The Public Sector in EURACE

EURACE Winter School 2009

Sander van der Hoog

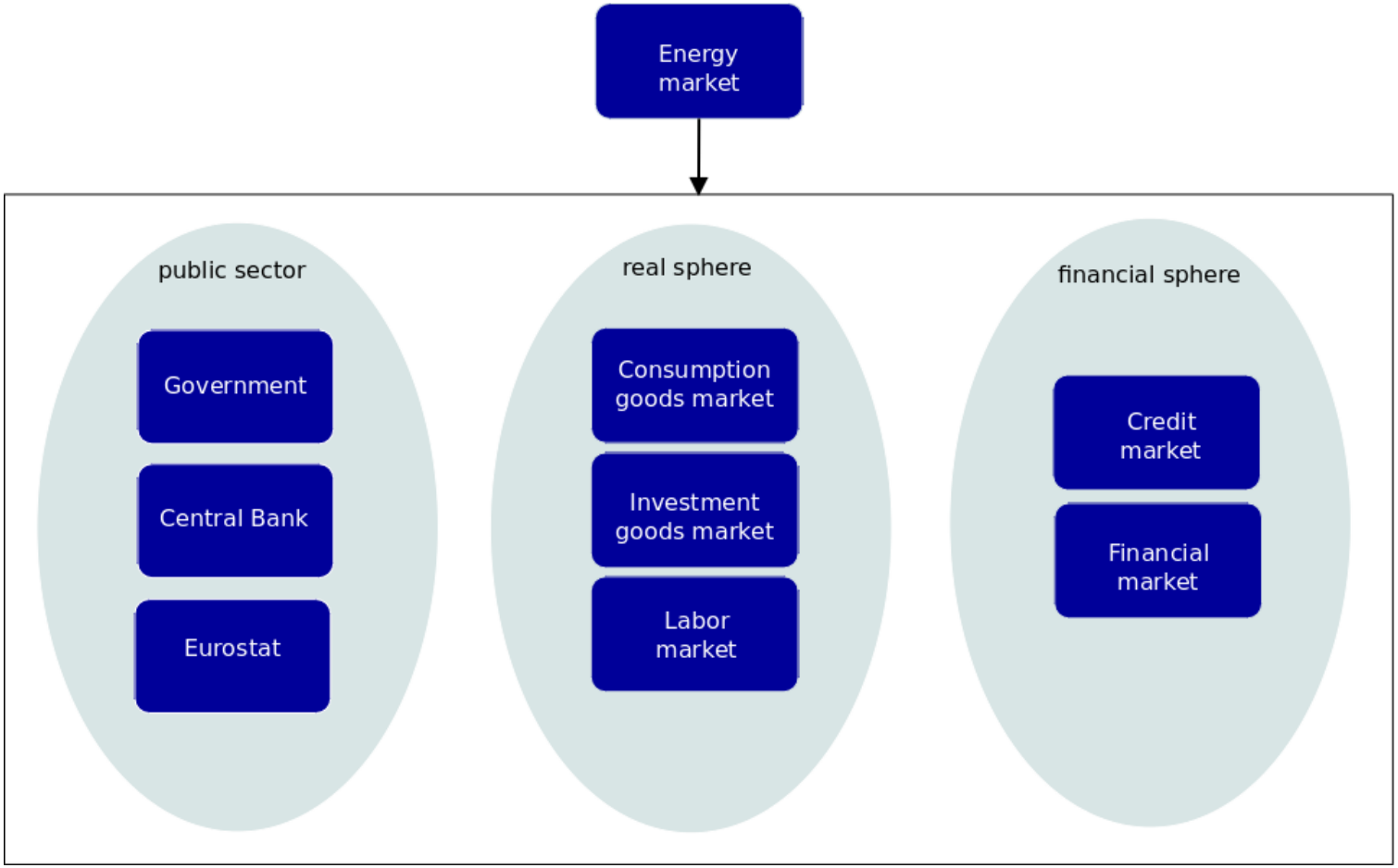
GREQAM, Université de la Méditerranée Aix-Marseille II

18 November 2009

Overview

Topics of this presentation:

1. Main aim of the public sector module
2. The Government module
3. The Eurostat module


Energy market
public sector
Government
Central Bank
Eurostat
real sphere
Consumption goods market
Investment goods market
Labor market
financial sphere
Credit market
Financial market

Main aim

Major policy issue in the EU: Lisbon Strategy (Lisbon, 2000)

> *'The EU should become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion.'*

Objectives of the "Lisbon Strategy for Growth and Jobs" (2005):

- Invest in R&D activities: total (public and private) investment of 3% of Europe's GDP in research and development by 2010.
- Invest in human capital: an employment rate of 70% by the same date.

