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Community Research

ROLE OF RESEARCH INFRASTRUCTURES FOR A COMPETITIVE KNOWLEDGE ECONOMY

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SEVENTH FRAMEWORK
PROGRAMME



SCALE AND SCOPE

Which Research infrastructures (RIs)?

1. RIs taken as a whole: could be a large budget (EU + MS total budget) significant in the GDP (0.5 – 1.5%):
 - i. Direct macroeconomic effects of the investment (capital stock) could be observed at national and EU level. Can be important at regional and local levels.
 - ii. Indirect impacts through innovation could be important.



SCALE AND SCOPE

2. RIs taken “case by case” (EU level): direct microeconomic effect, at regional and local levels.
3. The nature of RIs can have different types of impacts: e.g. SSH infrastructures *versus* Climate Change observations infrastructures!
4. Relationship between RIs and their contribution for solving “big societal challenges” in the longer term has to be specified.



SCALE AND SCOPE

Which impacts?

1. **Scale and scope** must be clear from the beginning; depend on the usefulness of results for policy making, selection/evaluation or management regarding RI;
2. Addressing economic and technologic issues and **also** societal and sustainability aspects; direct and indirect impacts;
3. Should be assessed against present situation **and** objectives and visions of the future (alternative scenarios or « business as usual » trend).



SCALE AND SCOPE

4. Impact assessment is general:

- economic (cost effectiveness, cost benefit analysis, impact on growth, competitiveness (production factors), employment, macro, meso, micro, EU, national, regional, local levels)
- social (welfare, cohesion, unemployment, quality of life, ...),
- environment and health (local, global, life cycle assessment, ...),
- policy and institutional aspects

Remark: nomenclatures, guide lines accounting frameworks exist for engineers, economists, sociologists, policy makers. They could be useful even if not specific to the « infrastructures » issue.

- Quantitative and qualitative impacts: quantification means development of methods and tools, not only limited to descriptive statistics and economic dimensions; qualitative impacts need structures and common definition.



SCALE AND SCOPE

Which methods?

- Methods and advanced tools must address technological progress, innovation and endogenous growth (growth generated by « externalities » and dissemination of knowledge).
- Should be macro, meso, micro; EU, national, regional, local dimensions.
- Interdependencies between the economics as well techno-economic and social dimensions should be present.
- « Forward Looking » activity is necessary: foresight for defining future scenarios but also forecast, technology assessment, impact analysis (quantitative and qualitative).



STATE OF THE ART

Methods for microeconomic level

- Technico-economic methods; very well known and applied; cost-effectiveness analysis
- « Green accounting »; valuation of damages for cost-benefit analysis. Well known from the large energy intensive industries.
- Socio-economic indicators

Methods for meso and macroeconomic levels

- Detailed economic impacts: value-added, employment, investment, import, export, prices, demand, ...
- Energy, emissions, capacities (until 2050)

These methodologies could be used (with some adaptation) for Infrastructures issues.



STATE OF THE ART

Quantitative methods available in EU

- *Top-down* economic models: GEM-E3, E3ME and NEMESIS, MIRAGE
- *Bottom-up* technology-rich models: MARKAL, POLES and PRIMES
- Quantification and monetary evaluation of external costs: EXTERNE, GREENSENSE and NEEDS
- Accounting frameworks and databases related to renewables and energy efficiency: SAFIRE, GREEN-X and MURE-ODYSSEE



