Benefits from R&D and Spill-overs in Aquaculture: An EU-15 Modelling Approach

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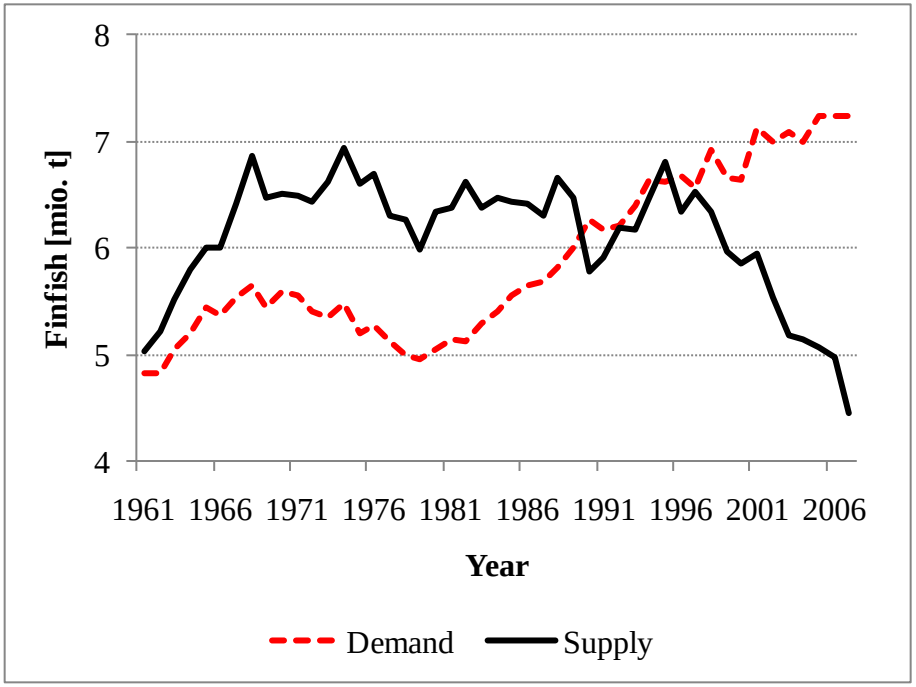
Introduction

Development of EU-15 supply and demand of finfish, 1961 - 2007



Source: FAO (2010)

