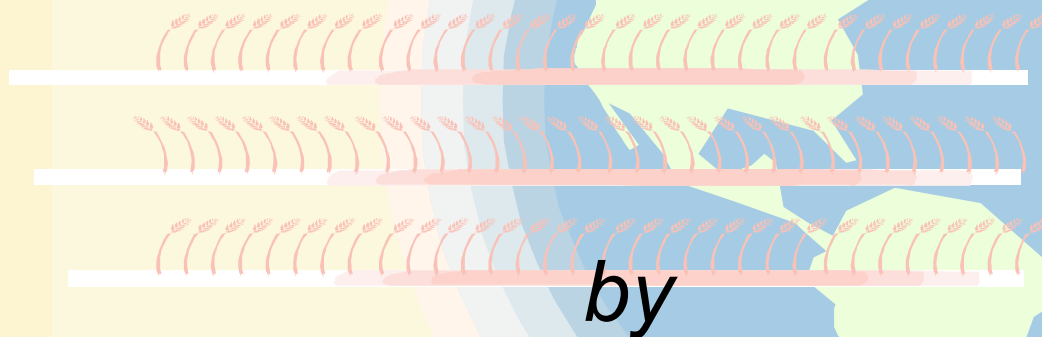




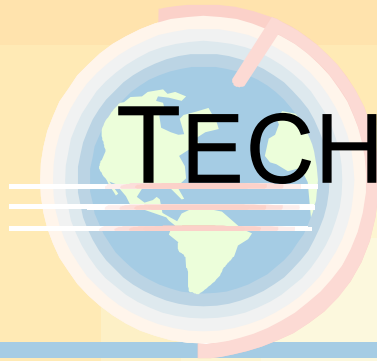
**GLOBALIZATION,
CROPPING CHOICES,
and PROFITABILITY
in AMERICAN AGRICULTURE**



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TECHNOLOGY *is the* CATALYST

Advances in . . .

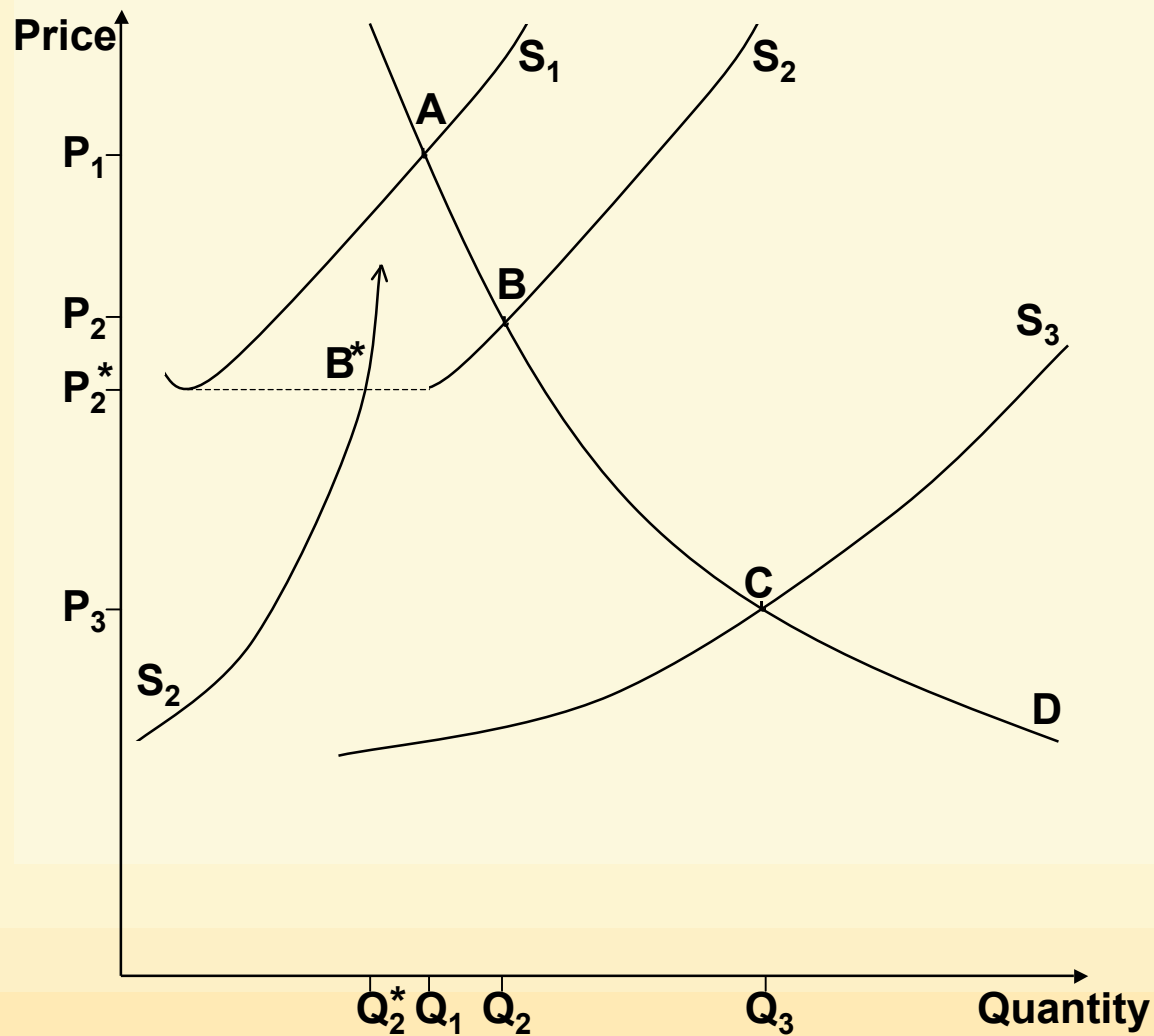
- * **production** create the need for global markets
- * **storage** expand the amount of time before spoilage
- * **transportation** expand the geographic size of a market

