THE IMPACTS OF CURRENT U.S. FOOD AND AGRICULTURAL POLICY ON THE WORLD WHEAT MARKET

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INTRODUCTION

In 1977, approximately 73 million metric tons of wheat were traded in the international market. The United States supplied about 31 million metric tons of this total. Because the U.S. is the world's principal excess supplier of wheat, the U.S. domestic food and agricultural policy is likely to have direct ramifications for the world wheat economy.

This article intends to examine the effects of current U.S. policy under the Food and Agriculture Act of 1977 on the world wheat market and the U.S. position in it. More precisely, this article will address these questions:

(1) What is the likely impact of U.S. policy on the market shares of major wheat exporters?

(2) What is the probable impact of the Act of 1977 on the U.S. foreign exchange position?

(3) How will wheat importers and other wheat exporters react to the effects of U.S. policy?

This article is divided into three sections. The first section provides a short overview of U.S. policy objectives with respect to food and agriculture. It also explains the principal provisions of the Act of 1977 that are the focus of this analysis. The second section employs basic economic theory to assess the impact of U.S. policy on world exports of wheat, market shares, and foreign exchange earnings. The third section uses the same theoretical approach to examine the effects of likely responses by importing nations to U.S. policy.

U.S. FOOD AND AGRICULTURAL POLICY: A BRIEF OVERVIEW

The Food and Agriculture Act of 1977 is the most recent explicit statement of U.S. agricultural and food policy. U.S. agricultural policy, that

is, public (government) participation in agriculture, dates back several decades to the Agricultural Adjustment Act of 1933. Originally, farm policy was designed to address the "farm problem". The "farm problem" was, and is, defined as persistently low returns to producers. In general, this problem results from the tendency of the U.S. agricultural sector to increase the supply of food (and fiber) at a rate which exceeds the growth in demand. Thus, continual downward pressure on prices and farm income is created. Periodic crop failures, due to weather conditions or pests, impose additional income uncertainty on farmers. While recent years have seen a general improvement in the economic state of agriculture, problems still exist. Consequently, farm and food programs remain an important part of total U.S. economic policy.

Contemporary U.S. agricultural and food policy pursues a wide range of objectives. In some instances, the objectives may be conflicting. The priorization of policy objectives varies with the political philosophy of the nation's leadership. This priorization is then reflected in the nature of the policy legislation proposed by each administration and enacted by each Congress.

Among the objectives pursued at various times and with various intensities through policy are the following (ordering does not imply any ranking):

(1) To insure a fair and reasonable return on investment and human effort to farm operators, resulting in sectoral stability.

(2) To maintain relatively low and stable prices for food at the consumer level.

(3) To maintain, to the extent possible, traditional rural society and farm ownership. That is, to preserve the family farm.

(4) To avoid domestic spot or temporary shortages of food products.

(5) To maintain and improve the U.S. position in international agricultural product markets.

(6) To insure that the American diet meets some minimum nutritional level.

(7) To foster competition in the production, processing, and marketing of farm output and food products.

(8) To continue the U.S. commitment to provide humanitarian food aid to less developed nations.

(9) To efficiently allocate resources within the agricultural sector, and between agricultural and other sectors.

(10) To pursue other national goals, such as full employment, foreign exchange generation, energy conservation, environmental protection, etc.

(11) To improve the economic state and working conditions of farm labor.

(12) To minimize public cost associated with the pursuit of this policy.

To accomplish these goals, as the current national leadership ranks them, Congress enacted the Food and Agriculture Act of 1977. The Act became law in fall of 1977 and expires in 1981. The Act of 1977 is basically a merger of early policy provisions into a configuration sensitive to current production and marketing conditions. A principal thrust of the Act of 1977 focuses on grain production and marketing. Grain is the leading U.S. Agricultural output and export from both a physical and dollar volume standpoint.

The Act of 1977 sets forth three basic provisions aimed at grain price stabilization, national grain inventory control, and producer income maintenance. They are:

(1) *Non-recourse (price support) loans*—This provision sets a price floor for food and feed grains. When market prices are below the loan price level, producers can store their grains and receive government loans against their stored crop. If prices do not exceed the support price level, they may surrender their grain as payment. If prices rise above the support level, farmers may market their grain through commercial channels and repay loans in cash. The current loan support-prices are set at $2.35 per bushel for wheat and $2.00 for corn.

(2) *Deficiency payments*—Congress granted the Secretary of Agriculture authority to set (with limits) target price levels for the purpose of providing direct supplemental income payments to producers. If prices are at or above the support price level, but below the target price level, farmers may qualify for a payment equal to the difference between the target price and the market price times production, on between 80 and 100 percent of their planted acres. The proportion of qualifying acreage is also determined by the Secretary of Agriculture. The current target prices are $3.40 per bushel for wheat and $2.10 per bushel for corn. Deficiency payments are limited to a total of $40,000 per producer (the limit will increase to $50,000 in 1981).

