Demography and GDP per Capita: a Cross National Study

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Ageing and GDP per Capita

- Many advanced countries today are facing rapid ageing of their populations due to the imminent retirement of their ‘baby-boom’ generations.

- At the same time, past declines in fertility mean that the numbers coming into the labour force at the young ages are either falling or, at least, not growing.

- All else being equal, this process will lead to a decline in the rate of growth of GDP per capita, a measure often used as a measure of living standards.

Aims of the Presentation

- This analysis sets out to examine the variability across 11 countries of outcomes over the period, 2010-2050 and examines the sensitivity of outcomes to:
  - demographic responses (fertility and migration) and
  - economic responses (increases in labour productivity and labour force participation rates).

Components of GDP

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

- Population
- Participation
- Productivity

Decomposition of GDP

- GDP = P x E/P x 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

- Further decomposition of each of these three components enables a very much more detailed decomposition of GDP.

Population

- A population can be sub-divided into its age and sex distribution: the numbers of each sex at each age.

Employment

- 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

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

MoDEM2

- 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/**commission**research/…/**modem/modem**2*

Usage of 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.

Outline

- Eleven countries examined: Italy, Spain, Germany, Austria, France, Sweden, Japan, United Kingdom, United States, Canada and Australia.

- One output shown: annual GDP per capita growth.

- A variety of country-specific scenarios.

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Modem Input

- Population by age and sex in 2005 and 2004
- Age Specific Fertility Rates 2005
- Pattern of immigration and emigration by age and sex
- Net International Migration (NOM) 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, Euro stats, UN data, ILO (laborsta)

Italy: Scenarios

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.38	330	0.08	50.09
Alternative TFR	**Constant to 2010, transitions linearly to 1.7 by 220, then stays constant**	330	0.08	50.09
Zero NOM	1.38	**Constant until 2010. transition to zero NOM take place over next 5 years**	0.08	50.09
Alternative NOM	1.38	**Flat to 2010, transitions to 165 take place linearly over 5 years between 2010-2015**	0.08	50.09
Alternative productivity	1.38	330	**Constant to 2010, rises linearly to 1% by 2020, and 1.7% by 2030, then constant**	50.09
Sweden's LFPR in 2025	1.38	330	0.08	**Linear increase from 50.09 in 2005 to 67.27 in 2025***

* Average for both men and women across all age groups

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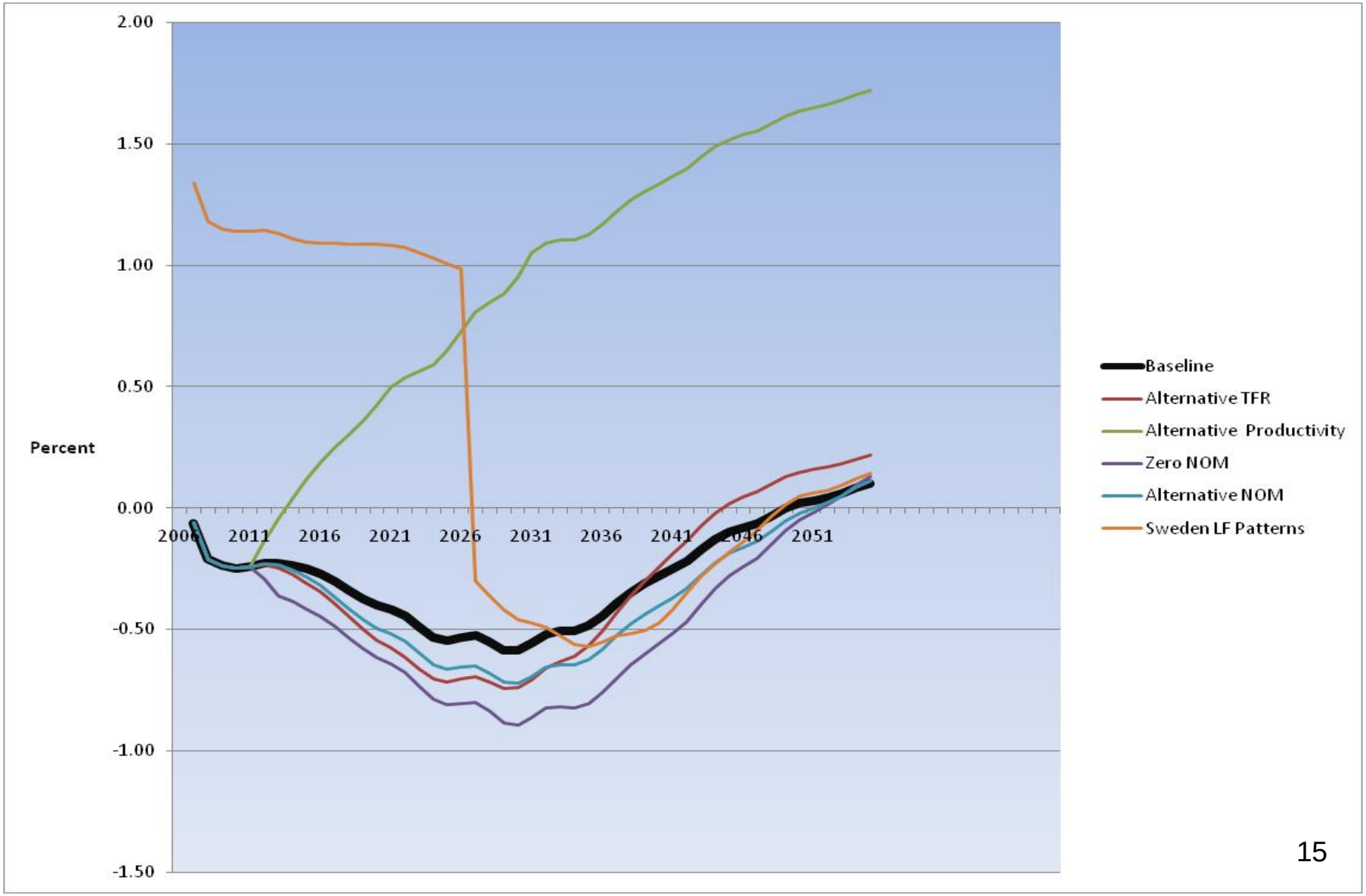
Italy: Annual GDP per capita growth



Italy: summary

- Italy faces negative rates of growth of GDP per capita almost throughout the projection period. The drop is sharper from 2016 to 2031 (falls from -0.2% to -0.6%).The rate rises from 2030 onwards.

