

Demand and supply of labour by education in Norway towards 2030

Linking demographic and macroeconomic models

By

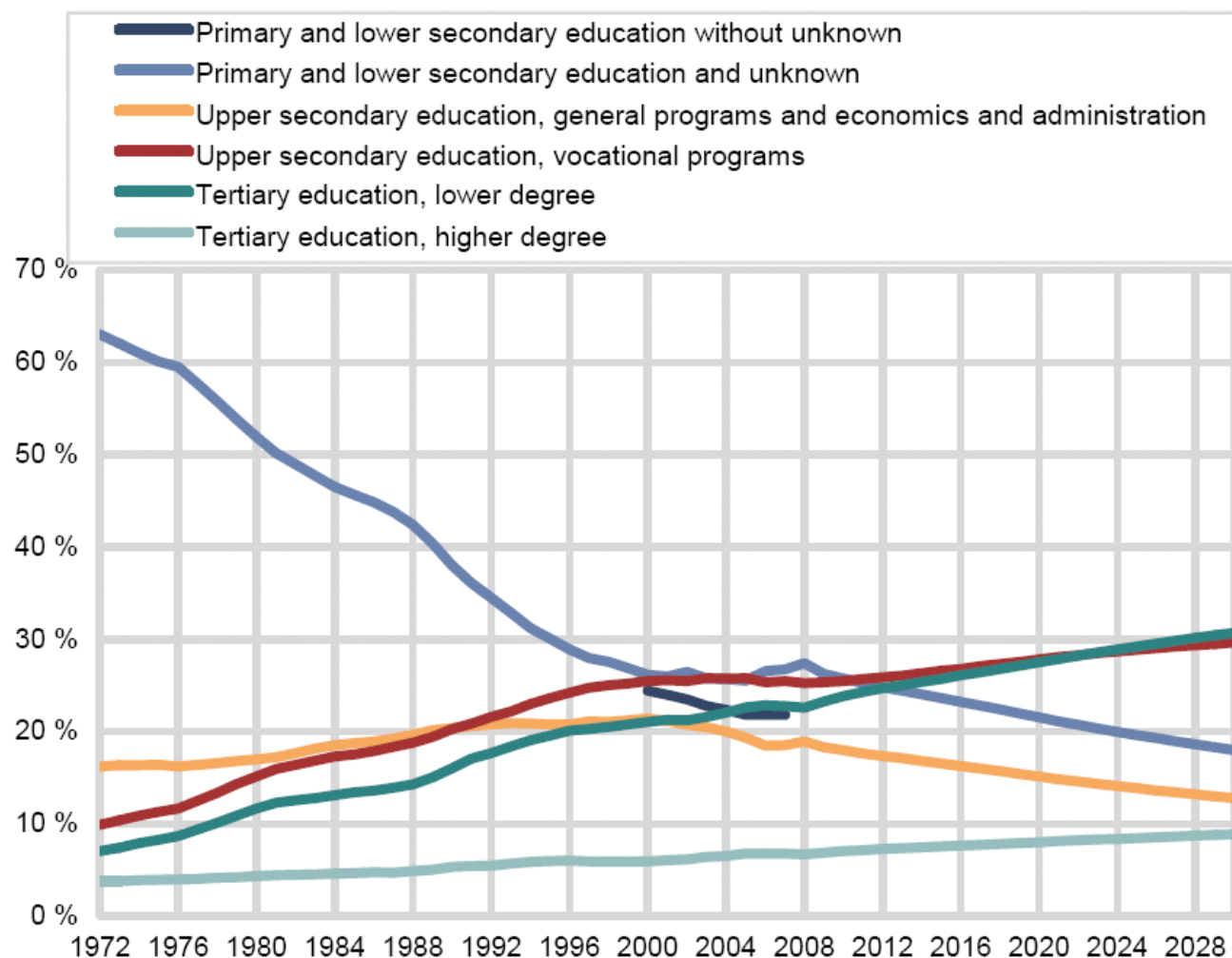
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17 – 18 February 2011*

Employment by level of education

Figure 6.2. Employment by level of education as a percent of total employment, 1986-2030



Driving forces behind the development

- Corresponding development in all Western countries
 - Increased employment of high skilled
 - Reduced employment of low skilled
- A major part of the development may be explained by technological change
 - Technology has replaced low skilled, and high skilled are needed to operate technology
- Stronger demand for services because of higher incomes
- International trade has caused low skilled to be replaced by import of cheaper products from developing countries
- In Norway increased demand for high skilled has been met by strong growth in supply
 - Has contributed to a balanced labour market and small differences in relative wages

