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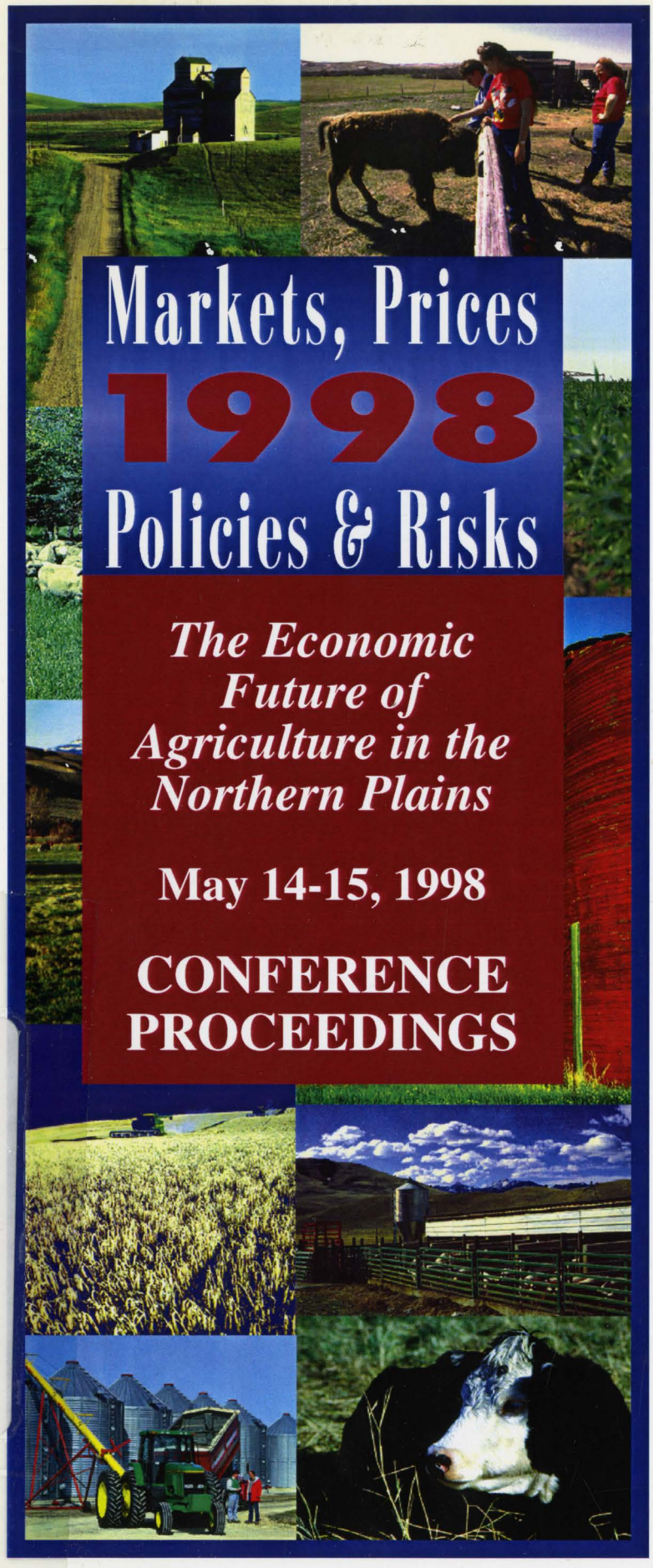

# Markets, Prices 1998 Policies & Risks

## *The Economic Future of Agriculture in the Northern Plains*

**May 14-15, 1998**

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Objective Analysis for Informed Decision Making

# Regional Economic Impacts in the Northern Plains and Rocky Mountain States

*Paul E. Polzin*

To paraphrase the old saying about politics, "all economics are ultimately local." Topics such as tariffs, productivity, and international trade catch the public's attention only if they can be translated into local economic impacts, such as changes in incomes and jobs. In addition, evaluations of these changes require knowledge about characteristics of the local economy.

