# LANDBRUK OG MILJØ

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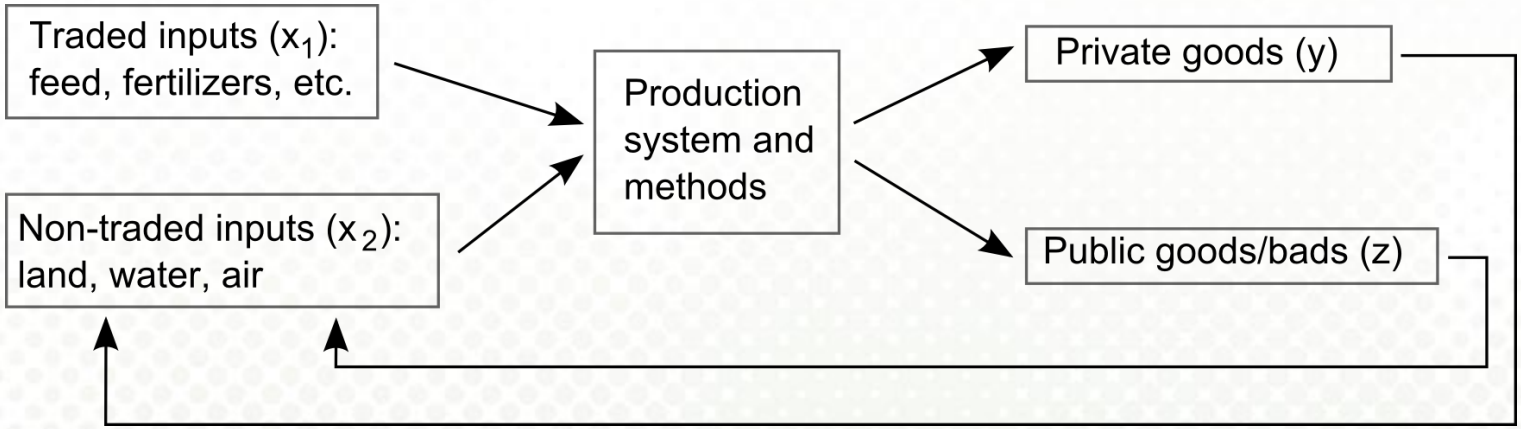
# OUTLINE

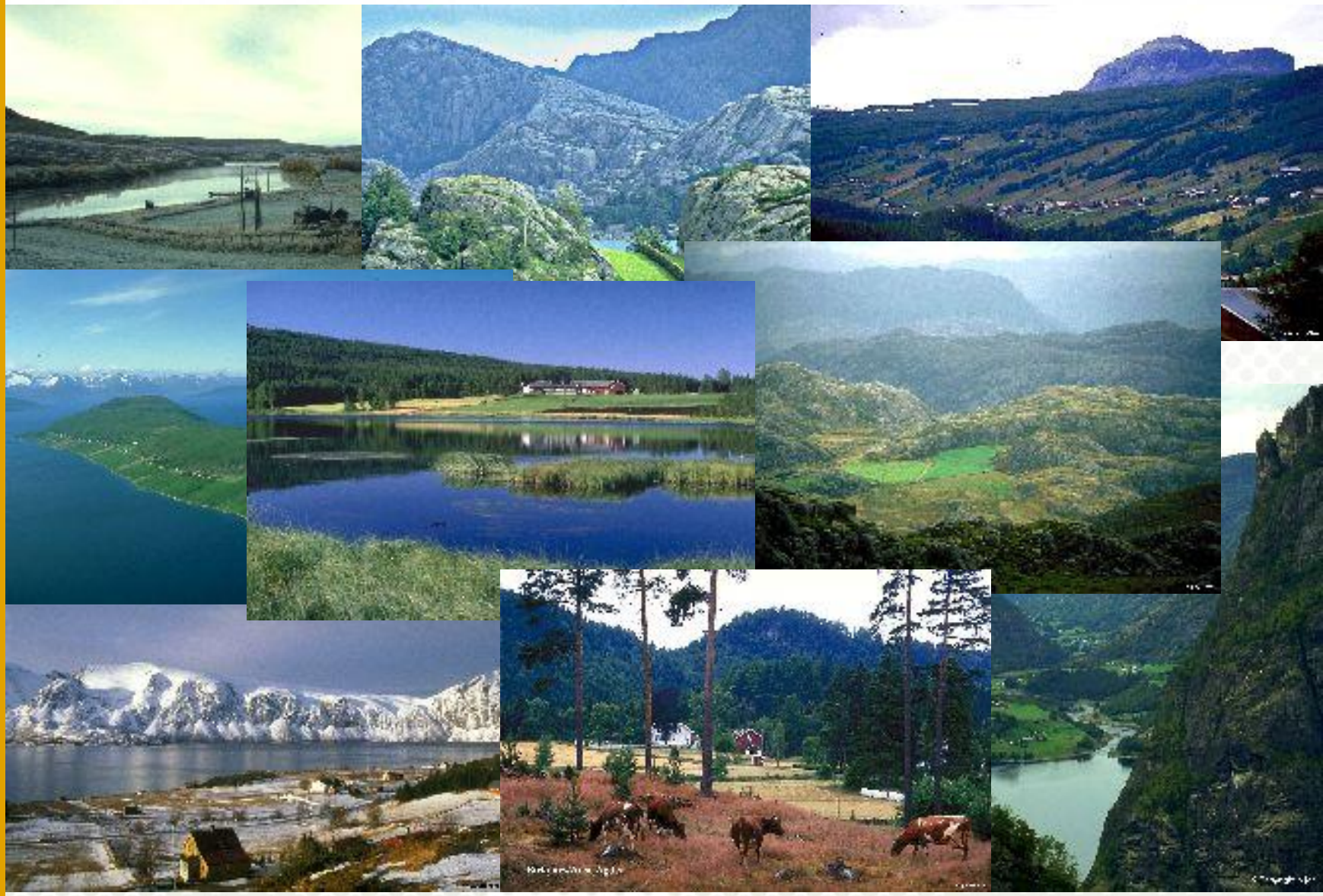
- What is multifunctional agriculture?
- Why do we need to regulate?
- How do we regulate (who and where)

# AGRICULTURAL PRODUCTION




- Private goods ≈ commodities = tradable inputs and outputs
- Bads = "goods" with negative values, e.g. pollution
- Public goods and bads = non-tradable (in practical terms)

# THE APPEARANCE



# MULTIFUNCTIONALITY

"Multifunctionality refers to the fact that an economic activity may have **multiple outputs** and, by virtue of this, may contribute to **several societal objectives** at once. Multifunctionality is thus an **activity oriented** concept that refers to specific **properties of the production process** and its multiple outputs." OECD (2001)

- This is really nothing new!
- Liberalization of trade and decoupling of support from production has brought the issue to the fore
  - OECD
  - WTO (non-trade concerns)

# ELEMENTS OF MULTIFUNCTIONALITY

- *Food and fiber*
- *Landscape*: biodiversity, cultural heritage, amenity values of landscape, recreation and access, scientific and educational value
- *Food related issues*: food security and food safety
- *Pollution*: losses of nutrients to water and air (ammonia, nitrate and $N_2O$, phosphorus), erosion, and pesticide residues in food, soil and water
- *Rural concerns*: rural settlement and rural economic activity

