

Institutional Analysis of a Time-Independent CPR Game

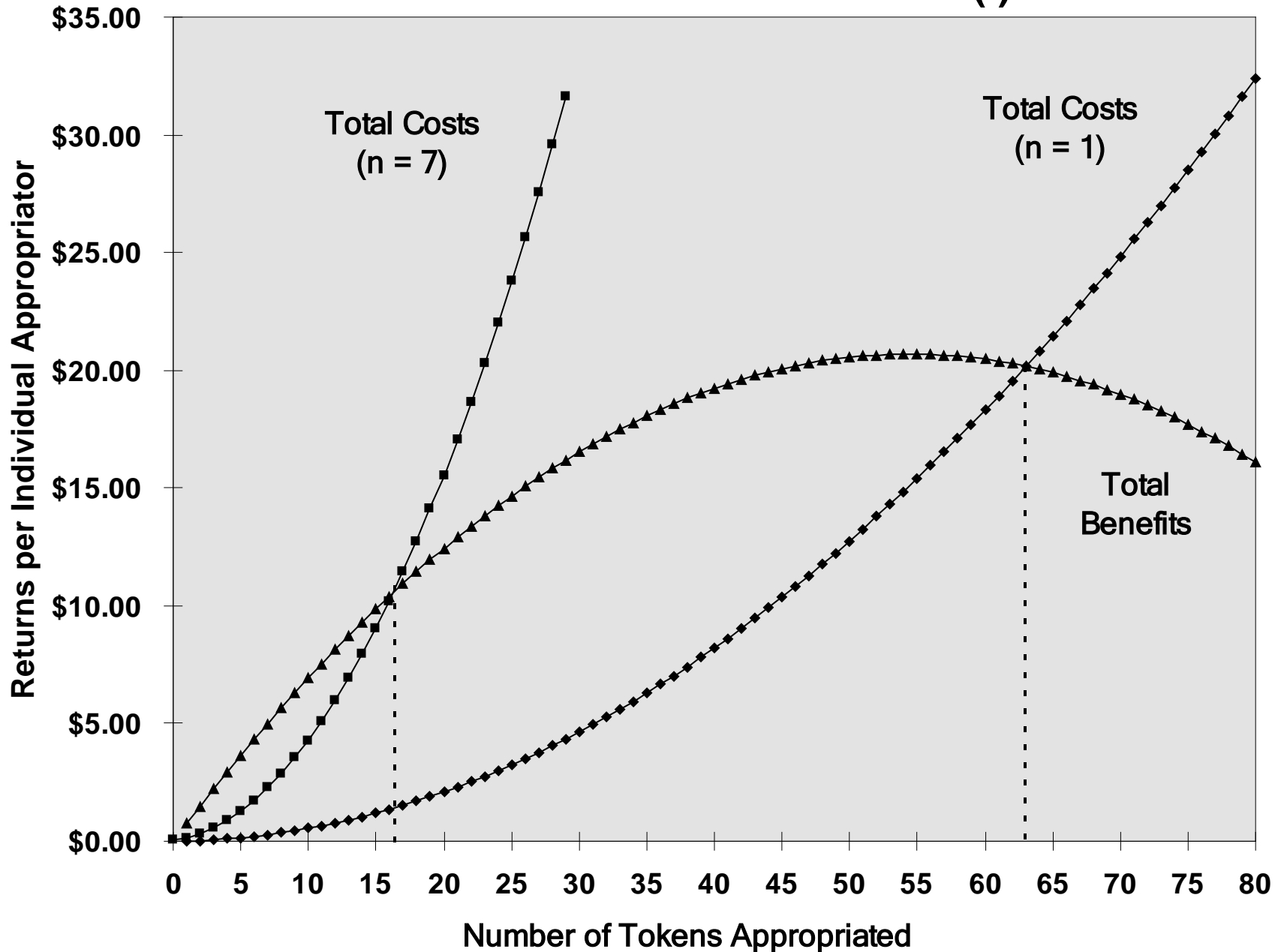
National APIS Workshop on ASWAp II