(3) *Acreage set aside*—To prevent overproduction, induced by the target price—deficiency payment scheme (and support prices), eligibility for these programs requires participation in the acreage set aside program. Farmers must withdraw 20 percent of wheat acreage and 10 percent of corn (and sorghum) acreage from production for program compliance.[1]

Beyond these three basic provisions, a number of other programs were renewed, or carried over from past legislation, including the food stamp program, P.L. 480, and disaster relief. The Act of 1977 also established desirable levels of grain stocks. For a more detailed explanation of the Act of 1977, see R.G.F. Spitze's article.[2]

[1]It should be noted that program participation is strictly voluntary. Farmers must, however, sign up for the program prior to the beginning of each crop year.

[2]R.G.F. Spitze, 1978, "The Food and Agriculture Act of 1977: Issues and Decisions," *American Journal of Agricultural Economics*, 60 (May), pp. 225–235.

International sales of grain have made a consistent and significant contribution to the U.S. foreign exchange situation. In the recent period of balance of trade and payments deficits, grain has been the leading component among agricultural export commodities. Agricultural exports generated a net $15 + billion in exchange in 1977 (estimated to be at least 17 billion for 1978). Consequently, the impact of domestic agricultural and food programs on the U.S. grain trade position is a topic of concern among U.S. policymakers, as well as among the participants in the grain-producing, marketing sector.

By way of background, the U.S. maintains a dominant role in the world wheat market in terms of market share. In 1978, the U.S. wheat sales accounted for about 42 percent of the total world sales (31.1 million metric tons out of 73.3 million metric tons).[3] Canada and Australia are the other principal export nations. The three leaders account for a combined 80 percent of international sales (see *Table 1*). Argentina also contributes a small share, but their market participation is variable.

TABLE 1

WORLD WHEAT TRADE

Region	1976/77 million tons	Percent market share	(Preliminary) 1977/78 million tons	Percent market share	(Forecast) 1978/79 million tons	Percent market share
Exporters:						
Canada	12.9	(20.5)	16.0	(21.8)	14.5	(20.0)
Australia	8.5	(13.5)	11.2	(15.3)	8.0	(11.0)
Argentina	5.6	(8.9)	2.5	(3.4)	2.6	(3.6)
Western Europe ...	6.7	(10.7)	7.5	(10.2)	10.3	(14.2)
U.S.S.R	1.0	(1.6)	1.0	(1.4)	1.5	(2.1)
U.S.	25.8	(41.0)	31.1	(42.4)	31.0	(42.7)
World	62.9		73.3		72.6	
Importers:						
Western Europe ...	5.6		7.7	(10.5)	7.2	
U.S.S.R.	4.6		6.9	(9.4)	4.0	
Japan	5.5		5.8	(7.9)	5.6	
Eastern Europe	6.2		5.0	(6.8)	3.8	
PRC	3.1		8.6	(11.7)	9.0	
World	62.9		73.3		72.6	

Source: *World Agricultural Situation*, ESCS, U.S. Department of Agriculture, December 1978.
Outlook for U.S. Agricultural Exports, ESCS, U.S. Department of Agriculture, May 1979.
Wheat Situation, ESCS, U.S. Department of Agriculture, May 1979.

[3]U.S. dominance in coarse grains is even more pronounced, with about a 62 percent market share (51.8 million metric tons out of 83.2 million metric tons total in 1978). Source: *World Agricultural Situation*, ESCS, USDA, December 1978.

In fiscal year 1978 (October 1, 1977–September 30, 1978), U.S. wheat (and wheat products) exports generated over $4.1 billion in exchange earnings, as will be discussed later. These earnings are expected to continue to increase.[4]

If effective, the U.S. grain policy should have some observable influence on world wheat markets. A comparative statics international trade model can be applied to assess the likely impacts of the provisions of the current farm program on the market share and exchange earnings situation for U.S. wheat exports. This approach can also be applied to coarse grains and oil seeds.

Figure 1 presents a graphical depiction of free market equilibrium and the theoretical influence of target prices and acreage controls on world price and U.S. trade volume.[5] Support price effects will be taken up later. Panel (a) depicts the U.S. domestic wheat market situation, where $D_X D_X$ is domestic demand and $S_X S_X$ is domestic supply in the absence of government intervention. Therefore, the excess supply of U.S. wheat, which equals $S_X S_X - D_X D_X$, can be show in panel (b), the international trade market, as ESES. Panel (c) illustrates the situation in wheat deficit region (referred to as the rest of world - ROW). $D_M D_M$ is demand for this aggregate region, and $S_M S_M$ is regional supply. Excess demand in ROW is represented by EDED in panel (b), and equals $D_M D_M - S_M S_M$. Assuming free trade, and absence of market interference by either trading partner, and zero transfer costs, the equilibrium price is P_2, and total trade is $0q_{t2} (= 0q_{X3} - 0q_{X1} = 0q_{m4} - 0q_{m1})$.[6]