Need for labour market projections

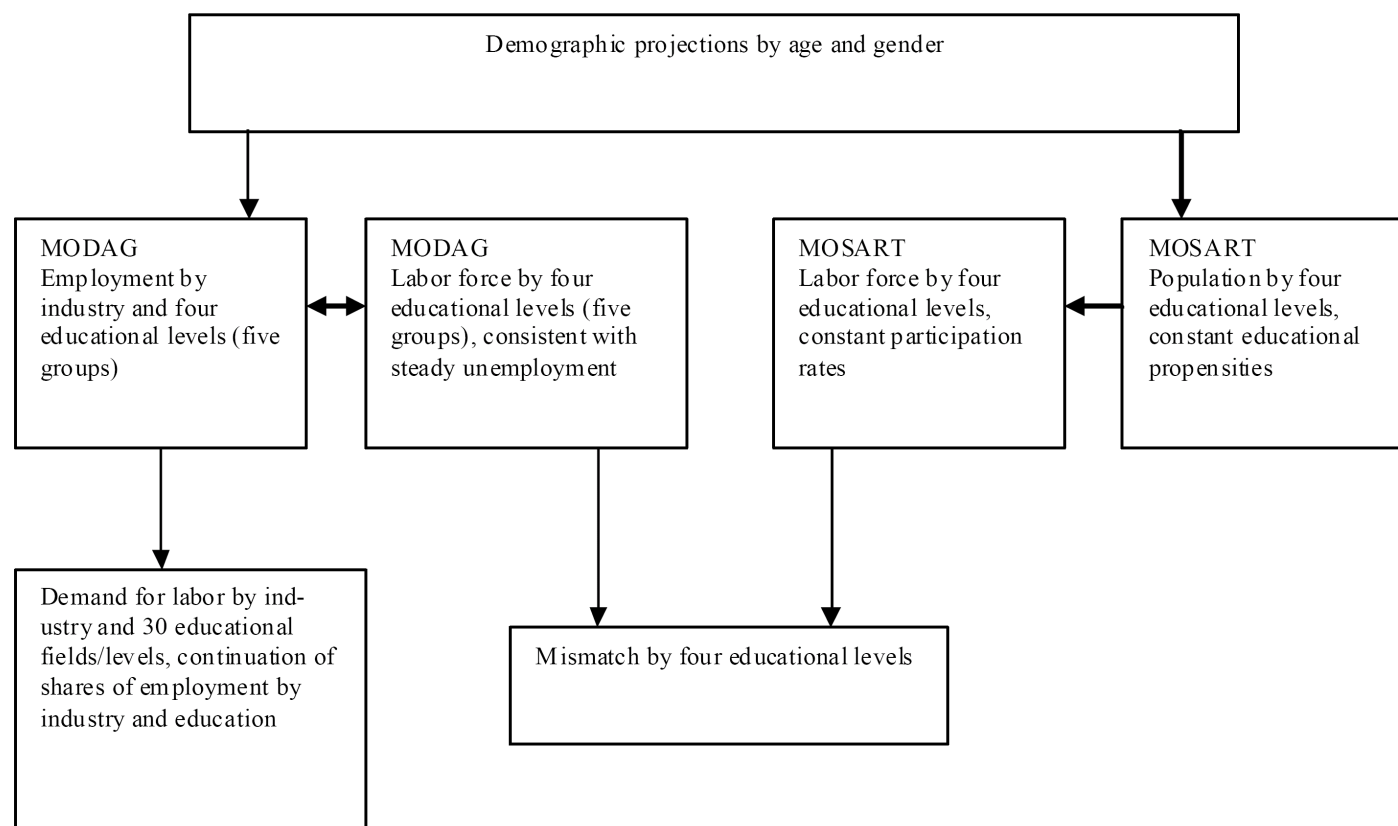
- Labour market projections produced by Statistics Norway since 1993
- A planning tool – Projections based on certain assumptions
- May be useful for
 - Youths in their choice of education
 - Authorities in planning educational capacity, industrial development and welfare reforms.
- Important to avoid projected imbalances to appear

A system of projection models in Statistics Norway

- BEFREG:
 - Projections of population by age and gender
- MODAG:
 - Macroeconomic model with 21 industries
 - Employment in man-hours and persons, supply of labour, wages
 - Extended version with 5 kinds of labour by skill
 - Demand further divided into 30 kinds of labour in a sub-model
- MAKKO, HELSEMOD, LÆRERMOD:
 - Partial models for demand for labour divided by education in the public sector
- MOSART:
 - Dynamic microsimulation model projecting population and supply of labour by education for given transition probabilities in the educational system and the labour market

