



# AN ECONOMIC ANALYSIS OF U.S. WHEAT EXPORT PROMOTION

January 2010

Dr. Harry M. Kaiser

Gellert Family Professor of Applied Economics and Management, Cornell University  
Director, Cornell Commodity Promotion Research Program

## EXECUTIVE SUMMARY

The purpose of this study was to measure the economic impacts of the generic export promotion programs operated by U.S. Wheat Associates (USW). An econometric modeling approach quantifying economic relationships using economic theory and statistical procedures with data was used to assess the effectiveness of U.S. wheat export promotion. The methodology allows simultaneous accounting for a variety of factors affecting wheat export demand in the foreign market in question, including: U.S. wheat prices; competing country wheat prices; exchange rates; competing country wheat exports; income; and wheat export promotion expenditures. Casting the export promotion evaluation in this framework enables the study to filter out the effect of other factors and, hence, directly quantify the net impact of USW promotion activities on U.S. wheat demand from overseas consumers.

This study answers four key questions about the effectiveness of USW and FAS export promotion. Two trade models were developed to address the questions: a macro model representing U.S. wheat demand by all coun-

tries importing U.S. wheat; and a more disaggregated model of U.S. wheat imports into specific countries.

**1. What is the responsiveness of the import demand for U.S. wheat in the world market, and for selected important countries with respect to U.S. wheat export promotion?**

Overseas demand for U.S. wheat is highly responsive to export promotion spending. Results from the macro model indicate that a 1% change in export promotion changed exports more than 0.295%, holding all other demand factors constant. The level of responsiveness is within the range of estimated values for other commodities in other studies, but on the high side of the range, indicating wheat promotion is highly effective relative to other commodities.

**2. What would U.S. wheat exports have been in total and in selected countries, had there been a 50% reduction in export promotion?**

Exports would have been substantially less if export promotion had been reduced by 50% between 2000 and 2007. Specifically the macro model indicates that exports would have been 17.1% lower, equal to a total loss

of 37.4 million metric tons (1.374 billion bushels) or 4.7 million metric tons (just under 172.7 million bushels) per year.

**3. How does the gain in export net revenue due to wheat export promotion compare to the costs of the promotion?**

The benefit of export promotion far exceeds the cost of conducting export promotion programs and has a large and beneficial impact for producers and the economy. Wheat producers provide roughly 50% of total annual export promotion investment directly or through in-kind contributions (USDA/FAS pays for the other 50%). Based on Model 1 results, wheat producers are receiving benefits of export promotion ranging from 19.2 to 37.22 times their investment in these programs and an average of 23 times. In terms of total gross rather than net revenue to producers, Model 1 results indicate that, on average, \$1.00 invested in wheat export promotion increases total gross revenue by \$95 to \$186.

Promotion expenditures are exceedingly small relative to product value with an average investment in 2007 of just 0.27% of the value of wheat exports. The model assumed a net margin factor for wheat producers (the portion of a revenue increase that goes to producers rather than other parts of the wheat industry) equal to

10%, based on recent USDA data. The model estimates this relatively small investment increased net producer revenue in a range from \$96.1 million to \$188 million per year, with an average of \$117 million. Thus, the total annual gross return to the entire wheat industry ranges from \$961 million to \$1.8 billion.

**4. What is the marginal return of the export promotion programs in total and in selected importing countries? Specifically, what is the gain in export revenue due to an additional 1% increase in the export promotion expenditures?**

Because marginal returns on U.S. wheat export promotion program spending is also significant, U.S. wheat producers would be very likely to receive incremental revenue above their costs by increasing their investment. The macro model indicates that for every additional \$1 invested in export promotion, U.S. wheat producers would earn marginal returns of \$7.72 to \$17.38, with a reasonable midpoint of \$9.95.

Overall, the study indicates that the economic benefits of U.S. wheat export promotion are substantial and that increasing the promotion investment has the potential to increase returns to wheat producers, the wheat supply chain, and the U.S. economy.

## FULL STUDY

The purpose of this study was to measure the economic impacts of the generic export promotion programs operated by U.S. Wheat Associates (USW). This was accomplished by developing two trade models: (1) a macro model representing U.S. wheat demand by all countries importing U.S. wheat, and (2) a more disaggregated model of U.S. wheat imports into specific countries. These two models were used to simulate the market-wide impacts of alternative scenarios involving the use of USW export promotion.

This study answers four key questions regarding the effectiveness of USW and FAS export promotion:

1. What is the responsiveness of the import demand for U.S. wheat in the world market, and for selected important countries with respect to U.S. wheat export promotion?
2. What would U.S. wheat exports have been in total and in selected countries had there been a 50 percent reduction in export promotion?
3. How does the gain in export net revenue due to wheat export promotion compare to the costs of the promotion?
4. What is the marginal return of the export promotion programs in total and in selected importing countries? Specifically, what is the gain in export revenue due to an additional 1 percent increase in the export promotion expenditures?

## ECONOMIC METHODOLOGY AND DATA REQUIREMENTS

To answer these four questions, the study quantified the relationship between the export promotion effort of USW and FAS, and the export demand for U.S. wheat in foreign markets. The model was based on the economic

theory of consumer demand. In theory, one expects that export promotion activities are beneficial to wheat producers because the promotion increases demand by foreign consumers for U.S. wheat, resulting in higher export sales and revenues. However, there are also other factors that affect import demand. In order to distinguish the impact of export promotion on import demand for U.S. wheat from the impacts of other factors, an econometric framework was adopted.

The econometric approach quantifies economic relationships using economic theory and statistical procedures with data. It enables one to account for the impact of a variety of factors affecting wheat export demand in the foreign markets in question simultaneously. These demand-determining factors (called “determinants”) included the price of U.S. wheat, the price of competing countries’ wheat, exchange rates, exports from competing countries, income, and the USW and FAS wheat export promotion expenditures. By casting the export promotion evaluation in this type of framework, we can filter out the effect of other factors and, hence, quantify directly the net impact of USW export promotion activities on U.S. wheat demand of foreign consumers.

To compare the relative importance of each factor on U.S. wheat demand, the results from the statistical (econometric) model were converted into demand “elasticities.” A demand elasticity measures the percentage change in U.S. wheat demand given a one-percent change in a specific demand factor, holding all other factors constant. For example, the computed price elasticity measures the percentage change in the demand for U.S. wheat given a 1 percent change in price. The computed export promotion elastic-

**A comparison of demand elasticities allows you to see which factors have the largest impact on U.S. wheat demand.**

ity measures the percentage change in the demand for U.S. wheat given a 1 percent change in export promotion expenditures, and so on. A comparison of the demand elasticities allows you to see which factors have the largest impact on U.S. wheat demand.

### **ECONOMETRIC MODEL AND DATA**

The study estimated the export demand equation for U.S. wheat with U.S. wheat exports as the dependent variable measured on a metric-ton basis for each calendar year (one metric ton equals 36.74 bushels). The following export demand determinants were included to ascertain their impacts on annual export demand for U.S. wheat:

1. Ratio of the price of U.S. wheat exports in dollars per ton, to the price of competing country wheat exports (dollars per ton);
2. Sum of Gross Domestic Product (GDP) for major importing countries;
3. Special Drawing Rights (SDR), a measure of U.S. dollar value relative to the euro, yen, and pound sterling. The SDR is equal to the sum of specific amounts of the four currencies valued in U.S. dollars based on exchange rates quoted in the London market;
4. Competing country export quantity; and
5. U.S. wheat export promotion expenditures.

