The Potential Impact of Genetic Testing Legislation on U.S. Life Insurance Mortality

Mark Lombardo FSA, FCIA
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Presentation Disclaimer

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Genetics news

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Genetics news

- U.S. scientists try 1st gene editing in the body to cure hereditary disease

- Handheld device sequences human genome

- 2017 was the year consumer DNA testing blew up

Sources:
http://www.cbc.ca/news/health/gene-editing-body-1.4403002
http://www.bbc.com/news/health-42838821
https://https://www.technologyreview.com/s/610233/2017-was-the-year-consumer-dna-testing-blew-up//

Genetics news

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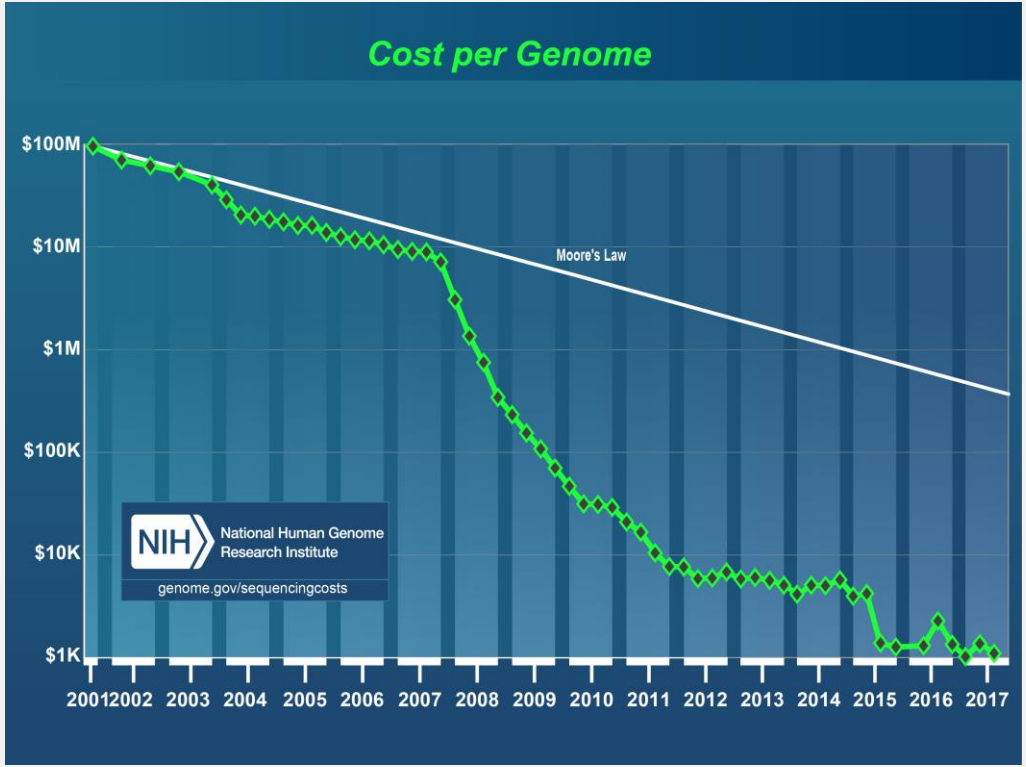
- Congrats on the new baby. Would you like a DNA screening test?

- Furless, buck-toothed, and immune to aging: Study suggests amazing new mole-rat attribute

- Science Says: DNA test results may not change health habits

Sources:
https://www.cnn.com/2019/01/06/health/newborn-genetic-screening-study/index.html
http://nationalpost.com/health/furless-buck-toothed-and-immune-to-aging-study-suggests-amazing-new-mole-rat-attribute
http://www.cbc.ca/news/health/dna-testing-1.4251280

Progress in technology makes whole genome sequencing affordable



A whole genome can be sequenced for less than $1,000

With reduced cost more people will have get some form of genetic testing

More genetic data will be available to support research

Knowledge increases (better prediction, prognosis, & new therapies)

What's safe to assume regarding genetic testing?

