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**Cooperative strategies and value creation
in sustainable food supply chain**
13th - 16th September 2017

Investments in poplar plantations in the Po valley: are we losing a bio-based segment of the primary economy?

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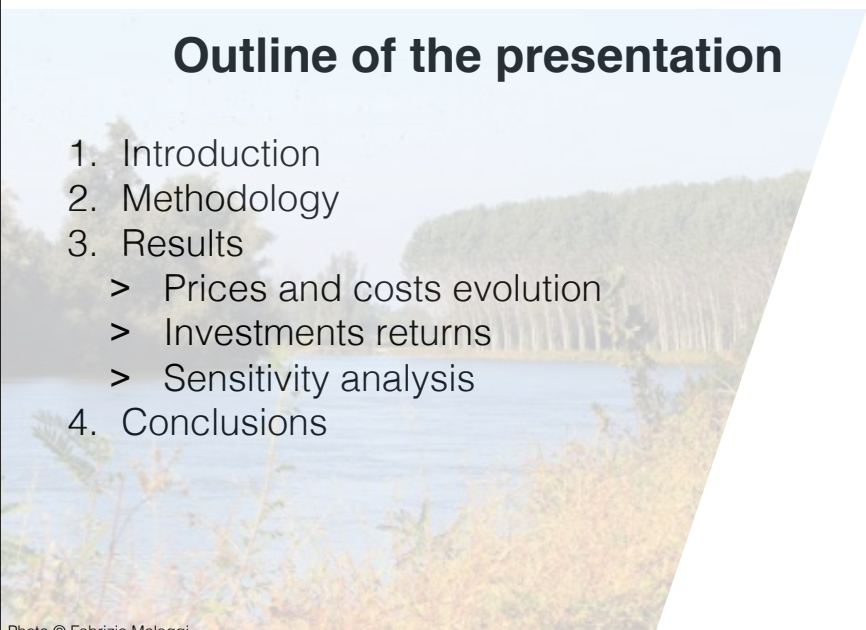




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Outline of the presentation


1. Introduction
2. Methodology
3. Results
 - > Prices and costs evolution
 - > Investments returns
 - > Sensitivity analysis
4. Conclusions

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Introduction (1/2)



- > **POPLAR PLANTATIONS = Most important** segment of **industrial timber production** in Italy
- > Plywood, pulp and paper, and wood-based panels industries
- > Plantations → 90% in the **Po valley**
- > **Alarming decline since 1980's**
- > **Direct variables** (+management and land costs, -timber prices) vs **indirect variables** (market transparency, environmental restrictions, subsidies, opportunity cost)



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Introduction (2/2)

OBJECTIVES


- > To **estimate how timber investments returns of poplar have changed** during the last 15 years (**2001-2015**) as a function of the evolution of investments costs and poplar timber prices.
- > To **assess the impact of the major policy and market factors** on financial returns, including the opportunity costs of agricultural land-use, public subsidies, and land cost.


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Methodology (1/3)

i. Definition of a representative management regime


- Approach used in Sedjo (1983) and Cabbage *et al.* (2007)
- Average site conditions
- 6x6 planting spacing (278 t/ha, 5% mortality)
- 10 years rotation + 1 year land recovery

Representative silvicultural model (own elaboration)

	Activities	Year																			
		0	1	2	3	4	5	6	7	8	9	10	11								
Costs	Site preparation	Ploughing	1																		
		Ripping	1																		
		Ridging	1																		
	Planting	Seedlings	1																		
		Mark, dig and planting	1																		
		Irrigation	1																		
	Silvicultural Management	Disk harrowing		3	3	3	2	2	2	1	1										
		Phytosanitary treatment <i>Marssonina brunea</i>		2	2	2	2	2													
		Phytosanitary treatment <i>Saperda carcharias</i>			1	1	1														
		Phytosanitary treatment <i>Cryptorhynchus</i>			1	1															
		Phytosanitary treatment <i>Phloeomyces</i>								1	1	1	1	1							
		Weeding/cleaning		1	1	1	1	1	1	1	1	1	1	1							
		Fertilizer		1	1	1	1	1													
		Low pruning			1	1	1	1													
		High pruning			1	1	1	1													
		Irrigation		1	1	1	1	1	1	1	1	1	1	1							
		Cleaning	Stumps titration and cleaning																		
Revenues	Standing trees sale																			1	



