



# Private sector responses to price volatility

**IAM Zaragoza, 19 Novembre 2014**

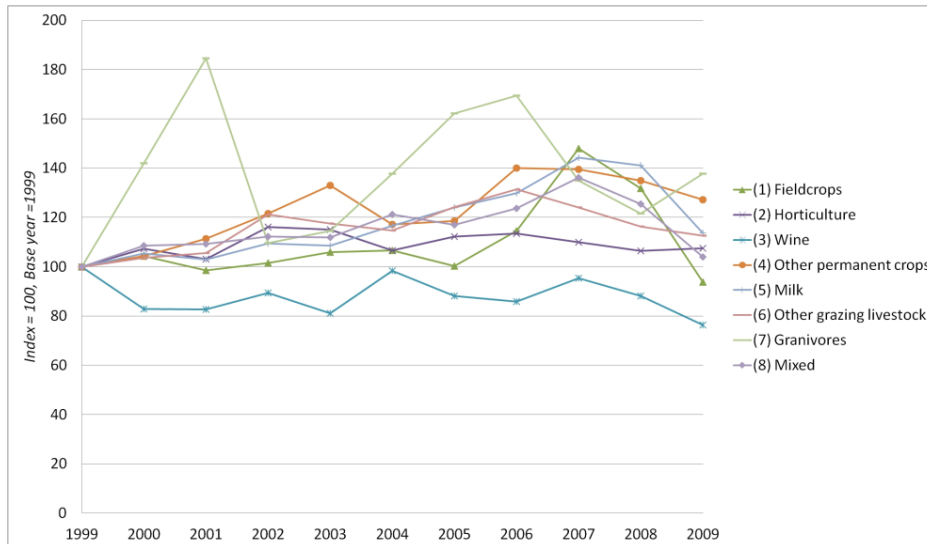
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# Private sector responses to price volatility

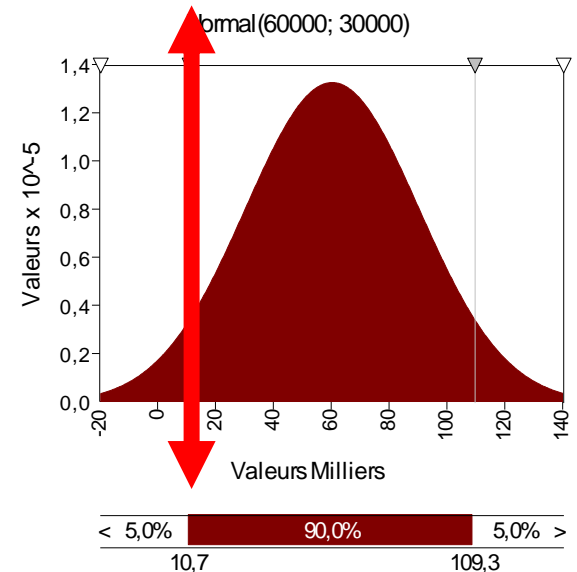
1. Risk and risk management instruments
2. Financial contracts
  - futures markets (futures price and implicit volatility)
  - the OTC market (derivatives and structured contracts)
3. Insurance policies
  - Private insurance policies on independent risks
  - Public support to policies on risks with systemic component
4. Mutual and vertical value chain risk management
5. Risk management strategies in the agri-food sector

# Introduction

## Variability of net income



⇒



Variability: variance  $\sigma_p^2$ , coefficient of variation  $\sigma/\mu$ , volatility  $\sigma_R$

Downside risk: Value-at-Risk (i.e. VaR(5%))

## The farm risk in France

### Comparative risk of four major segments of the farm France

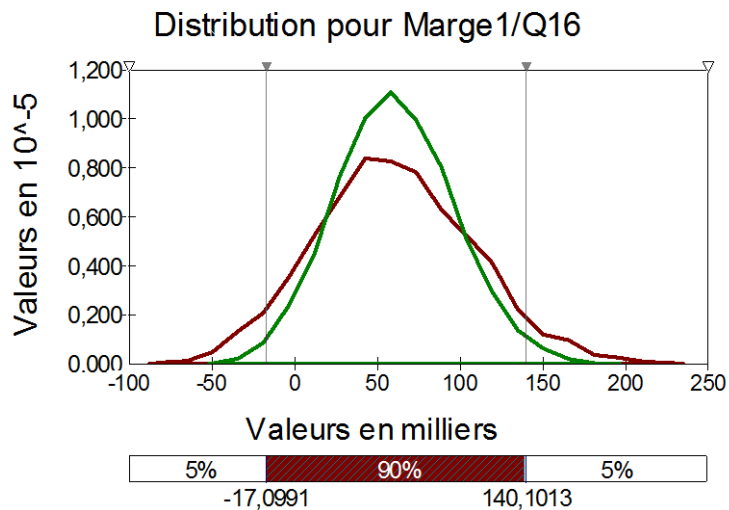
	Fruit trees	Main crops	Pig	Bovine-Milk
Coeff variation	0.74	0.41	0.84	0.39
VaR(5%)	-14 200	16 900	-19 700	22 300

Source: Jean Cordier (2008)

# 1/. Risk management

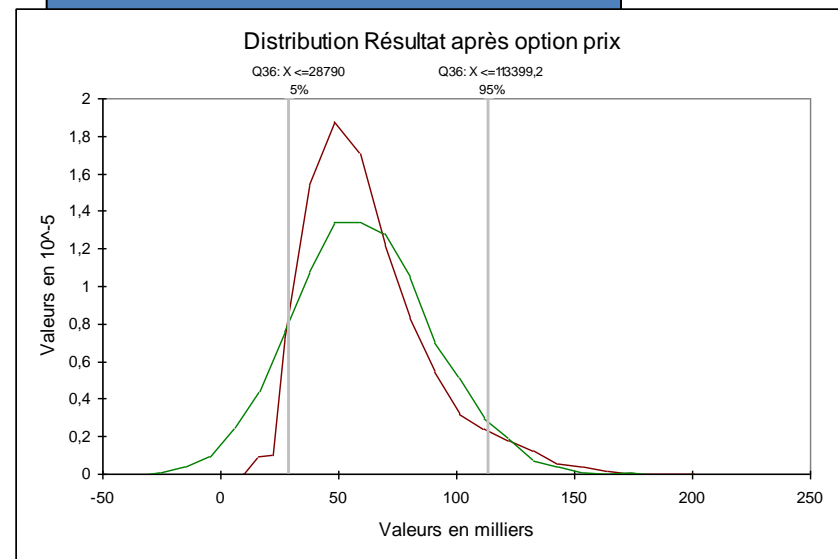
Two potential strategies: spreading or selling

Spreading: diversification, smoothing, etc.



Symmetrical management of risk : no actuarial cost

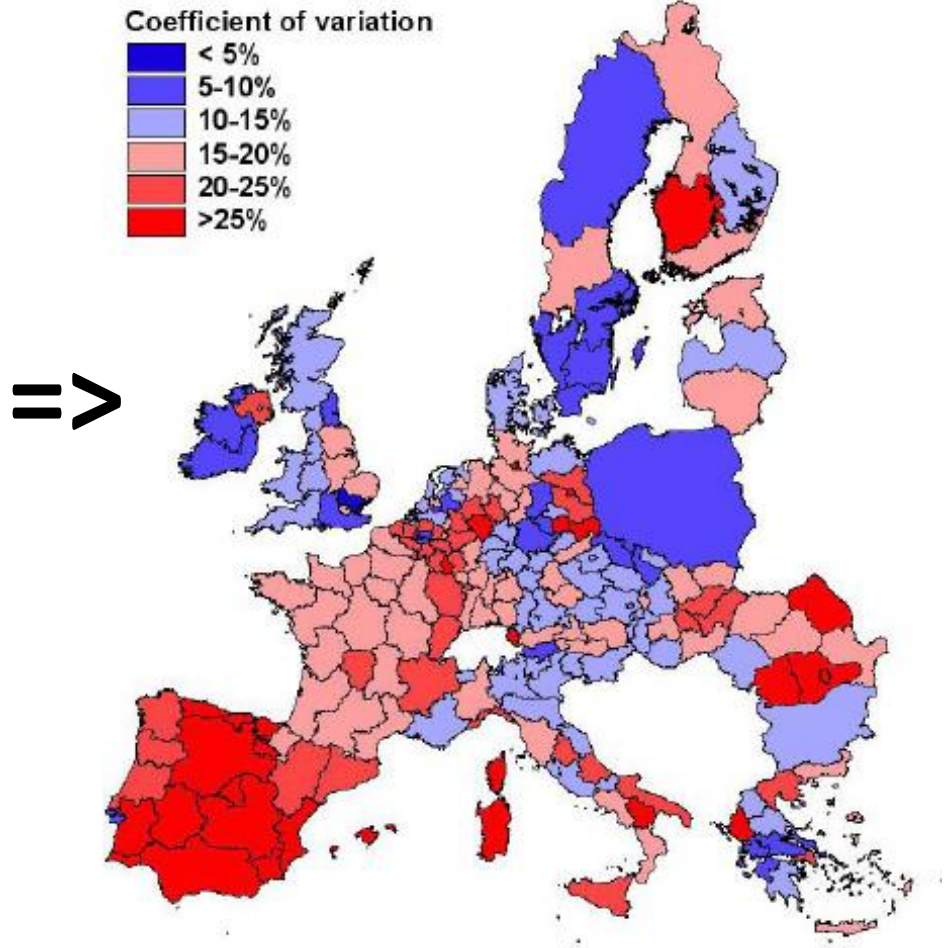
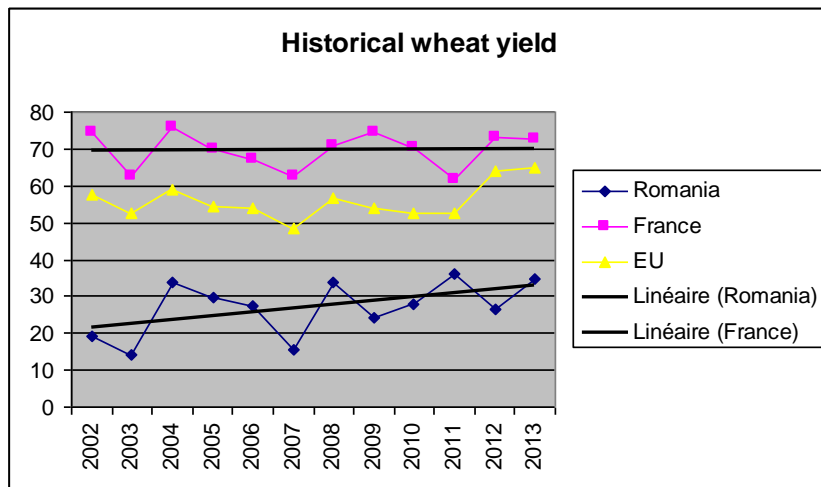
Transfer-selling



