UCLouvain

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Waiting period from diagnosis for mortgage insurance issued to cancer survivors

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Outline

Context

- Property loans must be accompanied with mortgage insurance
- Insurers evaluate applicant's health based on a questionnaire
- Cancer survivors are often penalized (i.e., higher premiums or insurance refusal)
  - based on the **perception** of aggravated risks (due to medical history)
  - rather than their actual state of health

Context

- Laws to ease access to mortgage insurance are passed
  - 2007: AERAS convention in France
  - 2016: right to be forgotten (RTBF*) in France
  - 2019: RTBF in Belgium
  - 2020-2023: RTBF or (non-legislative) agreement in 11 EU countries
  - 2024: discussions to expand it to other countries or even at EU-level

- *RTBF: right for a client seeking a loan not to declare a previous cancer after a given waiting period

- RTBF differs between countries. To summarize
  - waiting period starts at the **end of a successful treatment**
  - waiting period ranges from 5 to 10 years
  - reduced if diagnosed before 18 or 21 years old
  - discussions to reduce it further (and expand it to other diseases)

Different angles of approach

- **Estimate the time** after which cancer patients could be covered at the same rate than cancer-free applicants
- **Develop financial products** that allow patients to be covered while waiting for the RTBF to take effect
- **Quantify**
  - the risk of developing cancer for a healthy individual
  - the number of years of life lost (YLL) a cancer patient loses during the repayment period
- **Propose an alternative method** to estimate the waiting period

Objectives

1. reduce waiting period until it reflects the real risk posed by cancer survivors
2. show countries lacking RTBF that, under some circumstances, it is viable

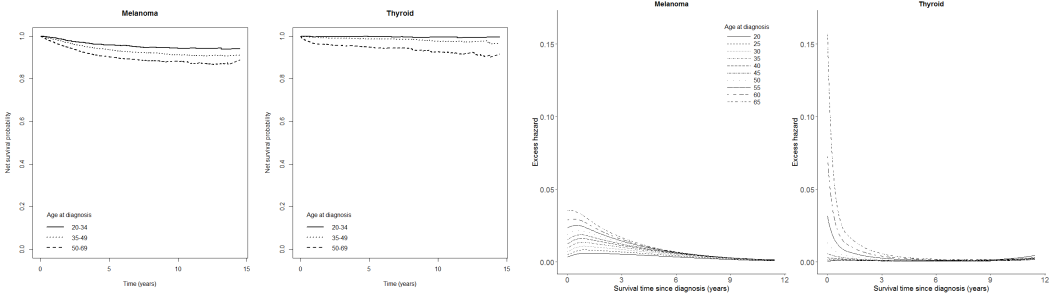
Chap. 2 - Waiting period from diagnosis

- Main objectives

1. show that for some cancers, survivors have a survival comparable to general population
2. demonstrate that patients having survived long enough to some cancers can access life insurance market at standard rates
3. promote a waiting period opening RTBF starting at diagnosis

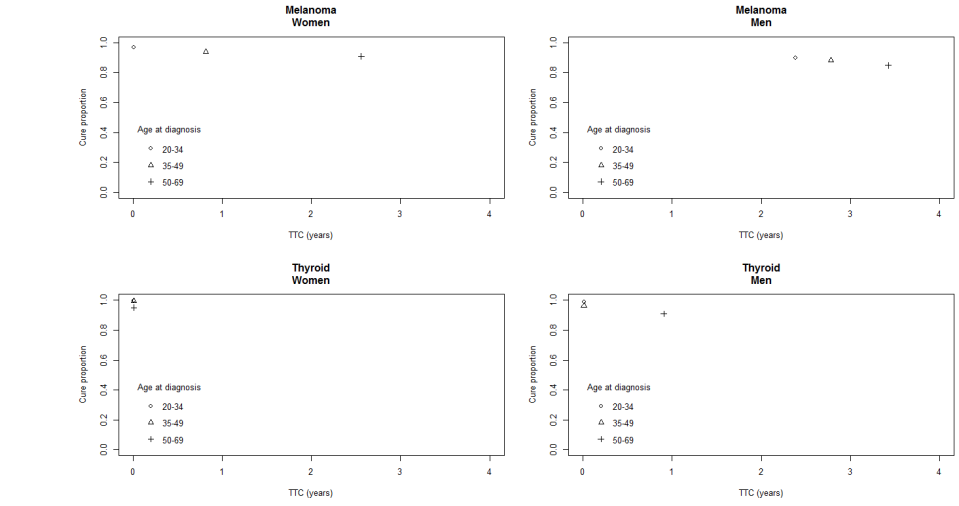
Survival is comparable to general population