This situation changes when U.S. policy, as prescribed by the Act of 1977, is imposed. First, the theoretical impacts of a deficiency payments program, when the target price is set above world market price, will be examined. If the U.S. target price is set at, say P_4, the effect is to induce farmers to view this as their market price for production planning purposes and adjust production to $0q_{X4}$ (point C on S_X), causing the U.S. supply curve to appear perfectly inelastic below C. Under this situation, the excess supply function becomes kinked at point F, such that U,S. excess suply is now ESES'. The positive supply response introduced influences the trade equilibrium price down to P_1 and increases U.S. exports to $0q_{t3}$. The total of U.S. deficiency payments to farmers equals $P_4 CEP_1$.
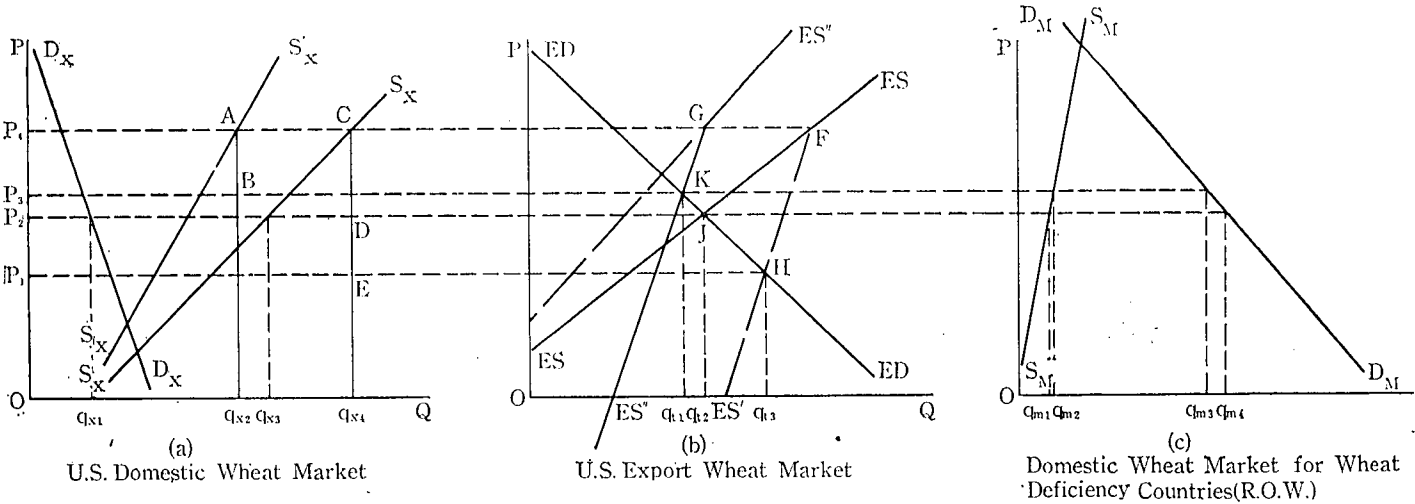
In an effort to minimize U.S. government expenditures under the deficiency payments program, and to buoy the world wheat price,

[4]Feed grain sales earned $6.0 billion, and soybeans earned $6.4 billion.

[5]It should be pointed out that the curves, as drawn, should be interpreted as an indication of elasticities. Rather, the elasticities, as estimated or implied, will be discussed in a later section.

[6]Zero transfer costs are assumed only for simplicity. The analysis could easily be expanded to include a positive transfer cost.

FIGURE 1

MODEL OF U.S. WHEAT EXPORT SITUATION UNDER THE DEFICIENCY PAYMENTS AND ACREAGE CONTROL PROGRAMS

(a)
U.S. Domestic Wheat Market

(b)
U.S. Export Wheat Market

(c)
Domestic Wheat Market for Wheat
Deficiency Countries(R.O.W.)

eligibility for deficiency payments (and other programs) requires participation in the acreage set aside program. If successful, acreage set aside should shift U.S. supply to the left, say, to $S'_X S'_X$. With the target price remaining at P_4, the apparent supply curve is vertical (perfectly inelastic) below point A. Thus, excess supply of U.S. wheat becomes $ES''ES''$ (kinked at point G). The trade equilibrium price rises as a result of production declines. In panel (b), the new equilibrium is shown at point D. In this case, the trade price is P_3, and quantity traded is $0q_{t1}$. The deficiency payment expense to the U.S. government is $P_4 ABP_3$.