- Aims of the Norwegian agricultural policy

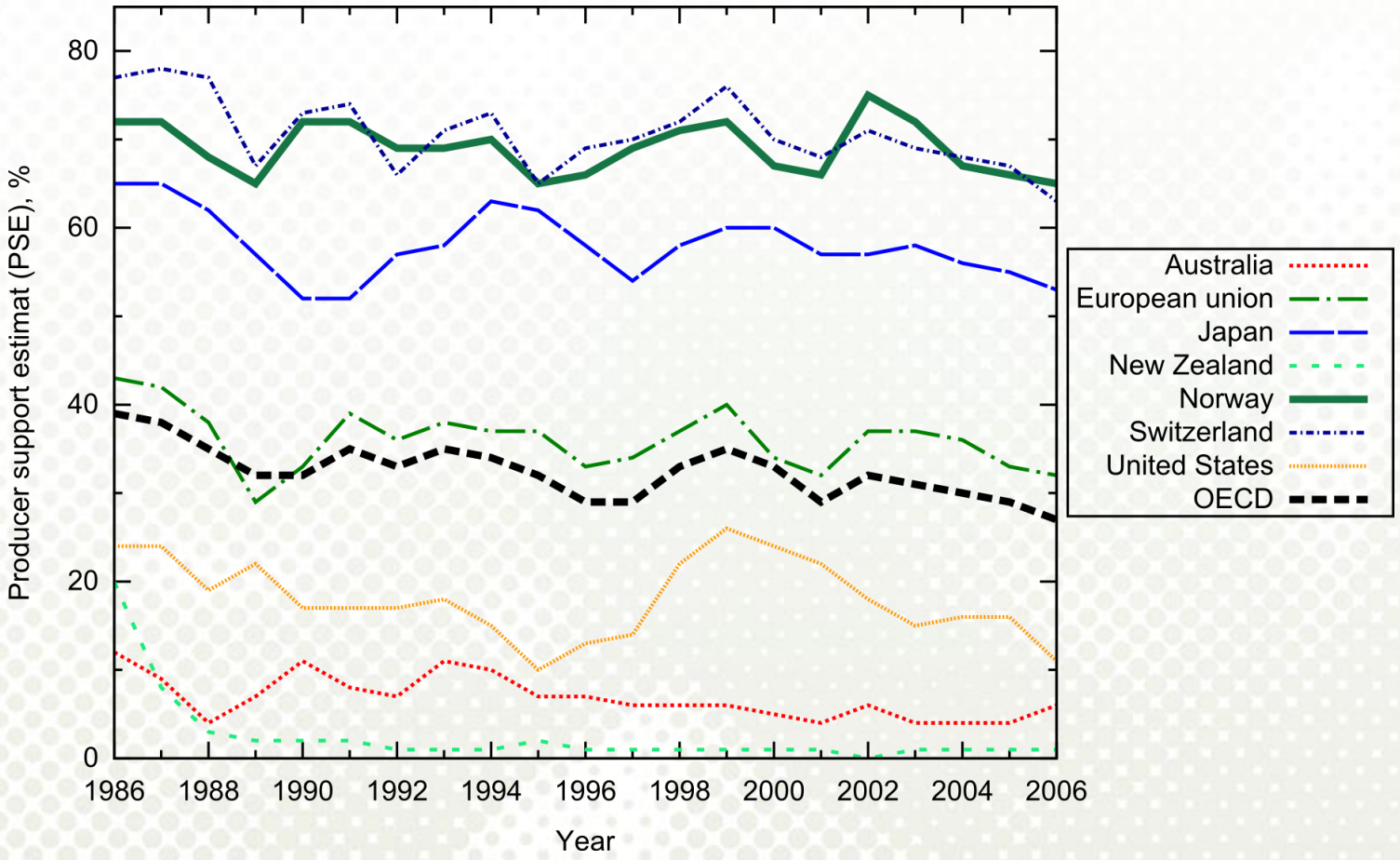
# THE NEED FOR POLICIES

- Public goods and bads are not traded in markets
  - The farmers do not receive the right signals (i.e. prices) through the markets
  - Sub-optimal production without regulation
- It is not possible to create (normal) markets for these goods due to incomplete property rights
- Complete property rights:
  - Well-defined
  - Transferable
  - Secure
  - All benefits and costs accrue to the owner

# THE NEED FOR SUPPORT?

- Total support: about NOK 20 billion ≈ 333000/man year
- Budgetary support: about NOK 12 billion
- Prices in Norway are more than two times the world market prices
- Norwegian agriculture is not competitive given world market prices
  - High cost level
  - Low productivity (climate and farm structure)
- Norwegian agriculture will (almost) disappear without support
  - Less pollution
  - The public goods will be lost

# LEVEL OF (RELATIVE) SUPPORT



# THE MAIN QUESTIONS

- The need for support does not necessarily mean that the Norwegian agricultural policy is optimal with respect to
  - Level
  - Policy instruments
- Is it wise to combine the two rationales for support?
  - Income (viability of agriculture) + production of public goods
- Or does the Tinbergen rule still apply
  - One policy per policy objective
- Transaction costs and jointness are crucial issues

