

Economics of Adaptation

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What is the objective of adaptation?

- Maximize the net benefits of changing in response to climate change
- Adaptations often cost resources to do
- Adaptations provide benefits- either in reduced damages or in new revenues
- Make sure that the benefits of each adaptation exceed the cost

Adaptation is local

- Every island, every country, has an incentive to adapt to make itself better off
- No free rider problem with adaptation
- But adaptations must fit local conditions
- What works in one place may or may not work in another

Private adaptation

- Action taken by an individual or firm for its own sake (farmer, household)
- Because individual pays the cost and reaps the benefit
 - Private adaptations will be efficient (benefits will exceed costs)
 - Do not require incentives or government regulations (benefits provide sufficient incentive to be done)

Public adaptation

- Actions taken on behalf of many people
 - Ecosystem protection
 - Water management
 - Coastal protection
- Difficult to coordinate
- Will require government assistance

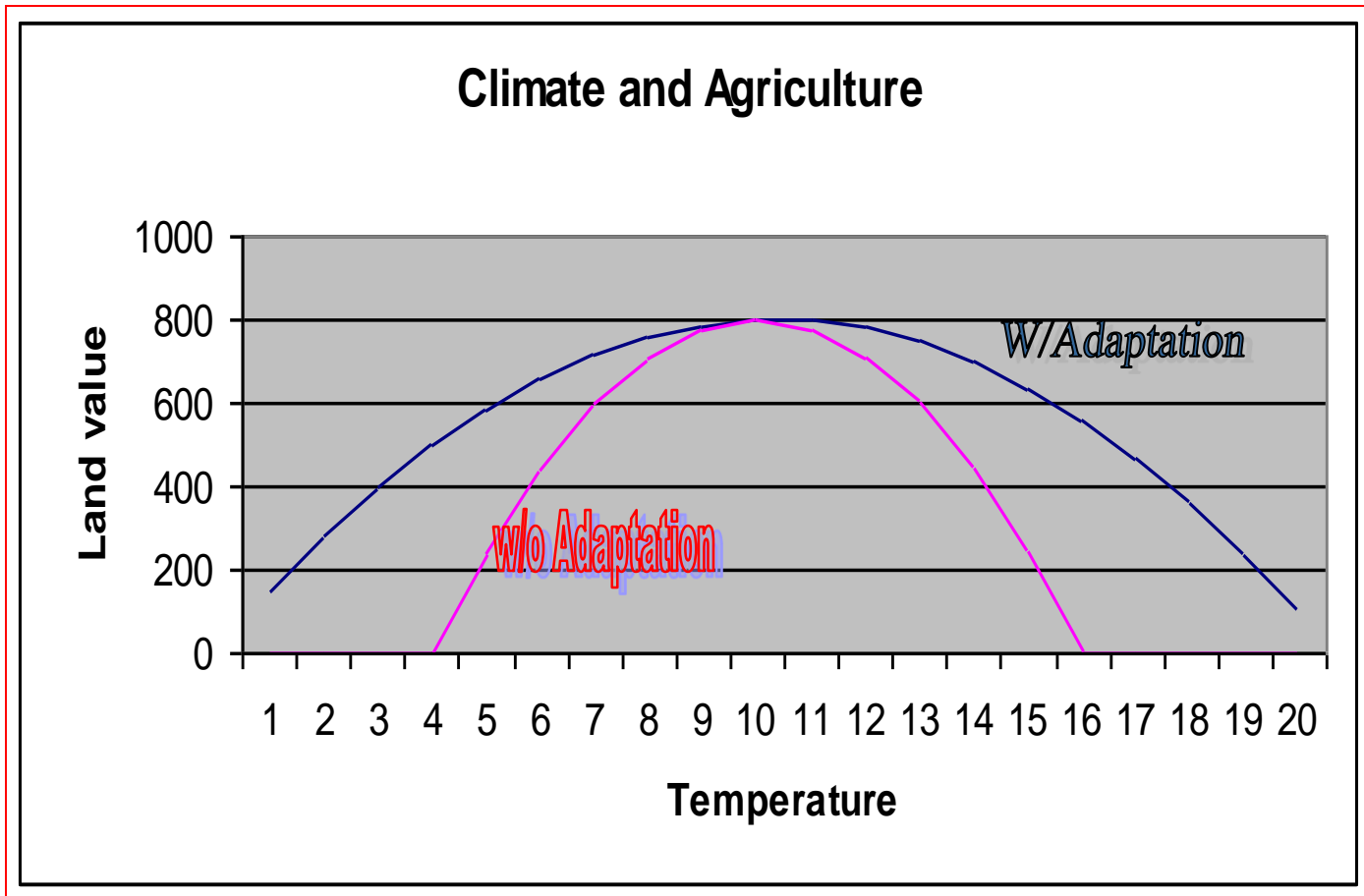
Common property

- Many households jointly own a resource
- Hard for households to coordinate- tend to undervalue common resource
- Hard to coordinate appropriate response to climate change

Connection between mitigation and adaptation

- Mitigation reduces impacts so need less adaptation
- Adaptation reduces net impacts so need less mitigation
- Optimal strategy is to rely on both

With and Without Adaptation



Where Should Adaptation be Done?

- In places where climate change is having largest impact (low latitudes)
- Not necessarily places with largest climate change (poles)
- More important in areas with more people (low latitudes) and in places which are more sensitive to climate (low latitudes)

Government Role in Adaptation

- If private individuals will do private adaptation on their own, what should government do?
- Help with barriers to adaptation: public goods, common property, pollution)
 - Dams, Sea Walls, Flood control, Technical change, Conservation, Public Health
- Address fairness of impacts

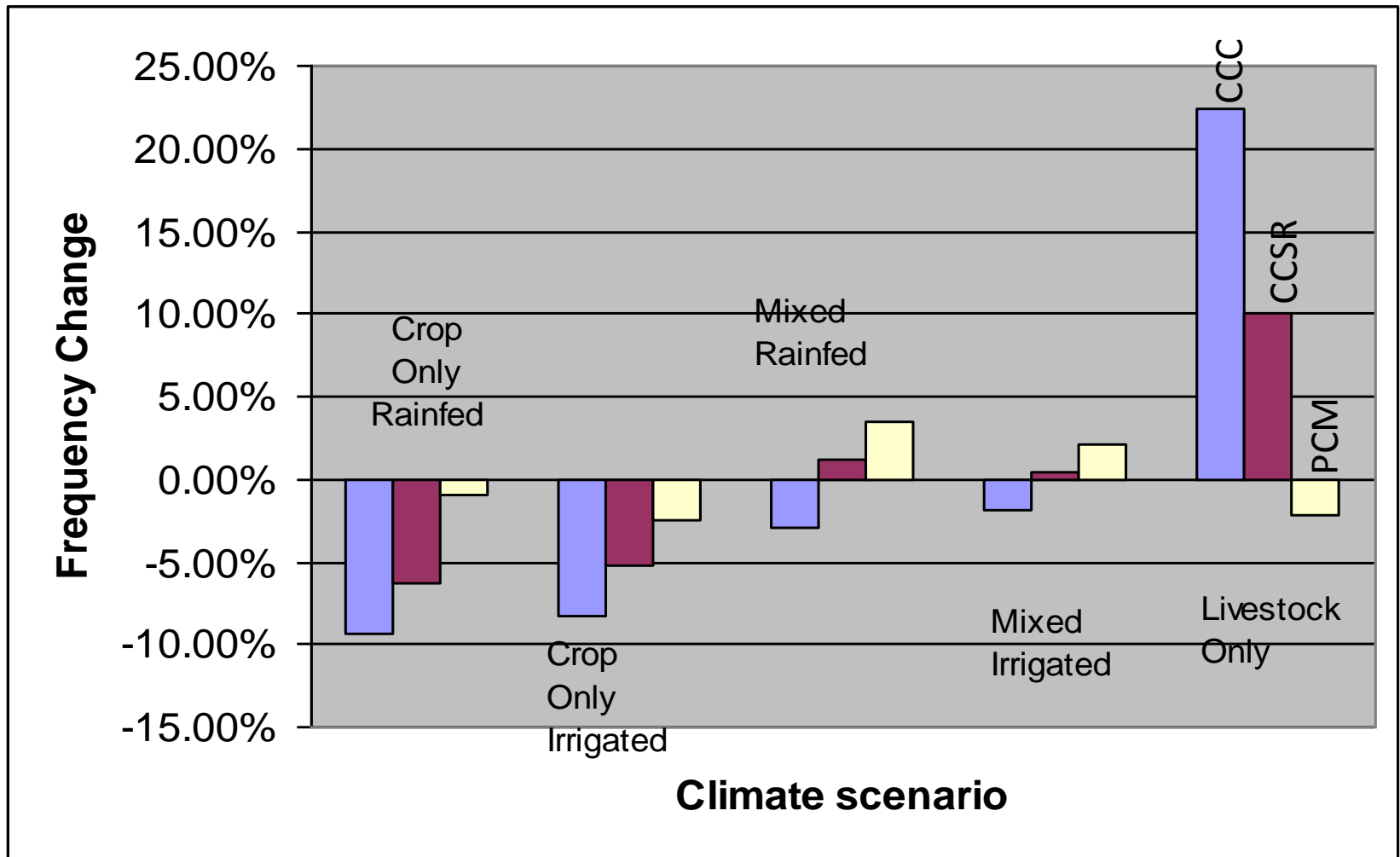
Can poor adapt?

