

EUFASOM Forestry Sector

People love chopping wood,
in this activity one immediately sees results

Albert Einstein

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EU FOREST AND AGRICULTURE SECTOR OPTIMIZATION MODEL

Producer and Consumer Welfare

Forestry Sector

Agriculture Sector

EUFASOM Forestry Sector

Overview

Forest sector in EUFASOM

Input

Constraints

Output

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Input Data:

- 🌲 Oskar Model (Oskar Franklin)
- 🌲 Forest Sector GTM
(Alexander Moiseyev)
- 🌲 FAOSTAT

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Oskar Model

delivers biomass, tree number, harvest costs ...etc. for each country, each species, each managing type (thinning), each period, each cohort.

(code input:)


2005.Bulg.Spruce.30-35.NoThin.Carbon

43.41 tons per ha

2005.Slvk.Car.105-110.NoThin.HarvestCost

1159.43 EUR per ha

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 are used as starting data
and
constraint parameters

(the Oskar Model simulates the grow of the trees...

-> this corresponds to CO₂ fertilisation

-> Exogenous parameters have a time dimension)

(code input:)

2070.Port.DouglasFir.55-60.NoThin.HarvestLabour 25.12 h per ha

 6.6 million data-lines from the Oskar Model

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Forest Sector GTM

IIASA/EFI

Process data



production of secondary products made out
of primary products

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Process: **HardWoodSAWING**
(code input:)

Needs	Labour	-3.00 hours
Needs	Electricity	-70.00 kW
Needs	OtherCosts	- 17.60 Euro
Needs	HardWoodSawLogs	- 2.10 m ³
Produces	HardWoodPulpChips	0.72 m ³
Produces	PanelChips	0.22 m ³
Produces	EnergyChips	0.11 m ³
Produces	HardWoodSawnWood	1.05 m ³

