

A brief overview of the FIDELIO model

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Short introduction

- Many studies at the European Commission:
 - use standard ***static*** Computable General Equilibrium (**CGE**) models with *small number of industries*.
- **Dynamic CGE models:**
 - incorporate *dynamic behavior* and *institutional constraints* at the aggregate macroeconomic level, usually modeling time through modeling investments
- **Econometric CGE models:** same as Dynamic CGE but estimating all necessary parameters (e.g. price elasticities of supply and demand) - *IGEM model* (Goettle, Ho, Jorgenson et al, 2007).
- **Econometric IO models;** generally deals with economic growth as demand driven and supply constrained, with no assumption of full-employment equilibrium (Barker et al, 2012)

What is FIDELIO?

- FIDELIO is a **dynamic econometric input-output model** developed by the European Commission's Joint Research Center in collaboration with the Austrian Institute of Economic Research and the Joanneum Research.
- Supply and use tables of Eurostat (**TIMESUT** database), and the **WIOD**'s world input-output tables together with the environmental and socio-economic accounts make the **core dataset** of FIDELIO.
- The model captures in an integrated way the interactions of consumption, production, labour market, international trade and the environment.
- **FIDELIO stands for: Full Inter-regional Dynamic Econometric Long-term Input-Output model**



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FIDELIO 1:
Fully Interregional Dynamic Econometric
Long-term Input-Output Model for the EU27

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The dynamic picture comes into play because:

- a) **private consumption** modelling is based on an inter-temporal optimization problem of the choice between durable and nondurable goods,
- b) **capital stocks** and **demands for investments** are obtained using the dynamic neoclassic theory of optimal capital accumulation, and
- c) time is explicitly incorporated in **various behavioural equations**, e.g., accounting for the effect of technical progress due to total factor productivity growth and factor-biased technical progress.



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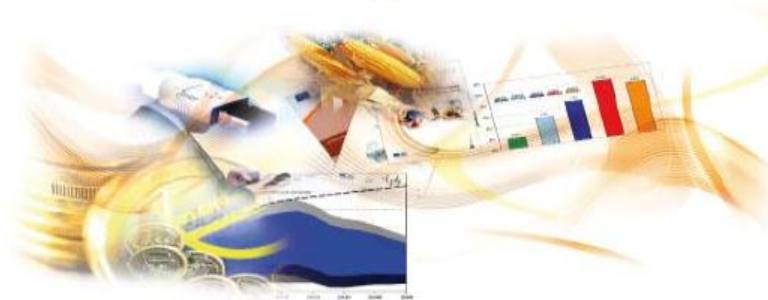
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Carbon-CAP
Consumption-based Accounting and Policy

- Besides **Leontief-type functions**, other flexible functional forms are employed: e.g. intermediate and primary inputs demands are modelled using the **translog** cost approach, while nondurable good allocation is based on the **Quadratic Almost Ideal Demand System** approach (QAIDS).
- Using the **wage curve** literature, wages by labour skill levels are specified as a function of labour productivity, consumer prices and unemployment rates.
- All the necessary parameters of the behavioural equations of the consumption, production and labour blocks are **estimated econometrically** from the appropriate time series data.