Both the U.S. and competing country prices were computed as unit values, equal to the value of exports divided by the quantity of exports.<sup>1</sup> The ratio of the U.S. to competing country export price was used in the demand equation because importers base their

demand decision on relative import prices for wheat. The U.S. price was expected to be negatively related to U.S. exports, i.e., a lower price results in higher U.S. export quantity demanded reflecting the law of demand. The export price of the seven competing countries was included because these countries are the other major wheat exporters in the world and the chief competitors to U.S. wheat in various markets. The relationship between competitors' prices and U.S. wheat demand was expected to be positive because other country wheat is a close substitute with U.S. wheat.

Rather than using world GDP, the sum of GDP for the top 30 U.S. wheat importing countries was used as a determinant of U.S. wheat demand in the model. This was preferred to world income because U.S. wheat exports depend on incomes from countries importing wheat rather than all countries in the world. These countries were used for the GDP variable: Japan, Indonesia, Korea, Philippines, Thailand, Italy, Spain, United Kingdom, Iraq, Egypt, Yemen, Iran, Morocco, Brazil, Colombia, Dominican Republic, Haiti, Jamaica, Mexico, Costa Rica, Cuba, Salvador, Guatemala, Honduras, Venezuela, Chile, Trinidad and Tobago, Algeria, Peru, and Nigeria. GDP was summed for these countries and deflated by the world price index. The relationship between GDP and the demand for U.S. wheat was expected to be positive, i.e., U.S. wheat demand should increase with a country's wealth.

The value of the U.S. dollar relative to other currencies has been shown to be an important determinant of the demand for U.S. exports. Therefore, it was included in the model as measured by Special Drawing Rights. The relationship between SDR and the

<sup>1</sup> Value and quantity of exports are exporting country customs values as reported by FAOSTAT. Competing countries for wheat exports included: Argentina, Australia, Canada, Kazakhstan, Russian Federation, Ukraine, and the European Union.

demand for U.S. wheat was expected to be negative. As the U.S. dollar becomes cheaper, U.S. wheat becomes relatively cheaper and export demand increases.

Another measure of the impact of competing wheat exporting countries on the demand for U.S. wheat is the export quantity of other countries. Hence, the sum of wheat exports from the seven competing countries was included in the model. This variable was expected to be related to the demand for U.S. wheat negatively since the two are substitutes with one another.

Unlike the majority of previous studies that only considered USDA/FAS expenditures for U.S. export promotion due to lack of data (see, for example, Dwyer (1995) and Wang (2005)), this analysis combines USDA/FAS MAP and FMDP expenditures with private cooperator expenditures from U.S. Wheat Associates to measure the total export promotion impact. Approximately 50 percent of expenditures for export promotion come from USDA/FAS and the remaining 50 percent come from wheat producers. For the econometric estimation, only non-administrative, demand-enhancing expenditures were included for export promotion expenditures. Administrative expenses that are later included in the calculation of the benefit-cost ratio were not included in the estimation because they do not directly impact export demand. Wheat export promotion expenditures were multiplied by the SDR and then this product was deflated by the world price index. The SDR is used as a proxy for exchange rates to adjust the purchasing power of U.S. export promotion dollars. Dwyer also used this approach. Its inclusion adjusted for U.S. dollars' purchasing power as exchange rates fluctuated, e.g., a devalued dollar will effectively lower the export promotion

expenditure impact and should be included. It is analogous to adjusting monetary series for inflation.

Export promotion generally has a carryover effect, i.e., promotion today has demand impacts tomorrow. To deal with this, preliminary regressions with one- and two-year lags were performed. However, they resulted in statistically insignificant coefficients for the lagged variables. Hence, the data do not support lagging export promotion. This does not mean that there is no carryover effect for export promotion. Rather, it means that because annual data is the time frequency being used, the carryover effect is not longer than one year.

The following data sources were used for the variables: the quantity, value, and therefore the price of U.S. and competing country wheat exports came from FAOSTAT. Competing country export quantity came from FAOSTAT and USW. Importing country GDP came from the World Bank. Annual wheat export promotion expenditures for both government and cooperators came from USDA/FAS and U.S. Wheat Associates. The SDR came from the International Monetary Fund.

Three versions of the model were estimated. In Model 1, the dependent variable was total U.S. wheat exports. In Model 2, the dependent variable was total U.S. wheat exports minus government concessional program exports, including Public Law 480, Section 416, Food for Progress, and U.S. Agency for International Development (USAID). In addition, a third model was estimated using a different specification for U.S. and competing country prices. Instead of using a ratio of the U.S.-to-competing-country wheat price, Model 3 was the same as Model 1, except it included the two prices as separate variables. The alternative model resulted in somewhat different

**This analysis combines USDA/FAS MAP and FMDP expenditures with (producer) expenditures... to measure the total export promotion impact.**

**U.S. wheat export promotion had a positive and statistically significant impact on U.S. wheat export demand.**

elasticities compared with the price-ratio model, but had exactly the same signs for the demand variables. While the following discussion focuses on the price-ratio specification for Models 1 and 2, the elasticity results for the alternative price specification for Model 3 is attached as an appendix (See Appendix Table 1).

**ECONOMETRIC RESULTS**

The U.S. export demand model was estimated in logarithmic form with annual data from 1975 through 2007. Because autocorrelation was detected in both models, a moving-average error term was appended to the regression so the resulting equation is subsequently free from autocorrelation. The R-squared indicated that the equation explained about 56 percent and 55 percent, respectively, of the variations in U.S. wheat export demand for Models 1 and 2. While this would not be considered a great measure of fit for a model designed to predict future wheat exports, the models were deemed satisfactory for the purposes of in-sample simulations of alternative export promotion funding levels. The elasticity signs were consistent with economic

theory, and all estimated coefficients were statistically significant at better than the 10 percent significance levels. No other econometric problems were encountered. The estimated elasticities for Models 1 and 2 are presented in Table 1.

All the results from Model 1 are first presented and discussed. The estimated demand equation indicated that the prices of U.S. and competing country wheat were important factors in explaining annual variations in demand for U.S. wheat exports. The estimated own-price elasticity was -0.611 indicating that a 1 percent increase in the U.S. wheat price relative to the wheat price in competing countries resulted in a 0.611 percent decrease in U.S. wheat exports, holding all other demand determinants constant. Alternatively, a 1 percent increase in the seven-country competing wheat price relative to the U.S. wheat price resulted in a 0.611 percent increase in U.S. wheat exports, holding all other demand determinants constant.

The sum of GDP in importing countries was positively related with U.S. wheat export demand. The estimated income elasticity was 0.318, i.e., a 1 percent increase in these countries' GDP resulted in a 0.318 percent increase in U.S. wheat exports, holding all other factors constant. Hence, the demand for U.S. wheat is what economists refer to as a "normal good;" demand increases as consumer income increases.

The value of the U.S. dollar relative to other currencies was the most important factor in determining the demand for U.S. wheat exports. An estimated elasticity of -1.8, indicating a 1 percent increase in the value of the U.S. dollar relative to other currencies, led to a 1.8 percent decrease in U.S. wheat exports, holding all other demand determinants constant. Clearly

**Table 1. Estimated Elasticities for U.S. Wheat Export Demand.\***

Demand Factor	Model 1 Elasticity	Model 1 t-Statistic	Model 2 Elasticity	Model 2 t-Statistic
U.S. price/competing country price	-0.611	-3.36	-0.410	-2.03
Importing countries GDP	0.318	1.86	0.395	2.02
Value of U.S. \$	-1.800	-3.50	-1.847	-3.19
Competing country export quantity	-0.723	-2.24	-1.001	-2.82
U.S. export promotion	0.295	2.13	0.412	1.94

\*A demand elasticity measures the percentage change in U.S. wheat exports given a 1 percent change in each demand factor, holding constant all other demand factors. For instance, the estimated U.S. price elasticity in this table means a 1 percent increase in the U.S. wheat price relative to the wheat price in competing countries leads to a 0.611 percent decrease in U.S. wheat exports.

wheat exports are quite sensitive to exchange rate fluctuations, which is true of most export commodities.

