

In the context of low fertility, there is a concern about future decline in the size of the labour force and its potential economic impacts. This can be addressed through increases in fertility but attention has also been addressed by demographers towards 'replacement migration' – using migration to make up for the deficit in labour supply. Recently demographers have been asking questions like: what level of migration would it take to maintain a constant number of people at age 30 in the future?

Why should the aim be to have a constant number of people at age 30? This seems to me to be a very unsophisticated approach? It is not difficult to construct models that provide much more useful results for alternative demographic futures than mere replacement of the population at age 30. Much more meaningfully, we can model future labour supply or future GDP or future GDP per capita.

GDP is the product of three components that can be called the three Ps:

- Population
- Participation
- Productivity

$$\text{GDP} = P \times E/P \times \text{GDP}/E$$

Where:

GDP= gross domestic product

P = population

E/P = employment to population ratio

GDP/E = labour productivity (output per unit of labour input)

Further decomposition of each of these three components enables a very much more detailed decomposition of GDP. Population can be sub-divided into its age and sex distribution: the numbers of each sex at each age. Employment can be divided into:

- The rates of labour force participation for each sex at each age
- The age-sex specific unemployment rates
- The distribution of employed persons into part-time and full-time employees, by age and sex, and
- The average number of hours worked by full-time and part-time workers by age and sex

Productivity can also be subdivided into the level of productivity of each age and sex category.

All of these detailed components form the input for the economic-demographic projection model, MoDEM2, that is used in this analysis. MoDEM2 is freely available at:

- www.pc.gov.au/research/commissionresearch/.../modem/modem2
- MoDEM2 can be used to make projections of employment, GDP and GDP per capita according to varying scenarios for all of the model inputs described earlier.
- We can investigate:

- The impacts on GDP per capita of changing birth and migration rates and changing age structure of the population.
- The effects of changes in labour force participation, unemployment or hours of work on GDP per capita
- The effects of changes in labour productivity.

MoDEM2 can be used to make projections of employment, GDP and GDP per capita according to varying scenarios for all of the model inputs described earlier. We can investigate:

- The impacts on GDP per capita of changing birth and migration rates and changing age structure of the population.
- The effects of changes in labour force participation, unemployment or hours of work on GDP per capita
- The effects of changes in labour productivity.

MoDEM has other more advanced features such as the capacity to introduce ‘shocks’ such as a spike in unemployment.

The specific inputs used in this application of MoDEM for each country are:

- Population by age and sex in 2005 and 2004
- Age Specific Fertility Rates 2005
- Pattern of immigration and emigration by age and sex
- Net Overseas Migration in 2005/2006
- Age pattern of mortality 2005
- Life expectation, male and female in 2005
- Labour force data by age and sex: participation rate, unemployment, part-time share, fulltime hours, part-time hours
- Average labour productivity growth (2001-2008)
- Using publicly available data online: OECD stats, Eurostat, UN data, ILO (laborsta)

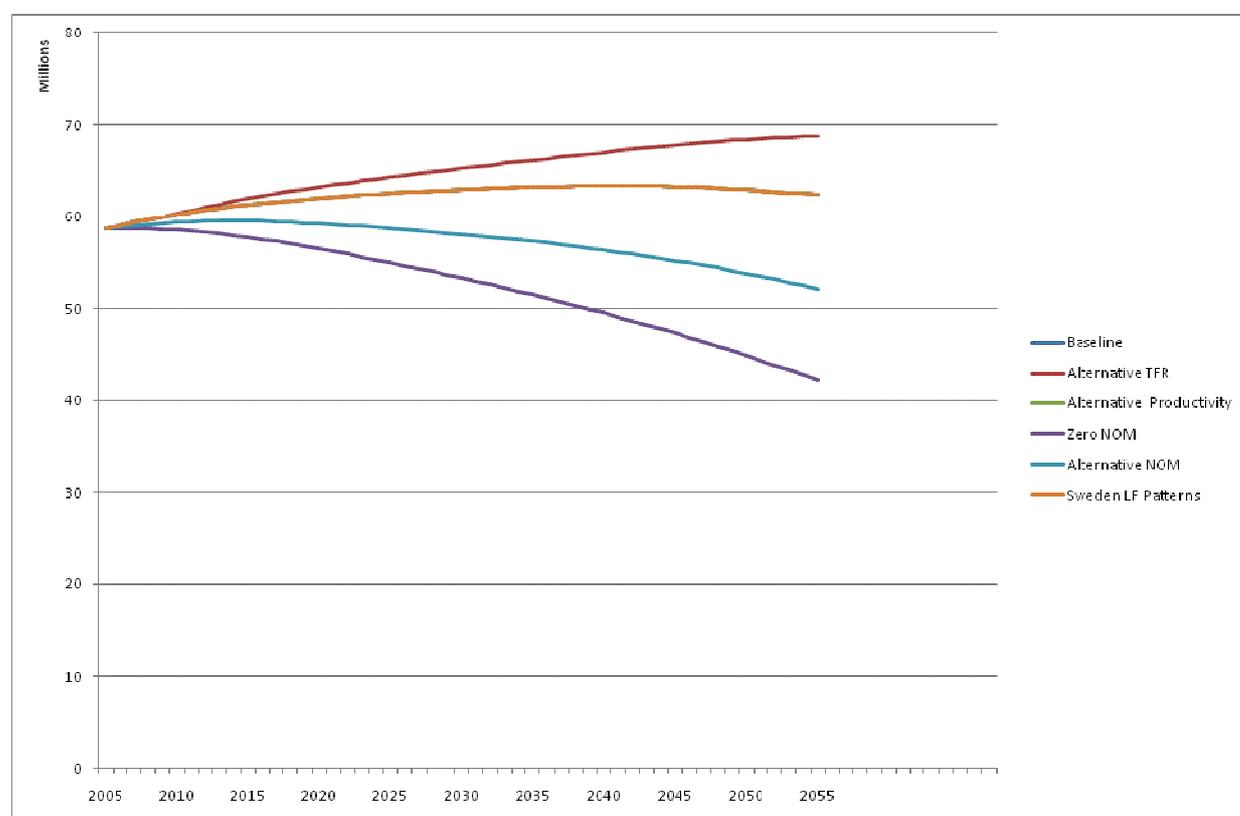
Outcomes (population size, age structure, labour force size and rate of growth and GDP and GDP per capita) are modelled for six varying scenarios for each country. The results show that many countries facing rapid ageing of their populations could alleviate the impact on GDP per capita by increasing participation and, ideally, increasing their low rates of labour productivity. For other countries where participation is already relatively high, demographic approaches (higher fertility or higher migration) would be required but these impacts are slow. Almost all countries face a major fall in rates of growth of GDP per capita in the next decade as a result of the retirement from the labour force of the baby-boom generation.

