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Economics of increasing participation in Agri-Environmental schemes

John Rolfe

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BE WHAT YOU WANT TO BE

Economics of increasing participation in Agri-Environmental schemes

John Rolfe



Research issue of interest

- Governments increasingly focused on participation/adoption as a separate goal to environmental improvements
 - Expressed in several ways
 - Focus on engagement and grants
 - Caps on grants so as to involve more landholders
 - Specific targets for engagement with landholders
 - Specific targets for adoption by landholders
- What are the economic implications of pursuing these targets?

Why the specific focus on high levels of participation?

- Non-economic reasons
 - Generates more political support
 - Satisfies notions of equity
 - Meets ideals that smaller landholders are more conservation minded
- Economic reasons
 - More participation = more environmental benefit
 - Changes behaviour and norms
 - Avoids crowding out effects

Focus of this talk

- Better identifying the tradeoffs in economic terms
- Incorporate participation more directly in economic analysis on what actions to undertake
- Extension of the Pannell private/public benefit tradeoffs framework to incorporate participation

Case study of interest

- Reef Plan Targets

- Reduce discharge of DIN and P at end of catchment by 50%
- Reduce pesticides discharged at end of catchment by 50%
- 50% late dry season groundcover for grazing land
- 80% sugarcane (and other ag) adopted improved MPs
- 50% graziers adopted improved MPs

- Reef Rescue

- Program to implement the plan
- Focused on using grants to engage with landholders
- Has an even more ambitious target for adoption = 90% of sugarcane growers adoption improved MPs

- Do specific targets for participation/adoption make economic sense?

First report card on Reef Plan

- Specific focus on practice adoption
- Large variation in practice adoption across sugarcane and grazing industries
- Well below 90% target

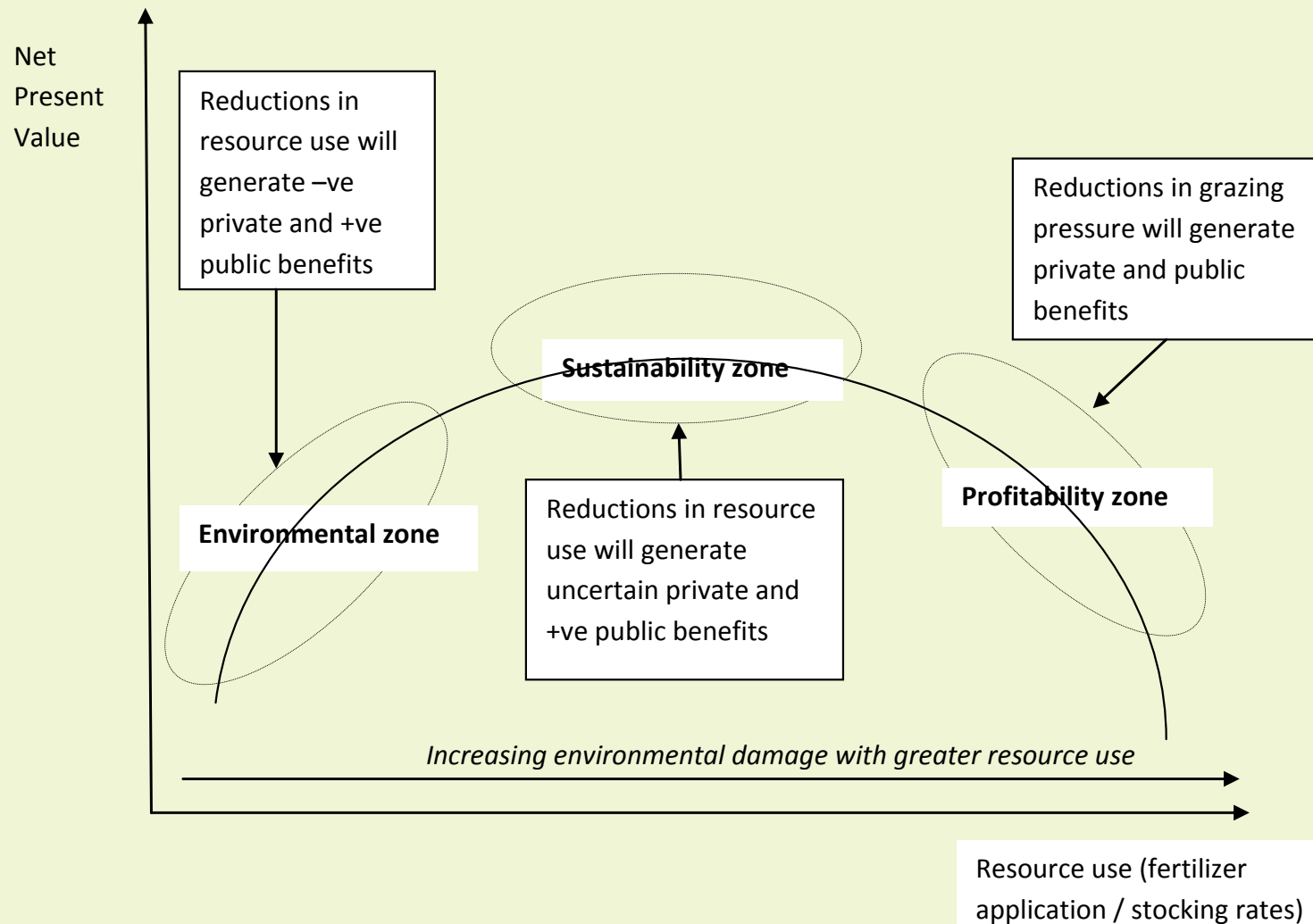
<i>Sugarcane</i> ^a			A	B	C	D
<i>Combined management</i>	<i>Number of growers</i>		87 (2%)	781 (18%)	2145 (50%)	1239 (30%)
	<i>Area km²</i>		94 (2%)	1149 (20%)	2845 (50%)	1564 (28%)
<i>Nutrient management</i>	<i>Number of growers</i>		84 (2%)	1427 (34%)	1279 (30%)	1462 (34%)
	<i>Area km²</i>		113 (2%)	2091 (37%)	1583 (28%)	1865 (33%)
<i>Herbicide management</i>	<i>Number of growers</i>		51 (1%)	252 (6%)	3625 (85%)	324 (8%)
	<i>Area km²</i>		57 (1%)	339 (6%)	4805 (85%)	452 (8%)
<i>Soil Mangement</i>	<i>Number of growers</i>		127 (3%)	665 (16%)	1530 (36%)	1930 (45%)
	<i>Area km²</i>		113 (2%)	1017 (18%)	2148 (38%)	2374 (42%)
<i>Grazing</i> ^{b,c}			A	B	C	D
<i>Number of graziers</i>			542 (12%)	1656 (38%)	1672 (38%)	548 (12%)
<i>Area km²</i>			24 186	89 489	106 398	31 407

Understanding the issues

- Three types of adoption goals to consider
 - Improving production while reducing resource use
 - expect financial benefits to landholders in short term
 - Improving sustainability
 - protect resource base, and expect financial benefits in longer term
 - Protecting environment
 - there may not be financial benefits in short or long term
- Most traditional literature focused on first goal
 - Not clear how consistent the factors are for different goals
 - E.g. expect that attitudes become more important in explaining adoption of environmental practices

Standard payoff function for landholder

- Shows private NPV of increasing intensity of resource use
- Many L-Hs out in profitability zone