Main structure of the model system

Figure 2.1. Main structure of the model system



Classification by education

- Chosen to diversify labour by education instead of occupation
 - Almost accurate information available from administrative registers
 - Distinction between different occupations is not as evident and may change if a person moves from one industry to another
 - Education is a more precise measure of skill
 - Makes data organisation easier
 - Classification by education already established in demographic models – costly to shift
- Classification by education chosen close to diversification by occupation

Detailed level of classification and corresponding numbers of employed in 2006

- 1. Primary and Lower secondary education (ISCED 0-2)
- 2a. Upper secondary education, general programmes (ISCED 3-4)
 - General programmes
 - Economics and administration
- 2b. Upper secondary education, vocational programmes (ISCED 3-4)
 - Electronics, mechanics, machinery
 - Building and construction
 - Science, technique and crafts
 - Nursing and caregiving
 - Other fields
- 3. Tertiary education, lower degree (ISCED 5, lower degree)
 - Humanities and arts
 - Education
 - Social sciences
 - Economics and administration
- Engineering
- Other fields of science
- Nursing and caregiving
- Other fields of health and social services
- Other tertiary education, lower degree
- 4. Tertiary education, higher degree (ISCED 5, higher degree and ISCED 6)
 - Humanities and arts
 - Education
 - Social sciences
 - Law
 - Economics and administration
 - Graduate engineering
 - Other fields of science higher degree
 - Medicine
 - Dental studies
 - Other tertiary education, higher degree
- Unknown

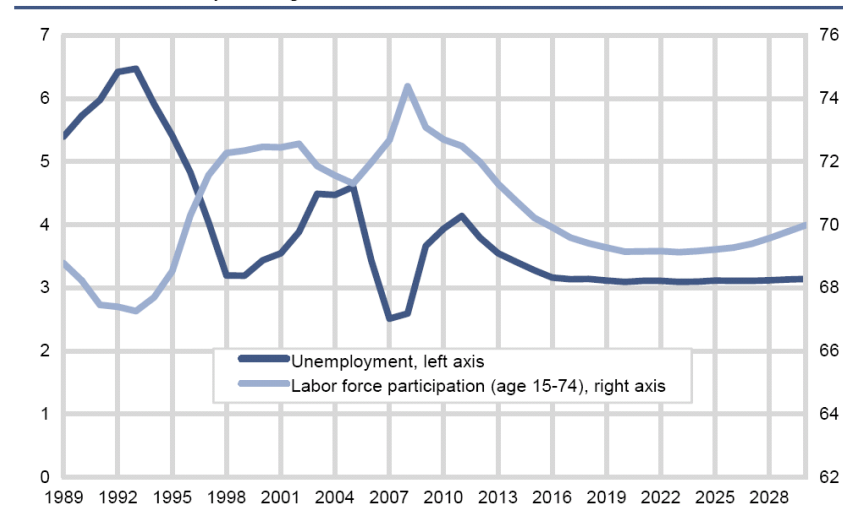
The macroeconomic model MODAG

- Disaggregated model with 21 industries and input-output central based on the National Accounts
- Econometric equations describing behaviour
- Man-hours, employed persons and wage rates
- Standard version homogenous labour
- Extended version: Labour divided in 5 categories by level of education
- Labour supply based on participation rates by education, gender and age from LFS
- Consistency: $NA = LFS + \text{foreigners working in Norwegian firms}$
- Used for medium term analyses up to 20 years ahead

Main assumptions behind the macroeconomic projections

- Norway only gently hurt by the financial crises
- Assumptions about a rapid recovery
- Back to long term trend levels in a few years
- 2-2.5 yearly percent growth in GDP
- Total LFS unemployment rate stable at 3.1 per cent from 2016
- Small decrease in average income tax from 2011 to 2023, followed by a small increase

Figure 5.1. Average labor market participation rate (number of persons offering work as share of the population aged 15-74 years, right axis) and unemployment rate (left axis). Given as percentages



Employment by sector

- An ageing population and modest growth in standards cause a growing share of employed in health and caregiving services

Share of total employment

	2009	2010
Manufacturing	10.8	8.6
Private services	45.7	43.6
Public sector	29.8	36.6