EXAMPLE: ITALY

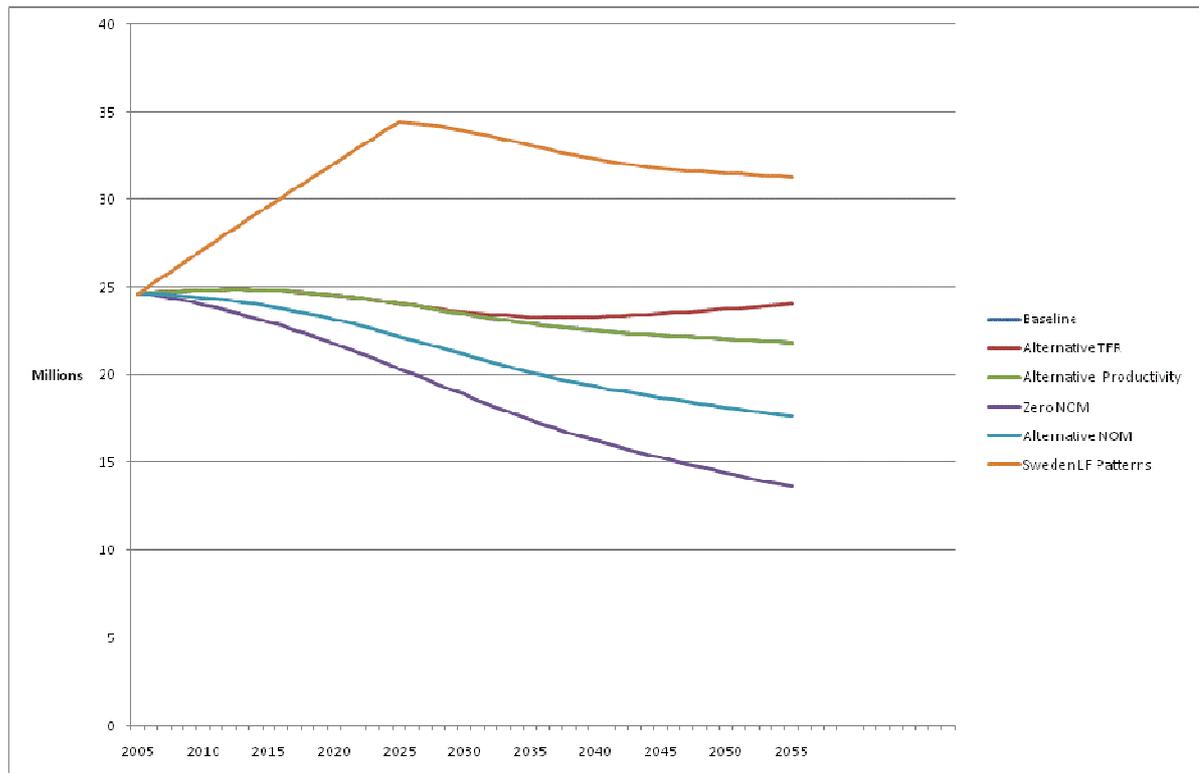
INPUT

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.38	330	0.08	50.09
Alternative TFR	1.7 in 2010	330	0.08	50.09
Zero NOM	1.38	0	0.08	50.09
Alternative NOM	1.38	165	0.0	50.09
Alternative productivity	1.38	330	2.00	50.09
Sweden's LFPR in 2025	1.38	330	0.08	Linear increase from 50.09 in 2005 to 67.27 in 2025

ITALY: TOTAL POPULATION



ITALY: SIZE OF LABOUR FORCE



ITALY: RATE OF GROWTH OF GDP PER CAPITA