Note that, if production (acreage) controls are precisely set, it is possible to achieve the original equilibrium at point J. *Figure 1* implies that the current production control program (combined with other influences) is inducing prices higher than would cocur in the absence of controls. This assertion will be dealt with in more detail in a later section.

This theoretical approach suggests that a deficiency payments-target price program tends to increase U.S. production, influencing trade prices downward and increasing export volume. Also, if producers view the target price as the minimum effective price they can receive, then the excess supply function for the U.S. will become more inelastic below the target price. Though not of specific concern here, this occurrence may have market implications under conditions of shifting excess demand.

While the existence of a target price serves to increase output, the acreage control is intended to reduce output. Thus, the world price and trade effects of the deficiency payments program may be more than offset by production controls. The questions regarding market shares and U.S. foreign exchange situation have yet to be answered. To address them, two additional issues must be examined. First, it is necessary to determine how other principal exporters of wheat will respond to increases in U.S. prices. Second, some approximation of the elasticity of excess demand for U.S. wheat over the range of likely price changes must be made. These two issues are closely related.

According to Alaouze, Watson, and Sturgess, in their extension and updating of McCalla's analysis, the international wheat market can be characterized as an oligopoly (triopoly to be more precise), comprised of the U.S., Canada, and Australia.[7] Market shares of these three countries are provided in *Table 1*.[8] Alaouze, et. al., contend that the oligopolists have an incentive to maintain market shares and follow price leader-

[7]Alaouze, C. M., A. S. Watson, and N. H. Stargess, 1978, "Oligopoly Pricing in the World Wheat Market," *American Journal of Agricultural Economics,* 60 (May): 173-185.

McCalla, A.F., 1966, "A Duopoly Model of World Wheat Pricing." *Journal of Farm Economics* 48 (August): 711-727.

[8]The actual market shares of the three major exporters is greater, since the EEC is generally both an exporter and an importer of wheat.

ship providing that doing so is consistent with their objective of maximizing sales revenues (foreign exchange earnings). Thus, price followship depends on the elasticity of the ROW's excess demand function. Likewise, the foreign exchange earnings impacts on all exporters from upward price pressure, initiated by the U.S., will vary with the degree of excess demand elasticity.

If the wheat export oligopolists face an elastic excess demand, Canada and Australia will choose not to follow U.S. price leadership. The U.S. market share will decline as Canada and Australia increase sales, initially from inventories and later from increased production. Further, as the U.S. price rises on an elastic excess demand function, foreign exchange earnings (total revenue from wheat sales) will fall. Finally, if the market share decline is substantial, that is, if Canada and Australia have relatively large reserve stocks, U.S. inventories may increase.

If, on the other hand, the wheat exporters are on the inelastic portion of the excess demand function, price increases initiated by the U.S. domestic programs will be followed by other exporters. Canada and Australia may have to increase their wheat inventories until they can adjust production downward. Market share should not change appreciably. The foreign exchange earnings of the three oligopolists will rise.[9]

To this point, the likely effects of the U.S. target price and acreage set aside programs have been examined under alternative relative excess demand elasticities. The effect of the support price (non-recourse loan) program has not been analyzed. Its impact will also be related to the elasticity of excess demand issue. That is, if the U.S. support price is set at a level above the trade equilibrium price, say P_s, in *Figure 2*, Canada and Australia will continue to follow the price lead if their excess demand functions are inelastic between P_3 and P_s. In this case, U.S. exports would fall to $(0q_{t0})$, and the U.S. inventories would increase by $0q_{t0}$ $0q_{t2}$ (ML). Exchange earning will rise and the U.S. Government expenditures for the deficiency payments program will fall to P_4ACP_s. The U.S. will incur storage expenses. Whether or not the increase in exchange earnings will offset this cost cannot be determined here.
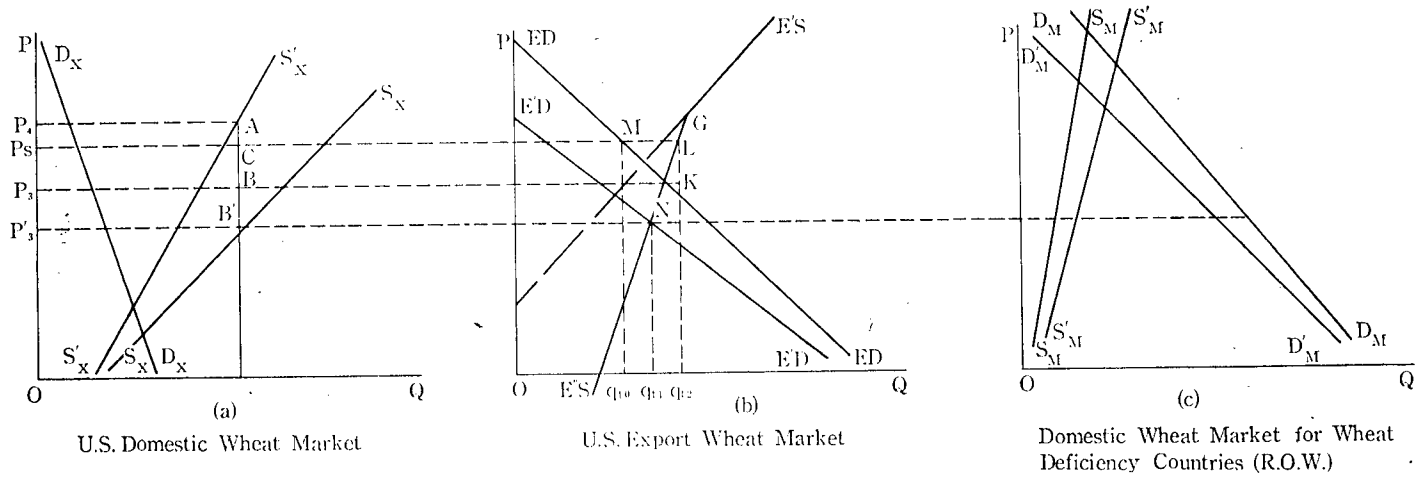
If, however, the support price of P_s is on the elastic portion of the excess demand function, the scenario would be reversed. Australia and Canada would refuse to follow the price up, U.S. exchange earnings would fall, along with its market share. Inventory accumulation would still occur, and probably at a fairly rapid rate.

