher failure rates than farmers. Private risk management strategies are effective for farmers. In contrast, government subsidies encourage excessive output and lower farm prices. There is little or no evidence from at home or abroad that risk can be better managed by the public sector than by the private sector (see Reinsel; Wright and Hewitt).

The best argument for public stockholding and other risk management activities is that private discount rates exceed public discount rates. Hence the private sector underinvests in stabilization effort, it is contended. This contention holds for virtually all goods and services, not just for risk management. But international experience from the former Soviet Union to New Zealand provides compelling evidence that widespread public mismanagement of risk overshadows other considerations. The weight of experience is on the side of leaving risk management in private hands except for information systems and other public goods.

4. ***Markets for farm commodities work*** (are efficient). Because they are rival, exclusionary, and transparent, farm commodities are market goods, most efficiently allocated by markets than by government (for definitions see Tweeten 1989, p.56). Markets work for more than just risk management. *On average*, competent commercial farm operators in the 21st century likely will earn returns as high as elsewhere *with or without* income support programs for *crops and livestock*. The best evidence for that conclusion is the past economic and technological success of commercial farms that are reasonably well managed (Tweeten 1989, ch.4).

The farming industry is not a welfare case. To be sure, a few limited resource farm families need public assistance. But commodity programs are of little help to operators of small farms (the majority of all farms) because they have little to sell and payments are tied to past production. Commodity programs won't help long-term net farm income because benefits are capitalized into land and lost to renters and new landowners. Commodity programs help retain family farms in the short run but not in the long run (Tweeten 1993).

5. ***Farms will become more "industrialized".*** They will be larger, more vertically coordinated, more challenging to manage and finance, and more high-tech with precision inputs used to produce designer outputs (Boehlje). The public and Congress will be less supportive of income transfers to an "industrialized", financially robust agriculture over time. This contrasts with 1998 when a budget surplus, election year, and partisan politics strongly favored intervention to supplement farm income.

6. ***Most farms will be family farms and they will deal with ever fewer and larger input supply and marketing conglomerates***, some of which will be cooperatives. Larger farms will evolve from economies of size, efforts to countervail large agribusinesses, and the need for close coordination of production at all levels to assure quality food tailored and timed to meet discriminating consumer demands.

Agribusiness conglomerates will innovate rapidly and have substantial bargaining power, but that does not mean low returns for farm resources or low prices for farm products. Even if private agribusiness input supplies were monopolists (they are not, and many are coops) and even if private firms buying commodities from farmers were monopsonists (they also are not, and many are coops), still farm resources would not earn low returns if their resources are mobile as they certainly are! Agribusiness conglomerates and contractors must pay producers a return that brings forth needed supplies. Of course, competition must be fostered--an “ounce” of competition can be worth a “pound” of regulation.

7. ***Noncommercial farms will decline in numbers and share of output***. Commodity programs tied to farm production will not save small farms--only off-farm income will. The mid-size farm is at risk when it is too small to achieve economies of size and too large to allow the operator to spend much time earning off-farm income. Rather than providing costly government payments to *all* producers, government can cut costs of saving farms at risk by targeting assistance to them through credit programs, for example.

8. ***One threat to family farms is cash flow***. Operators who must sink savings into refinancing a farm economic unit (over $2 million of assets) each generation will continue to “live poor and die rich.” Cash flow requirements to service debt can leave operators with little income to pay family living expenses.

    Leasing, contracting, and integration as well as help from parents are essential for operators to enter and survive on a family farm. Industrywide government transfers can aggravate the cash flow problem by raising land values and hence the debt burden for entrants.

9. ***Pressure by the public for government regulation of agriculture will increase***. Nonpoint chemicals and large livestock farms will be targets.

    Farmers will share decisions not only with bankers, input suppliers, and marketing firms, but also with bureaucrats. However, producers can turn some public environmental concerns to their advantage. Carbon sequestration payments to reduce global warming can supplement farm income, build organic matter, save soil, improve water quality and nutrient release, and raise yields (Tweeten et al., 1999).

