



An Economic Analysis of Gold Mines in Ontario

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Research Focus

- Economic research is focusing increasingly on the analysis of individual firms.
- Is a site-level economic analysis of Ontario mines possible?
- Topics which can be explored include:
 1. Analyzing competitiveness.
 2. Measuring productivity.
 3. Examining intertemporal tradeoffs.
 4. Determining the impact of government policies.

Data Availability

- Contemporary mine-level data is difficult to acquire.
- Historical data is publically available and very thorough.
- Ontario Department of Mines - Annual Reports are available from 1920 to 1970.
- Data available on the following subjects:
 - Financial variables.
 - Production data.
 - Employment levels.
 - Exploration and development figures.

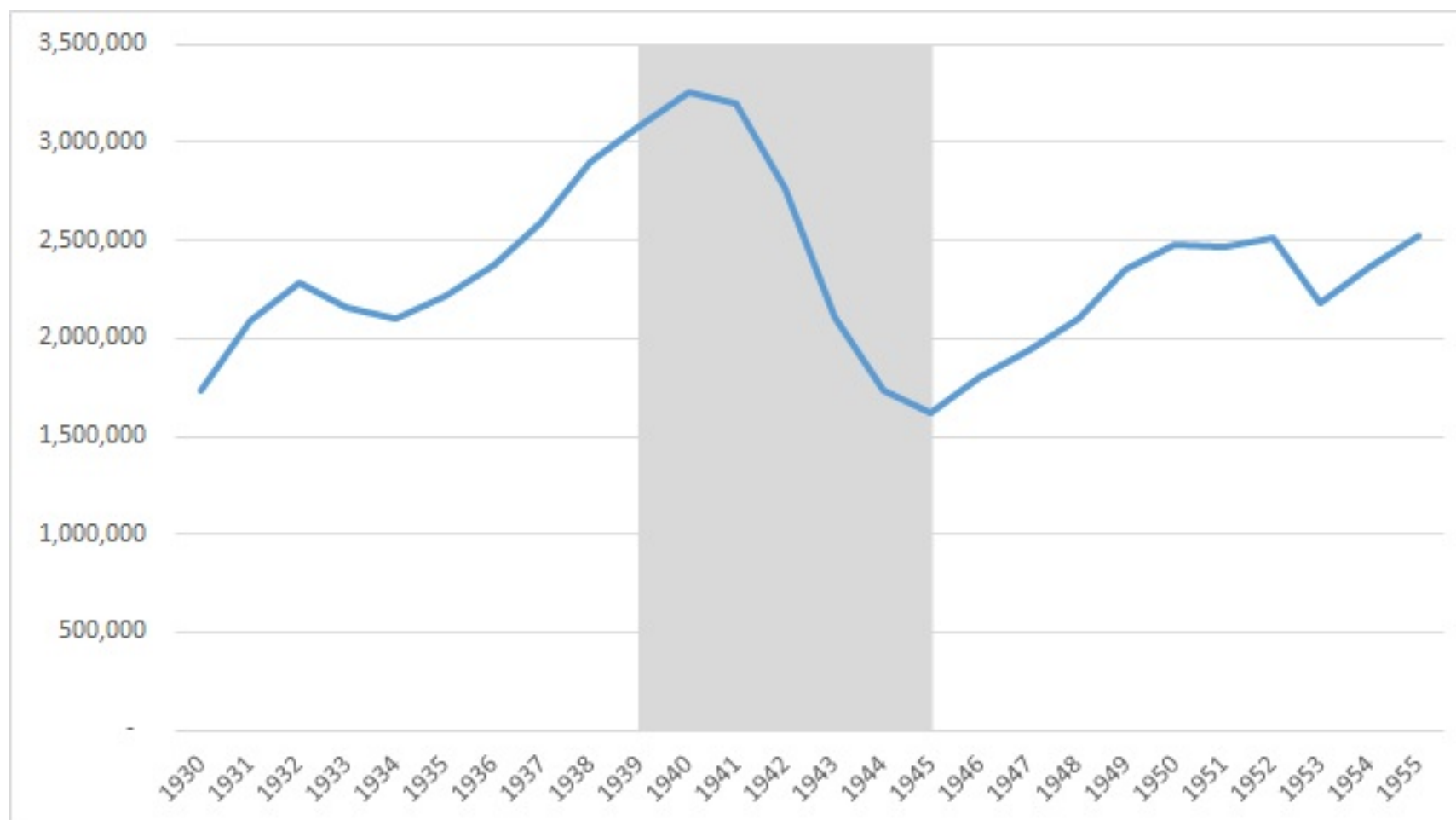
Value of Historical Data

- Results from historical studies allow us to draw conclusions regarding the present.
 - Impact of changing mineral prices.
 - Impact of government policies.
 - Determining cost-minimizing level of production.
- Demonstrates what type of analysis CESME can provide.
- Reapproach mining companies with a proof of concept.

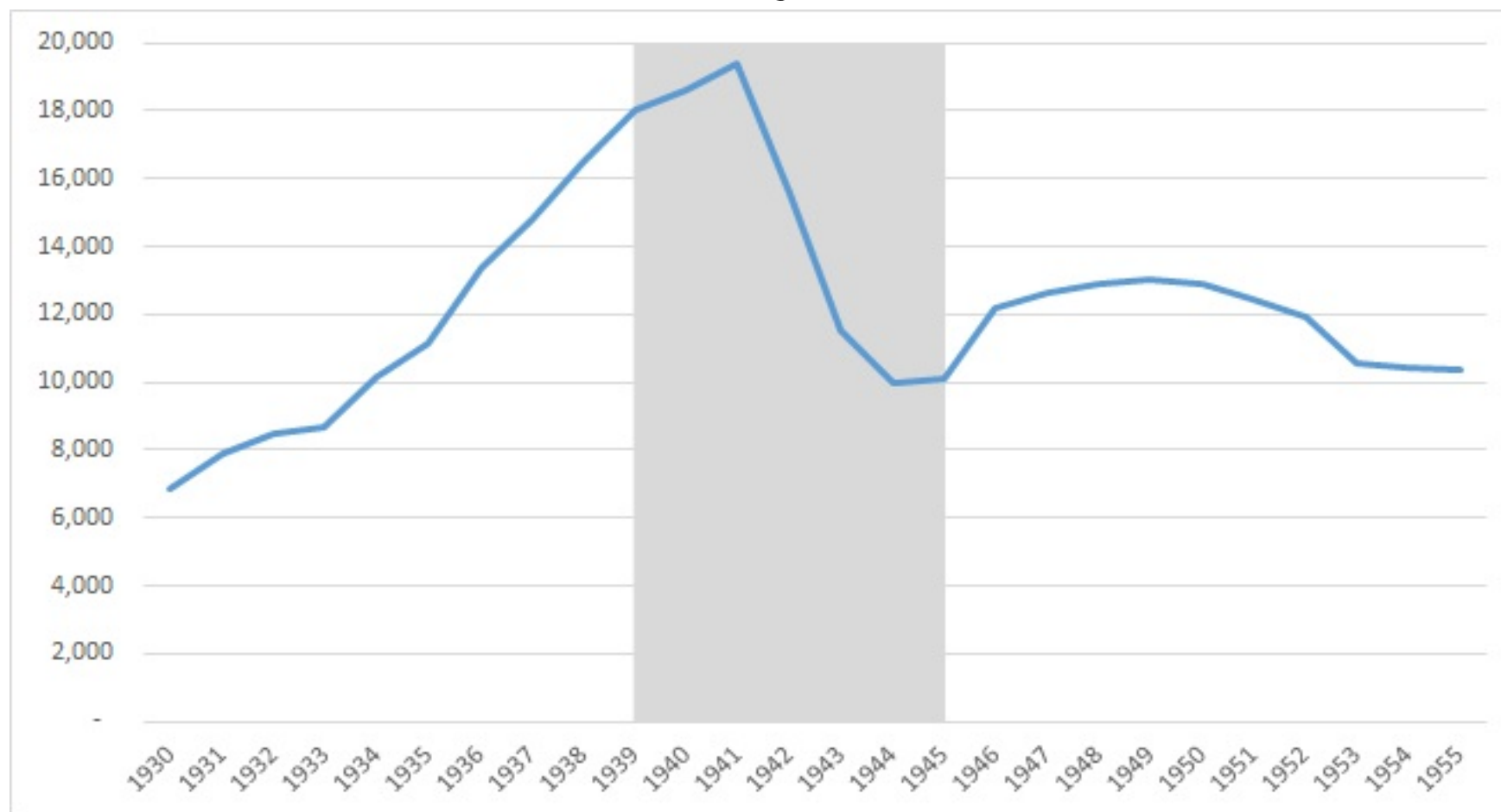
“The Impact of Labour Policies on Ontario Gold Mines in World War II”

