Briefing Paper on the Demand for U.S. Commodity Exports and the Mississippi River: Past and Future

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101 South Fifth St.
Columbia, MO 65201
573-882-3576
www.fapri.missouri.edu

FAPRI
At the University of Missouri
Food and Agricultural Policy Research Institute

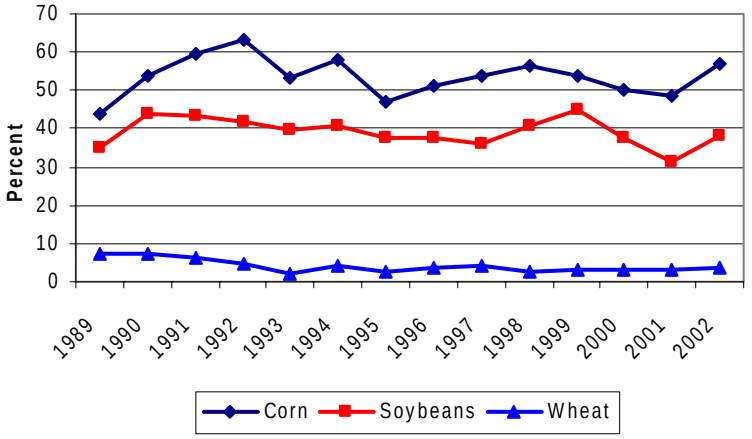
College of Agriculture, Food and Natural Resources

BRIEFING PAPER ON THE DEMAND FOR U.S. COMMODITY EXPORTS AND THE MISSISSIPPI RIVER: PAST AND FUTURE

By John R. Kruse, Seth Meyer, Abner Womack and Willi Meyers
FAPRI – University of Missouri-Columbia

Introduction

As part of the decision in evaluating the lock and dam upgrade on the Mississippi River, the U.S. Army Corps of Engineers (Corps) has contracted with various agricultural forecasting companies (most recently Sparks Companies, Inc.) to produce long range projections of agricultural exports and the implied demand for Mississippi River transportation services. The future demand for barge transportation services is a key component in evaluating the value of lock and dam upgrades. In this context, it is important to understand the volume of U.S. exports that utilize the river versus other modes of transportation. According to the Corps' 2002 data, corn, soybeans, wheat, and prepared animal feeds accounted for 66 percent, 26 percent, 2 percent and 6 percent, respectively, of the total agricultural commodities moved on the Mississippi River. Of total U.S. exports, 50 to 60 percent of corn, 30 to 45 percent of soybeans, and 2 to 8 percent of wheat was exported via the Mississippi River (Figure 1). Since corn and soybean exports account for the majority of agricultural commodities moved on the Mississippi River, evaluating the future



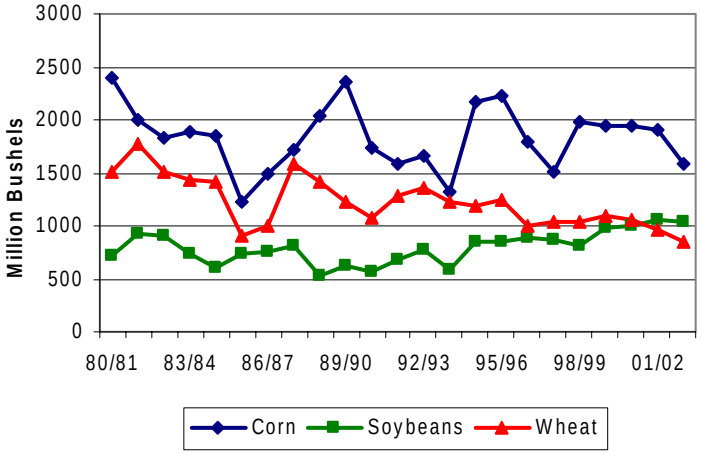
Sources: U.S. Army Corps of Engineers, USDA FATUS Databank

Figure 1 Share of U.S. Exports Sent Down the Mississippi River, Calendar Year Basis

export demand for these commodities is critical.