This paper first examines several of the unique economic and structural characteristics of the Northern Plains and Rocky Mountain States. Then, a concrete example of a trade induced effect is examined by looking at Montana and estimating and evaluating the impacts of changes in agricultural income.

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## Economic Structure of the Northern Plains and Rocky Mountain States

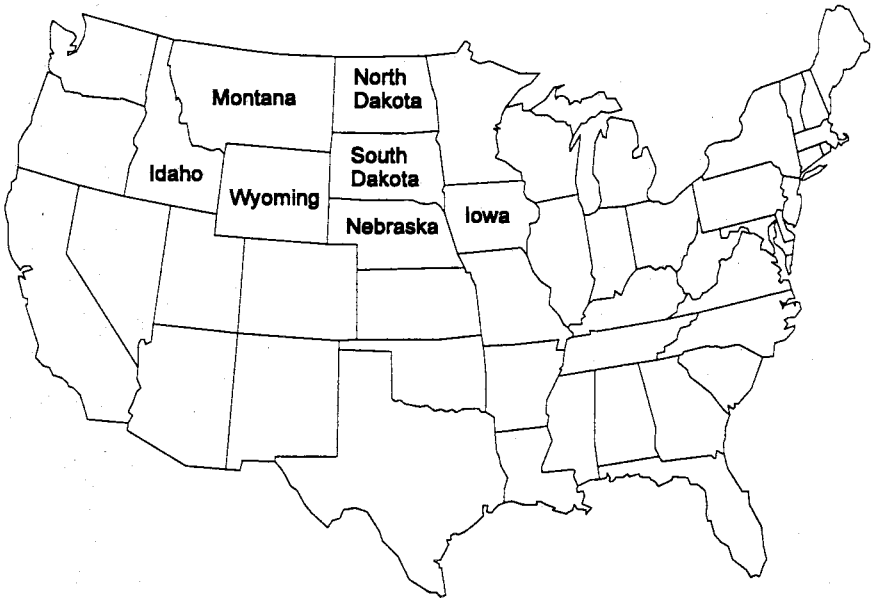
The Northern Plains and Rocky Mountain States are a unique region in the United States. Vast distances, low population, and high natural resource dependency characterize their economies.

*Population density*. The states making up the Northern Plains and Rocky Mountain region are highlighted (see Figure 17). The combined land area of these states is roughly 610,000 square miles, about 19 percent of the nation. These seven states have a population of about 8.4 million, approximately 3.2 percent of the U.S. total population. Population density in this region is 13.7 persons per square mile, only 16 percent of the national average of 82.8 persons per square mile (see Table 30).

*Resource Dependency*. The role of natural resources in the economies of the Northern Plains and Rocky Mountain States can be summarized by looking at their share of each state's economic base. Basic industries, or export industries, consist of firms that sell their products outside the local area or that are otherwise affected by events outside the local area.

Basic industries are responsible for injecting new funds into a region's economy, which in turn create additional jobs and incomes as these dollars are spent and respent locally. The incomes earned by workers in basic industries are spent at local grocery stores, car dealerships, and healthcare facilities such as hospitals and doctors and dentist offices (sometimes denoted as derivative or secondary industries). The relationship between basic and derivative industries is often summarized in terms of a "multiplier," which reflects the amount of additional income (or jobs) created in derivative industries for each dollar (or job) increase in the basic industries.

## Figure 17. Northern Plains and Rocky Mountain States




## Table 30. Population, Land Area, and Density, Northern Plains and Rocky Mountain States, 1995

| Area | Population (Thousands) | Total Area (Sq. Miles) | Density (Persons/Sq. Miles) |
|---|---|---|---|
| Idaho | 1,163 | 83,574 | 13.9 |
| Iowa | 2,842 | 56,276 | 50.5 |
| Montana | 870 | 147,046 | 5.9 |
| North Dakota | 641 | 70,704 | 9.1 |
| Nebraska | 1,637 | 77,358 | 21.1 |
| South Dakota | 729 | 77,121 | 9.5 |
| Wyoming | 480 | 97,818 | 4.9 |
| Total | 8,362 | 609,897 | 13.7 |
| United States | 262,755 | 3,171,796 | 82.8 |
| Region of United States | 3.2% | 19.2% | 16.5% |