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STATE OF THE ART

Qualitative methods

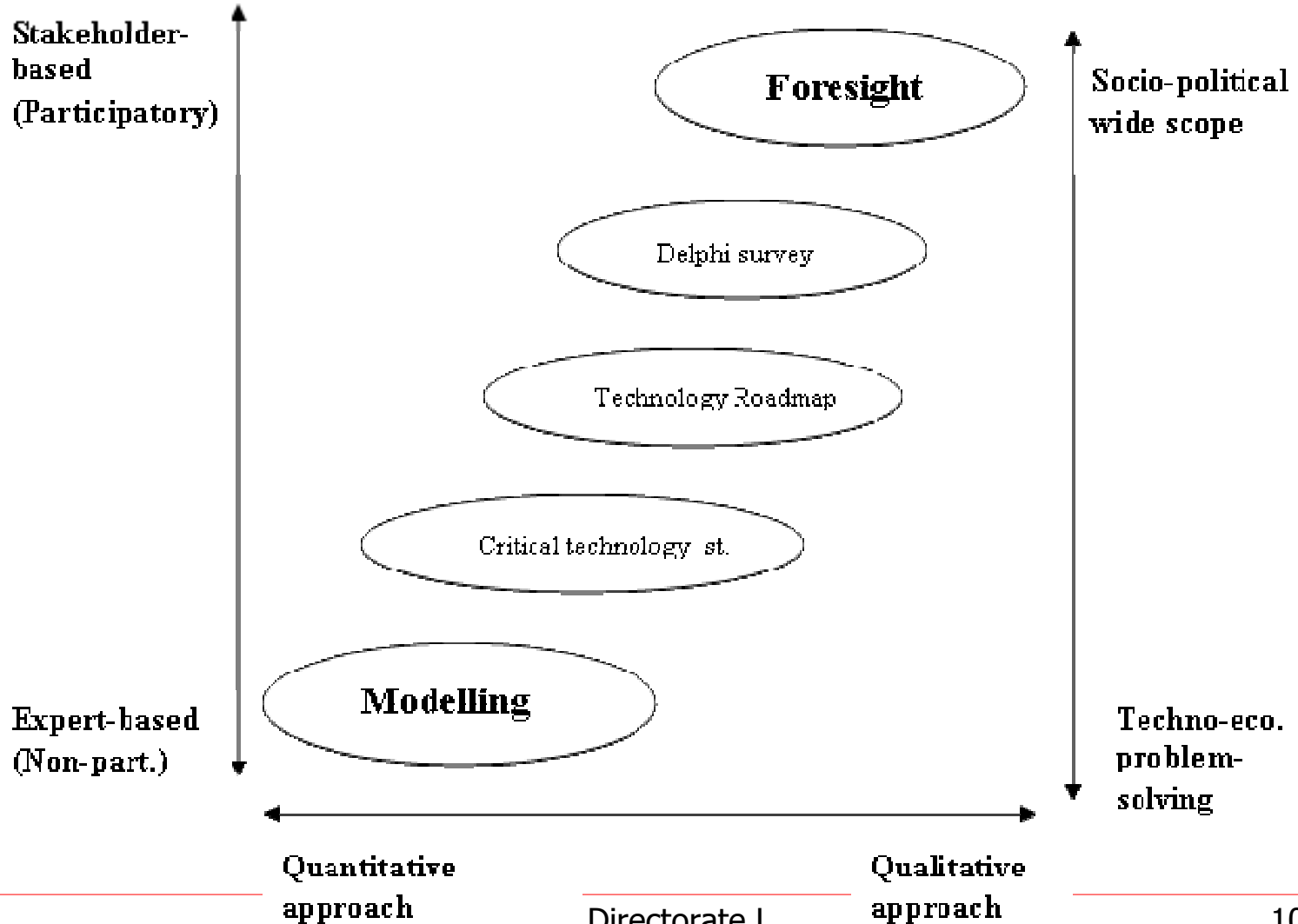
- Delphi method
- Multicriteria analysis
- Public opinion perception
- New indicators
- Participatory methods