Asymetrical management of risk: actuarial premium

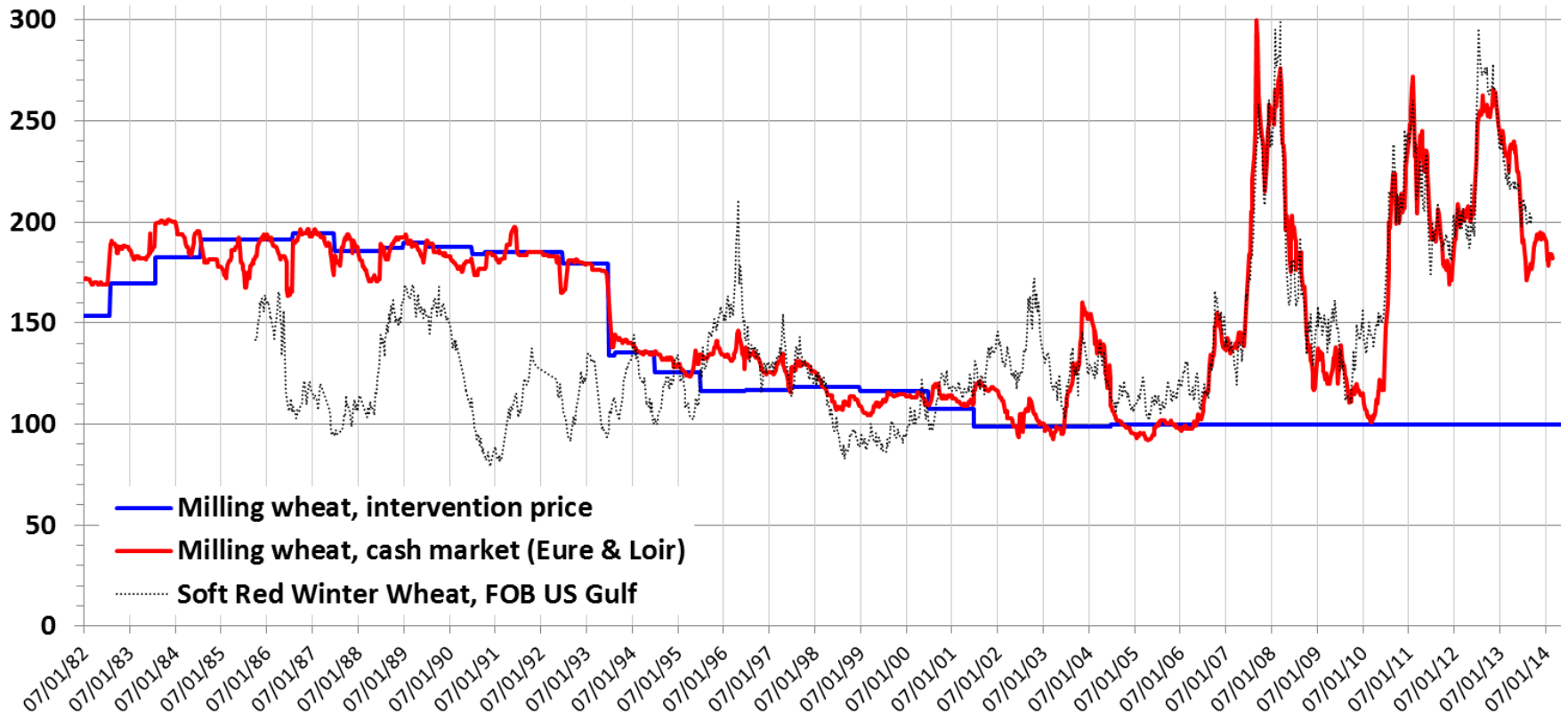
$$\text{Utility} = f(\text{wealth}, \text{risk aversion})$$