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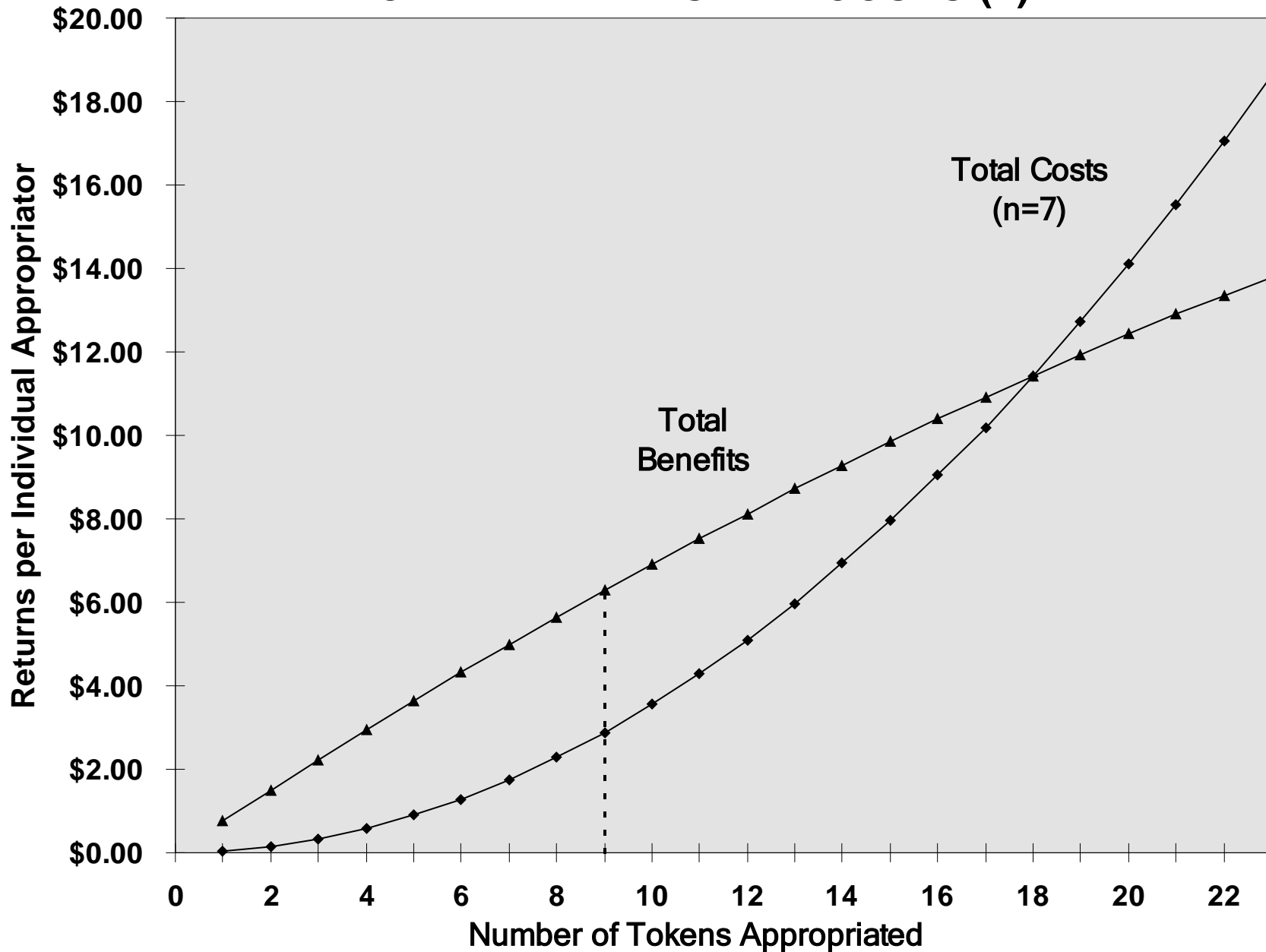
TIME-INDEPENDENT CPR GAME

TOTAL BENEFITS AND COSTS (I)



