The Elderly Disability Dependency Ratio (EDDR): a new index taking into account the specificity of elderly populations

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   -Decomposition of the index for 2012

   -Projections of the Canadian EDDR 2001-2051
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1. Measuring aging then and now…

- How to measure the aging process?
- Indexes within the 20th Century:
  - Dependency Ratios, with age as the main and only variable
    - Dependency Ratio UN 1958 (IUSSP 1958)
    - Age Dependency Ratio IUSSP 1982 (Henry, L., and Van de Walle, E. (1982)
    - Old Age Dependency Ratio (Youth and Total); Encyclopedia of Population, 2003 (Demeny, P. G. and McNicoll, G., 2003)
  - Old Age Threshold
    - Ryder's suggestion for Old Age Threshold: the threshold should take into account the numbers of years from death instead of the number of years from birth
    - Application of Ryder's suggestions (Desjardins & Légaré, 1984; Légaré & Desjardins, 1987)
    - Old Age Threshold and Retirement Age Threshold (3rd and 4th age : Laslett 1989)

1. Measuring aging then and now…

- Current Context: several limitations when using chronological age as a marker
  - New approaches taking into account changes in:
    - labor force participation (Encyclopedia of Population, 2003)
    - disability status over time (Science, 2010)
    - cognitive fitness (PNAS, 2012)
- The *Science* Study Context
  - Sanderson and Scherbov have suggested in *Science* (2010) improvements to measure the aging process
  - Propose the use of a new index taking into account changes in health status over time: Adult Disability Dependency Ratio (ADDR)
- Our proposed index is an extension of the Sanderson and Scherbov index

2. A new index – Why a new index ?

- When thinking about the *burden* of an aging population, most of the time, policy makers have in mind the elderly

- As an extension of the Sanderson and Scherbov index, we have proposed (Canadian Journal on Aging, 2014):

  - The Elderly Disability Dependency Ratio (EDDR)

- This index takes into account the specificity of the elderly and their health characteristics

$$\text{EDDR} = \frac{\text{Population 65+ with a disability}}{\text{Population 20+ without a disability}}$$

3. Data and Methods … for Canadian index

- For both the numerator and denominator, we have direct access to the number of disabled persons
  - Numbers of people with or without a disability by age within the total population (both in private and collective households)

- For Canadian data:
  - with disability = with severe and moderate disability
  - no disability = mild or no disability

- Source of the data:
  - Statistics Canada microsimulation model LifePaths

However, we had to use a different method to compute the index for European countries

3. Data and Methods … for European indexes

- For both the numerator and denominator, we do NOT have direct access to the number of disabled persons
- 3-steps approach to estimate the total number of disabled persons:

Step 1: Disabled population living in private households

– prevalence of people with activity limitations by age comes from EU SILC answers to GALI question (2004-2012)

– Number of people living in private households is equal to :

(100% - % of people in institutions by age in 2001) X (yearly population estimates by age)

– Rates of institutionalization of 2001 are kept constant through 2004-2012 period

– Prevalence of disability multiplied by number of people living in private households = number of disabled persons living in private households

3. Data and Methods … for European indexes

Step 2: Total population with disability

- In order to have the number of disabled, we made the assumption, the same that for Canada, that all the persons living in institutions have a disability
- We add those persons to the number calculated in Step 1

Step 3: Total population without disability

- To calculate the number of people without disability (the denominator of our index), we subtract the previous result (Step 2) from the total population by age for each country for a given year

Note: For the European data , «with disability» refers to moderately limited and severely limited while «no disability» refers to no limitation

- Source : European Health and Life Expectancy Information System - JA-EHLEIS)