# Climatic risks in the EU: coefficient of variation of wheat yield



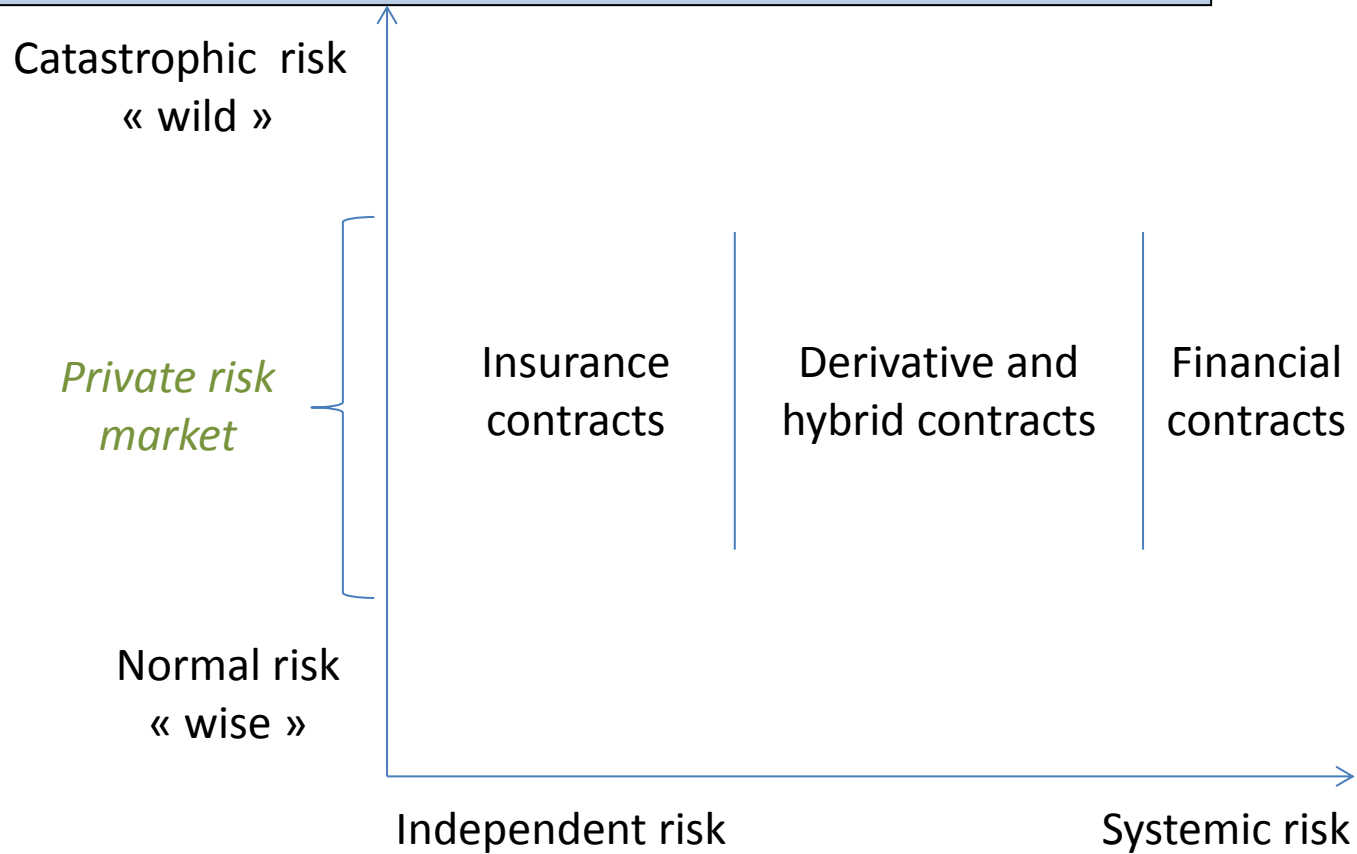
Source: Bielza et al. 2008

# Market risk: wheat prices on world reference markets

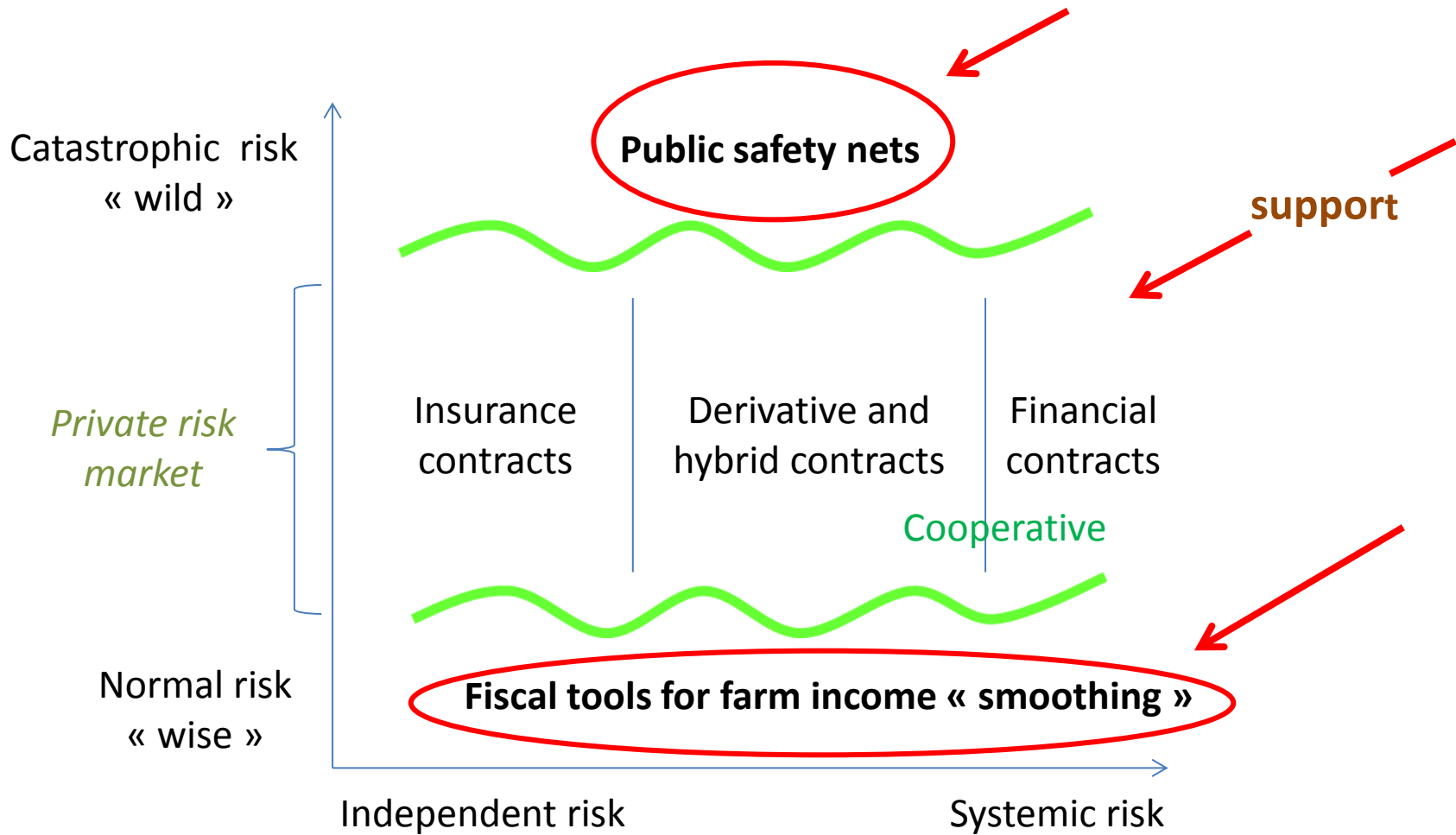


Source: Ferenczi, AGPB 2014

# Mapping of risk management instruments

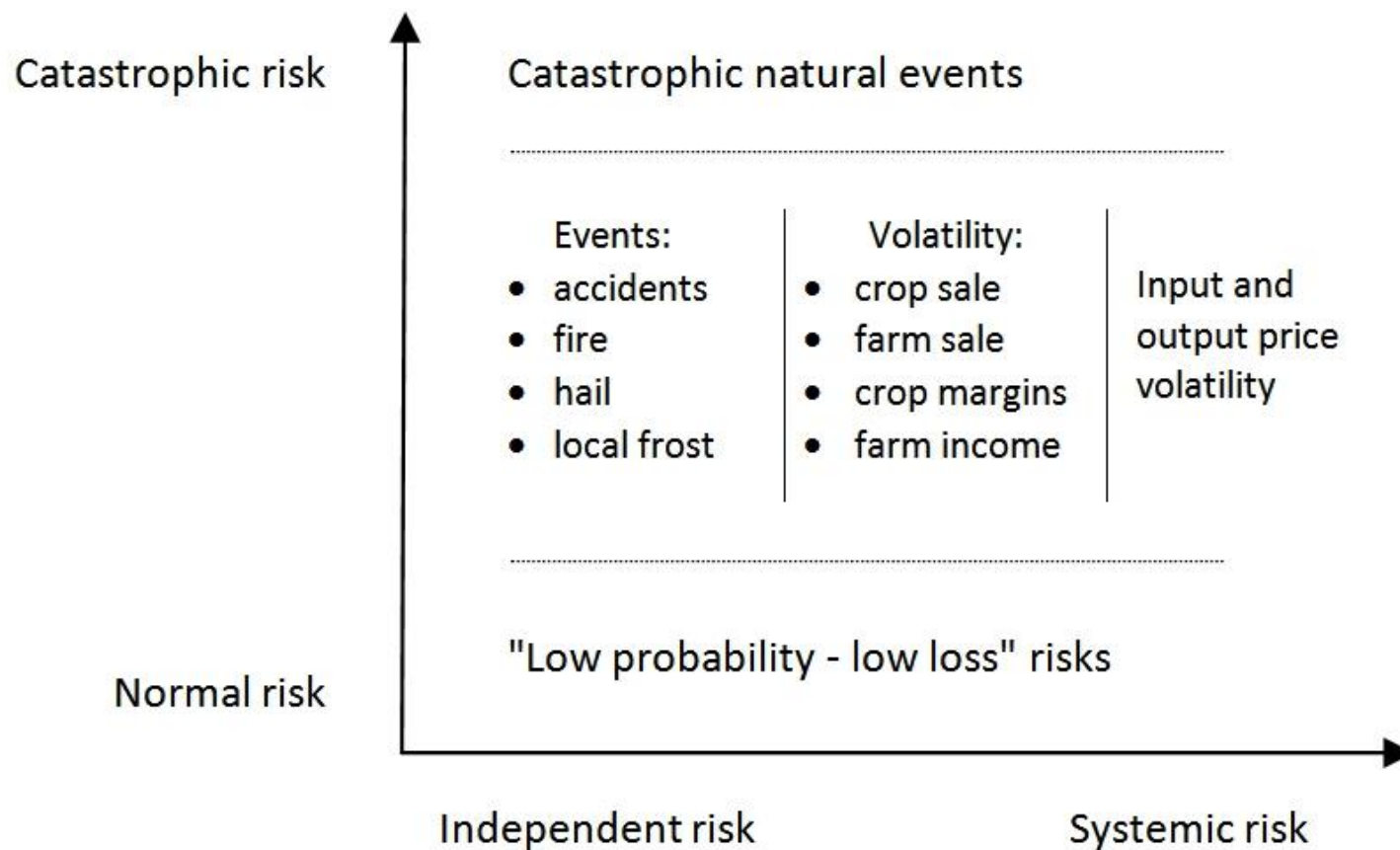






Source: Jean Cordier

# Typologie of risks and mapping



Source: Jean Cordier

## 2. Commodity markets and prices

- Three dimensions:
  - space
  - form (quality)
  - time

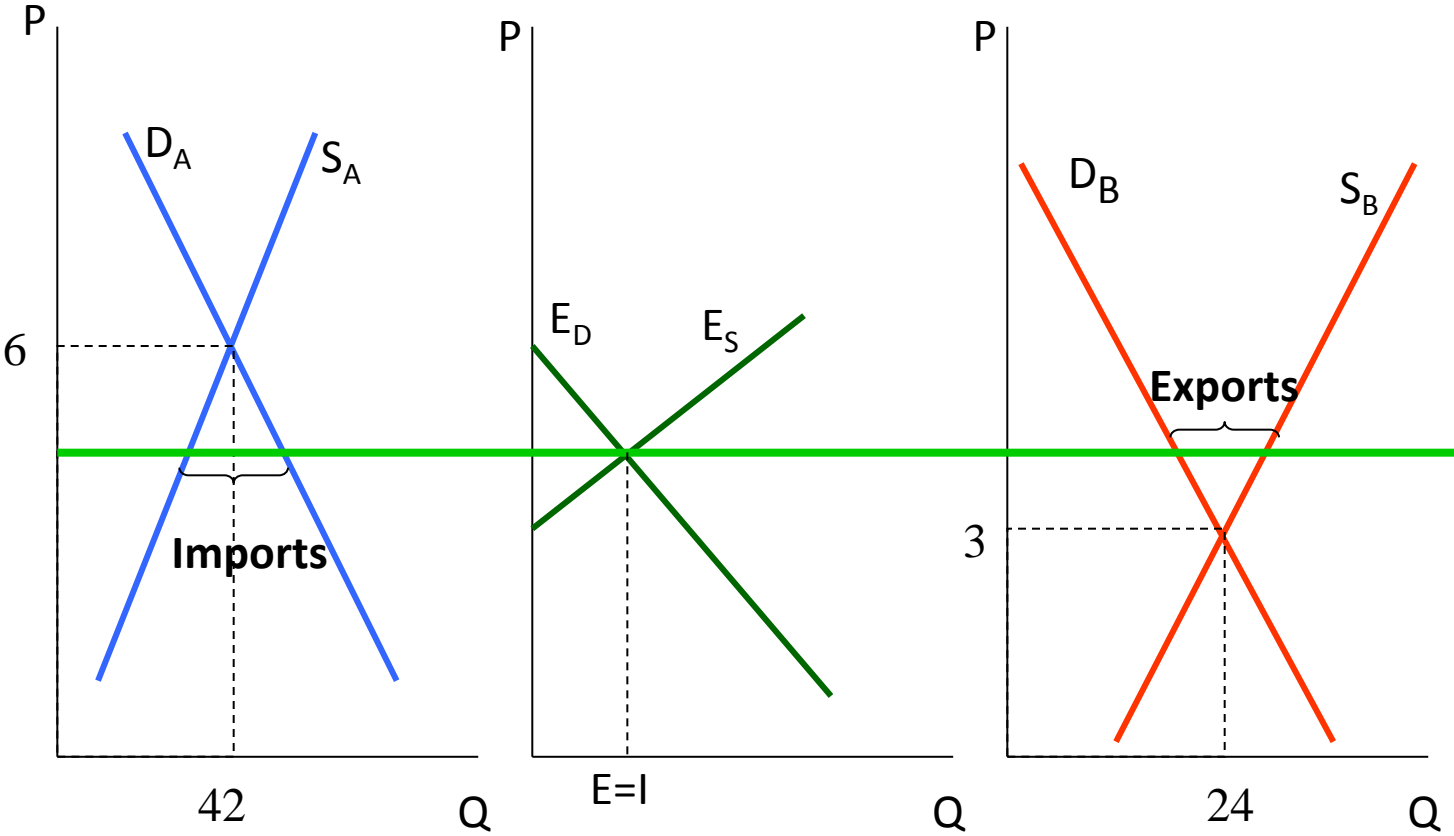
- The law of one price (efficient markets)

Under competitive market conditions all prices within a market are uniform, after taking into account the costs of adding place, time, and form utility to products within the market