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Methodology (2/3)

ii. Collection and organization of data on costs and revenues

- **Original** data ← from 7 poplar growers and agri-farms in northern Italy
- **Secondary** data ← agriculture contractors rates
- **Timber prices** ← CCIAA Mantua and CCIAA Alessandria
- **Indexes:** ISTAT Agriculture Producer Price Index and Inflation index

- > Associazione Pioppicoltori Italiani (MN)
- > Aziende Agricole Torviscosa (UD)
- > Ivan Turco e Maria Rosa Pitton SnC (UD)
- > Fabio Boccalari (MN-CR)
- > Francesco Mattioli (MN-CR)
- > Gianluigi Pippa (RO-FE)
- > Panguaneta SpA (MN)



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Methodology (3/3)

iii. Calculation of cash flow and financial indicators

- **4 situations** → Cmin-Pmax, Cmin-Pmin, Cmax-Pmin, Cmax-Pmax
- **Capital budgeting criteria and techniques**
 - > Net Present Value (NPV)
 - > Land Expectation Value (LEV)
 - > Internal Rate of Return (IRR)
- $r=3.5\%$
- **Base case scenario** → not including cost-opportunity, land costs, and subsidies

iv. Sensitivity analysis

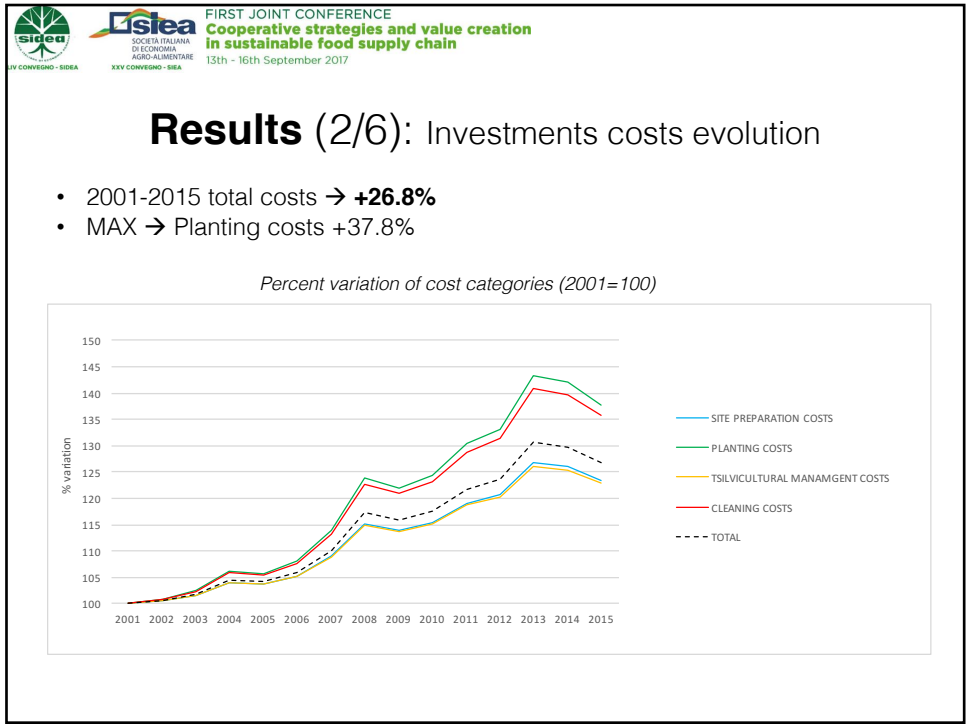
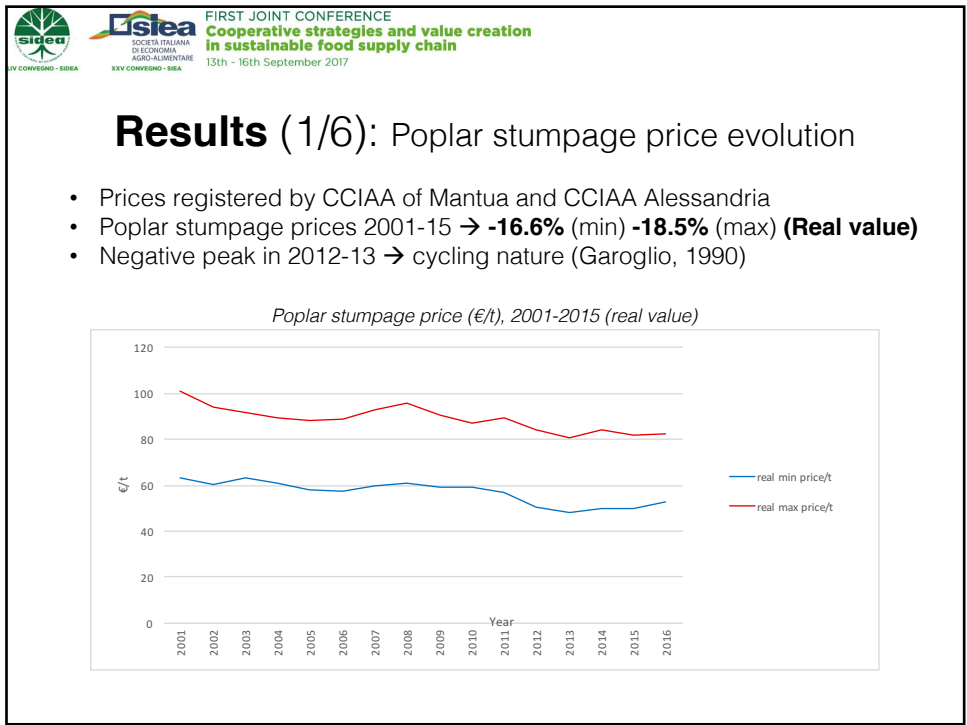
- a) **Opportunity cost** of alternative crop production (corn)
- b) **Land rent costs**
- c) **Subsidies**