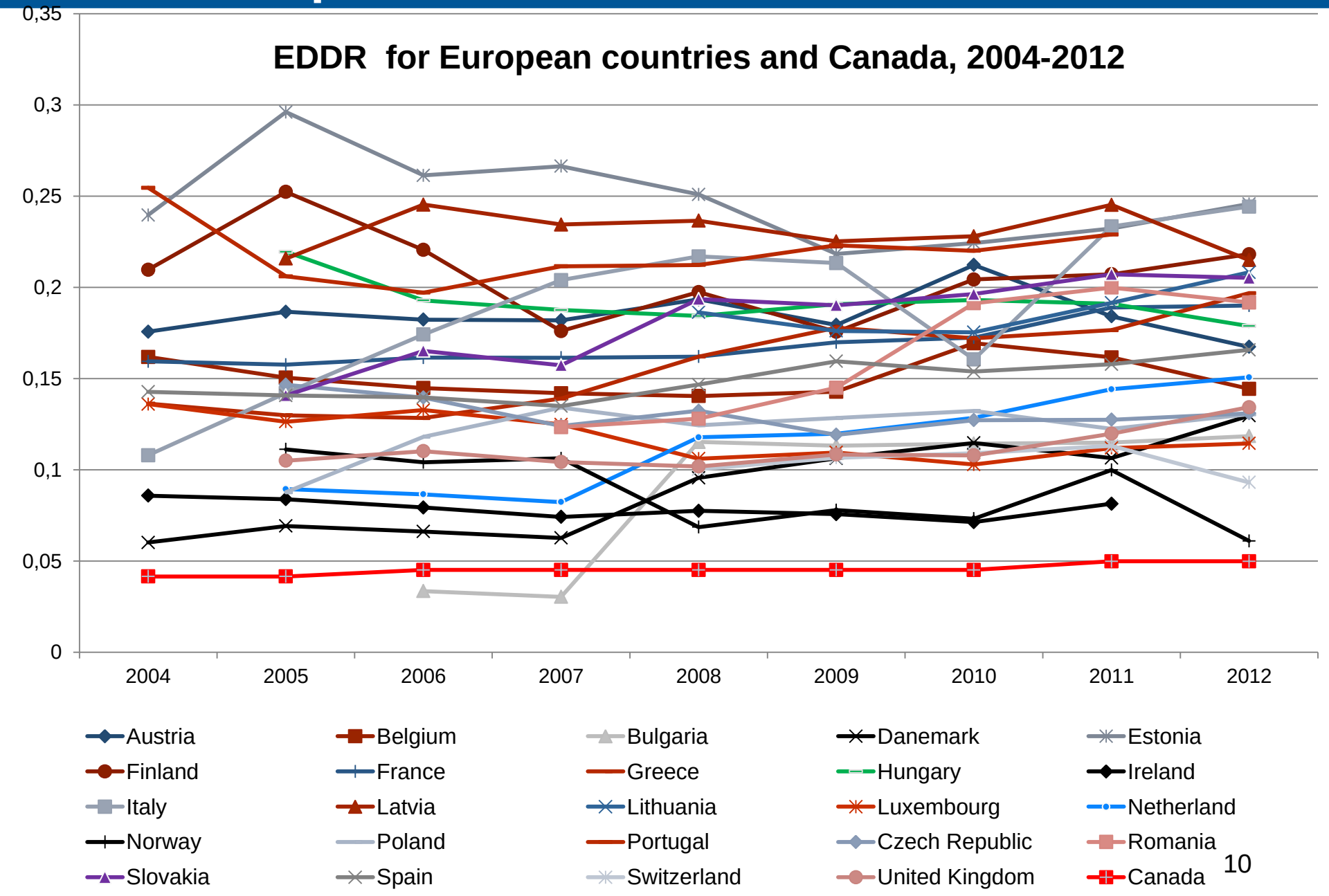
4. Results

-Current estimates for the period 2004- 2012

-Decomposition of the index for 2012

-Projections of the Canadian EDDR 2001-2051

4. Results: period 2004-2012



4. Results: period 2004-2012

- EDDR is :
  - stable over the short run
  - lower for Canada than for European countries
  - **in 2012 the range for European countries is between 0.06 (Norway) and 0.25 (Estonia and Italy)**

