A PRELIMINARY INVESTIGATION OF THE EFFECTS OF GENERAL AND

TARGETTED EXPORT SUBSIDIES ON THE WORLD WHEAT MARKET

by

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1.0 Introduction

The past several years have seen a heightening of trade tensions on a global basis. Although many areas of trade have been affected, it seems that trade in agricultural commodities, and grain trade in particular has received a majority of attention. The world's two largest traders of agricultural goods, the U.S. and the E.E.C., have been and are currently involved in what many have called a "trade war" but what might be better labelled competitive subsidization. This involves not only the U.S. and E.E.C., but Canada as well.

All major grain exporters are seeking to maintain and expand their market share. The reasons are simple; increased production capabilities have resulted in global surpluses of many commodities and strong farm lobbies have kept the pressure on their respective governments to maintain farm income. The problem is exacerbated by the fact that advances in technology have allowed many countries which were once large net importers of grains to become self-sufficient or even net exporters.

The U.S. and the E.E.C. have used a variety of instruments to meet the dual objectives of retaining market shares and supporting farm incomes. Among these are variable levies and import restrictions (eg. quotas) to protect domestic markets, and the use of export subsidies to capture export market share.

Canada is a country that produces far more grain than it can consume domestically, and thus must look to the export market as a major source of farm income. Arguably Canada's most important export commodity is wheat. Unfortunately, wheat is also one of

the commodities which has been most heavily subsidized by the U.S. and the E.E.C..

The purpose of this paper is to provide some preliminary evidence on the effects of export subsidies on world wheat trade. Specifically, the U.S. Export Enhancement Program (EEP) for wheat is used to illustrate how trade can be affected by general and targeted export subsidization by a major exporter, and how these results can be influenced by various assumptions concerning excess supply and demand elasticities among trading partners. Although the study uses actual trade and price data from the 1986/87 wheat marketing year it is designed as an illustrative exercise to demonstrate the range of effects that subsidies can have on trade. The reader is cautioned that the policies modeled do not correspond exactly with the U.S. EEP. More detailed theoretical and empirical work is necessary before this program can be analyzed in a rigorous fashion.

2.0 Export Subsidies

Export subsidies have become a major policy tool for nations seeking to enhance their export position in particular markets. Export subsidies are implemented for a number of reasons. Abbott, Paarlberg, and Sharples argue that the U.S. began its most recent wave of subsidies to counteract the effects of: (1) a strong domestic dollar, (2) price supports which held U.S. prices above world prices, and (3) unfair trade practices by other exporting nations, namely the E.E.C..

Export subsidies can be broken down into two major classifications: general and targeted. General export subsidies are uniform cash or commodity subsidies made available by an exporting nation to all foreign purchasers of a commodity or group of commodities. Paarlberg has shown that general export subsidies reduce the aggregate social welfare of the subsidizing nation. Given the usual neoclassical assumptions (1), these subsidies raise domestic prices, lower the world price, and increase domestic exports. Domestic producers and foreign consumers gain, while domestic consumers and foreign producers suffer. In the end, domestic taxpayers pay for the benefits received by domestic producers and foreign consumers in the form of subsidy costs. Paarlberg concludes that in this context general export subsidies are an irrational policy option.

Targeted export subsidies are subsidies made available only

to certain "targeted" importers. An example of such a program is the U.S. Export Enhancement Program (EEP) which is described later. Using the same neoclassical assumptions as before, Sharples has shown that a targeted export subsidy can, unlike the general subsidy, be considered a rational policy option as it is possible that the subsidizing country's welfare can be increased. The results of Sharples study on the effects of targeted export subsidies can be summarized as follows:

1) expansion of trade volume by the subsidizing exporter;

2) less welfare loss, relative to the uniform subsidy, per dollar spent on the subsidy, with the _possibility_ of a net welfare gain;

3) an increase in world price;

4) an increase in trade volume by other exporters; and

5) an increase in global imports.