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01 Genetic testing rates in the general population will continue to increase

02 Testing costs will continue to decline

03 The ability to analyze the growing volume of data will improve

04 Associating future disease risk to specific gene characteristics will improve

Recent genetic related legislative events

- Florida: CS/SB 1106 proposed a ban on the use of Genetic Information for Life and LTC insurance.
- *March 2018: Indefinitely postponed and withdrawn from consideration*

- Canada (May 2017): Genetic anti-discrimination law protects patient privacy without sacrificing research

Sources:
http://floridapolitics.com/archives/255567-life-insurers-say-ban-genetic-testing-harm-industry
http://www.cbc.ca/news/health/genetic-discrimination-patients-1.4018332

Recent genetic related legislative events

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UK: Voluntary code of practice by life insurers limits use of predictive test result unless face amount is greater than £500,000

Australia: Similar legislation to the U.S., but a parliamentary inquiry had begun to look into genetic discrimination in the life insurance industry…

- **As of July 1st, 2019, FSC is introducing a new moratorium** allowing Australians to get coverage without disclosing an adverse test result**.**
- The insurance cover limits are: lump sum $500,000 for death and total and permanent disability, $200,000 for trauma, $4,000 a month for income protection

Agenda

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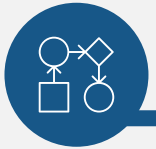
1 

The Impact of Genetic Testing on Life Insurance Mortality

2 

U.S. model description & results

3 

Moving forward, what needs to be done?

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1

SOA commissioned report

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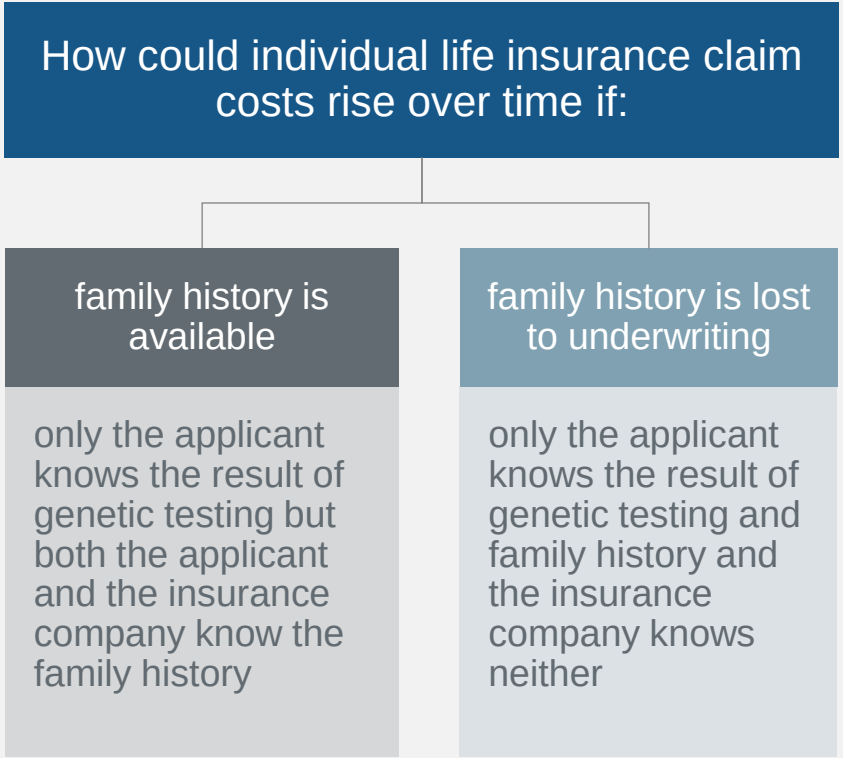
The SOA commissioned a report to illustrate the potential impact on the U.S. life insurance industry if legislation existed prohibiting the disclosure of genetic information during the underwriting process.

https://www.soa.org/resources/research-reports/2018/impact-genetic-testing/



What U.S. legislation exists?