Figure 5.2. Employment by sector, 1,000 persons

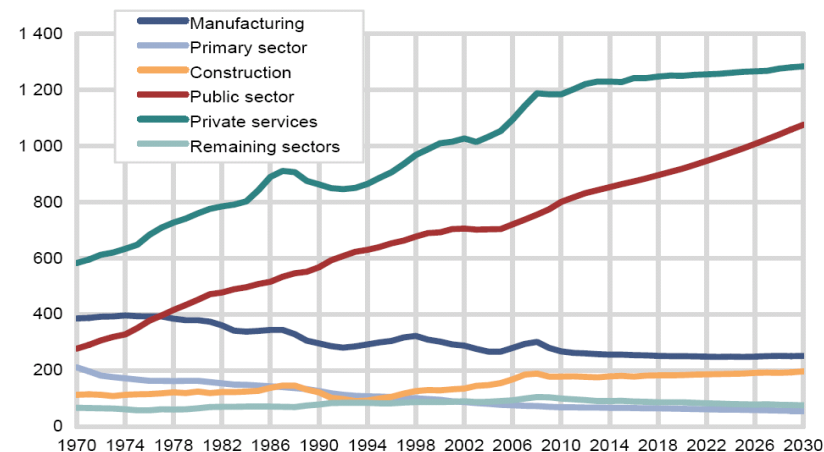
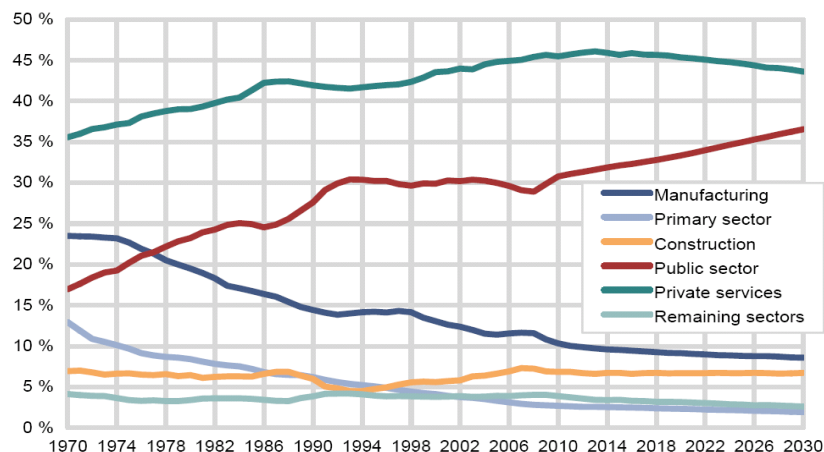