Not surprisingly, the quantity of competing country exports had a negative impact on U.S. exports, indicating a substitute relationship between U.S. and other country wheat. A 1 percent increase in competing country exports resulted in a 0.723 percent decrease in U.S. exports, holding all other demand determinants constant.

Finally, U.S. wheat export promotion had a positive and statistically significant impact on U.S. wheat export demand. The statistical evidence supports the notion that U.S. wheat export promotion programs, which are funded by public-private contri-

butions, have the effect of increasing the export demand for U.S. wheat. The estimated export promotion elasticity was 0.295. That is, holding all other demand factors constant, a 1 percent increase in U.S. wheat export promotion expenditures resulted in a 0.295 percent increase in U.S. exports.

The results for Model 2, which net out the government concessional wheat exports from commercial exports, were quite similar to Model 1. The price elasticity (-0.41) was a little lower, and the income elasticity (0.395) was a little higher than for Model 1. The elasticity for the exchange rate variable (-1.847), SDR, was almost identical, while the elasticity for the competing export quantity

**Table 2. Key results from economic impact studies on U.S. export promotion.**

	California raisins	US orange juice	US orange juice	US fresh grapefruit	US apples	US apples
Study	Kaiser, Liu, and Consignado (2005)	Lee and Brown (1986)	Armah and Epperson (1997)	Fuller, Bello, and Capps (1992)	Rosson, Hammig, and Jones (1986)	Richards and Patterson (1997)
Activities evaluated	Industry and FAS programs	Three Party program	Industry and FAS programs	FAS Three Party and TEA programs	Industry and FAS programs	Industry and FAS programs
US export promotion in:	Japan and UK	13 European countries	France, UK, Germany, Japan Netherlands	Japan, Canada, France, and Netherlands	All countries US has programs in	Singapore and UK
Period of estimation	1965-98	1973-82 (panel data)	1984-92 (panel data)	1969-88 quarterly	1972-81	1962-93
Type of model	Import demand, single equations	Import demand, single equations	Export demand, single equation	Import demand, single equations	Export demand, single equations	Import demand, LES/AIDS demand systems
Estimated promotion elasticities	Japan=0.029* UK=0.133*	Promotion elasticities not given	France=0.014 Germany=0.044* Japan=0.014 Netherlands=0.302* UK=0.014*	Japan=0.109* Netherlands=0.153* France=0.234*	Apples=0.51*	Singapore=0.055* UK=0.016*
Estimated benefit-cost ratio	Japan: AGBCR=5.13 MGBCR=0.42 UK: AGBCR=15.29 MGBCR=3.19	For all countries, MGBCR=5.51	MGBCRs: France=7.44 Germany=37.10 Japan=5.61 Netherlands=51.92 UK=7.64	MGBCR:Japan=5.02 Netherlands=6.65 France=4.13 Canada=no promotions	MGBCR=60.0	NA
Assumed no promotion price impact	Yes	Yes	Yes	Yes	Yes	NA
Peer reviewed	Yes	Yes	Yes	Yes	Yes	Yes

**Notes:** AGBCR means average gross benefit-cost ratio; MGBCR means marginal gross benefit-cost ratio.

\* Means statistically significant at conventional significance levels, i.e., at least the 10% level.

(-1.001) was higher than Model 1. The estimated promotion elasticity (0.412) in Model 2 was higher than that for Model 1. This result suggests that export promotion expenditures primarily affect commercial exports and may have limited impact on government concessional exports.

The estimated promotion elasticities were within the range of other estimates for U.S. export promotion, but on the high side of the range. For example, Rusmevichientong and Kaiser estimated a wheat promotion elasticity of 0.287. Other estimates of U.S. grain export promotion are lower including rice (0.186 – Rusmevichientong

and Kaiser), soybeans (0.016 to 0.073 – Williams et al.), and sorghum (0.148 – Rusmevichientong and Kaiser). So the estimates of 0.295 and 0.412 were on the high side of estimates for wheat and other grains. In addition, Table 2 presents the results from previous import demand studies in the row labeled “Estimated promotion elasticities.” There are 44 U.S. export promotion elasticities reported in this table for various commodities and various importing countries. These estimates range from a low of 0.014 to a high of 0.98, and the median elasticity (half the values lie below the median and half lie above it) from the Table 2 stud-

**Table 2 (continued). Key results from economic impact studies on U.S. export promotion.**

	CA table grapes	US frozen potatoes	US pecans	US walnuts	US almonds	US cotton
Study	Alston et al. (1997)	Lanclos, Devodoss, and Guenther (1997)	Onunkwo and Epperson (2000)	Weiss, Green, and Havenner (1996)	Halliburton and Henneberry (1995)	Solomon and Kinnucan (1993)
Activities evaluated	Industry and FAS programs	Industry and FAS programs	Industry and FAS programs	Industry and FAS programs	FAS FMD and MPP programs	FAS programs
US export promotion in:	Asian countries	Japan, Mexico, Philippines, Thailand	Asia and EU	Japan	Japan, Taiwan, Hong Kong, Singapore, South Korea	6 countries in the Pacific Rim
Period of estimation	1976-94	1978-93	1986-96 (panel data)	1986-96 (monthly data)	1986-92 (panel data)	1965-85
Type of model	Single equation, export demand	Import demand, single equations	Export demand, single equation	Event analysis	Import demand, single equations	Armington trade model
Estimated promotion elasticities	0.21*	Third Party: Japan=0.03* Philippines=0.53* Thailand=0.87*	Asia=0.98* EU=0.06*	\$1000 in promotion increased exports by 4.5 tons	3 models range from -0.2788 to 0.85	Japan=0.53* South Korea=0.045* Hong Kong=0.21* Philippines=0.26* Thailand=0.045 Taiwan=-0.54
Estimated benefit-cost ratio	ABCR: 4.1-9.4 MBCR: 4.1-4.2	Third Party MGBCRs: Japan=1.29 Philippines=11.77 Thailand=16.36	Asia: MGBCR=6.45 EU: MGBCR=6.75	MGBCR=5.85	MGBCRs: Japan=4.95 Taiwan=5.94 Hong Kong=3.69	NA
Assumed no promotion price impact	No	Yes	Yes	Yes	Yes	NA
Peer reviewed	Yes	Yes	Yes	No	Yes	Yes

**Notes:** AGBCR means average gross benefit-cost ratio; MGBCR means marginal gross benefit-cost ratio.

\* means statistically significant at conventional significance levels, i.e., at least the 10% level.

ies was 0.0575.<sup>2</sup> Hence, the results of this study (and Rusmevichientong and Kaiser) suggest that U.S. wheat export promotion has a larger impact than other export promotion programs.

## SIMULATION ANALYSIS

According to the econometric results, it is clear that wheat export promotion expenditures had a positive and statistically significant impact on U.S. wheat exports to the world market. Next, the estimated export demand equations from the two

<sup>2</sup> Actually, there are a couple of negative estimates in this table, which were statistically not different from zero.

models were simulated to address the remaining objectives of this study. Two scenarios were of interest: (1) a baseline scenario in which export promotion programs were in effect and expenditures on promotion were set at actual levels; and (2) a counterfactual scenario where U.S. wheat export promotion were set at 50 percent of their actual levels. The difference between the two scenarios gave the impact of a 50 percent reduction in export promotion expenditures on the demand for U.S. wheat exports. The models were simulated for the more recent period of 2000 through 2007.