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- The Genetic Information Nondiscrimination Act of 2008 (“GINA”)
  - Protects against discrimination for health insurance and employment
  - Does not cover all forms of insurance (life, disability, long-term care)
- State laws regarding life insurance vary

Restrictions on underwriting lead to…

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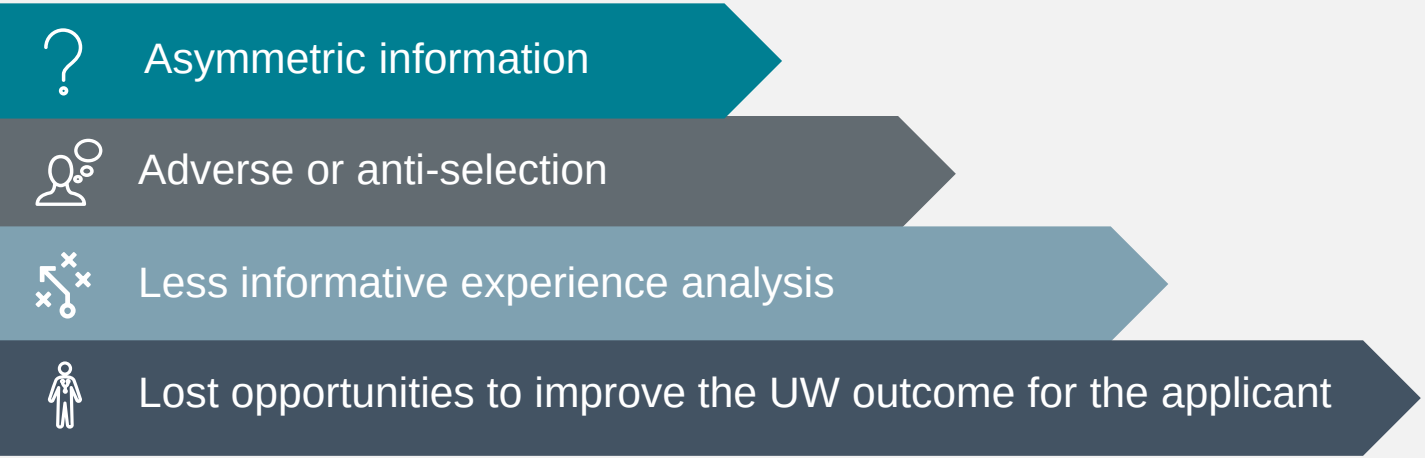

Value of family history compared to genetic testing

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Family History

- Used for >150 years
- Free
- No 3rd party interpretation
- Instant results
- Indicator of both genetic and environmental influences
- Little restriction of use

- Can be over-disclosed
- Can be non-disclosed (ND)
- ND unlikely to be proved
- Will miss de novo mutations

DTC

- Improving accessibility of both cost and availability
- No physician approval needed
- Status of 3 common BRCA mutations now reported

- Very limited value
- Restrictions of use
- Results often delayed
- Less predictive value than FH

Exome Sequencing

- Can identify 85% of significant disease causing mutations
- Better predictive value than FH for some diseases

- Same cost as other UW tests - $500
- Limited availability
- Restrictions of use
- Won't indicate environmental influences

Genome Sequencing

- More complete picture than FH and Exome testing
- Physician approval & counselling no longer required

- Expensive - $1000
- Full interpretation not possible
- Restricted use
- Won't indicate environmental influences

Impact on pricing - what are the important levers?

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Important Modeling Levers:

- **Genomic Specific Legislation:** What limitations on genetic information are insurers faced with?
- **Testing Rates**: What proportion of the general population will get a genetic test each year?
- **Anti-selection**: How many will seek insurance knowing they have a genetic mutation? How much will they purchase?
- **Underwriting Effectiveness**: How well does remaining underwriting identify substandard risks?
- **Conditions Considered**: Which genetic mutations and their related diseases do you include?