Goal: analyze EU-15-wide economic impact of R&D conducted by a single country

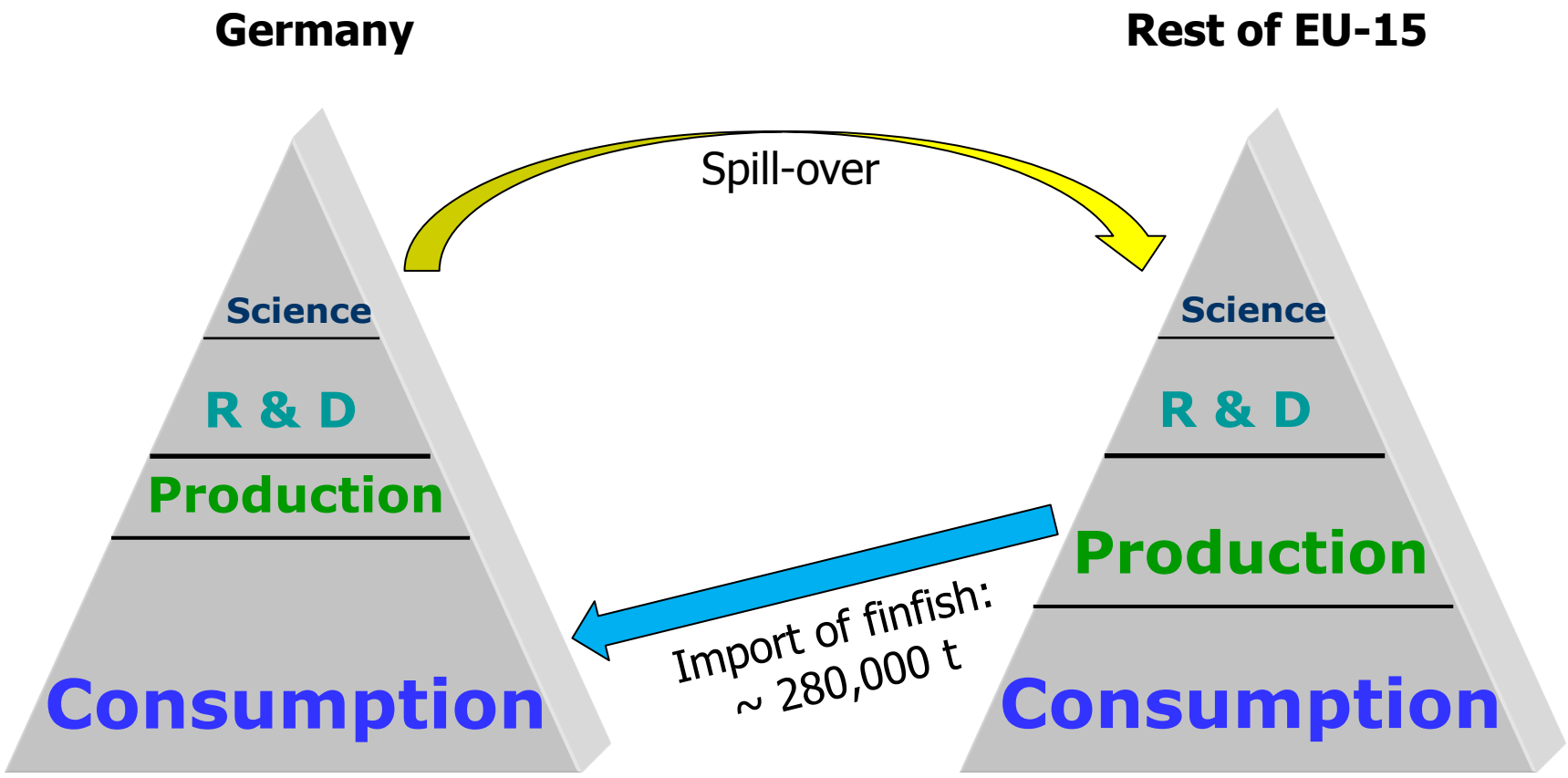
How to increase aquaculture production of fish in EU-15?