This implies that the reduction of imports by non-subsidized importers is less than the increase in imports by the subsidized importers.

If these simplifying assumptions are true, competing exporters should not be concerned with targeted subsidies since their export revenue increases.

Abbott, Paarlberg, and Sharples state three conditions which create the potential for a welfare gain to the exporting country utilizing a targeted export subsidy:

1) the income effect for the good in the subsidizing country is low;

2) the initial per unit subsidy is small; and

3) the income effect in the targeted country is large and
   dominates the substitution effects in the subsidizing
   country and in nations excluded from the subsidy.

This paper examines the effects of both a targeted and
a general export subsidy by a major exporter (the U.S.) on world
wheat trade patterns, prices, and revenues.   The basis for the
targeted export subsidy is the U.S. EEP for wheat.   The EEP was
initiated in May 1985 with a mandate to use up to $1.5 billion of
CCC commodities over a three year period ending in September
1988. The program was initially considered to be a narrowly
targeted export subsidy scheme since only markets in which the
U.S. felt it was being hurt by the unfair trading practices of
competitors were to be eligible for subsidies (2).   These
included North Africa, parts of Asia, and Eastern Europe. Over
time however, additional markets such as the U.S.S.R. and the
People's Republic of China (PRC) have received EEP subsidies,
calling into question whether the program is a true targeted
scheme, or in fact a general subsidy available to the majority of
U.S. export markets.

The analysis presented in this paper will focus on the
export (supply) side of the market. The effects of competitors'
export subsidies on Canada's trade position will be examined in
some detail.   Changes in global trading patterns will be
discussed where applicable.

3.0   The Model

The model   used for   this analysis is a micro-computer based program GTP (Generalized Transportation Problem),   written by Forrest Holland. A complete description of the model can be found in Holland.

GTP is used to solve competitive,   spatial price equilibrium problems.   The basic   assumptions of the model, and thus of this study, are: 1)   competitive   market   behaviour,   2) homogeneous traded products,   3) traded quantities are well behaved functions of price, and   4)   export   and   import   regions   are   specified a priori.

Within the   model it   is necessary   to specify excess demand and excess supply schedules.   These take the form:

Excess Demand (Supply) = γ + β (Price)$^{\alpha}$.

This functional form allows for scaler, linear, constant, and mixed elasticity schedules.   For this analysis a combination of scaler and constant elasticity functional forms were used.

It   is   also   necessary   to   specify per unit transportation costs between regions.   Due to a lack of more recent information, the   inter-regional   transportation   costs   provided   by   Holland (1984) are used.   The   model   was   calibrated   using   the average 1986/87   U.S.   Gulfport   price   for wheat and actual trade flows. All prices and revenues are   calculated   in   U.S.   dollars.   One further simplifying   assumption was   made; no binding constraints were put on trade flows.   This assumption   discounts the presence of long term trade agreements, such as the ones that have existed between Canada and the   U.S.S.R.,   and   Canada   and   China.   The

model, therefore, describes ideal trade flows (ideal in the sense that importers always are supplied by the least cost supplier), not necessarily those observed in the world market.

4.0 Methodology

The baseline scenario to which all other scenarios are compared is presented in Table 1. The trade flows and prices were generated by the model using 1986/87 price and quantity data and the previously stated assumptions. To illustrate the effects of general and targeted export subsidies on world trade, six additional scenarios were generated and then compared to this baseline. That is, for both the general and targeted subsidy cases, three different sets of excess supply/demand elasticities were used (Table 2).