U.S. model description & results

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General approach of the U.S. market model

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General approach of the U.S. market model

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1

Baseline In Force

Individual life insurance policies from business written in the past that are in force at year-end 2015

2

Baseline New Business

New individual life insurance policies for 20 years in the future assumed to have been written regardless of the genetic testing legislation

3

GT Positive New Business

Additional insurance policies from lives seeking insurance after receiving a positive genetic test result, that would have otherwise not bought insurance

Model block comparison

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Baseline In Force

119.3 million policies in force @ YE 2015

$12.1 trillion of face amount

2

Baseline New Business

10 million policies issued each year

Face amounts of $165k in 2016 increasing 3% annually

3

GT Positive New Business

19,319 (25,502 w/o FHx) policies issued each year

Face amounts of $700k in 2016 increasing 3% annually

Genetic conditions included

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1. Breast cancer
2. Hypertrophic cardiomyopathy
3. Dilated cardiomyopathy
4. Arrhythmogenic right ventricular cardiomyopathy
5. Long QT syndrome
6. Brugada syndrome
7. Huntington’s disease
8. Polycystic kidney disease
9. Myotonic dystrophy
10. Alzheimer’s disease early onset – autosomal dominance
11. Hereditary nonpolyposis colorectal cancer
12. Marfan’s syndrome
13. Catecholaminergic polymorphic ventricular tachycardia

Assumptions needed - Hypertrophic cardiomyopathy example

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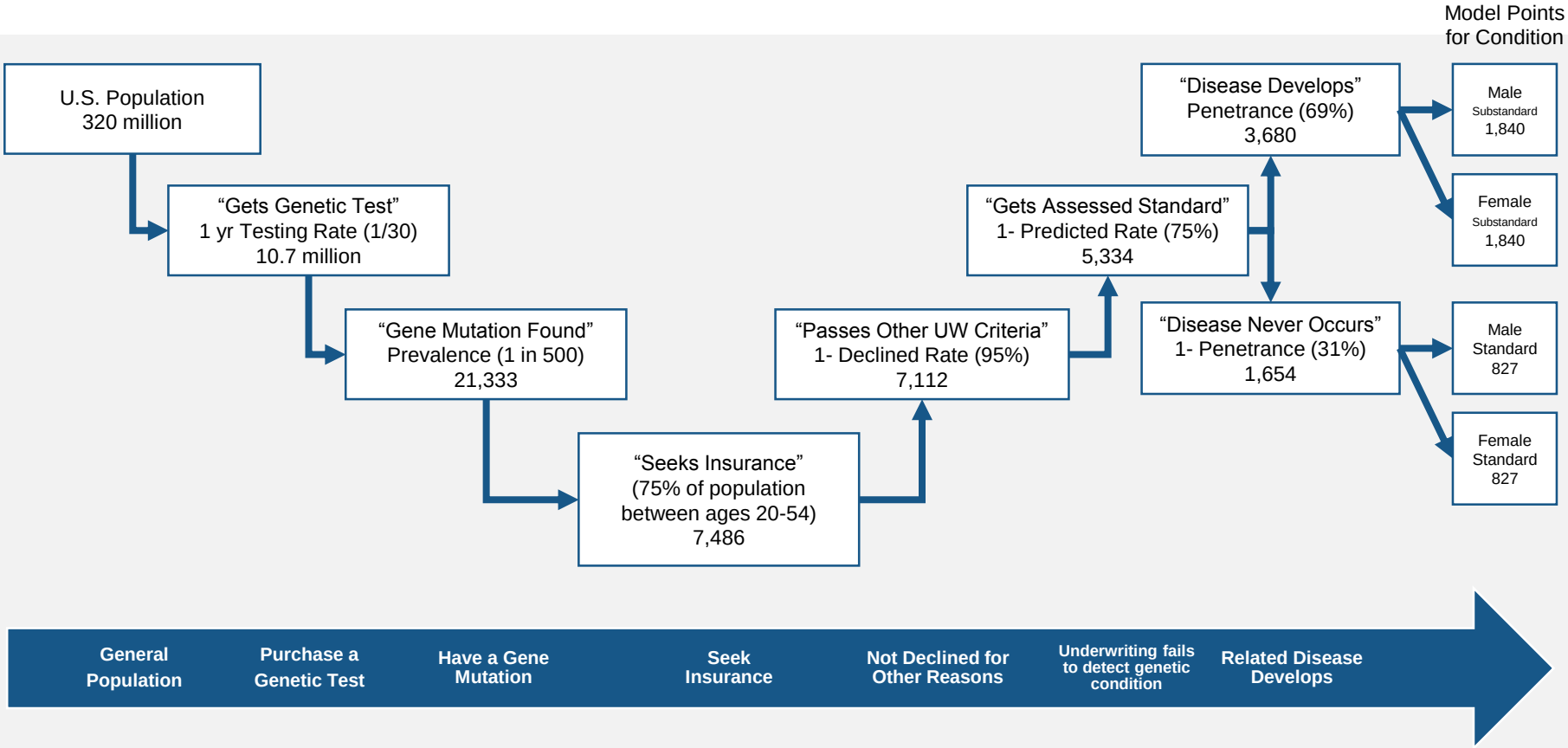