It is possible, of course, for the price associated with the acreage control program, P_3, to be on the inelastic segment of the demand function, while a slightly higher price, P_s, is on the elastic segment. In this

[9]If Australia and Canada follow the U.S. price lead up its inelastic excess demand function, and market shares remain constant, then the foreign exchange earnings of all these exporters must rise.

FIGURE 2

MODEL OF U.S. WHEAT EXPORT MODEL UNDER THE DEFICIENCY PAYMENTS, ACREAGE CONTROL, AND PRICE SUPPORT PROGRAMS
WITH POSSIBLE RESPONSES BY IMPORTING COUNTRIES

U.S. Domestic Wheat Market

U.S. Export Wheat Market

Domestic Wheat Market for Wheat
Deficiency Countries (R.O.W.)

case, Australia and Canada would follow the price up to the level associated with unit elasticity, but no further. Alaouze, et, al., suggest that the price leader's excess demand function may be kinked (much more elastic) above the point of unit elasticity for this reason.

If the support price is set below the trade equilibrium price, it will have no discernable short-run effect. There is an argument that, in the longer run, a support price at this level might effect an increase in supply, that is, a rightward shift of the U.S. supply function. The presence of a price floor, even set below market price, tends to reduce risk and, therefore, may encourage production expansion. This case, however, is beyond the scope of this article.

It is now clear that, to answer the questions posed earlier in this article regarding the market share and foreign exchange impacts of the Act of 1977, relative elasticity of the excess demand function for wheat must be determined. A number of demand elasticity estimates are available. There is no apparent consensus on this subject, and it is not the intention of this paper to present an empirical estimate of this elasticity. However, casual observation of recent market activity suggests that, at this time, and for recent price movements, the excess demand for wheat may be inelastic. Three such observations support this conclusion:

(1) The recent (1978-79) decline in U.S. output was accompanied by a decline in world wheat exports of approximately 8 percent.[10] During the same period, the export wheat price increased 19 percent. This suggests that the price flexibility of demand is greater than one (absolute value), and thus, if cross price effects are small, the elasticity of demand must be less than one.

Of course, an increase in excess demand might also explain this price increase. However, there is no evidence that excess demand increased over the period of this price change. Estimated world wheat utilization rose by only about 3 percent. At the same time, estimated world production increased by nearly 14 percent (see *Table 2*). Much of this increased output occurred in nations which are traditional net importers. Thus, the increased utilization was more than offset by production growth. No apparent shift in excess demand occurred.

(2) Estimates based on early trends indicate that U.S. export wheat will decline slightly (32.8 to 32 million metric tons, or 3 percent) in 1978-79. It is further estimated that total revenues from exports will increase by roughly 20 percent. An increase in price, accompanied by a decrease in consumption, which increases total revenue (ceterus paribus) implies movement along an inelastic demand function.[11] This conclusion, of course, follows from the previous one.

[10]U.S. wheat acreage declined 14 percent while production declined 12 percent. Yields per acre remain constant, suggesting the acreage controls succeed in reducing U.S. output.