In the inelastic scenario, all exporters except the U.S. exhibit perfectly inelastic excess supply elasticities. That is, they are constrained to export at their 1986/87 level. The U.S., in this case and throughout the exercise, exhibits a unitary elastic excess supply curve. In this scenario nearly 30 % of total wheat imports are unresponsive to price changes, while very small excess demand elasticities (-0.1 to -0.4) are assumed for the remaining importers. With these assumed elasticities the excess demand curve facing the U.S. has an elasticity of -0.20 and Canada of -1.6. This scenario depicts a world in which exporters are committed to shipping a set amount of wheat, no matter what the price. This could only happen when domestic producers and consumers are totally isolated from world price changes. It represents a policy of maintaining exports at any

Table 1
Baseline Solution

Exporters	Net Trade ('000 mt.)	Market Share (%)	Border Price ($/tonne)	Total Rev./ Cost ('000 $)
Canada	20,667	23.49	116.0	2,397,372
U.S.A.	26,842	30.51	112.5	3,019,725
Argentina	4,275	4.86	112.5	480,938
EEC 12	15,000	17.05	121.4	1,821,000
OW Europe	1,355	1.54	121.0	163,955
Australia	14,793	16.81	115.7	1,711,550
Other	5,059	5.75	113.8	575,714
Total	87,991	100	116.1	10,170,254

Importers				
Centr. America	1,779	2.02	126.3	224,688
Brazil	2,762	3.14	127.5	352,155
Other S. Amer.	2,479	2.82	129.0	319,791
EEC 12 Imp.	2,400	2.73	124.5	298,800
OW Europe Imp.	755	0.86	128.1	96,716
Eastern Europe	4,200	4.77	132.0	554,400
Soviet Union	16,000	18.18	132.3	2,116,800
PRC	7,869	8.94	138.9	1,093,004
Japan	5,781	6.57	129.1	746,327
East Asia	4,904	5.57	138.9	681,166
S.E. Asia	3,514	3.99	136.9	481,067
S. Asia	2,063	2.34	139.3	287,376
W. Asia	8,700	9.89	139.5	1,213,650
N. Africa	14,850	16.88	136.0	2,019,600
Other	9,935	11.29	136.6	1,357,121
Total	87,991	100	134.5	11,834,790

Table 2
Excess Suppply/Excess Demand Elasticities

Exporters	Inelastic Simulation	Average Simulation	Elastic Simulation
Canada	----- *	0.25	0.5
U.S.A.	1.0	1.0	1.0
Argentina	-----	0.1	0.25
EEC 12	-----	-----	0.1
OW Europe	-----	-----	0.1
Australia	-----	0.25	0.5
Other	-----	-----	-----
Average	0.30	0.41	0.54
Importers			
Centr. America	-0.1	-0.2	-0.4
Brazil	-0.1	-0.2	-0.4
Other S. Amer.	-0.2	-0.4	-0.8
EEC 12 Imp.	-----	-----	-----
OW Europe Imp.	-----	-----	-----
Eastern Europe	-----	-----	-0.2
Soviet Union	-----	-----	-0.2
PRC	-0.25	-0.5	-1.0
Japan	-----	-----	-0.1
East Asia	-0.2	-0.4	-0.8
S.E. Asia	-0.4	-0.8	-1.0
S. Asia	-0.4	-0.8	-1.0
W. Asia	-----	-----	-0.2
N. Africa	-----	-----	-0.2
Other	-----	-----	-----
Average	-0.07	-0.14	-0.35

* - indicates elasticity of 0; ie. the market is perfectly
    inelastic

cost.   Importers   are   also   price inelastic, indicating that a
certain level of imports are required, again irrespective of
cost.