Historical U.S. Exports

Over the last two decades, U.S. commodity exports have varied considerably. As Figure 2 illustrates, the demand for corn has exhibited the most variance, with little distinct trend. Wheat exports appear to have declined, which is consistent with reduced wheat production in the United States. Soybean exports appear to have increased, especially if one focuses on the last ten years. Yet a simple trend analysis of the data could lead to very erroneous assumptions about future demand for U.S. exports. Economic theory dictates that U.S. exports are a function of supply and demand in the United States, supply and demand in the rest of the world, and cost of transportation services. Many forces were in play over the past two decades that shaped world supply and demand.



Source: USDA FATUS Report

Figure 2 U.S. Corn, Soybeans, and Wheat Exports

Some of the **factors leading to a leveling off of U.S. exports over the 1990's**:

- strength of the U.S. dollar,
- China's decision to support their growing consumption and exports by drawing down their stocks,
- the increase in U.S. domestic demand for raw commodities for animal feed and manufacturing uses such as ethanol production, and
- record levels of global commodity production.

China significantly reduced its stock levels over the 1990's and early 2000's; the United States and other countries also carry much fewer stocks than the in the mid 1980's. As a result, larger price and export fluctuations can be expected in the 2000's.

The Future Demand for U.S. Exports

The outlook for U.S. agricultural commodity export growth over the next ten years varies by commodity based on the supply and demands in the United States and the rest of the world as well as transportation costs. In FAPRI's January 2004 baseline outlook, some of the factors which increase demand for U.S. grain exports include the following:

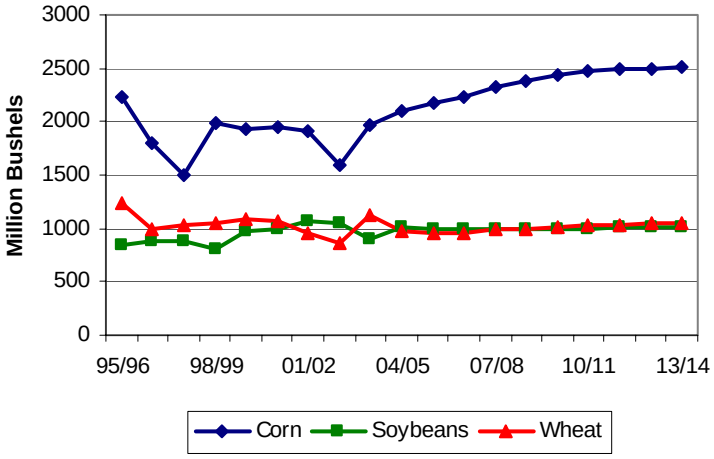
- weakening of the U.S. dollar,
- world per capita real income growth,
- demand in China that continues to outpace production and Chinese grain stocks that appear to have fallen to low enough levels that China cannot continue to rely indefinitely on stock reductions to satisfy local demand,
- the emerging middle class of approximately 350 million people in China is introducing more meat into their diets resulting in more demand for feed grains and soybeans, and
- the emerging middle class of approximately 300 million people in India that are also diversifying their diets to include more eggs and vegetable oils.

The factors culminate in a particularly optimistic outlook for U.S. corn exports. The United States is very competitive in growing corn with a large production area and very high yields relative to most other countries, especially South America and China. With ample supply available and the expected shift of China from a net exporting position to a net importing position, the United States is well poised to capture a significant share of the expansion in corn trade.