- Poor can do private adaptation
- Household farms may adapt better than commercial farms because more diversified (not specialized)
- May help poor adapt for equity reasons: they are low income and unlikely to have contributed much to emissions

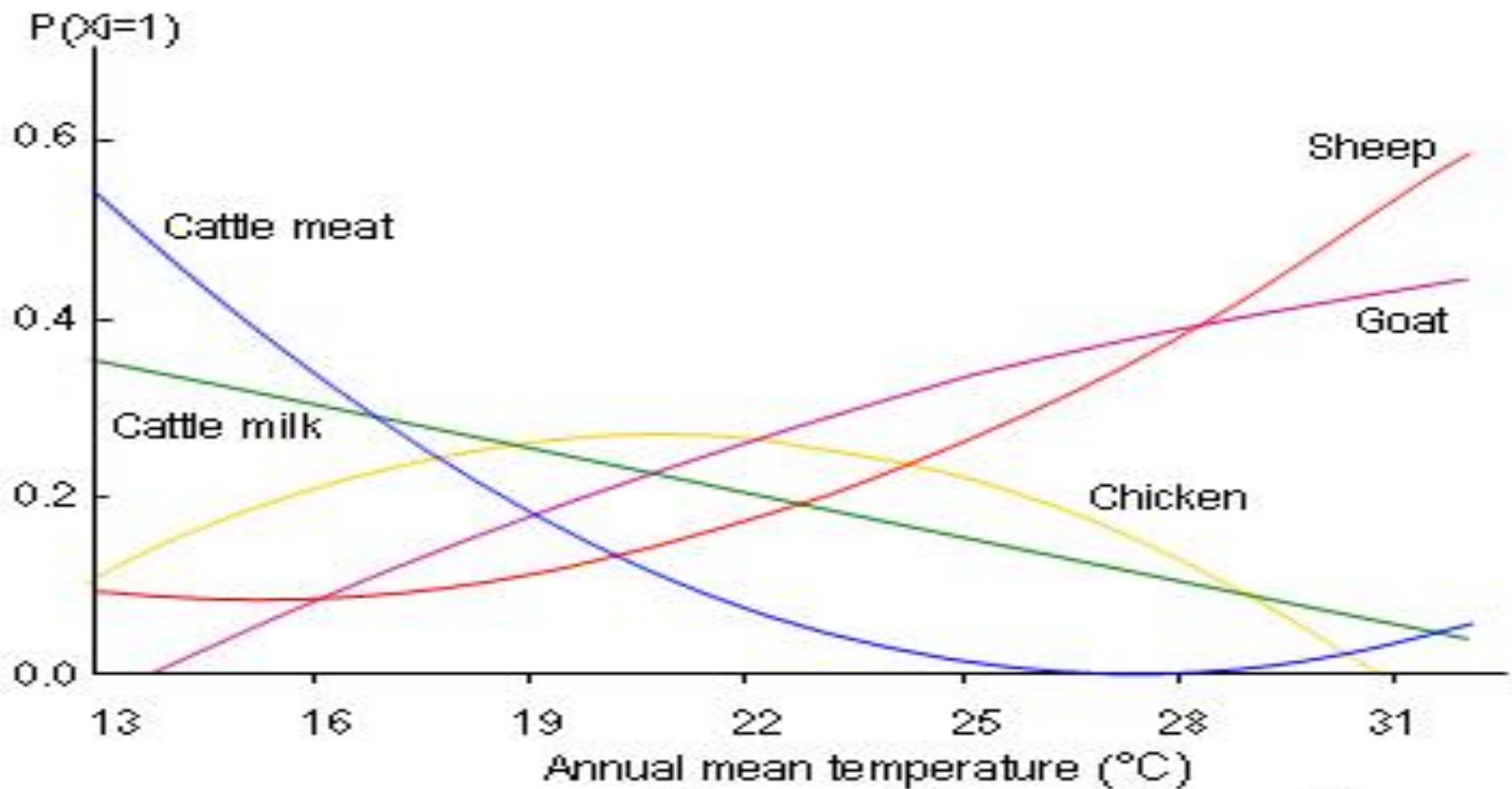
Examples

- Agriculture
 - Shift farm types, crops, livestock, management practices
- Water
 - Reallocate water to best use, dams, levees
- Sea level rise
 - Hard structures, planned retreat
- Tropical cyclones
 - Warning systems, develop away from coast, toward leeward side of island