- The alternative demographic scenarios (higher fertility or lower migration) make the situation worse until about 2040 when higher fertility level would produce an improvement.

- Increased labour force participation could have a major impact while the increase is being implemented.

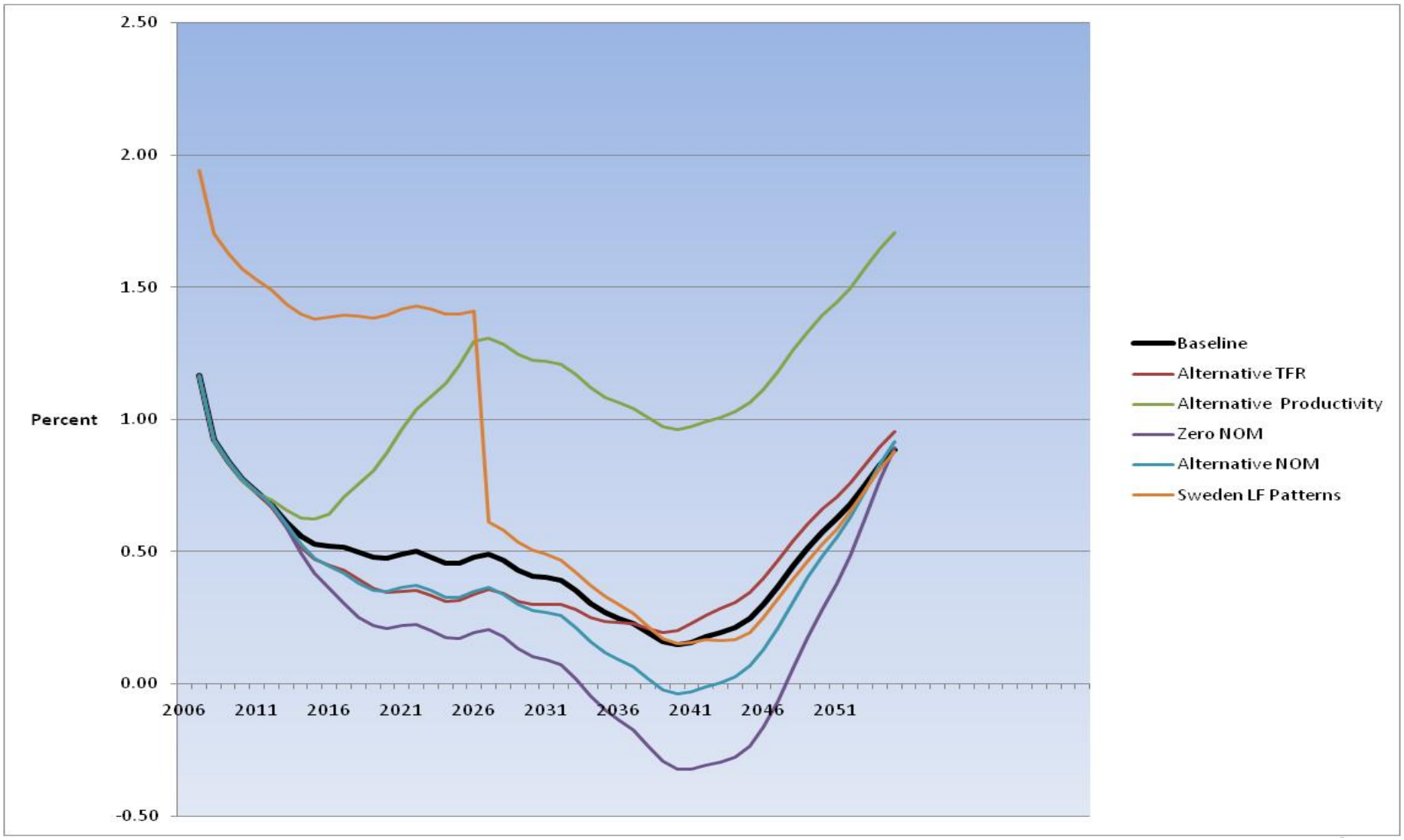
- Italy needs to increase its labour productivity, quickly.

Spain

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.43	350	0.88	56.19
Alternative TFR	**Constant to 2010, transitions linearly to 1.7 in 2020, constant again**	350	0.88	56.19
Zero NOM	1.43	**Constant until 2010. transition to zero NOM take place over next 5 years**	0.88	56.19
Alternative NOM	1.43	**Constant to 2010, transitions to 175 take place linearly over 5 years between 2010-1015**	0.88	56.19
Alternative productivity	1.43	350	**Constant to 2010, rises linearly to 1% by 2020, and 1.7% by 2025, then constant**	56.19
Sweden's LFPR in 2025	1.43	350	0.88	**Linear increase from 56.19 in 2005 to 67.27 in 2025***