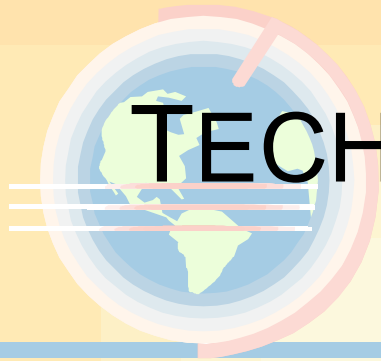


GLOBALIZATION *and* COMMODITY MARKET PRICES

Globalization of markets affects the profitability of commodity production, which affects the composition of those markets

**Figure 1. World market for an agricultural commodity:
from one supplier to competitive market**

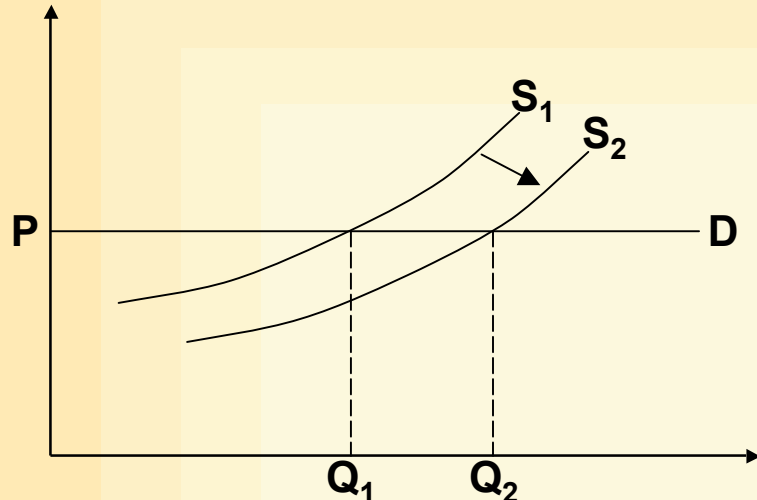




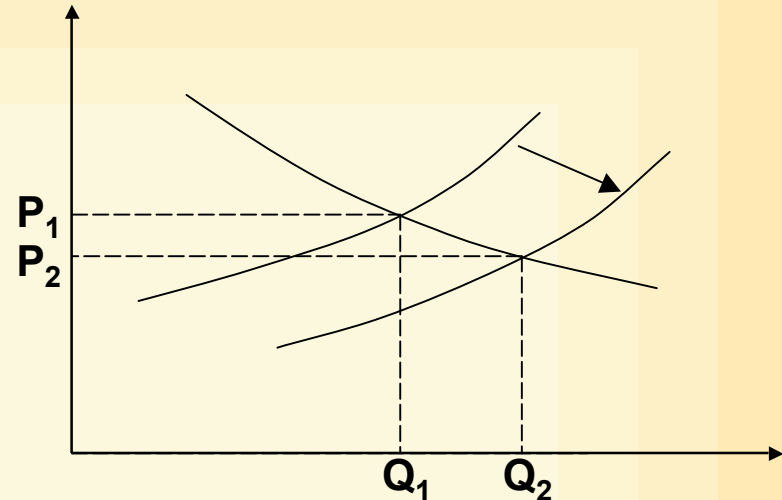
TECHNOLOGY *and* INDIVIDUAL FARMERS

- * Globalization of markets causes technological advances to affect all producers, whether or not they adopt the new technology.
- * This leads to changes in cropping choices of individual farmers.