in Czech Republic

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FAOSTAT

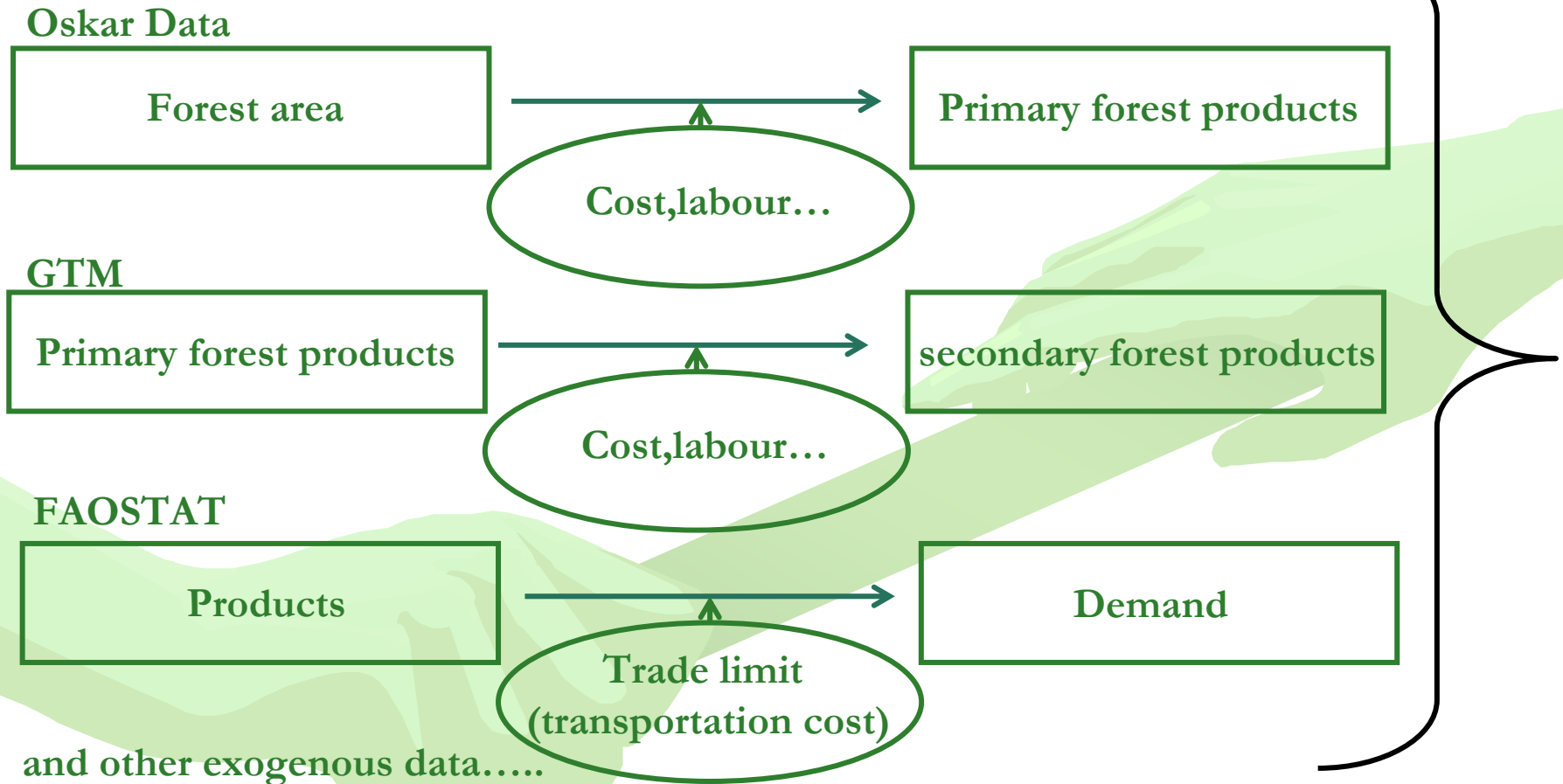
demand and supply data

per Product and Country demand and supply price, quantity, elasticity

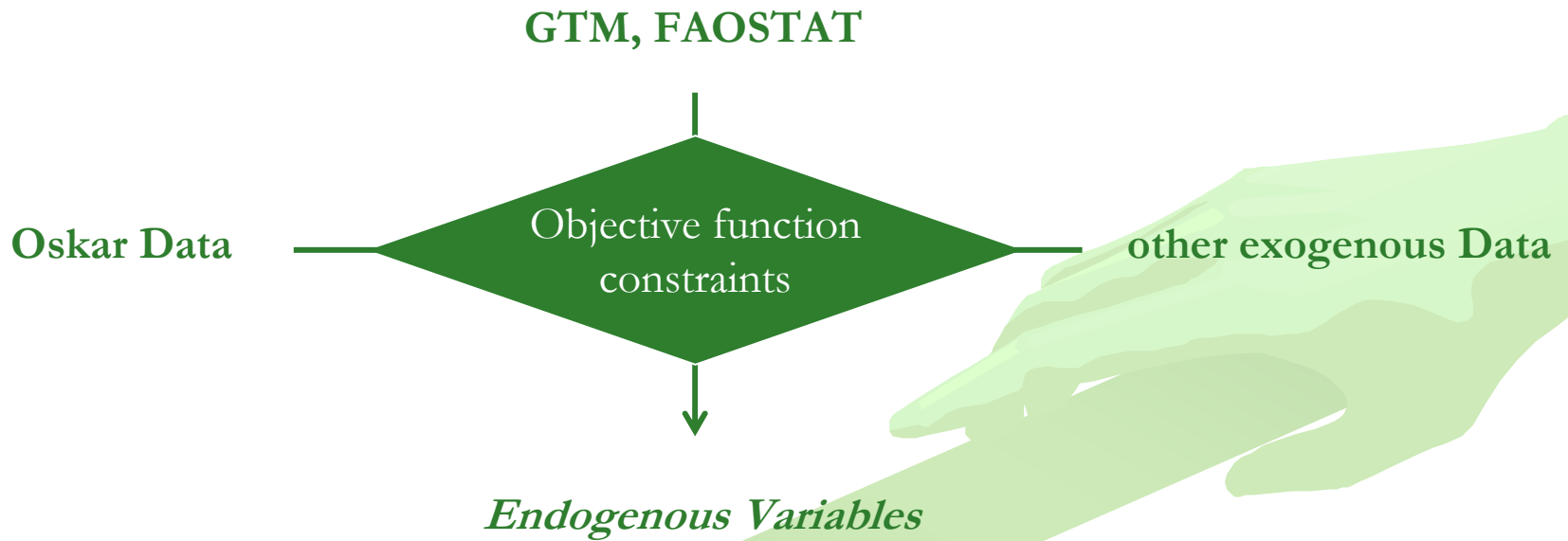
e.g. plywood, graphic paper, panel chips, energy chips....