Figures 1 and 2 illustrate the simu-

**Table 2 (continued). Key results from economic impact studies on U.S. export promotion.**

	CA table grapes	US frozen potatoes	US pecans	US walnuts	US almonds	US cotton
Study	Alston et al. (1997)	Lanclos, Devodoss, and Guenther (1997)	Onunkwo and Epperson (2000)	Weiss, Green, and Havenner (1996)	Halliburton and Henneberry (1995)	Solomon and Kinnucan (1993)
Activities evaluated	Industry and FAS programs	Industry and FAS programs	Industry and FAS programs	Industry and FAS programs	FAS FMD and MPP programs	FAS programs
US export promotion in:	Asian countries	Japan, Mexico, Philippines, Thailand	Asia and EU	Japan	Japan, Taiwan, Hong Kong, Singapore, South Korea	6 countries in the Pacific Rim
Period of estimation	1976-94	1978-93	1986-96 (panel data)	1986-96 (monthly data)	1986-92 (panel data)	1965-85
Type of model	Single equation, export demand	Import demand, single equations	Export demand, single equation	Event analysis	Import demand, single equations	Armington trade model
Estimated promotion elasticities	0.21*	Third Party: Japan=0.03* Philippines=0.53* Thailand=0.87*	Asia=0.98* EU=0.06*	\$1000 in promotion increased exports by 4.5 tons	3 models range from -0.2788 to 0.85	Japan=0.53* South Korea=0.045* Hong Kong=0.21* Philippines=0.26* Thailand=0.045 Taiwan=-0.54
Estimated benefit-cost ratio	ABCR: 4.1-9.4 MBCR: 4.1-4.2	Third Party MGBCRs: Japan=1.29 Philippines=11.77 Thailand=16.36	Asia: MGBCR=6.45 EU: MGBCR=6.75	MGBCR=5.85	MGBCRs: Japan=4.95 Taiwan=5.94 Hong Kong=3.69	NA
Assumed no promotion price impact	No	Yes	Yes	Yes	Yes	NA
Peer reviewed	Yes	Yes	Yes	No	Yes	Yes

**Notes:** AGBCR means average gross benefit-cost ratio; MGBCR means marginal gross benefit-cost ratio.

\* means statistically significant at conventional significance levels, i.e., at least the 10% level.

lation results for U.S. wheat exports for Models 1 and 2, respectively. Regarding Model 1, a 50 percent reduction in U.S. wheat export promotion expenditures would have decreased U.S. wheat exports by a total volume of 37.4 million MT from 2000 through 2007, or an average of 4.7 million MT per year. In percentage terms, this represented a reduction of 17.1 percent over this period. For Model 2, a 50 percent reduction in U.S. wheat export promotion expenditures would have decreased U.S. wheat exports by a total volume of 42.8 million MT over

this period, or an average of 5.4 million metric tons per year. In percentage terms, this represented a reduction of 19.6 percent over this period. Based on both models, U.S. wheat export promotion has had a large impact on total U.S. wheat exports.

### AVERAGE BENEFIT-COST RATIO

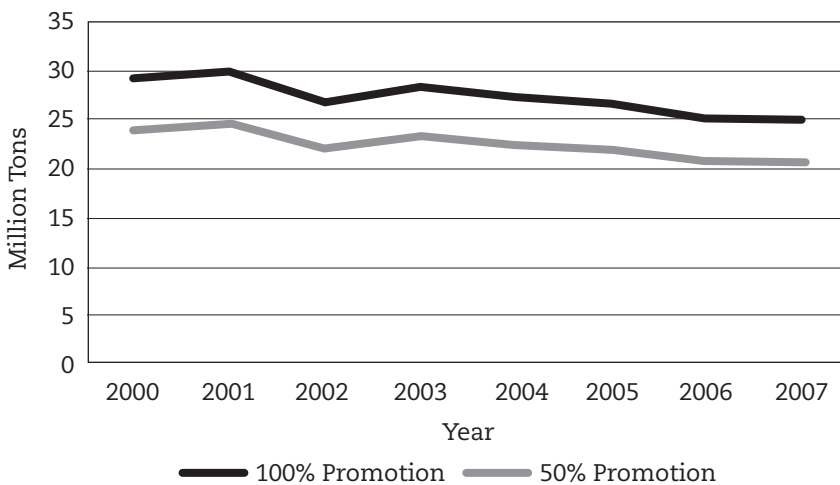
While the results indicated a positive impact of export promotion on U.S. wheat exports, the impact that export promotion has on wheat producer net revenue compared with promotion cost was a more important question to be addressed. That is, an average benefit-cost ratio (BCR) should be computed. The benefit of export promotion is the additional net revenue to the wheat producer resulting from higher exports and export price. The cost of export promotion is the cost of conducting export promotion programs.

The increase in export demand resulting from promotion just described assumed that all other demand determinants, including price, remained constant. However, an increase in demand generally will cause price to increase as well, provided that the demand increase is not perfectly offset by an increase in quantity supplied. Hence, to properly evaluate the full effect of U.S. wheat export promotion programs on quantity and price, an export supply response for U.S. wheat must be incorporated into the model.

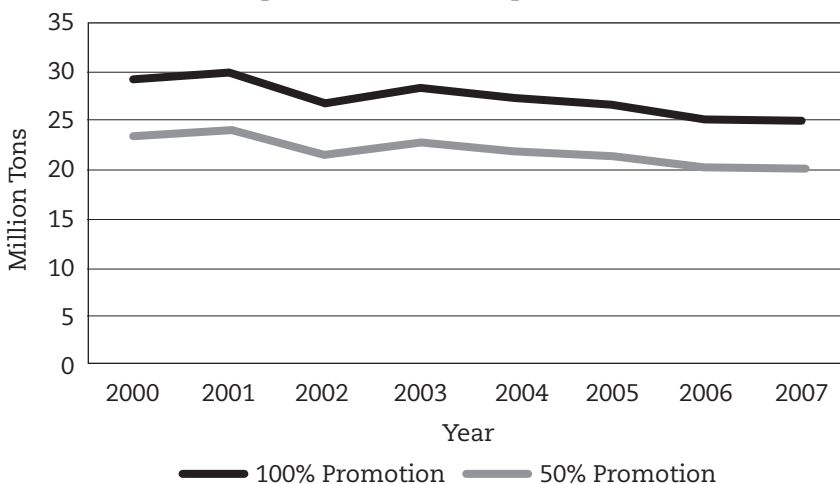
To do this, an approach similar to the one used by Alston et al. was used in the simulation. In this approach, the export supply response was incorporated using a constant elasticity form and equated with predicted export demand quantities. Changes in export demand attributable to U.S. wheat export promotion then affected the level of production and price.

The change in net benefits due

**FIGURE 1. Model 1 Simulated U.S. Wheat Exports With 50% and 100% Export Promotion Expenditures.**



**FIGURE 2. Model 2 Simulated U.S. Wheat Exports With 50% and 100% Export Promotion Expenditures.**



to export promotion programs was computed for each year (2000 through 2007) as the difference in net revenue ( $\Delta NR$ ) between the two scenarios, which mathematically equals

$$\Delta NR_t = (P_t Q_t - P_t' Q_t') M_t,$$

where  $P_t Q_t$  represents total revenue for the scenario with 100 percent export promotion expenditures and  $P_t' Q_t'$  represents total revenue for the scenario with 50 percent export promotion expenditures, and  $M_t$  represents a net margin factor for wheat exports which transforms the total into net revenue. It was assumed that the net margin factor was equal to 10 percent, which is based on recent USDA data. Specifically, the average baseline wheat price by USDA/AMS for 2009/10 is \$4.85 per bushel (<http://www.usda.gov/oce/commodity/wasde/latest.pdf>). In 2008, the national average operating and ownership costs for wheat was \$4.24 per bushel. The \$0.61 per bushel margin as a percent of the 2009/10 baseline export price (\$6.50) is 9.4 percent, which is very close to the 10 percent net margin used in this study. The net margin factor was also set to 5 percent and 1 percent, and the results are reported after the 10 percent results.