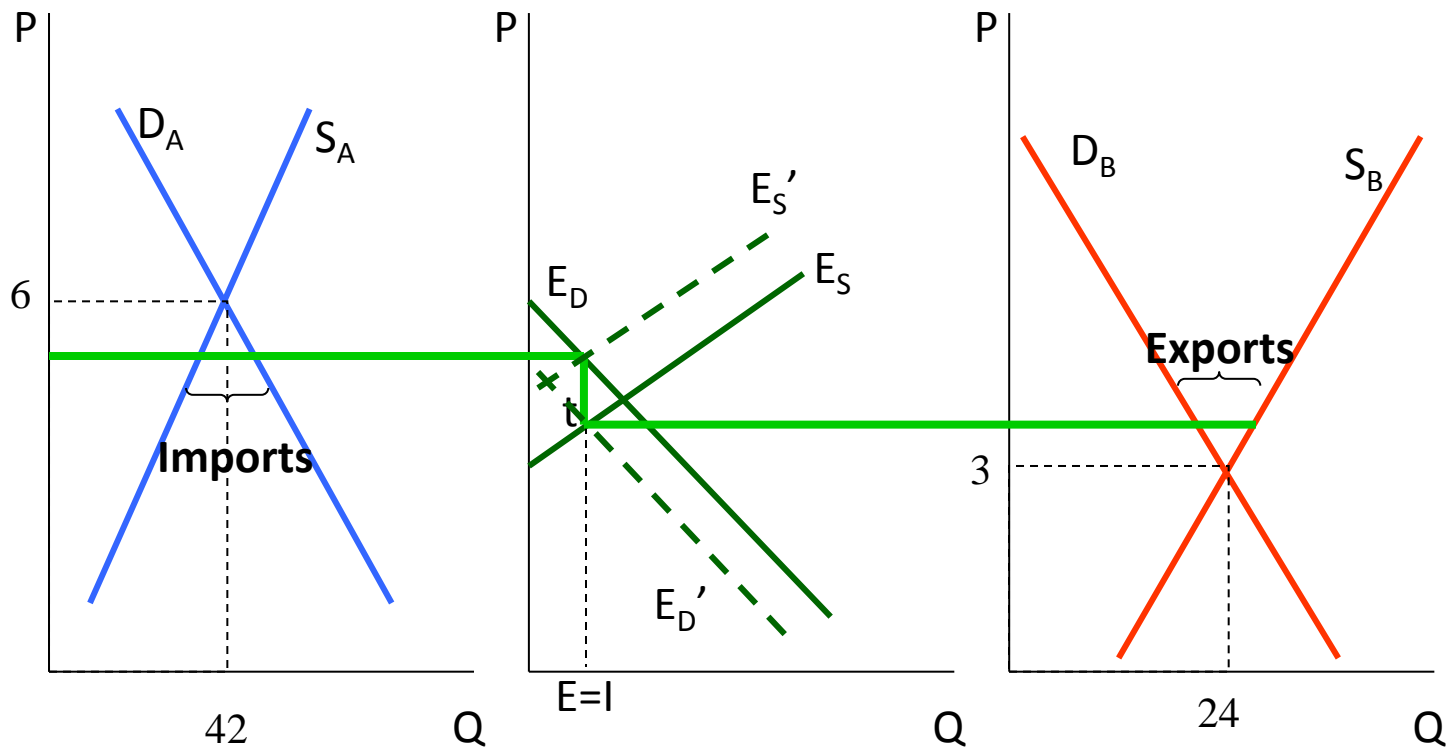


- Arbitrage  $\Rightarrow \Delta P \leq c_t$

# Example: 2-Region Trade: no Transportation Costs



# 2-Region Trade: with Transportation Costs

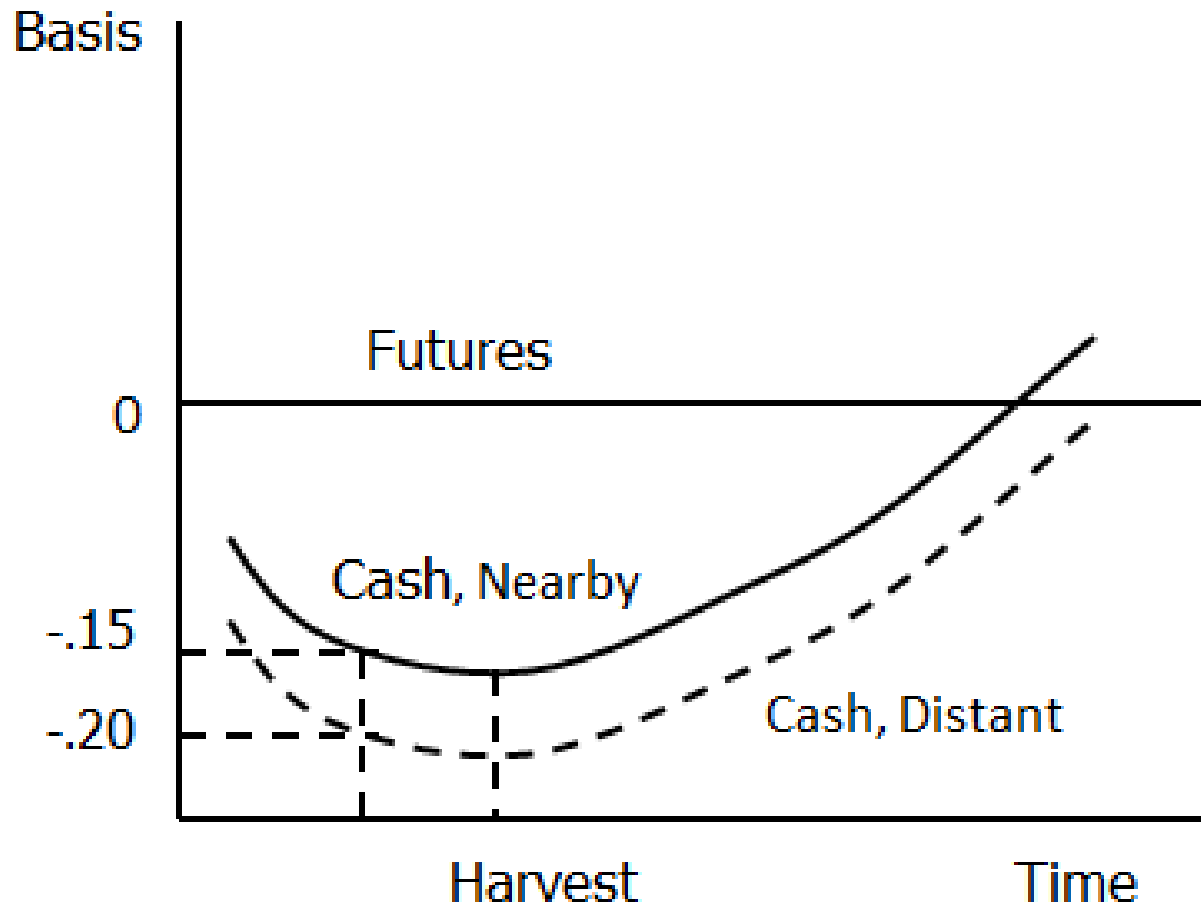


# Time dimension of commodity markets

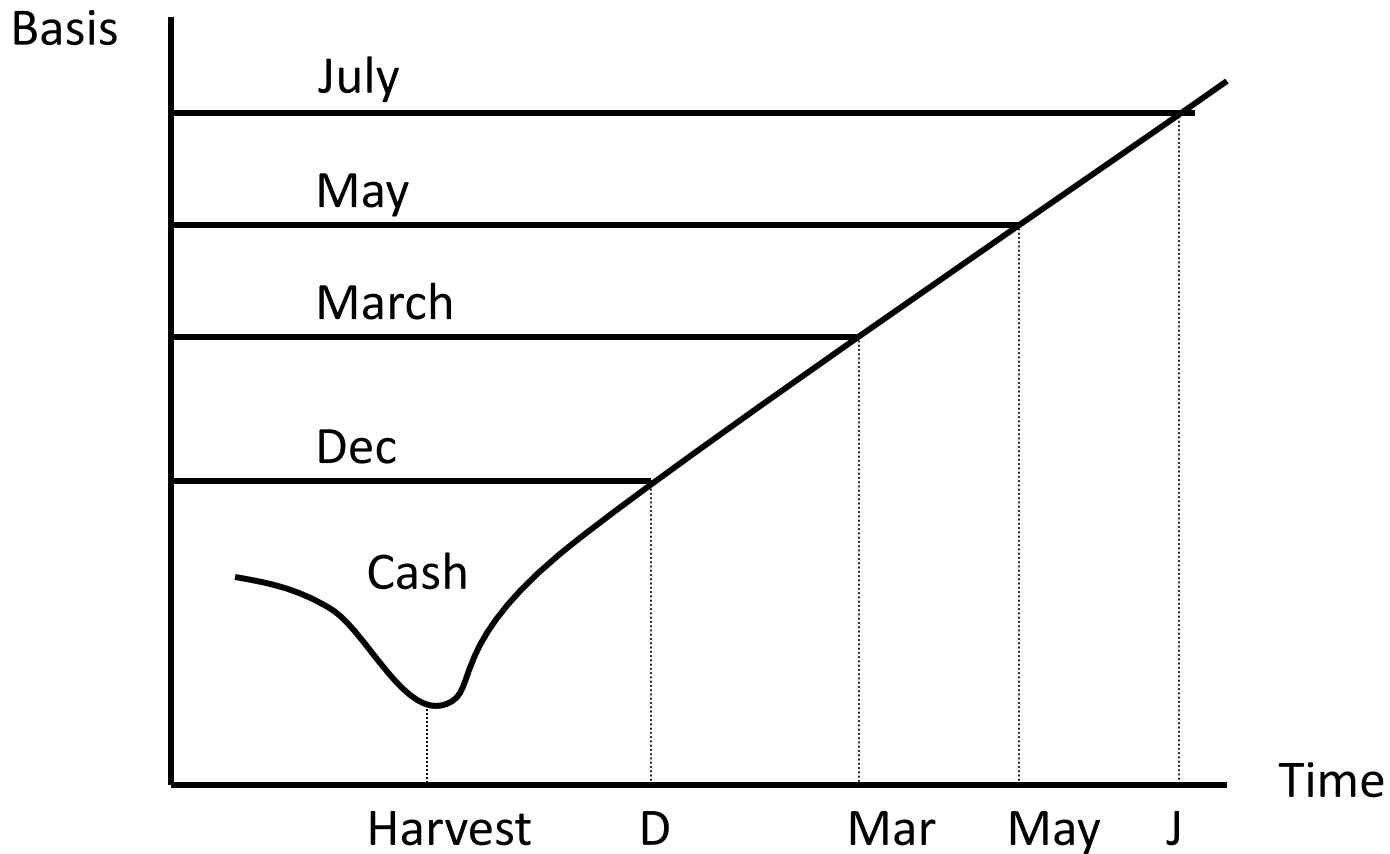
## Financial contracts

- Reference market = **futures markets** (CME, MATIF, ICE, Zhengzhou, ...) eliciting two types of signals
  - futures prices through futures contracts
  - implicit volatilities through call and put options
- Derived cash markets (O.T.C. markets)
  - basic forward contracts and OTC options
  - structured contracts (multiple delivery contracts, to-deliver contracts, tunnels, contracts with participation, multiple triggers option, swaps, etc.)
- Risk management => diversification, selling

# Basis Diagram



# Typical Storage Market Basis Configuration





## Wheat Hedge (trader)

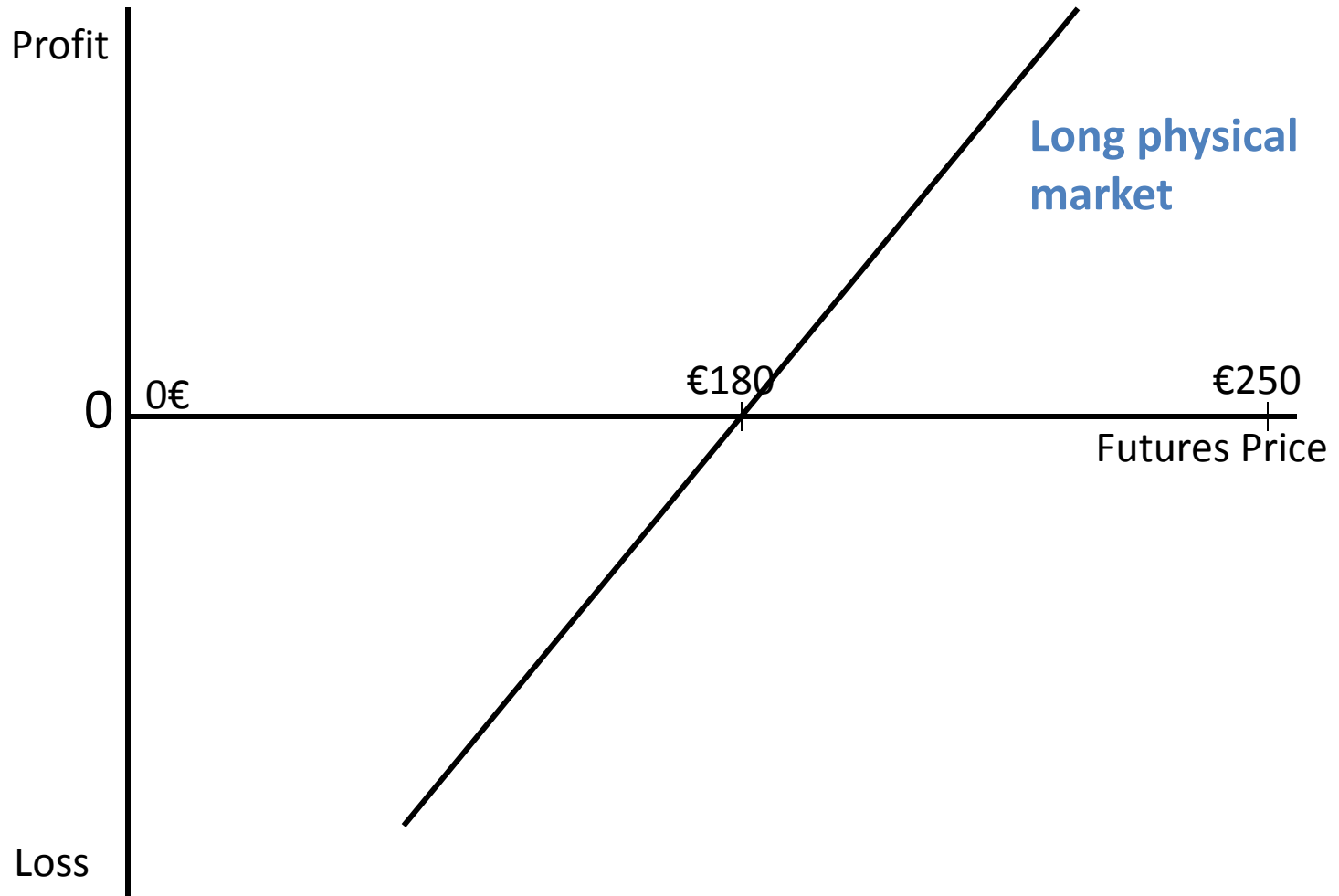
Date	Cash	Contract	Futures	Basis
July 15	Buy 159€	Sell Nov	180€	-21
Sept 15	Sell 167€	Buy Nov	174€	-7
	<hr/>		<hr/>	
	+8		+6	+14€/t