*Source:* U.S. Bureau of the Census

Basic industries also affect the local economy in other ways: They pay state and local taxes, purchase electricity and natural gas from local utilities, and may buy some other inputs from nearby suppliers. In relatively small and undiversified economies, it is the payment to workers (direct labor income) that constitutes the largest connection between the basic industries and the local economy.

Agriculture and mining are obvious examples of basic industries in the Northern Plains and Rocky Mountain States. They sell their products outside the local area and are influenced by national and international trends. Other basic industries include the federal government, both civilian and military; transportation (several major intercontinental rail and truck routes pass through these states); and other manufacturing, including the small but fast-growing high-tech and bio-tech sectors. Finally, there are certain industries normally considered derivative that are in fact basic in certain areas; these include nonresident travel (consisting of motels, grocery stores, and similar firms) and other specific activities, such as financial services in South Dakota.

**Agriculture and mining are obvious examples of basic industries in the Northern Plains and Rocky Mountain States. They sell their products outside the local area and are influenced by national and international trends.**

The 1994 Gross State Product for natural resource and other basic industries in the seven Great Plains and Northern Rocky Mountain States is presented (see Table 31). Gross State Product provides the best measure of these industries' contribution to the local economy because it measures the value of output or production rather than labor input. Most natural resource industries are very capital intensive and have high labor productivity. Thus, labor force measures such as employment or earnings tend to understate their contribution to an area's economic base.

The natural resource industries include agriculture and agricultural services, mining, and manufacturing associated with the primary processing of raw materials (such as food products, smelters, and oil refining). The importance of the natural resource industries range from a high of 62 percent of the economic base in Wyoming to a low of 34 percent in South Dakota.

Agriculture and agricultural services are the largest natural resource industry in each state except Wyoming. In Wyoming, mining, which includes coal mining and oil and gas extraction, ranks first. Agriculture's contribution to the economic base in the six remaining states ranges from a low of 17 percent in Montana to a high of 25 percent in South Dakota. Interestingly, Iowa and Nebraska are the two states with the highest agricultural Gross State Product and are also the states with the largest populations.

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### Montana Economic Impacts

The regional economic impact of changes in tariffs and trade policies will be evaluated using a "with and without" approach. First, a baseline scenario for the Montana economy for the years 1995 to 2020 is constructed. Then alternative projections are derived using different assumptions concerning a basic industry. Specifically, the impacts of a 15 percent increase and decrease in agricultural labor income are evaluated.

The projections are derived using an approach developed by the U.S. Bureau of Economic Analysis that has been modified and calibrated to

## Table 31. Gross State Product in Basic Industries, Northern Plains and Rocky Mountain States, 1994

| Industry | Idaho | Iowa | Montana | North Dakota | Nebraska | South Dakota | Wyoming |
|---|---|---|---|---|---|---|---|
| | millions of 1992$ | | | | | | |
| Ag and Ag Service | 1,535 | 4,823 | 973 | 1,387 | 3,502 | 1,832 | 375 |
| Mining | 162 | 158 | 884 | 384 | 1,818 | 176 | 5,081 |
| Primary Manufacturing | 1,677 | 4,266 | 573 | 249 | 1,934 | 458 | 154 |
| Subtotal Natural Resources | 3,374 | 9,247 | 2,430 | 2,020 | 7,254 | 2,466 | 5,610 |
| Natural Resources/Basic | 43.1% | 35.9 % | 41.8 % | 56.2 % | 46.7 % | 33.9 % | 61.6 % |
| Other Basic Industries | 4,468 | 16,544 | 3,383 | 3,594 | 8,290 | 4,794 | 3,497 |
| Total Basic | 7,842 | 25,791 | 5,813 | 5,614 | 15,544 | 7,260 | 9,107 |

*Source:* U.S. Bureau of the Census

Montana. There are several specific features of this model. The unique structure of the Montana economy is explicitly incorporated into model parameters. National and local trends are reflected in the model specifications, such as the rapid growth in labor productivity in goods-producing industries. The induced impacts vary as other model parameters change; that is, the "multiplier" is not constant. Values for specific derivative industries are then projected.