Coverage of FIDELIO

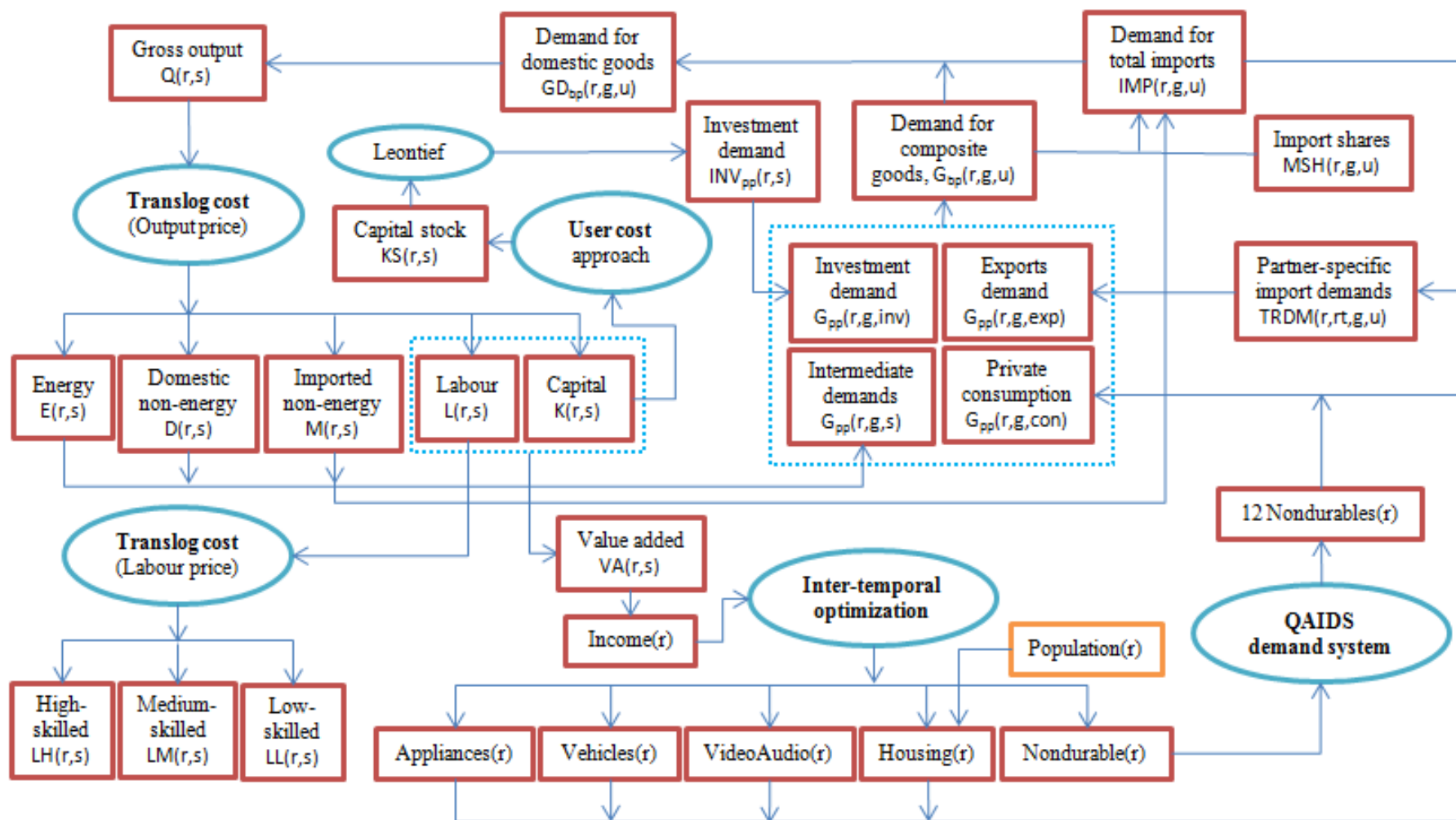
- **Geographical:** EU 27 MS plus US, BR, RU, IN, CN, JP, TK and RoW
- **Base year:** 2007 (revised from 2005)
- **Sectorial:** 59 industries * 59 products (NACE Rev.1.1)
- **Final demand:** 6 categories (CP, NPISH, CG, GFCF, INVENT, X)
- **Private Consumption:** 17 commodities * 59 products (NACE Rev.1.1)
- **Investment:** 59 industries * 59 products (NACE Rev.1.1)
- **Value added:** 5 categories (Wages, SocSec, ConsFC, PTNS, Surplus)
- **Employment:** 3 skill levels, 2 dimensions (hours, persons)
- **Blocks:** 5 (consump., production, labour, trade, environment)
- **Environm. extensions:** 5 (energy, air emissions, land, water, materials)
- **Econometric estimation:** 1995 – 2009 (or latest available) + demogr. variables