# Wheat Forward Pricing Hedge

Date	Cash	Contract	Futures	Basis
Nov 20/14	Buy $f_0=159$	Sell Nov15	180€	-21
Dec 23/14	Sell $f_1=174$	Buy Nov15	185€	-11
	+15		-5	+10€/t

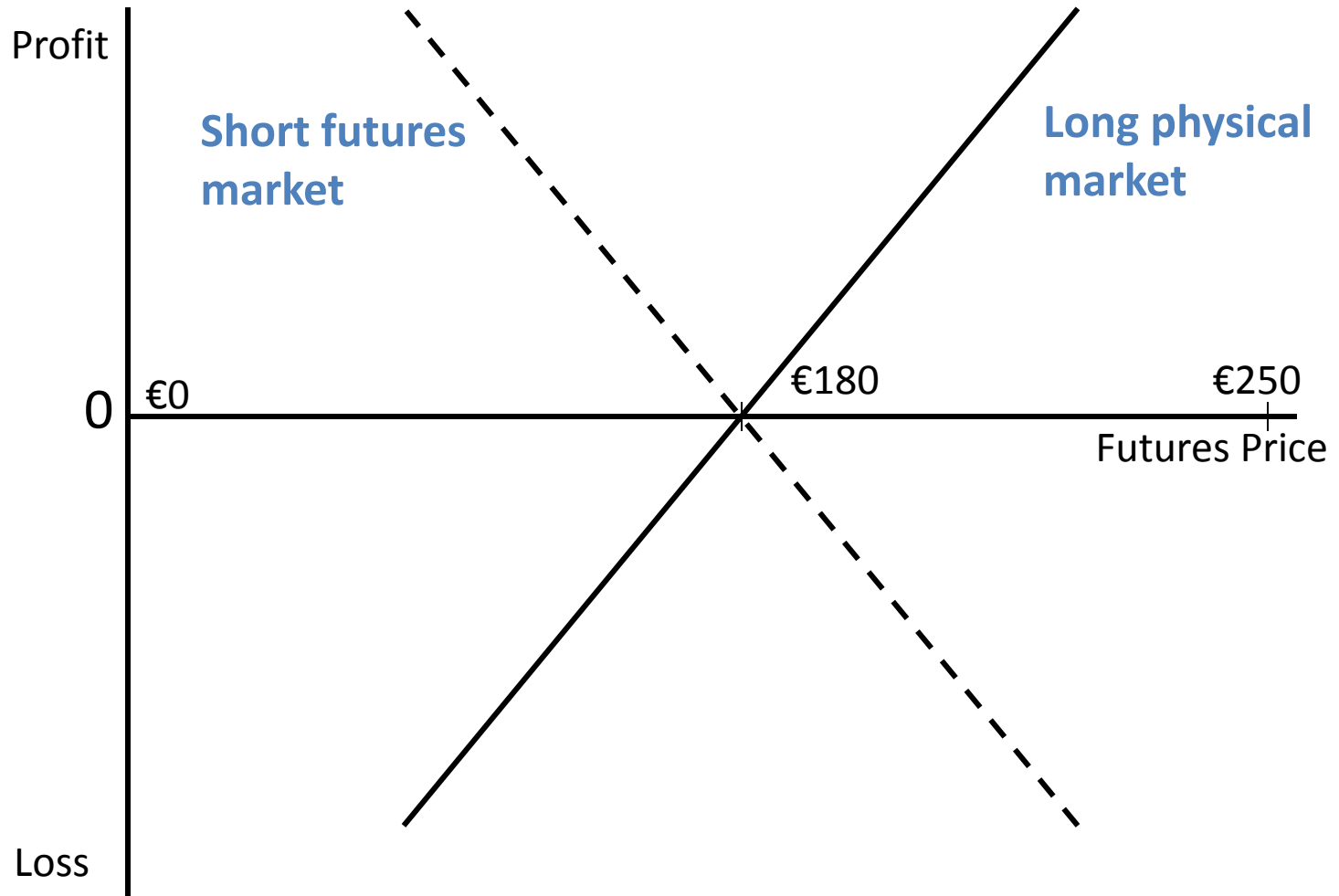
# Payoff Diagram

## Long cash wheat at 180 €/t



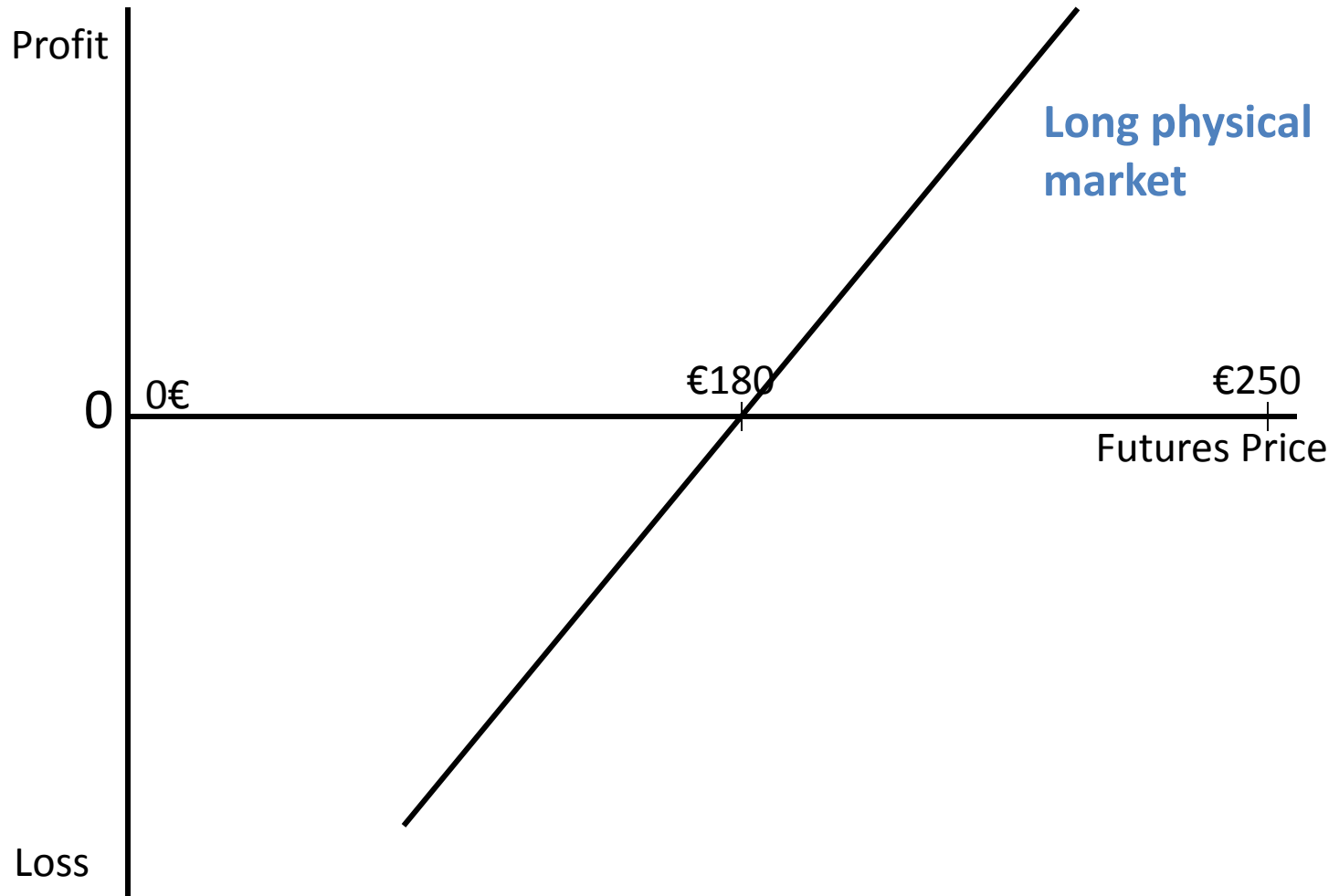
# Payoff Diagram

## Wheat hedge at 180 €/t



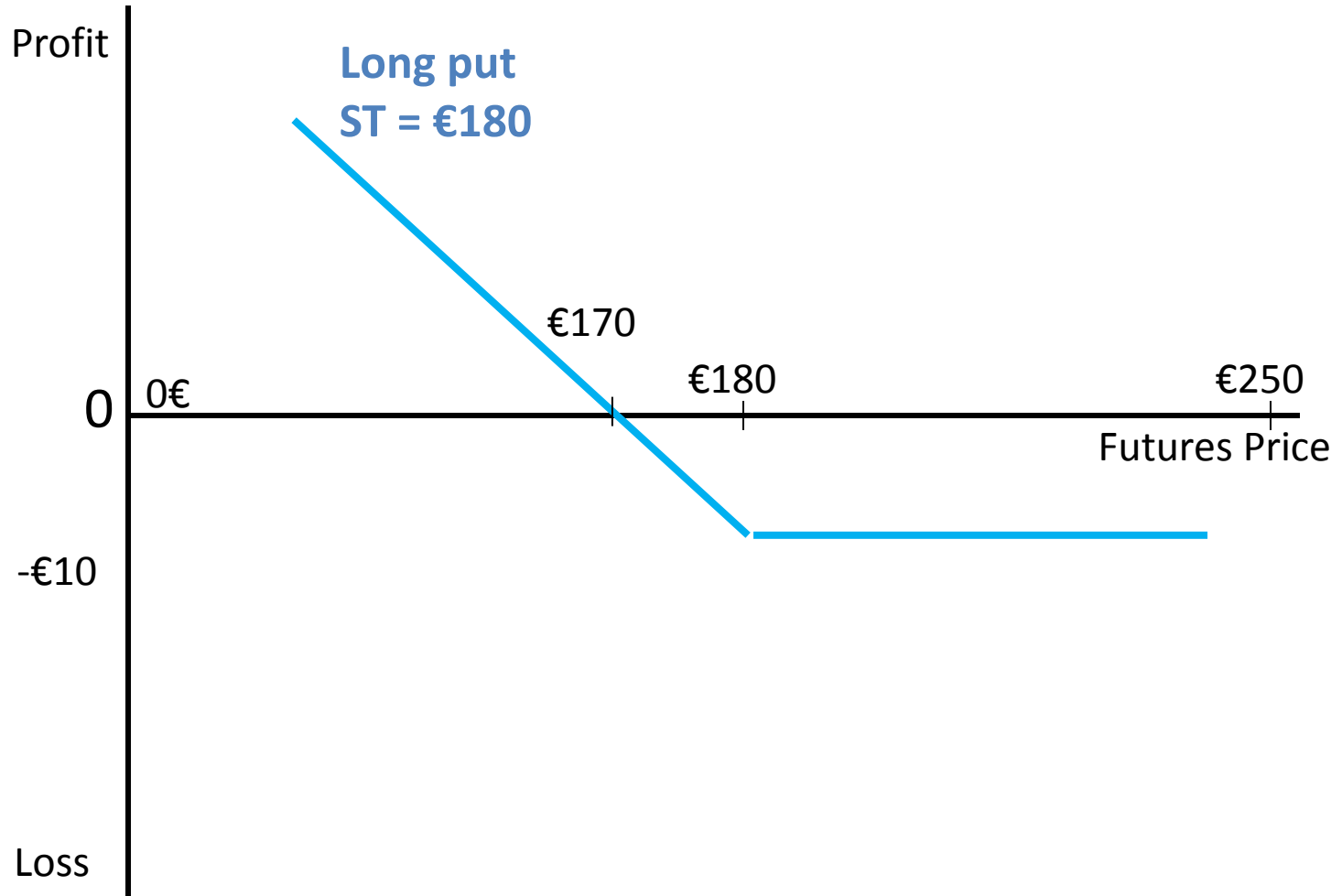
# Payoff Diagram

Long cash wheat at 180 €/t



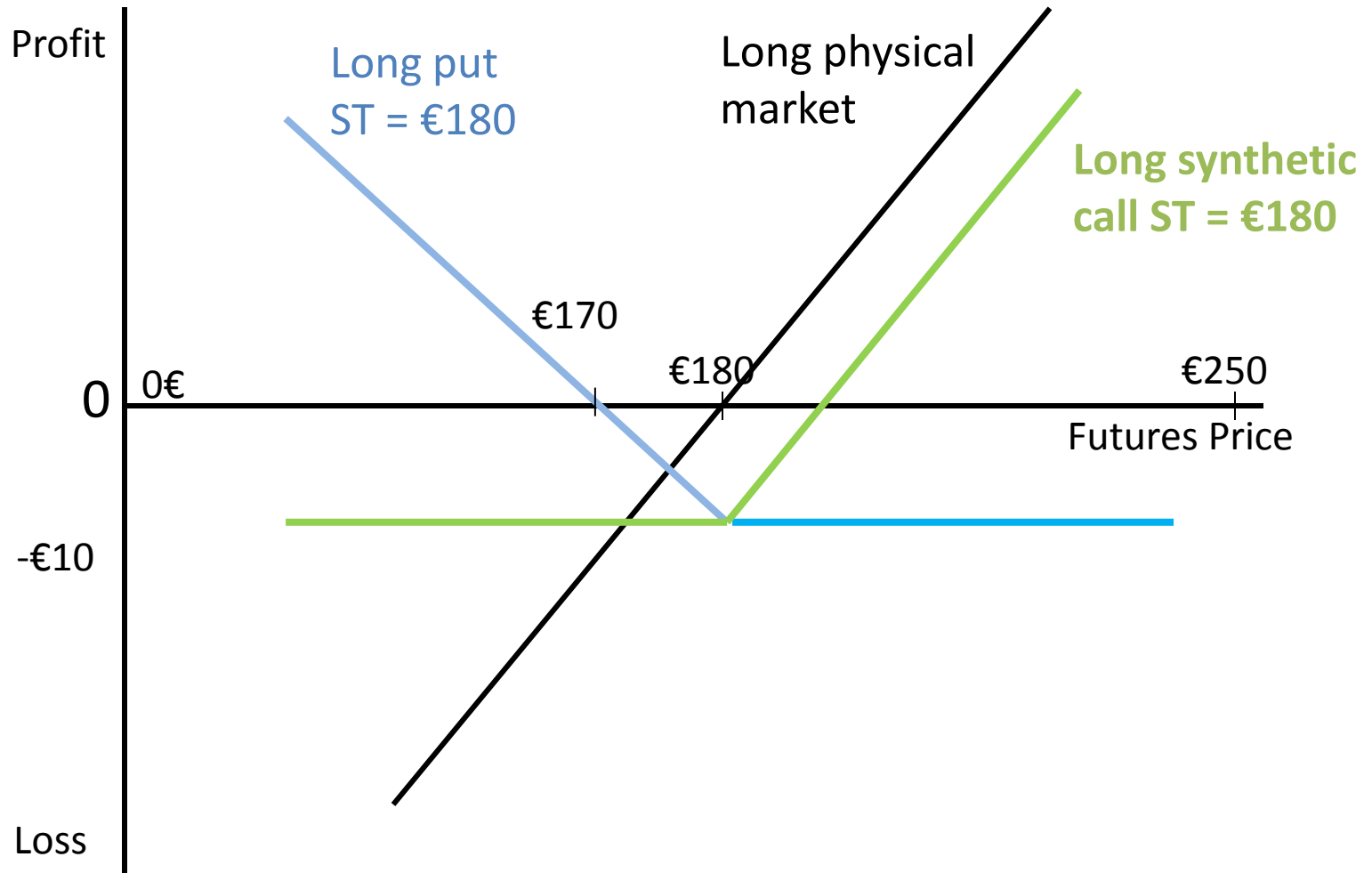
# Payoff Diagram

Long Put; Strike = 180 €/t Premium = 10 €/t



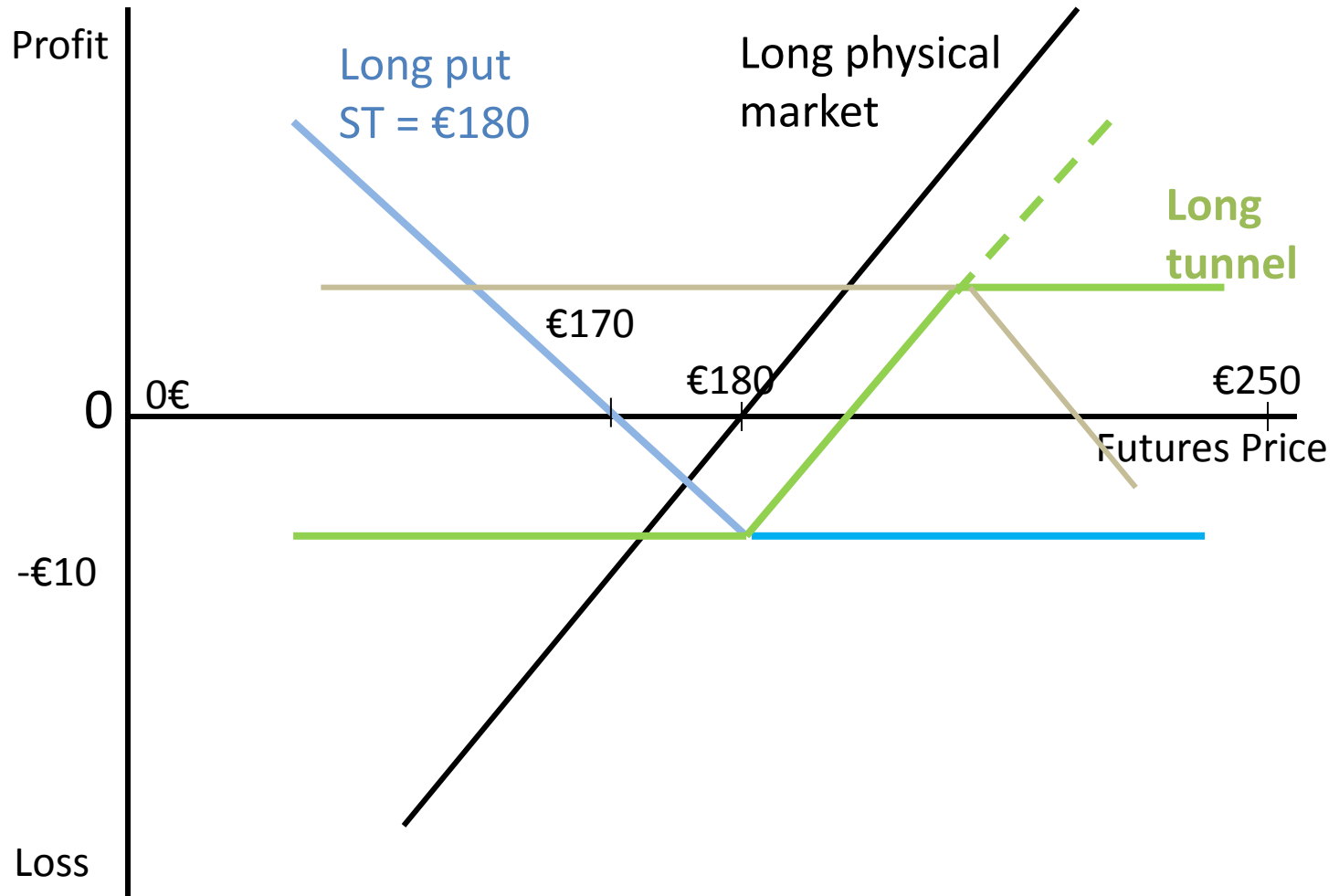
# Payoff Diagram

## Buying a put as a hedge (producer)



# Payoff Diagram

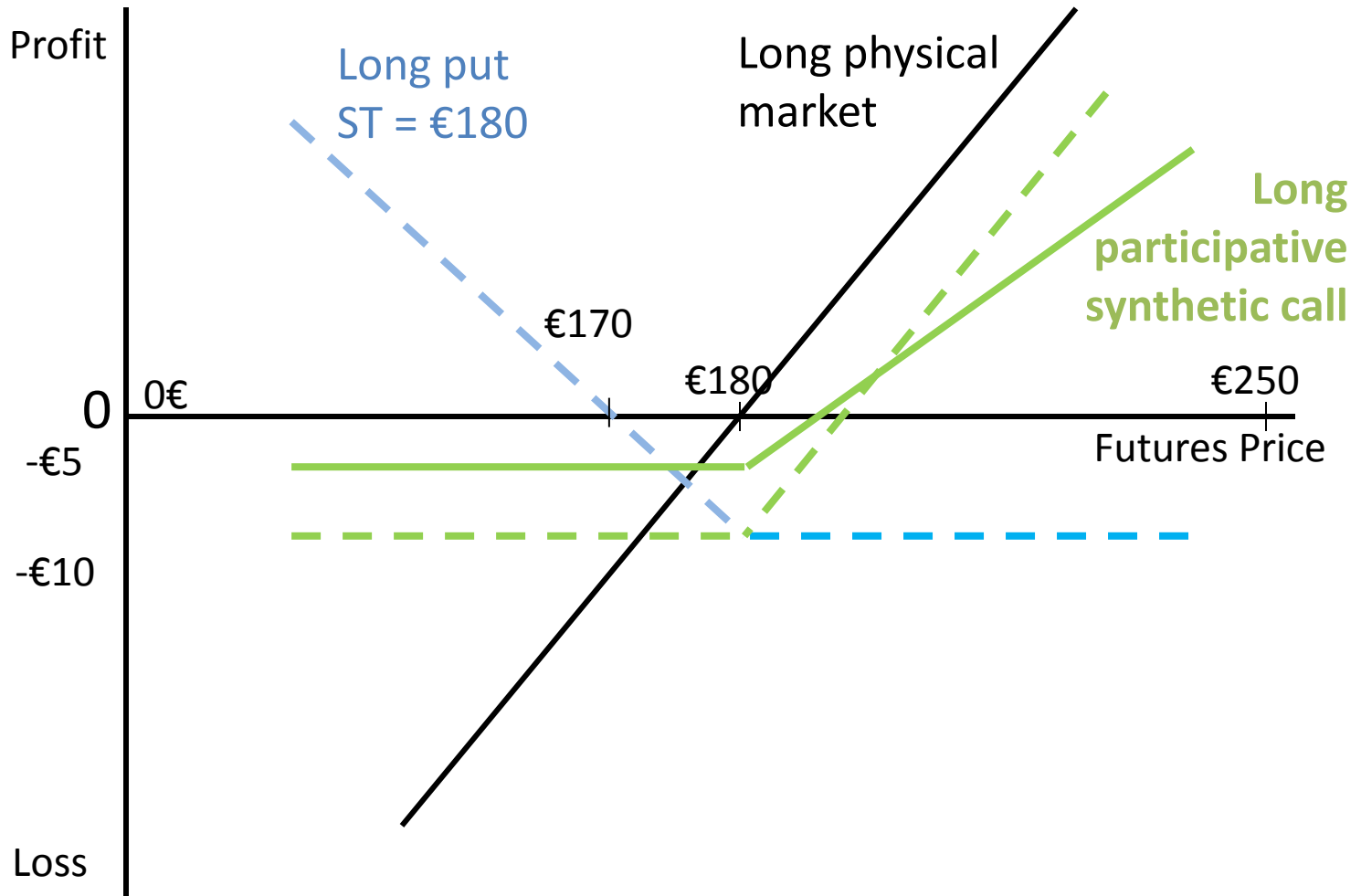
