Anti-selection in the Brazilian Individual Health Insurance Market

Ana Carolina Maia and João Vinícius de França Carvalho,
Department of Accounting and Actuarial Sciences,
University of São Paulo, Brazil

About the authors

- **Ana Carolina Maia**
- Assistant Professor at University of São Paulo
- BSc, MSc and PhD in Economics from Federal University of Minas Gerais, Brazil)

- **João Vinícius de França Carvalho**
- Assistant Professor at University of São Paulo
- BSc in Actuarial Sciences, MSc and PhD in Statistics from University of São Paulo, Brazil)

- Department of Accounting and Actuarial Sciences
- University of São Paulo, Brazil

Agenda

- What is the health insurance market like in Brazil?
- Anti-selection issues and the new regulation (‘popular plans’);
- Wei (2010) model;
- Databases, descriptive analyses and clustering procedure;
- Observed effects in lapse rates, loss ratios and aggregate profits;
- Final remarks.

Brazilian Private Health System

- Mixed System: public - universal and free– and private, covering 25% of the population (48 million of lives)
- Regulation of Private Health System: since 2000 by National Regulatory Agency for Private Health Insurance and Plans (ANS)
- Regulation about products: individual and group insurance are different. Individual contracts have:
  - 1. controls regarding annual premium readjustment;
  - 2. guarantee of renewable policy;
  - 3. Ratio of premium by age.

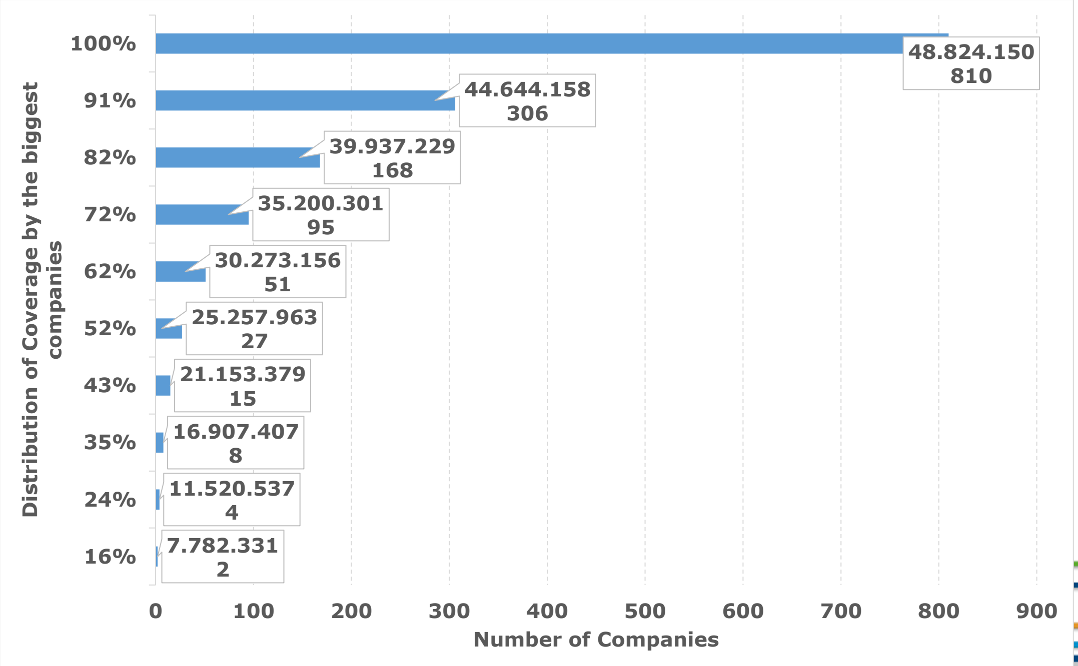
The main numbers (I)

- 9.5 million insured lives in individual health insurance

Annual Readjustments of Contracts Issued

Year	All Individual Health Insurance	General Inflation Rate (IPCA)
2017	13,55%	2,94%
2016	13,57%	6,28%
2015	13,55%	10,67%
2014	9,65%	6,40%