10. ***There are no decoupled payments***. Government payments cannot be decoupled from production because farmers are short of capital and use payments to purchase fertilizer, machinery, and other inputs that raise output. Government transfer payments to producers are likely to continue for income support and insurance, creating excessive output and low commodity prices. I return to this issue later.

New Policy Directions

The foregoing background provides a prism from which to review proposed changes in the 1996 FAIR Act. Critical reform issues include whether to raise loan rates, restructure insurance, and continue transfer payments.

Insurance Reform

Political pressures are mounting to use revenue insurance as a vehicle to channel larger government payments to farmers. Larry Combest, chairman of the US House Agriculture Committee stated in February 1999 that "I think basically we have to scrap the current program, the way we have thought about crop insurance, and completely rebuild it…we have to get away from the idea that crop insurance has to be actuarially sound, …you've got to have a revenue enhancement feature in it" (see Maixner, p.36). Shortcomings of that course of action are evident.

Farmers don't seem to be very risk averse. Their outlook is optimistic; most prefer to self-insure and don't buy crop insurance unless it is heavily subsidized (see Gardner, p.37). Farmers and the private sector are clever at devising and using private risk management tools.

One of the most widely used is off-farm income. Producers will buy private fire and hail insurance but the world offers no evidence that rich or poor farmers will pay the full cost of all-risk insurance. The federal contribution to crop insurance, historically about one-third of cost, has doubled in recent years. Yet, dissatisfaction with the programs remains high among producers and taxpayers.

A high income supplement (subsidy) component in insurance is likely to incur disfavor with the World Trade Organization (WTO) because it is a coupled payment. A high income supplement component encourages production generally but especially in switch regions versus core regions. Often these switch areas are environmentally fragile as well as economically marginal. Some are best suited for grass or trees. Maintaining production in uneconomic switch regions drives prices down for producers in core areas and reduces national income because costs to taxpayers exceed gains to producers and consumers.

Crop and revenue insurance feature quite uniform premiums over all risk situations, creating an attractive moral hazard: Able operators who manage so as to avoid losses reject programs while less careful managers insure and collect payments. The government gets more of what it pays for--unstable yields and revenues.

Another issue is what to insure: yields, prices, revenue, production costs, net farm income, or total net income of farm people from all farm and off-farm sources? Farmers face a bewildering array of insurance choices.

Much can be said for a program such as the Canadian Net Income Stabilization Account (NISA). Begun in 1991, NISA supplements yield insurance. In Canada, a farmer can contribute up to 2 percent of eligible sales up to $250,000 per farmer matched by the government and can make unmatched contributions up to 20 percent of sales (little used). Farmers are allowed to accumulate up to 150 percent of the 5-year average of eligible sales. Accounts (in local banks or a Consolidated Revenue Fund) earn the market interest rate plus 3 percentage points, the latter from the government. Withdrawals are allowed when net farm income falls below the five year average or a low-income threshold. A farmer may withdraw all accumulated funds to drop the program or retire.

Advantages of NISA are that it covers net farm income and hence all crops and livestock. It is cost effective because it is carefully targeted: net income variation is reduced at low Treasury cost per acre. The program in the US would operate much like an Individual Retirement Account (IRA). It is relatively easy to administer; it could be operated at low administrative cost by the Internal Revenue Service. A pilot Adjusted Gross Revenue insurance plan currently uses the IRS schedule F information to insure farm gross revenue. Program parameters can be adjusted to keep taxpayer costs as low as deemed appropriate by Congress.

Disadvantages of NISA are that it is

- Regressive. A producer with no income to accumulate an account receives no subsidy.[3]
- Prone to give out in a run of bad years. With no pooling, a producer’s fund may be exhausted quickly.
- Of no protection for beginning farmers before they have built a fund.
- Of little help to cash flow. American farmers have grown accustomed to advance deficiency or transition payments.

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[3] Creative accounting such as widespread underreporting of income and generous tax deductions allowed to the self-employed can result in much lower taxable income than real economic income (Tweeten 1993, pp.30, 31). The result could be seeming inconsistency as operators with no taxable net income add to their stabilization account.