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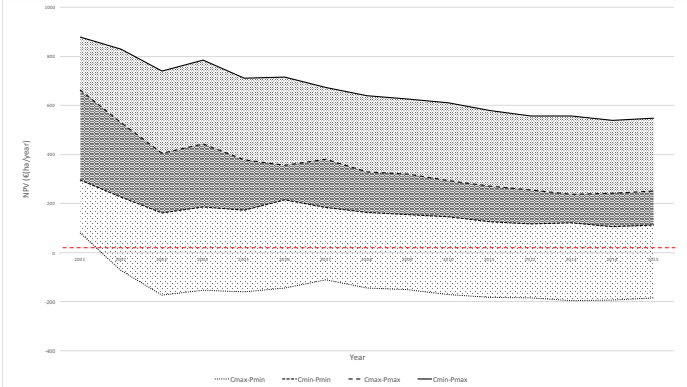
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Results (3/6): Base-case scenario


- **IRR** 2001= 4.7% to 15.3% → 2015= n.d. to 12.2% **(-2.8/-4.6%)**
- **NPV** 2001= 79.9 to 878.3 €/ha/y → 2015= -185.6 to 548.6 €/ha/y
- **LEV** 2001= 2,284 to 25,095 €/ha → 2015= -5,302 to -15,674 €/ha

NPV with a 3.5% discount rate for the base case scenario, 2001-2015 (real values)





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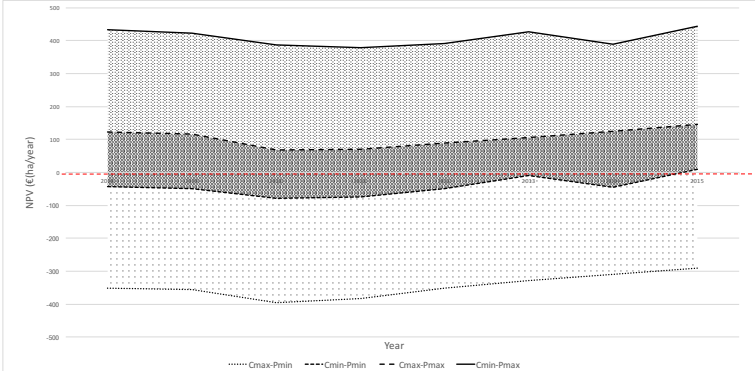
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Results (4/6): Base-case scenario + opportunity cost