* Average for both men and women across all age groups

Spain: Annual GDP per capita growth



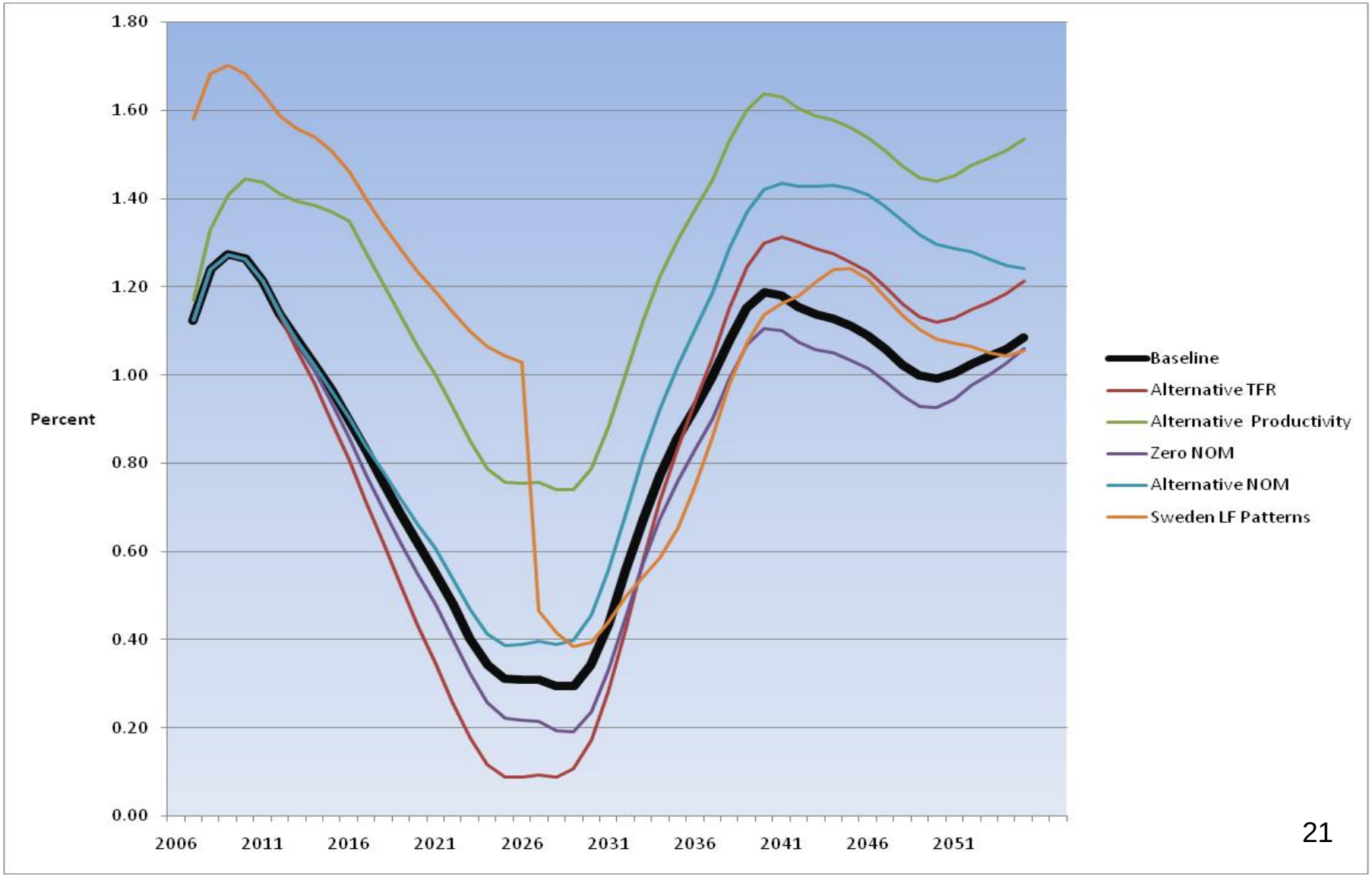
Spain: Summary

- Spain is facing a severe, immediate fall in the rate of growth of GDP per capita as a result of ageing and the fall is long-term continuing to 2040 (1.2% to 0.2%).
- Like Italy, demographic responses (higher fertility and lower migration) make the situation worse for the entire period.
- Increased labour force participation seems like the only way that Spain can deal with this issue in the short term. Over time, increases in labour productivity would also be beneficial.

Germany

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.32	110	1.25	60.74
Alternative TFR	**Constant to 2010, increases linearly to 1.7 in 2020, and then constant**	110	1.25	60.74
Zero NOM	1.32	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.25	60.74
Alternative NOM	1.32	**Constant to 2010, transitions to 330 take place linearly over 5 years between 2010-1015**	1.25	60.74
Alternative productivity	1.32	110	**Increases linearly to 1.7 by 2015 (from 2005)**	60.74
Sweden's LFPR in 2025	1.32	110	1.25	**Linear increase from 60.74 in 2005 to 67.27 in 2025**