- Ties up financial capital needed to purchase farm production inputs.
- Not cognizant of off-farm income which could offset low farm income.
- Subject, like other government insurance, to abuse through creative accounting if proper administrative oversight is lacking.

Many of these shortcomings could be corrected while retaining the advantages of insurance covering income of farm people from farm and off-farm sources.

Loan Rates

A second major change proposed in the 1996 farm bill is to raise commodity loan rates. Several considerations suggest that political pressures to raise rates be resisted.

Current loan rates encourage excess production which drives down commodity prices and creates pressure for public supply management, stock accumulation, and export subsidies. Operators find it advantageous to produce a crop if marginal (measured by variable costs in the short run) production costs are covered. Loan rates exceeded variable production expenses in 1996 and 1997 for every commodity in Table 3. The loan rate was especially high relative to variable expenses for soybeans, and planted acres expanded 13 percent from 1996 to 1998. The high loan rates distort market signals, discourage economic adjustments in resource use, skew the commodity mix, and raise loan deficiency payment and market loan costs.

Even loan rates set below free market equilibrium price or the cost of production create distortions. Setting the loan rate at the normal market clearing price or average cost of production p_e causes expected market price to rise from p_e to p_l (Figure 3). The average or expected price p_e when the entire "normal" distribution of possible prices is considered in Figure 3 is raised to p_1--the average or expected price when the shaded portion of the normal distribution is removed by a loan rate set at p_e. Thus cutting off the lower tail of the market price

Table 3. Loan rates, variable expenses, and total economic costs of production for major crops, US, 1996 and 1997.

Commodity	Year	Loan rates	Variable expenses[a]	Total economic costs[b]
Corn ($/bu.)	1996	1.89	1.22	2.76
	1997	1.89	1.23	2.69
Soybeans ($/bu.)	1996	4.97	2.16	6.30
	1997	5.26	1.88	5.61
Wheat ($/bu.)	1996	2.58	2.31	5.94
	1997	2.58	1.96	5.02
Cotton (¢/lb.)	1996	52	51	85
	1997	52	48	80
Rice ($/cwt.)	1996	6.50	6.11	11.06
	1997	6.50	6.28	11.70

Source: USDA, (Sept. 1998, pp.57-61).

[a]Variable expenses include seed, fertilizer, chemicals, fuel, repairs, hired labor, purchased irrigation water, etc.

[b]All costs, including overhead and land.