Net survival (left) and excess hazard (right) by age and cancer site:



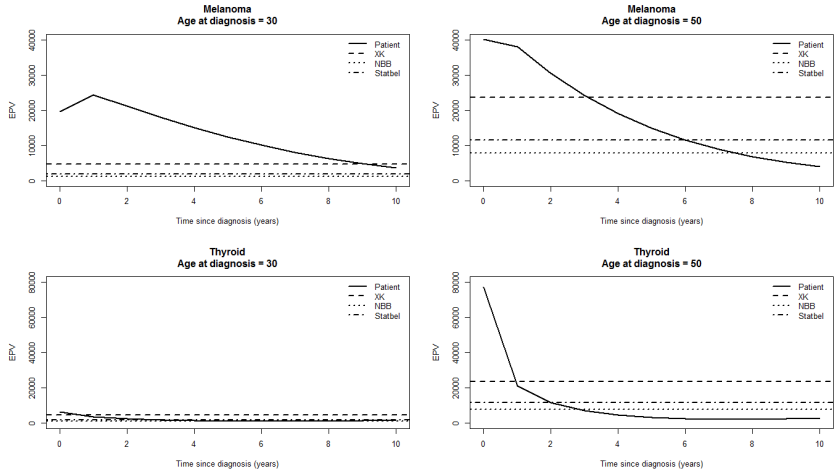
Survival is comparable to general population

Cure proportion and time-to-cure (TTC) by gender, age and site:



Application to mortgage insurance

Expected present value (EPV) of a typical mortgage insurance contracted by a 30 and 50-year-old cancer patient:



Take-home message

- Net survival, excess hazard, cure proportion and TTC show that, for melanoma and thyroid, excess mortality becomes negligible after some waiting period
- Waiting period is relatively short when computed as the time needed to get back to standard premium rates
- All this, with waiting period **starting from diagnosis**

Chap. 3 - Semi-Markov modeling

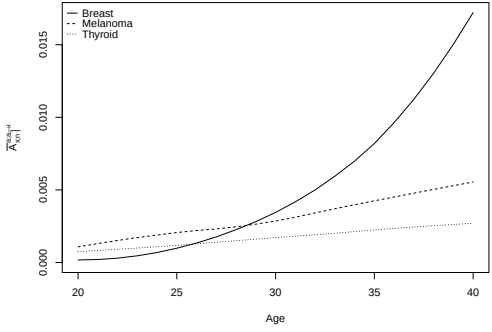
- Idea: develop insurance products to fill the gap in coverage **between the time of diagnosis and the time when RTBF is applicable**
  - particularly important at young age to guarantee access to home ownership to cancer patients whose health status has improved but who cannot (yet) benefit from RTBF

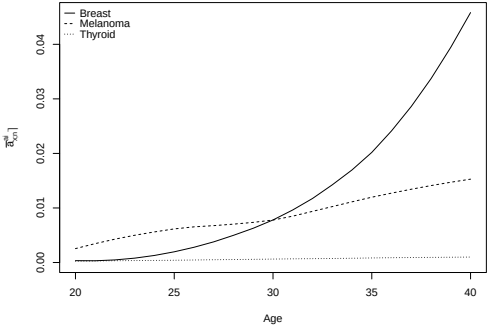
- Several products are considered
  - stand-alone covers
  - combined products
  - products granting access to some specific insurance cover

- Actuarial calculations are performed in a 3-state (healthy, ill, dead) Semi-Markov model (to account for the time spent in the current state)

Stand-alone covers

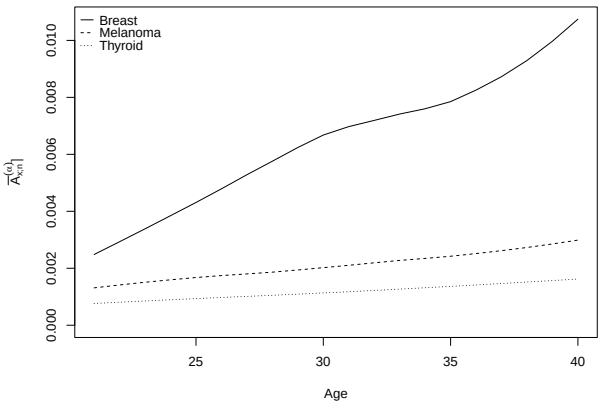
Lump sum paid at diagnosis (left) and temporary life annuity starting at diagnosis (right) (e.g., to cover out-of-pocket expenditures related to treatment):