Figure 5.3. Employment by sector, share of total employment

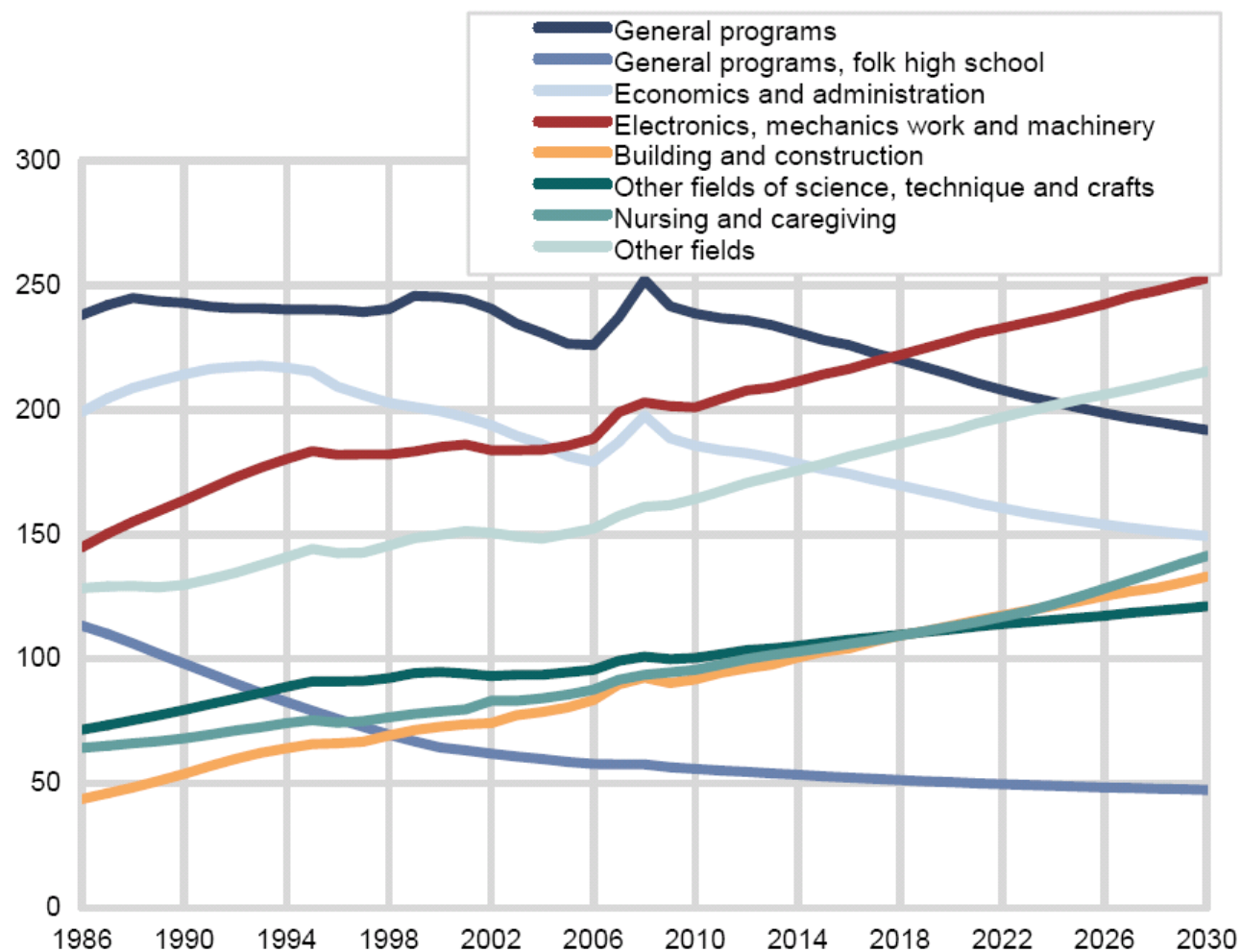


Demand for labour by educational field

- Diversification of employment into 30 educational groups by field based on information from administrative registers and LFS
- In private industries education-specific employment shares are projected by assuming continuing trends
- Partial models are used to project demand for labour by education in public sectors
- Assumptions about some possibilities for growth in service standards in the first years
- Smaller possibilities for growth in standards as time passes because of tighter financial constraints and a growing population of elderly persons

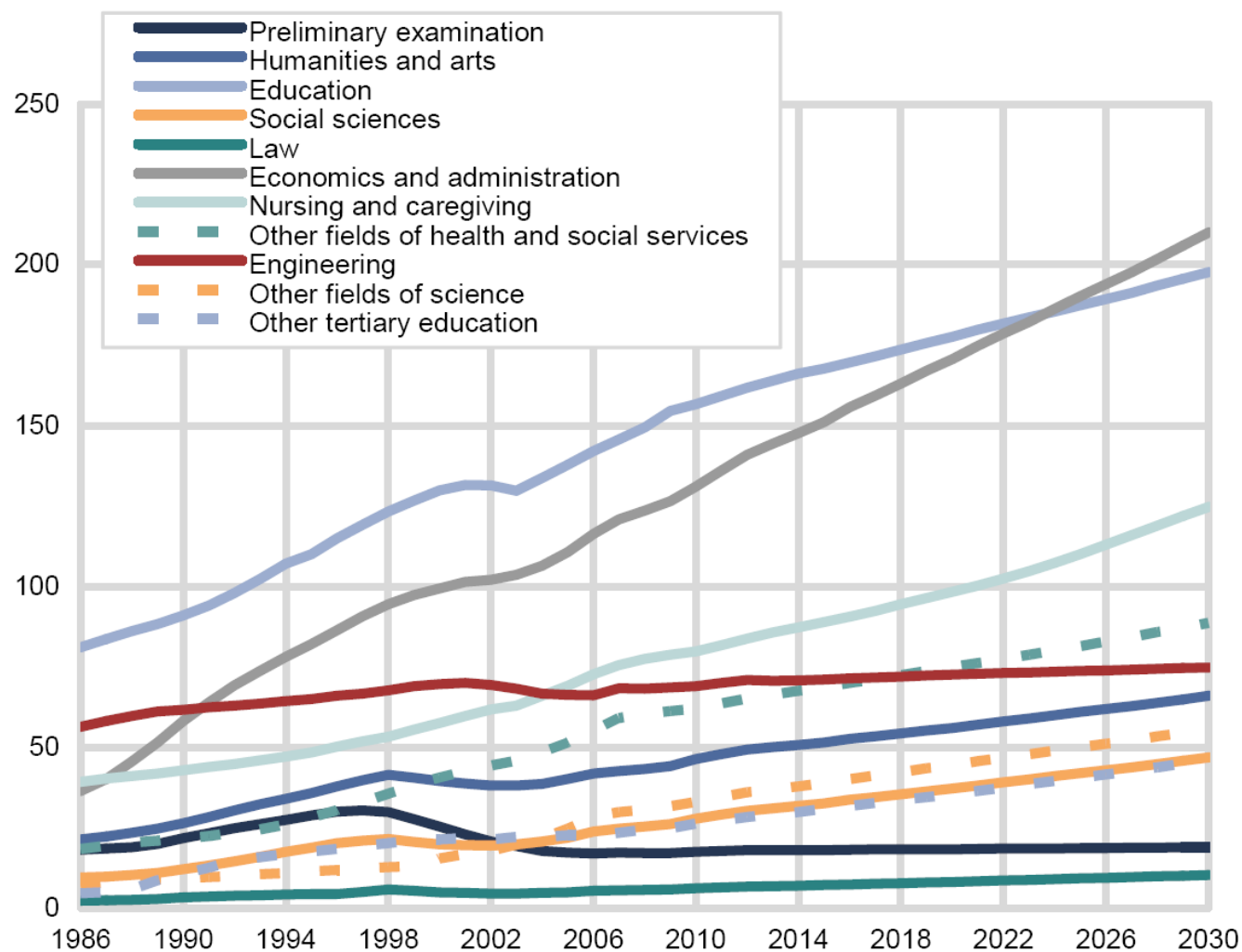
Educations at upper secondary school level