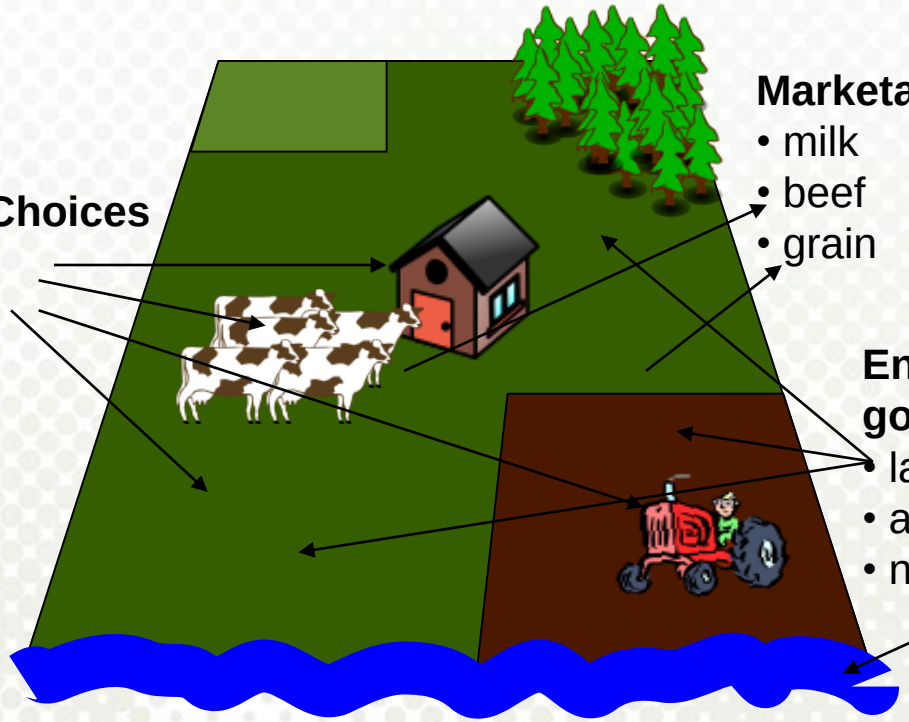
# THE AGRI-ENVRIONMENTAL SYSTEM

**The farmer**
- objectives
- knowledge

**The farm**
- climate
- soil
- topography
- capital

**External "signals"**
- prices
- costs
- polices
- off farm alternatives
- etc

**Choices**

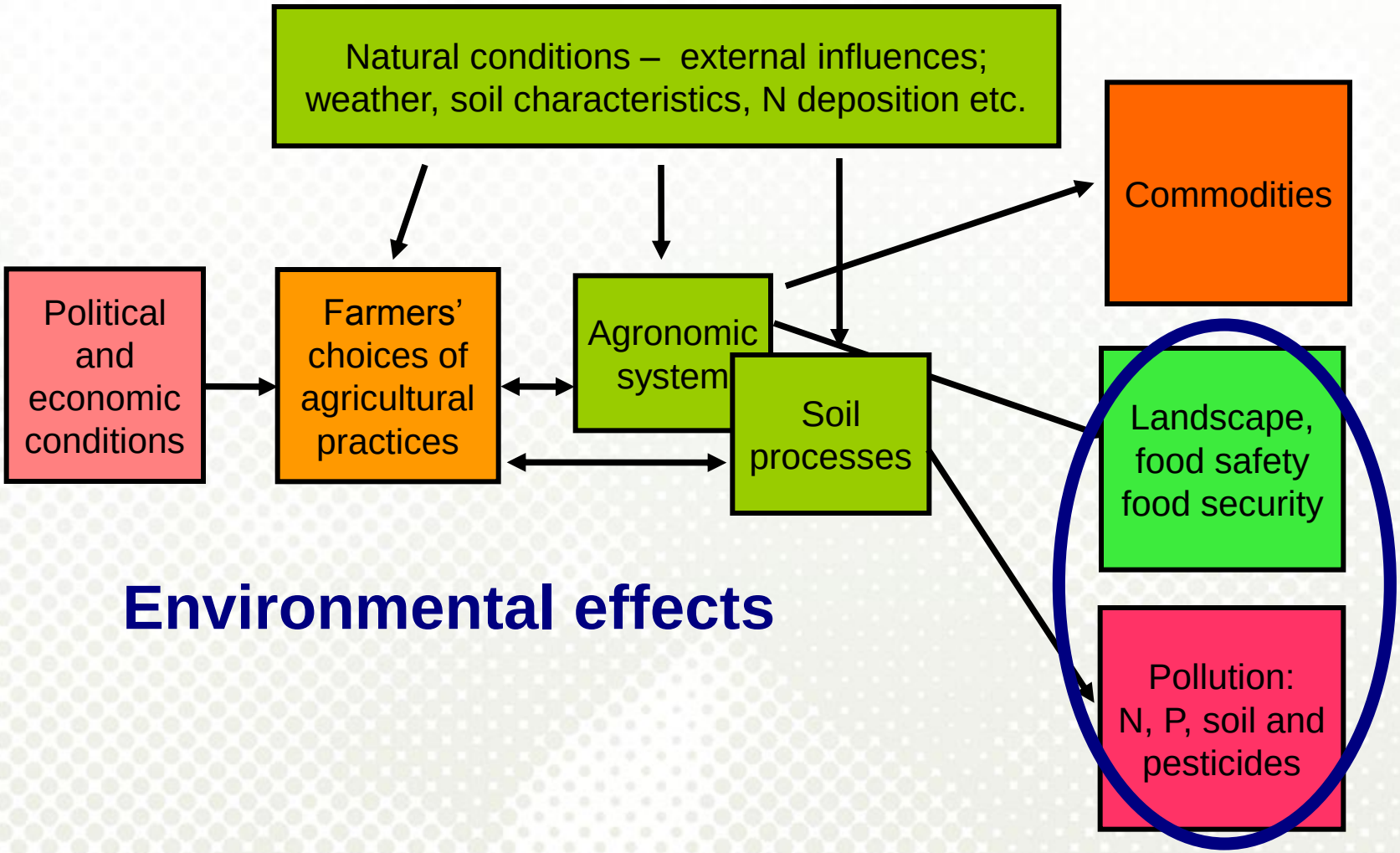


**Marketable outputs**
- milk
- beef
- grain

**Environmental goods/bads**
- landscape
- ammonia, N2O
- nutrients, soil

**Social "signals"**
- family
- social responsibility

# THE SIMPLIFIED VERSION



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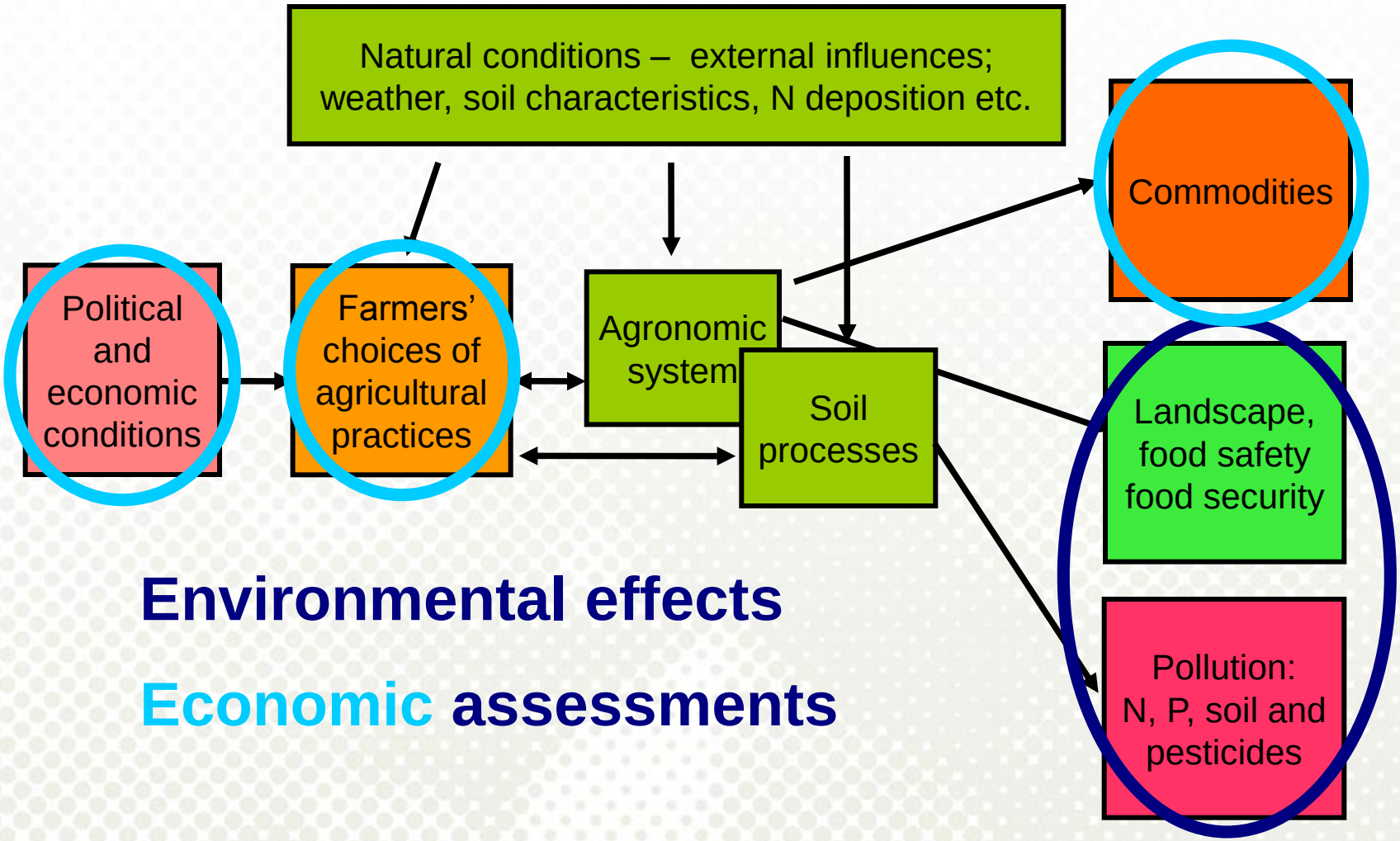
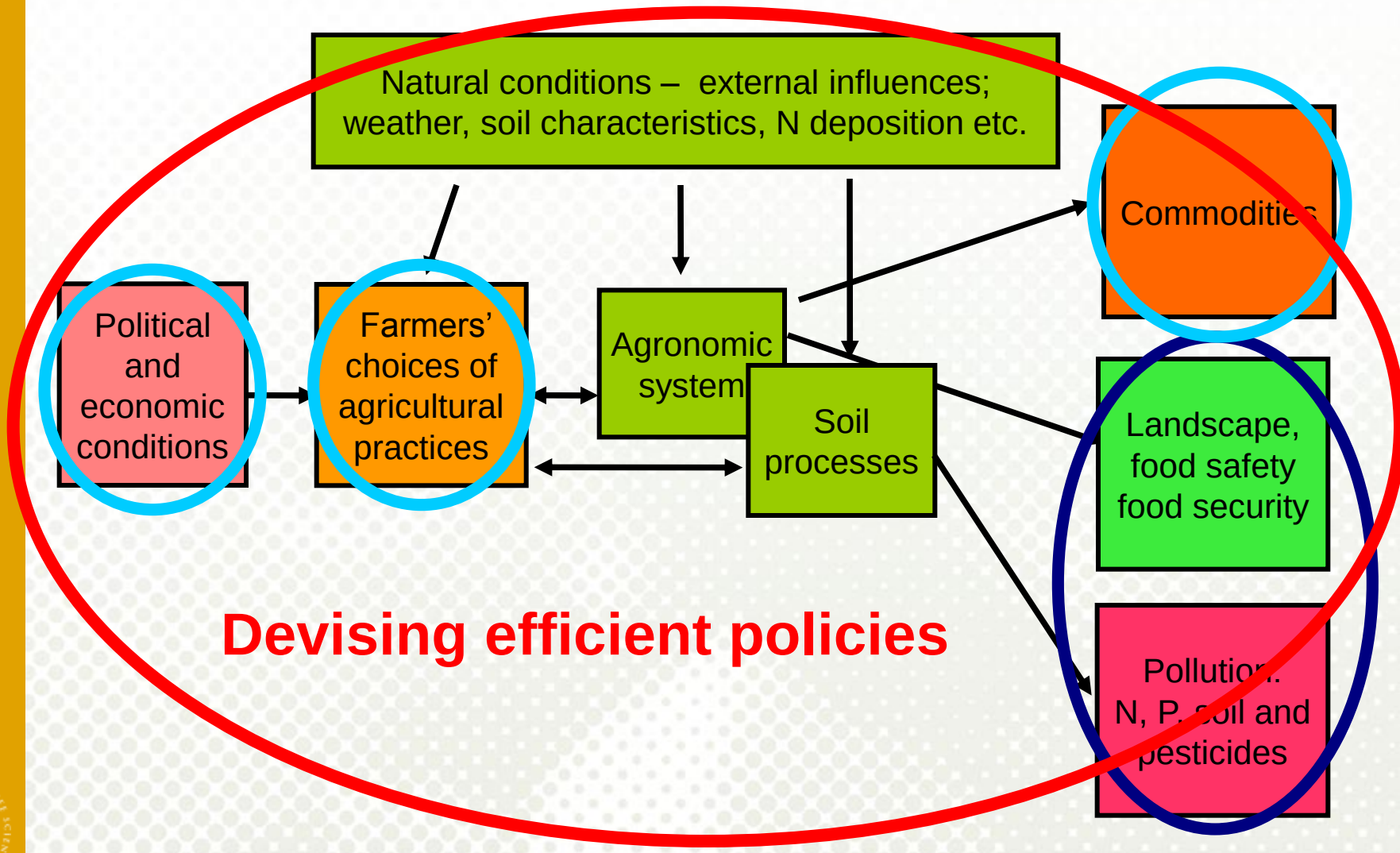