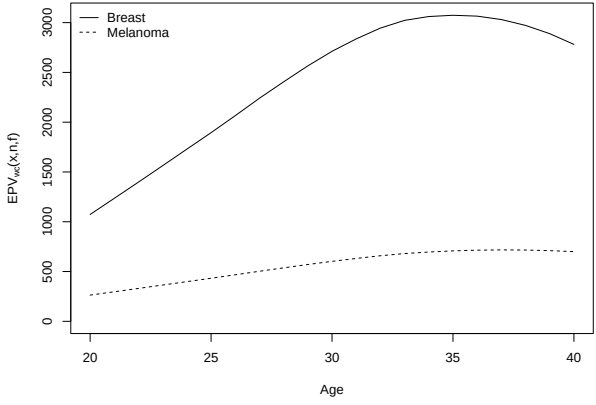
Combined products

Term life insurance with cancer acceleration benefit (e.g., death benefit is partially converted into a lump sum paid at diagnosis, and the remaining part is paid at death):



Mortgage insurance with specific cover option

Mortgage insurance, but with the sum insured being the difference between the actual premium and the reference premium computed from XK life table (and with a 2-year deferring period):



Take-home message

- Premium amounts (and thus costs) remain low for melanoma and thyroid cancers, but considerably increase for breast cancer
  - due to larger incidence
  - (and for temporary life annuity; larger payment duration as well)

- A new offer could develop, targeting needs of cancer patients

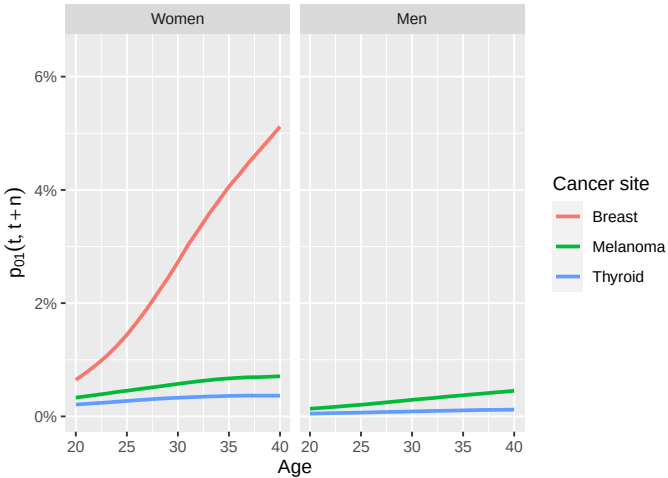
Chap. 4 - Health indices

- Main objective is to show how a 3-state illness-death model can be used to estimate
  1. incidence risk
  2. YLL due to cancer **given a certain time survived after diagnosis**

- Computations are performed
  - with a **non-homogeneous Semi-Markov model**, to account for
    - time spent in the current state
    - transition between states may depend on age
  - with a finite time horizon
    - as we are interested in implications for insurers in the context of RTBF

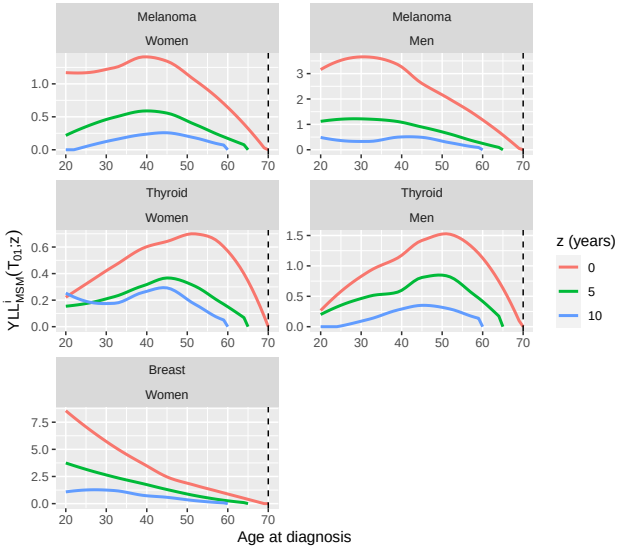
Incidence risk

What is the probability that a healthy individual is diagnosed with a specific cancer over the next 20 years?