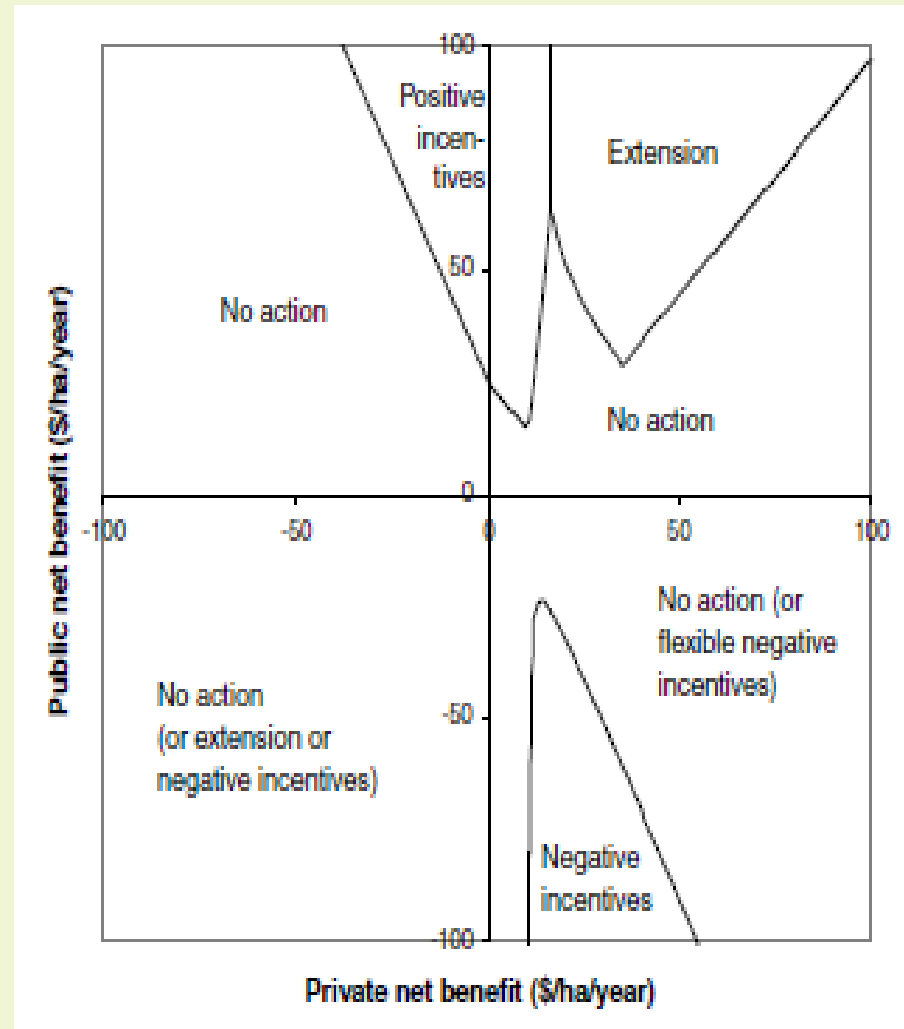


Where do we expect producers to be operating?

- Do not expect landholders to be too far from the peak of the tradeoff function – at either end of resource use
 - Unprofitable farmers exit the industry over the longer term
- Short term profit drivers and lags in adopting new practices mean many landholders are likely to be in top right hand side of the NPV curve
- Incentives for farmers should be:
 - In profitability zone – improve short term profits
 - In sustainability zone – improve long term profits
 - In environmental zone – achieve other goals

Choice of policy instruments

- Pannell (2008) provides major insights about selection of policy instrument
 - Makes it clear what the importance of net private returns are
 - Sets framework in terms of costs and benefits

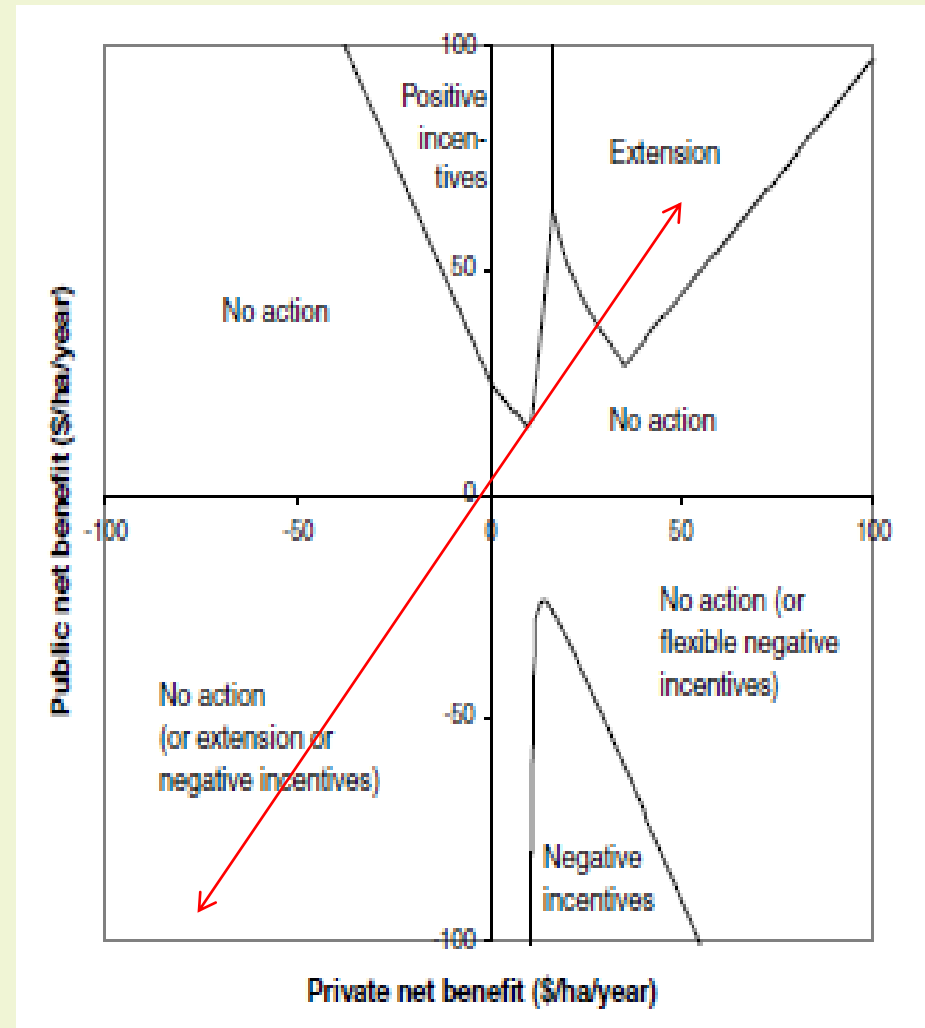


Incorporating participation

- The Pannell framework is essentially designed to be applied at the individual landholder level
 - Compares marginal net private and public benefits of a single enterprise change
- Not so clear how to expand to multiple participants
 - Heterogeneity - tradeoffs likely to vary between individual landholders
 - Complex relationships between participation and additions to marginal net benefits and costs