A summary of the baseline scenario and the alternatives are presented (see Table 32). Agricultural labor income under the three scenarios is shown in the top portion of the table. The economy-wide impacts are summarized in the projections for Total Personal Income and Gross State Product. The sensitivity of various sectors and implications for changes in the structure of the economy can be analyzed with the forecast for retail and service industries.

**Overall, this 15 percent perturbation in agriculture leads to about a 3 percent change in the Montana economy.**

The baseline scenario has agricultural labor income (roughly equal to Net Farm Income) increasing from about $332 million in 1995 to about $731 million in 2020. The high scenario calls for the 2020 figure to be about $841 million, whereas the corresponding figure for the low scenario is roughly $621 million (all estimates in 1994 dollars).

Overall, this 15 percent perturbation in agriculture leads to about a 3 percent change in the Montana economy. For both Total Personal Income and Gross State Product, projected values for the years 2000 to 2020 corresponding to the high and low scenarios are 2.9 to 3.0 percent above and below the baselines, respectively. (Gross State Product data for 1995 are not yet available.)

**Table 32. Income and Gross State Product Projections, Alternative Scenarios, Montana**

| | 1995 | 2000 | 2010 | 2020 |
|---|---|---|---|---|
| | | *millions of 1994$* | | |
| Agriculture Labor Income | | | | |
| Low | 332 | 510 | 578 | 621 |
| Baseline | 332 | 600 | 680 | 731 |
| High | 332 | 690 | 782 | 841 |
| Total Personal Income | | | | |
| Low | 16,062 | 18,811 | 25,241 | 31,752 |
| Baseline | 16,062 | 19,440 | 26,050 | 32,725 |
| High | 16,052 | 20,070 | 26,859 | 33,700 |
| | | *millions of 1987$* | | |
| Gross State Product | | | | |
| Low | | 17,275 | 23,121 | 28,255 |
| Baseline | | 17,851 | 23,856 | 29,115 |
| High | | 18,426 | 24,590 | 29,974 |
| Manufacturing Gross State Product | | | | |
| Low | | 1,176 | 1,386 | 1,586 |
| Baseline | | 1,182 | 1,393 | 1,596 |
| High | | 1,189 | 1,400 | 1,603 |
| Services Gross State Product | | | | |
| Low | | 2,688 | 3,684 | 4,583 |
| Baseline | | 2,754 | 3,797 | 4,719 |
| High | | 2,839 | 3,910 | 4,853 |
| Retail Trade Gross State Product | | | | |
| Low | | 1,904 | 2,574 | 3,178 |
| Baseline | | 1,967 | 2,657 | 3,275 |
| High | | 2,031 | 2,739 | 3,373 |

The secondary impacts are not evenly distributed over the entire economy. The projected values for the manufacturing, services, and retail trade industries are also shown (see Table 32). Manufacturing is almost unaffected by the changes in agriculture. There is very little difference between the high and low scenarios in the Gross State Product value for 2020. Most manufacturing firms in Montana are classified as part of the economic base, and they are mostly affected by events outside the state. Retail trade and the services, on the other hand, are much more substantial. The 2020 values for the high and low scenarios are 3.0 to 3.2 percent above and below the baseline values, respectively.

**About the Author**

Paul Polzin is the Director of the Bureau of Business and Economic Research and a Professor in the Department of Management at the University of Montana. He has extensively studied the Montana economy during the past twenty-five years, published studies of the long-term and short-term economic trends in Montana, and made economic projections for Montana's future.