Figure 7.2. Employment by education at upper secondary school level, 1,000 persons



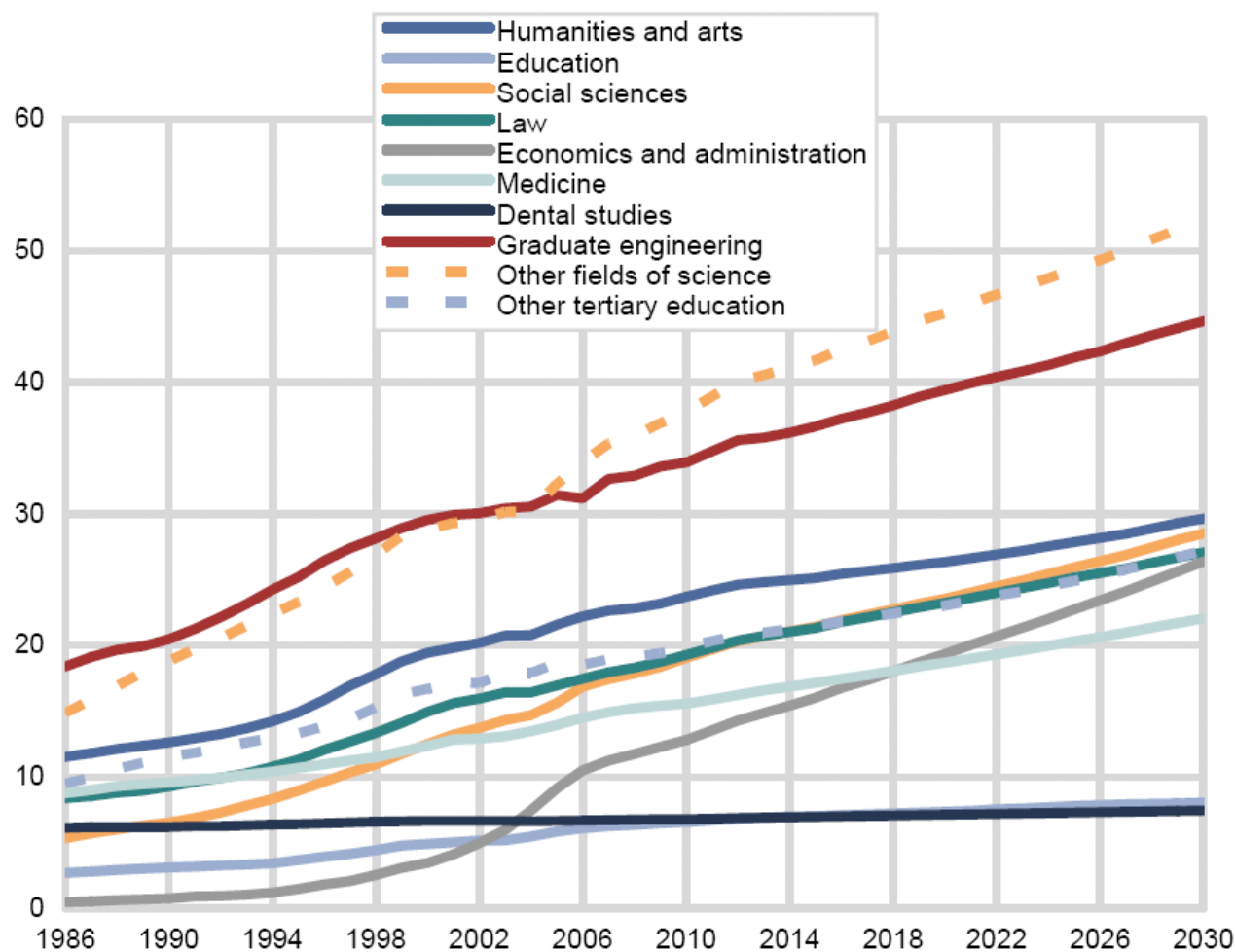
Tertiary level, lower degree

Figure 7.3. Employment by education at a tertiary level with a lower degree, 1,000 persons