- Corn ← **Farm Accountancy Data Network (FADN)**
- No Direct Payment from CAP considered
- Effect of volatility of corn prices in recent years

NPV with a 3.5% discount rate for the sensitivity analysis (a), 2008-2015 (real values)

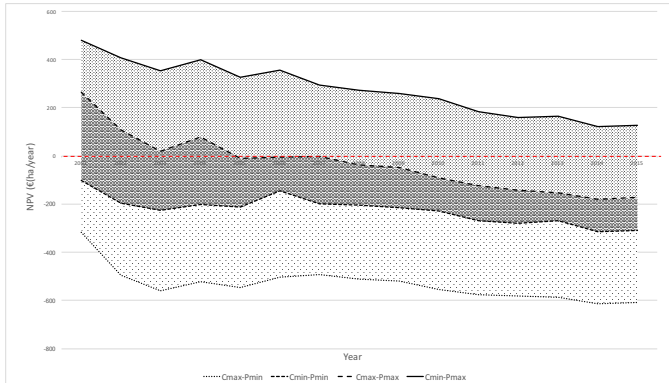




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Results (5/6): Base-case scenario + land rent cost

- Annual Agriculture Review of CREA (ex-INEA)
- Land rent prices 2001=337€/ha → 2015 455€/ha

NPV with a 3.5% discount rate for the sensitivity analysis (b), 2001-2015 (real values)



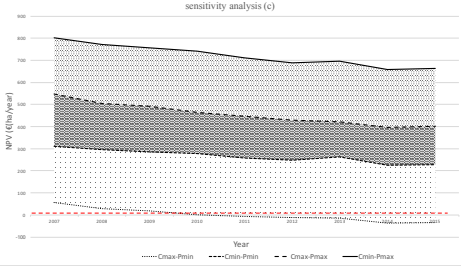

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Results (6/6): Base-case scenario + subsidies

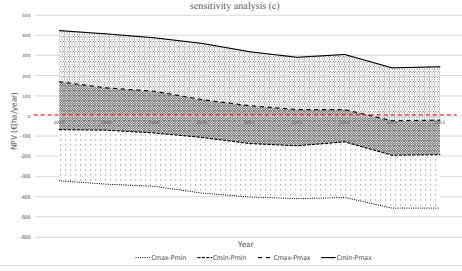
- Average level of contribution of RDPs of northern Italian regions
- Measure 221 (RDP 2007-13) and Measure 8.1 (RDP 2014-20)
- +subsidies → IRR +2.7 and 3.8%

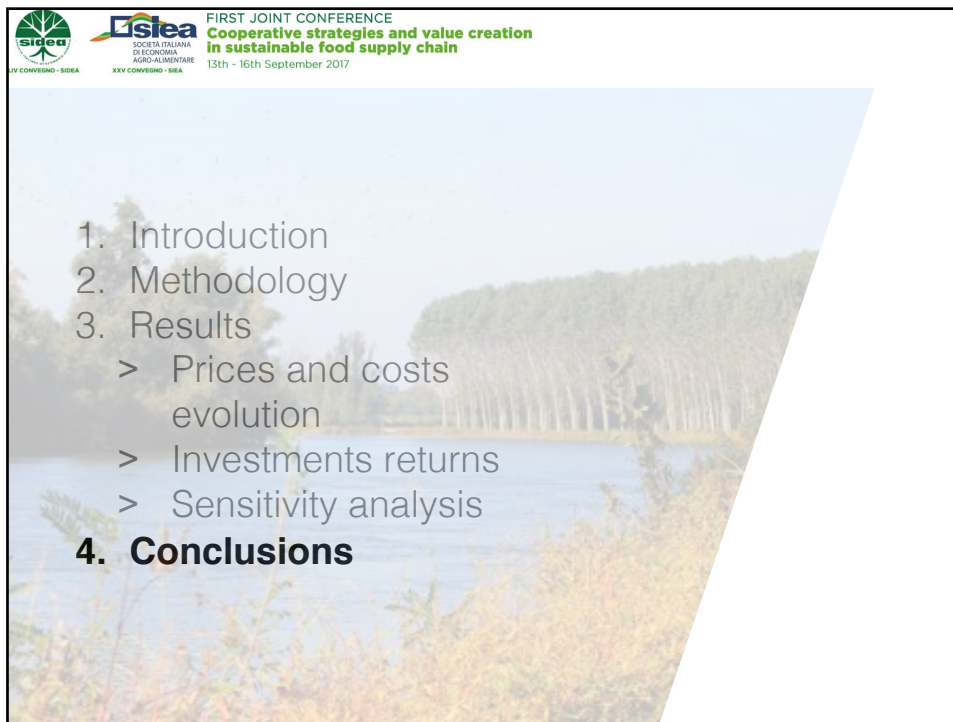
NPV with a 3.5% discount rate for the sensitivity analysis (c) and (d), 2007-2015 (real values)