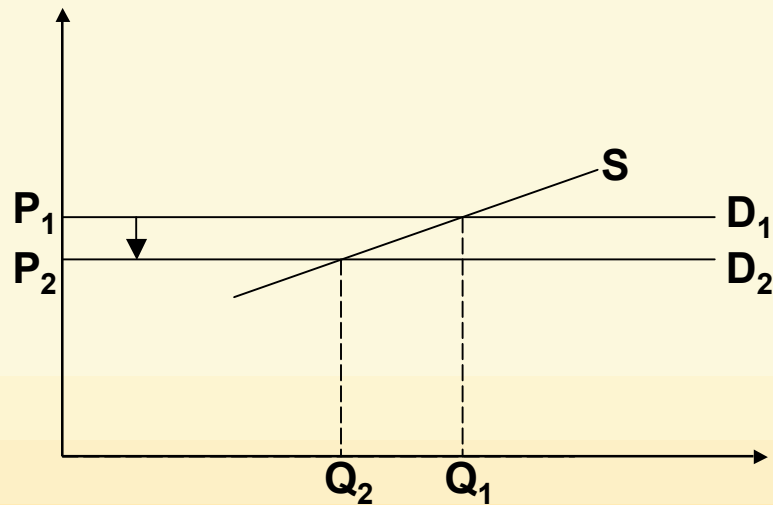
Figure 2. Technology's effect on individual farmers



Panel A: Farmer's case: incentive to adopt new technology



Panel B: World market case: technology adoption lowers global price



Panel C: Farmer's new case: lower price creates need for change



COMPETITIVE FORCES THAT WILL SHAPE AGRICULTURE

1. Ag profits are being squeezed:

Commodity price is global

Production cost is local



COMPETITIVE FORCES THAT WILL SHAPE AGRICULTURE

2. Local costs are rising:

Land, labor, inputs

3. World commodity prices are relatively stable or falling, ignoring seasonality



AGRICULTURE'S PROFITABILITY

- * Gross profit margin has been 2 to 3% on average over the last 30 years.
- * The average real net return to assets financed by debt has been negative for a decade: -3.8% in 1999.
- * 90% of farm operators households' income came from off-farm sources in 1999.



DECLINING U.S. FARM INCOME

	<u>1994</u>	<u>1999 (F)</u>
Farm marketings (<i>billion \$</i>)	181.3	192.5
Total production expenses (<i>billion \$</i>)	166.8	190.1
Gross income from marketings (<i>billion \$</i>)	14.5	2.4
Gross margin on marketings (%)	8.0	1.2



PROFITABILITY *and* CROPPING CHOICES

In portfolio theory, utility maximization is assumed to be a person's objective. Therefore, the focus of decision making is the certainty equivalent of expected profits:

$$E(U_{\phi}) = E(\Pi_{\phi}) - (\xi/2)(\sigma^2 \Pi_{\phi})$$

When the scale of possible losses from an investment is significant, risk averse investors have been shown to adopt “safety-first” decision rules.

$$\Pi_{\phi} \equiv \sum_{i=1}^n w_i \pi_i$$

where:

$$\pi_i = R_i - C_i - K_i$$

$$R_i = P_i Y_i$$

$$C_i = \sum_j c_j x_{ij}$$

$$K_i = \sum_h k_h z_{ih}$$

For a risk-neutral or risk-averse farmer to meet his/her financial objective, it must be true that:

$$E(\Pi_{\phi}) \geq E(U_{\phi}) \geq \Pi_{*}.$$



WHEN CROP PORTFOLIO CHANGES ARE NEEDED

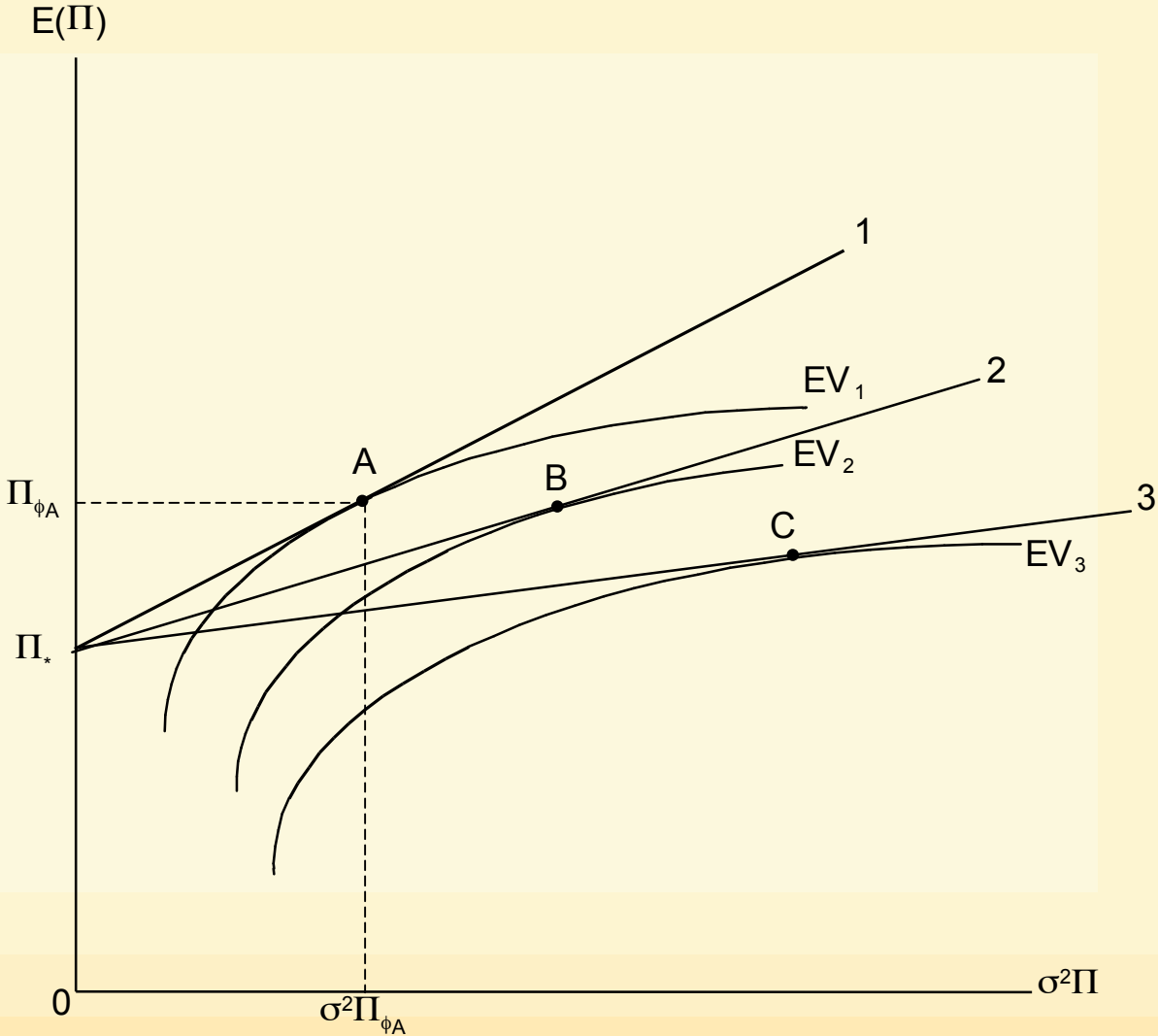
When a farmer has all assets invested in agriculture, external shocks may cause production adjustments.

For a farmer to meet his/her profit objective in the future, a change in that farmer's crop portfolio composition is needed immediately whenever

$$E(\Pi_{\phi}) < \Pi_{*}.$$

Or in the long-run: $E(U_{\phi}) < \Pi_{*}.$

Figure 3. Cropping opportunities in a declining market





AMERICAN AGRICULTURE...

...is “moving up the Farming Food Chain”

...thus becoming more risky and needing more \$/acre for higher value crops.