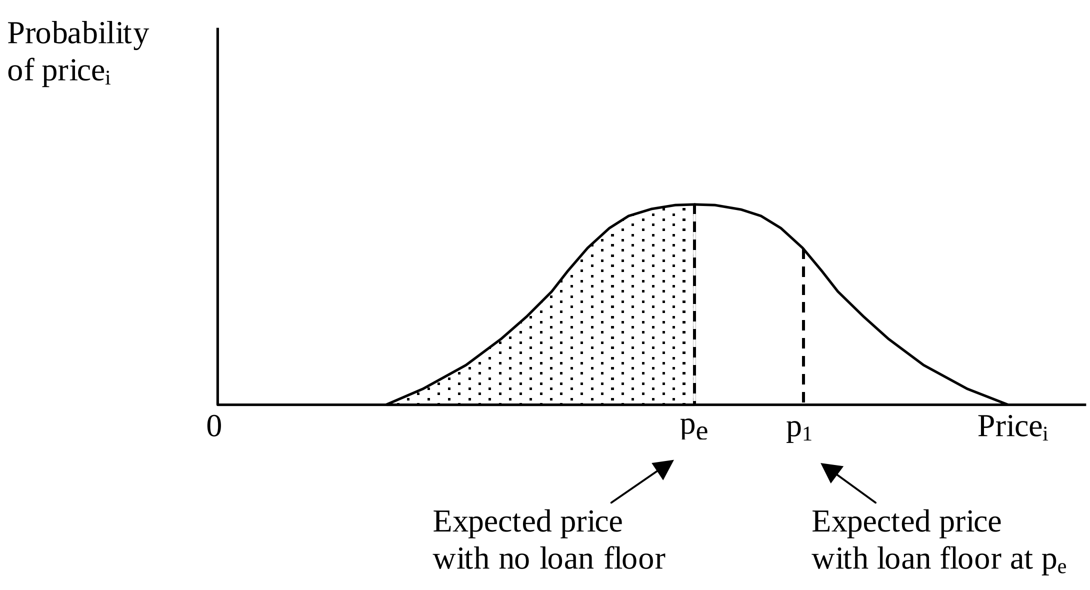

Figure 3. Illustration of impact of the loan rate on price expectations.

distribution with loan rates set at p_e not only raises the expected price from p_e to p_l, but also raises output and depresses market price. Loan rates tied to production costs of average producers also inflate supports because most production occurs below (unweighted) average costs of production--larger producers on average have lower unit costs.

A high safety net encourages continuation of excessive production and delays economic recovery in the farming industry. The general rule is that low returns attend low risk as illustrated by stocks versus bonds. Thus a market orientation is likely to bring more unstable but higher returns on average.

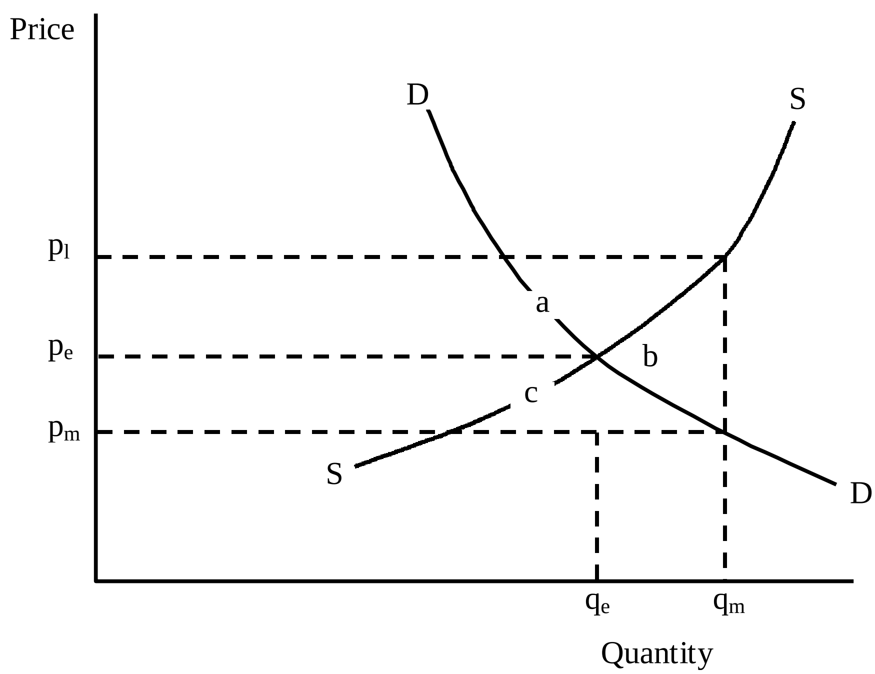

Figure 4. Impact of loan rates set at p_l above the open market clearing price p_e, giving a new market price p_m and loan deficiency payment of p_l-p_m per unit of output.

The economic impact of loan rates set above marginal costs in Table 3 is illustrated in Figure 4. Given the short-run supply S and demand D for commodity q, welfare gains in monetary value from the loan support rate p_l bringing market quantity q_m and price p_m compared to free market equilibrium price p_e and quantity q_e are:

	Area (value)
Gain to: Producers	a
Consumers	c
Taxpayers	-a-b-c
Society	-b

Income Transfers

As indicated earlier, it is difficult to build a case for government subsidized insurance or any other perennial income transfers to farmers to address economic instability. Output is expanded, commodity prices are reduced, and transfers are from poorer taxpayers to wealthy farmers. Any net economic benefits are bid into land prices. If politics dictates that transfers must occur, careful targeting of specific help such as credit to small family farms at financial risk is more cost effective than across-the-board payments.