**Environmental effects**

**Economic assessments**

# THE SIMPLIFIED VERSION



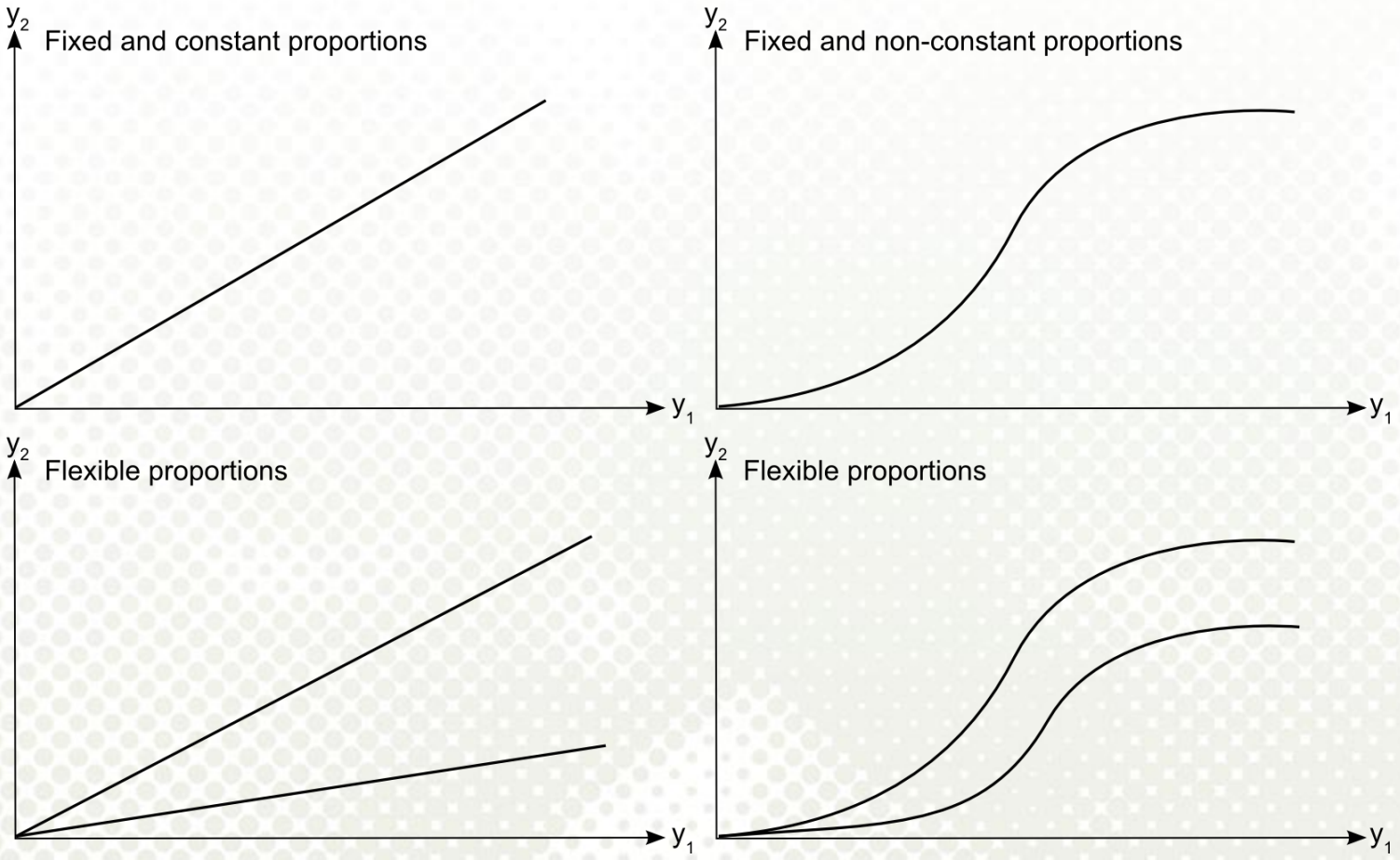
# JOINTNESS

"Joint production refers to situations where a firm produces two or more outputs that are interlinked so that an increase or decrease of the supply of one output affects the levels of the others"

OECD (2001)

- Sources of jointness (OECD):
  - Technical interdependencies
  - Non-allocable inputs
  - Fixed allocable inputs