Why 19,319 GT new business policies issued each year?

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Condition	Policy Counts by Model Point With FHx Included				Total With FHx Included	Total With FHx Excluded[a]
	Male Substandard	Male Standard	Female Substandard	Female Standard		
BRCA 1 or 2	—	—	2,222	741	2,963	2,963
HTCM	1,840	827	1,840	827	5,334	5,334
DCM	494	165	494	165	1,317	1,317
ARVCM	533	178	533	178	1,422	1,422
Long QT	74	221	74	221	588	588
Brugada	500	167	500	167	1,333	1,333
Huntington	42	2	42	2	89	178
PKD	889	—	889	—	1,778	3,556
MDyst 1 or 2	83	28	83	28	222	444
ADEO	47	—	47	—	94	187
HNPCC	889	889	889	889	3,556	7,112
Marfan	89	89	89	89	356	712
CPVT	100	33	100	33	267	356
Total	**5,580**	**2,599**	**7,802**	**3,340**	**19,319**	**25,502**

[a]Policy counts by model point when FHx is excluded have been left out of this table, as they are distributed between sex and substandard classes in the same proportions as when FHx is included

Model results: increase in claim expectations

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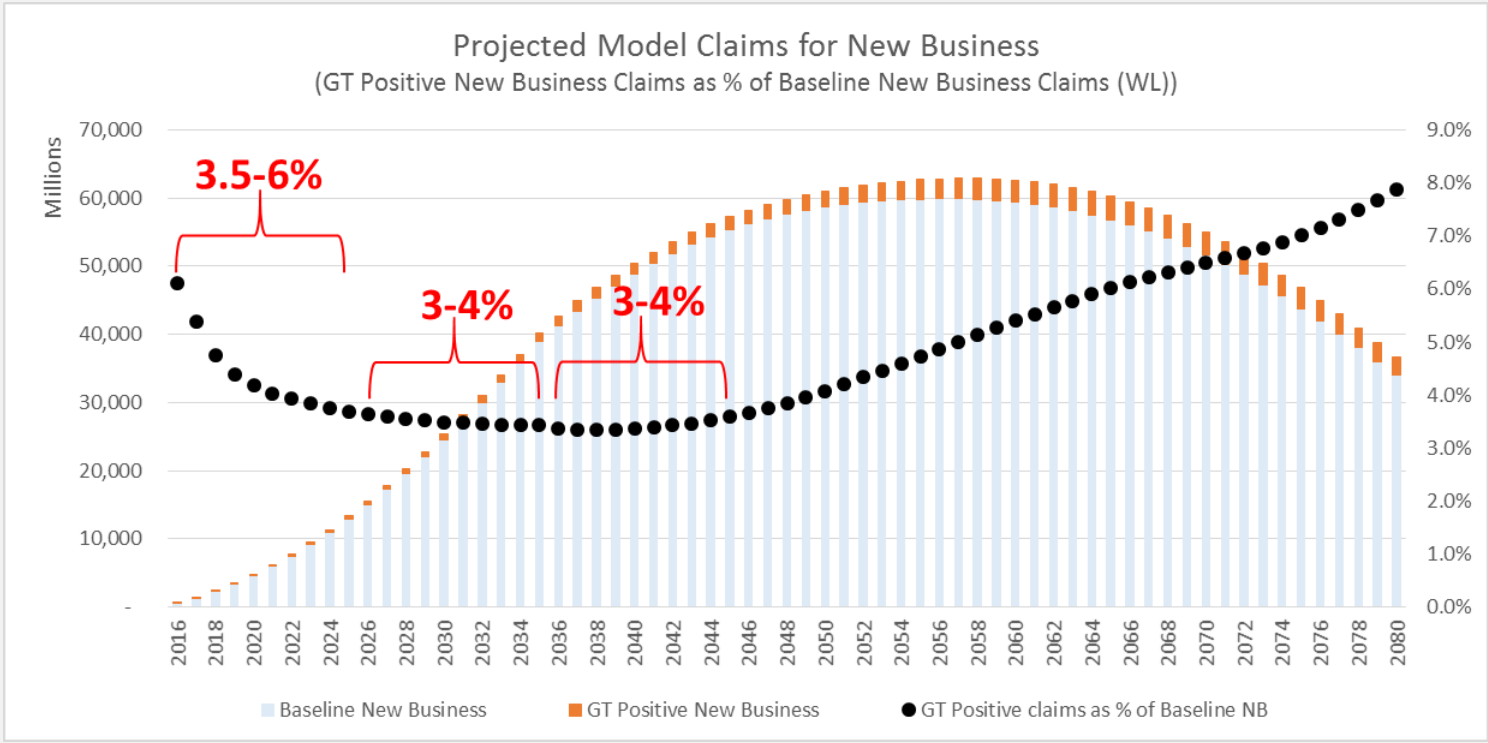
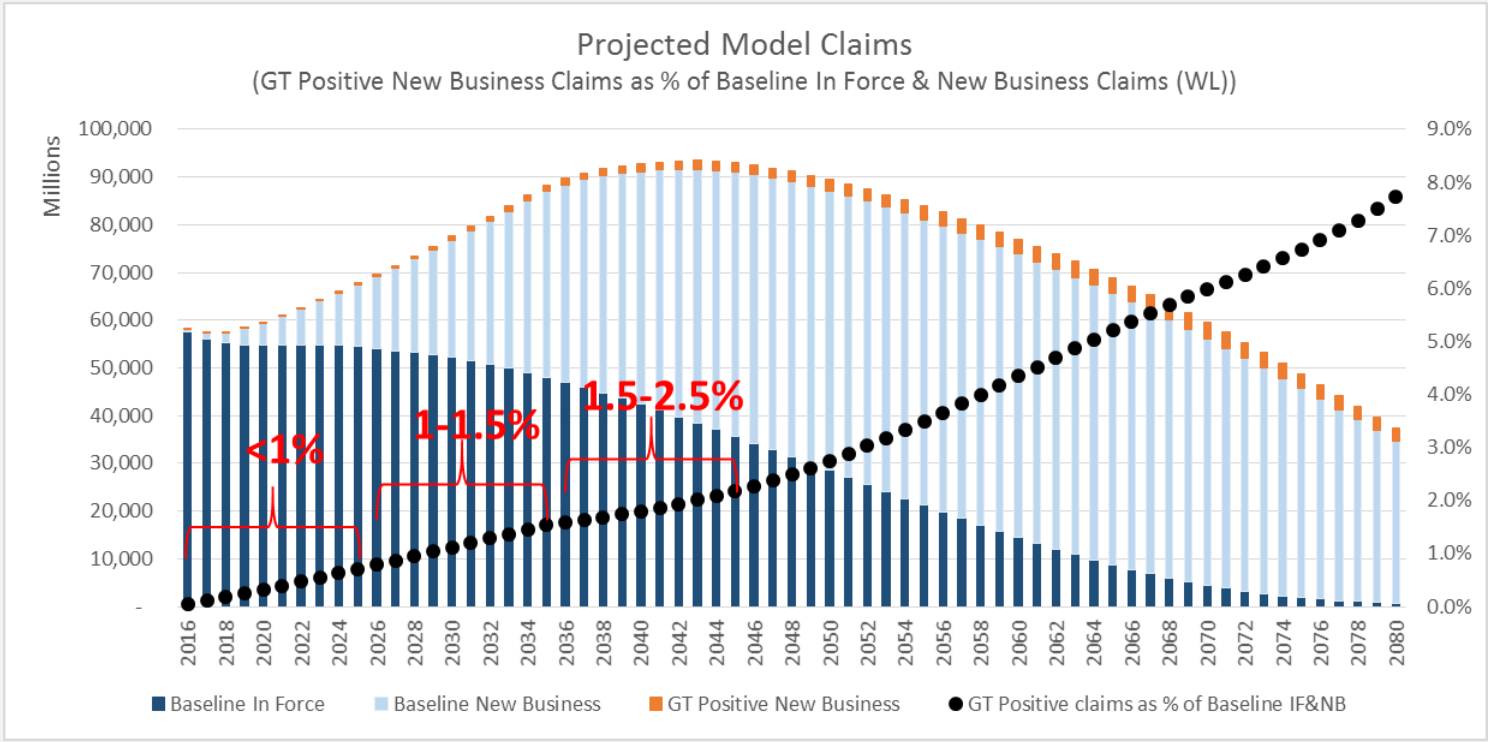


