

Estimating the Impact of Low Mississippi River Levels on Arkansas Soybean Prices

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The Mississippi River plays a vital role in moving Arkansas crops, especially soybeans, from farms to domestic buyers and export markets. For example, in 2020, U.S. agricultural exports totaled \$146 billion, increasing 7 percent year over year (U.S. Department of Agriculture's Foreign Agriculture Service, 2021). That year, approximately 46 percent of grain exports were moved by barge. Soybeans, the top U.S. agricultural export, rely heavily on barge transportation, with 53 percent of exports and 28 percent of total supplies shipped via the river system. Extreme weather events, such as drought, not only impact agricultural production (e.g., crop yields) but also disrupt transportation infrastructure, including the Mississippi River.

Arkansas soybean producers were affected by low Mississippi River levels during harvest seasons from 2022 to 2024. During this time, the Lower Mississippi River reached record lows. In October, the U.S. Geological Survey (USGS) Memphis stream gauge recorded -12.0 feet in 2023 and -10.8 feet in 2022. The previous record was -10.7 feet, set in 1988. These record-low water levels increased transportation costs and barge freight rates (Biram, et al., 2022; Gardner, Biram, and Mitchell, 2023; Biram, Mitchell, and Stiles, 2024). Higher transportation costs are passed on to producers through lower cash bids, or a weakening of basis (calculated as the cash price minus the futures price). These events have highlighted the need to better understand how low river levels affect Arkansas soybean prices.

Mitchell and Biram (2025) estimate the impact of low water levels in the Mississippi River on Arkansas soybean basis for 12 regional grain markets. They use soybean basis data from the U.S. Department of Agriculture's Agricultural Marketing Service (USDA-AMS), and river level data from USGS stream gauges. In their analysis, a "low river" condition is defined as the river gauge reading below -5 feet. They also allow the impact of low river levels to vary depending on how far a grain market is from the Mississippi River. For example, the impact on the Memphis grain market is larger than for the Augusta market. Using regression analysis, Mitchell and Biram (2025) estimate how much soybean basis (in \$ per bushel) changes when the Mississippi River is low, and how this impact changes with distance from the river.

Mitchell and Biram (2025) find that when the river stream gauge in Memphis, Tennessee reads -5 feet, Arkansas soybean basis weakens (widens), on average, by \$0.58 per bushel, \$0.29 per bushel, and \$0.12 per bushel for grain markets that are 5 mile, 10 miles, and 25 miles from the closest Mississippi River port, respectively. Similarly, they find that Mississippi soybean basis weakens (widens) by \$0.55 per bushel, \$0.28 per bushel, and \$0.11 per bushel for the same distances to grain markets. Figure 1 below shows the degree of the impact of low river levels on soybean basis in Arkansas with markets near the river experiencing weaker basis than of those further from the river.

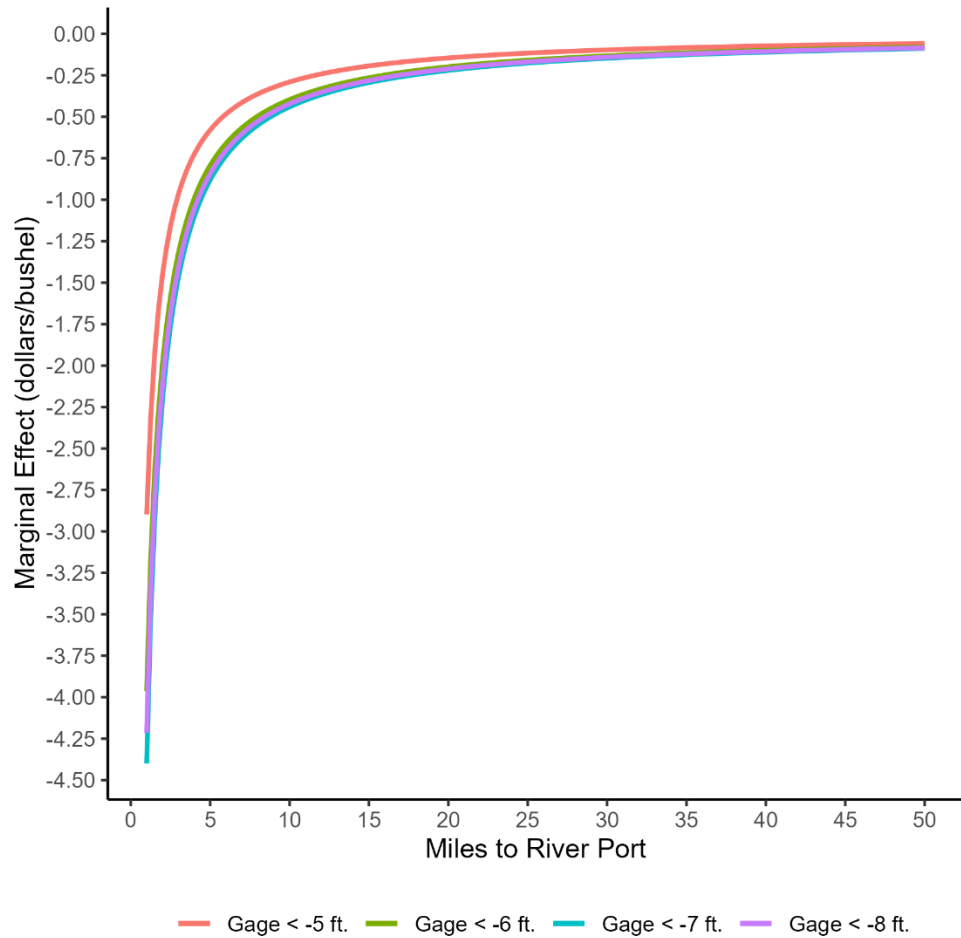


Figure 1. Impact of Low Mississippi River Levels on Soybean Basis in Dollars per Bushel in Arkansas. Each line represents a different stream gage height threshold. The term "marginal effect" denotes the change in Arkansas soybean basis, measured in dollars per bushel, for every additional mile between a grain market and a river port.

References

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