By equating the equations for export supply and export demand and solving for world market equilibrium, the actual U.S. prices and predicted quantities were obtained (from the export demand model) using the actual values for the explanatory variables. The counterfactual scenario was then simulated assuming a 50 percent reduction in export promotion expenditures by setting the values at 50 percent of their actual levels in each year. Six assumed values for export supply elasticities were used, which ranged from 0.5 to 3.0 in order to examine a broad range of elasticities. The Eco-

nomics Research Service of USDA has an estimate of 1.6 for the export supply elasticity (Price), which is about the midpoint of this range. The simulation was conducted using both Models 1 and 2 for export demand.

The BCR was then computed for each export supply elasticity as:

$$BCR = \Delta NR_t / \Delta COST, \text{ where}$$

$\Delta COST$  is the difference in nonadministrative and administrative costs of USW export promotion programs for the 50 percent and 100 percent funding scenarios. Note that unlike the econometric estimation of the model, the calculation of the BCR includes administrative costs of export promotion.

**MODEL 1 RESULTS.** Table 3 presents average annual impacts and BCRs for U.S. wheat export promotion efforts over the various assumed own-price elasticities of export supply using export demand Model 1. This table gives a measure of how prices, net revenue, and BCRs would change based on a 50 percent increase in wheat export promotion spending. For example, the average increase in price ranged from \$49.52 per ton, in the case of the most inelastic supply response (0.5), to \$9.53 per ton, in the case of the most elastic supply response (3). The magnitude of price impacts declined as the assumed supply response became larger because producers under larger supply responses further dampened the positive price impacts of the promotion-induced, increased demand by increasing the quantity supplied to the world market relative to smaller supply response scenarios. That is, the more elastic the export supply, the larger the “rent dissipation” effect, i.e., longer term gains in net revenue due to effective promotion results in increased production and, consequently,

**A 50 % reduction in U.S. wheat export promotion would have decreased U.S. wheat exports by a total of 37.4 million metric tons from 2000 through 2007.**

**It is clear that U.S. export promotion has had a significant and positive impact on wheat producer net revenue.**

a dampening of price increase. For  $\epsilon = 1.6$ , which is the ERS reported elasticity, the increase in price was \$17.41 per ton.

U.S. wheat export promotion also had a positive impact on net revenue over this period. The average increase in wheat producer net revenue due to wheat export promotion ranged from \$188 million per year in the case of the least elastic supply response ( $\epsilon = 0.5$ ) to \$96.1 million per year in the case of the most elastic supply response ( $\epsilon = 3$ ). The same negative relationship between supply elasticities and net revenue occurred, i.e., the more elastic the supply elasticity, the smaller the increase in net revenue due to promotion. For  $\epsilon = 1.6$ , the increase in net revenue was \$114 million. It is clear that U.S. export promotion has had a significant and positive impact on wheat producer net revenue over this time period.

How did the gain in wheat producer net revenue compare with the costs of export promotion? To answer that question, an average BCR was computed (see the bottom row of Table 3). The average BCR was computed as the average annual benefits divided by the average annual costs. The average BCR exceeded 1.0 for every supply response considered in the simulation.

For the least elastic supply response ( $\epsilon = 0.5$ ), the average BCR was 18.61. This implies that, on average from 2000 to 2007, the promotion program benefits were 18.61 times greater than the cost. At the opposite end of the spectrum in supply response ( $\epsilon = 3$ ), the average BCR was 9.51, implying that the benefits of the wheat promotion programs were 9.51 times greater than the cost. For  $\epsilon = 1.6$ , the BCR was 11.29.

Because wheat producers pay for roughly 50 percent of the export promotion programs (USDA/FAS pays for the other 50 percent), the actual BCR to wheat producers is twice as high as those reported in Table 3. Hence, based on Model 1 results, wheat producers are receiving benefits of export promotion ranging from 19.2 to 37.22 times their investment in these programs. In terms of total *gross* rather than *net* revenue, Model 1 results indicate that, on average, \$1.00 invested in wheat export promotion increases total gross revenue by \$95 to \$186. Clearly, U.S. wheat export promotion has a large and beneficial impact for the economy.

**MODEL 2 RESULTS.** Table 4 presents average annual impacts and BCRs for U.S. wheat export promotion efforts over the various assumed own-price elasticities of export supply using

**Table 3. Average Annual Market Impacts and Average Benefit-Cost Ratios due to U.S. Wheat Export Promotion, 2000–2007 Based on Model 1.**

Assumed supply elasticity =>	0.5	1.0	1.5	2.0	2.5	3.0
Change in producer price (\$/ton)	49.52	26.97	18.51	14.09	11.37	9.53
Change in net producer revenue (million \$)	188.0	136.0	117.0	107.0	100.0	96.1
Change in promotion cost (million \$)	10.1	10.1	10.1	10.1	10.1	10.1
Benefit-cost ratio	18.61	13.47	11.58	10.59	9.99	9.51

**Table 4. Average Annual Market Impacts and Average Benefit-Cost Ratios due to U.S. Wheat Export Promotion, 2000–2007 Based on Model 2.**

Assumed supply elasticity =>	0.5	1.0	1.5	2.0	2.5	3.0
Change in producer price (\$/ton)	58.18	32.25	22.27	17.00	13.74	11.54
Change in net producer revenue (million \$)	202.0	149.0	128.0	117.0	111.0	106.0
Change in promotion cost (million \$)	10.1	10.1	10.1	10.1	10.1	10.1
Benefit-cost ratio	20.00	14.75	12.67	11.58	10.99	10.50

export demand Model 2. The results are similar to Model 1, except that the impacts are slightly larger. For example, based on  $\epsilon = 1.6$ , which is the ERS estimate for U.S. wheat export supply, the average increase in price was \$20.97 per ton, the average increase in net producer revenue was \$126 million, and the BCR was 12.48. Table 4 displays the results for the other elasticities of supply. Given the wide range of supply responses considered in this analysis and the fact that the BCR exceeded 1.0 in all cases, there is significant evidence that U.S. wheat export promotion was profitable for wheat producers.

As was the case before, these average BCR for wheat producers is about twice that reported in Table 4. So based on Model 2 results, wheat producers' investment in export promotion returned between 21 and 40 times their costs in terms of additional net revenue. Model 2 indicates that every dollar invested in export promotion returned \$105 to \$200 in *gross* revenue to the industry.

Questions often arise about the accuracy of such estimates of BCRs in economic evaluations of commodity promotion programs. The resulting BCRs are generally large because promotion expenditures are exceedingly small relative to product value so only a small demand effect is needed to generate large positive returns. For example, average U.S. wheat export promotion expenditures in 2007 were a mere 0.27 percent of the value of wheat exports by wheat producers. Still, this relatively small investment in U.S. wheat export promotion has increased net revenue by more than \$96.1 million per year since 2000 (based on  $\epsilon = 3$  in Model 1). Therefore, the resulting BCR was quite large.

**SENSITIVITY ANALYSIS ON THE NET MARGIN FACTOR.** To determine

how sensitive the average BCRs were to the assumed net margin factor, both Models 1 and 2 were resolved using 5 percent and 1 percent factors instead of the original 10 percent factor. The results are presented in Table 5. When a 5 percent net margin factor is assumed, BCRs are still well above 1.0 for all assumed supply responses, ranging from a high of 9.32 ( $\epsilon = 0.5$ ) to a low of 4.76 ( $\epsilon = 3$ ) for Model 1 and a high of 10.01 ( $\epsilon = 0.5$ ) to a low of 5.26 ( $\epsilon = 3$ ) for Model 2. When a 1 percent net margin factor is assumed, BCRs are still at or above 1.0 for all assumed supply responses, ranging from a high of 1.96 ( $\epsilon = 0.5$ ) to a low of 1.00 ( $\epsilon = 3$ ) for Model 1 and a high of 2.00 ( $\epsilon = 0.5$ ) to a low of 1.06 ( $\epsilon = 3$ ) for Model 2. These results imply that even if margins shrink from 10 percent all the way down to 1 percent, U.S. wheat export promotion is still profitable for wheat producers.

