

Mikrosimuleringsmodellen MOSART (Modell for simulering av Skolegang, Arbeidsmarked og Trygd)

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What is MOSART?

- A dynamic cross-sectional microsimulation model.
- Uses the entire population, or a representative sample, in a given year as the base population.
- Observed historical transitions are used for estimating transition probabilities depending on individual characteristics.
- The population and the transition probabilities are used for simulating the further life course of each individual.
- A large number of events are simulated, including demographic events, household formation, education, labour force participation, retirement and income.

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Main purpose

- Since 1997 the model has been used to analyse direct effects from reform of the Norwegian public pension system:
 - Labour supply (handled exogenously)
 - Public expenditures
 - Financial burden
 - Income distribution
- Main advantages
 - Detailed and complicated tax and pension rules may be exactly reproduced
 - Capture heterogeneity of the population
- Also used for projecting labour force by educational level and field

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Historical background

- 1970s-1988: Projection and analyses of population, education, labour supply and pension expenditures by different transition matrix models
- 1988-1990, MOSART 1: Demographic events, education and labour force participation
- 1991-1993, MOSART 2: Public pension benefits and labour market earnings
- 1993-1999, MOSART 3: Household formation, simple representation of other incomes, taxation, savings and wealth
- 1999-2006: Shrinking staff to 1-2 persons and heavy use caused no further extensions and updating limited to calibration to aggregate data
- 2007-: Expanded staff, reprogrammed to a modern technological platform
- 2010-2011, MOSART 4: Base population comprising the entire population
- 2012-, MOSART 5: Gross immigration and emigration included
- 2013: Educational module reestimated
- 2014: Education among immigrants included. Also taking effects via the tax system into account when analysing shifts in disability pensions
- 2015: Staff further expanded. Occupational pensions in the public sector and more emphasis on research projects

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Main characteristics

- Dynamic microsimulation
- Full cross-section of the population
- Migration, mortality, fertility, household formation, education, labour supply and income, public pension benefits, income and wealth
- Simulation unit: Persons
- Micro-macro link: None
- Discrete time, calendar year as time unit
- Simulates one event at a time in fixed order, conditional trans. prob.
- Simulates the whole population each year before entering the next
- Real initial population based on administrative data
- Transition probabilities estimated with observed rates
- Mean-constrained drawing methods

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Base population

- Spring 2015, base population for the entire population updated to 2013, including diseased and emigrated. Above 7 million persons.
- For convenience, smaller stratified samples are generated. These are mostly used for testing purposes.
- Every person in the base population is represented with actual information on birth histories, marriage, educational level and activities, pension status and entitlements, labour market earnings and wealth.
- Information is collected from administrative registers, dating as far as registers exist.

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Calibration

- Transition probabilities are estimated based on information from the base population.
- These probabilities may be adjusted and calibrated to equal number of observed events in later years.
- Spring 2015 the model will be calibrated to match annual data up to 2014.
- Population projections from Statistics Norway are used for making demographic assumptions.

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Relationships with other long-run official simulations

- Demographic development exactly consistent with Statistics Norway's demographic projections
- Projections from MOSART regarding Labour force, Number of pensioners and Pension expenditures used as input in the long term macroeconomic projections.
- No direct feedback from macroeconomic development
 - Alternative assumptions on Labour market participation rates and Working hours may be implemented exogenously in the model (e.g. provided by the Ministry of Finance or the EU commission)
 - Projections by MOSART are made in fixed wages. Growth in nominal (and real) wages are handled by the macroeconomic projections

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Applications

- The model is only operated at Statistics Norway due to:
 - Technical facilities
 - Data security restrictions
 - Detailed knowledge of the model necessary
- Model simulation used in our own economic analyses
- The Ministry of Finance and the Ministry of Labour and Social Affairs are the main external users
 - White papers on long term analyses of public pension benefits prepared for the Parliament and for Public Commissions
 - Critical and qualified users
- Development and maintenance of the model partly financed through general funding of Statistics Norway, partly from the Ministry of Finance and the Ministry of Labour, partly by the Norwegian Research Council, and partly by the Ministry of Education

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Maintenance

1. Keep the underlying assumptions up to date by adjustment factors for the last (relevant) year
2. Keep initial population up to date – earlier less important without major changes in the economy or social institutions
 - Now including information from new administrative data more frequently – Necessary for the joint analyses of pension benefits and taxes
 - Population per 01.01.15
 - Most data are updated towards 2013
3. Reestimate the transition probabilities on newer data. Not necessary with reestimation every year

