

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

Philip Adams,

Centre of Policy Studies

Lill Andersen, Lars-Bo Jacobsen,

Danish Research Institute of Food Economics

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