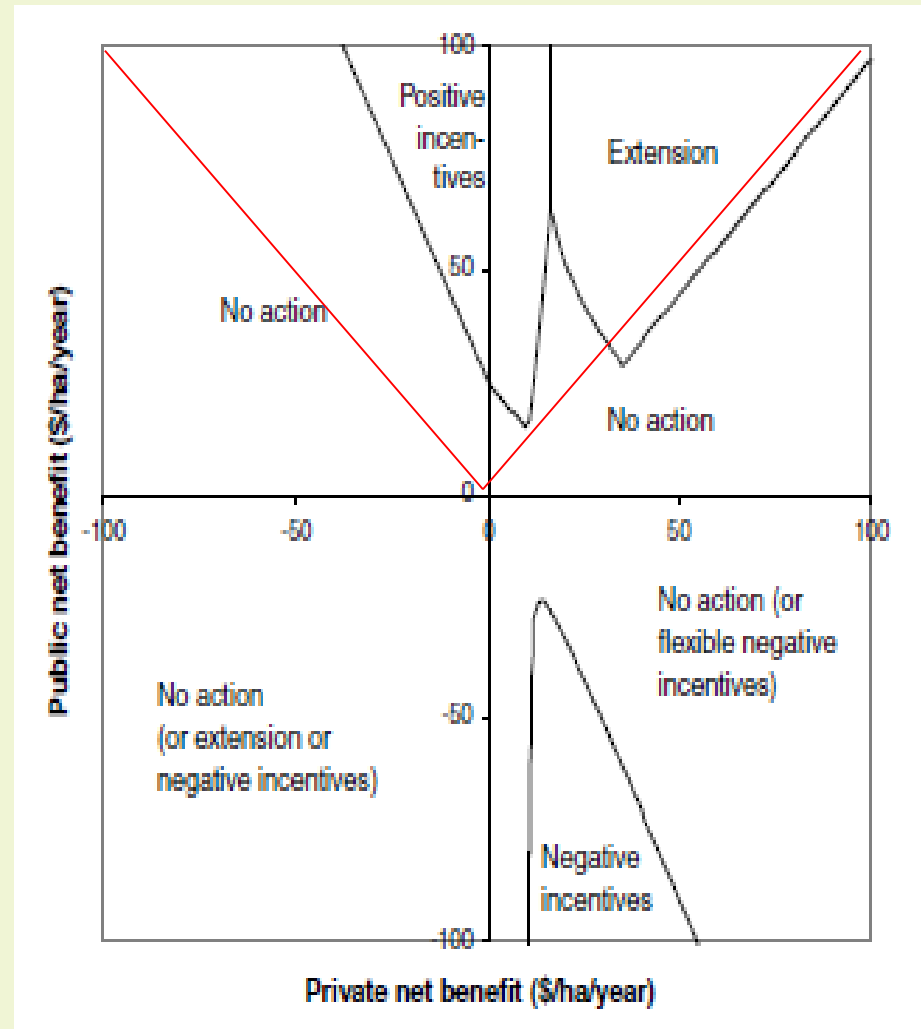
Extending from marginal analysis of single landholder decision to multiple participants

- There are several options for extending to multiple participants
- One option is to add a 3rd dimension of benefits to Pannell diagram
 - Extra dimension would allow total benefits of increasing participation to be shown

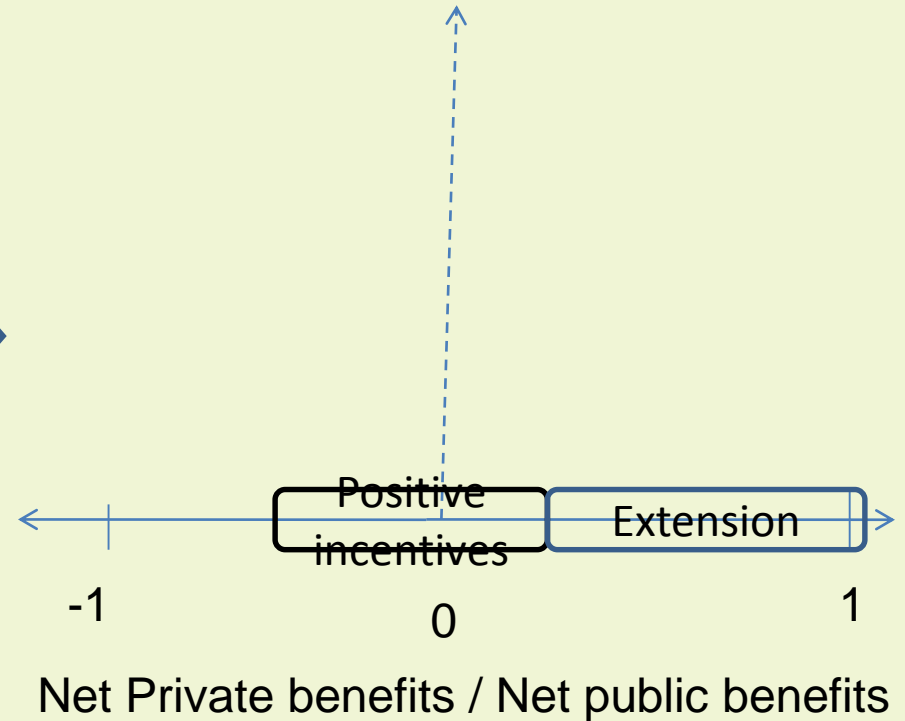
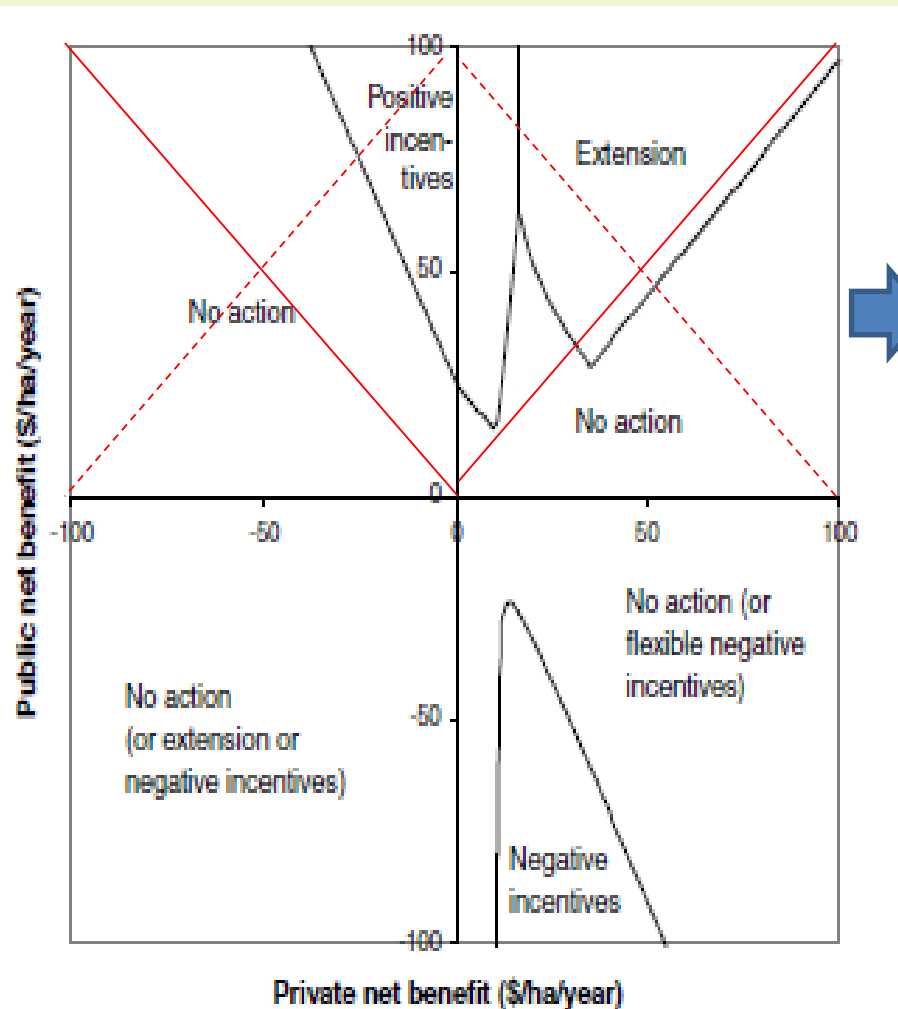