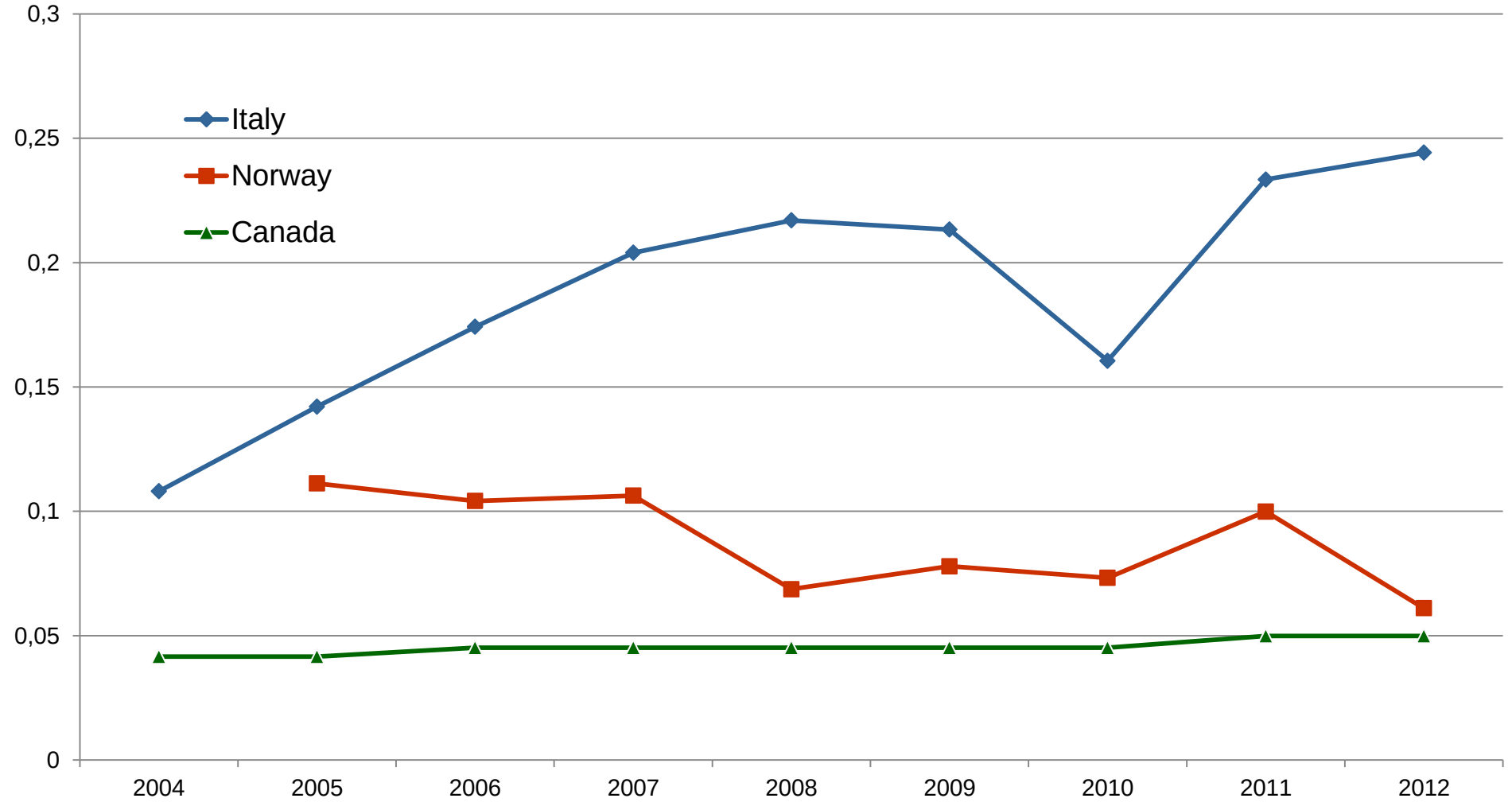
To better understand these levels, we will present a descriptive analysis of the three main factors affecting our indicator :

- age structure
- living arrangement: proportion living in institutions
- health status