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Exogenous Data



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OBJECTIVE FUNCTION OF EUFASOM:

$$\begin{aligned} \text{Total Welfare} = & \\ & \text{Consumer Surplus} + \text{Producer Surplus} \\ & + \text{Governmental Net Payments} \\ & - \text{Cost of Production} \\ & - \text{Cost of Transport} - \text{Cost of Processing} \\ & \text{s.t. constraints} \end{aligned}$$

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Constraints:

e.g. Forest Inventory Equations (simplified):

$$fv(\text{period}, \text{cohort}) - fv(\text{period}-1, \text{cohort}-1) \\ - fv(\text{period}-1, \text{oldestcohort})$$

$$+ hv(\text{period}, \text{cohort}) = fia(\text{firstperiod}, \text{cohort})$$

fv.....forest variable (forest area) (ENDO.)

hv.....harvest variable (harvested wood area) (ENDO.)

fia.....forest initial area (*EXO. DATA*)

Constant:

country, soil-type, soil-state, species, owner, management

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FORINVENT_EQU(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT, FORTECH,POLICY)..

FOREST_VAR(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT,FORTECH ,POLICY)

\$(FOREST_DATA(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT,FORTECH,POLICY,

SOILTYPE)AND(FOREST_DATA(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,C OHORT,"ALLTHIN",POLICY,"AREA") OR (NOT YOUNGEST(COHORT))))

- FOREST_VAR(PERIOD-1,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT-1, FORTECH,POLICY) \$((NOT FIRST(PERIOD)) AND (NOT YOUNGEST(COHORT)) AND

FOREST_DATA(PERIOD-1,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT- 1,FORTECH,POLICY,SOILTYPE))

- FOREST_VAR(PERIOD-1,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT, FORTECH,POLICY)

\$\$((NOT FIRST(PERIOD)) and OLDEST(COHORT) AND FOREST_DATA(PERIOD-1,REGION, SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT,FORTECH,POLICY,SOILTYPE))

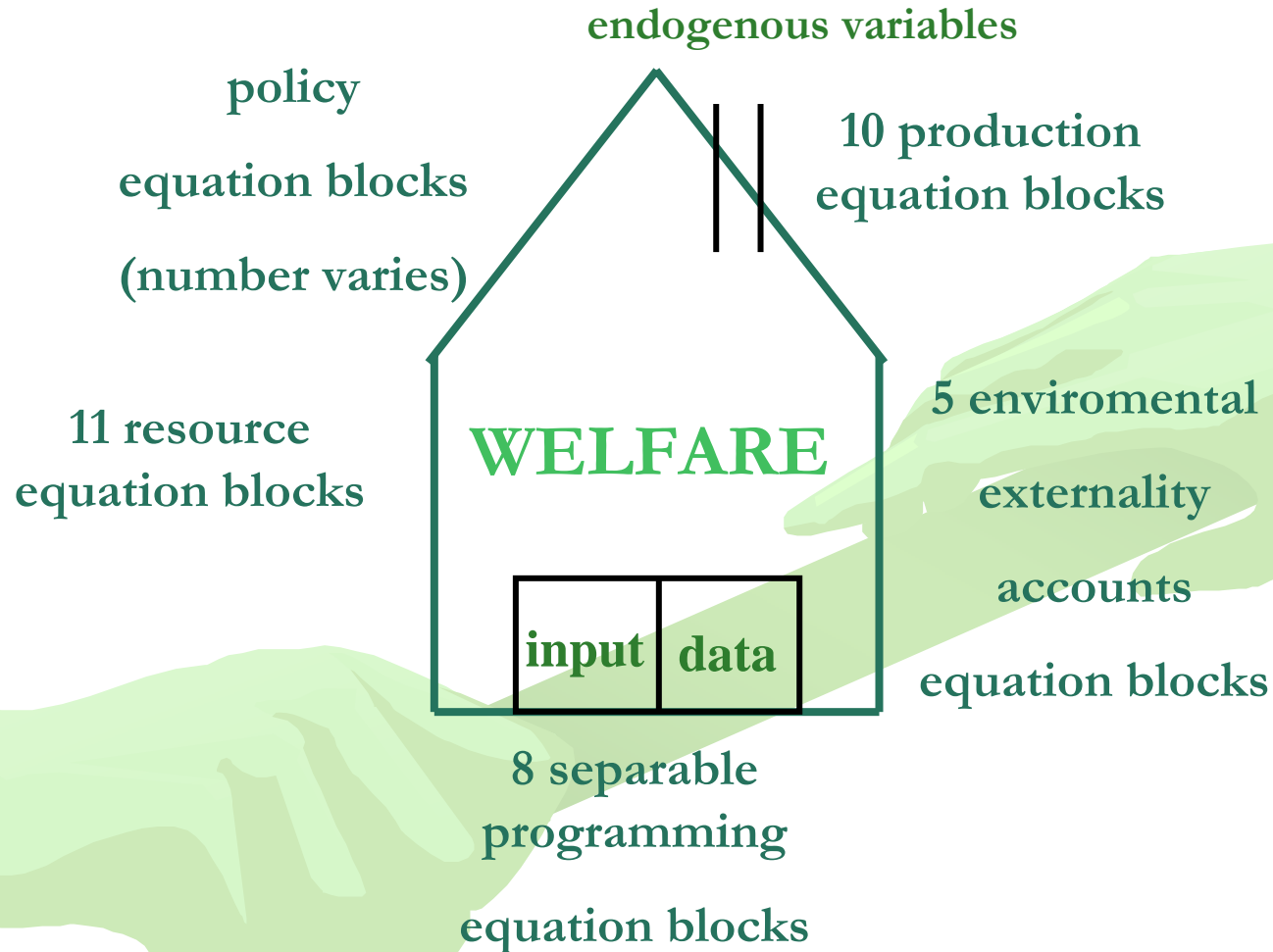
+ HARVEST_VAR(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT, FORTECH,POLICY) \$(FOREST_DATA(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,