SEVENTH FRAMEWORK
PROGRAMME



Advantages and weaknesses





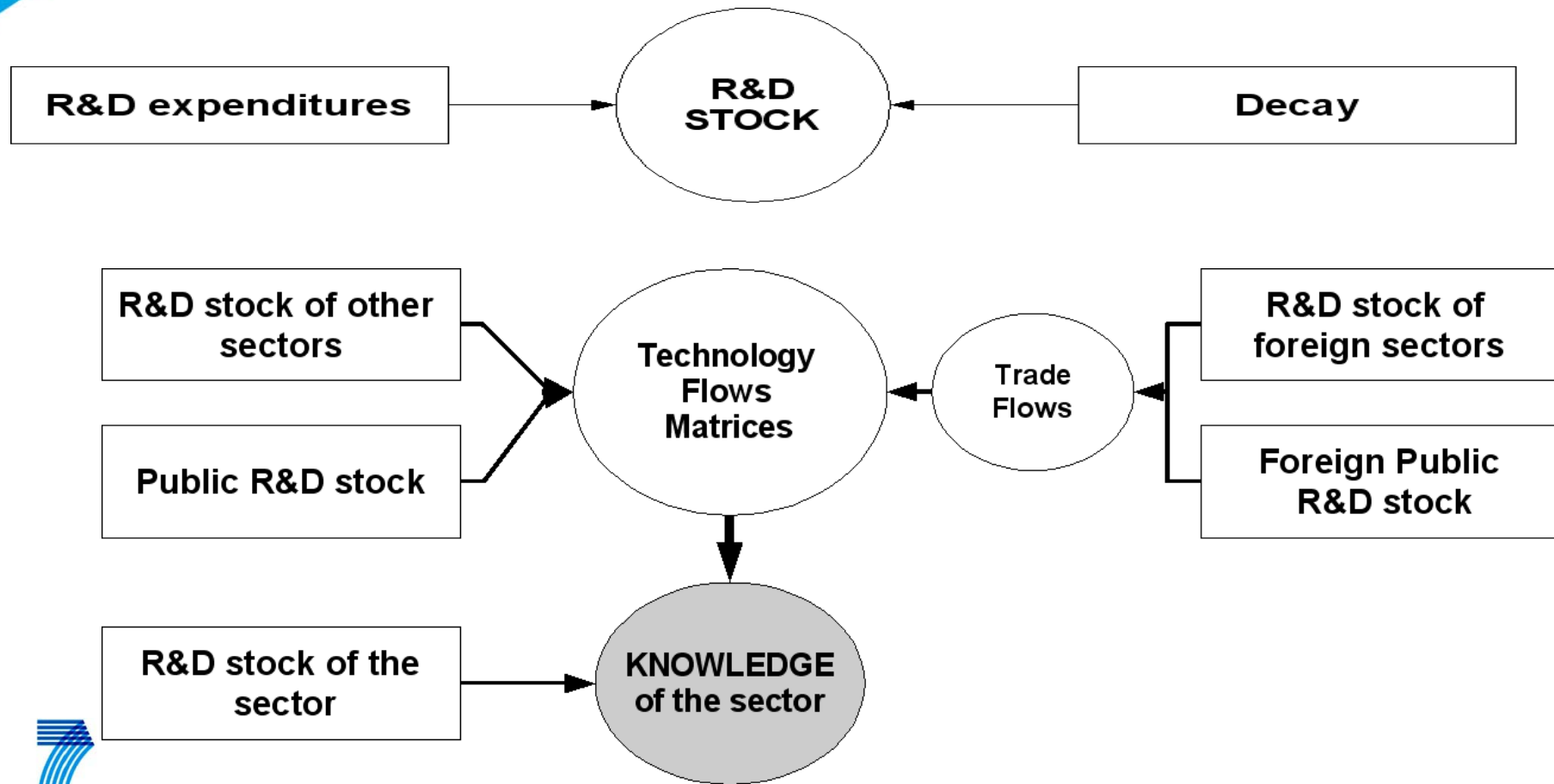
STATE OF THE ART

Technical progress in modelling framework

- *From R&D to knowledge stock*
- *From knowledge to innovation: process and product*
- *From innovation to economic performances:*
 - process innovation in productivity growth:
 - > increase of supply
 - > price decrease
 - product innovation in increase of efficiency by volume
 - > decrease of unit price
 - > increase of demand



