



On the Regulation of genetically engineered crops in the EU

Do environmental benefits count?

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Background

- Release of transgenic crops (or any other new crop!) includes social benefits and costs:
 - private reversible benefits and costs (yield, pesticides, crop management, ...);
 - private irreversible benefits and costs (fixed costs, health effects, product quality, ...);
 - public reversible benefits and costs (administration, ...);
 - public irreversible benefits and costs (health, climate change, biodiversity, administration, ...).





Background

- The irreversible costs of introducing transgenic crops are of major concern to decision makers in the EU:
 - In June 1999 five member states declared they would block new approvals of genetically modified organism (GMOs) until the European Commission proposed additional legislation governing their introduction (Commission of the European Communities, 1999).
- => The decision became to be known as the *quasi moratorium* on GMOs.





Declaration by the Danish, Greek, French, Italian, and Luxembourg delegations concerning the suspension of new GMO authorisations

The Governments of the following Member States (**Denmark, Greece, France, Italy and Luxembourg**), in exercising the powers vested in them regarding the growing and placing on the market of genetically modified organisms (GMOs),

given the need to put in place a tighter, more transparent framework, in particular for **risk assessment**, having regard to the specifics of **European ecosystems**, monitoring and labelling,

given the need to restore public and market confidence,

point to the importance of the Commission submitting without delay full draft rules ensuring labelling and traceability of GMOs and GMO-derived products and state that, pending the adoption of such rules, in accordance with **preventive and precautionary principles**, they will take steps to have any new authorisations for growing and placing on the market suspended.





Declaration by the **Austrian, Belgian, Finnish, German, Netherlands, Spanish and Swedish** delegations

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Against this background the Governments of these Member States, having regard to the precautionary principle set out in Article 174(2) of the Treaty, intend:

- to take a thoroughly **precautionary approach** in dealing with notifications and authorizations for the placing on the market of GMOs,
- not to authorise the placing on the market of any GMOs until it is demonstrated that **there is no adverse effect on the environment and human health**, and
- to the extent legally possible to apply immediately the principles, especially regarding traceability and labelling, laid down in the political agreement for a revision of Directive 90/220/EEC reached by the Council on 24/25 June 1999.

...





Background

- Release of transgenic crops is a decision under **irreversibility, uncertainty, and flexibility:**

=> Real Option Approach





Objective

Identification of incremental irreversible and reversible social benefits from planting Bt grain maize and ht grain maize in the EU 15 to provide information for answering the following questions:

- What are the Maximum Incremental Social Tolerable Costs of immediate introduction?
- What are the forgone **incremental** benefits and costs of a postponed release?





Economic Assessment Framework

Scope	Private	External (Public)
Reversibility		
Reversible	<p style="text-align: center;">1</p> Reversible Benefits (<i>PRB</i>) Reversible Costs (<i>PRC</i>)	<p style="text-align: center;">2</p> Reversible Benefits (<i>ERB</i>) Reversible Costs (<i>ERC</i>)
Irreversible	<p style="text-align: center;">3</p> Irreversible Benefits (<i>PIB</i>) Irreversible Costs (<i>PIC</i>)	<p style="text-align: center;">4</p> Irreversible Benefits (<i>EIB</i>) Irreversible Costs (<i>EIC</i>)





Real Option Model

$$I^* = \frac{W}{\beta / \beta - 1} + R$$

- R , social incremental irreversible benefits, *SII*B;
- W , social incremental reversible benefits, *SIR*B.
- I^* , maximum incremental social tolerable irreversible costs, *MISTIC*;





Real Option Model

$$SIRB \equiv SIRB_{04} = \int_0^{\infty} SIRB(t) e^{-\mu t} dt$$

SIRB per year: partial equilibrium model for a small open economy





Real Option Model

$$SIIB \equiv SIIB_{04} = \int_0^{\infty} SIIB(t) e^{-\mu t} dt$$

Includes:

- change in pesticide use;
- social costs of pesticide use;
- change in number of pesticide applications;
- diesel use per application;
- change in climate effects in Euro per CO₂ equivalent.





Data

- EUROSTAT (based on FADN);
- ECOGEN field trials in Narbonne, France;
- data published by Gianessi, Sankula, and Reigner for HT corn.