OWNER,COHORT,FORTECH,POLICY,"HarvestCost") AND (FOREST_DATA(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT, FORTECH,POLICY,"AREA") OR (NOT YOUNGEST(COHORT))))

=E=INITIALFOREST_VAR(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER, COHORT,FORTECH,POLICY) \$(FIRST(PERIOD) AND

FOREST_DATA(PERIOD,REGION,SOILTYPE,SOILSTATE,SPECIES,OWNER,COHORT, "ALLTHIN",POLICY,"AREA"));

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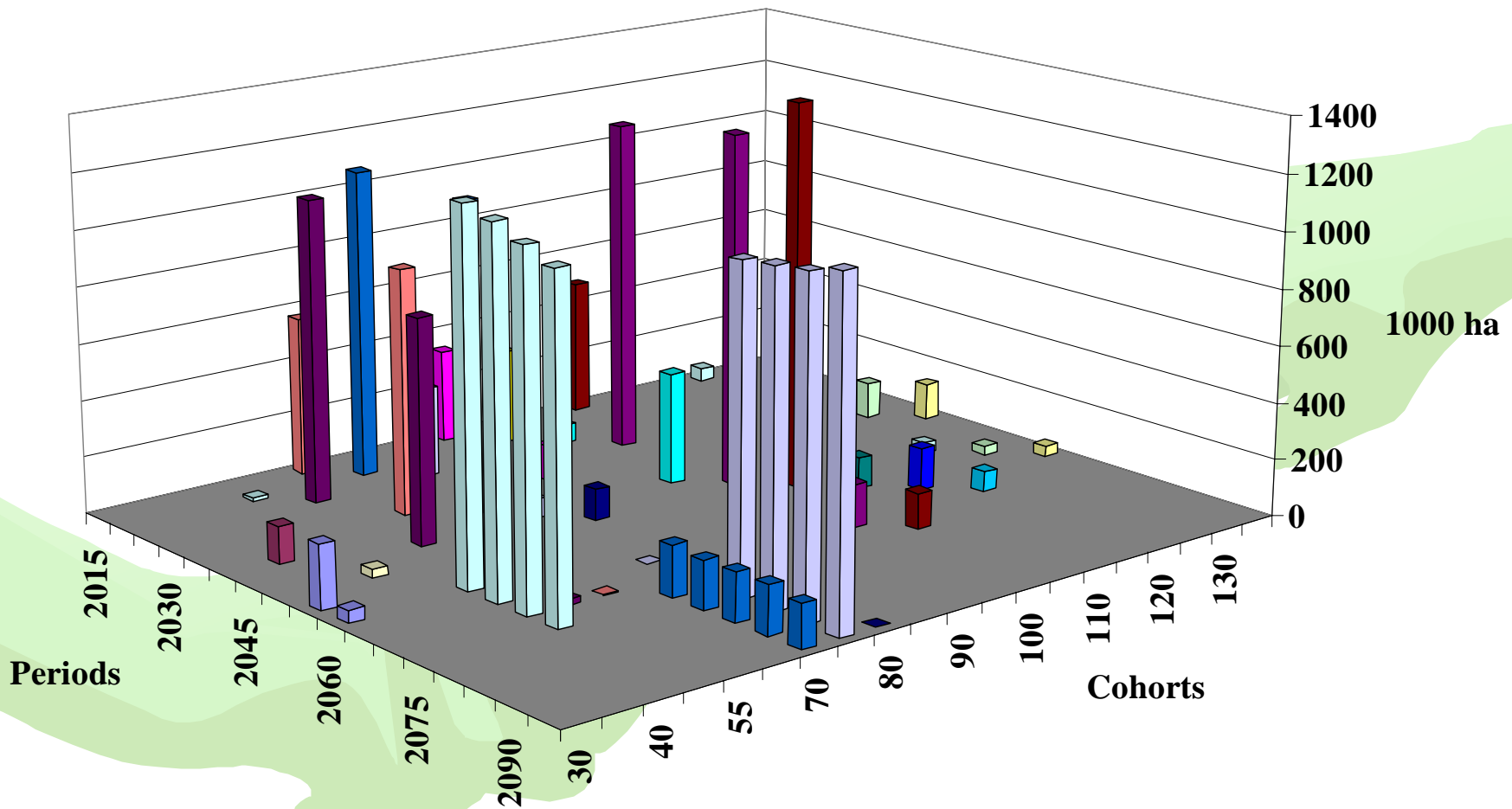
Results