- Results are presented for Italy, Norway and Canada

4. Results: period 2004-2012

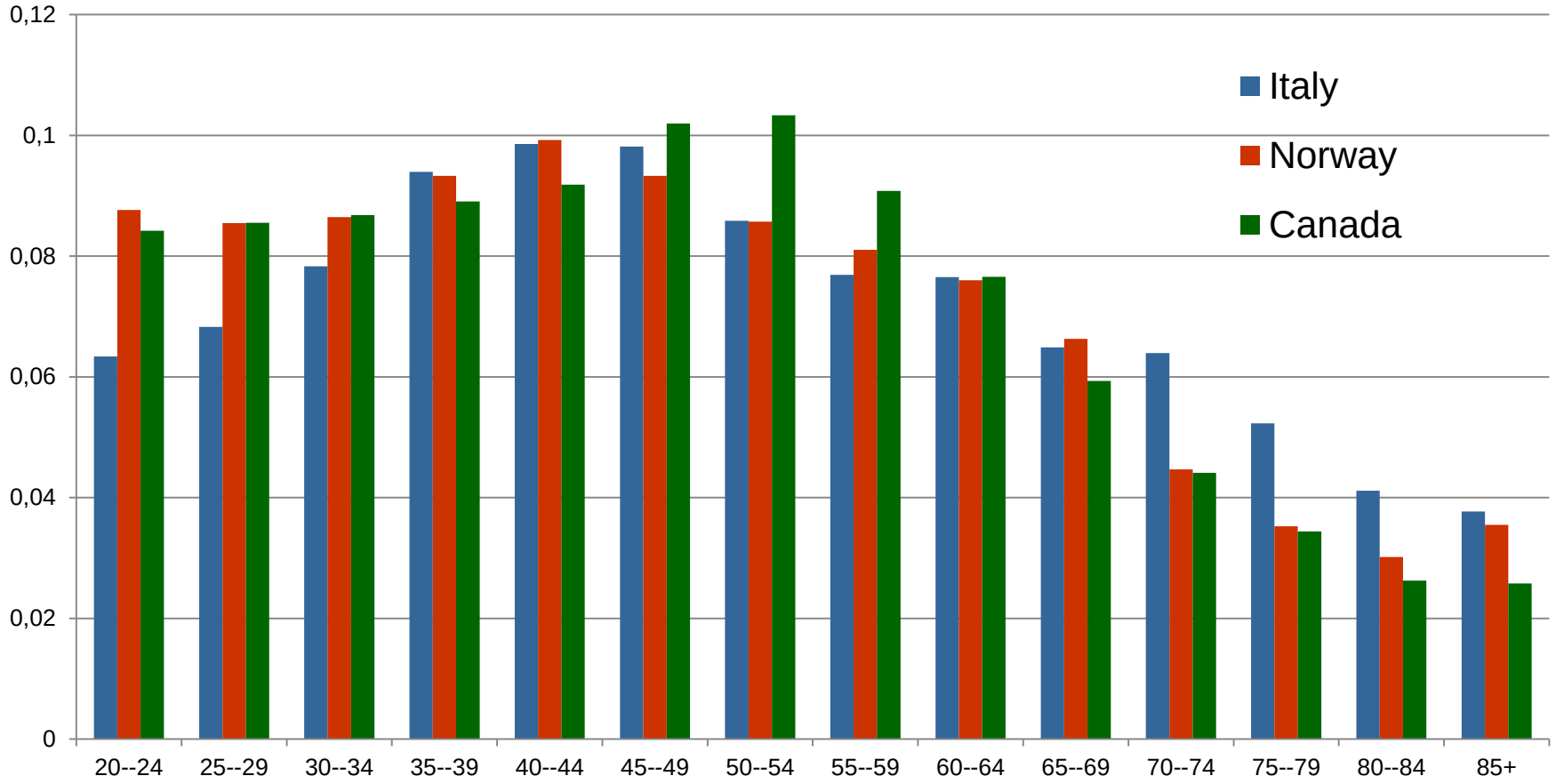
- EDDR for Italy, Norway and Canada



- How the data can explain the difference ?