The elastic excess supply/demand scenario is, as the name
implies, the case where both importers and exporters exhibit the
largest assumed responsiveness to price, although in most cases
the elasticities are less than 1.0 in absolute terms. All
exporters and importers exhibit some price responsiveness, with
the exception of the "other" category which is used as a balance
for total world trade (ie. all unaccounted for trade goes under
"other" to make the total world trade number correct), and the
EEC 12 and OW Europe import regions. This depiction of the world
market is essentially the opposite case of the inelastic world
market.   Exporters are modestly price responsive (in absolute
terms, but extremely price responsive when compared to the
inelastic scenario), indicating that in times of low prices they
would be willing to hold exportable commodity in storage, reduce
production, increase consumption, or some combination of the
three. Importers are assumed willing to modify their production
and consumption patterns in order to import less wheat in times
of high prices, and more in times when prices fall. In this case
the implied U.S. and Canadian excess demand schedules have
elasticities of -1.9 and -3.2 respectively. Over 94 % of total
wheat exports show some price responsiveness, as do approximately
85 % of total imports.

The average scenario is a middle case with excess
supply/demand elasticities in between those in the inelastic and

elastic cases. In this situation the excess demand schedules facing the U.S. and Canada have assumed elasticities of -0.8 and -2.1 respectively.

5.0   The Policy Scenarios

i) General Export Subsidy:

Each of the elasticity scenarios was run after applying a general export subsidy on every tonne of U.S. wheat exported. The general subsidy was set at $11.53/tonne(3).

ii) Targeted Export Subsidy:

Data for the targeted export subsidy was obtained from press releases supplied by the U.S. Economic Reporting Service (ERS) (Table 6). The total value of the EEP bonus was calculated for each importing region. This was then divided by the total amount shipped by the U.S. to each region. The subsidy is thus on a per-unit shipped rather than on a per-unit subsidized basis. These subsidies were then scaled down proportionally in order to make the cost of the targeted subsidy program comparable to the cost of the general subsidy program. Without this step, the countries receiving the largest subsidies (the U.S.S.R., P.R.C., and Eastern Europe) expand their import volume significantly because no constraints are imposed on the quantity available at the subsidized price. This causes the cost of the targeted subsidy program to escalate, making meaningful comparisons with the general subsidy program difficult to make. Consequently, the targeted subsidies were scaled proportionally in order to make

the cost of the general and targeted subsidy programs approximately the same.

Although the EEP for wheat is an in-kind export bonus program, it has been treated as a straight cash subsidy in this analysis, and as if it were available on every tonne shipped to each of the targeted regions. Since the ERS reports the implicit value of each EEP initiative, there is no difficulty in calculating this number. The fact that the actual program involves an in - kind subsidy and is available on only a limited quantity of product is a complication that awaits further work. For a complete discussion of the economics of export bonus programs, see Houck.

Since it is not possible to directly incorporate a targeted export subsidy into the GTP framework, the per tonne subsidy is subtracted from the U.S. to importing country transportation cost. The desired effect is achieved since the landed price in the importing country is lower by the amount of the targeted subsidy.

5.1 Effects of a General Subsidy

The results of the general export subsidy simulations are presented in Tables 3 - 5. In the average elasticity case, the theoretical results postulated by Paarlberg are well illustrated. With a general export subsidy of $11.53/tonne in place, the average world price received by exporters falls by 5.8 %. The U.S. export price with the subsidy in effect falls 6.0 %, while the price received by U.S. producers rises 4.3 %. The actual

Table 3
General Export Subsidy
Inelastic Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost *	Total Producer Revenue	Program Cost (thou.$)
Canada	0.00	-0.51	-8.11		-8.11		
U.S.A.	1.67	1.15	-8.36	1.68	-6.83	3.38	321,251
Argentina	0.00	-0.51	-8.45		-8.45		
EEC 12	0.00	-0.51	-7.76		-7.76		
OW Europe	0.00	-0.51	-7.79		-7.79		
Australia	0.00	-0.51	-8.14		-8.14		
Other	0.00	-0.51	-8.27		-8.27		
Total	0.52		-8.00		-7.69		
Total Importers	0.52		-7.00		-6.50		