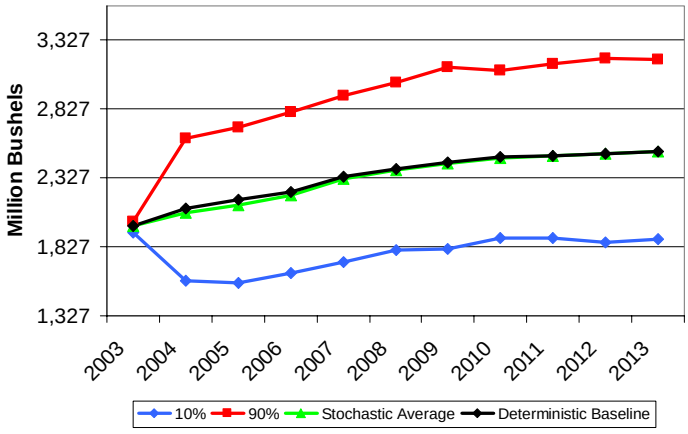
The U.S. also faces some challenges in its export growth opportunities in the form of competition from other countries, particularly South America. The rapid expansion of soybean production in Brazil is expected to continue and limit the expansion of U.S. soybean exports long term. In the case of wheat, the continued competition from the European Union, Australia and Canada limit U.S. wheat export demand growth. Furthermore, U.S. wheat production is expected to remain relatively stagnant, as returns for competing crops remain favorable relative to wheat returns.

Even for corn, growth in U.S. exports may be restrained by availability of exportable supplies. While FAPRI's baseline indicates there could be significant growth in U.S. corn production over the next ten years, much of that growth will be absorbed by domestic feed demand and continued rapid growth in ethanol production.

In the 2004 FAPRI deterministic baseline, U.S. corn exports expand by 25 percent from 2003 to 2013 (see Figure 3) while competition from other countries keeps soybean and wheat exports relatively flat. FAPRI also develops a stochastic baseline in order to put some possible ranges around the deterministic baseline. The ranges are based on a number of assumptions, including continuation of current policies, that influence the size of the ranges around the deterministic baseline. For corn, the 10th percentile ranges from 1,500 to 1,800 million bushels while the 90th percentile ranges from 2,800 to 3,200 million bushels over the 2003 to 2013 period. The variance in world supply and demand makes movements within these percentiles likely over the ten year period. For example, a drought in Argentina or China could move U.S. exports into the 2,800 to 3,200 million

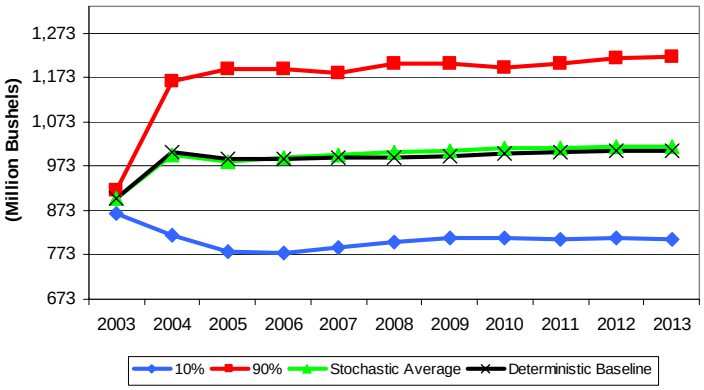


Source: FAPRI World Outlook Report 2004
Figure 3 U.S. Corn, Soybeans and Wheat Exports

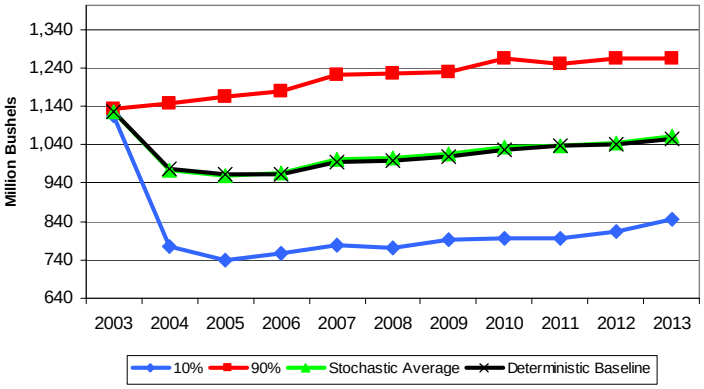


Source: FAPRI World Outlook 2004
Figure4 U.S. Corn Exports

bushel range, while good weather worldwide or a U.S. drought could drop U.S. exports into the 1,500 to 1,800 range. This potential range of variance in exports is similar to the changes in U.S. corn exports observed from 1989/90 when corn exports reached 2.3 billion bushels, then fell to 1.3 billion bushels just four years later in 1993/94.