- resource-based growth strategy
- R&D

R&D in aquaculture

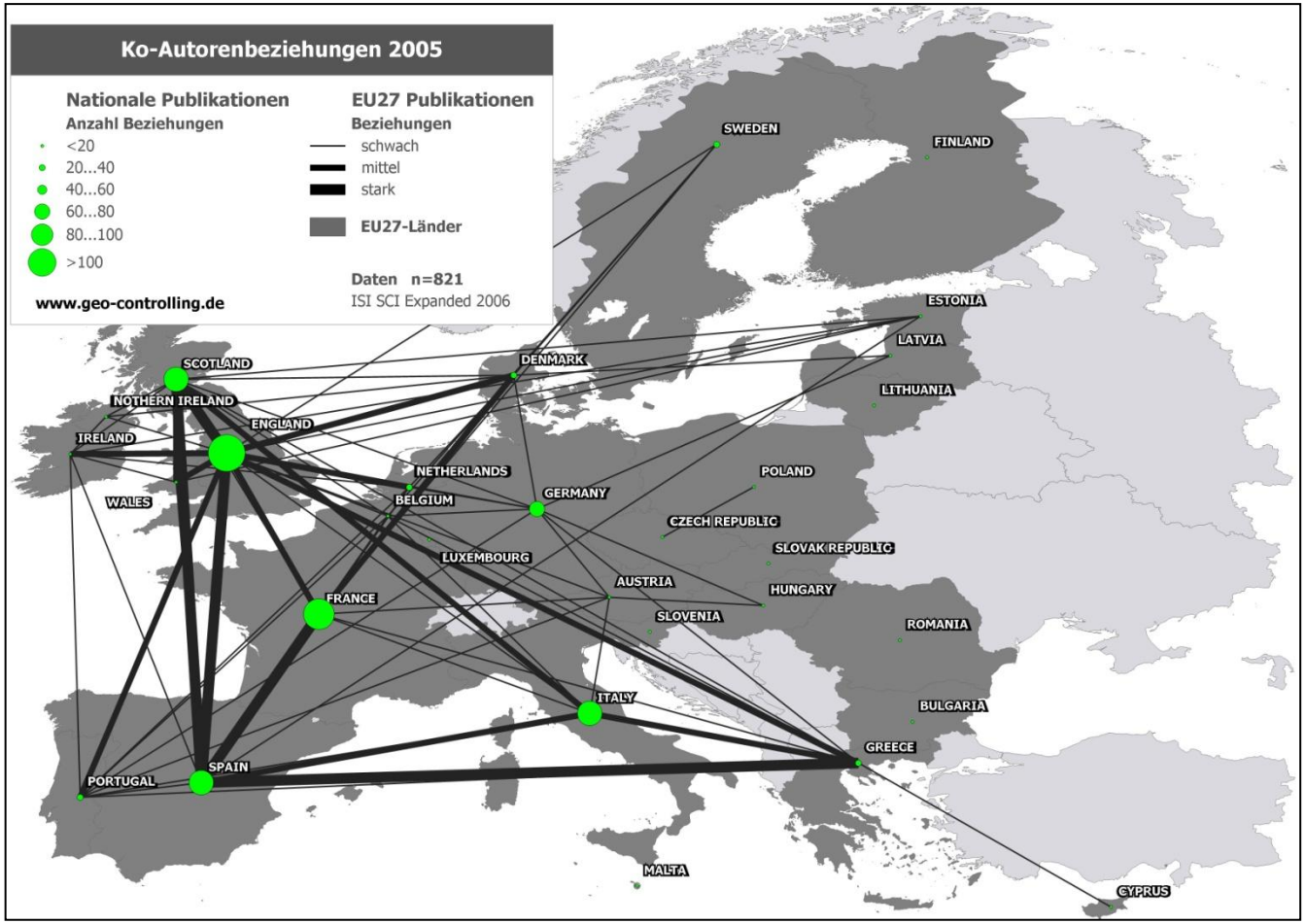
- relatively young compared to R&D on poultry, pigs, or cattle
- highly diversified (fish species and production systems)
- transforming wild fish into domesticated fish
- transforming common property to private property

Pyramid of knowledge and spill-overs



Spillovers in aquaculture research

Co-author relationships in aquaculture research in EU-27, 2005



Source: Seidel-Lass et al. (2008)