### MARGINAL BENEFIT-COST RATIO

To explore the optimality of wheat export promotion expenditure levels, a marginal simulation analysis was also conducted. The estimated demand equations (Models 1 and 2) were used to simulate the outcome of an additional scenario to be compared with the results of the baseline scenario. In this third scenario, export promotion expenditures were increased by a marginal amount (1 percent) from the baseline scenario levels while keeping all other variables the same as before. The marginal BCR was then computed

The average increase in wheat-producer net revenue... ranged from \$96.1 million per year to \$188 million per year.

**Table 5. Benefit-Cost Ratios for Models 1 and 2 with Net Margin Factors of 5 Percent and Percent.**

Assumed supply elasticity =>	0.5	1.0	1.5	2.0	2.5	3.0
Model 1 Benefit-cost ratio (0.05)	9.32	6.75	5.79	5.28	4.97	4.76
Model 1 Benefit-cost ratio (0.01)	1.96	1.42	1.21	1.11	1.04	1.00
Model 2 Benefit-cost ratio (0.05)	10.01	7.37	6.35	5.82	5.48	5.26
Model 2 Benefit-cost ratio (0.01)	2.00	1.47	1.27	1.16	1.10	1.06

**Wheat producers should consider investing more funds in export promotion because doing so would return benefits that exceed the costs.**

as the increase in net revenue between the 1 percent increase scenario minus the base scenario divided by the change in export promotion costs between scenarios.

The estimated marginal BCRs (and price and net revenue impacts) are presented in Tables 6 and 7 for Models 1 and 2, respectively. For Model 1, all of the values exceeded 1.0. For example, for the least elastic supply response ( $\epsilon = 0.5$ ), the marginal BCR was 17.38, indicating that an incremental \$1.00 increase in promotion yielded \$17.38 in net revenue to wheat producers. For the most elastic supply response ( $\epsilon = 3$ ), the marginal BCR was 7.72, still greater than 1.0. Model 2 results were almost identical to Model 1, except slightly larger. Because all of the marginal BCRs were greater than 1 for all elasticities considered, wheat producers should consider investing more funds in export promotion since doing so would return benefits that exceed the cost. These relatively large marginal BCRs are also common for agricultural promotion programs, suggesting that these collective-action programs are frequently under-funded from an economic optimality point of view (see Table 2 for marginal BCRs for other commodities).

## INDIVIDUAL COUNTRIES

The previous analysis examined the impact of U.S. wheat export promotion on total U.S. (or total less government concessional) wheat exports. That analysis was useful in measuring the benefits and costs of U.S. wheat export promotion. However, that analysis did not provide information on U.S. wheat export promotion impacts in specific importing countries. In order to measure specific country impacts, one must develop import demand equations for specific countries.

The U.S. exports wheat to many different countries, and it is beyond the scope of this report to measure the impact of promotion on all importing countries. Instead, we limit our attention to five countries that were chosen by USW as a representative set of countries. The five countries include: Mexico, Colombia, Nigeria, Egypt, and Thailand. Hence, the continents of North America, South America, Africa, and Asia are represented in the analysis.

Import demand equations for U.S. wheat were estimated for each country with U.S. wheat exports as the dependent variable, which was measured on a metric ton basis for each calendar year. The following determi-

**Table 6. Average Annual Market Impacts and Marginal Benefit-Cost Ratios due to 1 Percent Increase in U.S. Wheat Export Promotion, 2000–2007 Based on Model 1.**

Assumed supply elasticity =>	0.5	1.0	1.5	2.0	2.5	3.0
Change in producer price (\$/ton)	0.84	0.42	0.28	0.21	0.17	0.14
Change in net producer revenue (million \$)	3.51	2.34	1.95	1.755	1.64	1.56
Change in promotion cost (million \$)	0.202	0.202	0.202	0.202	0.202	0.202
Benefit-cost ratio	17.38	11.58	9.65	8.69	8.12	7.72

**Table 7. Average Annual Market Impacts and Marginal Benefit-Cost Ratios due to 1 Percent Increase in U.S. Wheat Export Promotion, 2000–2007 Based on Model 2.**

Assumed supply elasticity =>	0.5	1.0	1.5	2.0	2.5	3.0
Change in producer price (\$/ton)	0.85	0.426	0.284	0.213	0.171	0.142
Change in net producer revenue (million \$)	3.511	2.344	1.954	1.76	1.642	1.564
Change in promotion cost (million \$)	0.202	0.202	0.202	0.202	0.202	0.202
Benefit-cost ratio	17.39	11.60	9.67	8.71	8.13	7.74

nants were included to ascertain their impacts on the import demand for U.S. wheat:

1. Ratio of U.S. wheat price to price in competing countries,
2. GDP for major importing countries,
3. Domestic production,
4. Freight rate cost index, and
5. U.S. wheat export promotion expenditures.

All monetary measures (prices, income, and promotion expenditures) were converted to the domestic currency of each country in order to take into effect the relative value of currencies to the U.S. dollar. To take into account the lagged effect of U.S. wheat export promotion on U.S. imports, lagged as well as current values were included in the demand equation. Lag length ranges from a low of one-quarter to a high of three-quarters, which is within the range of lag length of six to nine months suggested by Clarke. The promotion elasticity values reported in Table 8 give the total or long-run impact of U.S. export promotion on U.S. wheat imports.

The models were estimated with quarterly data from 1995.1 through 2009.1. Because autocorrelation was detected in some models, a moving average error term was appended to the regression so the resulting equations were subsequently free from autocorrelation. The elasticity signs were consistent with economic theory and most estimated coefficients were statistically significant at better than the 10 percent significance levels.<sup>3</sup> No other econometric problems were encountered. The R-squared measures for the individual country models were: 72 percent for Mexico, Egypt, and Nigeria, 31 percent for Colombia, and 21 percent for Thailand. The low

<sup>3</sup> The freight index was not statistically significant for Mexico, Nigeria, and Egypt, and domestic production was not statistically significant for Colombia, Nigeria, and Thailand.

R-squares for Colombia and Thailand are attributable to the lack of any pattern or trend in U.S. wheat imports over the estimation time period. In time series models that have no apparent trend over time in the dependent variable, it is more difficult for the explanatory variables to fit the data as well as when a trend is apparent; hence these models usually have dramatically lower R-square values. The estimated elasticities for the five

**Table 8. Estimated Import Demand Elasticities for Selected Countries Importing U.S. Wheat.**

Country	U.S. Price	Competitor Price	GDP	Production	Freight Index	Promotion
Mexico	-0.921	0.921	0.589	-0.422	<b>-0.044</b>	0.126
Egypt	-0.624	0.624	0.438	-0.747	<b>-0.024</b>	0.241
Nigeria	-0.331	0.331	0.477	Na	<b>0.034</b>	0.155
Colombia	-0.573	0.573	0.376	Na	0.213	0.070
Thailand	-1.722	1.722	0.462	Na	-0.554	0.137

NOTE: Values in bold are not statistically significant.

countries are presented in Table 8.