* - Indicates total country export revenue/import cost

Table 4
General Export Subsidy
Average Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost	Total Producer Revenue	Program Cost (thou.$)
Canada	-1.47	-2.16	-5.78		-7.16		
U.S.A.	4.34	3.61	-5.96	4.34	-1.87	8.9	322,929
Argentina	-0.61	-1.30	-5.96		-6.53		
EEC 12	0.00	-0.70	-5.52		-5.52		
OW Europe	0.00	-0.70	-5.54		-5.54		
Australia	-1.47	-2.16	-5.79		-7.17		
Other	0.00	-0.70	-5.89		-5.89		
Total	0.70		-5.82		-5.17		
Total Importers	0.70		-5.50		-4.30		

Table 5
General Export Subsidy
Elastic Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost	Total Producer Revenue	Program Cost (thou.$)
Canada	-1.90	-3.00	-3.73		-5.56		
U.S.A.	6.67	5.48	-3.85	6.67	2.57	13.8	324,544
Argentina	-1.00	-2.10	-3.94		-4.90		
EEC 12	-0.36	-1.47	-3.56		-3.90		
OW Europe	-0.37	-1.48	-3.57		-3.92		
Australia	-1.91	-3.00	-3.74		-5.57		
Other	0.00	-1.12	-3.89		-3.89		
Total	1.13		-3.83		-2.72		
Total Importers	1.13		-3.10		-2.10		

price received by U.S. producers is equivalent to the U.S. export price plus the $11.53 subsidy. Canada's export price falls 5.8 %. However, while the quantity exported by the U.S. increases 4.3 %, Canada's exports fall by 1.5 %. The end result is a 7.2 % drop in total export revenue for Canada, with the U.S. experiencing a 1.9 % decline. Furthermore, the subsidy program costs the U.S. almost $323 million; this represents 9.8 % of total export revenue. In aggregate, world export revenue drops 5.2%, while importing countries realize a saving of 4.3 %.

In the inelastic elasticity scenario, the losses in price (-8.1 %) and total revenue (-8.1 %) for Canada are larger than in the average elasticity case. This follows from Canada and the other non-subsidizing exporting nation's committment to maintaining exports at baseline levels. In the elastic scenario, Canada's losses are less severe (-3.7 % in price and -5.6 % in total revenue).

It is interesting to note that in the elastic simulation the U.S. actually receives an increase in total export revenue as well as an increase in producer revenue. Although its border price falls by 3.9 %, exports increase by 6.7 %, resulting in a 2.6 % increase in total export revenue. Producers receive a 6.7 % increase in the price they receive, with total producer revenue increasing almost 14 %. The cost of the subsidy program is only 0.5 % higher than in the average elasticity scenario. Trade flows are unaffected by the general export subsidy in all three simulations, but the U.S. gains market share in each case. All other exporters lose market share to the U.S., with Canada and

Australia consistently the largest losers.   Thus,   the general

subsidy does   not gain   any new markets for the U.S., but it does

increase U.S. market share at the expense of competing exporters.

5.2   Effects of a Targeted Subsidy

As   mentioned   earlier,   the   targeted   export   subsidy   is

incorporated into the model through a reduction in transportation

costs from the U.S. to the targeted region.   The targeted subsidy

simulation results are presented in Tables 7 - 9.

From Table 6 it can be seen that the largest subsidies are

offered   to   the   U.S.S.R.,   Eastern   Europe,   and   the   P.R.C..

Political realities aside, it may seem surprising that the U.S.

would target the U.S.S.R, a market that is either assumed to be

perfectly inelastic or exhibits an extremely small excess demand

elasticity.   However,   Abbott,   Paarlberg,   and   Sharples   have

demonstrated using a similar model to the one employed in this

analysis that export subsidies targeted to markets which are

perfectly inelastic can be welfare increasing.   This occurs when

the market in question is shared with a competing exporter or

exporters.   For example, the Soviet market is supplied by Canada,

the U.S., and "other" exporters in the baseline solution. By

targeting this market, the U.S. drives a wedge between its price

and the other exporters', capturing the total market.   Again,

this paper does not attempt to gauge whether the U.S. program is

in fact optimal, only to illustrate the effects that such

programs can have.