Germany: Annual GDP per capita growth



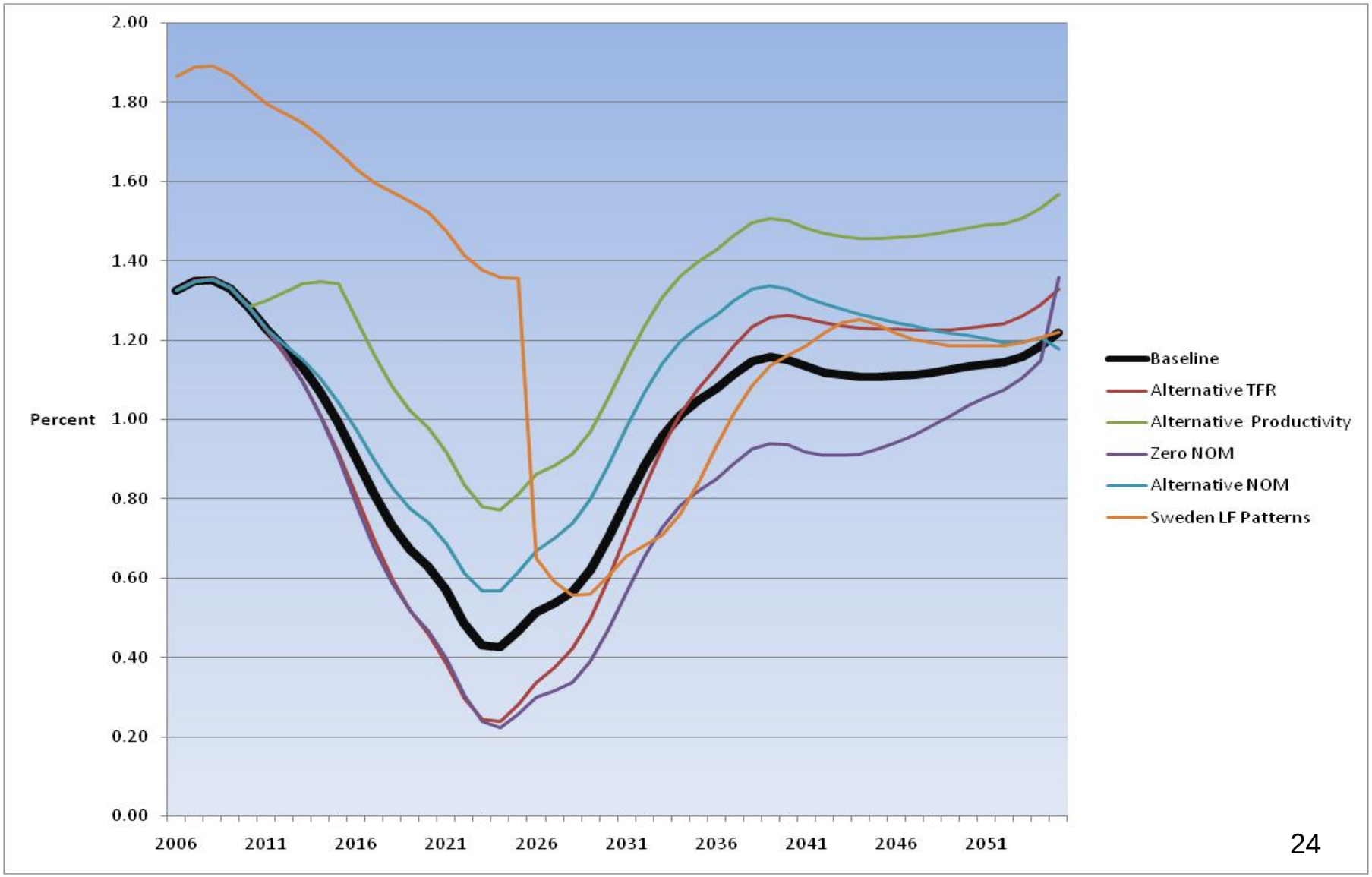
Germany: Summary

- Germany faces a massive and immediate decline in the rate of growth of GDP per capita as a result of ageing (1.25% to 0.3%).
- The hypothesised demographic scenarios will make almost no difference to the result until an assumed higher level of migration begins to have an impact in the 2020s.
- The situation rapidly reverses in the 2030s as rates of GDP growth rise sharply.
- Before the reversal, Germany needs to consider both increases in labour force participation and to improve labour productivity.

Austria

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.38	32	1.35	59.10
Alternative TFR	**Constant to 2010. transitions linearly to 1.7 by 2020, constant again**	32	1.35	59.10
Zero NOM	1.38	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.35	59.10
Alternative NOM	1.38	**Constant to 2010, transitions to 60 take place linearly over 5 years between 2010-1015**	1.35	59.10
Alternative productivity	1.38	32	**Constant to 2010, then rises linearly to 1.7 by 2015**	59.10
Sweden's LFPR in 2025	1.38	32	1.35	**Linear increase from 59.10 in 2005 to 67.27 in 2025**

Austria: Annual GDP per capita growth



Austria: Summary

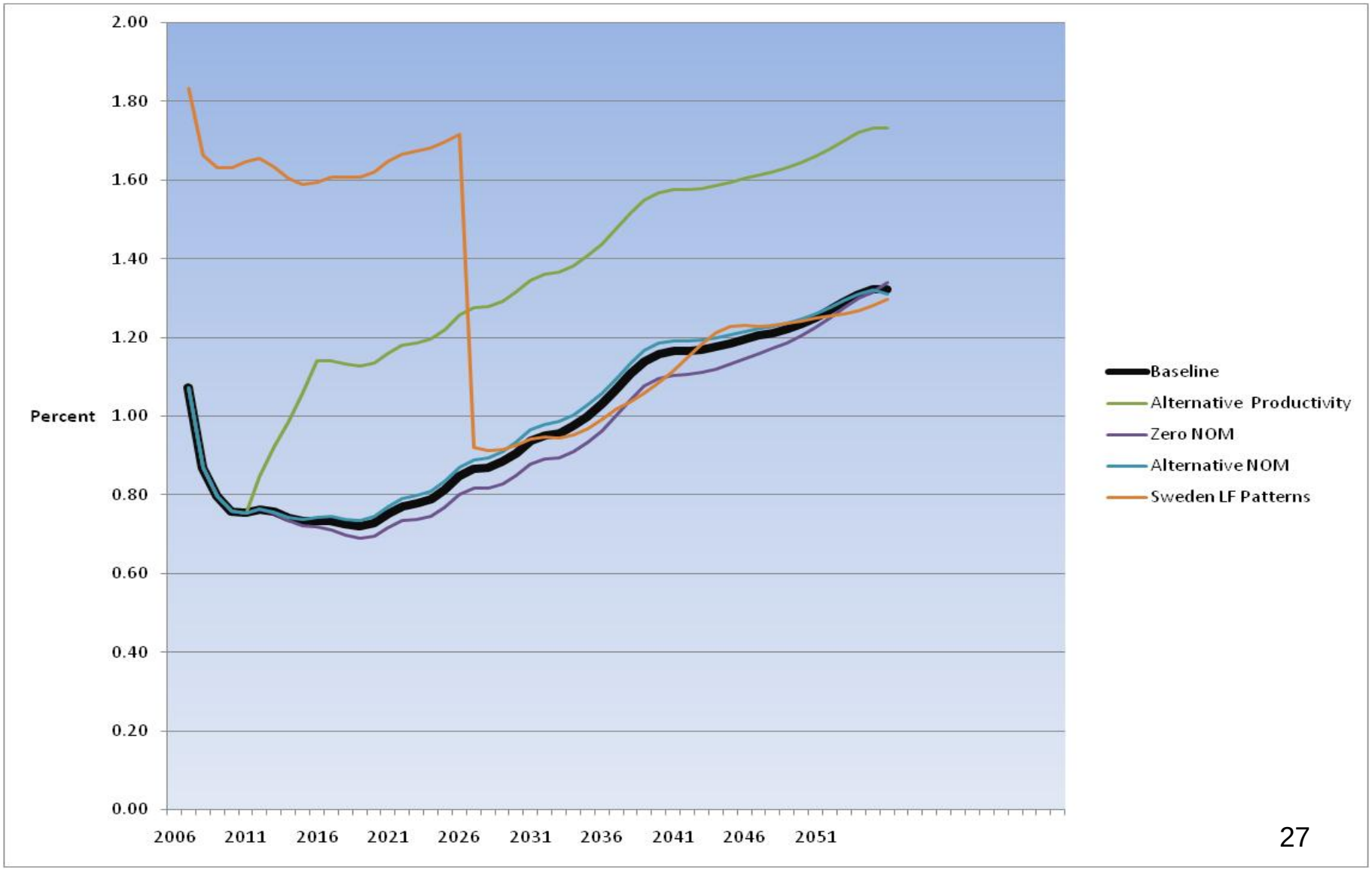
- Austria faces a future similar to that of Germany: immediate sharp fall in GDP per capita (1.35% to 0.4%) due to ageing followed by an equally sharp rise from the mid 2020s.

- Getting through the next 15 years would be supported by increases in labour force participation and productivity and/or increases in migration (shown here as double the current level).