Distribution of coverage by the biggest companies (2016)



The main numbers (II)

The insurance companies with more than 1 million active contracts

Insurance Company	Individual Insurance	Group Insurance	Average Annual Premium - Individual	Average Annual Premium - Group
UNIMED - BELO HORIZONTE	**239,967**	**975,848**	**$ 1,335.54**	**$ 774.04**
CENTRAL NACIONAL UNIMED	16,884	1,440,901	$ 2,268.78	$ 633.10
SUL AMERICA COMPANHIA DE SEGURO SAÚDE	159,097	1,594,600	$ 3,860.79	$ 2,117.96
NOTRE DAME INTERMÉDICA SAÚDE S.A.	50,701	1,930,476	$ 1,878.33	$ 685.89
HAPVIDA ASSISTENCIA MEDICA LTDA	**625,052**	**1,631,007**	**$ 786.01**	**$ 398.64**
BRADESCO SAÚDE S.A.	149,473	3,217,511	$ 3,547.60	$ 1,485.96
AMIL ASSISTÊNCIA MÉDICA INTERNACIONAL S.A.	**594,455**	**3,250,895**	**$ 2,101.47**	**$ 1,255.77**

Note: the highlighted companies still offer individual insurance in the Market. The others have individual insurance portfolio in run-off.

New regulation (government's proposal to expand individual insurance market)

Current situation diagnosis:

- Individual health insurance is too expensive

Solution proposed:

- "popular insurance", with high deductibles, readjustments based on pool's previous performance

9,5 million contracts remain under current regulation

Anti-selection

Three situations:

1. The first time a policyholder buys an insurance coverage;
2. When the individual decides about a possible contractual change;
3. When the individual decides to interrupt the policy.

Expected effect of the new regulation:

"Low risk" individuals escape to new products (popular insurance)

The point is: can this movement result in a spiral of anti-selection over the current portfolio?

But it depends on:

- the proportion of "low risk" in the portfolio;
- Intensity of solidarity (vis-à-vis the mutualism) in the pool will determine who is "low" and who is "high" risk;
- Differential in relative premiums between two products.

The Wei (2010) Model Development Idea

- The model starts from an individual behavior, then introduces the aggregate results of the block (age group);
- Evaluates effects of different percentages of premium readjustment over loss ratio and profit of insurance companies;
- Individuals can lapse the portfolio if there is:
  - (cause I): an exogenous change in price, or;
  - (cause II***): changes in relative prices between their policy and an equivalent policy among options in the market.

The Wei (2010) Model Main Functions and Parameters

$$L(R) = F(1+R)$$
$$I(R) = I_0(1 - F(1+R))$$
$$PT(R) = I(R)\hat{P}(R)$$
$$CT(R) = I(R)C_0\bar{V}(R)$$
$$LR(R) = C_0\frac{\bar{V}(R)}{\hat{P}(R)}$$
$$Profit(R) = I(R)(\hat{P}(R) - C_0\bar{V}(R))$$

where *lapse* (*L*), *inforce* (*I*), *total premiums* (*PT*), *total cost* (*CT*), *loss ratio* (*LR*) and *profit* have*:*

- F (1 + R) follow a Generalized Pareto Distribution (with ***e***, ***d*** two parameters to be estimated)
- V(R) = 1 + R (the excess of risk);
- I_0 representing the initial quantity of the portfolio;
- C_0 the initial cost of the standard risk profile in an age group;
- $\hat{P}(R) = \hat{P}_0(1+R)$ is the result of the readjustment applied to the initial premium (added to a security charging margin) by policy;
- $\bar{V}(R)$ is the expected excess of risk of the representative individual profile of a given age group.