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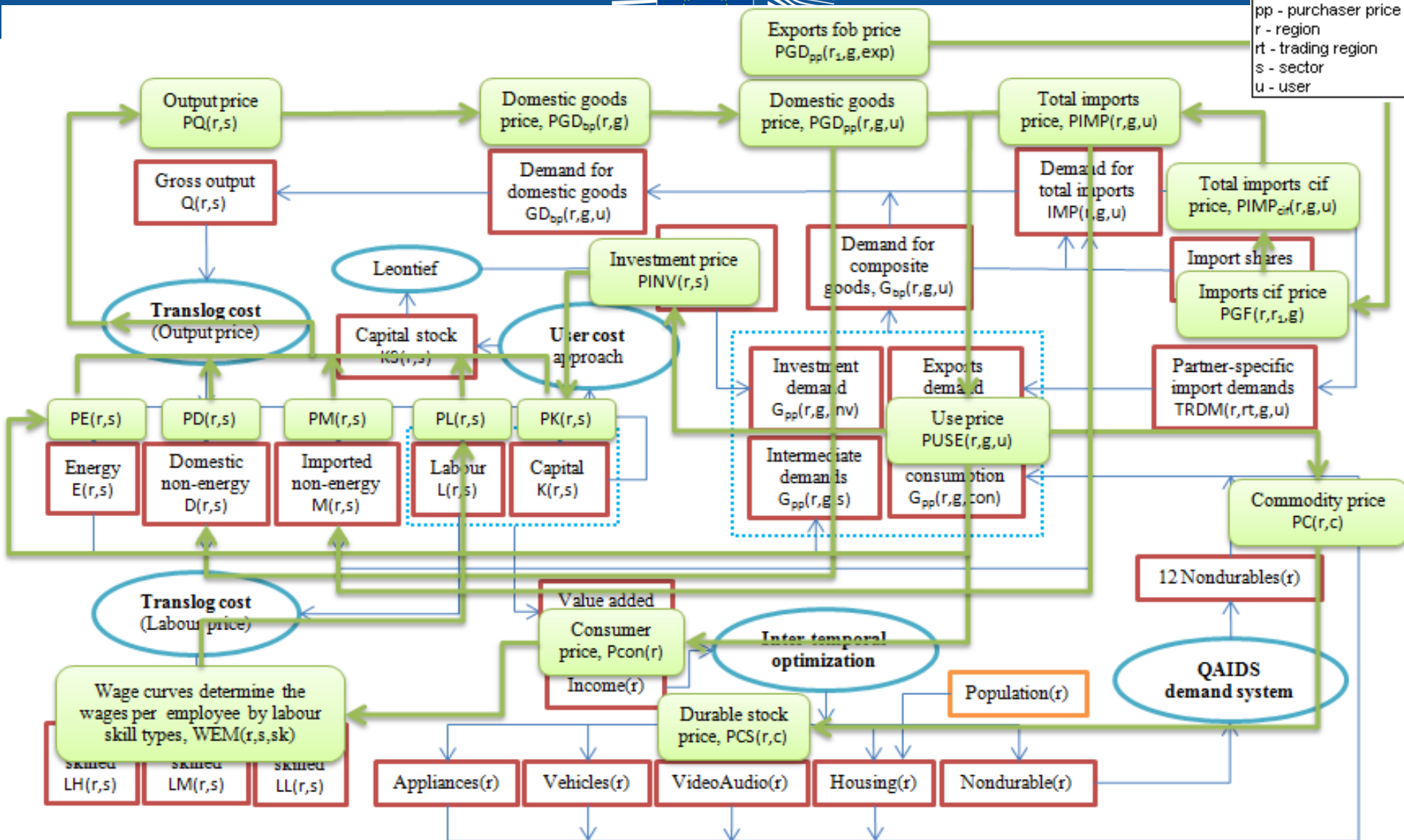
bp - basic price
c - commodity
g - good
pp - purchaser price
r - region
rt - trading region
s - sector
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FIDELIO



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Databases for FIDELIO

- EURSOTAT-JRC (**TIMESUT**) time series of Supply-Use and Input-Output Tables (1995-2007), incl. valuation matrices, for individual Member States
- FP7 funded World Input-Output Database (**WIOD**):
 - Trade, environmental and socio-economic accounts
- Other databases:
 - National Accounts as published by Eurostat;
 - EUKLEMS data for factor demand by industries and factor prices;
 - UN Comtrade for import prices;
 - Odysee database for data on energy efficiency;
 - EUROSTAT/COICOP data for HH consumption commodities;
 - WIFO, ECB, OECD: prices of housing and other durables, energy prices

Potential applications of FIDELIO

- Demand-side vs. supply-side shocks:
 - Consumption (e.g., market based instruments: taxes, subsidies)
 - Production (e.g., external/natural shocks on output supply)
 - Trade (e.g., effects of tariffs and transit costs)

1st case study: Thematic Strategy on Air Pollution (TSAP)

- Reduction of particulate matter (PM) emissions from solid fuel use (biomass and coal) in small combustion sources (fireplace, medium boiler, single house boiler, stoves)
- Impact assessment with FIDELIO: households' appliances demand

Potential applications of FIDELIO

- Assessment of CO2 reduction policies
 - Consumer oriented: changing consumer behavior in using less pollutant-intensive goods, taxing pollution-intensive good consumption
 - Producer oriented: taxation of CO2 emissions by industry (in line with the European market CO2 price)
- Income (in)equality and income distribution aspects (depending on the outcome of FIDELIO 2)
- In general, assessing policies that are related to changes in
 - product-related taxes (e.g., VAT),
 - international transport costs and tariffs,
 - exchange rates,
 - depreciation (e.g., premature scrapping),
 - borrowing ability of households, etc.

Recent improvements of FIDELIO and timeline

- Extending geographical coverage by including US, Brazil, Russia, India, China, Japan and Turkey
- Endogenising the environmental block
 - Linking energy consumption, air emissions and land use
 - Linking economic and environmental variables
- Splitting households demand into different income levels
- Sensitivity analysis (robustness vs. uncertainty in parameters)
- Change of the base year from 2005 to 2007
- **TIMELINE:** Final project meeting 20-22 October 2014 (JRC-IPTS) and preparation of the model for Carbon Cap (from November 1, onwards)



Thank you for your attention!

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