## Buying a tunnel (producer)





# Payoff Diagram

## Buying a 50-50 participative put (producer)



# 3. Insurance policy

- An insurance policy is a contract to transfer (insurable) risk:
  - the insured agent is transferring risk, random by definition, to the insurer. If the contract indicates a deductible (or a franchise), the insured keep part of the risk.
  - the insurer will compensate the insured agent with respect to defined triggers (accident, fire adverse climatis event, sanitary event) after payment of a premium.
- Principle of compensation: the financial compensation should not exceed the loss incurred by the insured agent.
- Economic statement for the insurer:  
$$\text{loss ratio} = \Sigma \text{premium} / \Sigma \text{compensation}$$
- Two issues to cope with
  - moral hazard
  - adverse selection

**Which public policy  
in agricultural risk  
management ?**

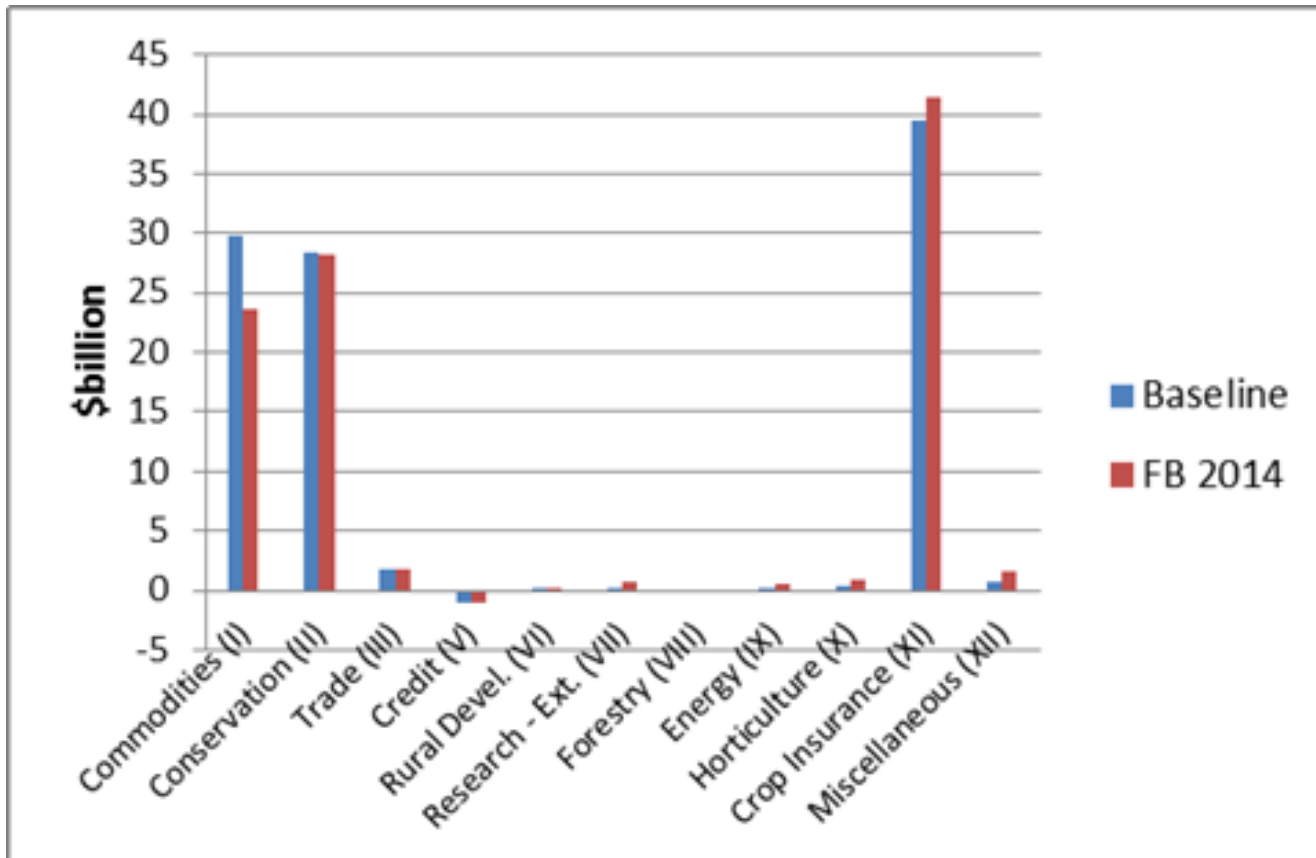


# Public safety nets and private risk management instruments

- Need of coordination between safety nets and RM tools (to avoid crowding out of private contracts and benefit from « best » risk premium)
- From unitary to combined losses  
From yield, market prices, input costs to commodity revenue ( $Y \times P$ ), commodity margin ( $Y \times P - \text{Operational costs}$ ), whole-farm revenue and margin =  $\sum(\text{commodity revenue and margin})$   
=> natural risk diversification