France

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.89	100	1.29	56.59
Alternative TFR	1.89	100	1.29	56.59
Zero NOM	1.89	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.29	56.59
Alternative NOM	1.89	**Constant to 2010, transitions to 150 take place linearly over 5 years between 2010-1015**	1.29	56.59
Alternative productivity	1.89	100	**Constant to 2010, then rises linearly to 1.7 by 2015**	56.59
Sweden's LFPR in 2025	1.89	100	1.29	**Linear increase from 56.59 in 2005 to 67.27 in 2025**

France: Annual GDP per capita growth



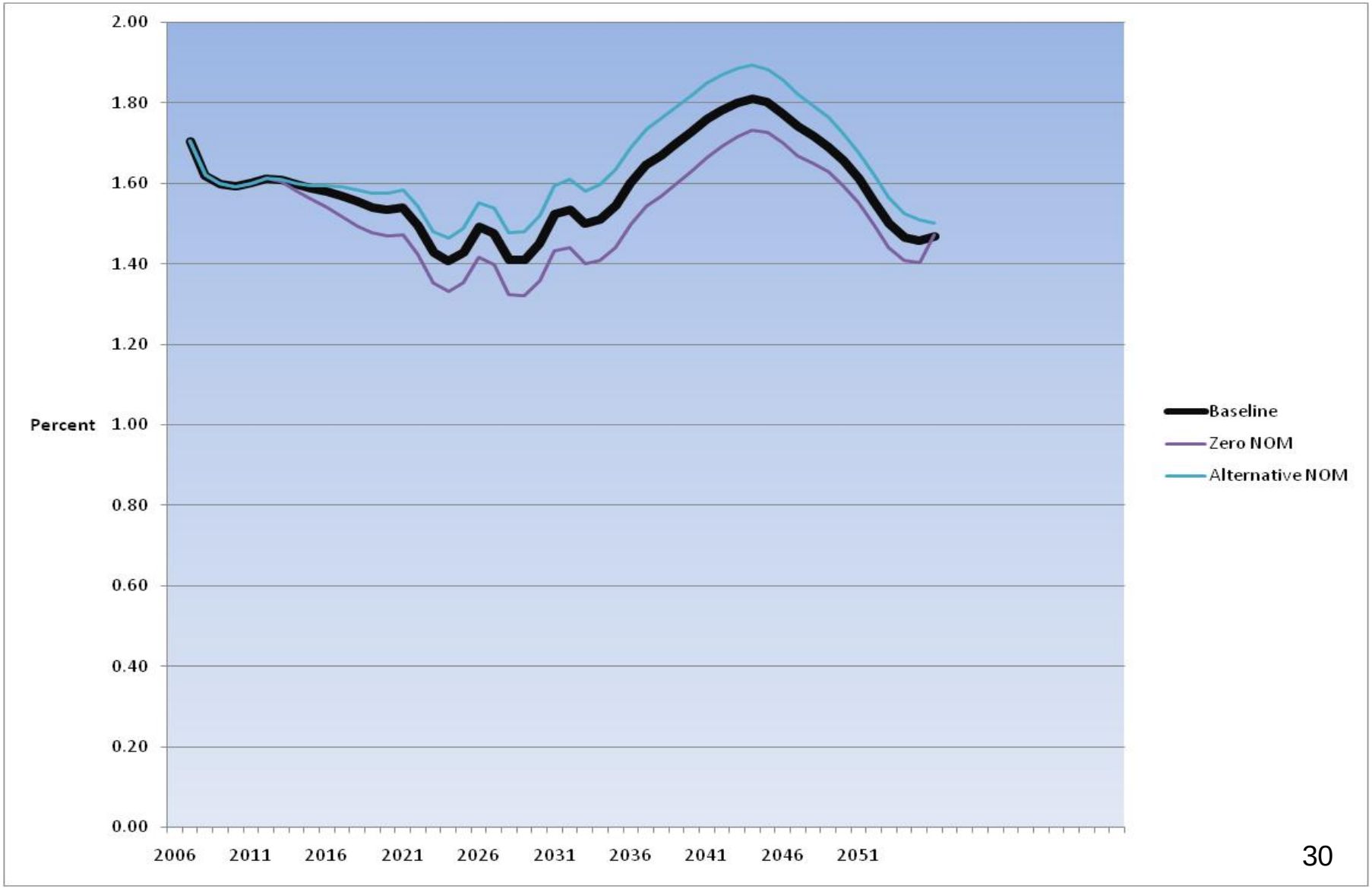
France: Summary

- France differs from the countries reported so far. From 2010 onwards, the rate of growth of GDP per capita is flat to 2020 and then rises continually (from 0.75% in 2020 to 1.3% in 2050).
- Migration 50% higher than at present would make little difference.
- There is scope for France to achieve an even more favourable result through increased participation and increased productivity.

Sweden

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.87	30	1.76	67.27
Alternative TFR	1.87	30	1.76	67.27
Zero NOM	1.87	**Constant until 2010, transition to zero NOM take place over next 5 years**	1.76	67.27
Alternative NOM	1.87	**Flat to 2010, transitions to 60 take place linearly over 5 years between 2010-2015**	1.76	67.27
Alternative productivity	1.87	30	**1.76**	67.27
Sweden's LFPR in 2025	1.87	30	1.76	67.27