TABLE 2

U.S. AND WORLD WHEAT SITUATION; ACREAGE, PRODUCTION, UTILIZATION, AND STOCKS, 1976/77, 1977/78, 1978/79

	1976/1977	(Preliminary) 1977/1978	(Forecast) 1978/1979
Acreage, Production, Utilization:			
U.S. acreage (planted)	80,202,000	75,119,000	66,008,000
Percentage change...................		−6	−12
	.................(million metric tons)················		
U.S. production	58.3	55.5	49.1
Percentage change...................		−5	−12*
World production	415.1	381.9	435.8
Percentage change...................		−8	+14
World utilization	379.6	398.1	412.0
Percentage change...................		5	+3
Stocks:			
U.S.	30.3	32.3	27.3
Percentage change...................		7	−15
Canada	13.3	12.1	13.6
Percentage change...................		−9	+12
Australia	2.1	0.8	5.7
Percentage change...................		−62	+613
Argentina	1.4	0.5	0.5
Percentage change...................		64	0
Rest of world	51.4	36.6	59.0
Percentage change.....................		−29	+61
World Total	98.4	82.3	106.1
Percentage change...................		−16	+29

* Average U.S. yield was 30.3 bu./acre in 1976/77, 30.6 bu./acre in 1977/78, and 31.6 bu./acre in 1978/79.

Source: *Wheat Situation*. ESCS, USDA, February 1979 (and other issues);
World Agricultural Situation, ESCS, USDA, December 1978 (and other issues);
Fatus, ESCS, USDA, March/April 1979.

(3) [If the price leadership oligopoly argument, made by Alouze, et. al., is accepted, then recent market activity suggests that prices have moved on an inelastic excess demand function. It appears, based on short-run indications, that both Australia and Canada have increased their inventories, as the U.S. reduces theirs, so that market shares have not changed (see *Table 1* and *2*).

There is some evidence that inventory accumulation, on the Canadians' part, may not be entirely the result of following the U.S. price. Problems within their internal marketing system may have prevented (may be preventing) the Canadians from delivering wheat to export ports. It is difficult to determine what inventory levels in

¹¹For the period October to February 1978–79, wheat exports increased 17 percent, while the value of wheat exports increased 41 percent. Source: *Fatus*, ESCS, USDA, March/April, 1979.

Canada would be if maximum export delivery were possible. For whatever reason, inventories have been adjusted and market shares have remained nearly constant with higher international wheat prices

Further support for the contention that excess demand for wheat is inelastic is provided by Gallagher, Bredahl, and Lancaster.[12] They estimated the elasticity of per capita demand for wheat in LDCs to be −0.71, and the elasticity of Japan's demand for U.S. wheat to be −0.97. Their analysis suggests that price was not significant in import demand for wheat as food in Europe, and was −1.47 for wheat as feed. However, feed use of wheat was (and is) very small. It should be noted that these estimates are based on time series date from 1960–61 to 1974–75. If we assume demand has increased from 1974–75 to the present, and this assumption seems realistic, theory tells us that demand will become more inelastic at each price with a rightward shift in the demand function.

Thus, a cursory examination of recent market behavior and recent econometric estimates support the hypothesis that the current U.S. agricultural policy provisions have not adversely affected the U.S. share of world wheat markets. It appears that the increased prices, which have occurred over the past year, are having a favorable impact on U.S. foreign exchange earnings.

This analysis suggests that the production control program may be the principal factor in the upward influences of wheat prices. The target price program, by itself, results in downward price pressure, World wheat prices have remained well above the support price level for the duration of the Act of 1977, making the support price (loan price) virtually irrelevant in the short-run.

Three cautions must be made in posting such a hypothesis. First, the Act of 1977 has only been in effect for one crop year (at the time of this writing). Data for comparative purposes is extremely limited. Second, world wheat makets are subject to a wide range of influences. Whenever any variable, or set of variables, is anlayzed under *ceteris paribus* conditions, one runs a risk form oversimplification. Finally, these markets are dynamic. All conclusions are, therefore, *a posteriori* in nature, and the problem of differentiating between correlation and causability is extreme.

U.S. POLICY AND WHEAT IMPORTERS

If U.S. policy has the hypothesized impacts on exporting countries, then it must have the opposite impact on importing countries. An increase in foreign exchange earnings from wheat sales for exporters implies a loss

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[12]Gallagher, P., M. Bredahl, and M. Lancaster, 1979, "Japanese and Western European Demand for U.S. Wheat," *Wheat Situation*, USDA, ESCS, May, pp. 14–18.