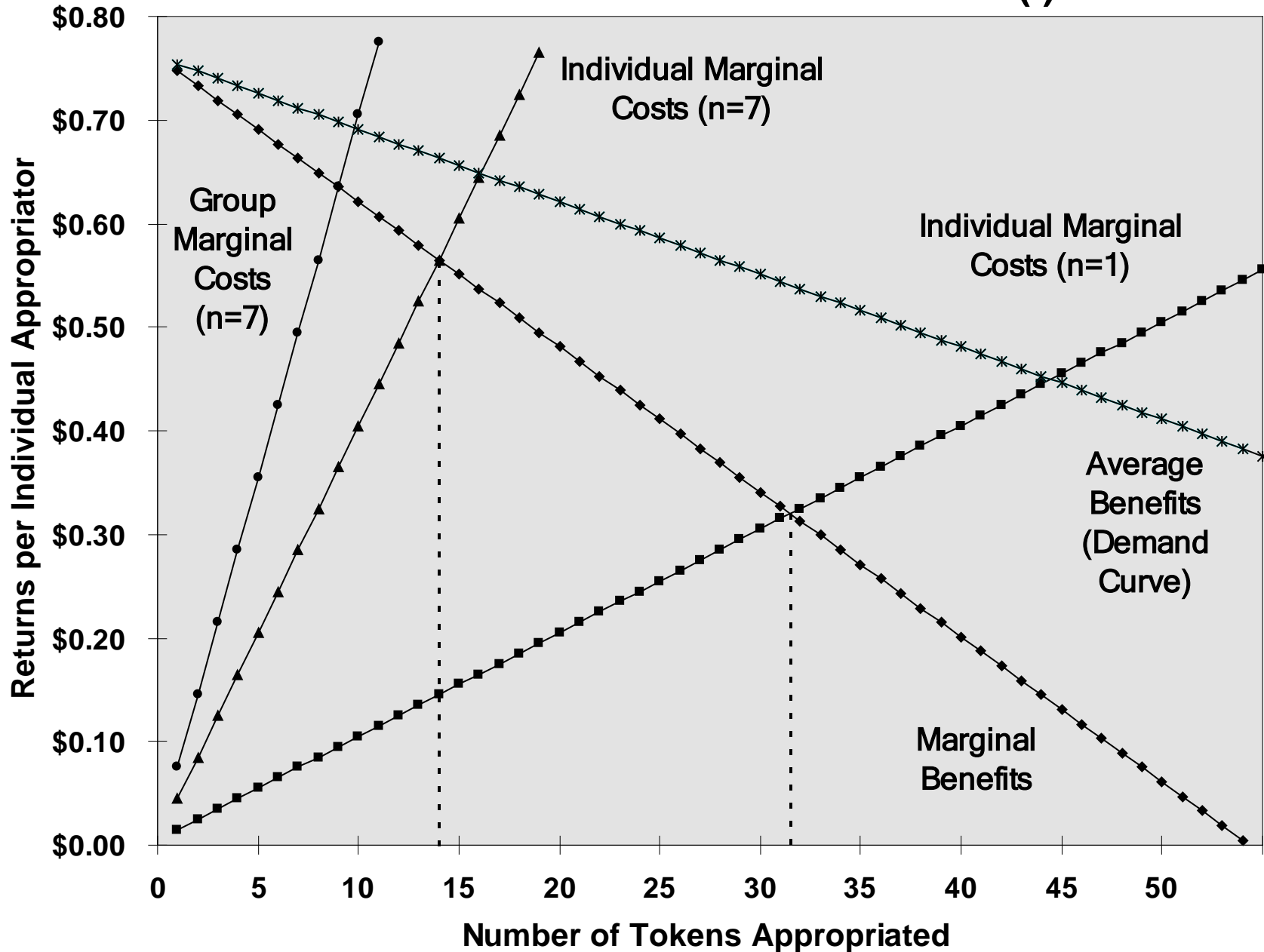
TIME-INDEPENDENT CPR GAME

TOTAL BENEFITS AND COSTS (II)