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Human resources

- At present 7 persons who deal full or part-time with research and analyses linked to the model
- Total use of resources about 5 man-years
 - Directly serving the Ministries 1 ½ man-year
 - Updating and technical development ½ man-year
 - Further development, research and analyses 3 man-years
(Education and labour market, Evaluation of Pension Reform, Occupational Pensions, Analyses where the pension system and tax system are linked together)

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External contacts

- Contact with other researchers at the Research Department of Statistics Norway
 - Static microsimulation unit – tax analyses
 - Demographic analyses
 - Macroeconomic analyses
 - Microeconomic analyses of e.g. labour market behaviour
- Some contact with other Norwegian institutions
 - Researchers at the Social Security Administration
 - Research Institutes: Frisch Centre and ISF
- Aim to increase contact with researchers in other countries
 - Dynamic microsimulation
 - Researchers in Public Finance
 - Microeconomic analyses of behaviour

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Aktuelle forskningsprosjekter 2015

Anvendelse eller videreutvikling av modellen

- Brinch, Vestad og Fredriksen: Forventet levealder og uttak av pensjon
- Fredriksen og Holtsmark: Offentlig tjenestepensjon – Valg av sektor og inntektsopptjening over livsløpet
- Fredriksen, Stølen, Holmøy og Strøm: Makroøkonomiske effekter av pensjonsreformen
- Fredriksen og Stølen: Fordelingseffekter av pensjonsreformen mellom ulike generasjoner
- West-Pedersen (ISF), Halvorsen og Stølen: Effektivitet og fordeling av pensjonsreformen

Relatert til feltet dekket av modellen

- Frisch-senteret, Jia og Vestad: Pensjon og arbeidstilbud
- Andreassen og Kornstad: Ungdom som faller utenfor
- Gjefsen og Gunnes: Utdanning og arbeidsmarked for barn av innvandrere

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Nyvinning 2014: Lotte-trygd

- Overføre trygdeberegninger fra MOSART til LOTTE på individnivå
- Spesielt relevant for analyser av ny uførepensjon: Se skatteregler, pensjonsytelser og andre inntekter i sammenheng
- Mosart
 - Opptjente pensjonsrettigheter (forløpsdata, folketrygden)
 - Regler for beregning av pensjon (alderstrygd, uføretrygd, etterlattepensjon og fra 2015 arbeidsavklaringspenger)
 - Har hovedregler for skatt, enkel modellering av andre inntektsposter
- Lotte
 - Selvangivelser for siste tilgjengelige år (grunnlagsår)
 - Alle inntektsposter, alle skatteregler
 - Inntekter m.v. framføres inntil 3 år
- Egne moduler for
 - Dagpenger og sykepenger

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Offentlig tjenestepensjon i Mosart

- Bakgrunn:
 - Manglende elementer i systemet for offentlig tjenestepensjon må på plass
 - Opplegget fra 2009 ikke tilfredsstillende for yngre generasjoner
 - Offentlig tjenestepensjon viktig i offentlige finanser
 - Tjenestepensjoner viktig for inntektsfordelingen
 - SSB er av EU pålagt å beregne nåverdien av SPK, utsatt inntil videre
- Vil inkludere SPK og KLP samlet
- Har arbeidet med data og regelverksbeskrivelse
- Skille beregninger på kort sikt og lang sikt
 - Offentlig ansatte 50+ har vi mye data på
 - For langsiktige framskrivinger må simulering av arbeidstilbud oppgraderes; sektor, sluttlønnorientering

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Evaluering av pensjonsreformen – Fiscal and social sustainability

Fire delprosjekter:

1. Følsomhetsanalyse for direkte effekter
2. Første runde med analyser av makroøkonomiske effekter av reformen
3. Fordelingseffekter mellom generasjoner
4. Makroøkonomiske analyser basert på modell med overlappende generasjoner

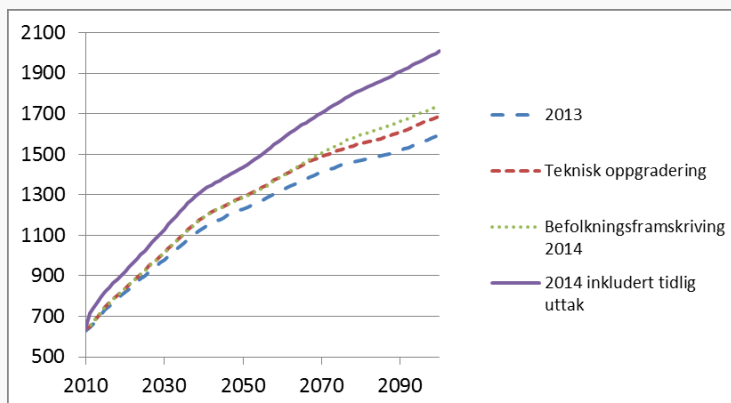
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Første resultater fra delprosjekt 1 publisert i ØA 6/2014