Pannell diagram in one dimension

- Another option is to focus on top half of Pannell diagram and represent it in a single dimension
 - Ratio of net private benefits to net public benefits
 - Red lines show where ratio = -1, 1



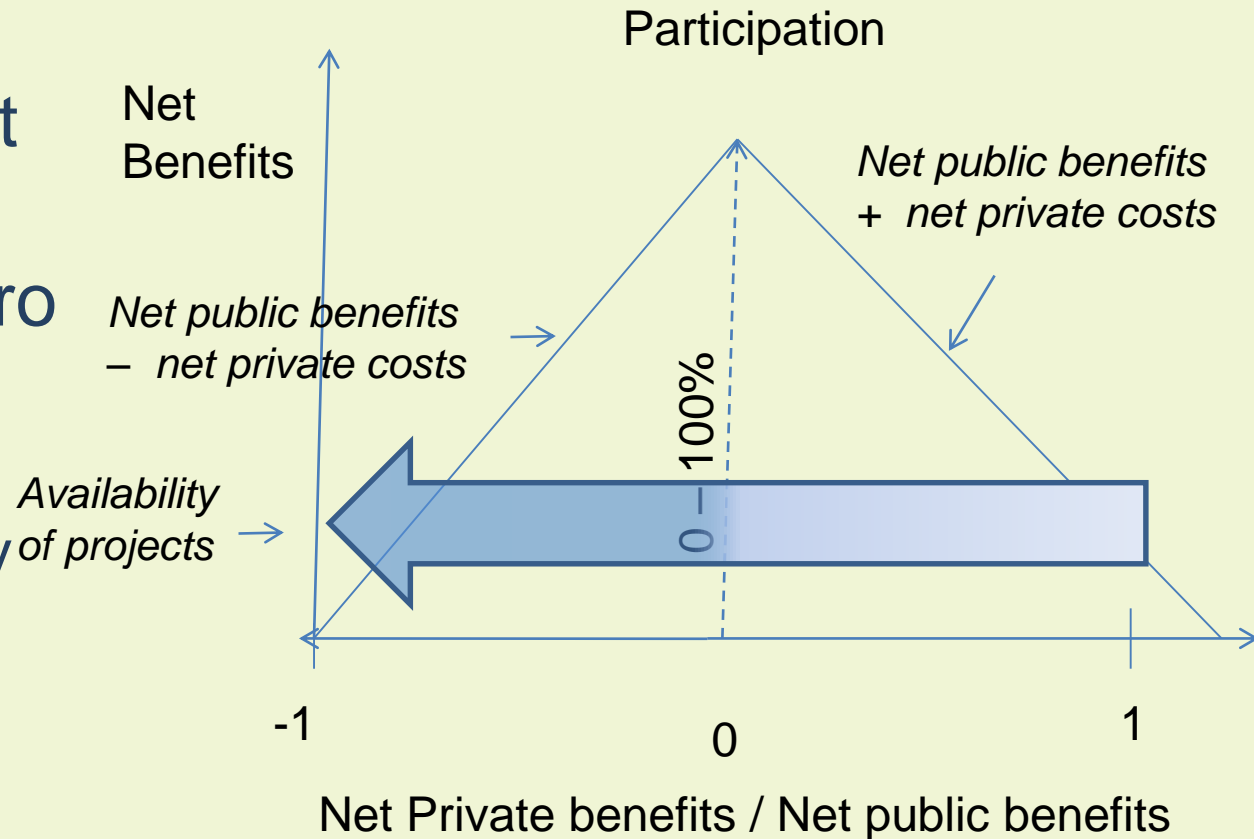
Converting ratio of benefits into a single dimension



Measure total additional benefits with increased participation

Net benefits highest when Net Benefit ratios close to zero

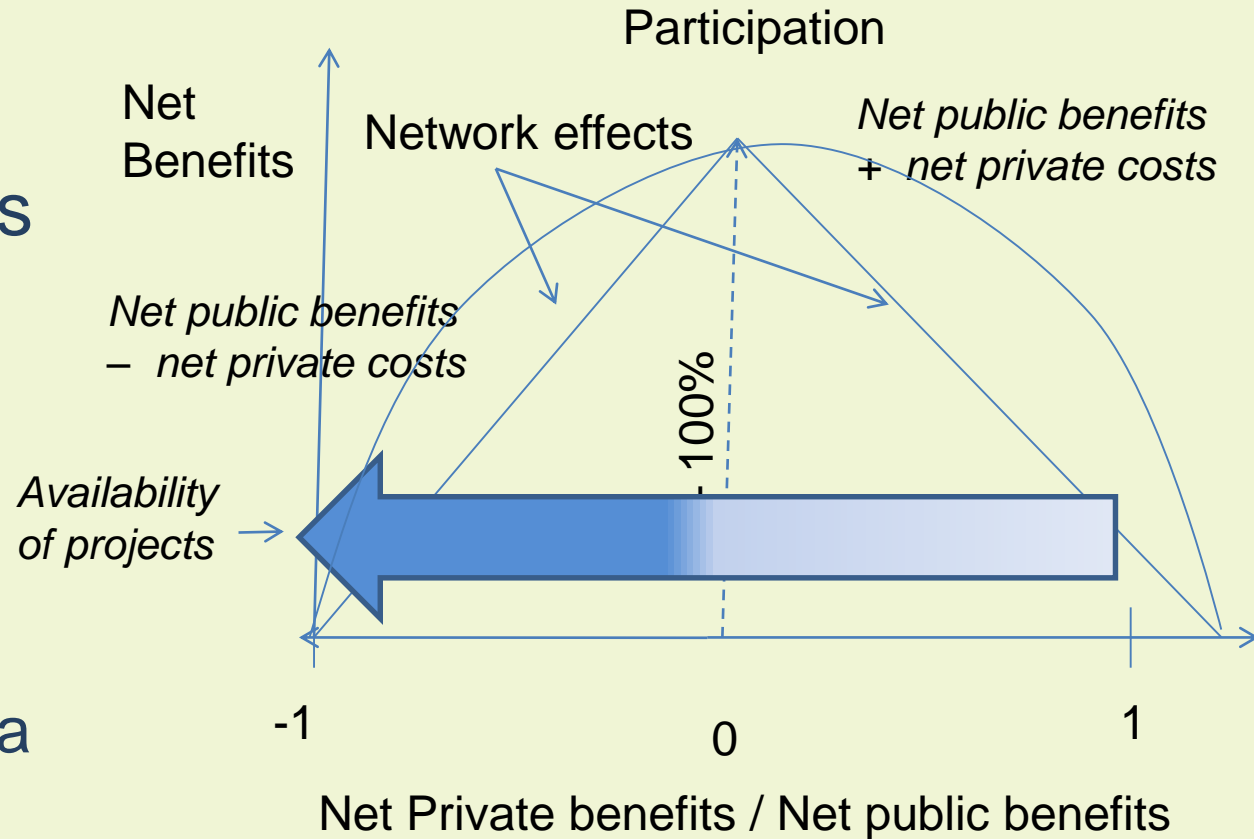
- As ratio approaches 1, limited availability of projects limits total benefits
- As ratio approaches -1, private losses begin to > public gains