Research questions

- How do the actions of the Government affect the income of specific groups of people (workers with different skill levels, households in different regions)?
- How do they affect the behavior of the different actors mentioned above?
- How do they affect the factor productivity and the (regional or economy-wide) growth?

The Government module

Features:

- Taxation: income tax, corporate tax (capital gains tax, VAT)
- Unemployment benefits
- Subsidies and transfers
- (Government consumption and investment)
- (Government employment)

Stages of model development

Stage 1: Government only has redistributive functions

- Simple taxation: only income and corporate profit tax (only unemployment insurance fees).
- Expenditures: unemployment benefits, bond interest payments.
- Deficit financing: bond issuing to households, ECB, or fiat money creation by ECB.
- Any surplus is deposited in an account at the central bank.

Budget projection

- The forecast for next year's GDP is a naive expectation that follows from extrapolating the current GDP growth rate:

$$Y^e_{t+1} = (Y_t / Y_{t-1}) Y_t. \tag{1}$$

- Next year's Government income is expected to grow at the same rate as the GDP growth rate:

$$I^g_{t+1} = (Y_t / Y_{t-1}) I^g_t. \tag{2}$$

- Projected Government expenditures:

$$G^e_{t+1} = (Y_t / Y_{t-1}) G_t \tag{3}$$

- Projected Government budget balance (surplus/deficit):

$$B^e_{t+1} = I^g_{t+1} - G^e_{t+1} \tag{4}$$

Deficit financing

When does the Government execute the actual financing of the deficit?

- The Government computes its budget deficit once per month, but enters the bond market on a daily basis.
- The Government runs the budget accounting function each month to determine the monthly budget deficit.
- The Government has a standing facility at the Central Bank that functions as a buffer account to finance ongoing payments.

Deficit financing (cont.)

Financing options:

- Bond financing: The budget deficit can be 100% financed by selling bonds on the bond market to households.
- Quantitative easing: In case of bond market rationing, the unsold bonds can be sold to the ECB, which creates fiat money to buy the bonds.
- Money financing: no bonds are sold, but the ECB directly creates fiat money for the government.

Government balance sheet

Positive cash flows	Negative cash flows
Tax revenues	Investments
	Consumption
	Unemployment benefit payments
	Subsidy payments
New bond issues	Bond interest payments
Total income	Total expenses

Assets	Liabilities
Gov. cash holdings	Outstanding bonds

Stage 2: Subsidies

Stage 2: Government distributes subsidies

- Subsidies are conditional on a specific purpose under which they are granted:
  - a firm can receive a subsidy for internal training of employees that will raise the general skills.
  - a firm can receive an investment subsidy to buy investment goods.
  - a household can receive a consumption subsidy to buy consumption goods.
- The subsidies are non-discriminatory: they are available to all firms or households.

Stage 2: Subsidies (cont.)

- Allows the possibility of regional policies: some subsidies are available in one region, not in the other.
- Firms and households decide whether to apply for a subsidy. The corresponding behavioral rules need to be modelled.
- Firms or households who apply for a subsidy are certain to receive it, and they spend it as required by the Government.

Stage 3: Government consumption and investment

(Stage 3 is not yet implemented)

- Government consumption: Government purchases with CGP (interaction with the malls).
- Government investments: Government purchases with IGP (general expenditure for any capital formation, e.g. infrastructure projects).

The investment and/or consumption can have diverse impacts, such as:

- lowering transportation costs (commuting and/or distribution costs).
- augmenting the productivity of the firms.
- augmenting the productivity of labour.

Stage 4: Government employment

Government buys investment and consumption goods, hires labour, and uses it to produce a public good. (Stage 4 is not yet implemented)

- The Government hires workers with specific characteristics (government officers).
- Hiring can be local or interregional.
- The public good can have diverse local or inter-regional impacts:
  - augmenting the productivity of the firms (technological infrastructure).
  - augmenting the productivity of labour (general skill level).