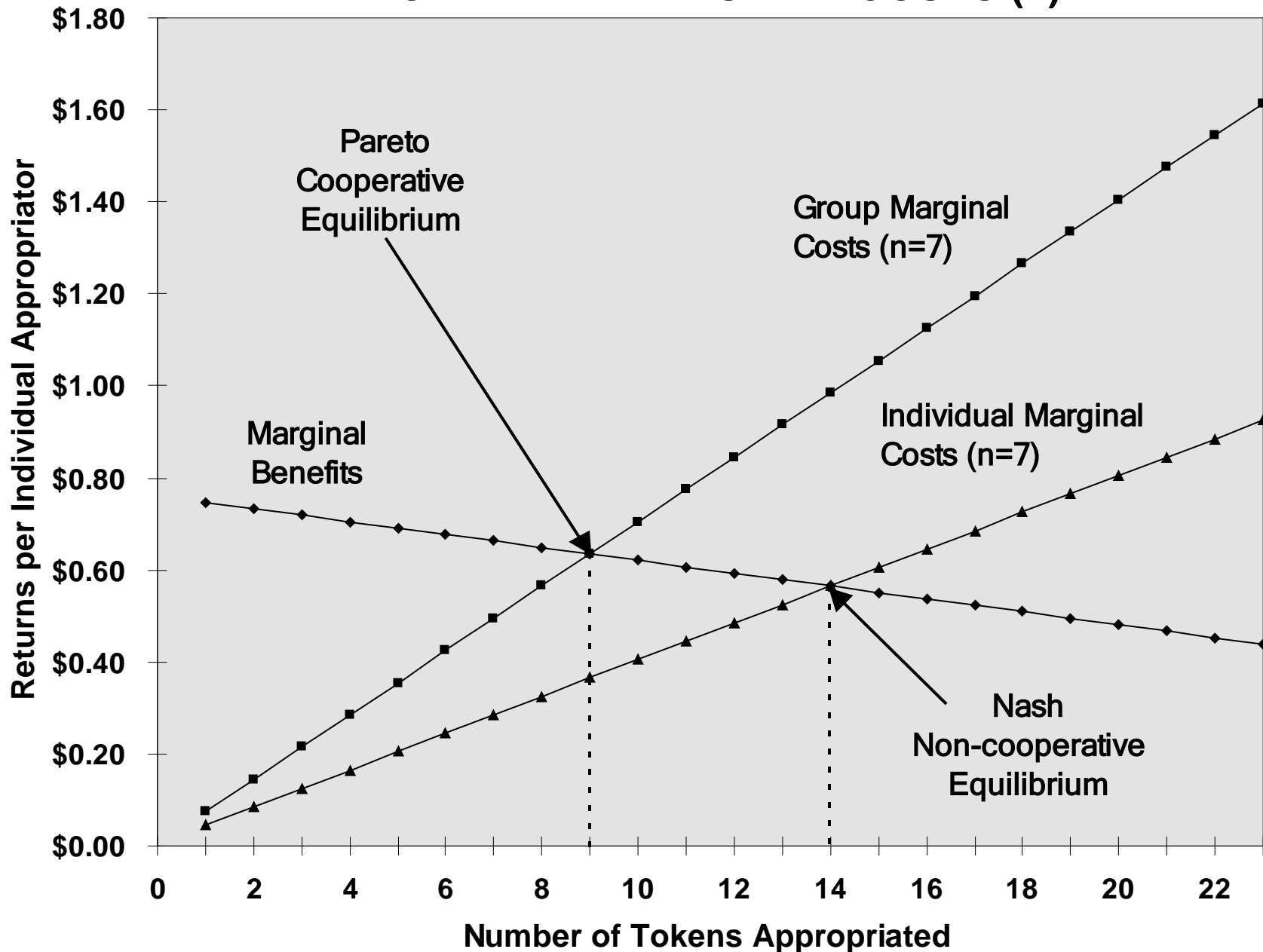
TIME-INDEPENDENT CPR GAME

MARGINAL BENEFITS AND COSTS (I)

