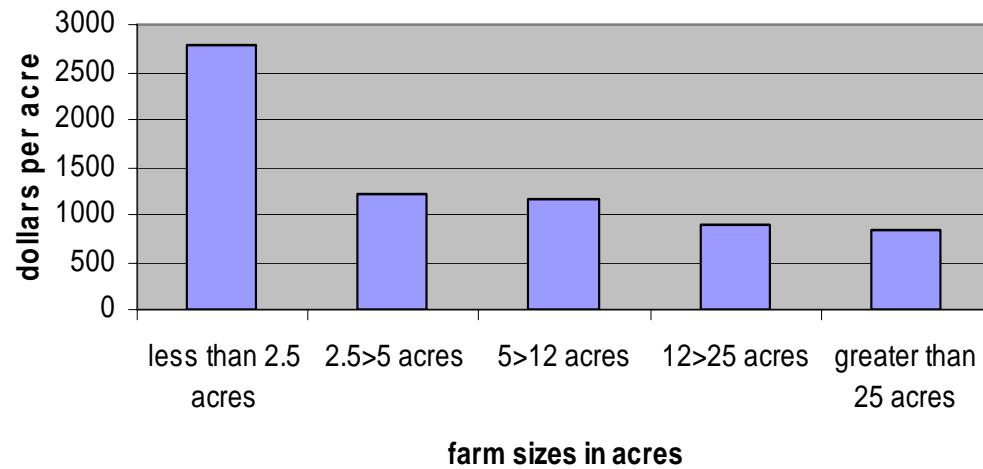




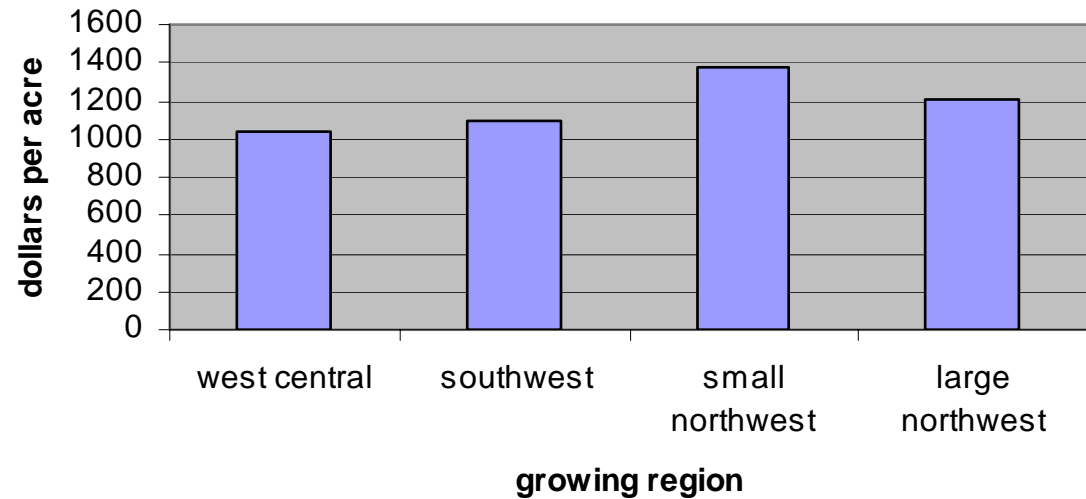
**Relative Cost of Production:
The United States and Poland**