In the average elasticity case, the targeted subsidy has the

Table 6
Targeted EEP Subsidies For Wheat - 1986/87

Region	(1) Total Regional Imports (mmt.)	(2) Subsidized Imports (mmt.)	(3) Total Subsidy Value (mil. $)	Actual Subsidy [(3)/(2)] ($/tonne)	Effective Subsidy * ($/tonne)
North Africa	6.55	4.48	134.386	30.00	6.16
West Asia	2.06	1.01	34.841	34.50	5.07
Eastern Europe	1.00	0.96	36.947	38.49	10.55
South Asia	1.63	0.21	7.434	35.40	1.37
U.S.S.R.	1.50	1.5	64.138	42.76	12.30
P.R.C.	0.43	0.43	16.249	37.79	11.10
Other	2.34	2.34	16.261	6.95	2.09

Source: ERS press releases
* - The effective subsidy was obtained by dividing (3) by (1)
    and then proportionally scaling the subsidy down so that
    the general and targeted subsidy program costs would be
    roughly equal.

Table 7
Targeted Export Subsidy
Inelastic Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost	Total Producer Revenue	Program Cost (thou.$)
Canada	0.00	-0.34	-7.19		-7.19		
U.S.A.	1.10	0.76	-9.12	1.13	-8.20	2.25	324,854
Argentina	0.00	-0.34	-2.09		-2.09		
EEC 12	0.00	-0.34	-6.87		-6.87		
OW Europe	0.00	-0.34	-6.89		-6.89		
Australia	0.00	-0.34	-5.76		-5.76		
Other	0.00	-0.34	-8.01		-8.01		
Total	0.34		-7.17		-3.86		
Total Importers	0.34		-5.36		-5.04		

Table 8
Targeted Export Subsidy
Average Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost	Total Producer Revenue	Program Cost (thou.$)
Canada	-1.40	-1.84	-5.52		-6.84		
U.S.A.	3.10	2.65	-7.30	3.02	-4.50	6.22	324,423
Argentina	-0.02	-0.46	-0.27		-0.29		
EEC 12	0.00	-0.44	-5.27		-5.27		
OW Europe	0.00	-0.44	-5.29		-5.29		
Australia	-1.03	-1.46	-4.06		-5.05		
Other	0.00	-0.44	-6.33		-6.33		
Total	0.44		-5.23		-2.02		
Total Importers	0.44		-3.86		-3.43		

Table 9
Targeted Export Subsidy
Elastic Excess Supply/Demand Schedules
% Change From Baseline Solution

Exporters	Net Trade	Market Share	Border Price	Prod. Price	Total Revenue /Cost	Total Producer Revenue	Program Cost (thou.$)
Canada	-1.94	-2.74	-3.82		-5.68		
U.S.A.	5.06	4.20	-5.68	5.04	-0.91	10.35	321,030
Argentina	0.40	-0.42	1.65		2.06		
EEC 12	-0.37	-1.18	-3.64		-3.99		
OW Europe	-0.37	-1.18	-3.65		-4.01		
Australia	-1.17	-1.98	-2.31		-3.46		
Other	0.00	-0.82	-4.70		-4.70		
Total	0.83		-3.73		0.15		
Total Importers	0.83		-2.39		-1.59		

effect of increasing U.S. exports by 3.1 %, the U.S. producer price by 3.0 %, and total U.S. producer revenue by 6.2 %. When the cost of the subsidy is accounted for, the U.S. border price falls 7.3 % and U.S. export revenue falls 4.5 %. All other exporters experience losses in exports, price, total revenue, and market share. Canada is the biggest loser, with exports declining 1.4 %, price 5.5 %, and total export revenue 6.8 %. Overall, total world trade increases 0.4 %, while total export revenue falls 5.3 %. Importers experience a drop in the average world price of 3.9 %, and a savings on total imports of 3.4 %. The gain in U.S. producer revenue is slightly less than in the general subsidy scenario (6.2 % as compared to 8.9 %). The targeted subsidy program cost of $324 million represents 10 % of export revenue, comparable to the cost of the general subsidy program.