endogenous variables and marginal of equations

- Harvest age
- Harvest species
- Average harvest age
- Species change
- Product prices
- Trade
- ...

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Harvest Area Germany

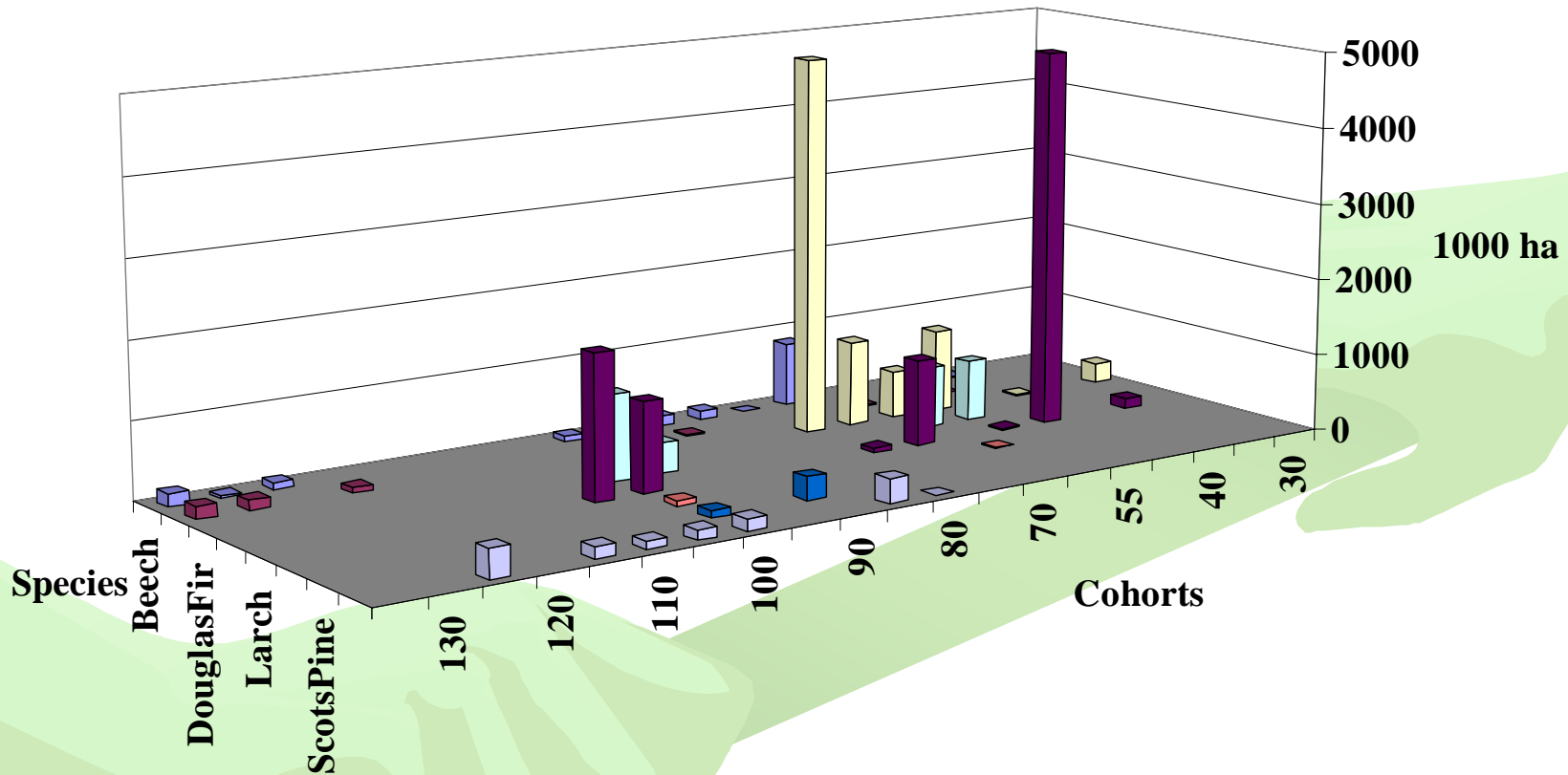


no agriculture , no trade, no carbon tax

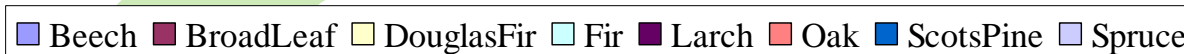
Forestry
Program