Technical progress in NEMESIS

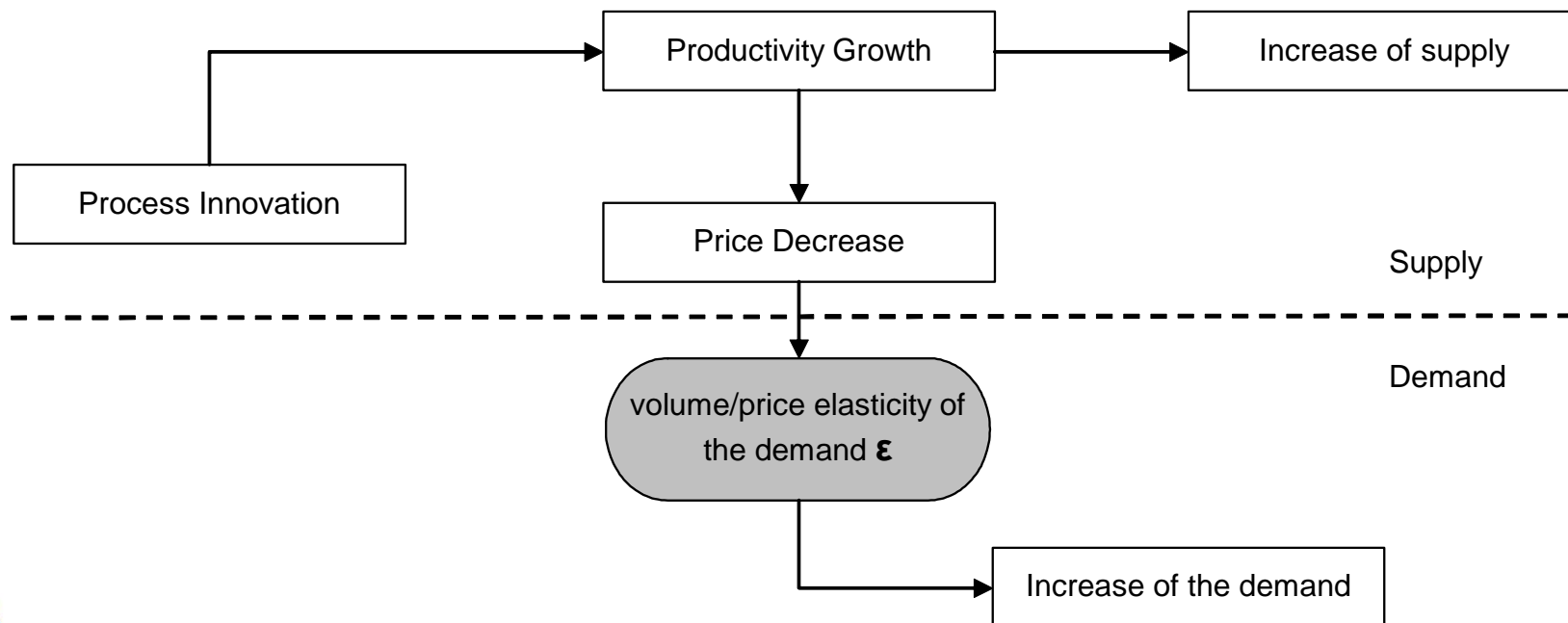




Technical progress in NEMESIS

From innovations to economic performances...

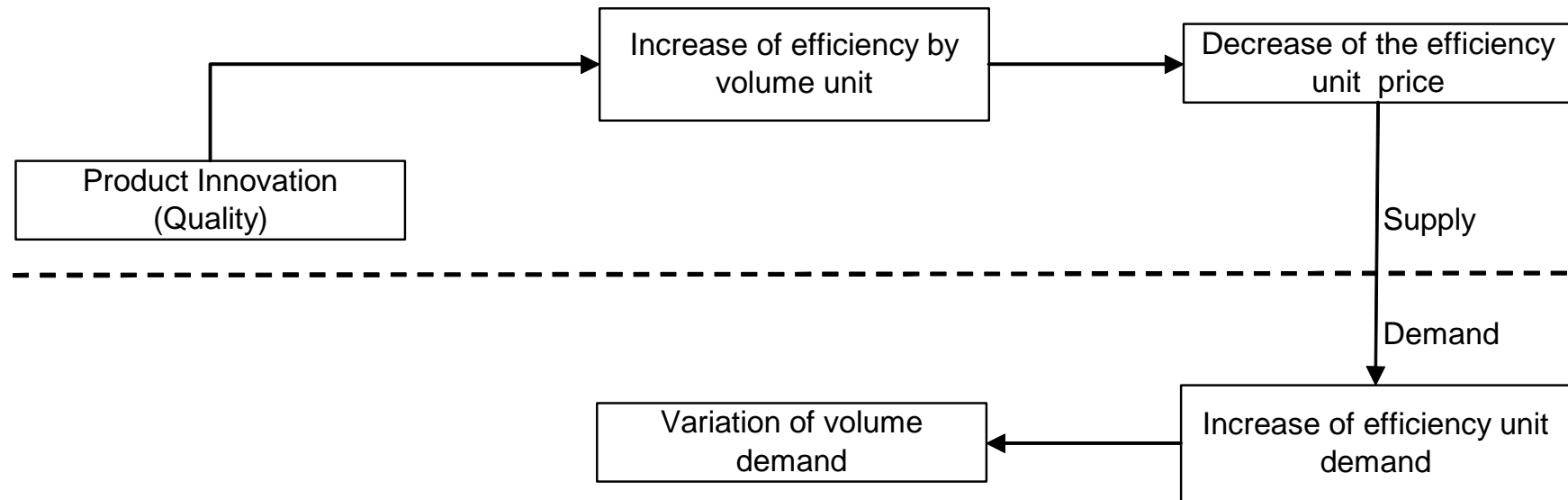
- Process innovation:





Technical progress in NEMESIS

From innovations to economic performances...