Sweden : Annual GDP per capita growth



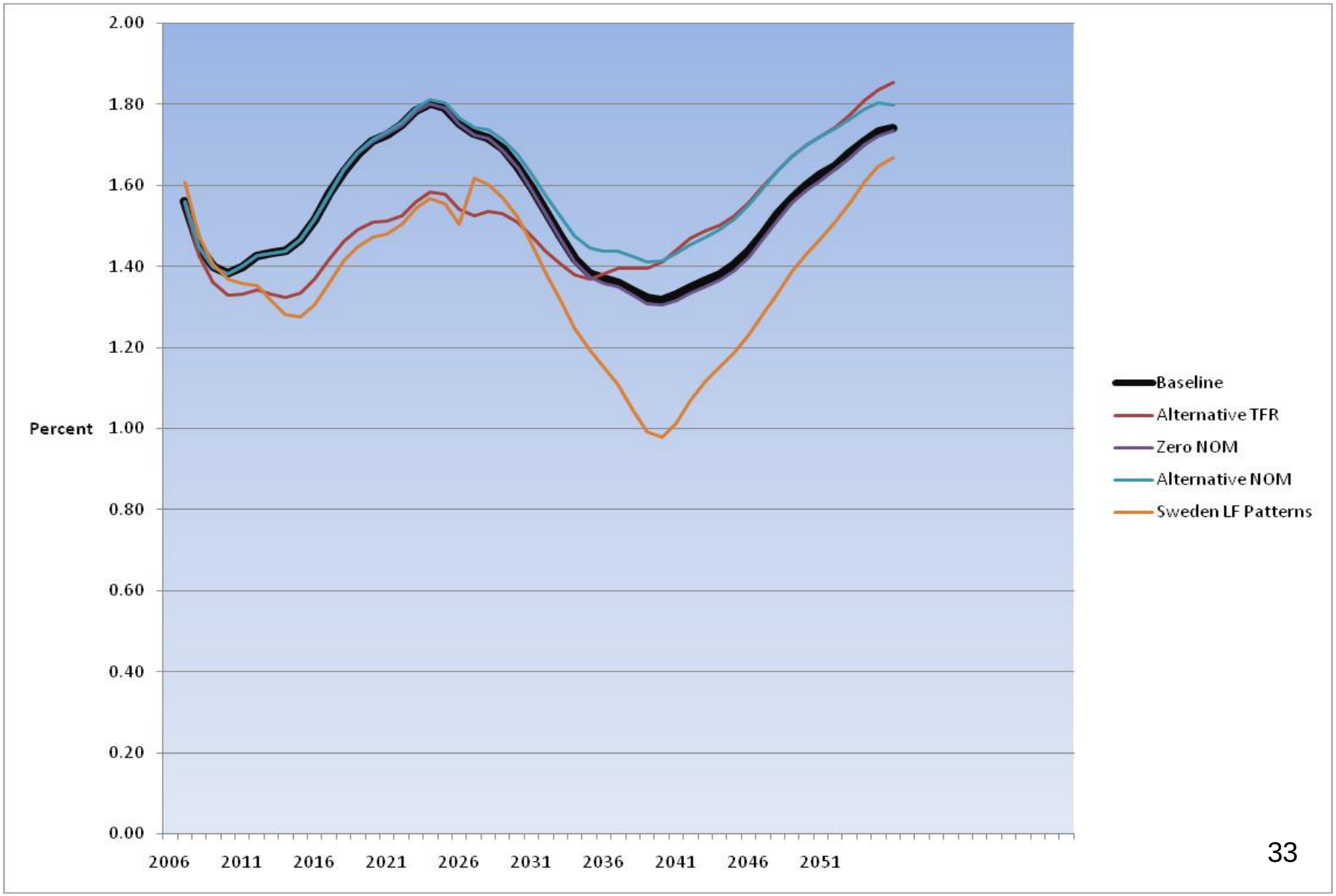
Sweden: Summary

- GDP per capita growth falls initially as a result of ageing (1.6% to 1.4%) but it remains relatively high and increases from the mid 2020s.
- Immigration being 50% higher or 50% lower has small but predictable impacts.
- As Sweden's participation and labour productivity are already high, no alternative assumptions are used

Japan

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.27	30	1.84	64.22
Alternative TFR	**TFR rises to 1.4 by 2010 and then to 1.7 by 2020**	30	1.84	64.22
Zero NOM	1.27	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.84	64.22
Alternative NOM	1.27	**Constant to 2010, transitions to 300 take place linearly by 2020**	1.84	64.22
Alternative productivity	1.27	30	**1.84**	64.22
Sweden's LFPR in 2025	1.27	30	1.84	**Linear increase from 64.22 in 2005 to 67.27 in 2025**

Japan: Annual GDP per capita growth



Japan: Summary

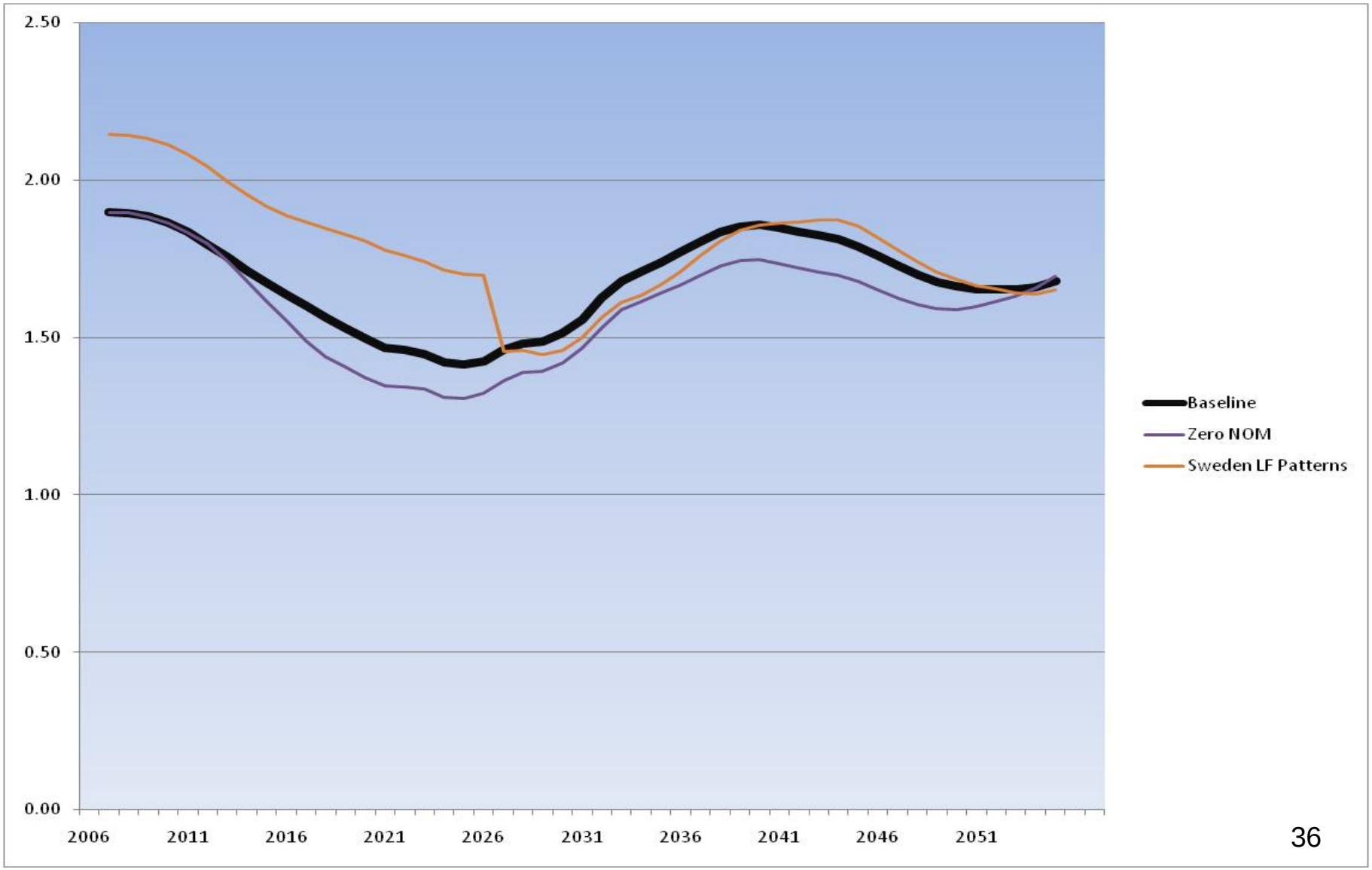
- Although Japan's population and labour supply decline in the future, the age structural changes do not produce a decline in the rate of growth of GDP per capita. In fact, age structure leads to a rise between 2010 and 2025 (1.4% to 1.8%).

