

**HOW SINKS IN WOOD PRODUCTS AFFECT THE  
COST OF KYOTO PROTOCOL AND WORLD TRADE  
OF WOOD PRODUCTS:  
results from a global economywide model**

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- **Economywide costs of Kyoto Protocol have been analyzed with countryspecific and global economic models**
- **Very few of these analysis take into account carbon sinks**
  - **Pohjola (J.of Forest Economics, 1999) - Finland**
  - **MIT Joint Program on the Science and Policy of Global Change - Global level**
  - **ABARE – Global level**
- **In this study we are building a global economywide model that takes into account C sinks of forests and wood products**

# The model

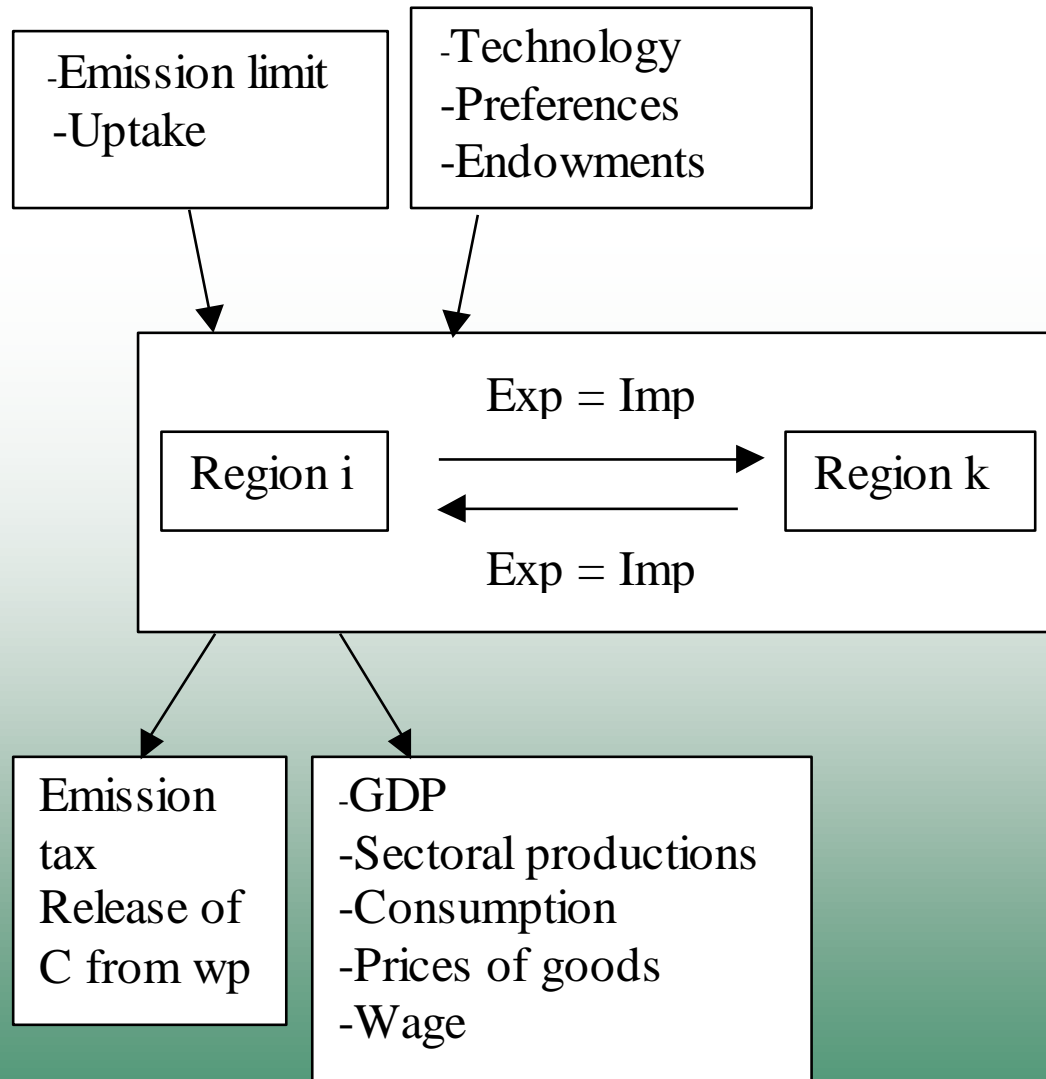
- **Computable general equilibrium (CGE) model**
  - covers whole economy
- **Multiregion**
- **Top down**
- **Optimizing**
- **Recursively dynamic**