Allowing for network effects with increased participation

There may be additional benefits from participation from network effects

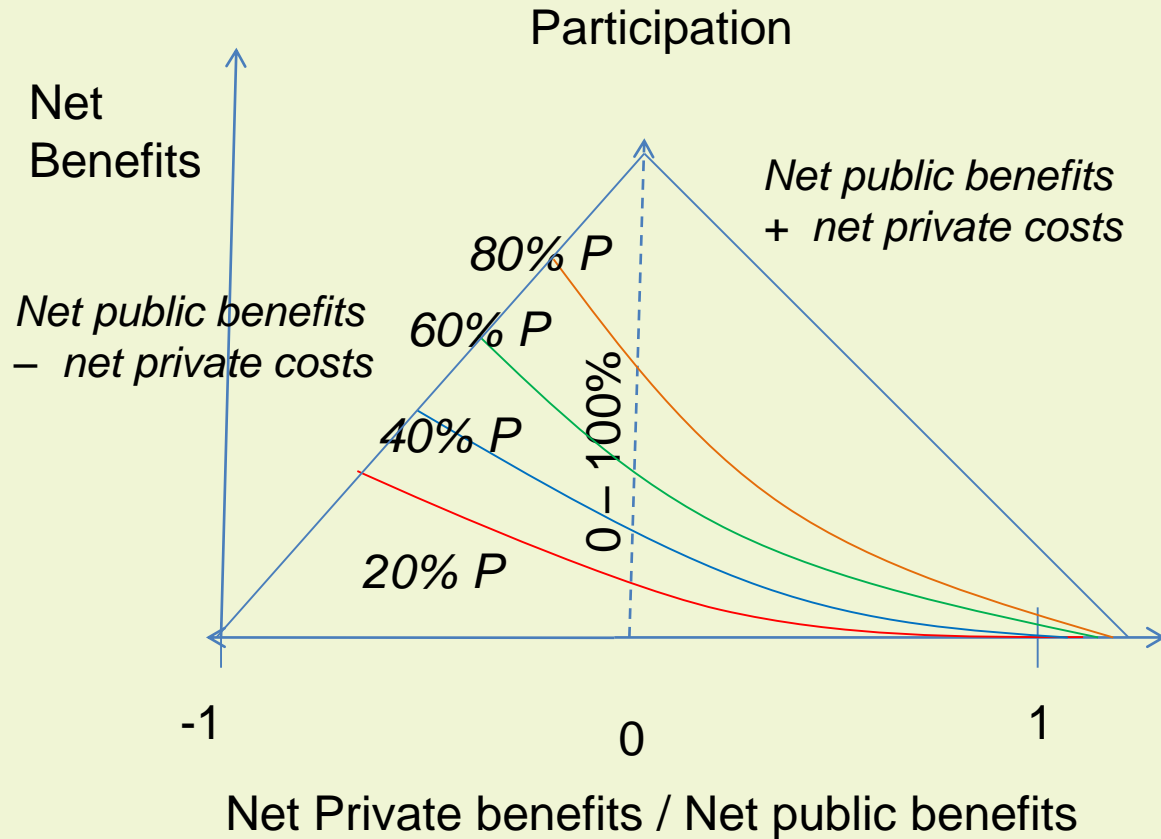
- Social networks and peer groups tend to attract and hold extra participants



Adding in the external costs of increasing participation

Add a family of cost curves for increasing participation

- Increasing as net private benefits reduce
- Cost curves shift upwards with increasing participation to reflect
 - difficulty of involving more landholders
 - Increasing marginal costs
- Costs of participation are increasingly higher as private costs are involved

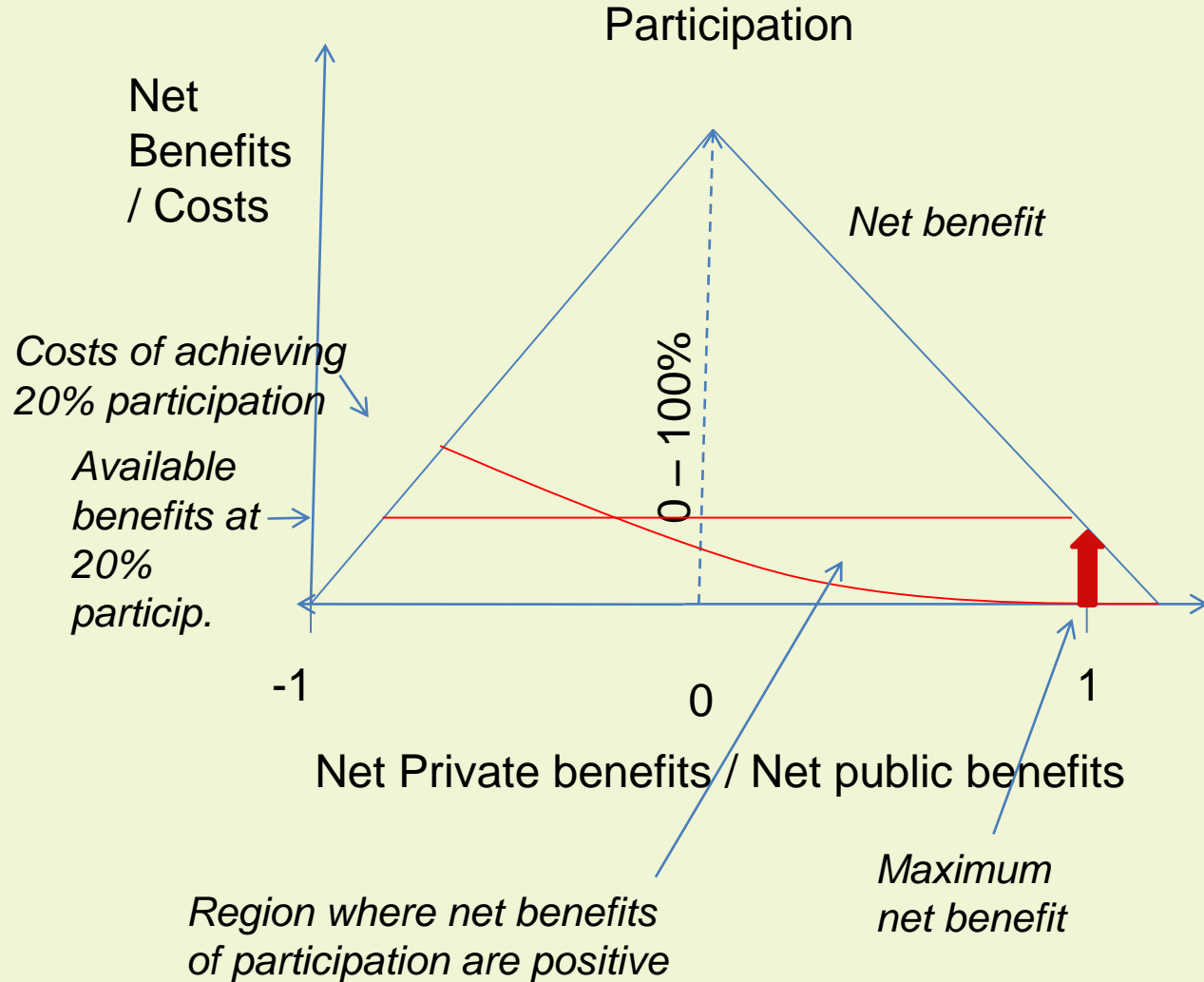


Identifying the net benefits for one level of participation

Area above cost curve and below benefit level is feasible set

Compare net benefits at 20% participation against costs of achieving that participation