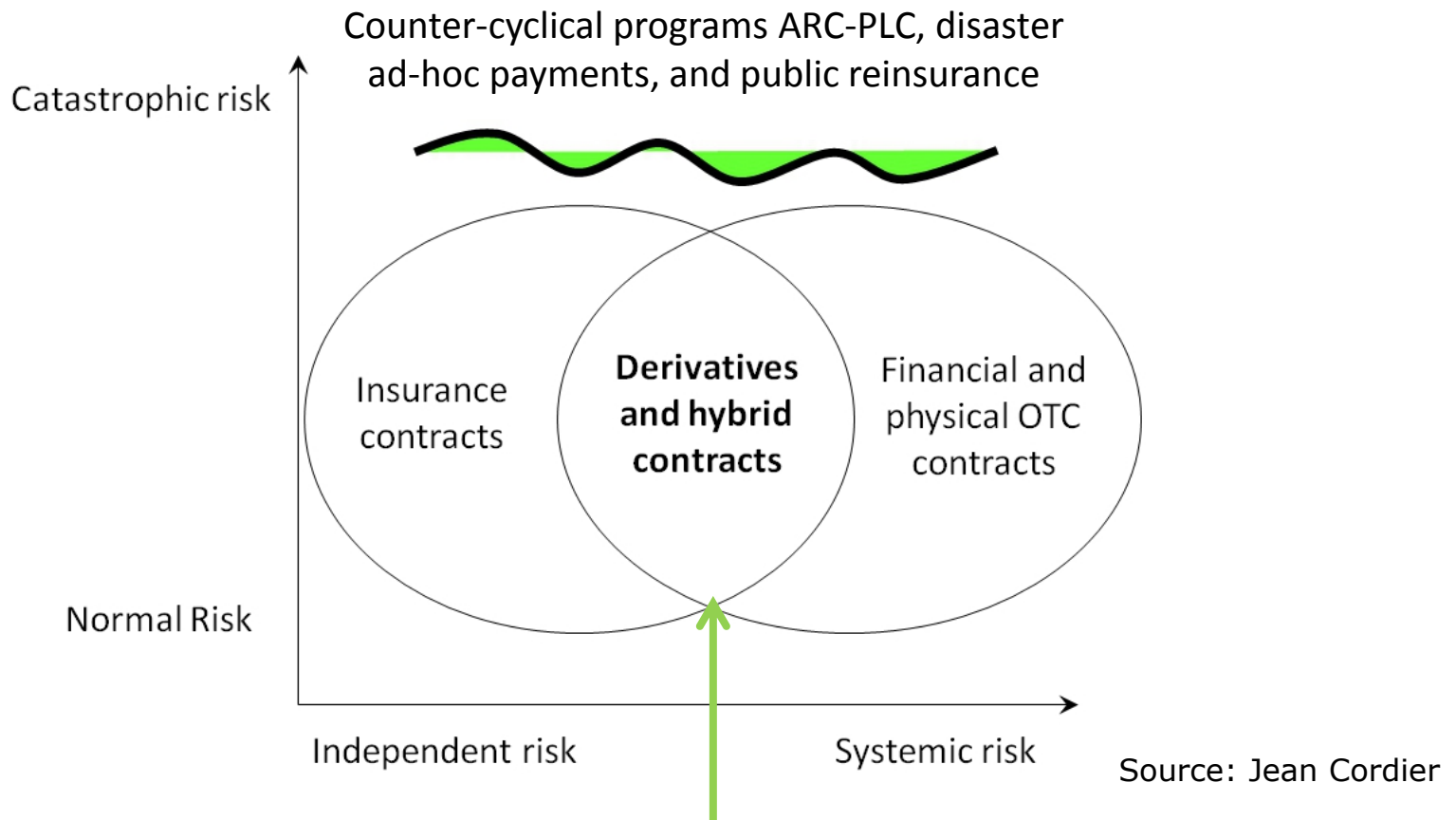
## Example 1: the US

### Estimated spending in the 2014 Farm Bill (except Title IV – Nutrition)



Source : Jean Cordier, European Parliament  
IP/B/AGRI/IC/2014-44

# Example 1: The US safety nets and risk management tools (Farm Bill 2014)

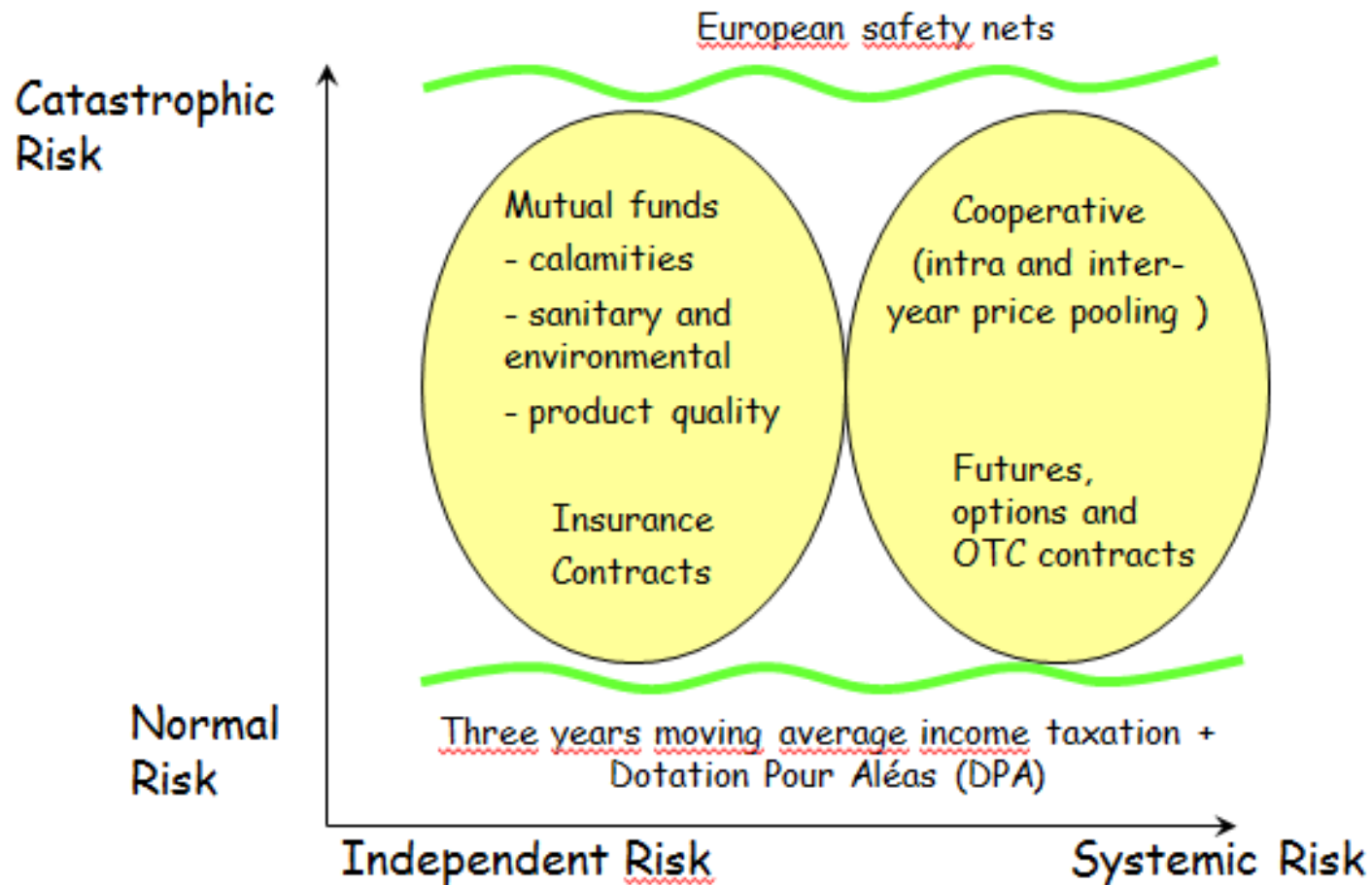


- Common policy YP and RP (ex APH, CRC, IP and AR
- ARPI (area-based index)
- SCO and STAX for shallow loss
- AGR and AGR-Lite

## Example 2: the 2014-2020 CAP

- **Pillar 1:** safety nets (Regulation (EU) n°1308/2013)
- **Pillar 2:** support to risk management instruments (Regulation (EU) n°1305/2013)
  1. support to crop insurance
    - 30% of production loss with possibility of deductible buy-up
    - use of index allowed since december 2013
  2. support to mutual funds dealing with production risks (climatic and sanitary)
  3. support to mutual funds dealing with drops in farm income (Income Stabilisation Tool)

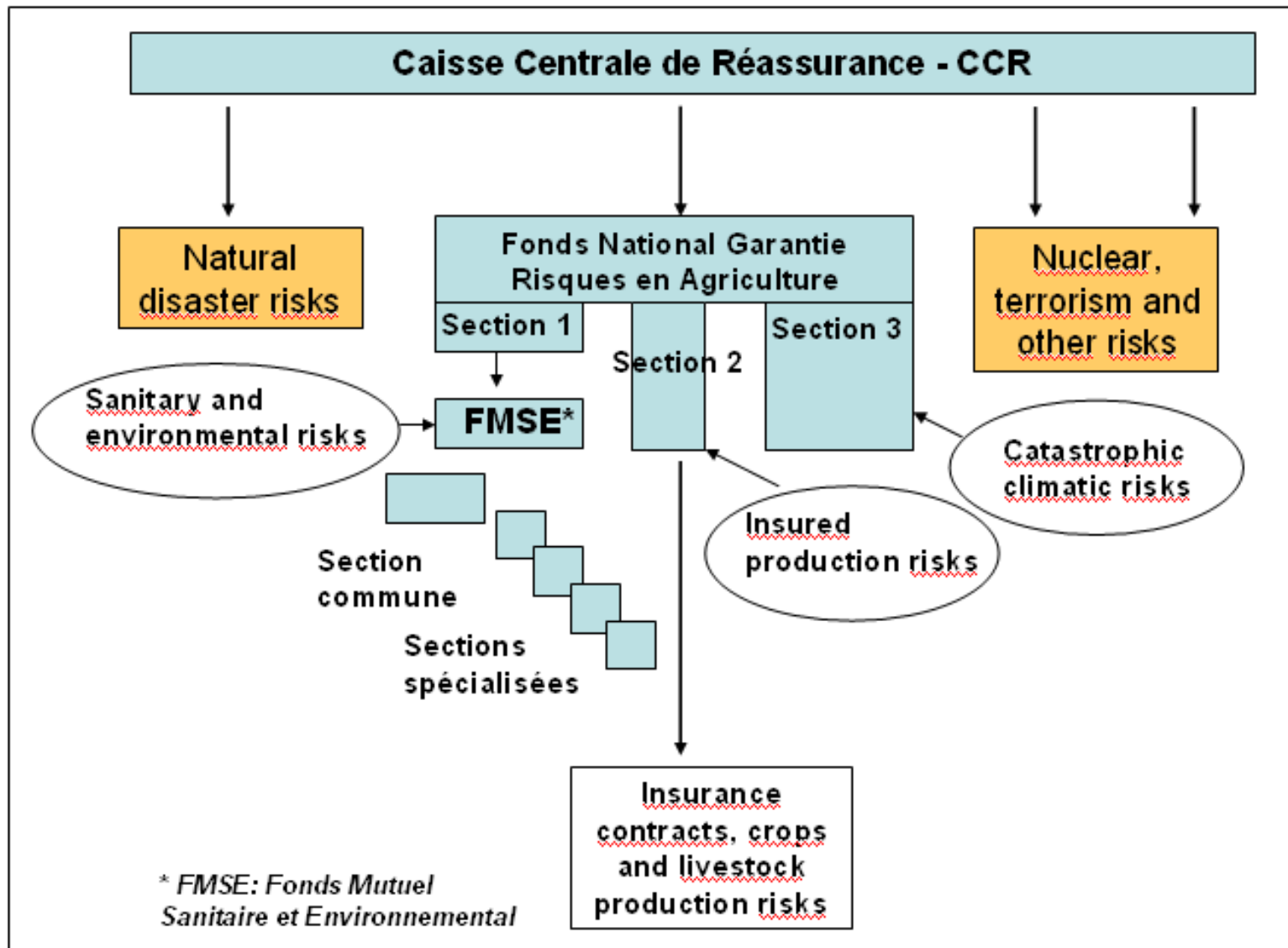
## Example 2: France within the European Union (and the CAP 2014-2020)



Source: Jean Cordier



# The organization of mutual funds in France

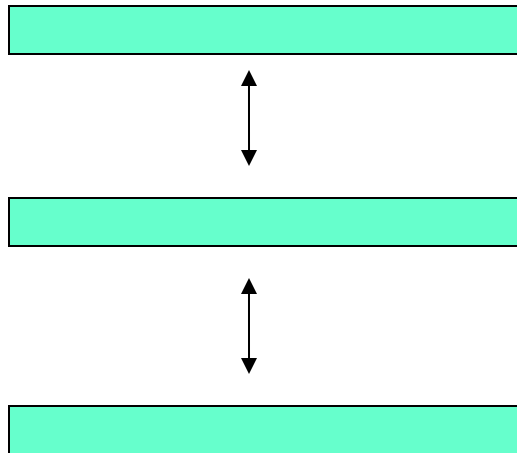


## 4. Mutual and vertical value chain risk management

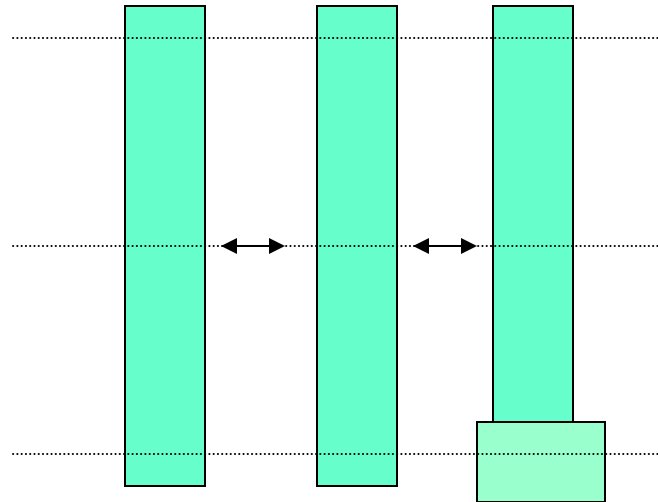
- Agricultural cooperatives with price pooling
- Mutual insurances and mutual funds
- Vertical coordination / contracting (*slide*)
- Swaps between producers and users (*slide*)

# Horizontal and vertical competition

Yesterday



Tomorrow



Source: Jean Cordier

## 5. Conclusion

### Risk management strategies in the agri-food sector

- Goal of risk management
- A range of on-farm and off-farm instruments
- Each instrument requires a strategy
  - price risk management using financial contracts
  - crop and livestock insurance policies
- Need to integrate the environment (public policies = subsidies, incentives and constraints)

=> a risk management strategy based on:

- (i) prevention,
- (ii) the availability of private instruments, and
- (iii) a structured public policy