- Viktigste endringer siden publisering i 2011
 - Innarbeidet faktisk pensjoneringsatferd fram til og med 2013
 - Befolkningsframskrivingene 2014
 - Observert tidlig uttak av pensjon uten uttrede fra arbeidslivet
- Viktigste resultater
 - Pensjonsreformen har ført til utsatt pensjonering
 - Men foreløpig ikke fullt så omfattende som lagt til grunn på forhånd
 - Mindre innstramming på kort sikt, mer på lang sikt
 - Tidliguttak av pensjon uten tilsvarende pensjonering gir klart høyere pensjonsutgifter på kort sikt
 - Bidrar imidlertid noe til sterkere innstramming på lang sikt

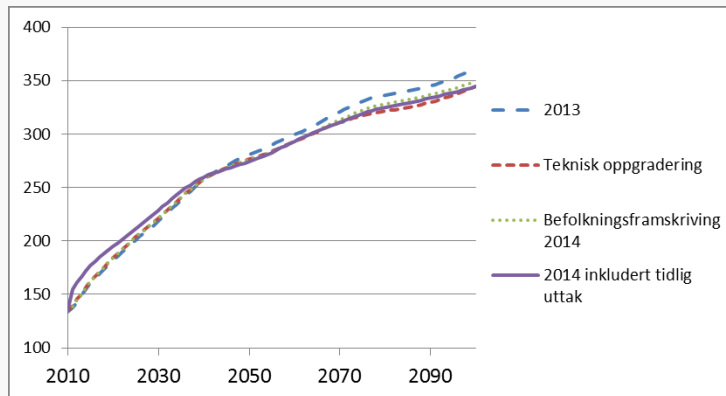
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Framskrevet antall mottakere av alderspensjon. 1000 personer



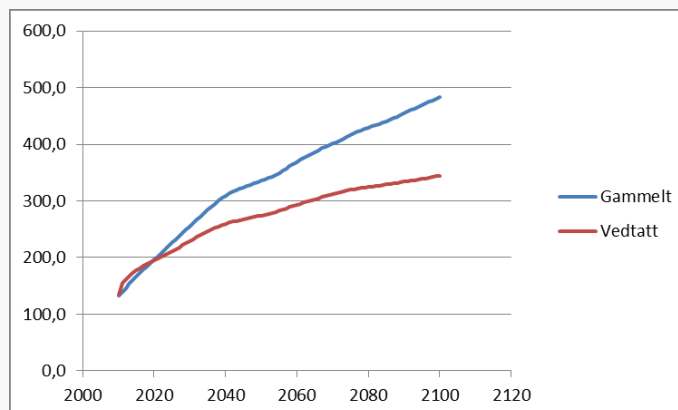
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Framskrevne utgifter til alderspensjon Mrd. kr i 2013-beløp



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Framskrevne utgifter til alderspensjon, vedtatt og gammelt system. Mrd kr i 2013-beløp



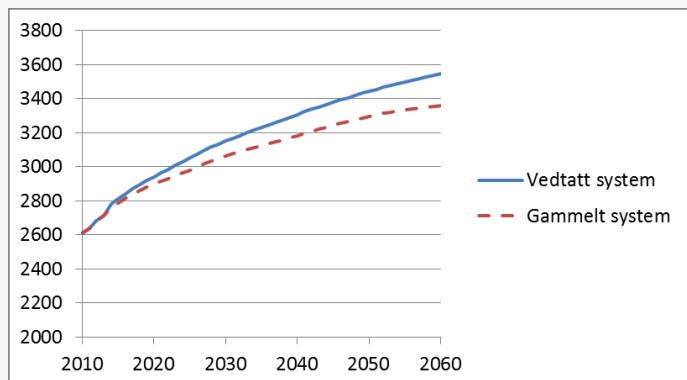
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Framskrivning av arbeidsstyrken. 1000 personer

	Framskrivning 2013	Teknisk oppgradering	Befolknings- framskrivning 2014	2014 inkl. tidlig uttak
2013	2773	2711	2711	2711
2020	2990	2962	2942	2941
2030	3191	3152	3149	3151
2050	3489	3425	3441	3443

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Framskrivning av arbeidsstyrke vedtatt og gammelt system. 1000 personer



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Bidragsrate, vedtatt og gammelt system. Prosent