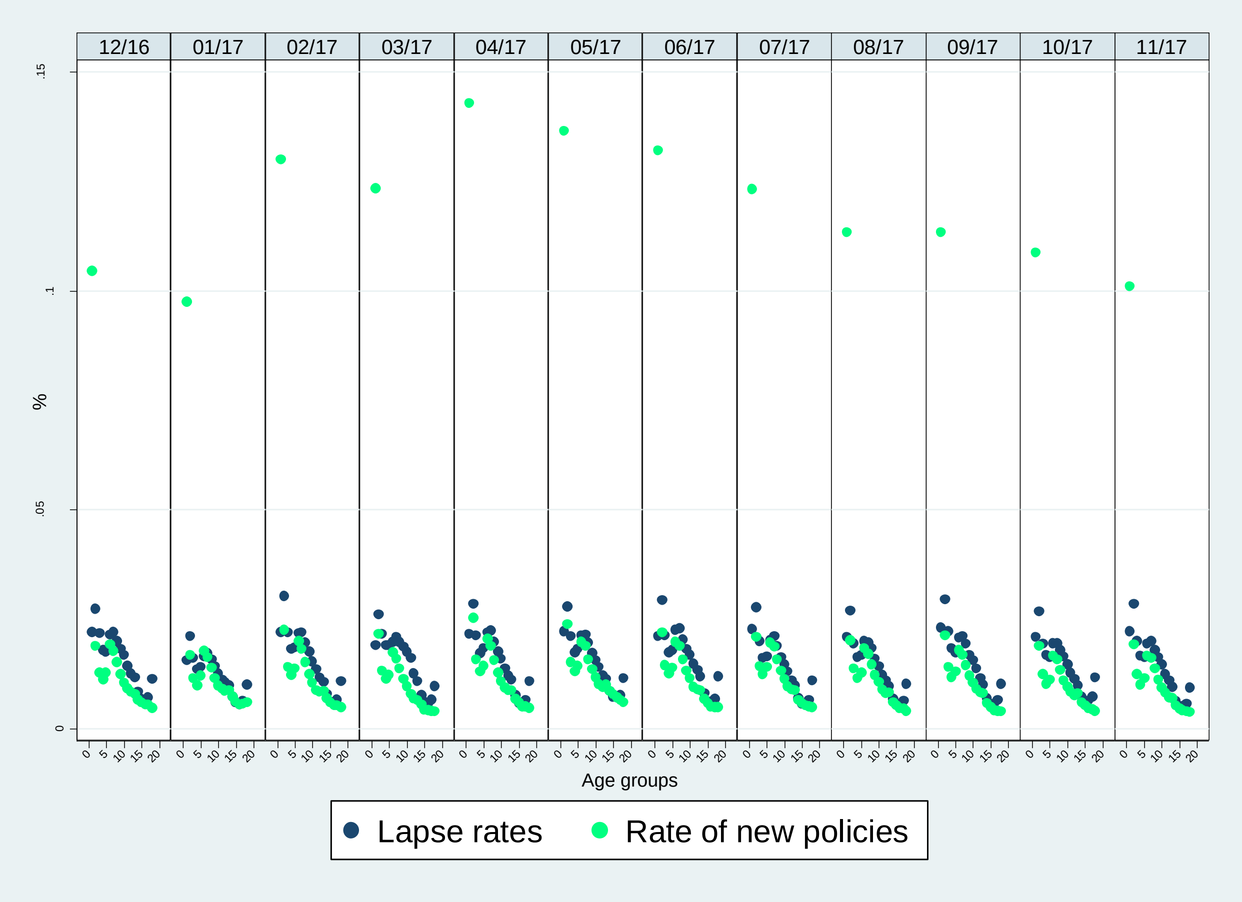
Databases

- D-TISS from ANS (National Agency of Health)
  - Panel containing registry of all claims events paid;
  - Events classified according to pre-defined procedures, including the separation of outpatient and hospital events, by insured individuals.
- Situation Room – Caderno 2.0 (National Agency of Health)
  - Records of movements (accessions and cancellations) of all health insurance policies.