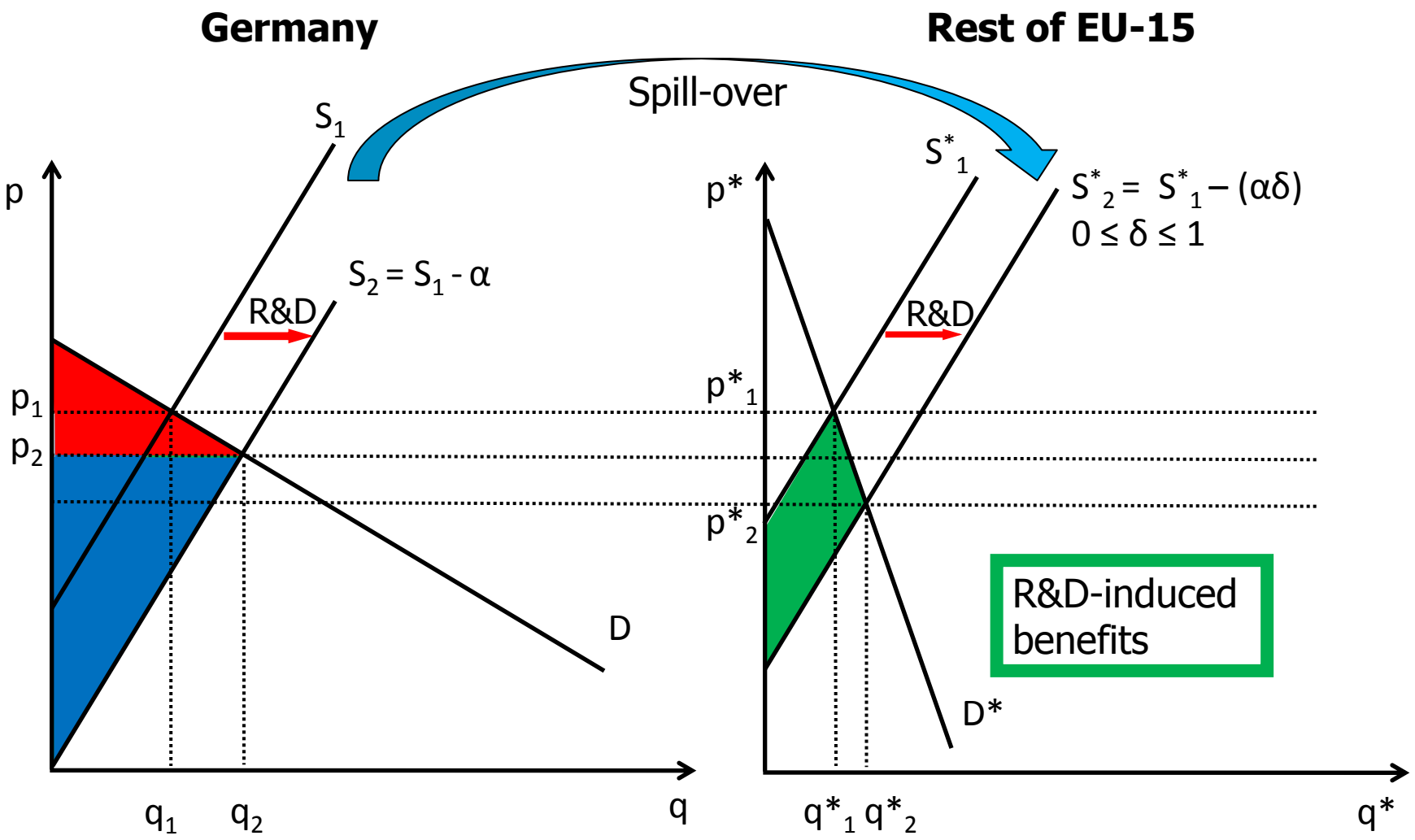
increase in scientific aquaculture and fisheries publications:

1990 – 1994:
1,751
publications

2000 – 2005:
8,634
publications

Source: Seidel-Lass (2009)