4. Results: Decomposition of the index for 2012

- The age structure for those countries are relatively different



- Italy has an older population than Norway and Canada

4. Results: Decomposition of the index for 2012

- From the age structure of the population, we can calculate the Old Age Dependency Ratio (OADR), those 65+ on population 20-64

	Population aged 65+ on population aged 20-64 (OADR)
Italy	**0.35**
Norway	**0.27**
Canada	**0.21**

- In 2012, Italy as the higher OADR, Canada the lower, Norway is in between

- But, the age structure is not the only thing that affect our indicator.

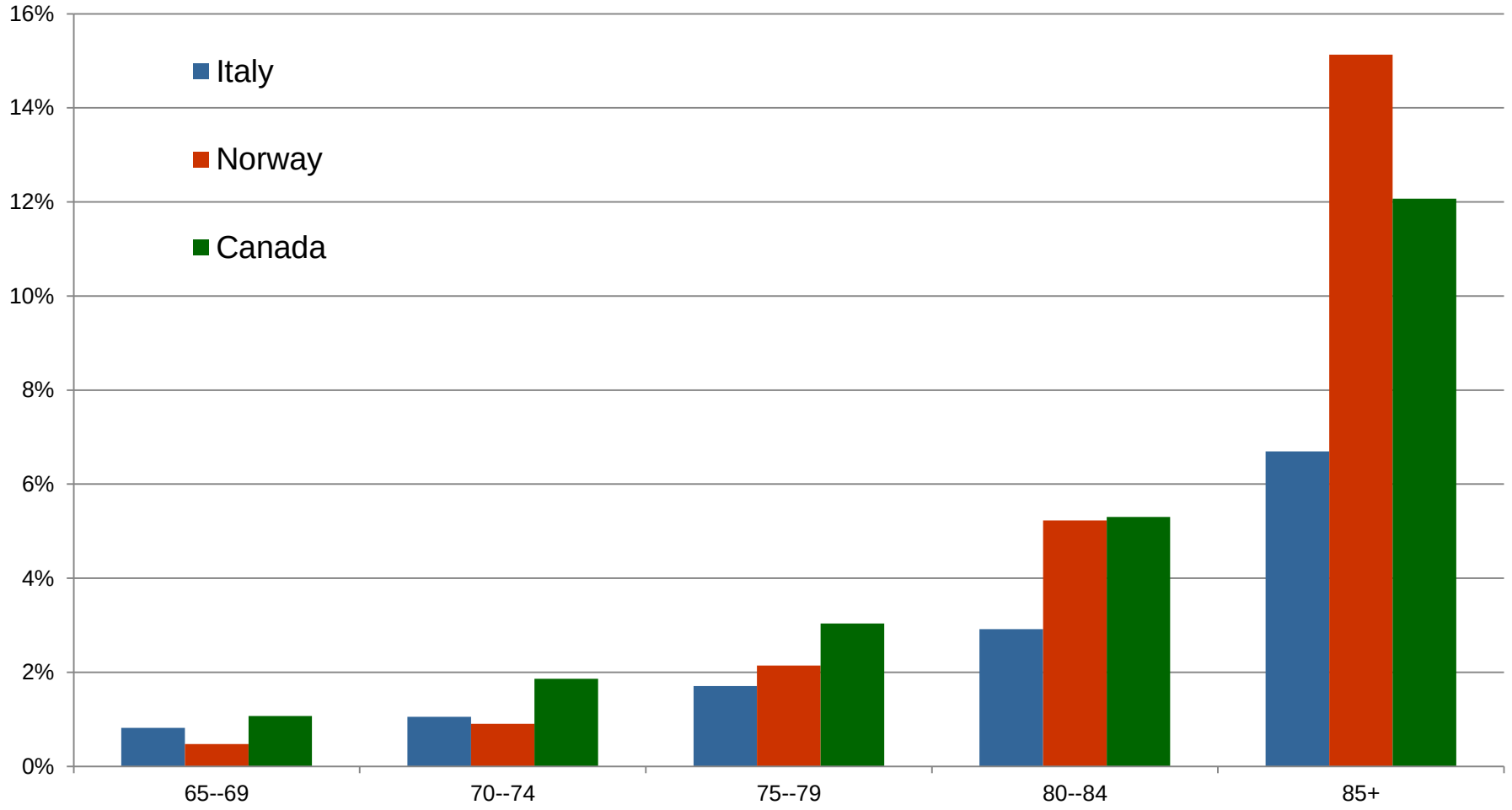
4. Results: Decomposition of the index for 2012