- The impact of two labour market policies are examined:
 1. Designating the industry a “vital war industry” from 1939 to 1941.
 2. A series of restrictive labour policies imposed from 1942 to 1945.
- We show that the first policy made inefficient use of labour in the effort to maximize gold output.
- The second policy cost the industry nearly \$1 billion in forgone profit.

Gold Output



Employment



Data

- We have data on 33 gold mines, representing 87% of the province's gold output.
- Mines are located in one of 6 regions.
- Mines differ across a number of characteristics:
 - From 128 workers to 2,561 workers.
 - From 11,875 oz produced a year to 340,941 oz produced a year.
 - From a grade of 0.10 ounces per ton to 0.78 ounces per ton.
 - From a daily milling capacity of 75 tons to 6,000 tons.

Early War Years

- Gold was needed to buy American weapons prior to their entry into the war.
- Designating the industry as a “vital industry” encouraged workers to enter the gold mining industry.

Year	Employment	Output
1939	18,032	3,086,060
1940	18,611	3,261,686
1941	19,362	3,194,310

- The average worker in 1939 produced 171 oz of gold.
- The extra 1,330 workers in the industry were only averaging 81 oz of gold each.

Early War Years

- We undertake a statistical analysis of the data to determine which factors influenced whether a mine grew or shrank.
- The results show that workers were moving to the firms which were most profitable, not the mines which could produce the most gold.
- The more profitable mines offered higher wages which attracted the incoming workers and even induced workers from other gold mines to switch jobs.
- The policy must be considered a partial failure, as the amount of gold produced was below the maximum potential level.