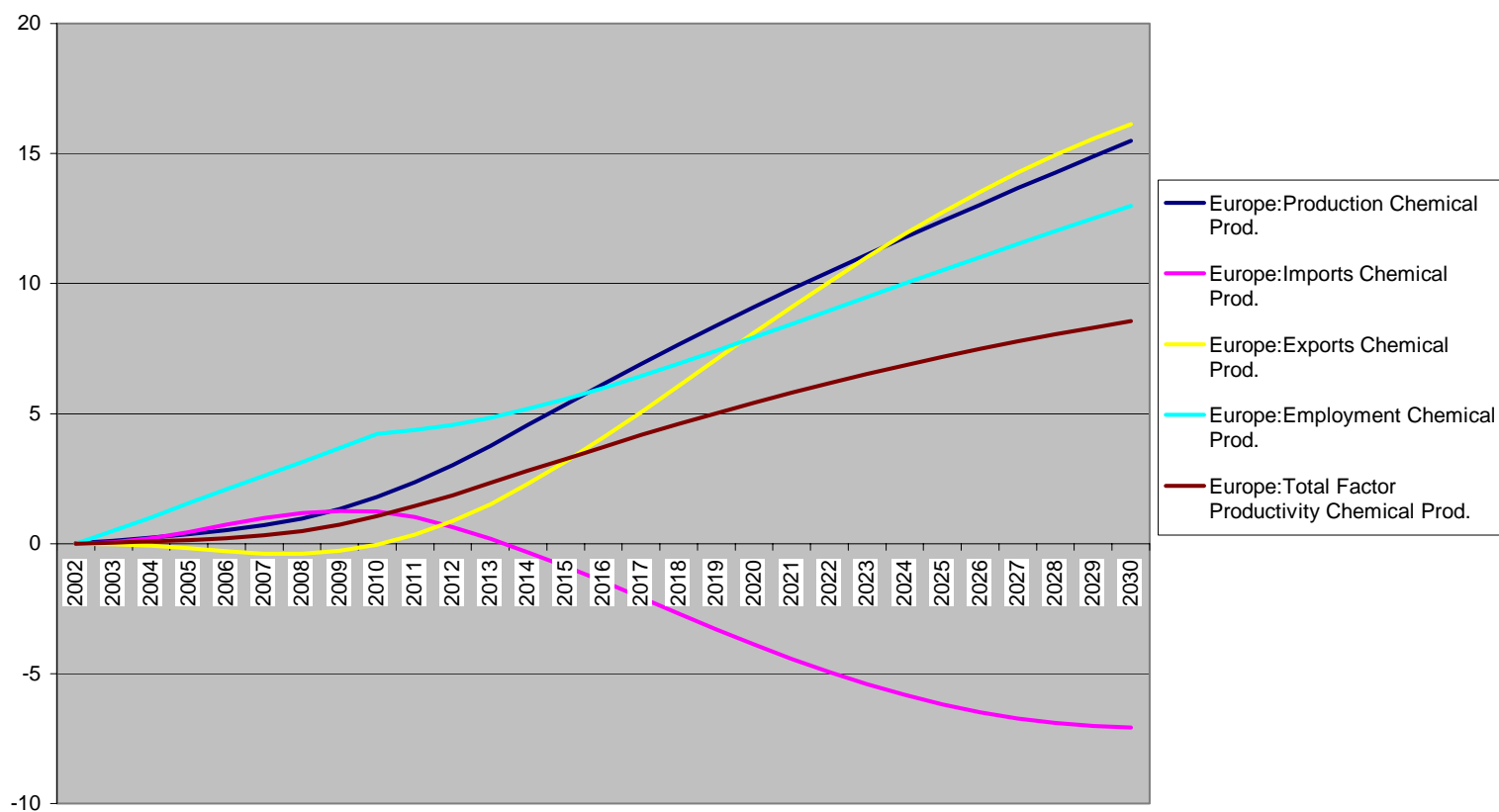


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3% Barcelona Objectives: Sectoral Results for Europe