Gallagher, P., M. Bredahl, and M. Lancaster, 1979, "LDC Demand for U.S. Wheat," *Wheat Situation*, USDA, ESCS, February, pp. 14–17.

of foreign exchange for purchases of wheat. The analysis outlined suggests that this process is occurring. Moreover, reduced export sales means that possible shortages may result in some parts of the world. For some very poor nations, a reduction in the availability of wheat and increased prices could be critical. The U.S. is continuing its commitment to humanitarian aid under P.L. 480, and various concessional sales arrangements in the hope of offsetting a crisis situation which may arise due to high world wheat prices.[13]

The short-run impacts of an increase in world wheat price on importers are fairly clear. The intermediate and long-run effects on, and responses by, importers are less obivous. Two possible responses present themselves immediately. Nations that have current deficits in wheat may attempt to increase domestic wheat supply. If this is possbile, the supply curve in Panel (c) of *Figure* 2 will shift to $S'_M S'_M$. As a consequence, the excess demand for wheat, faced by exporters, will shift to the left. The world price will decline and exporter exchange earnings will fall. Or, with increased wheat prices and reduced wheat supplies in world markets, importers may have an incentive to substitute other commodities for wheat. For example, these nations could increase domestic production and/or consumption of rice. This would shift the demand curve $D_M D_M$ in Panel (c) to $D'_M D'_M$. The effect on excess demand is the same as in the preceding case. Excess demand curve $ED'ED'$ represents the shift changes in both $S_M S_M$ and $D_M D_M$. Since the excess supply function is relatively inelastic below point G, the shift in excess demand will cause a fairly dramatic drop in price to P'_3. Foreign exchange earnings for the U.S. will drop, and the U.S. deficiency payment expenditure will increase to $P_4 A B' P'_3$. The impact on market shares for exporters is indeterminant, since counter-responses by other exporters and the U.S. are uncertain. This is certainly a plausible hypothesis. Testing it in any formal way is difficult, due again to the absence of historic long-term periods of high or rising wheat prices. An accurate measurement of either international supply or demand response to increased wheat prices does not readily present itself. Still, a brief review of the events which accompanied and immediately followed the surge in world prices, which occurred in the 1973–74 period, lends credence to the contention that food grain importers may turn to rice when wheat becomes relatively expensive.

Figure 3 indicates the price movements of rice and wheat from 1970 through 1978. Also, the production of wheat and rice, by wheat importing nations, is shown. Note that the world rice price moved up with wheat prices in 1973 and 1974. This occurred, even while total rice production was rising. This rice supply surge appears to be more than accidental.

[13]Public Law 480, "Food for Peace," includes programs designed to provide long-term, low cost credit to low income nations for food purchases, subsidized food sales, and free emergency food aid.

FIGURE 3

REST OF WORLD (WORLD MINUS U.S., CANADA, AND AUSTRALIA) PRODUCTION OF RICE
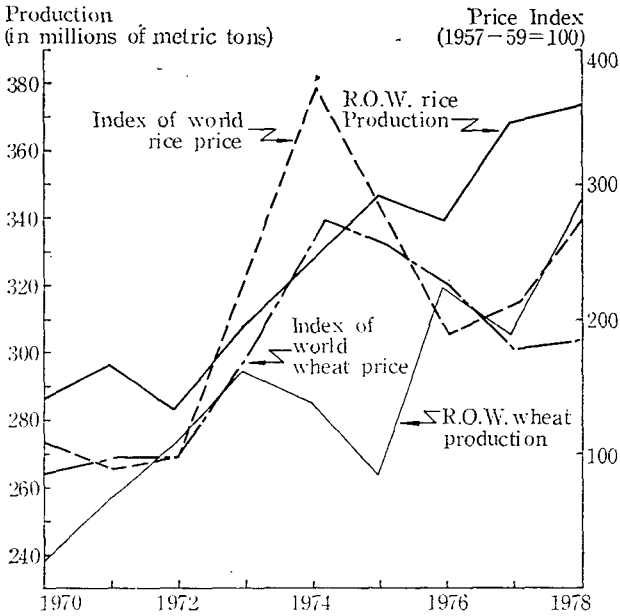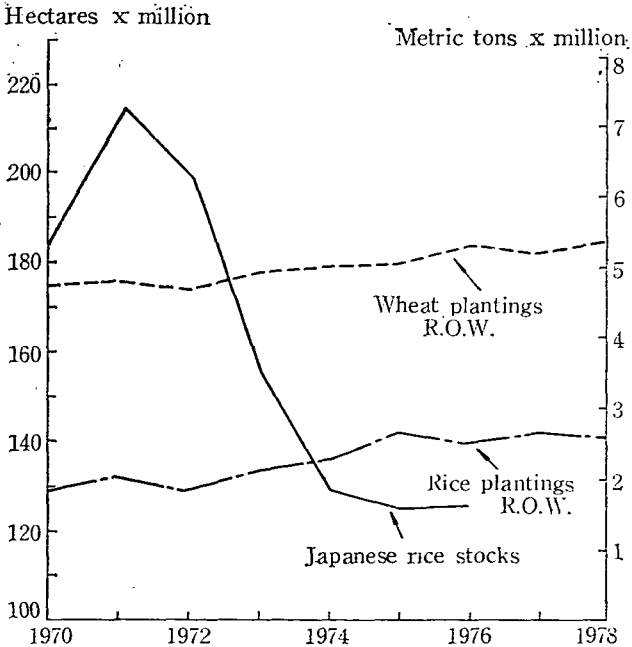AND WHEAT: INDEX OF WORLD RICE AND WHEAT PRICES, 1970–78.

