

SIXTH FRAMEWORK PROGRAMME
Future and Emergent Technologies

**SPECIFIC TARGETED RESEARCH OR
INNOVATION PROJECT**

EURACE

An agent-based software platform
for European economic policy design
with heterogeneous interacting agents:

New insights from a bottom up approach
to economic modelling and simulation

Duration:

September 1st, 2006 – August 31, 2009

PARTNERS:

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A very large
and
very ambitious
project

GOAL:

**CREATE A FLEXIBLE FULL-SIZE
ELECTRONIC REPRESENTATION OF
THE EUROPEAN ECONOMY THAT
CAN BE USED FOR POLICY-ANALYSIS**

→ ADVANCES IN COMPUTER SCIENCE

AND

**→ ADVANCES IN ECONOMIC MULTI-
AGENTS MODELING**

MAIN PROJECT OBJECTIVES:

SO1 Establish a agent-based computational framework for the study of the macroeconomy according to the agent-based computational approach.

SO2 Provide new insights on the emergence of global regularities in a population of heterogeneous interacting economic agents.

TO1 Develop new software methodologies for implementing, designing and validating large-scale agent-based economic simulations.

TO2. Develop an agent-based software platform to perform simulation experiments on economic policy design for the European Union.

Basic *economic* approach:

Agent based modelling (ACE)

WHAT IS AGENT-BASED COMPUTATIONAL ECONOMICS?

- *Culture-dish approach* to the study of decentralized market processes
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- *Simulation and study* of economies modelled as evolving systems of autonomous agents, typically with *anticipative, strategic, and learning* capabilities

Elements of an ACE model:

- Large number of **ECONOMIC** (social, biologic, ...) **AGENTS**, characterized by their *internal state* and *behavioral rules*
- **ENVIRONMENT**: in which these agents operate: *landscape, communication network, ...*
- **RULES** defining the different interactions : *agent-environment, environment-environment, agent-agent*



VIRTUAL ECONOMIC WORLD

- The modeler sets the initial conditions
- The world then evolves over time without further outside intervention

The world is driven solely by the agents' interactions

The main enhancement of this project on the state-of-art of ACE will be the integration in an unified modelling and simulation framework of different types of artificial markets, including markets for real goods, such as labour, consumption and capital goods, and market for financial assets, such as stocks and debt securities.

In the project we will:

1. Construct agent-based models of different specific markets:

- Labor market
- Consumption goods market
- Capital goods market
- Financial market

Each of the market models will be developed in several “regional” versions: core economies, accession countries, etc. *Institutions* play a critical role.

Markets may include specific
geographical components

Agents can act on more than one market
at once

Agents can move on the landscape

Agents' actions are event-driven

2. Validate the single market models

Compare the aggregate patterns which emerge in the models with macroeconomic empirical regularities observed in real economies.

If the macro-regularities are not satisfied, retune the market model.

A second major enhancement on the state-of-the-art of ACE should be the discovering of general relationships between the emergent aggregate behaviour and the microscopic setting of agent-based models.

3. INTEGRATE THE MARKETS

**4. VALIDATE THE INTEGRATED
MODEL**

5. CONDUCT POLICY EXPERIMENTS

CONTRIBUTIONS FROM
AND PARTICIPATION OF
THE ECONOPHYSICS
COMMUNITY ARE
WELCOME!