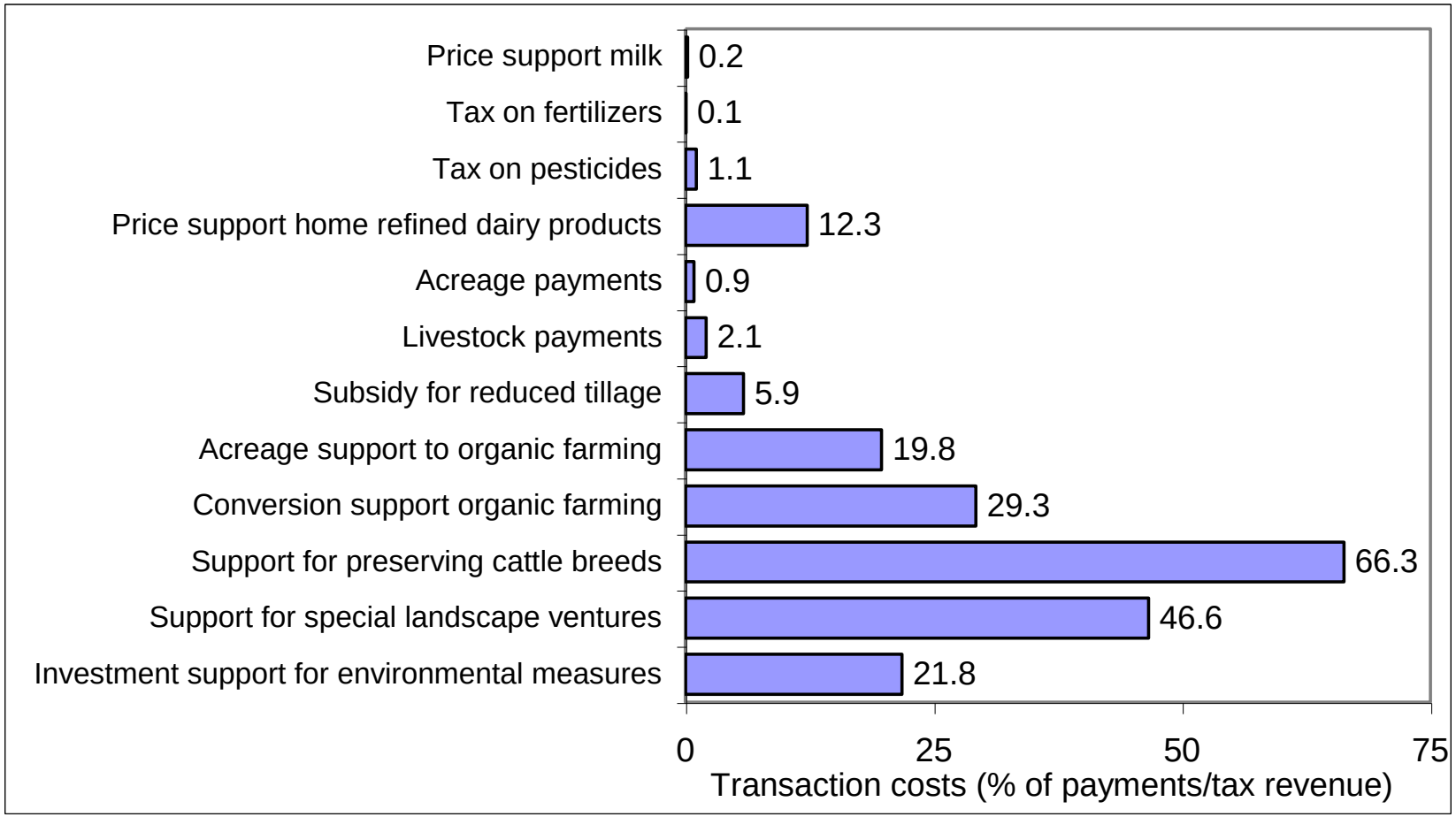
# FORMS OF JOINTNESS



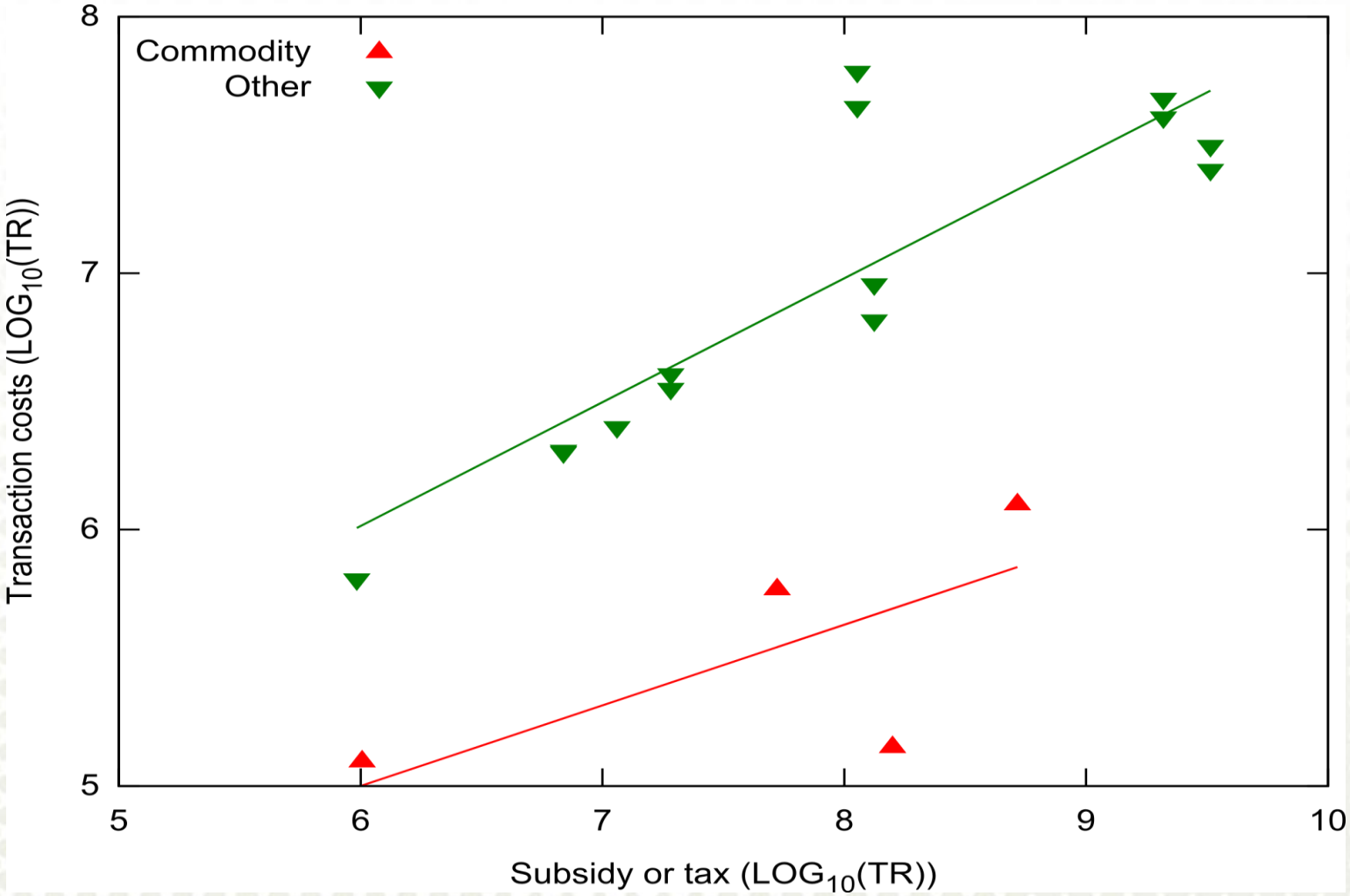
# TRANSACTION COSTS (TCs)

- Many definitions:
  - "…the costs of arranging a contract ex ante and monitoring and enforcing ex post" (Matthews, 1986:906)
  - "…transaction costs encompass all those costs that cannot be conceived to exist in a Robinson Crusoe economy" (Cheung, 1987:56)
- Operationalization (Dahlman, 1979; Stavins, 1995)
  - Information gathering
  - Contracting
  - Monitoring and enforcement
- Policy-related transaction costs (OECD, 2007)
  - Initial and final costs
  - Implementation costs
  - Participation costs

# TCS AND NORWEGIAN AGRICULTURAL POLICIES



# ESTIMATED TOTAL TCs AND POINT OF POLICY APPLICATION



# PUBLIC BADS = POLLUTION

- Non-point source, diffuse
  - Measurable in the recipient, e.g. JOVA
  - Not possible (or very costly) to measure the contribution from each farmer
  - Not possible to place the incentives on individual emissions
- Nitrate loss
  - For a given crop, soil and year, the loss is mainly determined by the amount of nitrogen applied
  - Regulate the input use:
    - Tax on nitrogen
    - Quotas (tradable or non-tradable)

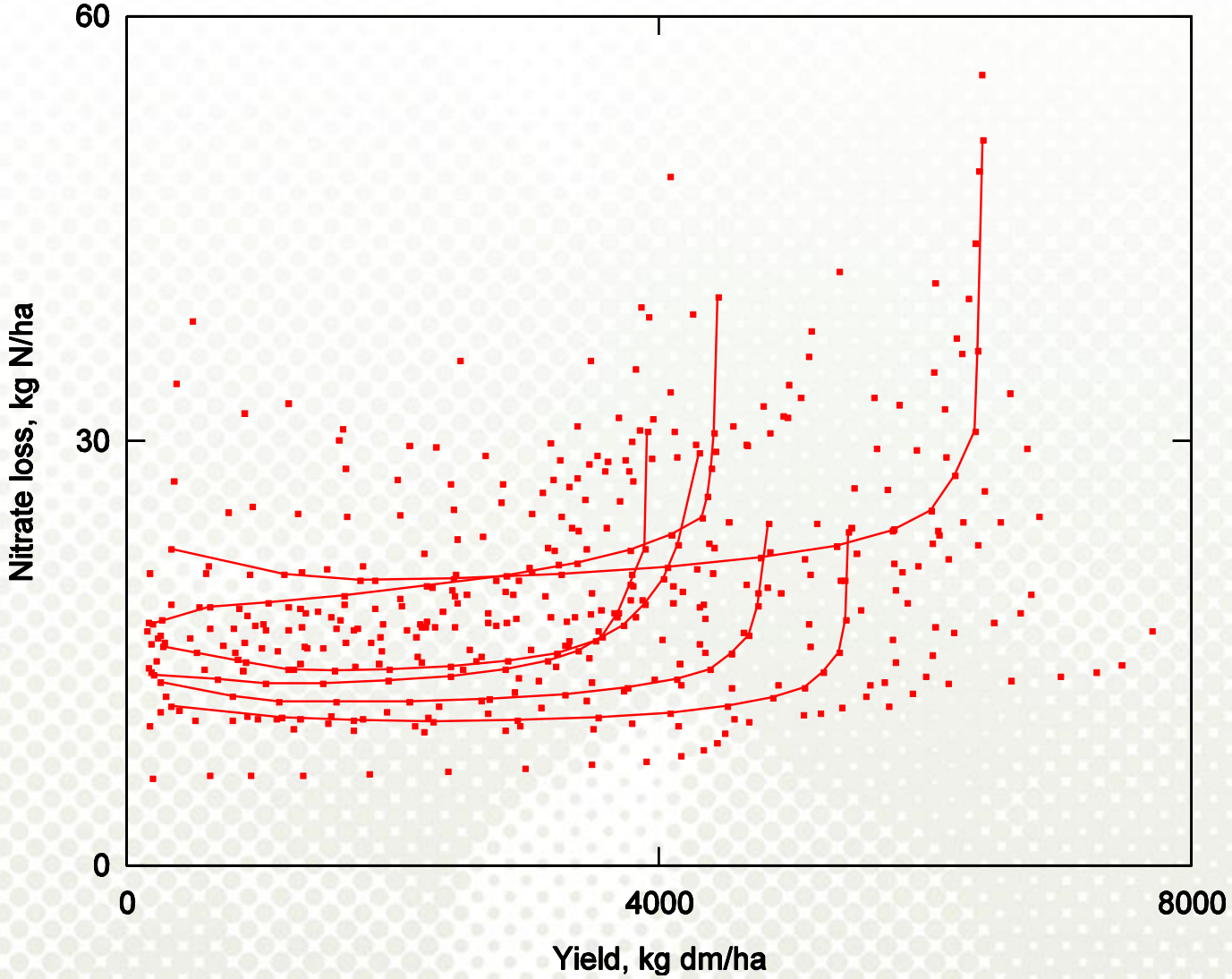
# MEASURING ENVIRONMENTAL EFFECTS

- What to measure is determined by the objectives of the policy or the concrete policy goal
  - For example ”reduce the load of phosphorus to the North Sea by 50% from 1990 level by year 2010” is measurable since it is defined in physical terms
  - Policy statements like “we want to improve the quality of lake Årungen, let’s try policy X” is harder
- Even when defined in physical terms the assessment may be challenging
  - Most processes are driven by the weather, e.g. losses vary from year to year
  - Transport in the landscape – retention, sedimentation
  - Ecosystem dynamics