FIGURE 4

HECTARES]PLANTED OF WHEAT AND RICE IN REST OF WORLD (WORLD MINUS U.S.,
CANADA, AND AUSTRALIA); JAPANESE RICE STOCKS, 1970–78.

As can be seen in *Figure 4*, rice and wheat plantings in wheat importing countries increased between 1973 and 1974. Commitment of land to rice appears to have increased at a greater rate than new commitments to wheat.[14]

Figure 4 also shows the rice stocks position of Japan, the world's second leading net wheat importer.[15] Note that Japanese rice stocks plunged in 1973 and continued downward through 1975. This suggests that, as wheat prices increased, the Japanese shifted consumption to rice. Even as rice production was rising substantially, stocks were being consumed. Total rest of world rice stock movements are identical to Japan's.

This substitute relationship between wheat and rice is supported by Hutchison, Naive, and Tsu's analysis.[16] Their estimate of per capita rice consumption, based on time series data from 1957–67, indicates that rice consumption responds positively to changes in wheat and flour prices.

The degree to which importers can and will respond to long-run periods of high and/or increasing wheat prices cannot be precisely determined. Thus, the effect of their response on U.S. exchange earnings and market share is also uncertain. Still, the evidence and theory support the contention that some erosion of short-run gains for wheat exporters will be likely to occur.

SUMMARY AND CONCLUSIONS

The analysis presented in this paper supports the following observations about the impacts of the Act of 1977 on the international grain trade.

(1) The deficiency payments program, through the target price, tends to increase excess supply, expanding grain exports creating downward pressure on the world price. Without some provision for production controls or an export tax, this program would demand sizable deficiency payments expenditure by the U.S. government. Further, it could be argued that this program would create an effective income transfer from U.S. taxpayers to foreign and domestic consumers of U.S. grain.

(2) The production control program, applied through an acreage control, is intended to prevent large price declines caused by a supply response to the target price. In the first full year of its operation, the acreage control appears to have had the effect of reducing wheat production and increasing the world price. There is evidence that the other major wheat exporters (Canada and Australia) followed the U.S. lead in elevating the world wheat price. There is some evidence to suggest that internal

[14]If the USSR is removed, the rice planting surge looks even more dramatic relative to wheat.

[15]In recent years, the USSR's net wheat imports have slightly exceeded those of Japan.

[16]Hutchison, J. E., J. J. Naive, and Sheldon K. Tsu, 1970, *World Demand Procpects for Wheat in 1980*, USDA,[ERS, Foreign Agricultural Economic Report No. 62.

marketing problems, particularly in Canada, left no choice but to re-
duce exports and follow the U.S. price lead. Nonetheless, during the
first year of the Act of 1977, U.S. wheat output has been reduced, and
world trade volume of wheat has declined. This has been accompanied
by an increase in price, an increase in U.S. exchange earnings, and a
slight increase in the U.S. market share. The recent increase] in the
wheat price has positively affected U.S. producer incomes.

(3) The experience of 1973–75 implies that a rapid and relatively large
increase in world wheat price may cause a supply and consumption
response on the part of wheat importing nations. This response may be
most dramatically experienced in rice economies. Increases in rice
consumption and supply, accompanied by decreases in rice invento-
ries, may ultimately serve to dampen demand for wheat. It is much
too early to tell whether such a response will be initiated as a result of the
wheat market effects of the Act of 1977.

If current U.S. policy objectives are to (1) increase, or at least sta-
bilize, wheat producer incomes, (2) generate U.S. foreign exchange,
(3) maintain the U.S. share of the world wheat market, and (4) minimize
U.S. government expenses, then it can be concluded from this analysis
that the Act of 1977 has been at least partially successful in its early
phases. The probability of long-run success cannot be fairly assessed at
this point.

Finally, it should be reiterated that much of this analysis relies on
casual observation of market events. Because the Act of 1977 has a very
short history, a full-blown appraisal of its effects in a formal analytical
framework is premature. Further, this analysis and the resulting con-
clusions are based on data available through May of 1979. The crop
year 1979–80 could well bring a dramatic change in market conditions.
For example, there are early indications that world demand for wheat
may surge in the coming year, largely as a result of a production short-
fall in the Soviet Union. Moreover, yields for U.S. wheat crop being
harvested at the time of writing, appear to be unusually large. Thus,
total U.S. production may be very high, even with the acreage set aside
(production control) program. Sorting out the U.S. policy impact from
these and other market events may prove to be impossible during such a
period.