If transfers are a political necessity, it is well to consider continuing transition payments decoupled from production but coupled to environmental practices. Payments for carbon sequestration could be spread widely among producers because virtually any crop producer can build soil organic matter, thereby holding carbon in crops and soils rather than in greenhouse gas (CO_2) contributing to global warming. Elsewhere I have summarized studies showing that payments for carbon sequestration cannot be justified by the value of reducing global warming alone but must be justified by complementarity with benefits such as less soil erosion, better water quality, and improved water holding capacity and nutrient release (Tweeten et al., 1999).

Concluding Comments

This paper makes the case that basic food production instability from yield variation has not increased and that exports can help to stabilize markets. Markets work for farm commodities and for risk management if given the opportunity. Widespread subsidies to producers when farm prices fall can be counter-productive, retarding resource and commodity adjustments to markets that would quickly return profitability to farmers.

I summarize by triaging agricultural commodity policy alternatives for an unstable agricultural economy into three categories: rejected or “blue box” programs, acceptable or “green box” programs, and questionable or “amber box” programs.

WTO Illegal, “Blue Box”, and/or Congressionally Rejected Programs

Because of opposition from the World Trade Organization or because Congress is unlikely to turn back the 1996 FAIR Act, the following programs show little promise of success:

1. Supply management (set aside) programs.
2. Price supports or guaranteed price above cost-of-production in a coupled deficiency payment and target price program.
3. Dumping commodities abroad through large export subsidies under the Export Enhancement Program.
4. Government stock accumulation.

WTO Legal or “Green Box” Programs

Other programs are more widely acceptable because they have favorable economic payoffs or are not deemed to interfere much with trade. Examples include:

1. Science: Research, education, extension, information systems
2. Grades and standards
3. Exports: Promotion (Market Access Program), low interest loans and guarantees (GSM), food aid (PL480)
4. Environmental protection (CRP, EQIP, Wetlands Reserve, technical assistance)
5. Infrastructure investment (ports, rail, roads, etc.)
6. Sanitary-phytosanitary (SPS) restrictions based on science

7. FAIR Act

   - Production Flexibility Contract (Transition) Payments
   - Loan rates--if set low enough

8. Disaster assistance

9. Insurance programs with only nominal subsidy

Repeated attempts to replace disaster assistance for all time with government subsidized crop or revenue insurance have failed. Hence a wise course of action may be to keep the subsidy component of insurance programs as low as possible while recognizing that ad hoc disaster assistance is likely to continue. Such a policy is probably less resource-use distorting than reliance on large insurance subsidies--the latter program likely to be either vigorously opposed by competing exporters or (worse yet) adopted by them.

"Amber" Programs—Worthy of caution and perhaps to be Negotiated in WTO 1999+Round

Several emerging policies were not necessarily anticipated in the Uruguay Round of multilateral trade negotiations or the FAIR Act but are of growing concern, especially to trading partners or competitors, and need to be addressed by Congress and in trade negotiations:

1. Loan or price supports above market or world prices, especially in the absence of production control.

2. Yield or revenue insurance, disaster assistance, or export assistance programs with sizable subsidy components.

Risk and environmental problems in agriculture will not go away; addressing these problems begins with use of private markets and public "green box" activities listed above. This paper makes the case that loan rates (especially for soybeans) usefully could be lowered rather than raised, that risk insurance could usefully be replaced by insurance of net income of farm operators from all sources including crops, livestock, and off-farm income in an IRA type fund, and that transition payments be continued (if at all) based on carbon sequestration and other environmental goals of value to the public.

Lawyers' maxim that "tough cases make bad law" applies also to economics. The tough economic times in 1998-99 for farm grain and hog producers are traumatic for some but are no surprise, given the history of commodity cycles endemic to agriculture. Farmers had come off three of their best years in history, and most were positioned to weather setbacks. The setback could not be blamed on the 1996 farm bill--hogs were not covered in previous farm bills and grain prices were low partly due to less US exports to Asia. A useful response would be temporary credit or cash assistance only to at-risk producers.

