Urban Dynamics and Energy Policies

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Motivations

- Transport and oil :
  - A **high oil consumption sector**
  - A **Low price responsiveness**

- Links between **transport demand** and **spatial organization**
  - Location of industrial activities
  - Location of households
  - ➢ Freight and passenger flows

- To what extend can spatial organization cope with transport related oil consumption?
  - Necessity of a **theoretical framework** to assess policies' impacts on **local scale** and **global scale**

Description of the model

- **Objectives**

  - Describe agents' **location choices** and **induced transport demand** under **macroeconomic constraints**
  - Assess impacts of such choice on **energy consumption** and **growth**

- **Methodology**

  National/regional scale

  - Disaggregate the national economy into a **system of cities** in **interaction** and a rural area

  Local/urban scale

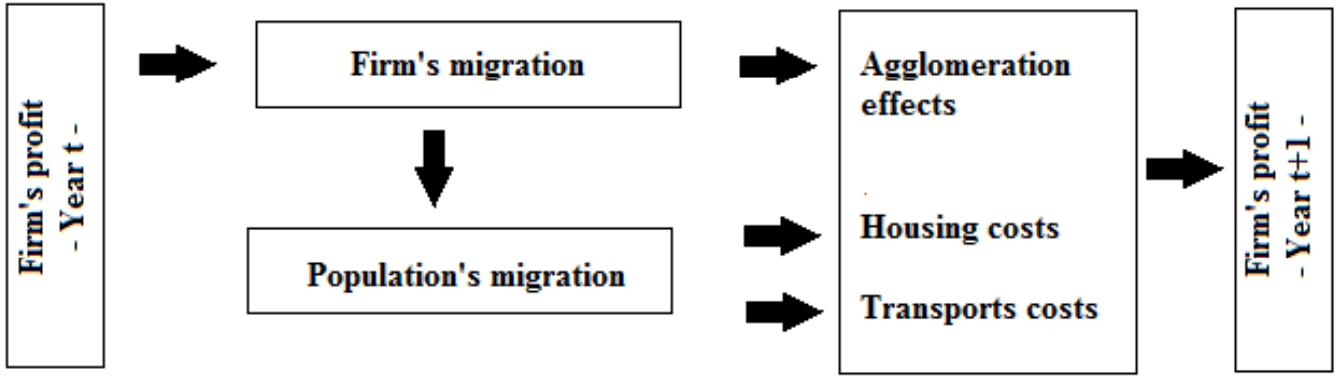
  - Represent the **agglomeration effects** and the **dispersion effects** sparking off the spatial organization

Description of the model

- **Agglomeration effects**: *New economic geography*

- **Dispersion effects:** *Urban Economics*
  - *Commuting costs:* urban form and transport infrastructure endowment
  - *Housing costs*: availability of dwellings and trade-off of households between housing and commuting