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Germany Harvest Area

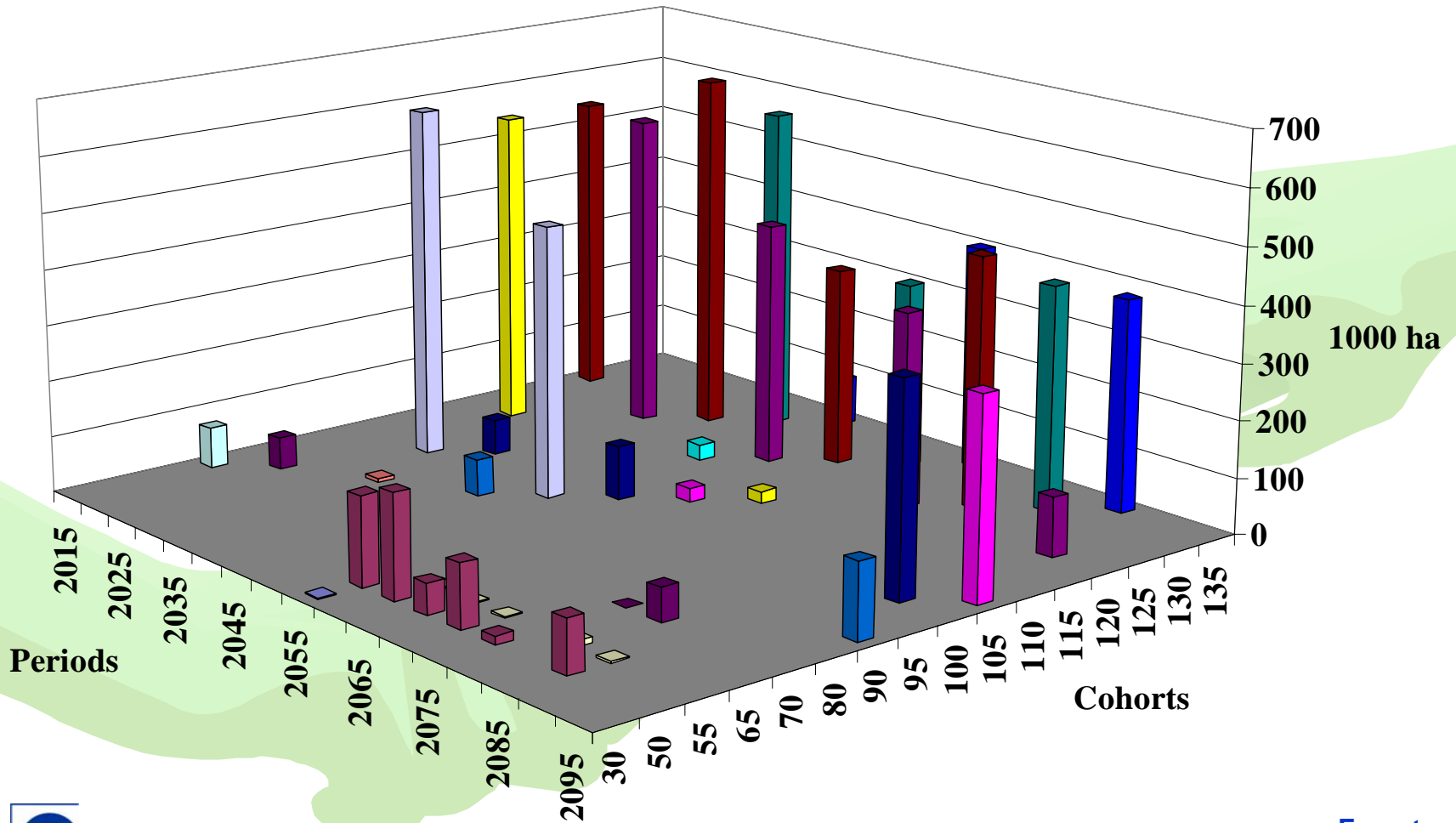


no agriculture , no trade, no carbon tax



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Harvest Area Finland

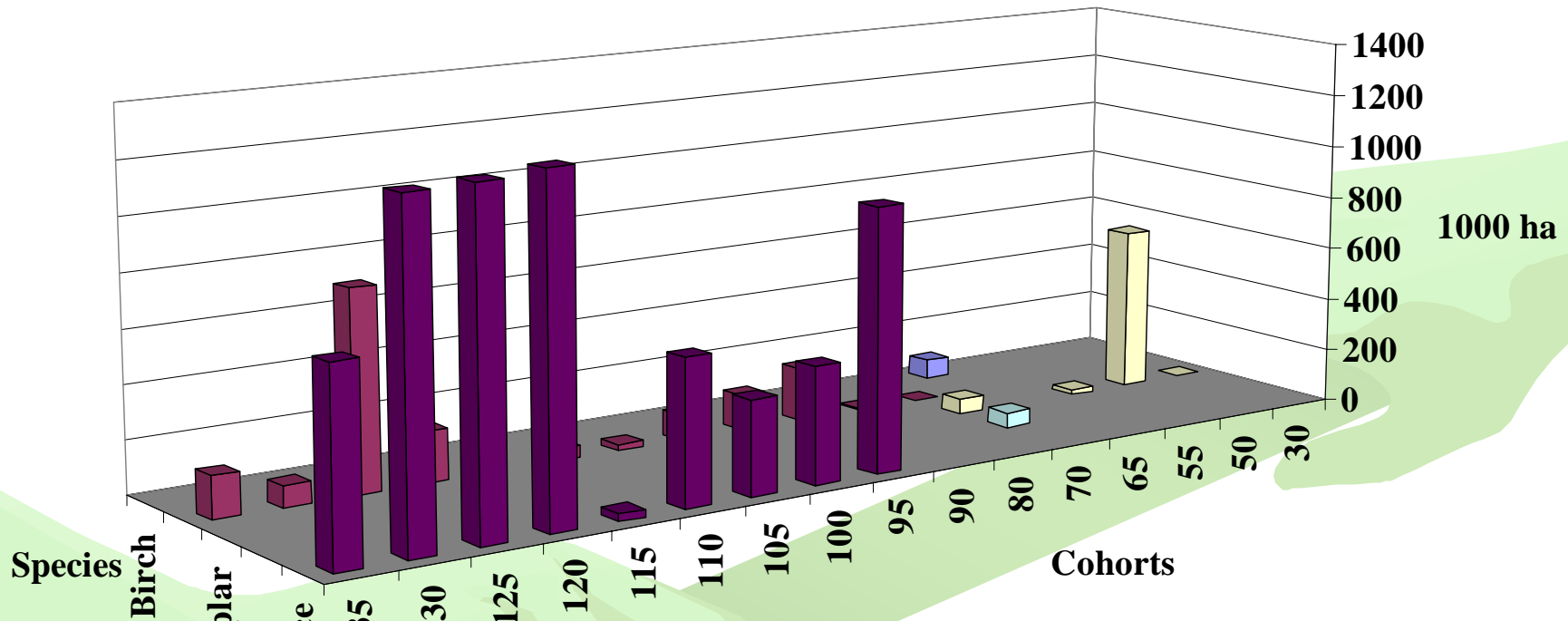


no agriculture , no trade, no carbon tax

Forestry Program

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Finland Harvest Area