Impact of Climate Change in 2100 on Farm Type in Latin America

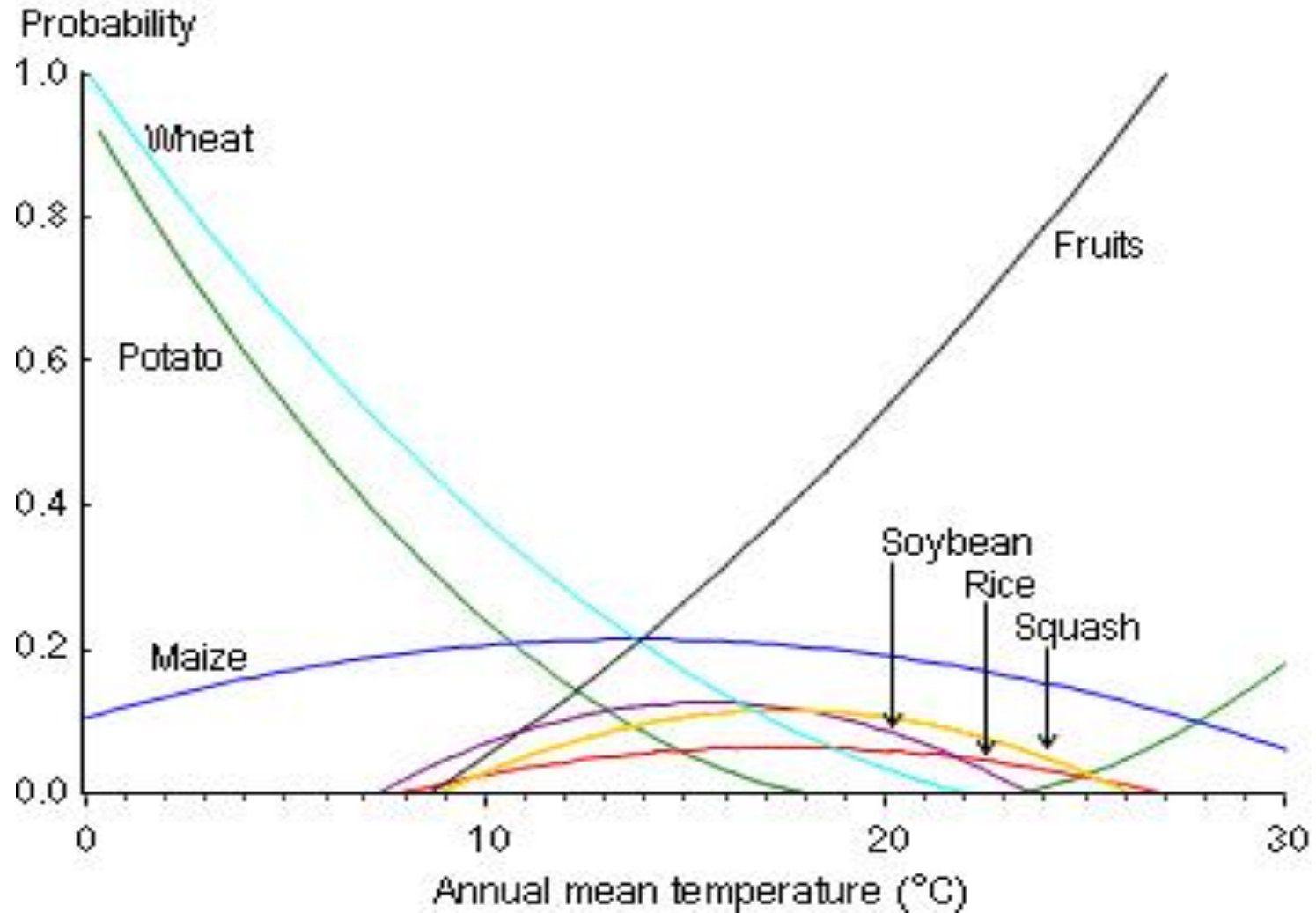


Latin American Livestock Choice

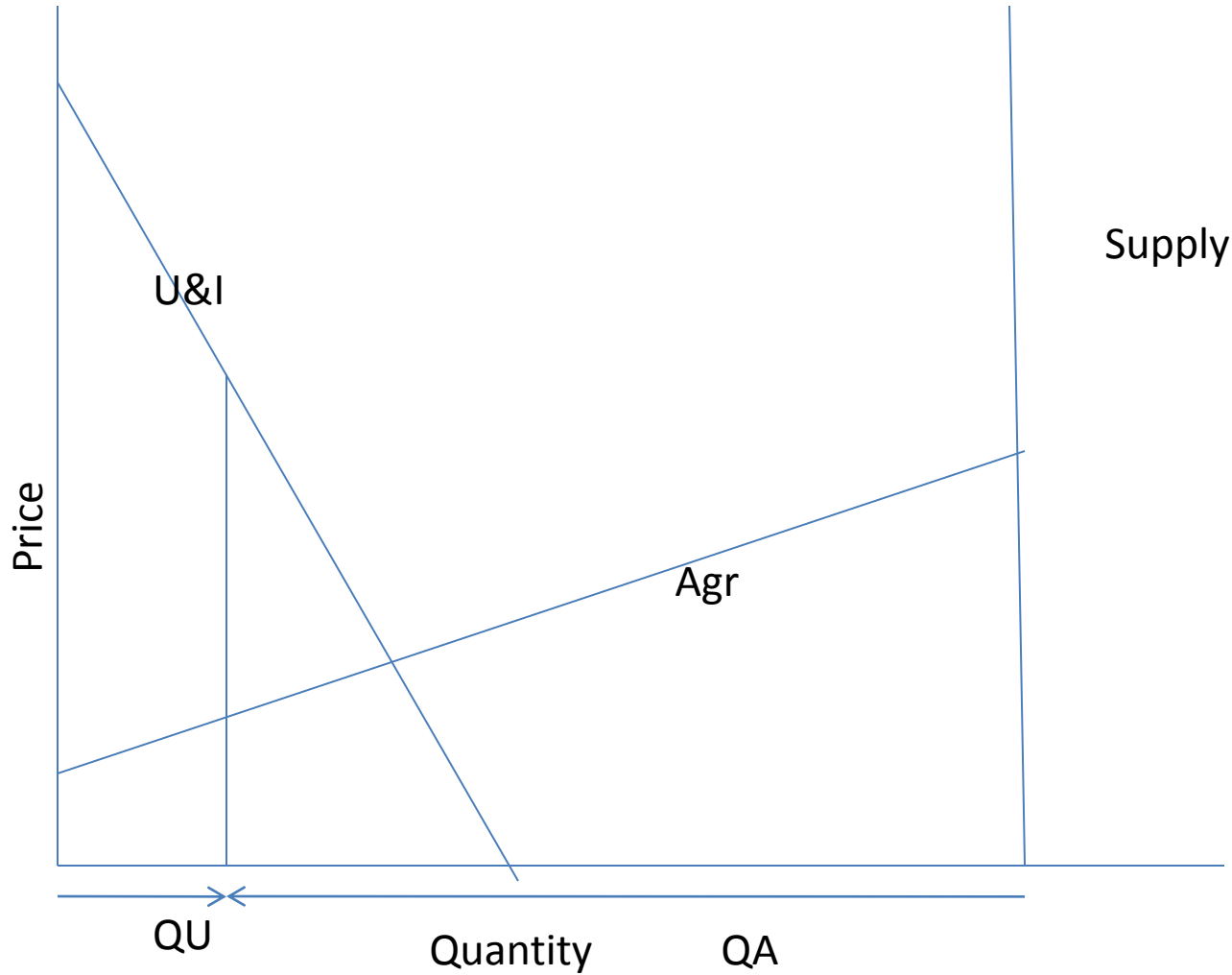


Mean temperature: Cattle meat=19; cattle milk=19; goat=24; sheep=24; chicken=21