- An index on population aging has to take into account the population living in institutions
- This is especially the case when the relative weight of the oldest-olds is important in the calculation of the aging index
- It is therefore important for EDDR, and less for ADDR

It is important to note that, for European countries as for Canada, we made the assumption that all people living in institutions have a disability

4. Results: Decomposition of the index for 2012

- Norway and Canada generally have an higher proportion of people living in institutions



- This is particularly true for those aged 85 and over

4. Results: Decomposition of the index for 2012

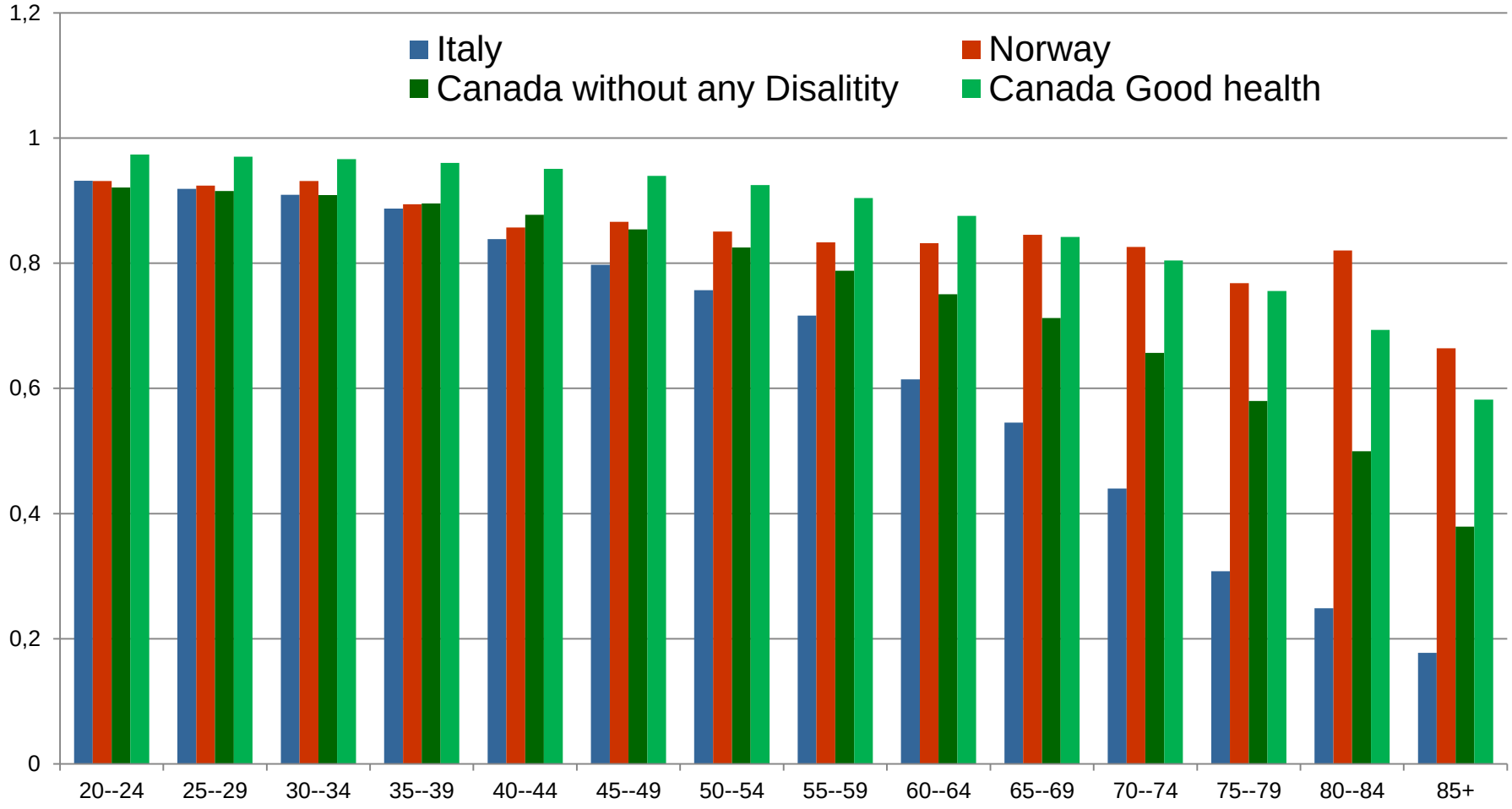
- Our assumption about those living in institutions affects less then 5% of the 65 and over

