STRUCTURAL FORECASTS FOR THE DANISH ECONOMY USING THE DYNAMIC-AAGE MODEL

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Overview of Project

- Dynamic-AAGE model used to produce medium-term forecasts for structural variables in the Danish economy.
- Variables forecasted include:
  - production by industry
  - employment by industry
  - exports and imports by commodity
  - prices of output by commodity
- Forecast period, 2000 to 2010.
What is Dynamic-AAGE?

- A Dynamic Applied General Equilibrium Model of Denmark
- *Dynamic* means that the model can produce a sequence of annual solutions, linked by stock accumulation equations, expectations, etc.
- *Applied* means that the model provide numerical results
- *General* means that it contains a detailed representation of the economy:
  - 50 industries producing 56 commodities
  - 50 investors
  - five sources of final demand
  - specification of exports and imports
What is Dynamic-AAGE?

- **Equilibrium** means that:
  - households are utility maximisers and industries are cost minimisers
  - prices equal costs
  - demand equals supply for commodities and services, but not necessarily labour and capital

- Also features a detailed agricultural sector specification
  - substitution between capital, labour, energy, herbicides, land fertiliser and insecticides
Why Forecast?

- Applied General Equilibrium (AGE) models traditionally used to answer "what if" questions:
  - policy shocks such as tariff changes,
  - transition from conventional to organic farming
  - EU enlargement, etc.
- No emphasis on how the economy would look without the shock
- No emphasis on how the economy responds through time to the shock
- Forecasts provide a realistic base case from which to answer traditional "what if" questions
Why Forecast?

- Forecasts are also useful in their own right.
- In Australia, they are used extensively for *planning*:
  - financial institutions concerned with lending to firms in a range of industries
  - multi-industry firms concerned with allocation of resources
  - educational and training authorities
  - governments concerned with the development of public infrastructure
  - forecasting groups that require a tool for checking consistency of forecasts
    - do they add up to something sensible?
    - what do they imply for variables not forecast
Methodology

- Large amount of information imposed
  - macro forecasts (currently from the Danish Economic Council)
  - assumptions for changes in industry technologies and household tastes (based on Australian numbers)
  - forecasts for the quantities of exports (based on material prepared at DRIFE)
  - changes in policies, such as agricultural quotas
- Model used to trace out implications for structural variables.
Assumptions - Macro variables (Table 2)

- Subdued business cycle through the decade to 2010
  - GDP growth average 1.6 per cent, c.f. 2.7 per cent between 1995 and 2000
- Unemployment reduced to 5 per cent by 2010
- Real private consumption grows faster than real GDP: 2.3 per cent
- Real investment grows slower than real GDP: 1.1 per cent
- Exports and imports increase as a share of GDP:
  - growth rates of 3.4 per cent
  - Compared to the last 5 years growth in international trade slows down
Assumptions - Technology and Tastes (Table 3)

- Tastes
  - favouring fruit, vegetables, dairy, cars and communications
  - against pig meat, tobacco and petrol

- Intermediate input using technological change
  - favouring chemicals (including plastics), equipment (especially electronic), financial and property services, communications
  - against trade services and freight

- Primary factor saving technological change
  - moderate savings for agriculture, mining and food manufacturing
  - rapid improvements in utilities
  - slow improvements in services
Assumptions - Structure of Exports (Table 4)

- Poor export prospects:
  - Oil and gas
  - Fish and dairy products

- Good export prospects
  - Most industrial commodities, including
    - Textiles, clothing and leather products
    - Petroleum products and other chemicals
    - Metal products
    - Machinery and equipment
    - Transport equipment

- Middle export prospects
  - Most agricultural commodities
Forecasts for Industry Output (Table 5)

- Ten fastest growing industries in our forecast

1. Textiles, wearing apparel and leather
2. Machinery and non-transport equipment
3. Basic chemicals
4. Transport equipment
5. Agricultural chemicals, nec
6. Communications
7. Metal products
8. Electricity
9. Finance and property services
10. Oil refinery products
Forecasts for Industry Output (Table 5)

- Ten slowest growing industries in our forecast

  41 Paper products
  42 Bakery shops
  43 Tobacco
  44 Dairy products
  45 Cattle-meat products
  46 Meat cattle and milk producers
  47 Roughage
  48 Fishing
  49 Gas
  50 Extraction of oil and gas
Principle reasons for fast growth

- Fast growth in exports
  - Textiles, wearing apparel and leather; Machinery and non-transport equipment; Basic chemicals; Transport equipment; Agricultural chemicals; Metal products; Oil refinery products

- Favourable trends in technology and household tastes
  - Machinery and non-equipment transport; Basic chemicals; Transport equipment; Communications; Electricity; Financial and property services
Principle reasons for slow growth

- Environmental constraints
  - Extraction of oil and gas; Fishing
- Quota constraints
  - Meat cattle and milk producers
- Slow growth in exports/increased import penetration
  - Manufactured wood and glass products; Paper products and publishing.
- Adverse trends in technology and household tastes
  - Tobacco manufacture; Bakery shops
- Input/Output linkages
  - Urban gas; Roughage; Cattle-meat producers; Dairy products
Conclusions: Strengths

- Very detailed
  - For Australia, forecasts are produced for up to 384 occupations, 200 household types, 836 commodities and 57 regions

- Flexible
  - Able to take on board a wide range of forecasts from specialist forecasting groups

- Consistent
  - Economy-wide framework where everything has to add up