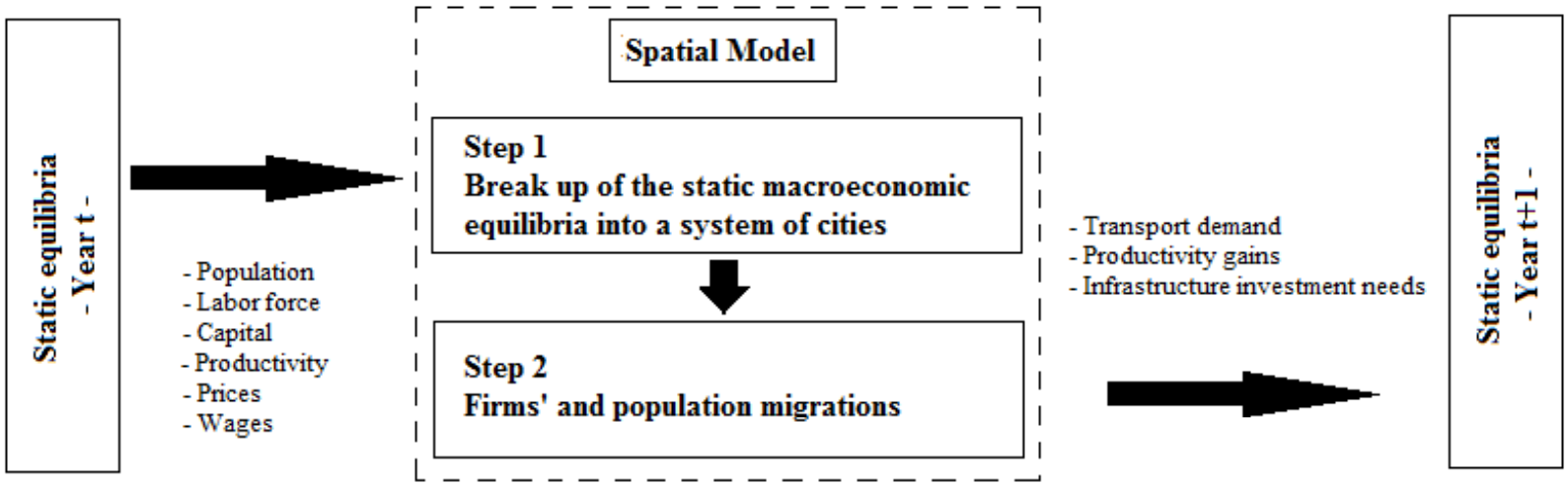
- **Dynamics:**
  - Firms' migration with inertia according to their expected profits
  - Population migration without inertia to find jobs



Description of the model

- Spatial model **coupled with** a CGE modeling framework in order to:
  - **Assess global impacts** of spatial policies
  - **Assess local impacts** of global policies

- Spatial dynamics affect **macroeconomic trends**



- IMACLIM-R : a **multi-sectorial dynamic CGE** model

Calibration on France

- **Setting numeric values to variables** defining the spatial economy at the baseline year to be representative of the reality

- Numeric values must :
  - Ensure consistency with macroeconomic aggregates
    "consistency equations"
  - Satisfy empirical equations at the agglomeration level
    " empirical equations"

- Macroeconomic aggregates derived from **balanced input-output tables**

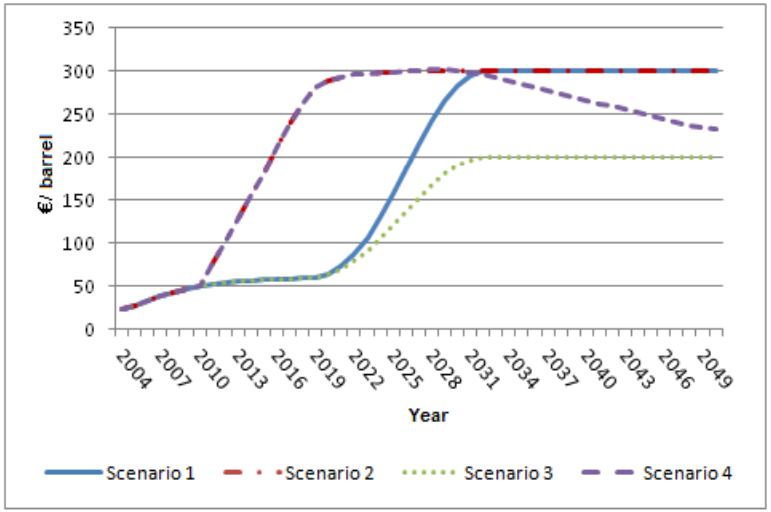
- **Socio-economic variables** characterizing each urban agglomeration derived from **local data**

Presentation of the scenarios

- Scenarios based on **2 macro-energy contexts** and **2 infrastructure policies**

		Infrastructure	
		Low	**Significant**
Macro energy context	**Lose**	Scenario 1	Scenario 3
	Uptight	Scenario 2	Scenario 4