SIRBs, SIIBs, Hurdle Rates, and MISTICs for Bt grain maize on average per year for the EU-15 at 10.5% discount rate w/ and w/o CAP subsidies (in 2005 prices).

Country	SIRB		SIIB		Hurdle Rate	MISTIC			
	Mio. €	€/ha	Mio. €	€/ha		Mio. €	€/ha	€/capita	€/farmhl.
France	61.90	203.80	0.24	0.81	1.14	54.31	178.81	0.90	467.12
Greece	11.76	280.34	0.04	1.03	1.79	6.60	157.34	0.60	73.75
Italy	59.90	299.29	0.19	0.98	1.23	48.87	244.16	0.84	214.27
Portugal	4.48	194.31	0.02	1.08	1.21	3.73	161.56	0.36	30.84
Spain	27.24	340.13	0.07	0.90	1.28	21.42	268.73	0.51	257.86
France	35.89	117.89	0.24	0.81	1.16	31.09	102.11	0.52	267.40
Greece	7.11	169.32	0.04	1.03	2.50	2.89	68.75	0.26	32.25
Italy	37.25	186.71	0.19	0.98	1.31	28.55	143.13	0.49	125.20
Portugal	2.00	87.19	0.02	1.08	1.19	1.71	74.48	0.16	14.11
Spain	17.86	222.52	0.07	0.90	1.03	17.47	217.66	0.41	210.31





SIRBs, SIIBs, Hurdle Rates, and MISTICs for ht grain maize on average per year for the EU-15 at 10.5% discount rates w/ and w/o CAP subsidies (in 2005 prices).

	SIRB		SIIB		Hurdle RATE	MISTIC				
	Mio. €	€/ha	Mio. €	€/ha		Mio. €	€/ha	€/capita	€/farmhl.	
Austria	2.46	88.99	0.05	1.69	1.58	1.61	58.10	0.20	52.61	
Belgium	0.60	73.76	0.01	1.80	5.60	0.12	14.97	0.01	13.94	
France	28.53	101.00	0.55	1.97	1.14	25.47	90.19	0.42	219.06	
Germany	10.34	144.85	0.12	1.71	1.28	8.20	114.94	0.10	191.10	
Greece	5.44	138.95	0.10	2.49	1.79	3.13	79.97	0.28	34.99	
Italy	19.64	105.37	0.44	2.38	1.23	16.40	87.99	0.28	71.89	
Netherlands	0.84	242.83	0.01	1.77	5.51	0.16	45.82	0.01	41.84	
Portugal	2.06	96.28	0.06	2.62	1.21	1.76	82.15	0.17	14.54	
Spain	12.60	168.61	0.16	2.18	1.27	10.08	134.95	0.24	121.43	
Without CAP										
Austria	1.46	52.60	0.05	1.69	1.83	0.84	30.39	0.10	27.64	
Belgium	0.13	15.67	0.01	1.80	41.01	0.02	2.18	0.00	2.02	
France	16.63	58.43	0.56	1.97	1.16	14.85	52.18	0.25	127.73	
Germany	5.31	73.82	0.12	1.71	1.18	4.64	64.49	0.06	108.02	
Greece	3.28	83.91	0.10	2.49	2.50	1.41	36.06	0.13	15.73	
Italy	12.26	65.74	0.44	2.38	1.31	9.77	52.43	0.17	42.85	
Netherlands	0.85	242.85	0.01	1.77	4.83	0.18	52.00	0.01	47.81	
Portugal	0.92	43.21	0.06	2.62	1.19	0.83	39.00	0.08	6.87	
Spain	8.19	110.27	0.16	2.18	1.03	8.13	109.59	0.19	97.95	





Conclusions

- The total MISTICs are high. From that perspective it is doubtful if irreversible health and environmental effects will be that high.
- Considering potential irreversibility can be considered in an economic assessment considering concerns by MS (societal concerns)
- Economic issues are not considered at this point in time by EFSA.





Conclusions

- Looking only at potential damages results in an overly cautious assessment with substantial economic consequences
- The high MISTICs per farm holding show farmers do have much higher interests to have access to the technology than consumers in general.





Conclusions

- Overall the EU has foregone a substantial amount of economic benefits.
- For Italy about **80 million** Euro a year.
- On the lower side, indirect effects not considered (R&D, health, competitiveness, ...)





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- Questions?
- Comments?



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