Descriptive Analysis – D-TISS

		Outpatient			Hospital			Ratio of Cost
Age Group	Exposed	Frequency	(% of Exposed)	Severity	Frequency	(% of Exposed)	Severity	(Outpatient + Hospital)
0 to 18	11.675.447	4.967.410	42,5%	464,42	187.880	1,6%	910,73	1,00
19 to 23	3.356.510	1.441.050	42,9%	544,25	74.837	2,2%	1.345,16	1,24
24 to 28	4.193.288	2.029.360	48,4%	635,18	129.239	3,1%	1.430,00	1,66
29 to 33	4.993.336	2.519.947	50,5%	718,67	182.119	3,6%	1.627,77	1,99
34 to 38	4.953.109	2.576.138	52,0%	888,78	185.860	3,8%	1.931,32	2,52
39 to 43	3.844.151	2.046.800	53,2%	1.465,88	132.390	3,4%	4.237,84	4,36
44 to 48	3.228.409	1.762.210	54,6%	1.519,86	106.332	3,3%	3.348,21	4,43
49 to 53	2.984.707	1.664.063	55,8%	1.088,46	103.068	3,5%	2.093,24	3,20
54 to 58	2.493.902	1.692.547	67,9%	1.012,42	114.730	4,6%	2.028,62	3,68
59 +	6.544.314	3.787.669	57,9%	1.172,99	414.935	6,3%	2.410,52	3,92
NR		5.997.197		390,80	201.627		1.492,03	