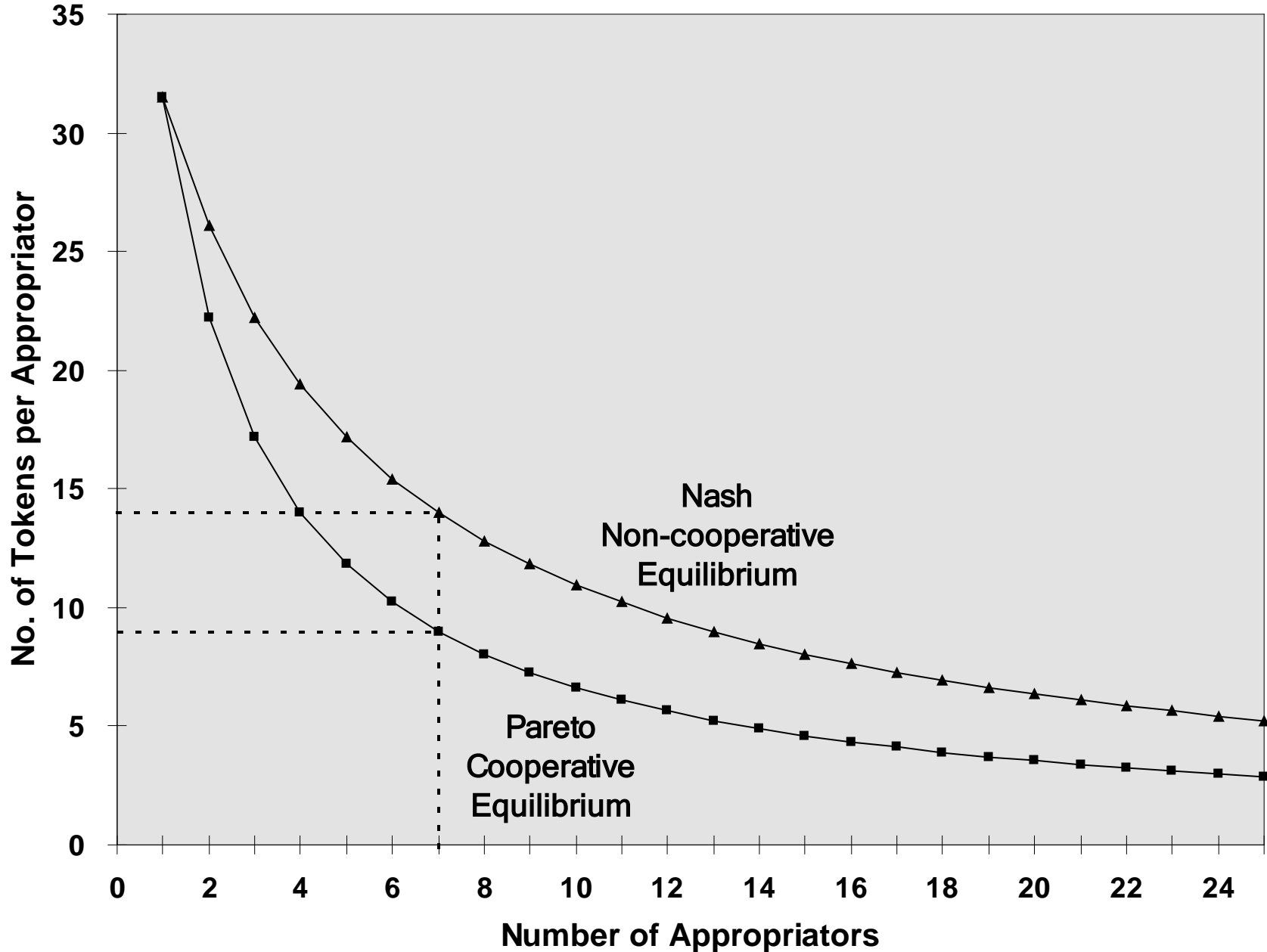


TIME-INDEPENDENT CPR GAME