	Proportion of 65 + living in institutions
Italy	**2.2%**
Norway	**4.0%**
Canada	**3.7%**

- About institutionalization, we have to keep in mind that:
  - the phenomena is very cultural and strongly affected by the supply
  - it may not necessary be an indicator of poor health
  - it is quite rare that health surveys include population living in institution

4. Results: Decomposition of the index for 2012

- Health is the other key variable to analyze



- We observe important disparities between countries in the proportion of people with no disability

4. Results: Decomposition of the index for 2012

- According to the data, Italy has a very low proportion of people in good health at older ages

	Proportion of 65 + in good health
Italy	**37.1%**
Norway	**79.5%**
Canada	**76.2%**

- What can explain those important differences?

4. Results: Decomposition of the index for 2012

- What can be concluded from this descriptive analysis?

	Population aged 65+ on population aged 20-65 (OADR)	Proportion of 65 + living in institutions	Proportion of 65 + in good health	EDDR
Italy	**0.35**	**2.2%**	**37.1%**	**0.24**
Norway	**0.27**	**4.0%**	**79.5%**	**0.06**
Canada	**0.21**	**3.7%**	**76.2%**	**0.05**

- **The main driver to explain the difference in the EDDR is the health status**

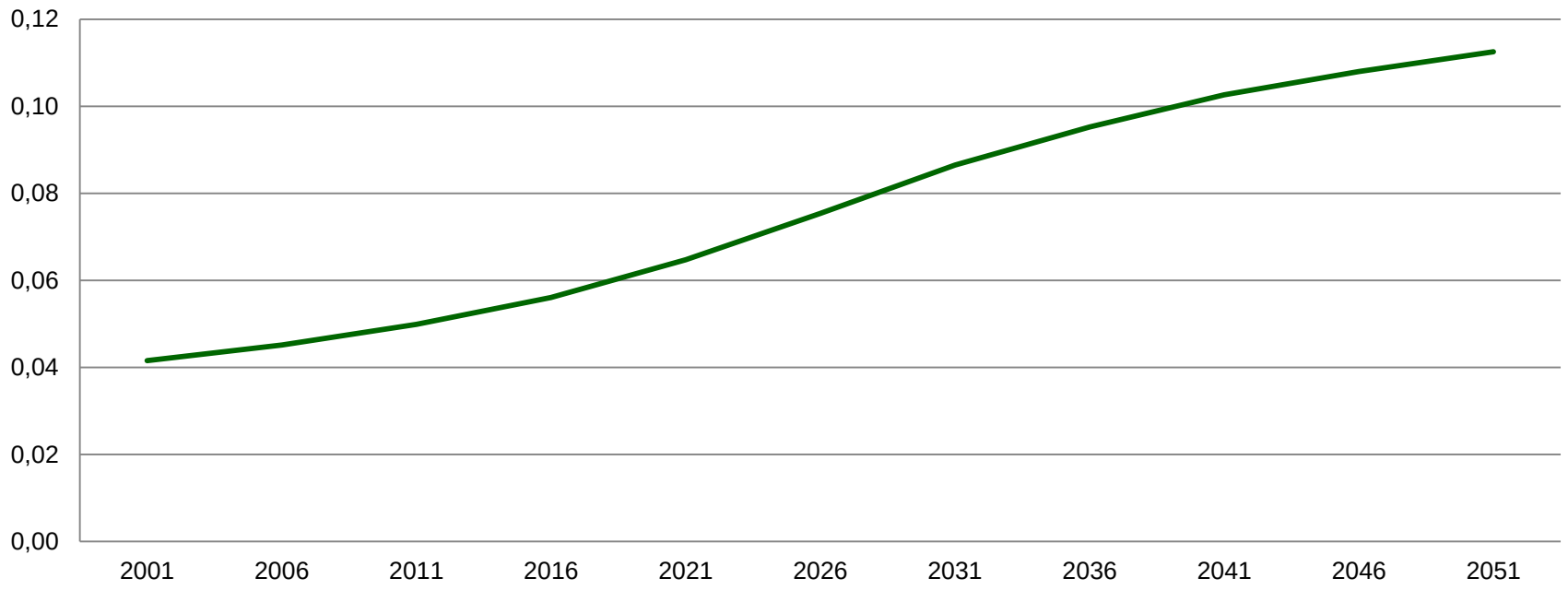
4. Results: Projections of the Canadian EDDR 2001-2051