Descriptive Analysis – Situation Room – Caderno 2.0



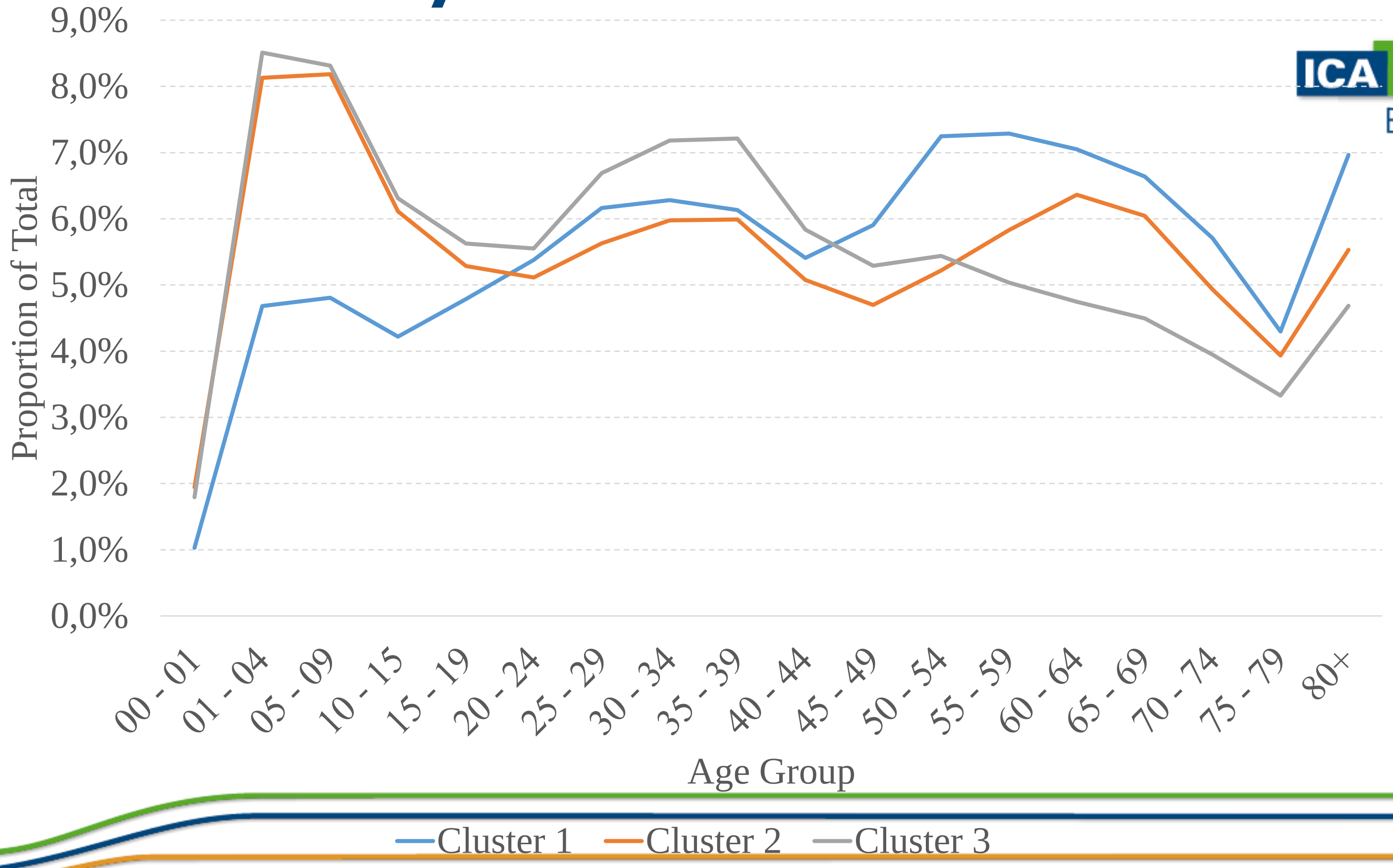
Clustering procedure

- Large and diverse market (25% of population, or approximately 50 million people);
- Very different risk profiles;
- High number of insurance companies offering individual policies (534 companies)
    - 6 different legal classifications

Clusters' profiles

	Cluster 1	Cluster 2	Cluster 3
Quantity of operators	**50**	**210**	**274**
Composition by Legal Nature	44 Philanthropies	8 Cooperatives	274 Cooperatives
	6 Insurance Companies	202 Group Medicine	
Average size of the Portfolio of insurance companies, for the type of individual accession (std. dev.)	14.366 (32.967)	19.343 (66.883)	16.408 (31.664)
Average size of the Portfolio of insurance companies, for all types of accession (std. dev.)	137.405 (550.280)	78.850 (332.165)	61.163 (141.221)
General lapse (std. dev.)	0,11 (0,06)	0,20 (0,09)	0,15 (0,04)

Age distribution by Cluster



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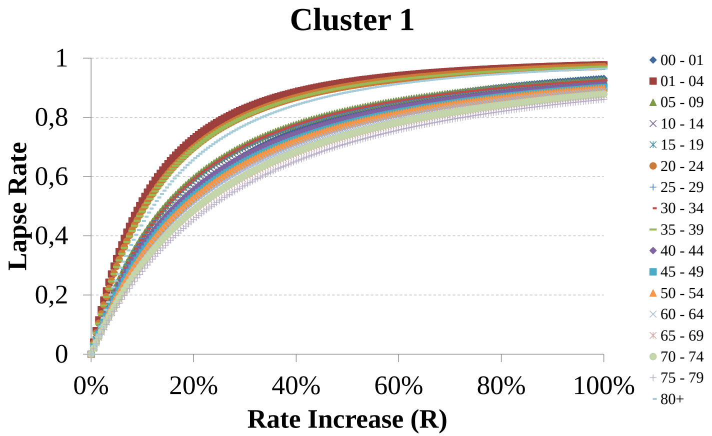
Clusters' profile summary