- This is probably because the Japan population has already aged and there is a benefit to GDP per capita growth of recent low fertility.

United Kingdom

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.84	190	1.84	64.2
Alternative TFR	1.84	190	1.84	64.2
Zero NOM	1.84	**Constant to 2010, transition to 0 takes place linearly over 5 years between 2010-1015**	1.84	64.2
Alternative NOM	1.84	190	1.84	64.2
Alternative productivity	1.84	190	1.84	64.2
Sweden's LFPR in 2025	1.84	190	1.84	**Linear increase from 64.2 in 2005 to 67.27 in 2025**

UK: Annual GDP per capita growth



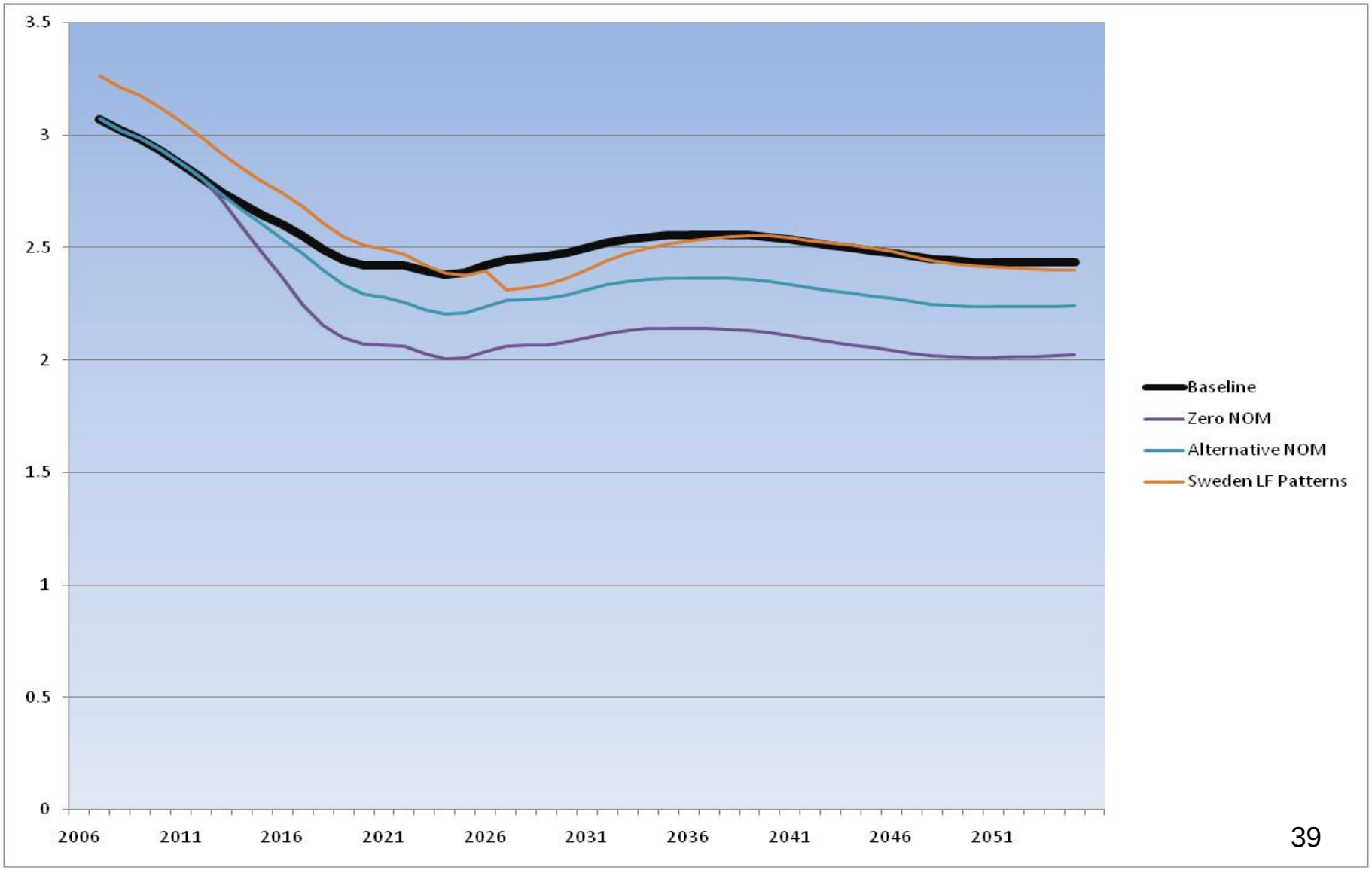
UK: Summary

- Ageing will bring down the rate of growth of GDP per capita in the UK over the next 15 years (1.9% to 1.4%) but not nearly as sharply as in Germany, Austria and Spain.
- From the mid 2020s, the rate of growth of GDP per capita would rise.
- A shift to zero migration would not have a major impact on the UK rate of growth of GDP per capita but its labour supply would fall in the longer term.