Results for Chemical Products (in % Deviation w.r.t. the Baseline)



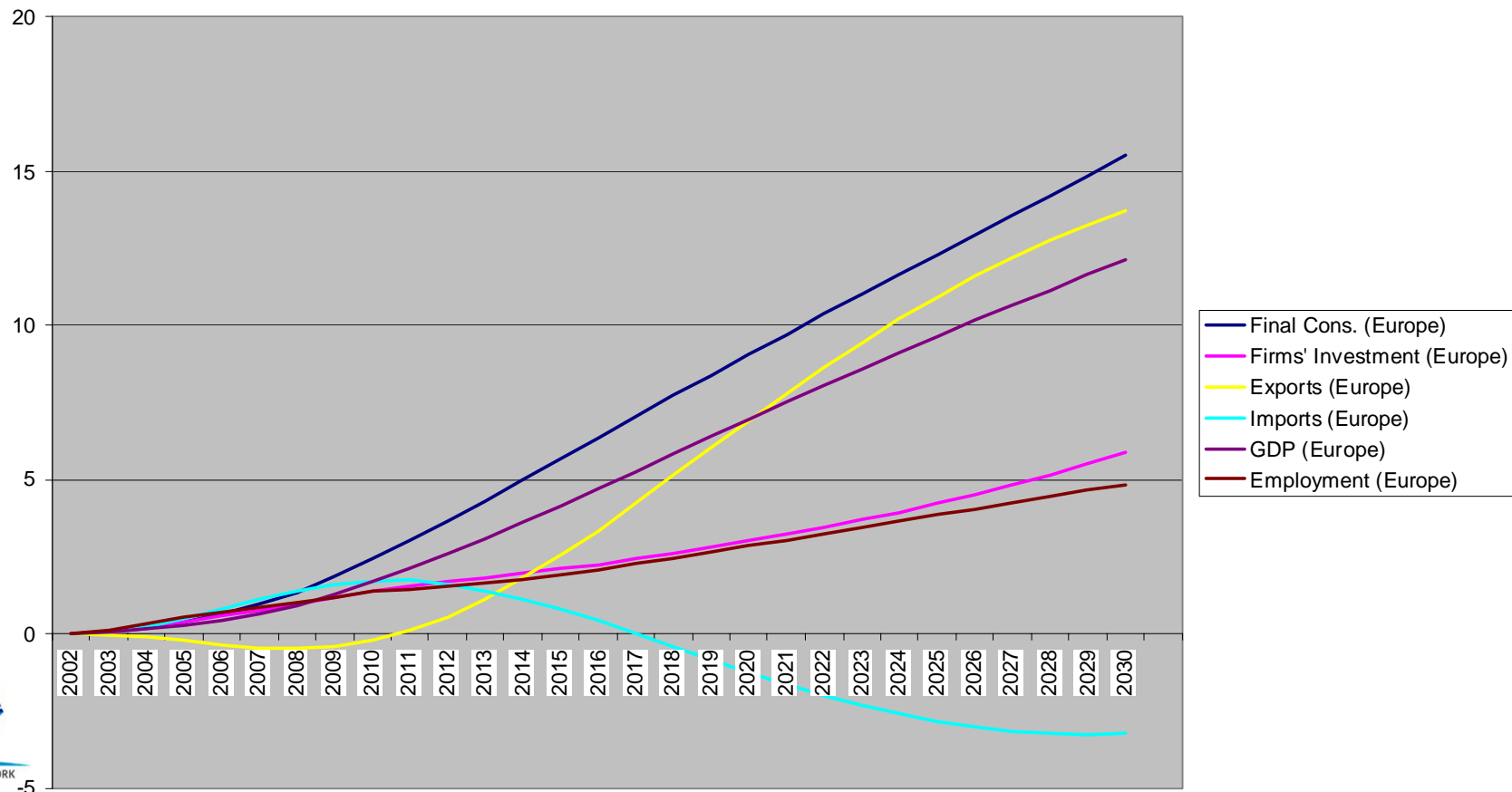


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3% Barcelona Objectives: Macro-economic Results for Europe

GDP and its Counterparts for Europe (in % Deviation w.r.t. the Baseline)