Source: FAPRI U.S. Stochastic Baseline 2004
Figure 3 U.S. Soybean Exports



Source: FAPRI U.S. Stochastic Baseline 2004
Figure 4 U.S Wheat Exports

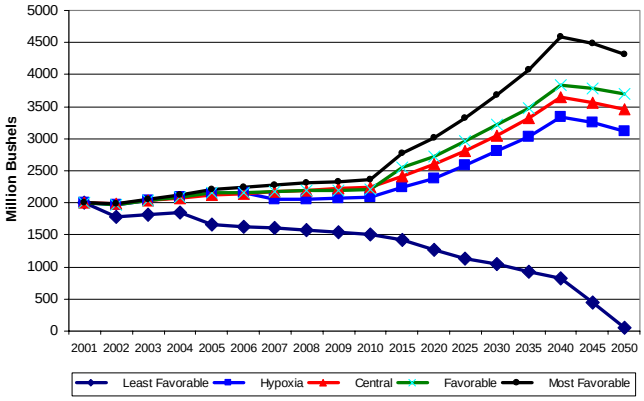
The 10th and 90th percentile ranges for soybeans and wheat are presented in Figures 5 and 6. Coincidentally, the 10th percentile is approximately 800 million bushels while the 90th percentile is approximate 1,200 million bushels for both soybeans and wheat . As in the case of corn, variance with the 10th and 90th percentiles will likely occur with variable world crop production.

The FAPRI stochastic baseline incorporates only some of the factors contributing to uncertainty about future agricultural export demand. For example, the baseline assumes a

continuation of current agricultural and trade policies around the world. While the baseline assumes future variability in yields, it is assumed that underlying the underlying average rate of growth in crop yields is fixed. If there are policy shocks or if the rate of technological improvement changes, the projected distributions will no longer hold. True uncertainty around the deterministic baseline is large and probably expands over time.

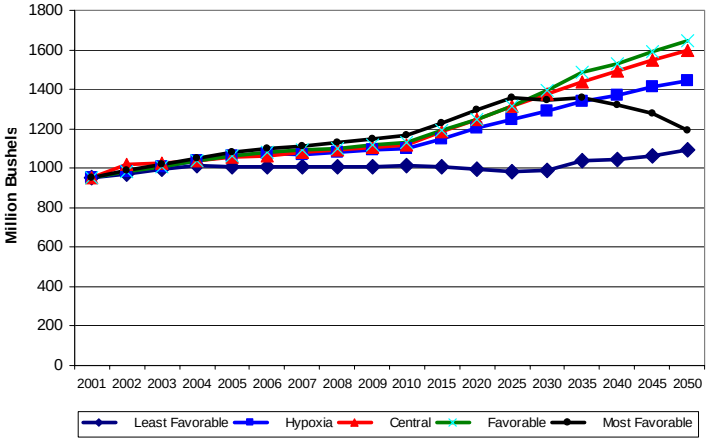
Corps' Study

In 2002, Sparks Companies, Inc. produced an analysis of the potential demand for U.S. exports for the Army Corps of Engineers. Sparks used five scenarios to analyze U.S. exports. The central scenario was considered to be the most likely scenario. The favorable and very favorable scenarios were designed around increases in demand from China and/or India. The least favorable scenario was driven by the assumptions that China and India each refused to become major



Source: "Upper Mississippi River and Illinois Waterway Navigation Study", Sparks Companies, Inc.