Large range of Net Benefit ratios appropriate



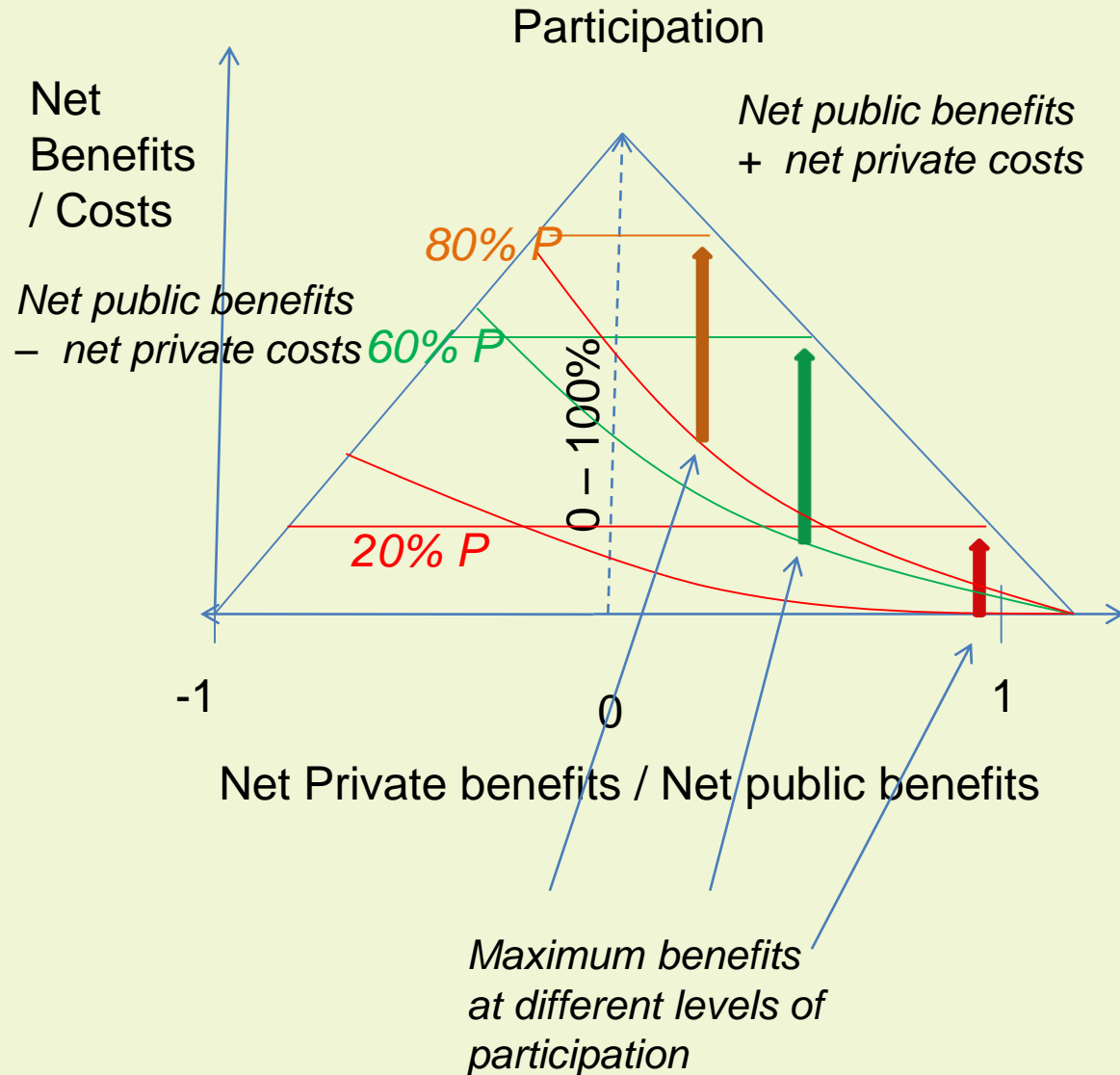
Optimising net benefits of increasing participation

Find optimal difference between benefits and costs at each level of P.

- Max. benefits moves left with increased P.

Compare maximum net benefits at each P.

- Optimal P. depends on shape of net benefit and participation cost functions

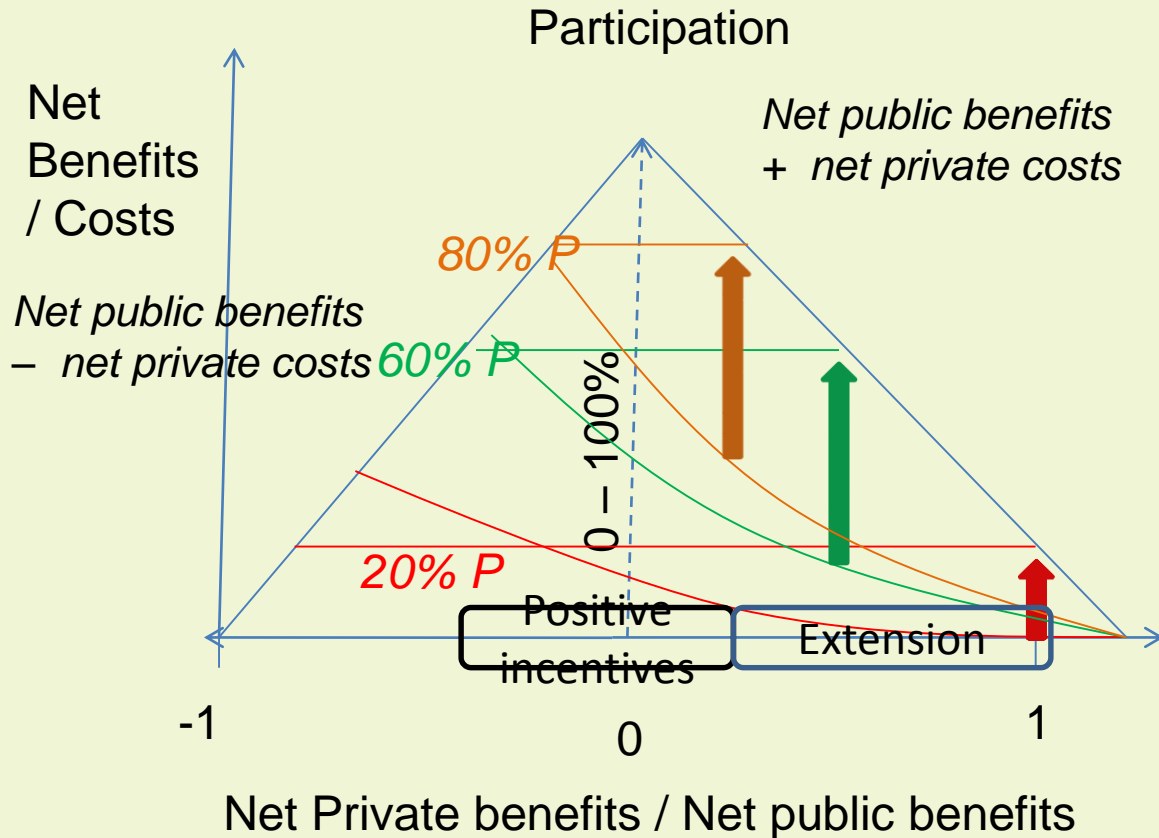


Mapping participation targets against policy options

Max. benefits tend to move left with increased P.