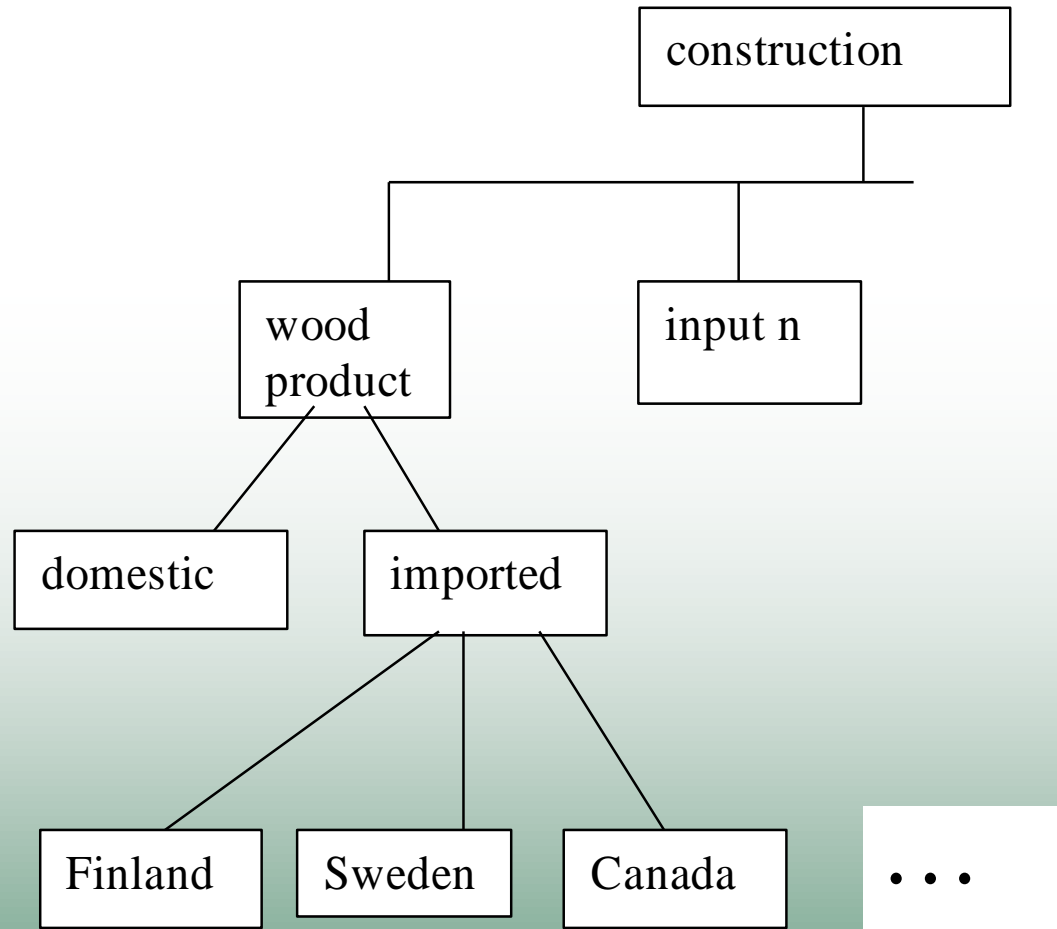
# Regions in the model

- **Canada**
- **USA**
- **Finland**
- **Sweden**
- **Germany**
- **UK**
- **Rest of the Western Europe**
- **Eastern Europe and Former Soviet Union**
- **Rest of OECD**
- **Asia**
- **Rest of the world**
  
- **Japan, New Zealand**

# Production sectors

- **Agriculture**
- **Forestry**
- **Paper and pulp**
- **Wood products**
- **Iron and steel**
- **Other industries**
- **Services**
- **Electricity and heat**
- **Oil**
- **Coal**
- **Gas**
- **Fossil fuel products**
  
- **Construction**





# Modelling sinks

- carbon uptake given as an exogenous input
- carbon in wood products and release of it is modelled (so far not properly)
  - no real lag function
- no recycling, no landfills



- **Economic data**
  - **GTAP database including trade data and national input-output tables with taxes and tariffs**
- **Emissions**
  - **estimates for first commitment period**
- **carbon flows in forest and wood products**
  - **national communications**
  - **Finnish estimates for carbon in wood products**

# Policy scenarios

- **Examples related to atmospheric-flow approach**
- **Emission trading allowed within Annex I countries => marginal cost of emission reduction equalized**
- **Fossil fuel emission limits according to Kyoto Protocol**
  - **i) no sinks**
  - **ii) emission limit adjusted with sinks/sources in forests and wood products, tax on carbon released**
  - **iii) as ii) + subsidy on carbon sequestered**

# Imports of wood products, change compared to reference scenario, %.

	No sinks	Tax	Tax+ subsidy
UK	<b>-0.13</b>	<b>-0.87</b>	<b>-0.16</b>

# Exports of wood products, changes compared to reference scenario, %.

	No sinks	Tax	Tax+ subsidy
Finland	<b>-1.8</b>	<b>-1.4</b>	<b>+0.1</b>
Sweden	<b>-1.5</b>	<b>-1.3</b>	<b>+0.5</b>
Europe	<b>-0.4</b>	<b>-0.7</b>	<b>-0.3</b>
Asia	<b>+7.5</b>	<b>0.3</b>	<b>-0.4</b>
ROW	<b>+0.6</b>	<b>4.7</b>	<b>+3.8</b>

# Conclusions

- **Fossil fuel emission reduction affects the production and trade of wood products**
  - **fossil fuel intensive materials lose competitiveness**
  - **leakage**
  
- **Negative trade effects related to atmospheric-flow approach could be partly compensated by subsidizing C uptake in producing country**

# Future research

- **DATA**
  - **FAO data of trade flows**
  - **carbon in wood products**
  - **forest sinks**
- **Proper lag function – path can be estimated**
- **more policy scenarios (stock-change approach,...)**
- **more detailed results**