YLL given *z* years since diagnosis

How many years a patient is expected to lose due to cancer? *(before 70)*



Take-home message

- Probability of being diagnosed with cancer over next 20 years
  - remain low for melanoma and thyroid cancers for both sexes
  - but considerably increases with age for female breast cancer

- YLL before 70 years due to cancer
  - peaks between 35 and 55 years for melanoma and thyroid cancers
  - is larger for men than women
  - remains below 0.5 year for melanoma and thyroid once the patient survived 10 years after diagnosis
    - for insurers: limited number of years lost during repayment period

Chap. 5 - Right to be forgotten

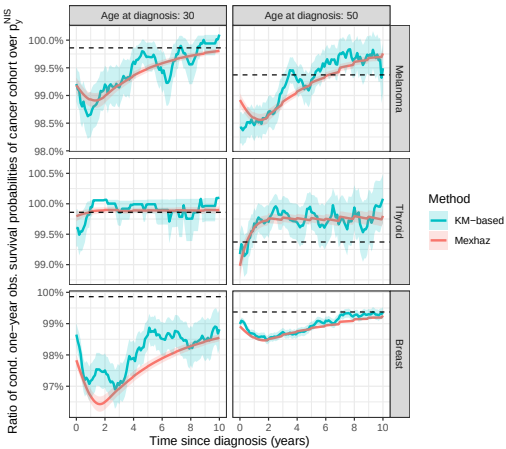
- Methods used in Chap. 2 require
  - long follow-up (10 years of RTBF + loan duration), or
  - extrapolation of the excess hazard
- In our case, extrapolation was needed, but it appears that results depend on the chosen method

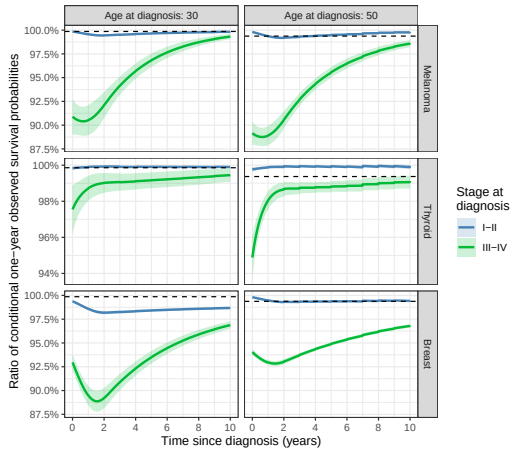
$\Rightarrow$ An alternative method is proposed to escape the problem of limited follow-up
  - (and at the same time controlling the resulting premium)

- Impact of the stage of the tumor at diagnosis on RTBF is also investigated

Proposed approach for limited follow-up

Ratio of conditional one-year observed survival probabilities:





Comparison with Chap. 2

Cancer site	Age at diagnosis	Proposed approach All stages	Chap. 2 All stages
Melanoma	30	> 10	9
Melanoma	50	6	3
Thyroid	30	1	1
Thyroid	50	1	1
Breast	30	> 10	NA
Breast	50	> 10	NA

- Thyroid: waiting periods (WP) are similar across both methods
- Melanoma: WP slightly higher with proposed approach
- Results in line with reduced WP in Belgian legislation (max. 6 years after end of treatment for melanoma and thyroid)
- But all WP are based on **time since diagnosis**

Take-home message

Cancer site	Age at diagnosis	Proposed approach		
		Stages I–II	Stages III–IV	All stages
Melanoma	30	> 10	> 10	> 10
Melanoma	50	4	> 10	6
Thyroid	30	1	> 10	1
Thyroid	50	0	> 10	1
Breast	30	> 10	> 10	> 10
Breast	50	7	> 10	> 10

- Proposed approach cannot be used to argue a shorter WP for cancers with late recurrence (due to excess hazard even many years after diagnosis)
- WP should be computed cancer-by-cancer because
  - female breast cancer: **should** be done by stage
  - melanoma and thyroid: **could** be done by stage

Conclusion

RTBF is already a step forward, but it can be improved

- WP starting at diagnosis rather than end of successful treatment
- insurance products could be developed to make it less “all-or-nothing”
- insurers should assess whether the mutualization mechanism could take effect in regards to obtained results (and not on the *perception* of aggravated risks)
- if not viable when all stages are included, why not considering to propose it for *some* stages?
- why only applicable in 8 EU countries?

Future research

- Study other
  - cancer sites (and perhaps *in situ*)
  - diseases or conditions (both for which RTBF does or does not exist)
  - countries
- To vary coverage conditions depending on cancer site, construct a model with as many states as types of cancer (+ dead/healthy states)
- Allow transition from ill to healthy to account for cancer recurrence
- Consider other
  - products (e.g., targeted to two persons)
  - methods (e.g., a-spline, joint models)
- Refine the analyses at regional level, and/or include calendar time
- Consider other metrics than YLL (e.g. disability-adjusted life years)
- Assess whether
  - the same general population can be considered for patients diagnosed at stages I-II vs. III-IV
  - mortality in general population is similar than in insured population

Thank you!