- For Canada, we are able to project the EDDR using the LifePaths microsimulation model

- We project our index until 2051, when the last Canadian Baby-Boomer will have reached the age of 85

4. Results: Projections of the Canadian EDDR 2001-2051

- The EDDR results for Canada coming from LifePaths projections show an important upward trend



- Canadian policy makers should be aware of this possibility when they are thinking about future elderly programs

5. Discussion

- Health status
  - For European countries, self-reported information for activity limitations use the same question GALI all over the years
  - However, important discrepancies are observed and from our point of view, they should be analyzed more deeply
  - For Canada, being based on HUI rather than GALI, levels of EDDR may differ from European countries
- We should be careful with the long term projection of sensitive variables like disability
  - For future work, sensitivity analysis around the projection assumptions and different health scenarios should be developed

5. Conclusion

- From the descriptive analysis, we have already showed the our new index EDDR is driven by the age structure and the health status of the elderly population

- We think that using only the elderly population at the numerator can give a better idea of the potential burden related to population aging

- Even if Canada will see its EDDR multiply by three during the first half 21st Century, it would reach the current European levels in year 2050, according to our microsimulation model.

- Can the Canadian situation be compared with the European situation?

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Annexes

Table 3. Multi-dimension disability level classification system using HUI variables.

HUI Dimension	Level and description of the level of functionality	Disability level			
		No	Mild	Mod-erate	Sev-ere
Vision	1 No visual problem	X			
	2 Problems corrected by lenses (distance, close, or both)	X			
	3 Problems seeing distances – not corrected	X			
	4 Problems seeing close – not corrected		X		
	5 Problems not corrected by lenses (distances, close, or both)			X	
	6 No sight at all				X
Mobility	1 No mobility problem	X			
	2 Problem – no aid required		X		
	3 Problem – requires mechanical support			X	
	4 Problem – requires wheelchair			X	
	5 Problem – requires help from people				X
	6 Cannot walk				X
Dexterity	1 No dexterity problem	X			
	2 Dexterity problems – no help nor equipment required		X		
	3 Dexterity problems – requires special equipment		X		
	4 Dexterity problems – requires help for some tasks			X	
	5 Dexterity problems – requires help for most tasks				X
	6 Dexterity problems – requires help for all tasks				X
Memory and Thinking	1 No cognitive problem	X			
	2 Having a little difficulty to think	X			
	3 Somewhat forgetful	X			
	4 Somewhat forgetful/Having a little difficulty to think		X		
	5 Very forgetful/Some difficulty to think			X	
	6 Unable to think and to remember				X
Pain and discomfort	1 No pain or discomfort	X			
	2 Mild or moderate pain; does not prevent activity	X			
	3 Moderate pain; prevents few activities		X		
	4 Moderate or severe pain; prevents some activities		X		
	5 Moderate or severe pain; prevents most activities			X	

GALI Question

GALI : Global Activity Limitation Index

Jagger et al. 2010, Journal of Clinical Epidemiology,63, pp.892-899

The GALI is self-reported, whereby an individual is asked:

"For the past six months at least, to what extent have you been limited because of a health problem in activities people usually do?"

There are three possible responses:

not limited,
moderately limited, or
severely limited.