Map to broad allocation of policy options in Pannell diagram

- Low levels of participation – use extension
- Higher levels of participation require voluntary incentives
- Switching point will vary
 - with shape of benefit and cost functions
 - And any network effects

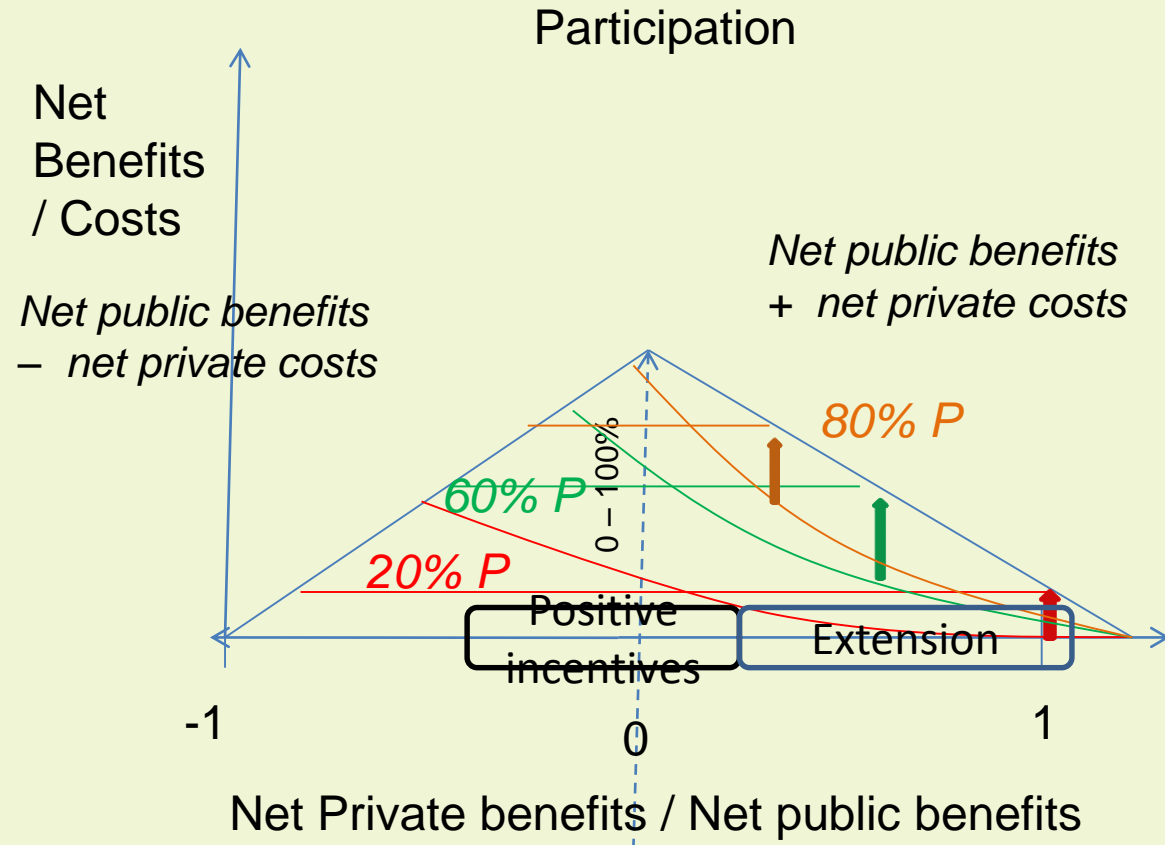


Effects of lower benefits on choice of policy options

Reducing overall benefit function of increased participation while keeping same participation cost functions

Reduces net benefits of intervention

Shifts policy options more towards extension

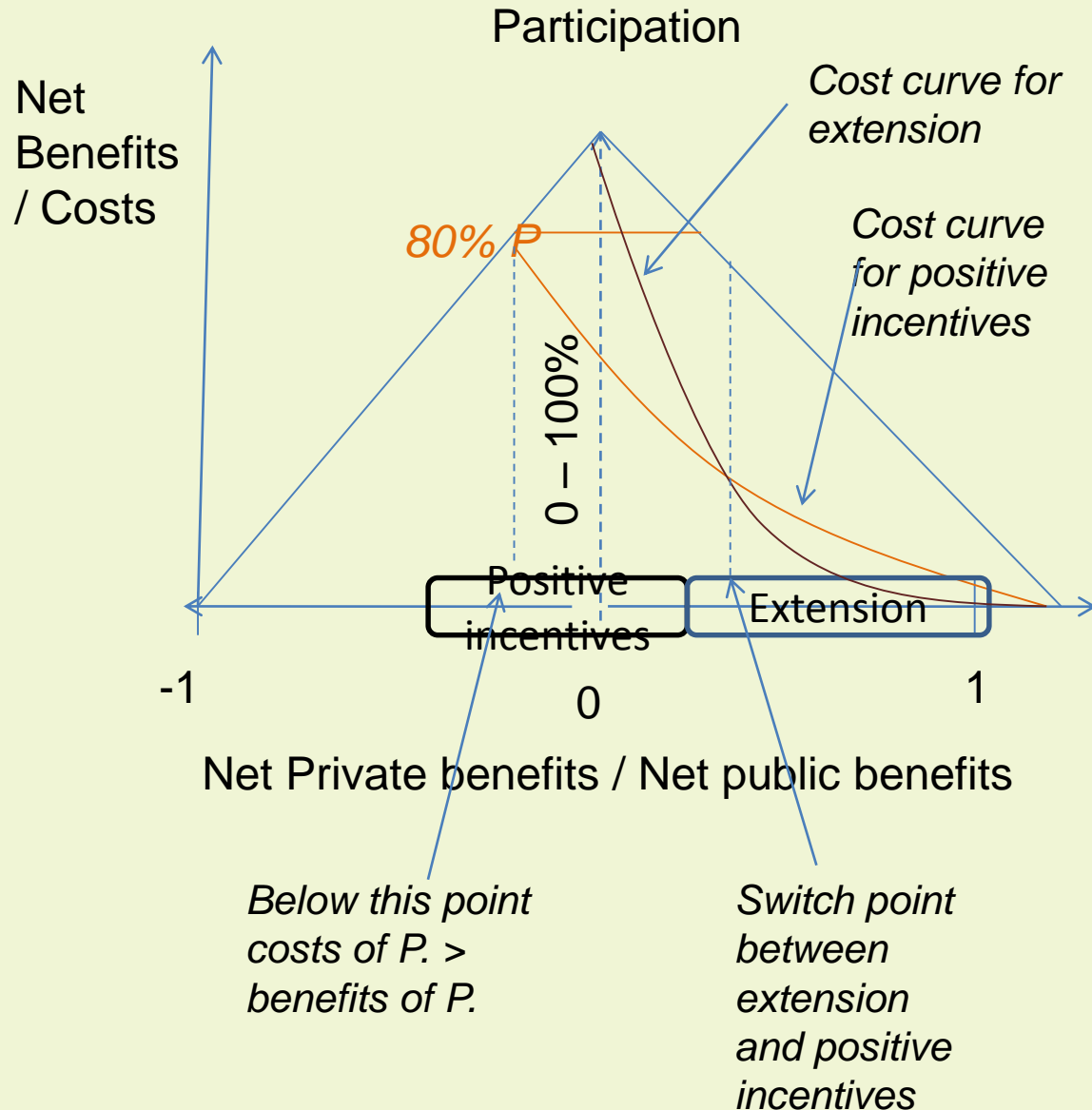


An alternative explanation for switching policy options

Max. benefits tends to moves left with increased P.