Costs of Production per Acre

Polish production costs per acre

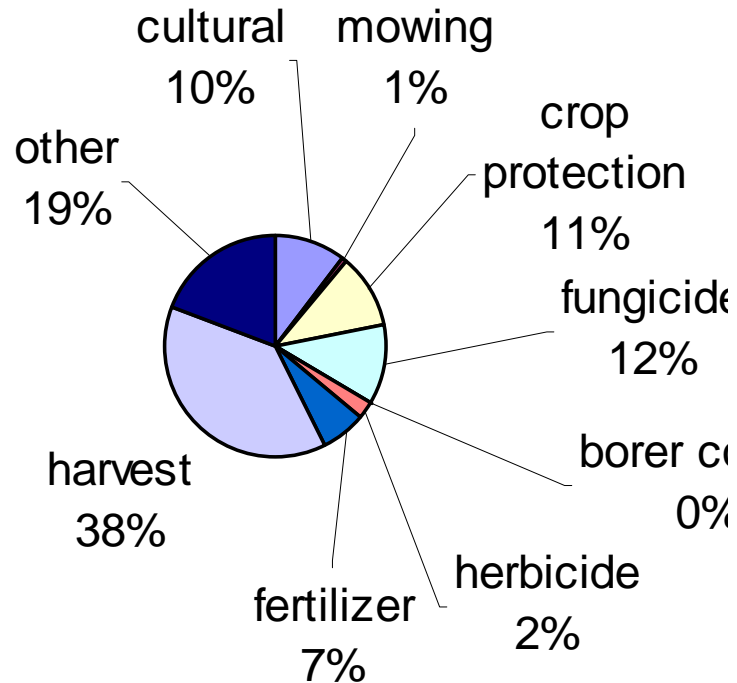


Michigan production costs per acre

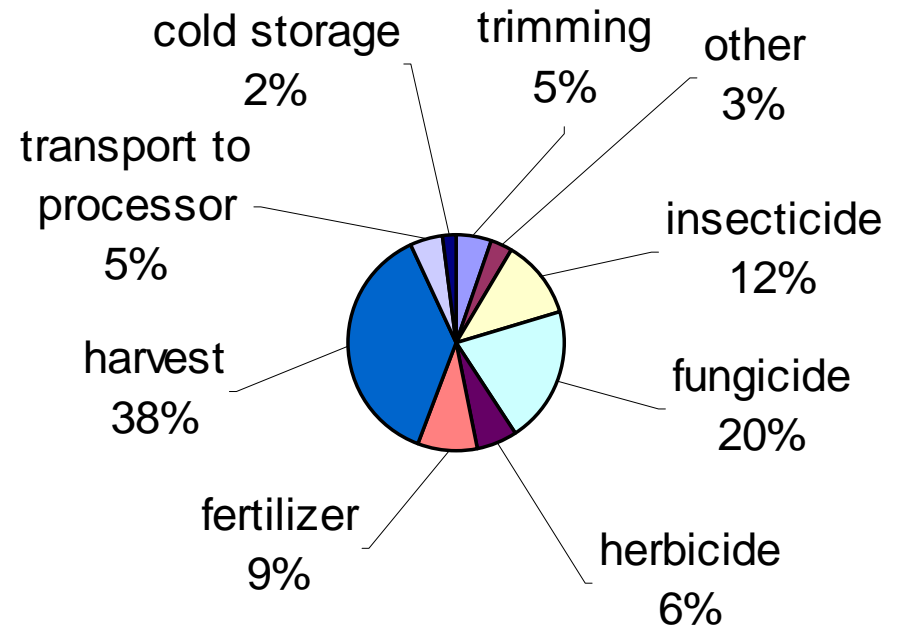


Michigan and Poland Production Costs

Michigan Production Costs



Polish Production Costs



Competition

- **The United States and Poland will compete on their ability to decrease production costs.**
 - **Harvest costs.**
 - **Chemical inputs, especially fungicides.**

Why harvesters?

- **In the United States, orchard densities are limited by harvesters.**
- **Shakers are expensive and asset specific.**
- **In Poland wages are low but they may rise due to high education levels and alternative employment in the European Union.**

Leapfrogging

- **Leapfrogging is the situation where an economically laggard firm is able to gain competitive advantage over an economically dominant firm by adopting technology superior to that currently used by the dominant firm.**
- **The dominant firm does not adopt the technology because it is heavily invested in an alternative technology.**

Leapfrogging

- **The United States will find it difficult to adopt higher yielding overhead harvesters due to long term investments in orchards that are designed around shaker technology.**
- **Poland will find it easier to adapt because hand harvesting does not require a particular orchard design.**

Who will adopt overhead harvesters in Poland?

- **Threshold farm size: A simple measure of the indifference point between labor and capital.**
- **Threshold farm size is measured as:**

**Annual cost of a harvester/
Labor and wages saved by using a
harvester**

Threshold Farm Size

- Assume 800 to 1110 labor hours per hectare by hand, 25 to 30 labor hours by machine.
- Assume \$1.20 to \$2.00 per hour.
- Assume harvester prices range between \$84,000 and \$150,000 new or between \$10,442 and \$19812 annually.
- **Threshold falls between 12 and 52 acres.**

Threshold Farm Size

Polish farm sizes

Farm size (acres)	Number of farms
Less than 2.5	125,000
2.5-5	6000
5-12.5	2000
12.5-25	265
25-50	78

Will U.S. farmers be able to adopt overhead harvesters?

- Financial analysis using current Michigan costs of production project that this could be viable if improved yields are high enough.
- Estimates suggest that Michigan growers will have difficulty removing an orchard younger than 25 years
 - These estimates consider the point when a farmer earns back his planting investment. They are based on both historical yield and price data (1979-2004).

Issues for U.S. Farmers

- Some uncertainty of incentives to adopt.
- High cost of young trees.
- Uncertainty of yield increases.
- Tunnel sprayer technology has the potential for making more efficient use of the harvester and reducing chemical inputs.
- Future fruit quality demands.

Issues for Poland

- What will happen to small growers (less than 2.5 acres)?
 - Smaller farms are more diverse.
 - No farm surveyed planted cherries on rented land.
 - Tart cherries on small farms may represent a supplement to regular incomes.
 - If tart cherries are manageable with family labor, why stop producing, especially if an orchard represents a long term investment?

Polish Crop Specialization