As was the case in the macro model, the ratio of the U.S. to competing country export price was used in the demand equation because importers base their demand decisions on relative import prices for wheat. The U.S. price was expected to be negatively related to U.S. exports, i.e., a lower price results in higher quantities of U.S. wheat imported, reflecting the law of demand. Both the U.S. and competing country wheat prices were defined as the value of wheat imports divided by the quantity of wheat imports (i.e., it is a unit value measure). As expected, U.S. price was an important determinant of U.S. wheat imports in all countries. The estimated price elasticity ranged from a low of -0.331 in Nigeria to a high of -1.722 for Thailand. This number measures the responsiveness of imports to changes in price. For example, a 1 percent increase in U.S. price led to a 1.722 percent decrease

**The highest estimated export promotion elasticity was in Egypt... the second highest was in Nigeria.**

in U.S. imports by Thailand holding all other variables constant. Alternatively, a 1 percent increase in the competing country wheat price relative to the U.S. wheat price resulted in a 1.722 percent increase in U.S. wheat imports in Thailand, holding all other demand determinants constant.

Another important determinant of U.S. wheat imports was income levels of the country, as measured by GDP for each country. This demand determinant, which should be positive, gives a measure of the responsiveness of U.S. imports to changes in country-level income. As expected, it was positive and statistically significant for all countries, ranging from a low of 0.376 in Colombia to a high of 0.589 in Mexico. Hence, a 1 percent increase in income in Mexico resulted in a 0.589 percent increase in U.S. wheat imports, holding all other demand determinants constant. For all countries, as incomes increased, U.S. wheat imports increased.

The level of domestic wheat production was an important variable in Mexico and Egypt, but not in the other countries. A 1 percent increase in Mexican wheat production resulted in a 0.422 percent decrease in U.S. wheat imports, holding all other demand determinants constant. A 1 percent increase in Egyptian wheat production resulted in a 0.747 percent decrease in U.S. wheat imports, holding all other demand determinants constant.

Because the price variables did not take into account the transportation costs of shipping wheat, a cost index for freight rates was included in the model. It was hypothesized that the elasticity for this variable would be positive for countries close to the U.S. (e.g., Mexico and Colombia) and negative for countries farther away (e.g., Thailand, Nigeria, and Egypt) relative to competing wheat country export-

ers. This variable was only statistically significant in Colombia (0.213) and Thailand (-0.554). Thus, for example, a 1 percent increase in freight rates holding all other variables constant led to a 0.554 percent decrease in U.S. imports in Thailand.

The variable of interest here was the export promotion elasticity. Export promotion was measured as total FAS and state expenditures measured in the country's currency deflated by the Consumer Price Index for the country. The results indicate that U.S. export promotion had a positive and statistically significant impact on U.S. wheat imports in all the countries. The highest estimated export promotion elasticity was in Egypt, where a 1 percent increase in U.S. wheat export promotion expenditures resulted in a 0.241 percent increase in U.S. wheat imports. The second highest promotion elasticity was in Nigeria; a 1 percent increase in wheat promotion led to a 0.155 percent increase in U.S. wheat imports. Thailand had the third largest promotion elasticity at 0.137, followed by Mexico (0.126) and Colombia (0.070).

In terms of statistical differences among promotion elasticities, Egypt had a higher promotion elasticity than all other countries. Nigeria, Thailand, and Mexico were not statistically different among each other, but were larger than Colombia. So the relative rankings based on promotion impacts was: (1) Egypt, (2) Nigeria, Thailand, and Mexico, and (3) Colombia.

These promotion elasticities are within the range of other estimates for U.S. export promotion presented in Table 2. Recall that these estimates ranged from a low of 0.014 to a high of 0.98, and the median elasticity (half the values lie below the median and half lie above it) was 0.0575. The median promotion elasticity of the five

countries in Table 8 was 0.137, which is larger than the median in Table 2. While these promotion elasticities are lower than the one calculated for the macro model, it should be noted that the macro model results are based on annual data over a much longer time period (1975-2007) than the quarterly numbers (1995-2009). Hence, the results of the two models are not directly comparable.

To explore the optimality of wheat export promotion expenditure levels across these five countries, a marginal simulation analysis was conducted. The estimated demand equations for each country were used to simulate two scenarios: (1) a baseline scenario, where all demand factors were set to actual levels, and (2) a counterfactual scenario, which was identical to (1) except that export promotion expenditures were increased by a marginal amount (1 percent) from the baseline scenario levels. The marginal BCR was then computed as the increase in net revenue between the 1 percent increase scenario minus the base scenario divided by the change in export promotion costs between scenarios. An own-price elasticity of supply equal to 2.0 was assumed in these simulations.

The estimated marginal BCRs for each country are listed in Table 9 and are based on a model simulation of 2000.1 through 2009.1. Export promotion to Mexico had the highest marginal BCR where an extra dollar put into export promotion would increase net revenue by \$33.98. The second highest marginal BCR was in Egypt, where an extra dollar put into export promotion would increase net revenue by \$20.60. The third highest marginal BCR was in Nigeria, where an extra dollar put into export promotion would increase net revenue by \$18.71. Thailand had the lowest marginal BCR

(6.47) and Colombia had the second lowest (13.07).

**Table 9. Estimated Marginal Rates of Return for Selected Countries Importing U.S. Wheat, 2000-2009.**

Country	Marginal rate of return
Mexico	33.98
Egypt	20.60
Nigeria	18.71
Colombia	13.07
Thailand	6.47

The reason why the relative rankings in marginal BCRs (Mexico, Egypt, Nigeria, Colombia, and Thailand) were different from the relative rankings of their export promotion elasticities (Egypt, Thailand, Mexico, Nigeria, and Colombia) was because the amount spent on export promotion in each country differs. So, for example, a 1 percent change in export promotion in Mexico is quite different from a 1 percent change in export promotion in Thailand. In terms of impact, the marginal BCRs provide more valuable information for allocation decisions between countries.

These results suggest that of the five countries examined, Mexico is clearly the most profitable market for wheat export promotion. On the other hand, Thailand is the least profitable. In terms of these five countries, the USW should consider reallocating some export promotion expenditures from the lower impact countries (Thailand and Colombia) to the higher impact countries (Mexico, Egypt, and Nigeria). Note, however, that significant reallocations will change these marginal BCRs, but as a general direction, this policy conclusion holds. Another caveat is that the USW has export promotion programs in many other countries that may have higher and/or lower BCRs than these five countries.

**Export promotion to Mexico had the highest benefit-to-cost ratio... an extra dollar put into export promotion would increase net revenue by \$33.98.**

## APPENDIX

**Appendix Table 1. Results of Model 1 With U.S. and Competing Country Wheat Prices as Separate Variable Instead of Single Price Ratio.**

<b>Demand Factor</b>	<b>Model 1 Elasticity</b>	<b>Model 1 t-Statistic</b>
U.S. price/world price deflator	-0.390	-2.31
Competing country price/ world price deflator	1.032	5.41
Importing countries GDP	0.384	2.61
Value of U.S. \$	-0.973	-2.60
Competing country export quantity	-0.324	-1.31
U.S. export promotion	0.218	1.65
R-square	0.70	

## REFERENCES

Alston, J.M. James A. Chalfant, Jason E. Christian, Erika Meng, and Nicholas Piggott. "The California Table Grape Commission's Promotion Program: An Evaluation." Giannini Foundation of Agricultural Economics Monograph Series (University of California, University of California), 1997.

Armah, B. and J. Epperson. "Export Demand for U.S. Orange Juice: Impacts of U.S. Export Promotion Programs." *Agribusiness* 13(1997):1-10.

Clarke, D. "Econometric Measurement of the Duration of Advertising Effect on Sales." *Journal of Marketing Research* 13(1976):345-57.

Comeau, A., R.C. Mittelhammer, and T.I. Wahl. "Assessing the Effectiveness of MPP and TEA Advertising and Promotion Efforts in the Japanese Markets for Meat." *Journal of Food Distribution Research*. 28(1997):27-35.