Tertiary level higher degree

Figure 7.4. Employment by education at a tertiary level with higher degree, 1,000 persons



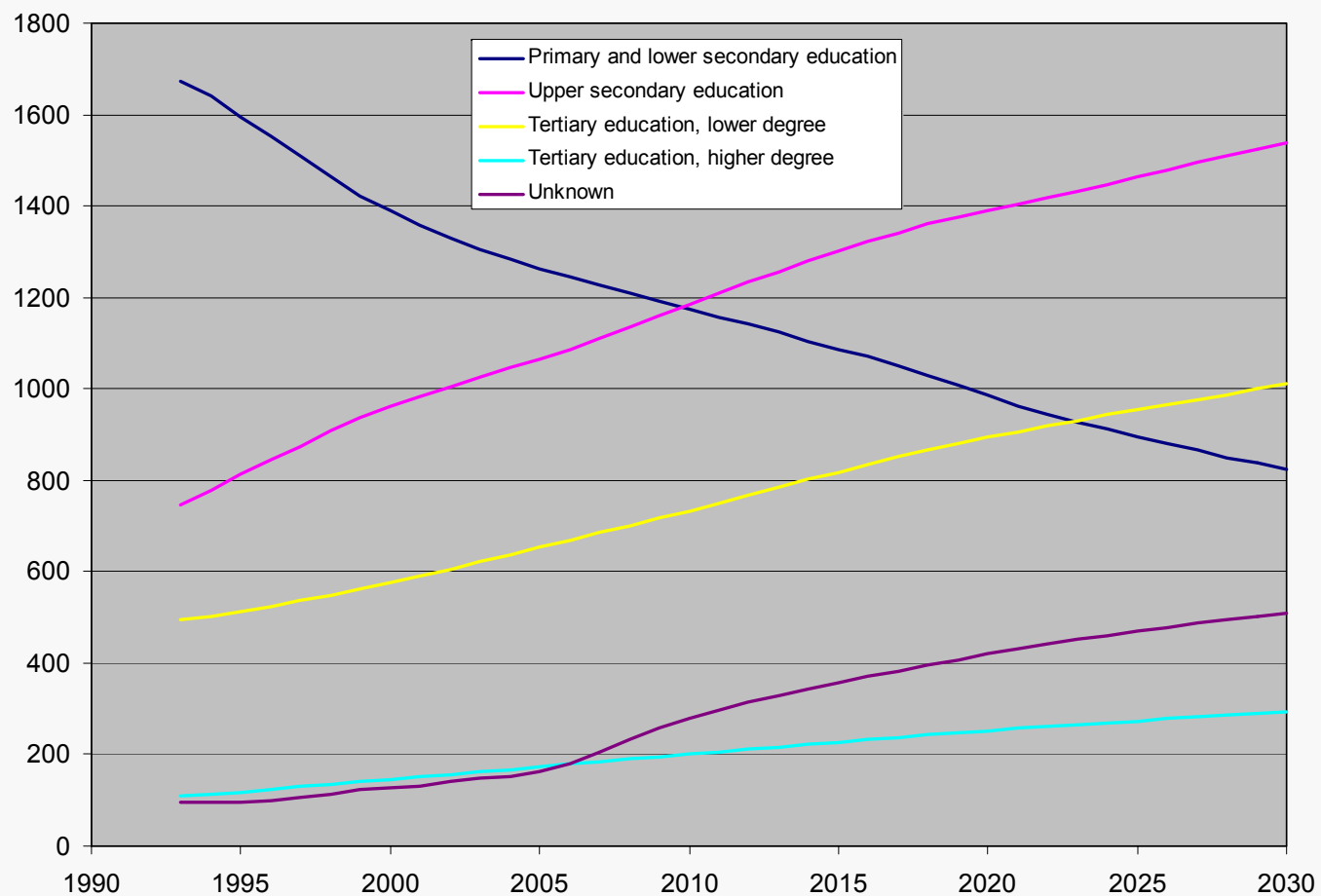
Alternative assumptions about supply of labour by education

- Extended MODAG
 - Labour market participation rates by age and gender linked to corresponding groups of individuals in working age
 - Discrepancy between supply and demand for the 5 groups of education affects wage formation
 - Wages affect participation rates as well as demand for labour
 - However equilibrium mechanisms not strong enough to secure a stable path including stable unemployment →
 - Labour force for the 5 educational groups determined from the demand side and exogenous rates of unemployment
- MOSART based on assumptions about constant propensities for education and detailed participation rates