sensitivity analysis (c)



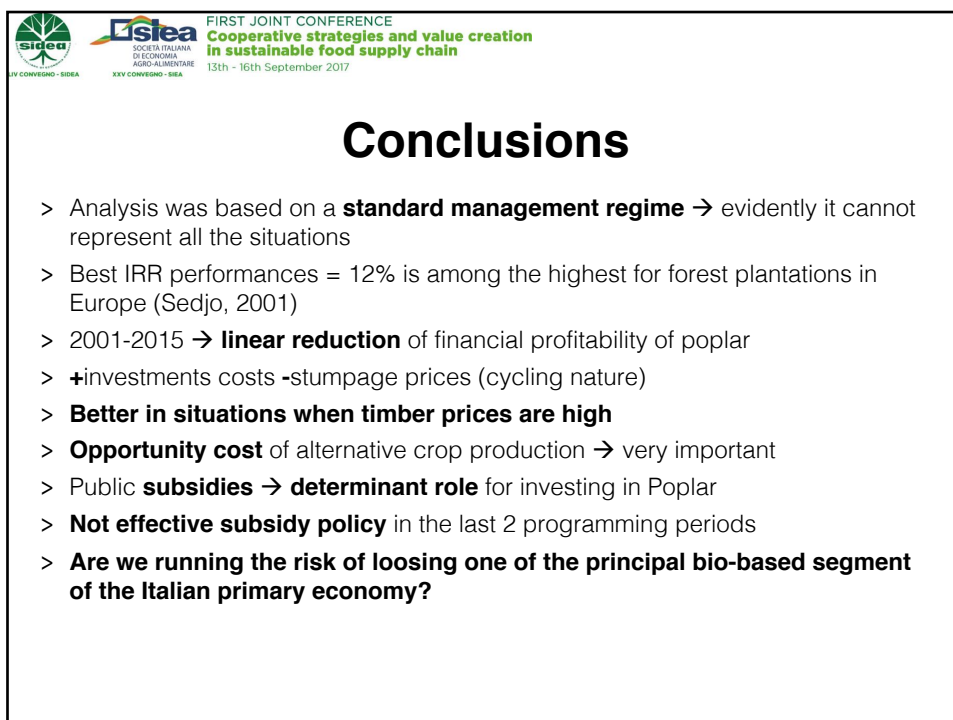
sensitivity analysis (d)









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Conclusions

- > Analysis was based on a **standard management regime** → evidently it cannot represent all the situations
- > Best IRR performances = 12% is among the highest for forest plantations in Europe (Sedjo, 2001)
- > 2001-2015 → **linear reduction** of financial profitability of poplar
- > **+investments costs -stumpage prices** (cycling nature)
- > **Better in situations when timber prices are high**
- > **Opportunity cost** of alternative crop production → very important
- > Public **subsidies** → **determinant role** for investing in Poplar
- > **Not effective subsidy policy** in the last 2 programming periods
- > **Are we running the risk of losing one of the principal bio-based segment of the Italian primary economy?**



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Presentation available on the web (Google: "[Pettenella](#)")