no agriculture , no trade, no carbon tax

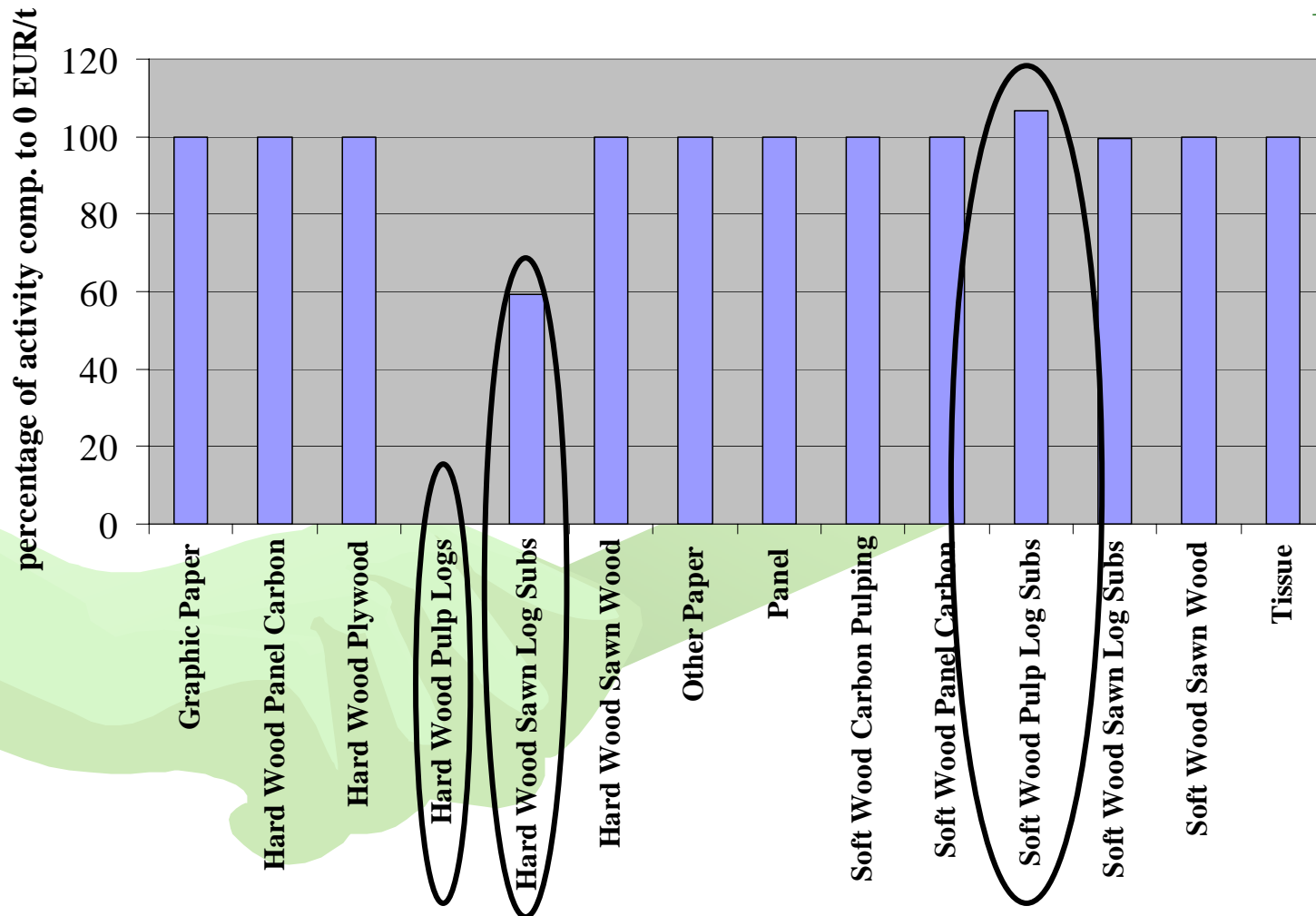


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Germany: percentage to 0 Carbon Tax by a rise of
50 Euro per metric tons Carbon

2020

No trade



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Conclusion

- 1) EUFASOM Forest Sector is established
 - Forest Industry (sawmilling, wood panel, pulp and paper)
 - Physical flows, financial flows
 - Labor effects
- 2) Climate policy analysis is carried out
 - average harvest age is increasing
 - We see substitution effects on the pulpwood market from hard wood to softwood pulp logs
- 3) Future
 - Technology update in cooperation with the EFORWOOD project
 - Assessment of relative competitiveness of harvested wood products
 - Other input updates