Again, the inelastic and elastic scenarios show the extreme solution values. In the inelastic case, Canada's revenue loss is 7.2 %, while U.S. producer revenue gain is 2.3 %. Total U.S. export revenue falls 8.2 % however. The elastic case shows Canada with a revenue loss of only 5.7 %, while the U.S. producer revenue increases 10.4 % from the baseline solution.

Unlike the general export subsidy, the targeted export subsidy does affect world trade flows. In the average case, not only does Canada's net trade fall 1.4 %, but it is forced out of one of its markets completely and into two others. In the baseline, Canada exports to Eastern Europe, the U.S.S.R., and West Asia. With the targeted subsidy Canada exports to the EEC-

Table 10
Trade Patterns of Major Exporters
Average Elasticity Schedules

i) Baseline

Exporter	Importer	Quantity
Canada	Eastern Europe	4200
	U.S.S.R.	9272
	W. Asia	7195
U.S.A.	Central America	1779
	Brazil	550
	Other S. America	2479
	EEC-12 Import	2400
	OW Europe Import	755
	U.S.S.R.	1669
	P.R.C.	1494
	Japan	5781
	Other	9935
EEC-12 Export	W. Asia	1505
	N. Africa	13495

ii) General Subsidy

Canada	Eastern Europe	4200
	U.S.S.R.	8969
	W. Asia	7195
U.S.A.	Central America	1798
	Brazil	688
	Other S. America	2532
	EEC-12 Import	2400
	OW Europe Import	755
	U.S.S.R.	1972
	P.R.C.	2147
	Japan	5781
	Other	9935
EEC-12 Export	W. Asia	1505
	N. Africa	13495

iii) Targeted Subsidy

Canada	EEC-12 Import	2400
	OW Europe Import	755
	Eastern Europe	619
	W. Asia	6668
	Other	9935
U.S.A.	Eastern Europe	3581
	U.S.S.R.	16000
	P.R.C.	8094
EEC-12 Export	W. Asia	1505
	N. Africa	13495

12 import market, OW Europe import, W. Asia, Eastern Europe, and becomes the sole supplier to all the "other" importers. The U.S. captures both the majority of the Eastern Europe market and the U.S.S.R. market from Canada, as well as the People's Republic of China market from Australia. Although the U.S. was a small supplier to the U.S.S.R. and the P.R.C. in the baseline solution, it becomes the sole supplier to both, as well as the major supplier of Eastern Europe with the subsidy. In the baseline simulation, the U.S. exported to nine different markets, but with the subsidy it supplies only the three most heavily subsidized markets. This, however, represents a 3.1 % increase in exports.

6.0 Concluding Comments

The preceding analysis has illustrated two important points about the effects of subsidies on world wheat trade; namely, trade volumes and patterns are influenced both by the type of subsidy enacted (general or targeted) and by the assumptions made about importer and exporter excess demand/supply elasticities. For the purposes of this paper, which is largely illustrative, both types of subsidy programs were tested with three representative elasticity scenarios.

The results of the general export subsidy simulations are in line with the theoretical results postulated by Paarlberg. Under all three elasticity assumptions the world price falls, the domestic (U.S.) price rises, and U.S. exports and world trade increase. Total export revenue declines for all exporters, including the U.S., in all simulations except for the elastic

assumption simulation. In this case, the increase in U.S. exports is sufficient to overcome the cost of the program, causing an increase in both producer revenue and export revenue. Although a detailed analysis of the welfare effects of such a program is outside the scope of this paper, theory would suggest that even in the elastic case the increase in producer surplus is less than the loss in consumer surplus plus the cost of the subsidy, implying an overall loss. Hence, the general export subsidy an irrational policy option. The general export scheme is not distortionary in the fact that established trading patterns are unaffected by the program.