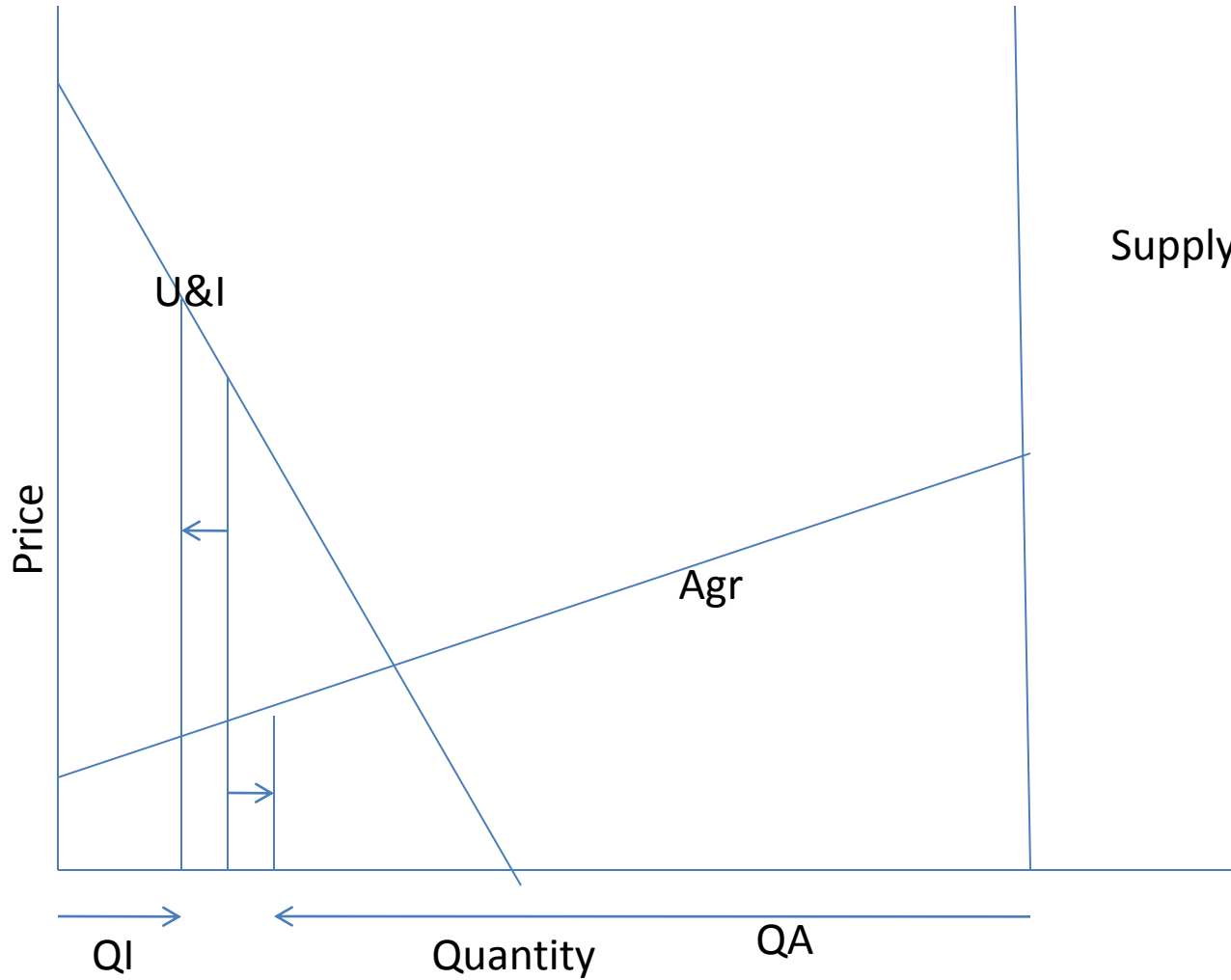
Latin American Crop Choice



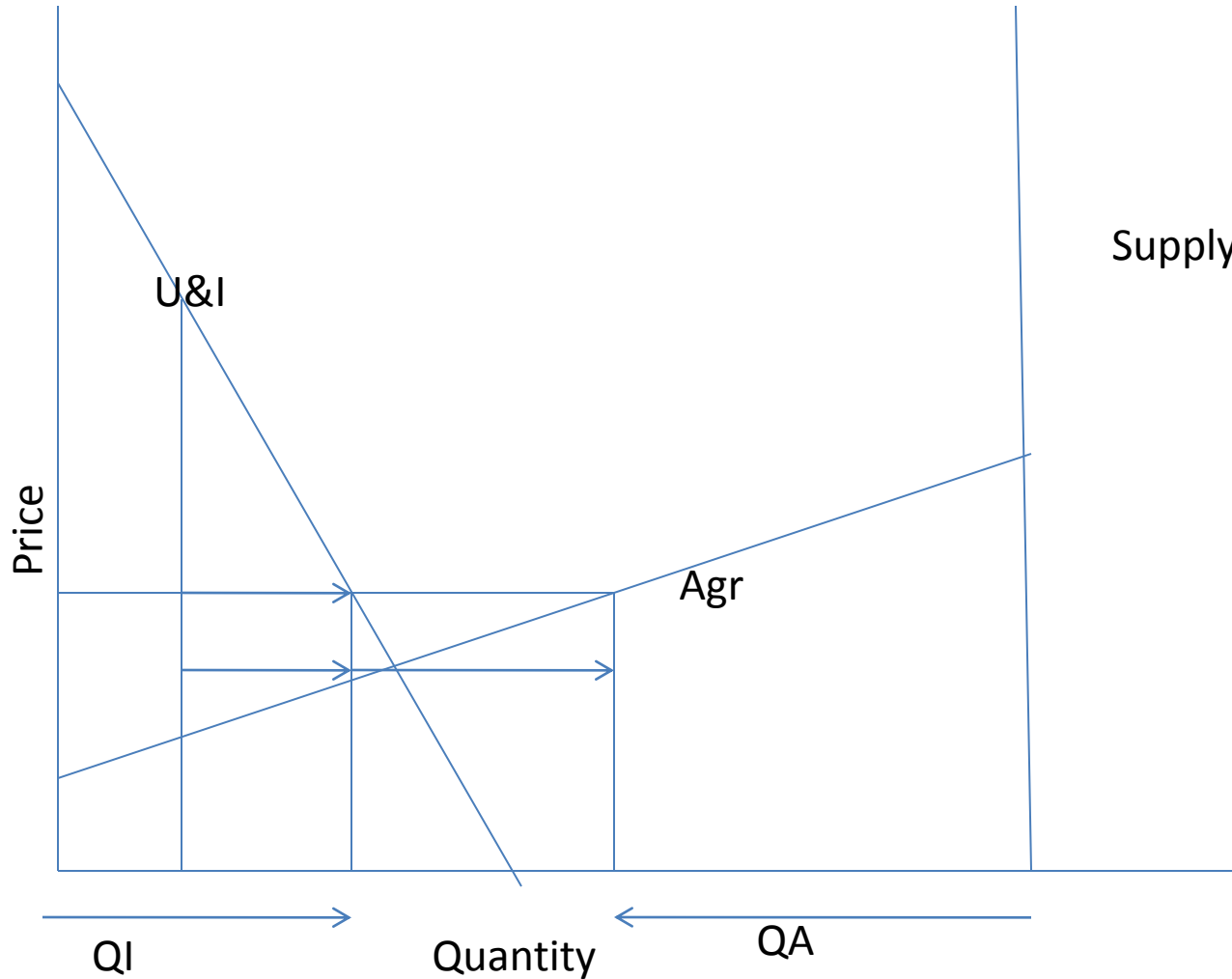
Water Initial Condition



Water Impact



Water Adaptation



Timing

- Timing is critical to adaptation
- Done too soon, raises cost and can be ineffective (public health program before disease materializes)
- Done too late, damages can be large (as if there is no adaptation)
- Because adaptation must wait for potential damages, the bulk of adaptations need to be done in the second half of this century

What adaptation can be done now?

- Planning and research
- Institutional changes: improve public management and privatize resources (land, water, fisheries)
- Help developing countries grow and become less dependent on climate sensitive economic sectors- namely agriculture