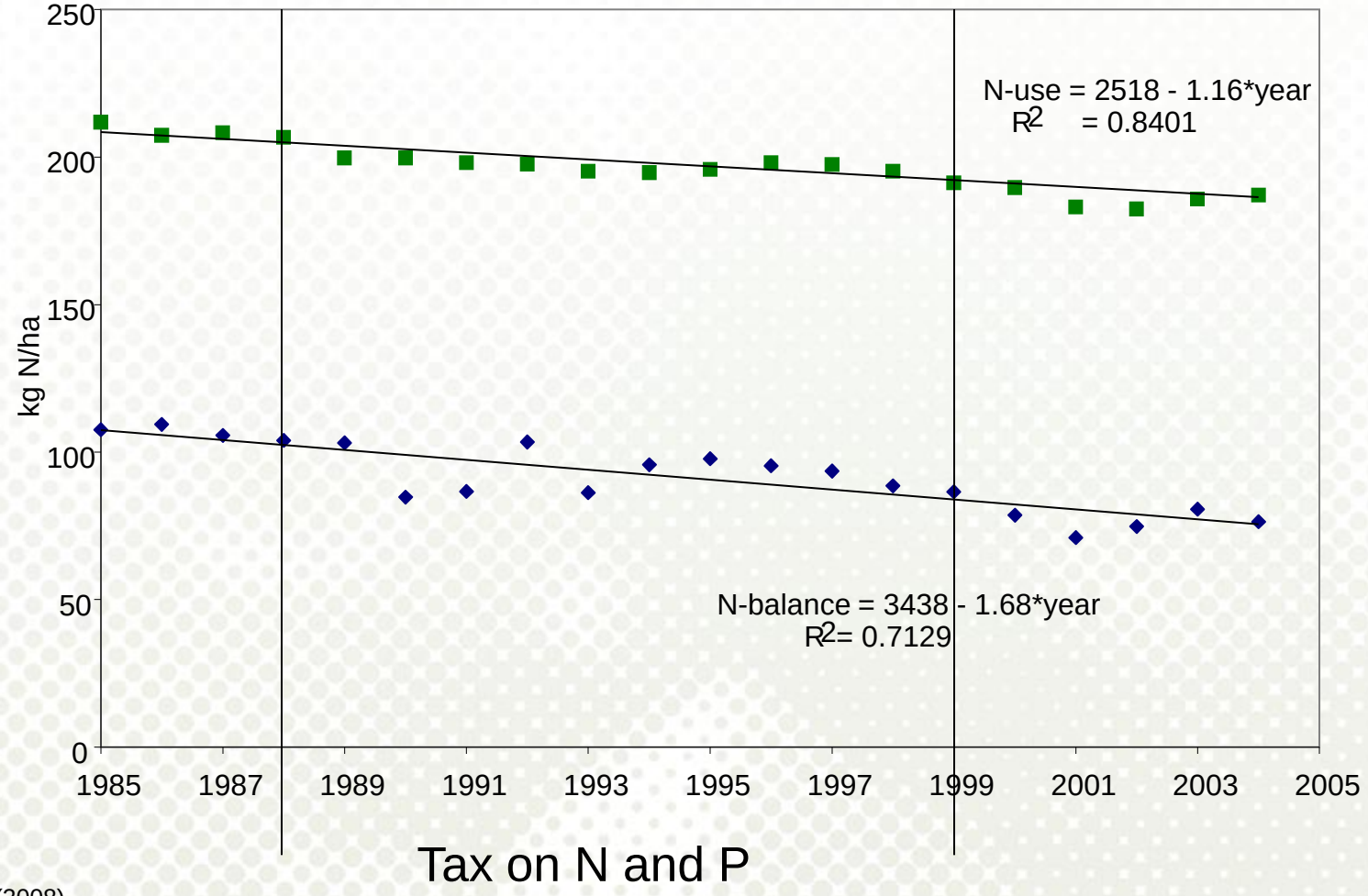
# ECOSYSTEM DYNAMICS

- Reduced phosphorus supply to lakes (eg. Årungen and Vansjø) has so far not lead to improved water quality
  - Phosphorus (P) is the main problem in freshwater
  - Large amount of P in sediments
  - Shallow lakes
  - Fish (roach and other carps) whirl up sediments that "feeds" the algae
- Not necessarily a policy failure, but other measures are needed in addition
  - Selective harvest of the largest predators (eg. large pike and pikeperch) may be part of the solution
- Understanding the system is important!