The FARMING FOOD CHAIN

*Development
stage*

*Crop
type*

*Investment
asset fixity*

4th

High-value
perennial

Very high,
highly fixed

3rd

High-value
annual

High,
inflexible

2nd

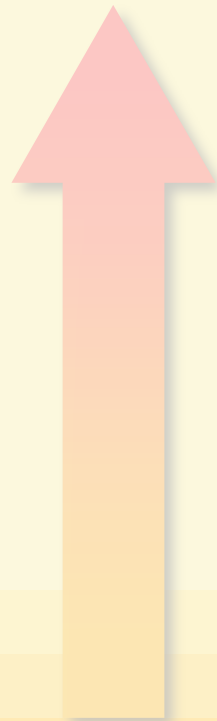
Low-value
perennial

Moderate,
flexible

1st

Low-value
annual

Low,
very flexible



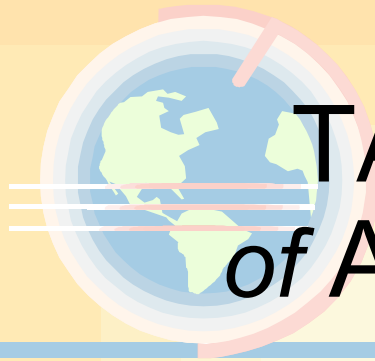
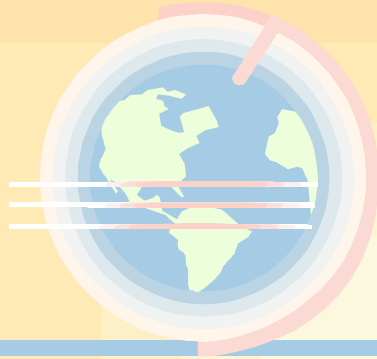


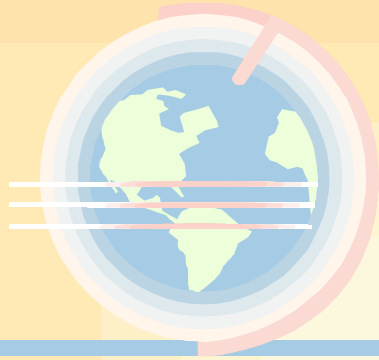
TABLE 1. U.S. CENSUS of AGRICULTURE TRENDS

	<u>1987</u>	<u>1992</u>	<u>1997</u>
Land in farms <i>(million acres)</i>	964.5	945.5	931.8
Farms <i>(1,000s)</i>	2,087.8	1,925.3	1,911.9
Full-time farms <i>(1,000s)</i>	972.2	932.5	869.7
Farms of 1,000 acres or more <i>(number)</i>	168,864	172,912	176,080
Vegetable acreage <i>(million acres)</i>	3.468	3.782	3.773
Orchard acreage <i>(million acres)</i>	4.560	4.771	5.158



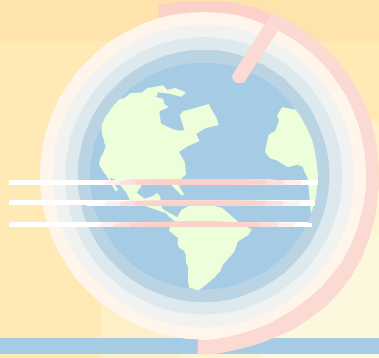
PROPOSITION 1.

In a market area with a single leasing rate, farmers who only consider agricultural investments and have higher financial obligation (i.e., higher Π_*) are more likely to be active producers (i.e., use all available land for crop production) than are farmers with lower debt levels and other financial obligations.



PROPOSITION 2.

External shocks that reduce agricultural profitability cause all farmers to shift into the production of more risky crops.



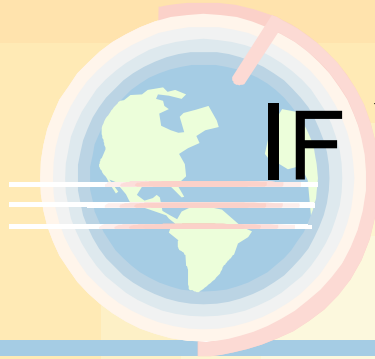
PROPOSITION 3.

Farmers who are relatively more risk averse will be the first to diversify out of agriculture, *ceteris paribus*.



GLOBAL COMPETITION IS:

- * Source of economic pressure on U.S. agriculture
- * Source of food in future



IF YOU CAN'T BEAT 'EM, JOIN 'EM"

U.S. agribusinesses are adopting price and cost strategies with a global perspective

Result: Bright prospects for U.S. firms and U.S. consumers