Proposals for more permanent economic cures such as higher loan rates and income transfers through risk insurance are likely to "make the patient worse". American insistence on exemption of agricultural trade from the discipline of the General Agreement on Tariffs and Trade opened the gates to a flood of foreign interventions especially by the European Union that continue to stifle our farm exports. A federal government venture into heavily subsidized loan rates and revenue insurance could be equally ill-fated. Other nations could contest such ventures in the WTO. Or other nations will emulate our actions with serious consequences for our farm exports. Even in the unlikely case that our competitors would not learn from our behavior, the result of higher loan rates and income transfers through revenue insurance is likely to be excessive output and low farm prices and incomes leading in turn to government stock accumulation, acreage set asides (or an expanded Conservation Reserve Program to curb output), and large export subsidies. Thus history would repeat itself with the return to agricultural policies that originated in the 1930s but are an anachronism for the 21st century.

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Table 1. Components of Estimated Variance of Stocks of Aggregate Food, Feed, and Fiber and of Feed Grains for the United States by Selected Periods, 1950-1998.

	U.S. Aggregate					Feed Grains				
Variance Source[a]	1950-59	1960-69	1970-79	1980-89	1990-96	1950-59	1960-69	1970-79	1980-89	1990-96
	------------------(Billion 1982 Dollars)------------------					------------------(Million Metric Tons)------------------				
S^2(O*i*)	15.1	10.9	615.1	229.7	23.2	192.6	180.6	722.8	2097.6	1252.7
(CV, %)[b]	(6.0)	(4.3)	(35.0)	(11.5)	(3.9)	(12.6)	(9.5)	(14.2)	(18.1)	(11.5)
S^2(D*i*)	16.6	23.4	358.0	65.2	27.7	76.6	71.4	159.9	276.9	132.5
(CV, %)	(8.1)	(7.8)	(31.5)	(8.2)	(5.7)	(8.7)	(6.7)	(8.8)	(8.9)	(5.0)
S^2(X*i*)	3.0	1.4	28.5	68.3	5.1	8.3	15.9	223.3	121.9	46.8
(CV, %)	(24.0)	(9.5)	(58.8)	(51.8)	(16.5)	(41.3)	(21.9)	(33.9)	(18.3)	(12.5)
-2S(O*i* D*i*)	-29.7	-29.4	-932.7	-200.4	-30.3	-218.4	-186.6	-390.4	-809.9	-533.4
-2S(O*i* X*i*)	-7.9	-4.2	-251.2	-200.2	-3.9	-78.5	-25.6	-693.3	353.8	-144.8
2S(D*i* X*i*)	8.0	4.9	186.7	75.4	-11.2	46.1	19.2	94.7	-94.4	-3.9
S^2(R*i* Total)	5.1	7.1	4.1	38.1	10.6	26.7	74.7	117.0	1946.0	750.1
3S(R*i* Total)	6.8	8.0	6.1	18.5	9.8	15.6	25.8	32.4	132.3	82.2
Mean(D*i*+X*i*)	57.2	74.9	69.6	57.3	41.1	107.4	144.4	188.5	124.0	142.7
(3S/Mean, %)	(11.8)	(10.7)	(8.7)	(32.3)	(23.7)	(14.5)	(17.9)	(11.1)	(106.7)	(57.6)
S^2(R*i*) share % to:[c]										
O*i*, D*i*	39	69	all	all	all	all	87	all	80	all
X*i*	61	31	-	-	-	-	13	-	20	-

Source: Basic data from U.S. Department of Agriculture. See Tweeten (1983) for procedure.

[a] Buffer stock residual R*i* = O*i* (output) - D*i* (domestic use) - X*i* (net exports) for commodity i.

[b] Coefficients of variation (CV) are standard deviations about the period mean as a percent of the period mean.

[c] O*i*, D*i* share of total variance is S^2 (O*i*) + S^2 (D*i*) -2S(O*i* D*i*); Xi share all other.