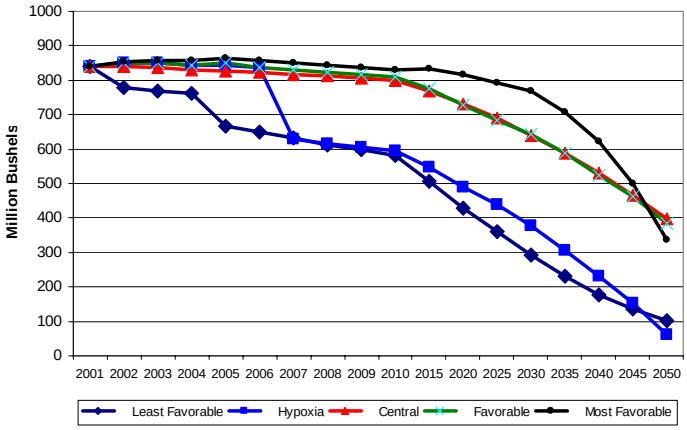
Figure 5 Sparks' U.S. corn export scenarios



Source: "Upper Mississippi River and Illinois Waterway Navigation Study", Sparks Companies, Inc.

Figure 6 Sparks' U.S. soybean export scenarios

world food importer and lower technology growth in the United States. The hypoxia scenario was an analysis of U.S. exports if U.S. farmers were required to reduce nitrogen losses by 20 percent.



Source: "Upper Mississippi River and Illinois Waterway Navigation Study", Sparks Companies, Inc.

Figure 7 Sparks' U.S. wheat export scenarios

In the case of corn, the scenarios produced by Sparks had ranges similar to the FAPRI stochastic baseline through 2013. After 2015, the Sparks projections suggest a rapid expansion in U.S. exports through 2040 for four of the five scenarios.

Figures 8 and 9 present the results of Sparks' scenarios for U.S. soybean exports and U.S. wheat exports. Sparks projects continued growth in U.S. soybean exports under most of the scenarios with the exception of the least favorable scenario. The U.S. wheat export scenarios are more pessimistic with a continued decline for U.S. exports, especially longer term, for most of the scenarios.

Conclusions

- Over the past decade a leveling off of the demand for U.S. agricultural exports was driven by the strength of the dollar, China's decision to support their consumption and exports by drawing down their stocks, the increase in U.S. domestic demand for raw commodities and record levels of global commodity production.

- Because global supply and demand will change in future years, trend analysis using historical export data could lead to erroneous conclusions regarding the future demand for transportation services on the Mississippi River.

- Analysis of future world supply and demands, suggests significant growth opportunities for U.S. exports resulting from:

    - a weaker U.S. dollar,
    - world per capita real income growth, demand in China that continues to outpace production and Chinese grain stocks that appear to have fallen to low enough levels that China cannot continue to rely indefinitely on stock reductions to satisfy local demand,
    - the emerging middle class of approximately 350 million people in China is introducing more meat into their diets resulting in more demand for feed grains and soybeans, and
    - the emerging middle class of approximately 300 million people in India that are also diversifying their diets to include more eggs and vegetable oils.

- U.S. corn exports, which account for 60 percent of agricultural volume, are projected to grow by 25 percent by 2013 to a level of 2.5 billion bushels based on world supply and demand growth.

- Stochastic analysis of U.S. corn exports puts a range of 1.8 to 3.2 billion bushels at the 10^{th} percentile and 90^{th} percentiles, respectively, with variability in world supply demand causing U.S. corn exports to move within this range.

- Variability in U.S. agricultural commodity exports will continue, especially with low world stock levels.

- U.S. soybean and wheat exports are expected to remain relatively flat with occasional export opportunities when shortfalls in production occur in other countries.

REFERENCES

United States Department of Agriculture. Foreign Agricultural Trade of the United States Database. http://www.ers.usda.gov/Data/FATUS/ , June 2004.

US Army Corps of Engineers. "Draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study" Rock Island District, St. Paul District, and St. Louis District. April 2004.

Food and Agricultural Policy Research Institute. "FAPRI 2004 U.S. and World Agricultural Outlook". January 2004.

Sparks Companies, Inc. "Upper Mississippi River and Illinois Waterway Navigation Study, Economic Scenarios and Resulting Demand for Barge Transportation. Final Report". May 2002.