USA

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.84	1010	1.99	65.3
Alternative TFR	1.84	1010	1.99	65.3
Zero NOM	1.84	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.99	65.3
Alternative NOM	1.84	**Constant to 2010, halve over 10 years, then constant**	1.99	65.3
Alternative productivity	1.84	1010	1.99	65.3
Sweden's LFPR in 2025	1.84	1010	1.99	**Linear increase from 65.3 in 2005 to 67.27 in 2025**

USA: Annual GDP per capita growth



USA: Summary

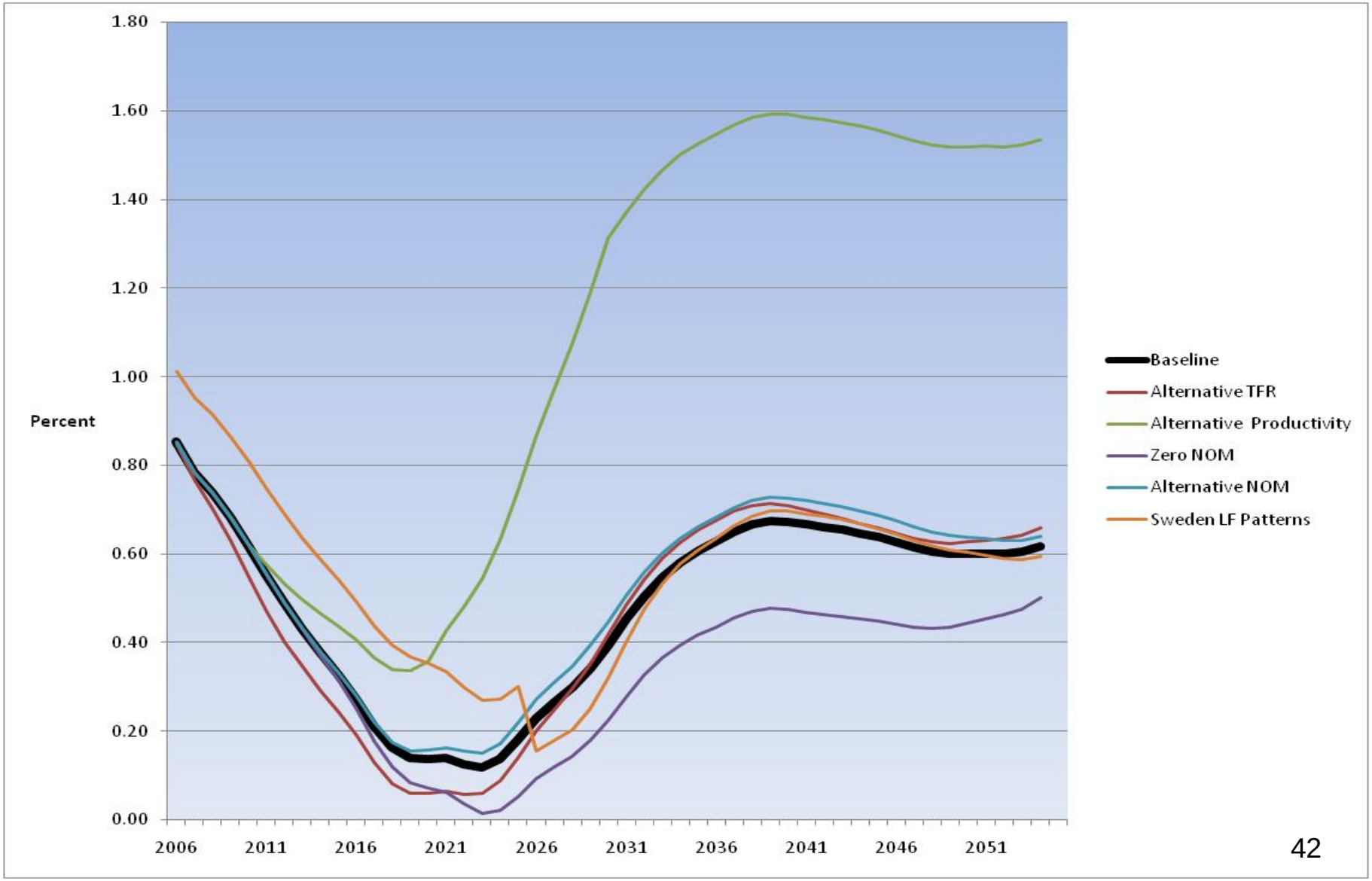
- The already very high rate of growth of GDP per capita in the USA (because of high participation and high productivity) would fall somewhat due to ageing (from 3% to 2.5% between 2010 and 2025) and then remain flat.

- Compared to zero migration, the current level of immigration to the US adds a large 0.5% to the annual growth rate of GDP per capita.

Canada

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.566	210	0.78	65.5
Alternative TFR	**TFR rises to 1.7 by 2010**	210	0.78	65.5
Zero NOM	1.566	**Constant until 2010. transition to zero NOM take place over next 5 years**	0.78	65.5
Alternative NOM	1.566	**Constant to 2010, transitions to 300 by 2020**	0.78	65.5
Alternative productivity	1.566	210	0.78	65.5
Sweden's LFPR in 2025	1.566	210	0.78	**Linear increase from 65.5 in 2005 to 67.27 in 2025**

Canada: Annual GDP per capita growth



Canada: Summary

- Canada is facing a severe and immediate fall in the rate of growth of GDP per capita due to ageing (from 0.8% to about 0.1% in 2020).
- The rate would subsequently rise but only to about 0.6%.
- The main issue for Canada is low labour productivity.
- Zero net migration would make the Canadian result much worse.

Australia

Scenarios	TFR	Migration (000)	Productivity	LFPR *
Baseline	1.83	180	1.5	63
Zero NOM	1.83	**Constant until 2010. transition to zero NOM take place over next 5 years**	1.5	63
Alternative NOM 1 (250 NOM)	1.83	**Transitions from 180 to 250 by 2010, constant at 250**	1.5	63
Alternative NOM 2 (Temporary 250 NOM)	1.83	**Transitions from 180 to 250 by 2010, fall to 180 by 2020, stay at 180**	1.5	63
Alternative NOM 3 (100 NOM)	1.83	**Transitions from 180 to 250 by 2010, falls to 100 by 2020, stay at 100**	1.5	63
Alternative productivity	1.83	30	**Flat to 2010, then rises linearly to 1.7 by 2015**	63
Sweden's LFPR in 2025	1.83	30	1.5	**Linear increase from 64.22 in 2005 to 67.27 in 2025**

Australia: Annual GDP per capita growth

Australia: Summary

- Due to ageing, Australia also faces an immediate fall in the growth of GDP per capita from about 1.7% to 1.1%.
- Higher participation and higher productivity would have the expected upwards impacts.
- Zero migration would have a large negative impact on the growth of GDP per capita.

Potential Limitations

- Differential productivity of immigrants.
- Complementarity of productivity for different age groups.
- Absolute size of economy effects, redundancy costs.
- Only labour productivity is considered, not multi-factor productivity.
- No account taken of the costs of ageing, eg. social security and health costs.