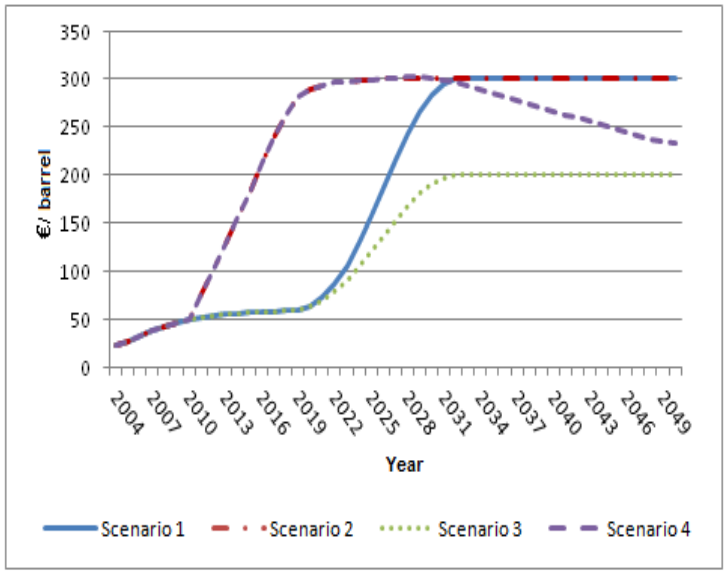
- Impacts of oil stock constraints
- Impacts of carbon regulation



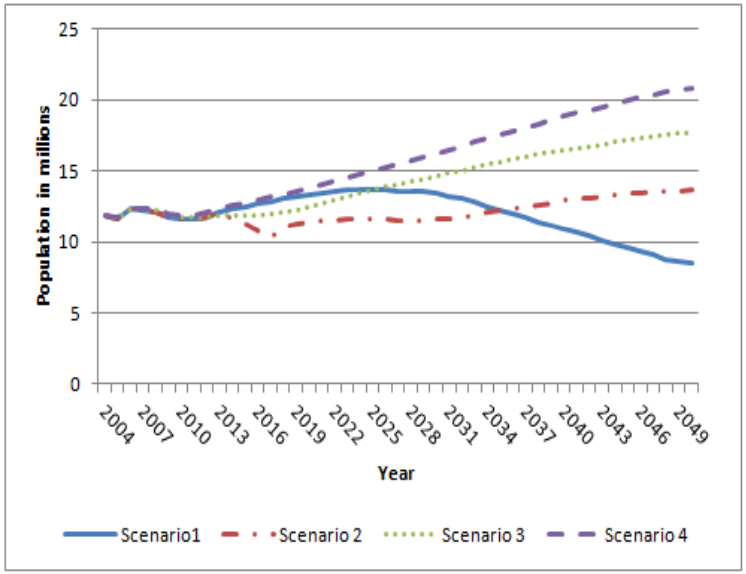
Oil barrel total cost

Results

- **Local impacts** of global policies
  - Oil price affects commuting and housing costs: modification of **bid rent function** and **mode shares**
  - Relative cities' attractiveness depends on **dwellings and public transport endowments**