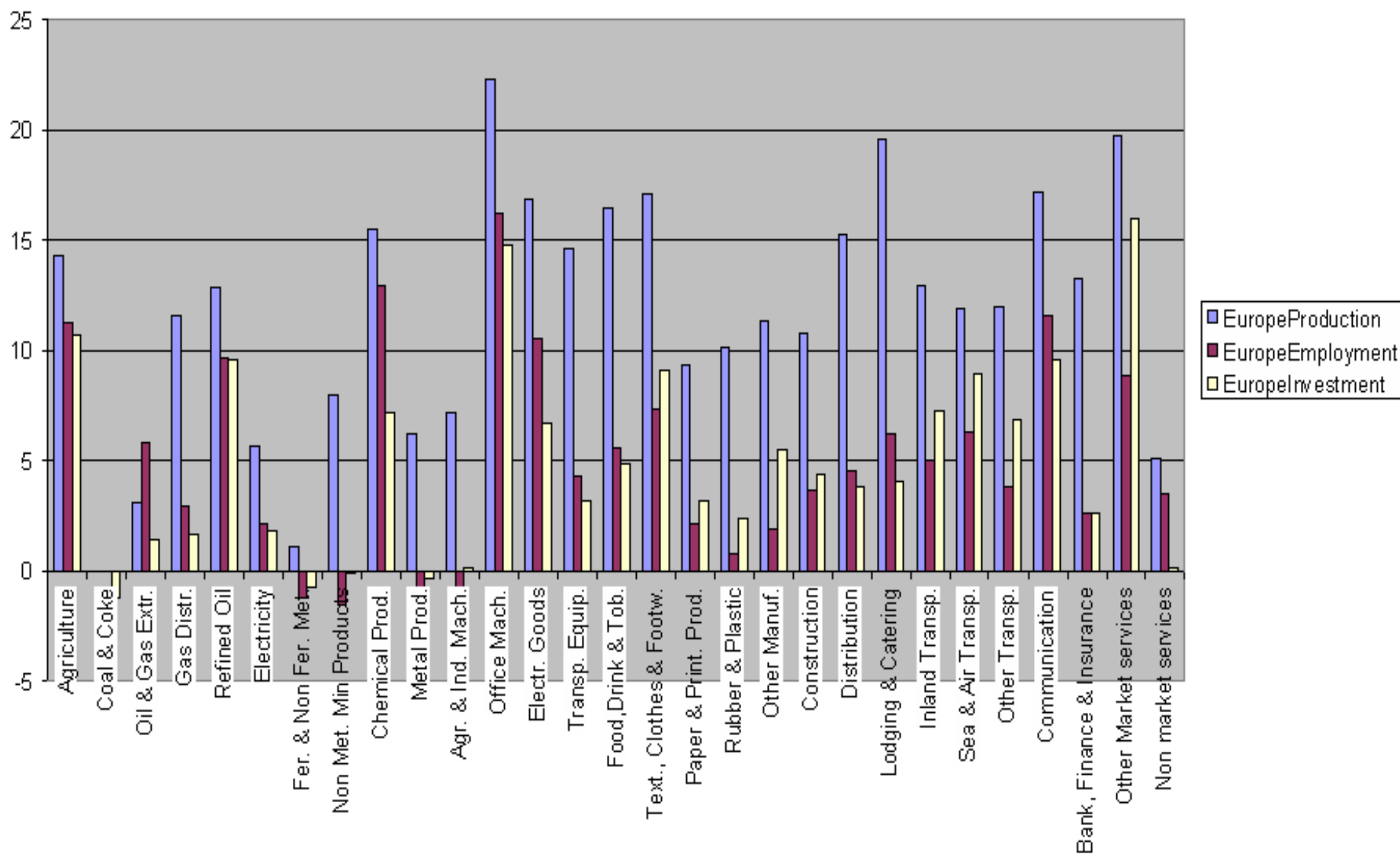




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3% Barcelona Objectives: Sectoral Results for Europe





CONCLUSIONS

- Impacts of large size Infrastructures are important to address in a general context.
- “We don’t start from scratch!”
- Forward Looking (including foresight) should be an activity of infrastructures by itself , useful for EU policy research, Joint Programming and Infrastructures.
- Adaptation of tools is nevertheless necessary, depending on the types of results necessary for addressing the policy and research planning questions; further specific development are necessary (mainly specific RIs microeconomics, research-innovation process).
- Methods and tools should be known and accessible... subject themselves to a dedicated Infrastructure!