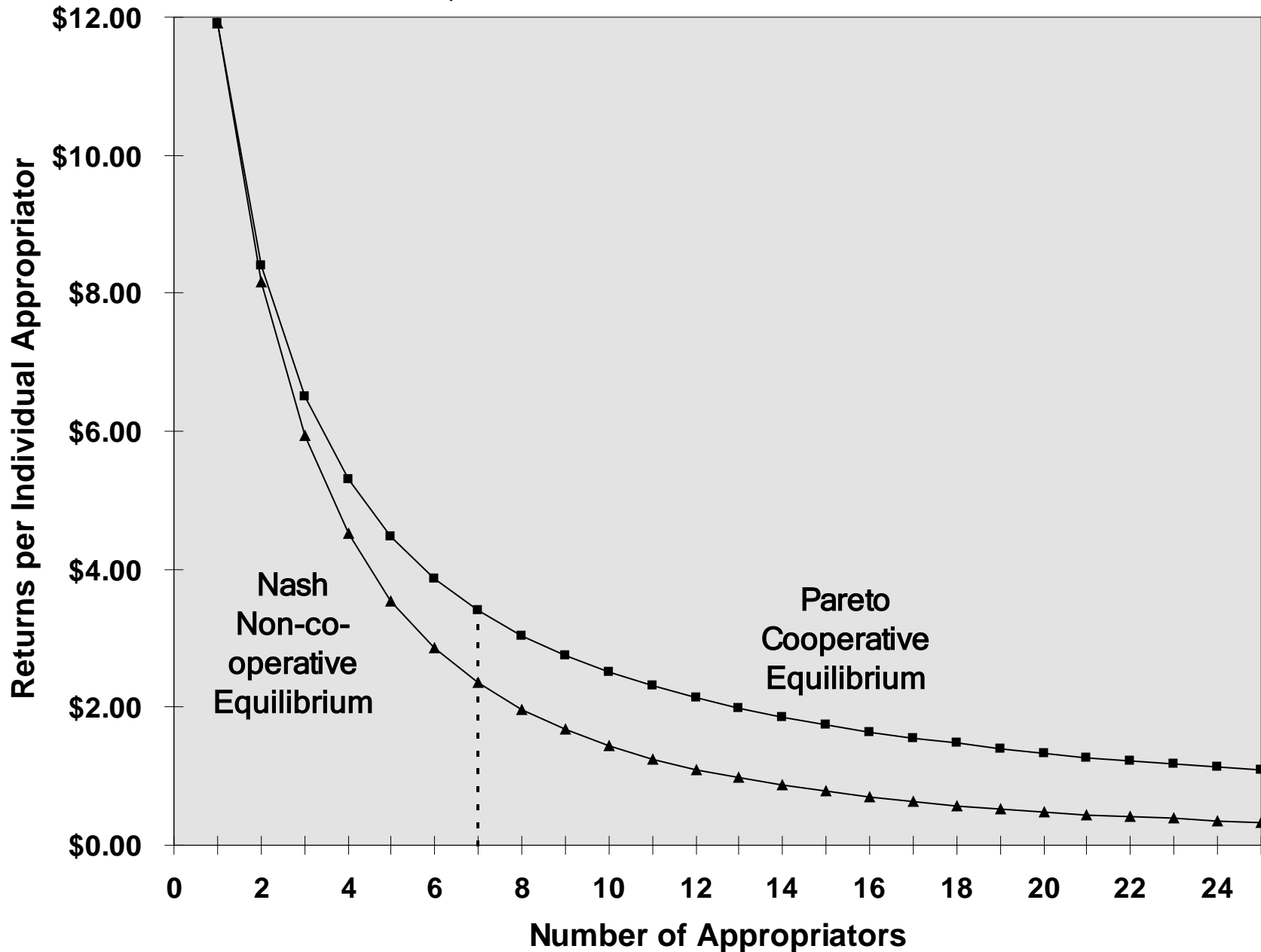
MARGINAL BENEFITS AND COSTS (II)