Oil barrel total cost

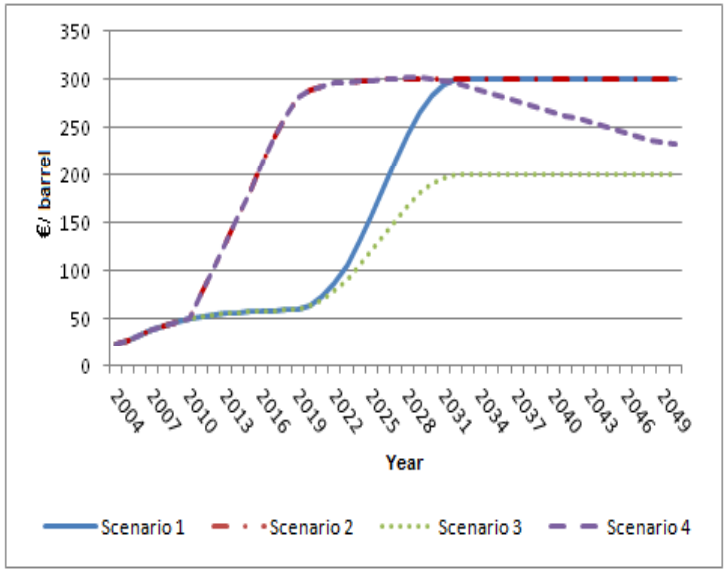


Population in Paris

Results

- **Global impacts** of local policies

  - Spatial organization and oil price modify global transport related oil demand



Oil barrel total cost

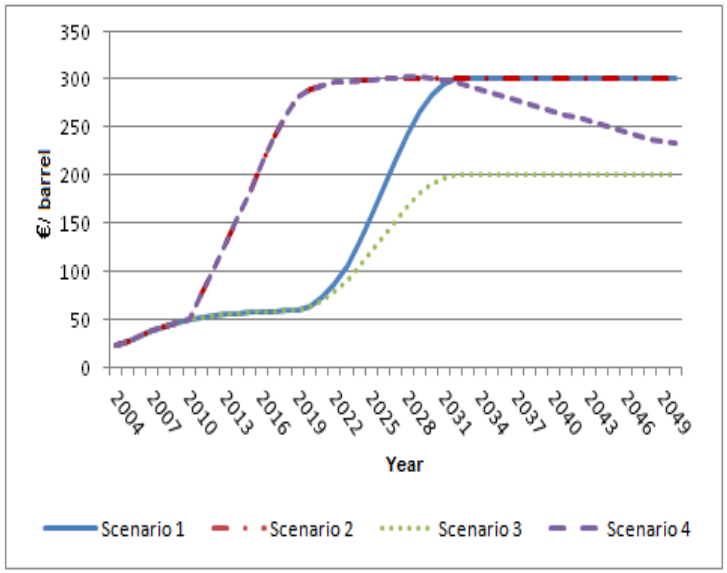
Mtoe	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2030	14.36	12.57	11.49	11.02
2050	15.92	15.11	13.20	12.58

Oil consumption in transport sector

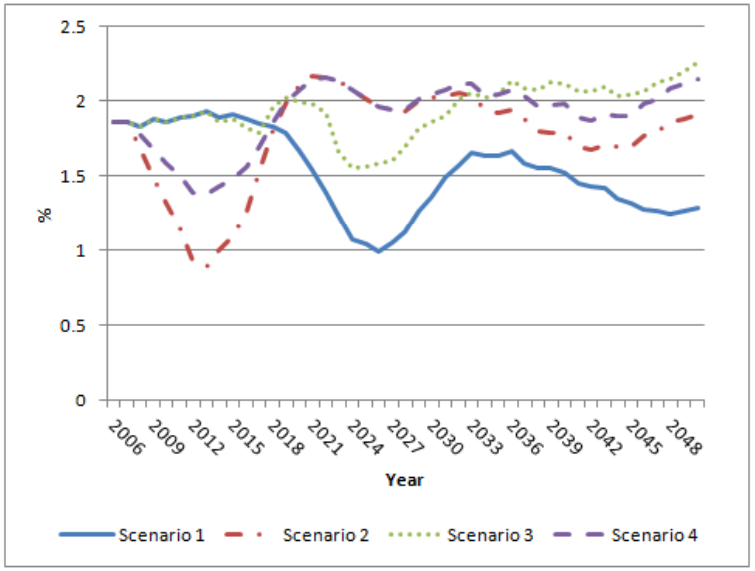
- **New dwellings** reduce commuting distances
- **Public transport** lowers oil consumption
- Earlier re-organization copes with **inertia**

Results

- **Global impacts** of local policies
  - GDP drop limited by **technical change** – energy production and efficiency
  - Modifications of agglomeration effects – **productivity**
    - Earlier re-organization – **inertia**
    - Construction of **dwellings** and development of **public transports**



Oil barrel total cost



Population in Paris

Conclusion

- **Spatial organization** matters in the assessment of energy policies
- **Local policies** have a role to play in the energy situation

But

- **Inertia** of the **urban forms** and of **infrastructure construction** (dwellings and transport networks) have to be dealt with

➢ **Integration between local policies and global policies**

Conclusion

THANK YOU FOR YOUR ATTENTION