



Harvard Economics Study Shows the Boundary Waters Economy is a Winner

A detailed review of the August 6, 2018 Harvard economic study

An independent study by a prominent Harvard economist compares the effects of the Forest Service's proposed 20-year mining ban near the Boundary Waters with the consequences of sulfide-ore copper mining in the Boundary Waters watershed. The conclusion: protecting public lands near the Boundary Waters generates greater long-term gain for the region (more employment and income) than copper mining.

Economic Scenarios Comparison: The new study by Harvard Professor James H. Stock, Ph.D., former chair of Harvard's economics department and former member of the White House Council of Economic Advisors, compares two scenarios being considered by federal agencies:

- **Scenario 1** – The Boundary Waters economy continues to develop during a 20-year mining ban; *versus*
- **Scenario 2** – The mining ban does not occur, and a Twin Metals mine is developed

Important Note: The Harvard study is the only study to analyze the longer-term dynamic economic effects of the two options over a 20-year timeframe.

Results Summary: The Harvard study projects 36 employment and 72 income scenarios representing a range of employment and income effects. The analysis shows that over a 20-year period, an economy based on copper mining would significantly underperform the growing, sustainable economy already in place. Compared to a Twin Metals mining economy, the proposed mining ban would result in:

- **1,500 to 4,600 more jobs**
- **\$100 million to \$900 million more income**

Study Details:

- The study analyzed activity in the greater Ely, Minnesota region, including usage of the Boundary Waters and recreational use in the region outside the Boundary Waters. The proposed Twin Metals mine would be in this area – so the study produced a direct comparison of two different economic models of the same region.
- The Harvard study considered three effects:
 - Employment (direct & indirect) and income generated by the Twin Metals mine;
 - Employment (direct & indirect) and income generated in the recreation industry; and
 - Income associated with in-migration to the area because of its amenity values.

Study's Central Conclusions: Over the 20-year timeframe of the proposed withdrawal, allowing copper mining in the Superior National Forest near the Boundary Waters would have a negative effect overall on the regional economy:

- Over twenty years, the economic benefits of copper mining would be outweighed by the negative impact of copper mining on the recreational industry and on in-migration. This leads to a boom-bust cycle in all the scenarios examined in the Harvard study, in which the region is in the end left worse off economically than it would be under the withdrawal.
- The study examined 72 different income scenarios that represent a range of growth parameters consistent with historical data, previous studies of the region, and the academic literature. All the scenarios show the boom-bust cycle of employment and income. In 96% of the income scenarios, the net present value of income under a 20-year ban exceeds that under no-withdrawal, in many cases by a large margin.
- The Harvard study's findings are consistent with the academic literature on boom-bust cycles in extractive resource use and the literature on the value of outdoor recreational amenities to regional economies.

The Study Results Are Conservative: The Harvard study omitted from its analysis several factors that would have amplified and reinforced the study's findings:

- Negative effects of mining on real estate values in the region;
- Positive value of the Boundary Waters and Superior National Forest as a regional attractor of talent in the Duluth area and elsewhere beyond the greater Ely and Wilderness edge areas;
- Employment and income elsewhere in Minnesota that are driven by the Boundary Waters and the Superior National Forest (canoe manufacturers, equipment and gear manufacturers, sporting stores, etc.);
- Negative long-term effects of an economy based on extraction after the resource has been exhausted; and
- Negative economic effects of environmental damage (spill or acid mine drainage).

Inclusion of these omitted factors would have reinforced and expanded the central conclusions of the study: that the growing Boundary Waters-based economy outperforms sulfide-ore copper mining over the long term, and that introduction of copper mining would harm the existing economy and cost the region jobs and income.

The Harvard study supports the proposition that only a 20-year mining ban will ensure economic improvement regionally over the long term.

Additional Details:

The Harvard study developed 36 employment scenarios and 72 income scenarios and then discounted the stream of benefits of the two comparisons to present value (withdrawal versus no withdrawal with a Twin Metals mine). This resulted in 72 income scenarios discounted to net present value.

- For example, in the mining scenarios, 3 employment figures were used (high, medium, low – all for 20 years)
 - 650 jobs (Twin Metals materials)

- 427 jobs (2012 UMD study cited by mining proponents)
- 260 jobs (40% of 650 jobs, to account for recently announced 60% reduction in daily production per Twin Metals)
- The Harvard study assumed employment adjustments using low and high productivity growth scenarios (which were end points of a 95% confidence interval for productivity growth estimated in Arizona copper industry from 1970 – 2016); NOTE that this is conservative because the copper industry is predicting a major increase in automation over the next 5 - 7 years
- High and low scenarios developed for the 20-year withdrawal scenario (high and low negative impact on recreational economy)
 - The Harvard study noted that the “high impact scenario was conservative in the sense that the impact on tourism over the long run of a major spill or acid mine drainage event are plausibly substantially more consequential.” No water pollution impacts were included in the assumptions.
 - Included impact of those who move away and those who would be deterred from moving to the region because of a Twin Metals mine
 - Two scenarios (zero population growth and 10% decline); Note: U of MN survey showed 23% would move away
- Figure 2 shows net annual employment effects of withdrawal over time (36 scenarios) in the mining and recreational sectors of the Arrowhead economy. Lines above ‘0’ on the vertical axis show a positive employment value – meaning the number of jobs in the withdrawal case (20-year ban in place) exceeds the number of jobs in the Twin Metals mine case; Note: all 36 scenarios are above ‘0’ by about year 7.5 (horizontal axis)
- Figure 3 shows net annual income effects of withdrawal over time (72 scenarios). Lines above ‘0’ on the vertical axis show a positive income value – meaning that income is higher in the withdrawal case (20-year ban in place). All 72 scenarios are above ‘0’ by about year 10.5.
- Figure 4 shows the 72 income scenarios after discounting all to a net present value. Only 3 scenarios (on the far left) show mining as the better performer. 69 scenarios out-perform mining, with 65 of the 69 out-performing mining by many millions of dollars.

Harvard study compares the results of this analysis with other studies of rural economic growth and amenities. He found:

- Multiple studies conclude that outdoor recreation and recreational amenities, especially wilderness amenities, have been the basis for strong and sustainable economic growth in rural communities with those attributes over the past 2 decades.
 - These studies validate the inclusion of in-migration effects and the attraction of the Boundary Waters and the Superior National Forest as an attractor of non-tourism, non-retirement jobs to the area because of the wilderness. This latter category is not included in the Harvard study – another example of the conservative, and under-stated conclusions. Had this been included, the out-performance of the current economy would have been greater.
- Multiple studies have examined resource extraction and economic growth. Although these studies found substantial short-term economic benefits, they also found longer term hardships persisted in the form of joblessness and depressed local incomes.

- These studies did not include any special effects that mining disamenities or environmental damage would have on employment and in-migration related to high-amenity regions like the area surrounding the Boundary Waters.
- Such effects would exacerbate the boom-bust nature because of deterioration in environmental conditions and amenity values that would reduce non-mining amenity-related incomes.
- If there was environmental damage or pollution, the Harvard study comparisons would show a much greater negative mining economic scenario.
- Property values
 - There is substantial evidence of a reduction in property values because of mining.
 - Had this been included, the Harvard study comparisons would show a much greater negative mining economic scenario.