# DOSE-RESPONSE – USING THE RIGHT FILTRE

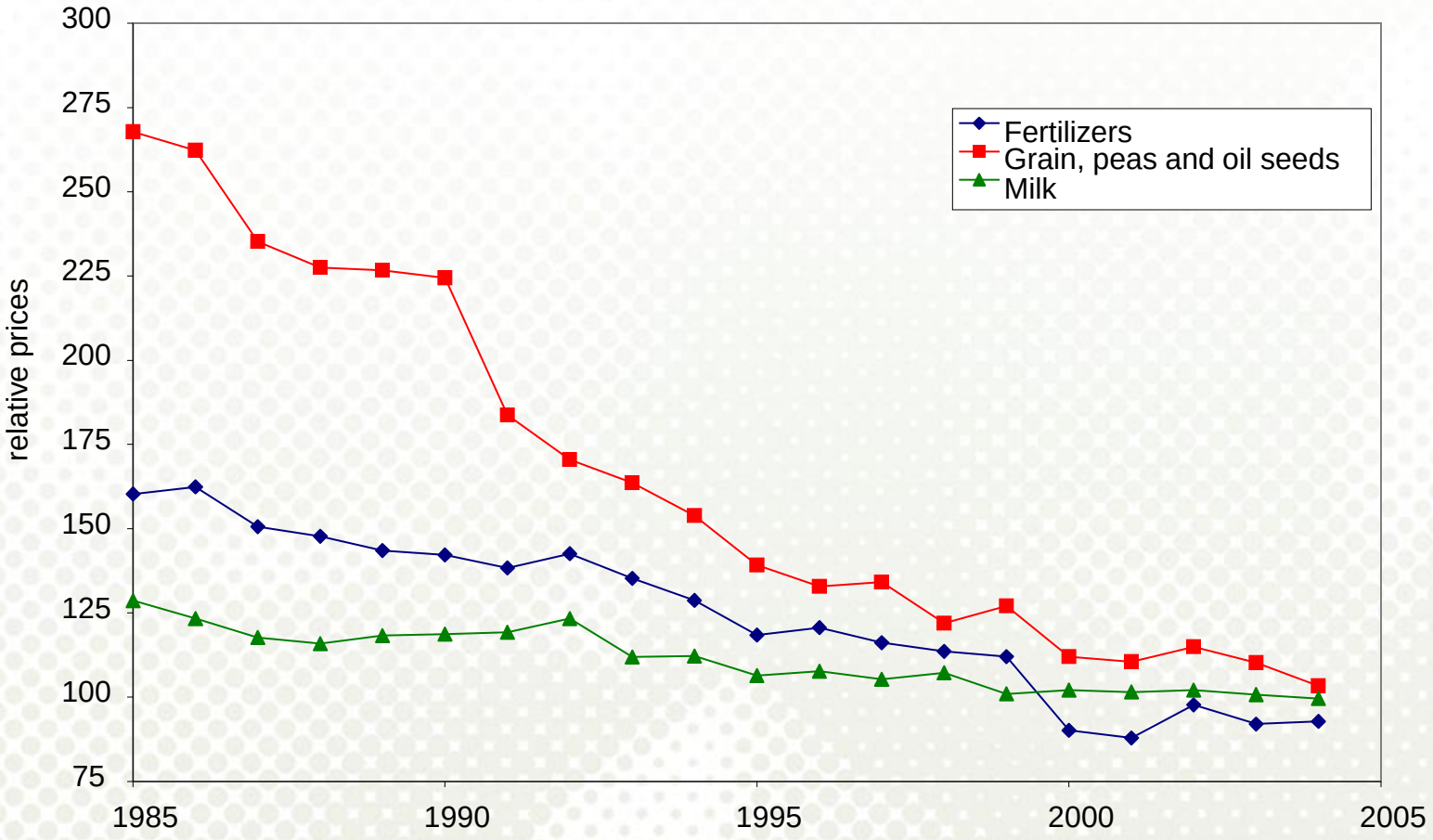


# POLICY EVALUATION



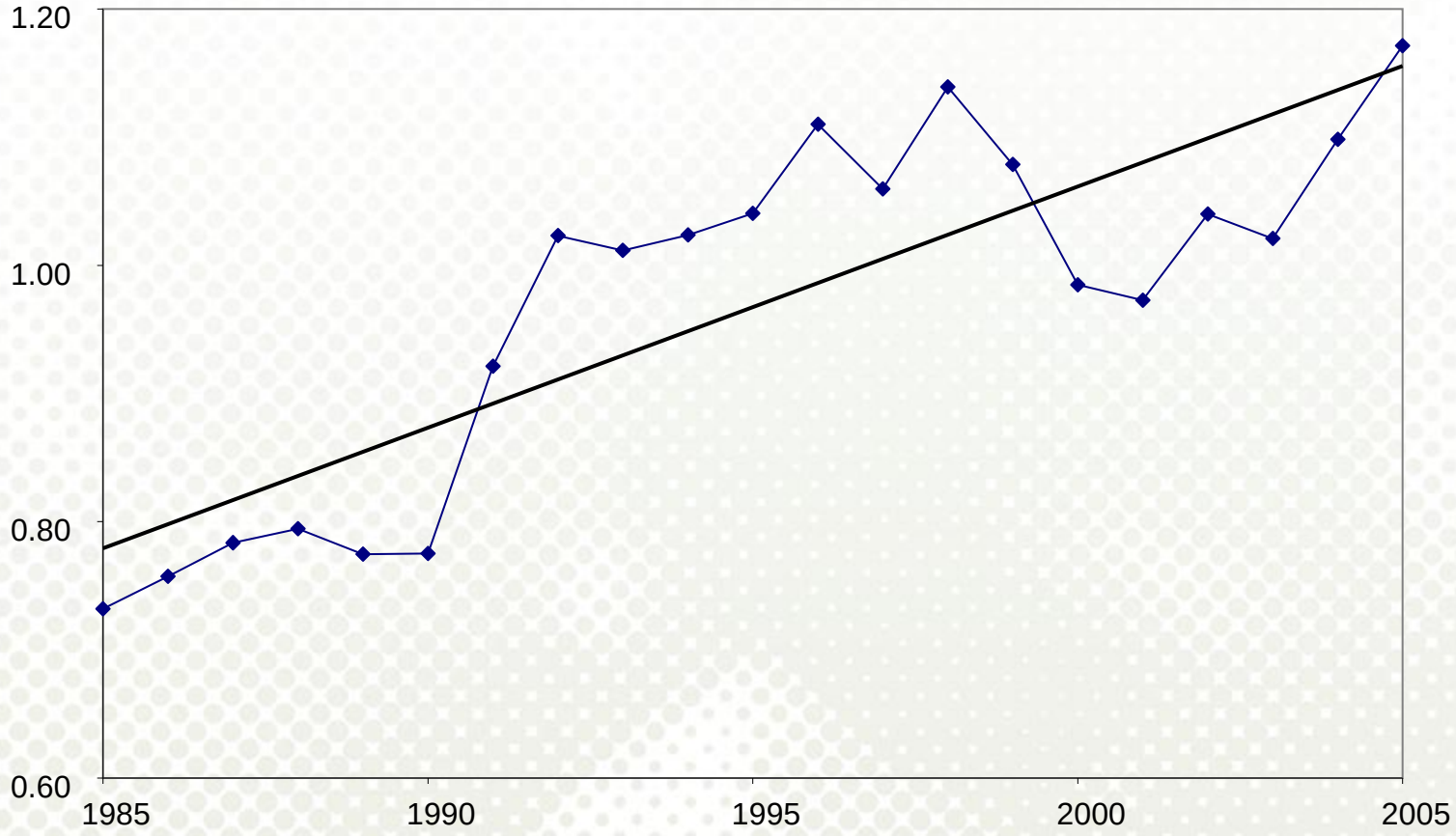

OECD (2008)
Environmental Performance of Agriculture in OECD countries since 1990
OECD.Stat, http://stats.oecd.org

# PRICE INDICES (DEFLATED, 2007=100)




Budsjettnemda for jordbruket
http://www.nilf.no

# RELATIVE PRICE: FERTILIZER TO GRAIN

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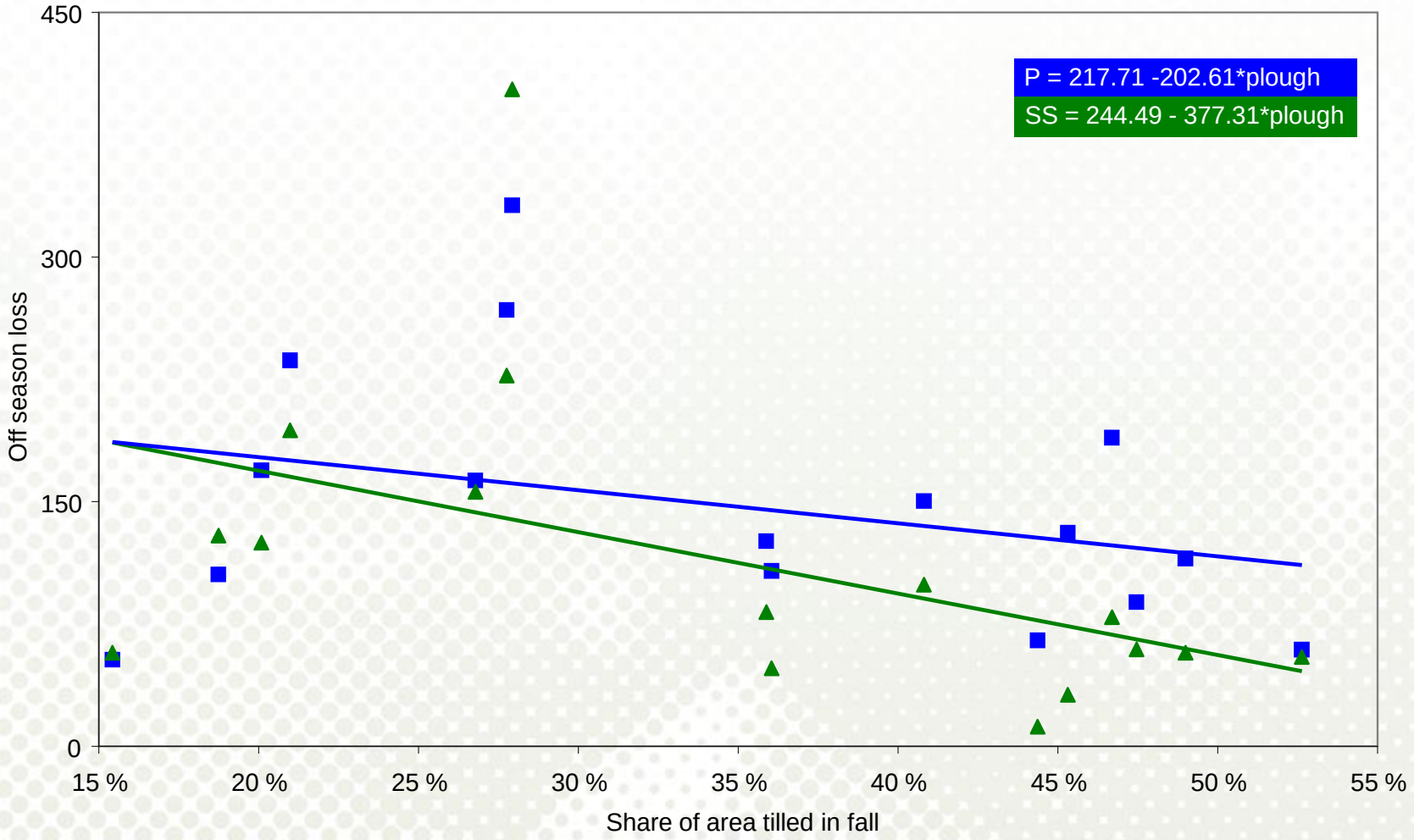
# JOVA – EROSION AND TILLAGE