Dwyer, M.J. "Evaluating the Effectiveness of the Market Promotion Program on U.S. High Value Agriculture Exports, Final Regulatory Impact Analysis." FAS staff paper 1-95. USDA, Washington, D.C., 1995.

Dwyer, M.J. and Kelly Kirby Flowers. "Evaluating the Impacts of TEA on Exports to Japan: A Simplified Econometric Approach." Final Regulatory Impact Analysis, June 14, 1991.

Fuller, S., H. Bello, and O. Capps. "Import Demand for U.S. Fresh Grapefruit: Effect of U.S. Promotion Programs and Trade Policies of Importing Nations." *Southern Journal of Agricultural Economics* July (1992): 251-260.

Halliburton, K. and S.R. Henneberry. "The Effectiveness of U.S. Nonprice Promotion of Almonds in the Pacific Rim." *Journal of Agricultural and Resource Economics* 20(1995): 108-121.

Kaiser, Harry M., Donald J. Liu, and Ted Consignado. "An Economic Analysis of California Raisin Export Promotion." *Agribusiness: An International Journal*. 19(2003):189-202.

Lanclos, D., S. Devadoss, and J. Guenther. "Impacts of Foreign Direct Investment and Advertising on the Export Demand for U.S. Frozen Potatoes." *Agribusiness* 13(1997): 273-284.

Le, Cong Tru, Harry M. Kaiser, and William G. Tomek. "Export Promotion and Import Demand for U.S. Red Meat in Selected Pacific Rim Countries." *Agribusiness: An International Journal*. 14(1998):95-106.

Lee, J.Y. and M.G. Brown. "Economic Effectiveness of Brand Advertising Programs for U.S. Orange Juice in the European Market: An Error Component Analysis." *Journal of Agricultural Economics*. 37(1986):385.

- Onunkwo, I.M. and J.E. Epperson. "Export Demand for U.S. Pecans: Impacts of U.S. Export Promotion Programs." *Agribusiness: An International Journal* 16(2000): 253-266.
- Richards, T. P.V. Ispelen, and A. Kagan. "A Two-Stage Analysis of the Effectiveness of Promotion Programs for U.S. Apples." *American Journal of Agricultural Economics*. 79(1997):825-37.
- Richards, Timothy J.; Patterson, Paul M. "Dynamic Complementarity in Export Promotion: The Market Access Program in Fruits and Vegetables." *Journal of Agricultural and Resource Economics*. 23(1998):319-37.
- Rosson, C., M. Hammig, and J. Jones. "Foreign Market Promotion Programs: An Analysis of Promotion Response for Apples, Poultry, and Tobacco." *Agribusiness* 2(1986):33-42.
- Rusmevichientong, Pimbucha and Harry M. Kaiser. "Are There Halo Effects of U.S. Grain Export Promotion?" *Applied Economics*. Forthcoming.
- Solomon, H. and H. W. Kinnucan. "Effects of Non-price Export Promotion: Some Evidence for Cotton." *Australian Journal of Agricultural Economics*. 37(1993):1-15.
- U.S. General Accounting Office. "U.S. Agricultural Exports, Strong Growth Likely But US Export Assistance Programs' Contribution Uncertain." GAO/NSI-AD-97-260, September 1997.
- U.S. General Accounting Office. "Agricultural Trade, Changes Made to Market Access Program, But Questions Remain on Economic Impact." GAO/NSIAD-99-38, April 1999.
- Weiss, K.R., R.D. Green, and A.M. Havenner. "Walnuts in Japan: A Case Study of Generic Promotion Under the USDA's Market Promotion Program." In *Agricultural Commodity Promotion Policies and Programs in the Global Agri-Food System, Proceedings of NEC-63 Conference*, NICPRE, Cornell University, May 1996: 47-80.
- Williams, G.W., C.R. Shumway, H.A. Love, and J.B. Ward. "Effectiveness of the Soybean Checkoff Program." *Texas Agricultural Market Research Center Report*. Department of Agricultural Economics. Texas A&M University. May, 1998.
- Wohlgenant, M. K. "Distribution of Gains from Research and Promotion in Multi-Stage Production Systems: The Case of the U.S. Beef and Pork Industries." *American Journal of Agricultural Economics*. 75 (1993): 642-51.

## ABOUT U.S. WHEAT ASSOCIATES

U.S. Wheat Associates is the industry's market development organization working in more than 100 countries on behalf of America's wheat producers. The activities of USW are made possible by producer checkoff dollars managed by 19 state wheat commissions, in-kind support, and cost-share funding provided by USDA's Foreign Agricultural Service. For more information, visit [www.uswheat.org](http://www.uswheat.org) or contact your state wheat commission.

## ABOUT THE AUTHOR



Harry M. Kaiser, Ph.D., is the Gellert Family Professor of Applied Economics and Management at Cornell University. He teaches and conducts research in the areas of price analysis,

marketing, industrial organization, policy, and quantitative methods. Professor Kaiser has written 110 journal articles, four books, 17 book chapters, and over 200 research bulletins in these areas. He has received over \$8 million in research grants from such agencies as the National Science Foundation, National Institutes of Health, U.S. Department of Agriculture, and the New York Department of Agriculture and Markets.

Since 1994, Professor Kaiser has been the director of the Cornell Commodity Promotion Research Program. Much of his research focuses on the market-wide economic effects of commodity advertising and promotion programs. Currently, Professor Kaiser and his staff annually conduct the economic analysis required by the U.S. Congress for the national dairy and

fluid milk processor advertising programs. Professor Kaiser was involved with some of the first research that investigated the economic impacts of climate change on the U.S. agricultural sector. More recently, Professor Kaiser has worked extensively in the area of behavioral and experimental economics, examining such issues as making the voluntary contributions mechanism more efficient and the impact of food safety on demand.

Professor Kaiser served as editor of *Agricultural and Resource Economics Review* from 1999-2001, associate editor of the *American Journal of Agricultural Economics* from 1999-2001, and has been the associate editor of *Agribusiness: An International Journal* since 1999. He was the President of the Northeastern Agricultural and Resource Economics Association from 2006-2008, and was on the executive board of directors of the American Agricultural Economics Association from 2003-2005. He is currently on the executive board of directors of the Council on Food, Agricultural, and Resource Economics. Professor Kaiser was co-recipient of the outstanding journal article of the year from the Northeastern Agricultural and Resource Economics Association in 1991, and from the Canadian Agricultural Economics Society in 2009. In 2006, Professor Kaiser received the Alumni Distinguished Achievement Award from the University of Wisconsin-Eau Claire. In 2009, he received the highest non-degree honor bestowed on an alumnus of the University of Minnesota, the Outstanding Achievement Award. He also received the Outstanding Alumni Award from the Department of Applied Economics from the University of Minnesota in 2009.

*January 2010*

**NOTE:** U.S. Wheat Associates commissioned this study, which was funded by the Market Access Program of the United States Department of Agriculture's Foreign Agricultural Service.

### **NONDISCRIMINATION AND ALTERNATE MEANS OF COMMUNICATIONS**

U.S. Wheat Associates prohibits discrimination in all its programs and activities on the basis of race, color, religion, national origin, gender, marital or family status, age, disability, political beliefs or sexual orientation. Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact U.S. Wheat Associates at 202-463-0999 (TDD/TTY - 800-877-8339, or from outside the U.S. - 605-331-4923). To file a complaint of discrimination, write to Vice President of Finance, U.S. Wheat Associates, 3103 10th Street, North, Arlington, VA 22201, or call 202-463-0999. U.S. Wheat Associates is an equal opportunity provider and employer.





3103 10th Street North, Suite 300 • Arlington, VA 22201  
Tel: (202) 463-0999 • Fax: (703) 524-4399  
[www.uswheat.org](http://www.uswheat.org)