Model results: increase in claim expectations



Model results: increase in claim expectations

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Claim Impact Estimate of Genetic Information Ban on Life Insurance Market	GT Positive New Business / Baseline Blocks % Increase in PV of Claims @ 4% - all projected years			
	FHx Included in Underwriting		FHx Excluded in Underwriting	
	Low	High	Low	High
Total Market Claims (Overall)	1.8%	3.0%	2.4%	3.9%
Total Market Claims (Male)	1.1%	1.9%	1.5%	2.5%
Total Market Claims (Female)	3.8%	6.0%	4.7%	7.5%
New Business Claims (Overall)	4.4%	7.4%	5.7%	9.5%
New Business Claims (Male)	2.7%	4.5%	3.7%	6.1%
New Business Claims (Female)	8.6%	14.6%	10.7%	18.2%

High level take-aways

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1. The U.S. Model suggested increases in industry-wide claims cost are expected to start slow but rise over time.
2. Splitting the U.S. Model results by sex suggests that females will experience higher claim cost increases across all scenarios.
3. The degree of the severity of the industry impact presented in the SOA report is very sensitive to two assumptions:
   - the rate at which individuals in the general population get genetically tested and
   - the face amount purchased by individuals seeking insurance after finding they have genetic characteristics associated with an increased risk of developing a particular medical condition.
4. While other individual medical conditions not considered in the U.S. Model developed for this report have low prevalence in isolation, in aggregate they may present a nontrivial addition to expected future claim costs.

Moving forward, what needs to be done?

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Moving forward, what needs to be done?

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1. Pricing actuaries in particular should familiarize themselves with the model assumptions and test ranges to gain comfort with and understand the impact of genetic testing developments on their book of business.
2. The insurance industry should be encouraged to seek out reliable sources of information on genetic testing rates nationally.
3. The insurance industry should be encouraged to seek out individuals' attitude towards purchasing insurance after a genetic test is taken.
4. The insurance industry should continue to monitor advances in the field of genomics as medical diagnosis increasingly includes some genetic component.

Questions

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Thank you.

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Thank You

Mark Lombardo
Vice President,
Global Actuarial Consulting Group
Munich Reinsurance Company Canada Branch (Life)

+1 (416) 359-8016
MLombardo@munichre.ca

Munich Re Centre
390 Bay Street, 27th floor
Toronto, Ontario, Canada M5H 2Y2
www.munichre.ca

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