TIME-INDEPENDENT CPR GAME EQUILIBRIUM NUMBER OF TOKENS



TIME-INDEPENDENT CPR GAME EQUILIBRIUM NET BENEFITS



For managing renewable natural resources

- Land, soils -- arable, pasture, and rangeland
- Water -- surface and groundwater
- Domesticated animals
- Forests
- Wildlife
- Marine resources, fisheries
- Watersheds, wetlands, coastal areas
- Protected areas

From which people derive various economic livelihoods:

- Agriculture -- rain-fed and irrigated
- Pastoralism
- Harvesting (forests)
- Hunting
- Fishing
- Biodiversity conservation
- Tourism

One of four generic alternatives

■ **Public sector management**

- State institutions, -- usually ministries, departments, or agencies of the bureaucracy -- make and enforce decisions about resource use

■ **Private sector management**

- Private individuals or companies with ownership rights make decisions about resource use within whatever limits are set by (state) law

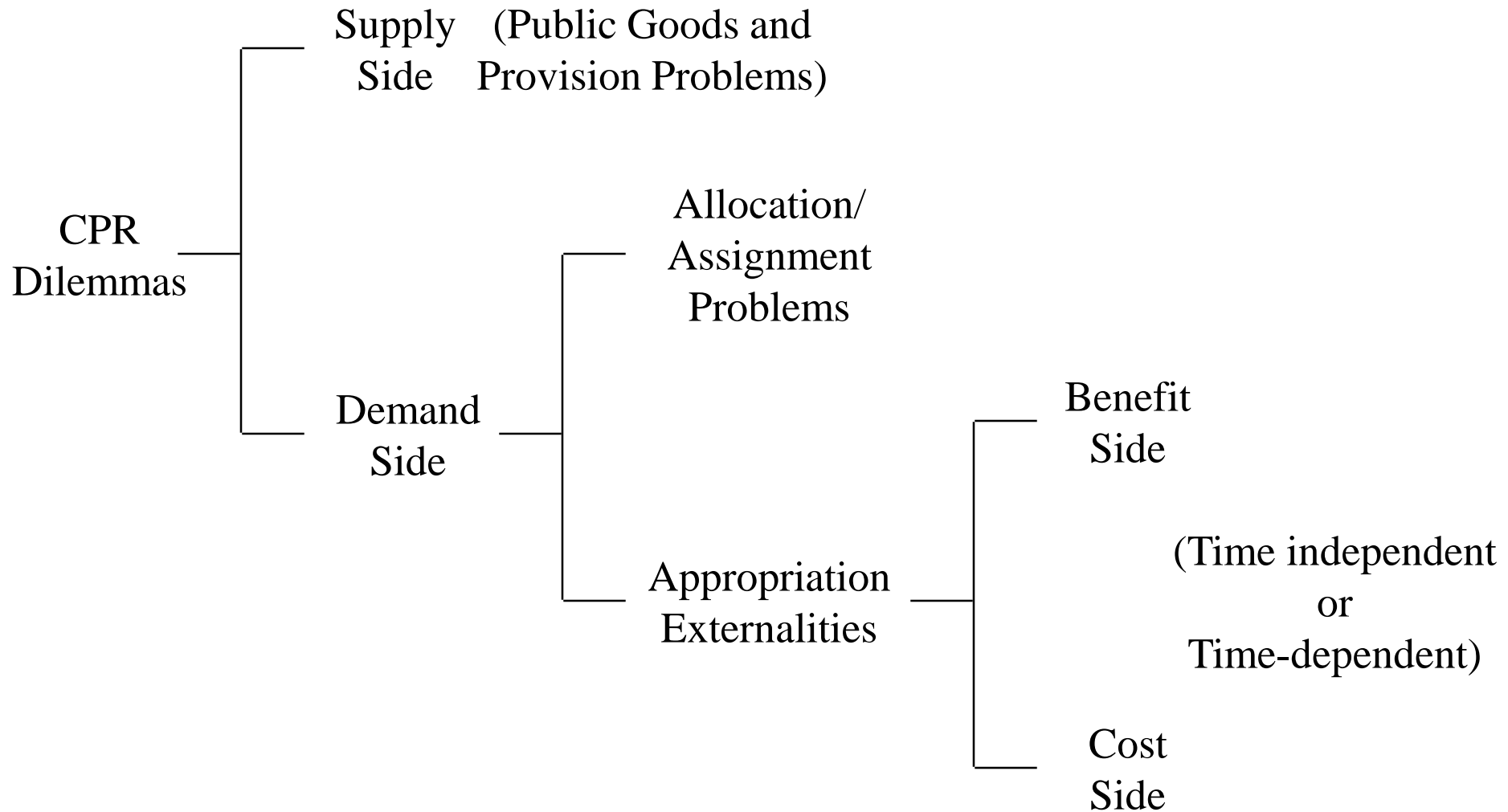
■ **Local community-based management**

- Community institutions with *de jure* or *de facto* ownership rights determine and administer access and use

■ **Open access**

- No one has *de facto* ownership of the resources
- Anyone can harvest the resources without threat of legal sanctions

CPR Dilemmas: A Conceptual Scheme



Which, if not resolved, result in:

- Deforestation
- Soil erosion, degradation, and desertification
- Surface and groundwater depletion
- Overhunting, poaching
- Overfishing
- Habitat destruction
- Species extinction

And give rise to concerns such as:

- Depreciation of natural capital => Loss of current (and future) production, leading to impoverishment
- Technological uncertainty: Will it always be possible to find technological substitutes for lost natural capital?
- Irreversibility: Some losses, like species, are irreversible.

Basic Problem

- Traditional common property management regimes are breaking down into open access regimes, due to:
 - Pressure on existing resources arising from economic “modernization” and rapid population growth,
 - Incursions by non-local interests, both international and domestic, public and private (e.g. hydro-electric dams, cement plants, large-scale mechanized farming, national parks), and
 - Failed attempts at centralized management
- Local communities, who are trying to organize themselves to deal with these threats, are running up against constraints beyond their power to control

Lessons

- From the video:
 - There exists a core set of eight design principles that characterize sustainable natural resource management regimes
- From the CPR game:
 - Non-cooperation doesn't necessarily deplete the resource; it just results in lower return equilibrium, called a Nash equilibrium – after John Nash
 - Even “cheap talk” – before rounds 3 and 4 – could improve individual and group net benefits

Basic Conclusions

- It is essential to involve local communities in the management of the resources from which they derive their livelihood.
- But communities cannot do it alone.
- Need support from central government agencies and local governments.
- Need to develop partnerships with the commercial private sector and NGOs.
- Need to create incentives for reform as well as incentives for long-term sustainable management.

Two factors affecting the difficulty of institutionalizing Community-Base Natural Resource Management (CBNRM)

■ **Nature of the resource:**

- Whether known and predictable, or
- Not well-known and unpredictable.

■ **Nature of the user-managers:**

- Whether an identifiable, coherent group, or
- Lacking group identity and structure.

Examples:

Natural Resource

*Known/
Predictable*

*Not Well Known/
Unpredictable*

User-Managers

*Identifiable/
Coherent Group*

**I. Irrigation
water
management**

**II. Coastal
fisheries**

*Lacking Group
Identity/Structure*

**III. Forest
management**

**IV.
Rangeland
management**

I. Irrigation water management	II. Coastal fisheries
III. Forest management	IV. Rangeland management

Institutionalizing CBNRM

- Easiest in situation I; the most difficult in situation IV; and of intermediate difficulty in situations II and III.
- Also easier where the benefits of management:
 - Accrue **immediately** or **very soon** rather than after a long time;
 - Accrue **locally** rather than remotely;
 - Are relatively **tangible** rather than hard to identify; and
 - Are distributed to the **same persons** who bear the costs of management, rather than to different persons.