Stage 5: Government finance

Advanced Government fiscal and monetary policy. (Stage 5 is not yet implemented)

- As in Stage 1, but in addition the Government has a more refined financial policy; smoothing expenditures in response to macroeconomic variables.
- It manages its debt and/or surpluses on the money and bond market according to standard fiscal and monetary policy rules.

Implementation details

- At the start of the year: the Government announces new policies by sending a general

```
policy_announcement_message:
 gov_id
 tax_rate_corporate
 tax_rate_hh_labour
 tax_rate_hh_capital
 tax_rate_vat
 unemployment_benefit_pct
 hh_subsidy_pct
 firm_subsidy_pct
```

- At the start of the year: all agents read the Government policy announcements (only from their own Government).
- Store that information in memory variables for later use.
- When an agent applies for any payment (benefits, subsidies, or transfers) it sends a notification message to its Government.

- List of notification messages:

```
tax_payment_message(gov_id,tax_payment)
unemployment_notification_message(gov_id,unemployment_benef
hh_subsidy_notification_message(gov_id,subsidy_payment)
firm_subsidy_notification_message(gov_id,subsidy_payment)
hh_transfer_notification_message(gov_id,transfer_payment)
firm_transfer_notification_message(gov_id,transfer_payment)
```

- Government computes total payments by looping over these notification messages each day and also computes monthly and yearly sums.

Other messages in the Government module

- When households become unemployed *during* the month, they send an `unemployment_notification` message to their Government immediately.
- At the end of the subjective month all agents send their `tax_payment` message, read by the Government daily and added to the Government's payment account.
- At the end of the year Eurostat sends multiple `data_for_Government` messages (one for each region) that contains the data for that region.

Eurostat module

Aims of the Eurostat module

Data collection:

- Micro to macro: construction of macro variables following statistical procedures of real Eurostat.
- Macro to micro: feedback to micro-level (downward causation). The macrovariables influence the behavior of Governments, Households, Firms, Banks.

Aims of the Eurostat module

Spatial levels:

- Regional data for a single region
- National data for a set of regions belonging to a Government (`region_list`)
- Supra-national data for the economy as a whole

EU-27:

- 268 regions (the number of NUTS level 2 regions)
- 27 states
- 1 supranational entity

Contents of Eurostat memory

- Constructed data: GDP, CPI, inflation rate, total output, unemployment rates, ...
- Stores histories of monthly and quarterly statistics
- Stores month-on-month growth rates and 'monthly based' annual growth rates.
- Stores quarter-on-quarter growth rates and 'quarterly based' annual growth rates.
- Measuring imports and exports between regions.
- Firm demographics: firm birth and death rates, firm survival rates.
- Indicators for the start and end of recessions, duration of recessions.

History storage

The memory of the Eurostat agent contains a moving history of monthly and quarterly data:

- cpi
- gdp
- output
- employment
- unemployment rate averaged
- unemployment rate per skill level
- wage averaged
- wage per skill level
- number of active firms
- number of firm ‘births’ (reactivations)
- number of firm ‘deaths’ (bankruptcies)

GDP computation

GDP can measured using three different approaches:

1. The 'expenditure' approach: measures total expenditure on finished or final goods and services produced in the domestic economy.
2. The 'production' approach: measures the contribution of each economic unit by estimating the value of an output (goods or services) less the value of inputs used in that output's production process.
3. The 'income' approach: measures the incomes earned by individuals (e.g. wages) and corporations (e.g. profits) in the production of outputs (goods or services).

$\longrightarrow$ Here: we use the expenditure approach.