Projecting supply of labour by education using the dynamic microsimulation model MOSART

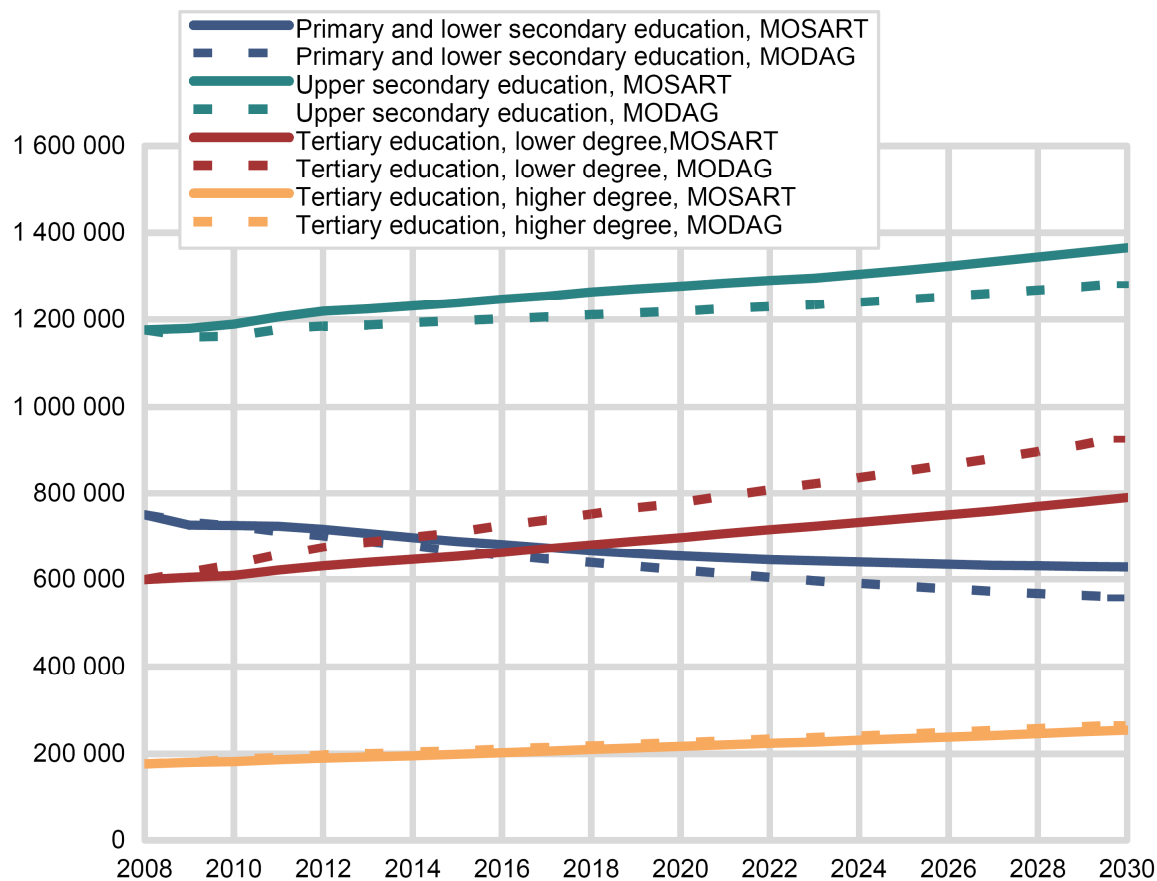
- Based on data from administrative registers and calibrated against aggregate data and demographic projections
- Simulates the further life-course of the Norwegian population
- The model projects choice of education, and the level of education is important for labour force participation and retirement
- Transition probabilities for
 - Entering education
 - Choice of educational field
 - Remaining in education
 - Completing education
- 22 different educations included in the model, but because of need for updating only able to present projections for the four main levels of education at the moment.

Population 16-74 by level of education 1000 persons



Comparing projections with fixed educational propensities with what is needed

Figure 8.2. Labor supply by education from MODAG compared with adjusted labor supply from MOSART



Projected demand for labour by level of education. Percent

	2006	2030
Primary and lower secondary	21	14
Upper secondary education	45	44
Tertiary education, lower degree	25	33
Tertiary education, higher degree	8	10

Concluding remarks

- Projections based on discussable assumptions must be used with precaution
- But being aware of the assumptions the projections summarize a lot of relevant and important information
- Comparing projections of demand for different kinds of labour with projections of supply for given educational propensities may give relevant information for authorities and youths
- Projections of relevant future trends in demand for different kinds of education are highly relevant in themselves