Economic Effects of Aquaculture-R&D



Scenario Analysis - Setup

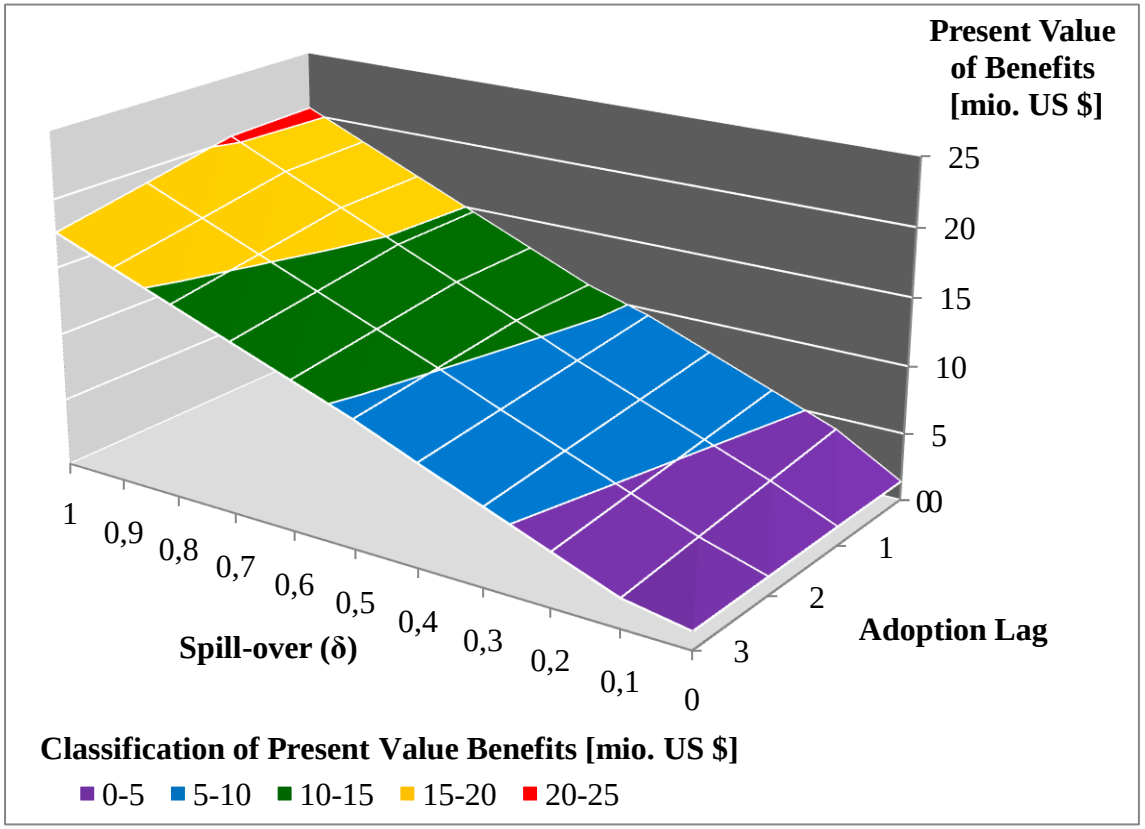
Assumptions:

- market for aquaculture finfish in EU-15 countries
- no international trade
- no spill-overs beyond the EU
- no substitutes, no externalities

Base data and parameterization:

- supply, demand and price based on EU-15 market characteristics
- supply and demand elasticity set to 1
- per unit cost reduction rate of 5% p.a.
- costs for R&D are set to zero
- real discount rate: 3%
- simulation period: 2010 – 2030

Results



- R&D without spill-overs leads to an increase of total economic surplus
- R&D with spill-overs boosts economic surplus
- adoption lag is less important

Regression:

PV Benefits = 234,259.2 – 67,509.5 * Adoption Lag + 1,797,343.4 * Spill-over

(0.000) (0.000) (0.000)

Discussion

- R&D with spill-overs boosts economic surplus, even when home production is weak
- Returns to R&D more sensitive to spill-over (δ) than to adoption lag
- it does not matter much when R&D-product are transfered, as long as they are transfered
- limitations
  - estimates of parameter values: ε, α, δ, etc.
  - functional forms of supply and demand curves
  - domestic and cross-border adoption lags
  - R&D spill-overs to other aquaculture species
  - path-impact of current R&D on future R&D

Thank You!

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http://www.agric-econ.uni-kiel.de/Abteilungen/II

Backup 1

Appendix 1: Observed number of country-to-country collaborations in aquaculture and fisheries research publication in the ISI Web of Science, 1990-2005

	Canada	England	France	Germany	Ireland	Netherlands	N. Ireland	Norway	P.R. China	Scotland	USA	Wales
Canada	-	58	23	20	6	9	2	43	16	23	249	6
England		-	43	32	30	33	14	29	16	108	85	32
France			-	8	3	7	2	13	7	19	42	1
Germany				-	2	11	1	12	1	15	27	1
Ireland					-	4	14	10	1	20	5	2
Netherlands						-	1	10	1	19	15	1
N. Ireland							-	1	0	9	2	3
Norway								-	2	33	43	2
P.R. China									-	1	40	4
Scotland										-	29	20
USA											-	6
Wales												-

NOTE: Symmetric matrix. Symmetric counterparts are left blank. Main diagonal is blank, because national collaborations are not considered.