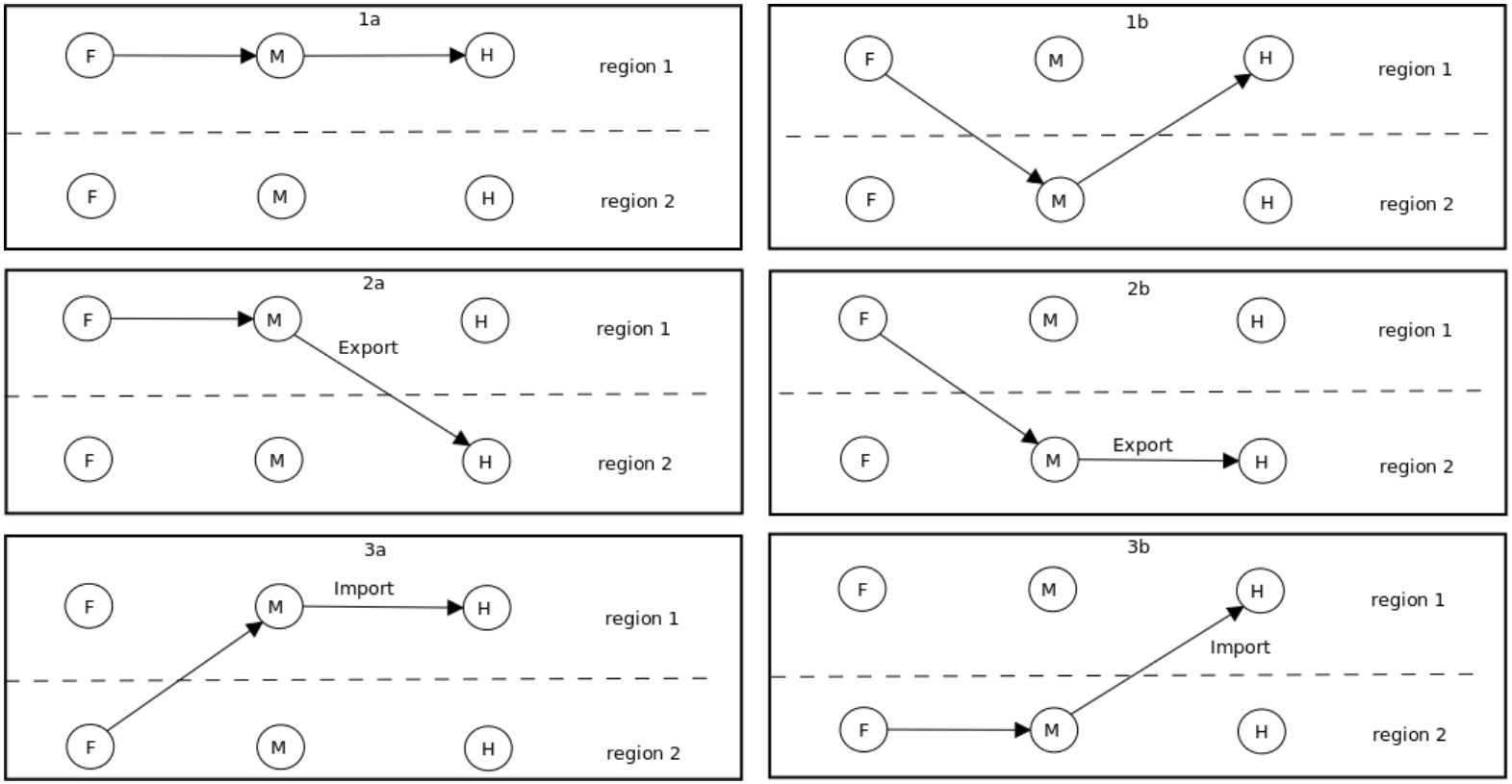
GDP computation (cont.)

$$GDP = \sum_{h \in H} C + \sum_{f \in F} I + \sum_{g \in I_g} G$$

- Household consumption expenditure: aggregated by the mall on a transaction basis
- Firm investments: aggregated in the IGFirm as revenues from selling investment goods
- Government consumption: aggregated by Eurostat

Imports and exports

From the perspective of region 1:



Indicators for the start/end of recessions

The definition for the start of a recession:

Definition

A recession begins at the beginning of the month at the start of two successive quarters with negative GDP growth: $X_{t+2}/X_{t+1} < 1$ and $X_{t+1}/X_t < 1$, where X_t is quarterly GDP.

The definition for the end of a recession:

Definition

A recession ends at the beginning of the month following one quarter with positive GDP growth after the start of a recession: $X_{t+k+1}/X_{t+k} \geq 1$. The duration of the recession is k quarters.

Macro-feedback

- Regional data: Eurostat knows all, so sends messages back
- National data: each Government has a list of regions
- Supra-national data: stored in Eurostat for analysis