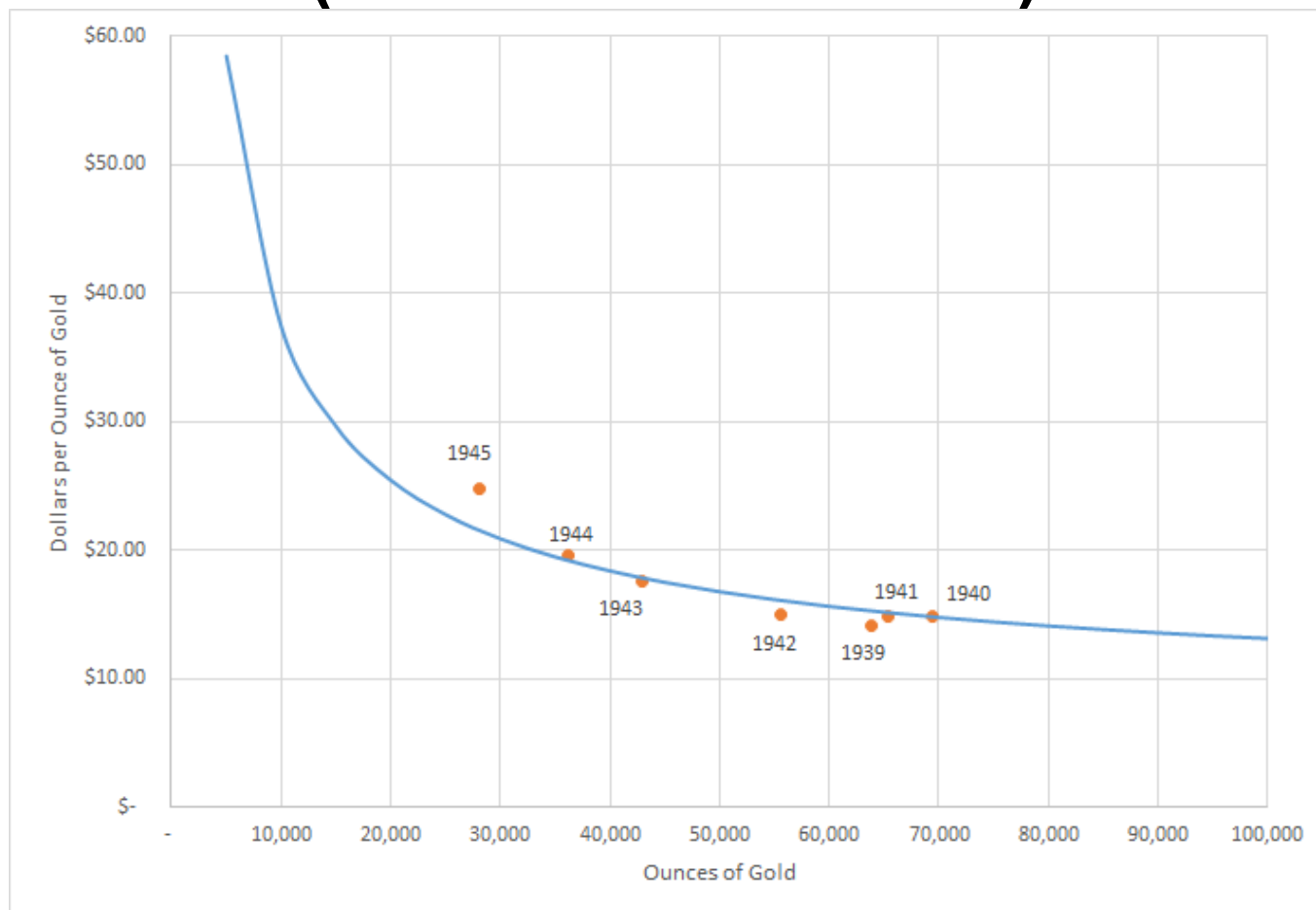
Later War Years

- The US enters the war and gold production is no longer seen as essential.
- Workers begin to leave the gold mining industry.
- The government wishes to keep the mines open as they are essential to the economy of the local communities.
- At the same time, restrictions are placed on the movement of labour in the economy as a whole which prevent labour from allocating itself optimally within the gold mining industry.

Later War Years

- We calculate the average cost curves of each of the 33 mines.
- We take into account factors such as the grade of ore and the size of the mill.
- We use these to measure how inefficient the mines were becoming due to all the government restrictions imposed on them.

Sample Average Cost Curve (Macassa Mine)



Counterfactual Exercise

- We use these results to ask the question:
 - “What would happen if we allowed mines to close and re-allocated their workers to other mines.”
- By doing so, we find that the industry could have produced more gold at a lower average cost.
- The potential additional profit from doing so would be nearly \$1 billion.
- Each community is still able to maintain at least one operating gold mine.

Savings

	Historical		Counter-Factual		
Year	Mines	Cost per Oz	Mines	Cost per Oz	Savings
1942	33	\$20.13	21	\$17.37	13.73%
1943	33	\$20.53	20	\$16.46	19.83%
1944	33	\$23.16	17	\$16.73	27.75%
1945	33	\$24.44	17	\$16.94	30.70%
Average		\$21.75		\$16.90	22.29%

Conclusions

- Though the government policies may have been necessary, they were implemented in an inefficient way.
- In the early-war years a more precise allocation of labour was required to maximize the industry's output.
- In the later-war years, the restrictions within the industry should have been eased in order to allow the market to efficiently distribute labour between mines.
- The mining sector required an industry-specific approach.

Going Forward

- The 1920 to 1970 period covers other interesting events.
 - The 1934 increase in the price of gold.
 - The 1948 “Emergency Gold Mining Assistance Act.”
 - The opening up of new mining camps.

Thank you



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