Recommended Reform Strategies

■ **Decentralization:**

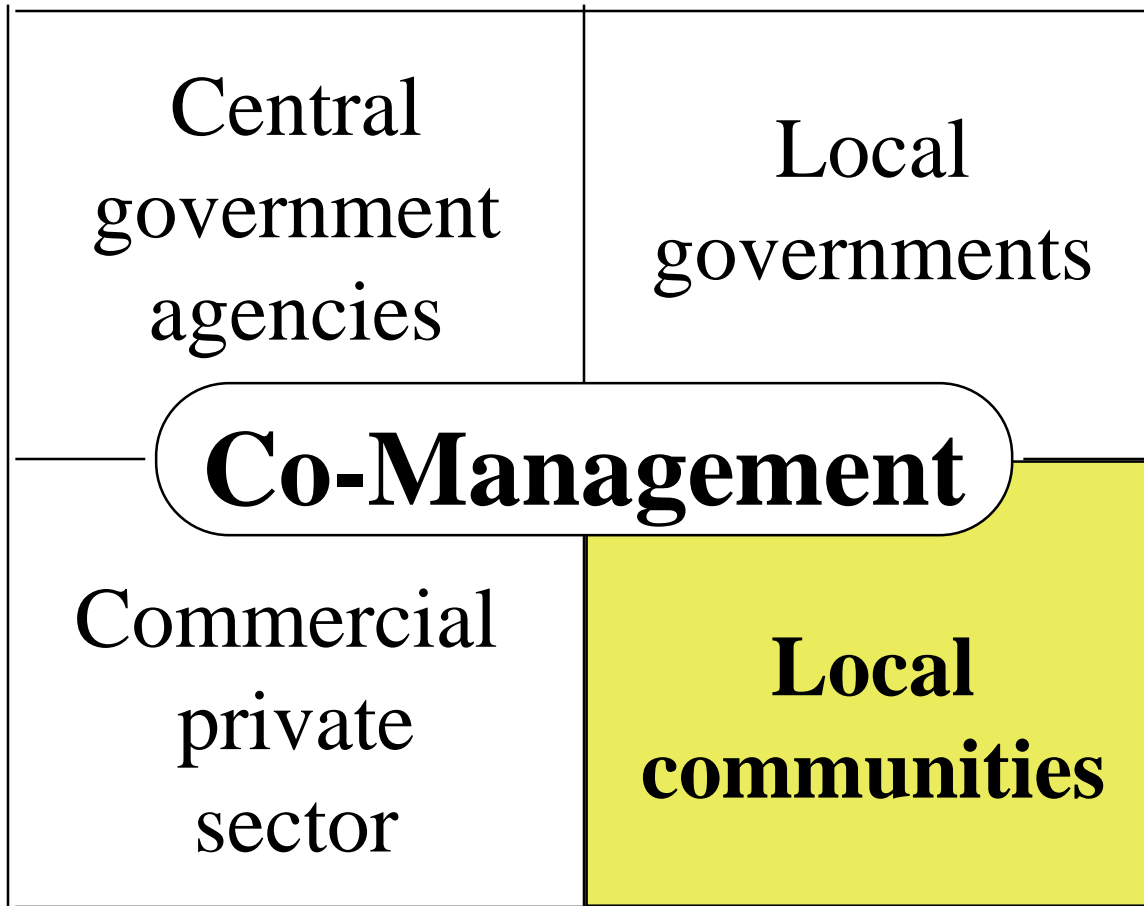
- The transfer of authority and responsibility for various government functions from higher to lower levels of government, as well as to communities and the private sector.

■ **Co-management:**

- Local communities manage their local natural resources in collaboration with other stakeholders, including central governments agencies, local governments, NGOs, and the commercial private sector.

More specifically:

- Communities exercise control and authority over decisions and resources, in accordance with their comparative advantage,
- Not in isolation, but with support from and in collaboration with the other stakeholders.
- Central agencies should:
 - Engage communities in larger conservation objectives, while at the same time seeking ways for them to become better remunerated
 - Be prepared to accommodate local interests, needs, and norms that are compatible with larger conservation objectives



Key Areas Requiring Action

- 1 **Organizing effective community-based groups**
 - Both at the local level and scaling up to the regional level,
 - In which process, catalytic organizations play a key role.
- 2 **Working out operational rules and linkages:**
 - Fiscal and other institutional arrangements
 - Between community-based groups, the public sector, and the commercial private sector
- 3 **Establishing conflict management mechanisms**
 - Both within and between communities, and
 - Between competing users of a given resource
- 4 **Codifying the legal and institutional framework:**
 - Well-defined property rights and responsibilities, at both the macro and micro-levels, in which communities have ownership, and
 - That foster the emergence of effective community-based organizations

Key Actors in the Reform Process

- **Catalytic organizations (usually NGOs):**
 - Advocate, facilitate, and (usually) initiate and pilot change
 - Help mobilize people and build capacity at the local level
 - Provide political cover for politicians
- **Community leaders:**
 - Representative and active participants in the reform process
 - Beyond consultation to collaboration and empowerment
- **Reform managers:**
 - At both the central and local levels
 - Help mainstream successful pilots
- **Politicians and senior policy-makers:**
 - Provide political commitment
 - Validate consensus and confirm strategic direction