Map to broad allocation of policy options in Pannell diagram

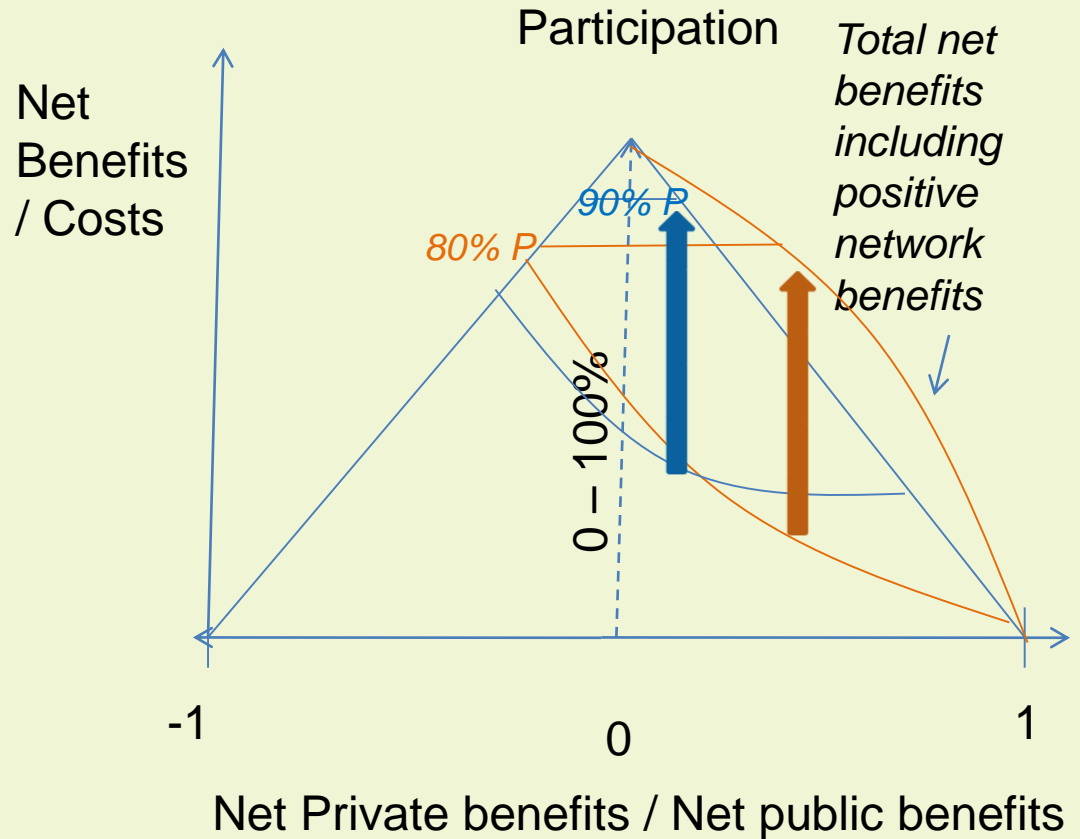
- Low levels of participation – use extension
- Higher levels of participation require voluntary incentives
- Switching point will vary
 - with shape of benefit and cost functions
 - And network effects



Tradeoffs between different positive incentives

Voluntary positive incentives have higher crowding in benefits – but larger costs for high participation levels

Regulatory positive incentives have crowding out benefits – but may have smaller costs for high participation levels



Application to GBR case study

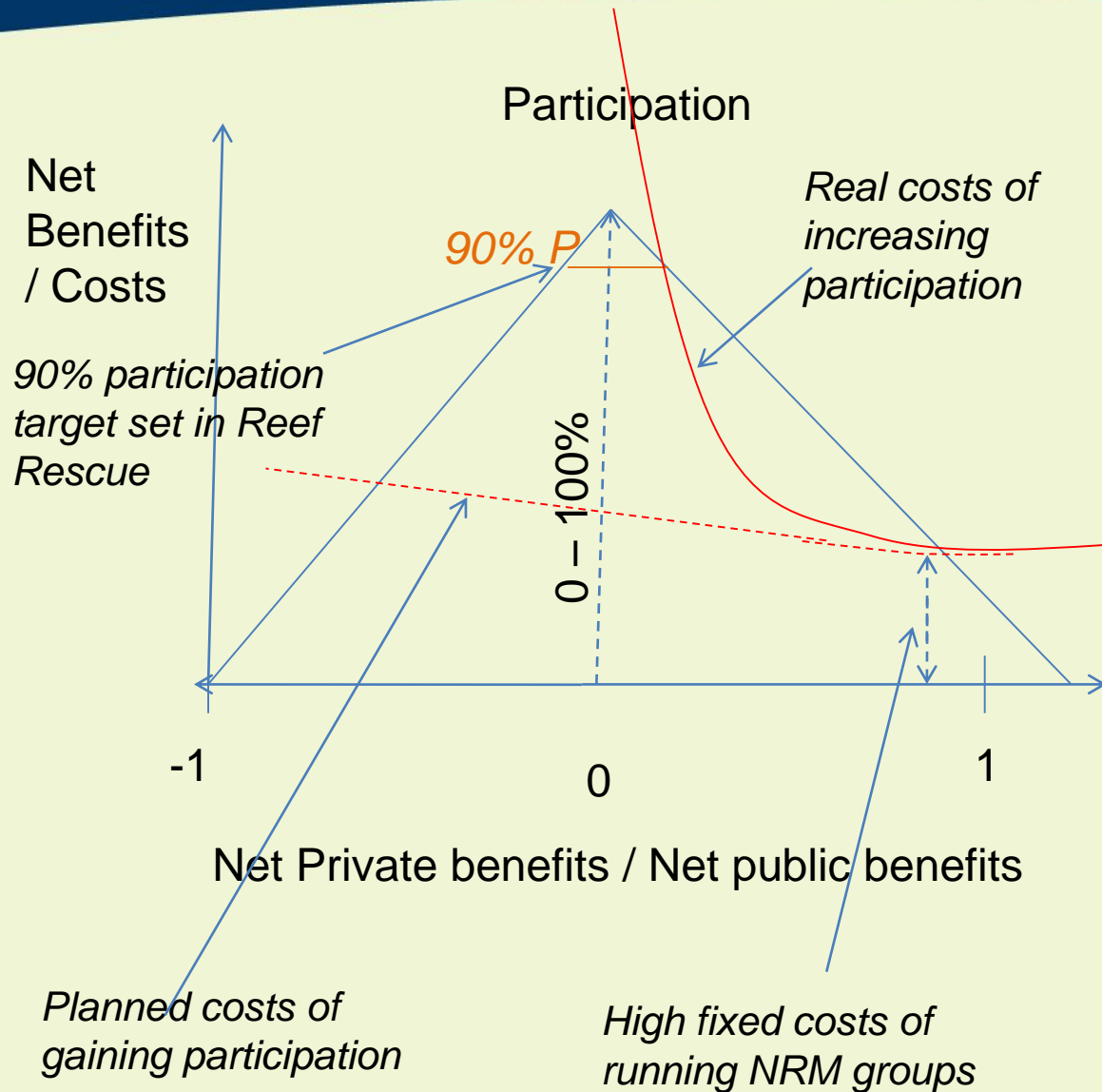
90% participation target appears to have been set without reference to costs

Program relies on implicit assumption that marginal costs of increasing participation don't rise

High fixed costs to run NRM groups / programs

Costs to date of achieving pollution reductions are very high – even for modest levels of adoption changes

Marginal costs almost certain to rise further



Conclusions

- Targets for landholder participation should be evaluated in overall economic framework
 - Increasing participation can involve significant costs
- Benefits and costs of increasing participation are unlikely to be linear, and will vary by policy instruments and impacts on incentives
- As higher participation levels are required, positive incentives become more appropriate than extension
- Maximum net benefits may not necessarily occur at highest participation levels
- No guarantee that 90% adoption target for Reef Rescue is feasible or economic