The effects of targeted export subsidies on world trade as postulated by Sharples are only partially borne out by the results of this study. Under all three elasticity assumptions, there is an expansion of trade volume by the subsidizing exporter (the U.S.) and an increase in global imports. However, the world price falls in all cases and competing exporters export less and lose market share. These results are a direct consequence of the nature of the targeted subsidy program incorporated into the model. In this study, as under the actual EEP program for 1986/87, the largest subsidies are targeted to the U.S.S.R., the P.R.C., and Eastern Europe. The subsidies are of sufficient magnitude as to divert total U.S. exports to these three markets. Since no constraints are placed on the amount of subsidized wheat that can be shipped, all U.S. wheat is exported at the subsidized price. The targeted export subsidy consequently resembles the general export subsidy in that every

tonne of U.S. wheat exported is subsidized. The movements in world price and trade volume of competing exporters are thus in the same direction as with the general export subsidy program.

From the U.S. point of view, the gains to producers from the targeted program are consistently smaller than those from the general subsidy program, although both programs cost approximately the same amount. The reason for this again appears to be the choice of target nations. Both the U.S.S.R. and Eastern Europe are assumed to be among the most price inelastic importers. Thus, the U.S. increases its exports less than it would have by targeting markets with more elastic demand schedules. It follows from this that domestic prices rise less than would be expected from a more "optimal" targeting schedule.

For both subsidy programs the effects of elasticities become crucial in assessing the impact of the program on world trade, prices, and revenues. For example, under the general export subsidy program U.S. producer revenue increases between 3.4 % in the inelastic scenario to 13.8 % in the elastic scenario. Canadian producer revenue, on the other hand, decreases between 5.6 % (elastic) to 8.1 % (inelastic). A similar pattern exists for the targeted subsidy program.

Under the assumptions used in this study the major difference between the two subsidy programs is that the targeted program changes global trading patterns. In the targeted subsidy simulations the three countries receiving the largest subsidies absorb total U.S. exports, closing these markets to competing exporters, but opening other markets formerly supplied by the

U.S.. In aggregate, competing exporters appear to be better off with the targeted subsidy program than they were with the general subsidy program. However, further study is required to determine if this result would hold under different U.S. targeting schemes, and whether the fact that the EEP is an "in kind" rather than a cash subsidy adds further complications.

Footnotes

1)   These assumptions are: homogeneous traded product, one world price, a common currency, no handling or transportation charges, and competitive trading practices.

2)   The EEP is actually an "in kind" rather than a cash subsidy. A full discussion of this type of subsidy can be found in Houck.

3)   The general export subsidy was calculated by taking the total dollar value of the EEP for wheat ($310,256,000 as reported in ERS press releases)and dividing by the baseline level of U.S. exports (26,842 mt.).

References

Abbott, Philip C, Philip L. Paarlberg, and Jerry A. Sharples.
   Targeted Agricultural Export Subsidies and Social Welfare
   Staff Paper No. 84-11, Dept. Agr. Econ., Purdue University,
   July,1984.

Holland, F.D.   GTP: A Microcomputer Program for the Spatial
   Equilibrium Problem, International Economics Division,
   Economic Research Service, U.S. Dept. of Agr., Washington,
   D.C., October, 1985.

Houck, James P. "The Basic Economics of An Export Bonus Scheme"
   North Central Journal of Agricultural Economics 8(2): 227-
   35.

Paarlberg, P.L.   "When Are Export Subsidies Rational"
   Agricultural Economics Research 36(1): 1-7.

Sharples, J.A.   The Economics of Targeted Export Subsidies
   Staff Paper No. 84-11, Dept. Agr. Econ., Purdue University,
   July, 1984.