Bechmann, M., G. H. Ludvigsen, A. Pengerud, H.O. Eggestad, G. Tveiti, L. Øygarden and O. Lode (2007)
Jord- og vannovervåking i landbruket (JOVA) Mørdrebekken 2006
Bioforsk Rapport Vol. 2 Nr. 117 2007

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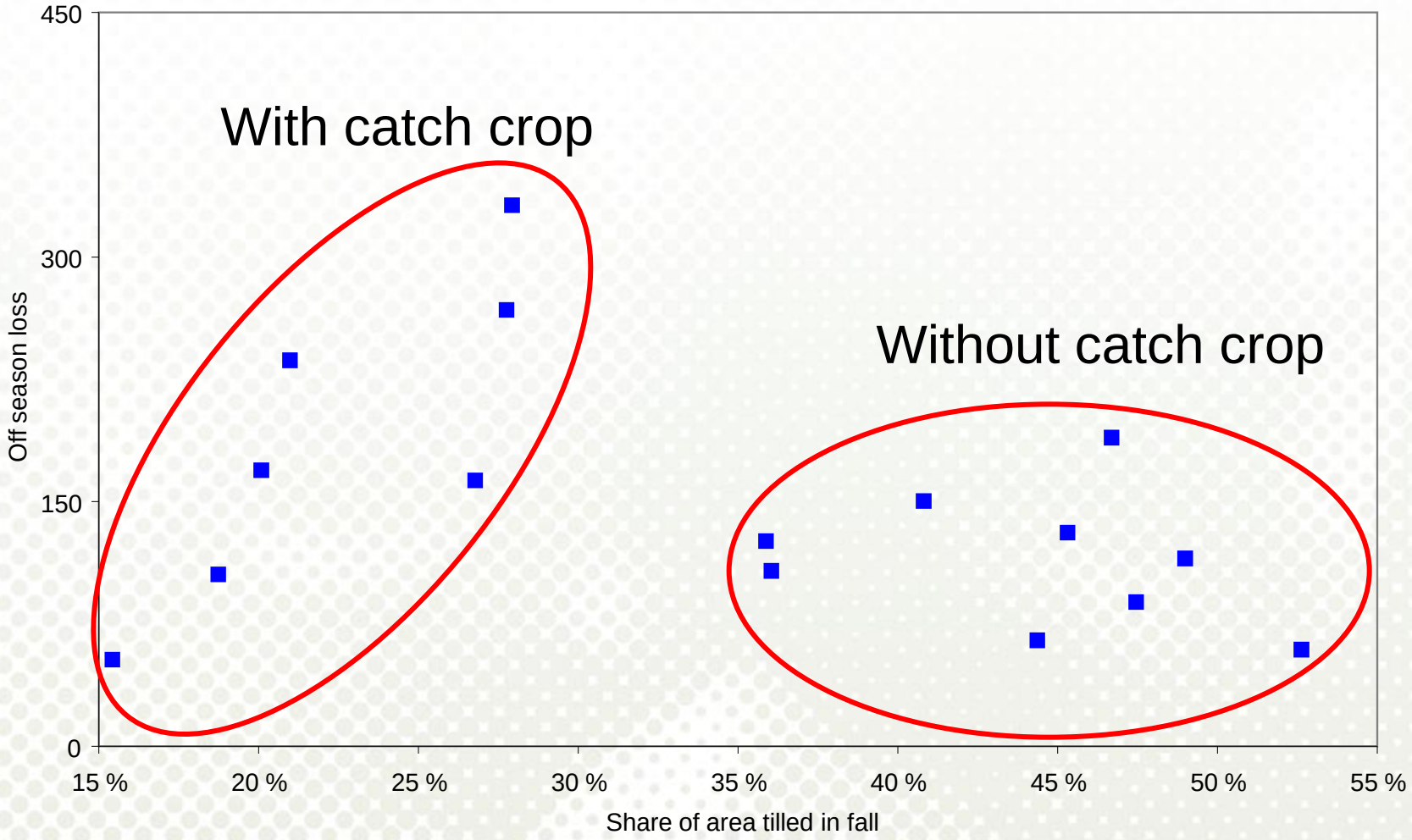


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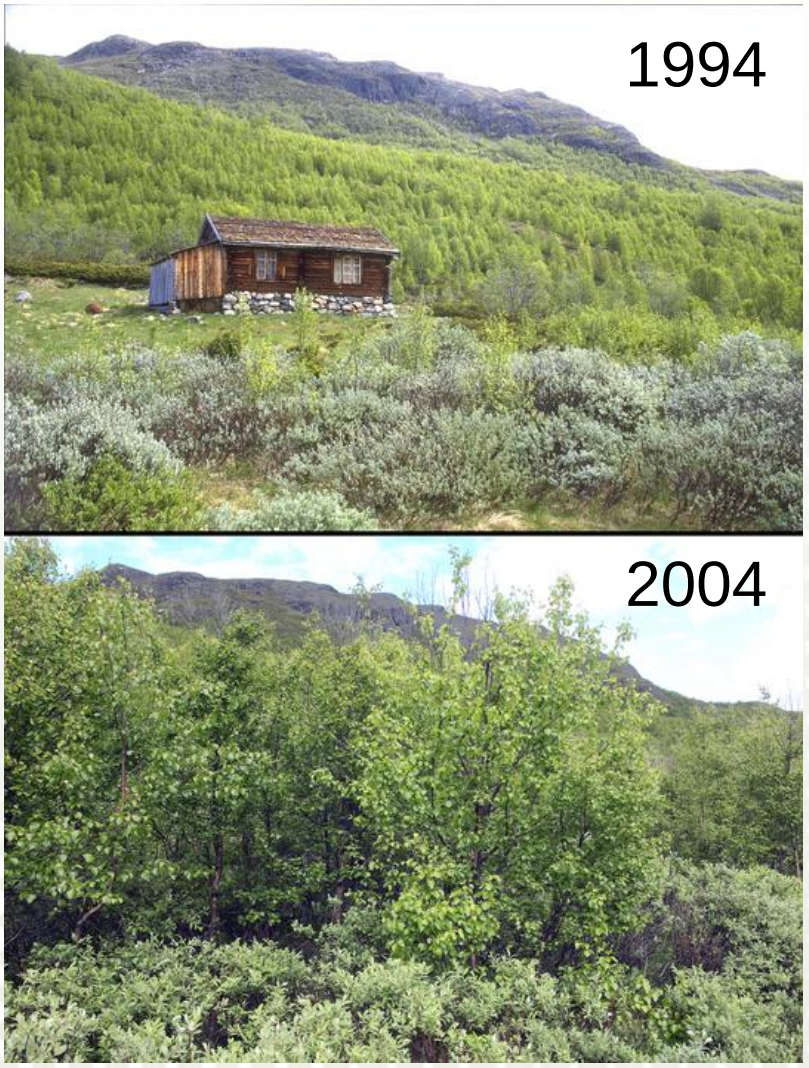
# THE CULTURAL LANDSCAPE


Puschmann, O. Tilbakeblikk – norske landskap i endring
Norwegian Forest and Landscape Institue, http://www.skogoglandskap.no

# SEPARATE VS. JOINT PRODUCTION

- Not all public goods are unique to agriculture, but may also be provided by other sectors (e.g. employment)
- Some goods may be produced separately from commodity production (e.g. landscape)
- If we want to produce both commodities and public goods in Norway, joint production is clearly the cheapest way to do so: economies of scope
- If import and separate production is possible
  - At least some joint production (in most cases)
  - As the number of jointly produced public goods increases, the likelihood of separate prod. being the optimal solution reduces
  - Empirical analysis is necessary

# CONCLUDING REMARKS 1

- The Tinbergen's rule applies to individual policy objectives
- Jointness means that no policy is production independent
- The optimal policy in Norway:
  - Reduce the number of policy schemes
  - Use price support up to a certain point
    - Will secure the existence of Norwegian agriculture and a certain level of the public goods
  - Use other policy instrument to fine-tune public good production

# CONCLUDING REMARKS 2

- Price support is an efficient policy in some cases, but not WTO legitimate
  - Efficiency in international commodity markets may lead to inefficiency in domestic public good production
- Clearly, price support has been abused
  - Over production -> export subsidies -> lower world market prices -> poor countries cannot compete on the world market -> etc
- It is naïve to believe that free trade will solve the problems, democracy is far more important!
  - China is a prime example