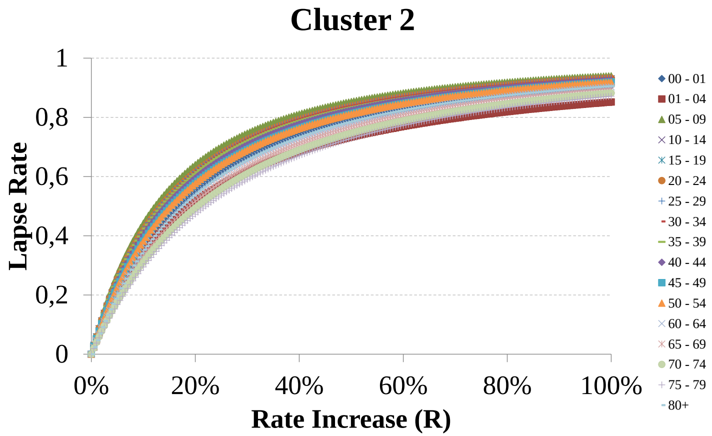
- Clear separation of insurance companies:
  - Cluster **1**: 44 **philanthropic** entities and all the six firms that are considered **insurance companies specialized in health insurance** (on average, smaller portfolios of individual policies with lower lapse rate and more elderly individuals);
  - Cluster **2**: predominance of insurance companies classified as "**group medicine**" (on average, the biggest portfolios of individual policies with higher lapse rate and fewer midlife individuals);
  - Cluster **3**: "**medical cooperatives**" (moderate levels of both measures, and more individuals under 40 years old).

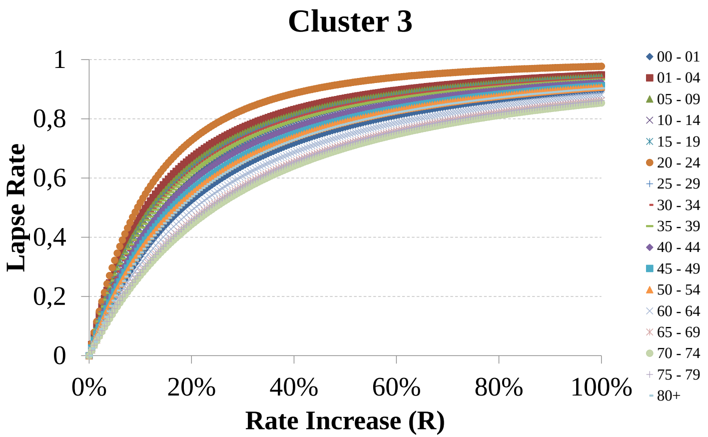
Parameter estimates

Parameter	Age group: 1 - 4			Age group: 30 - 34			Age group: 60 - 64		
	C #1	C #2	C #3	C #1	C #2	C #3	C #1	C #2	C #3
e	2,67	1,78	1,78	1,78	1,78	1,78	1,78	1,78	1,78
d	0,32	0,22	0,23	0,30	0,28	0,27	0,41	0,37	0,43
V(0)	1,19	1,28	1,30	1,39	1,36	1,34	1,53	1,47	1,56
C_0	1,00	1,00	1,00	1,99	1,99	1,99	3,92	3,92	3,92
P_0	1,19	1,28	1,30	2,76	2,70	2,67	5,98	5,78	6,11
A	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Initial Loss Ratio	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77

Aggregate lapse rates by age group and by cluster







Results summary (I)

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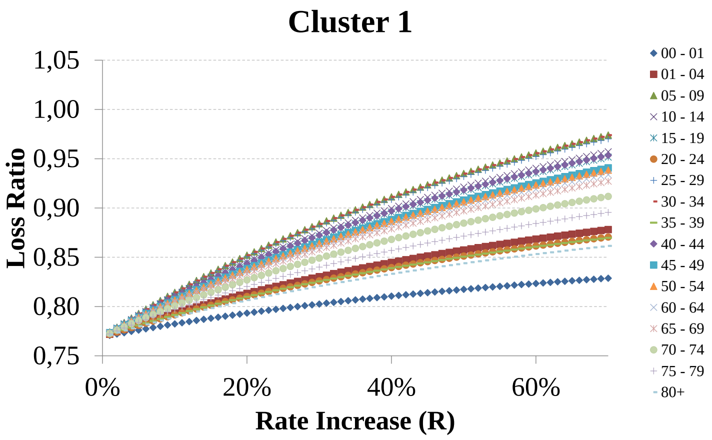
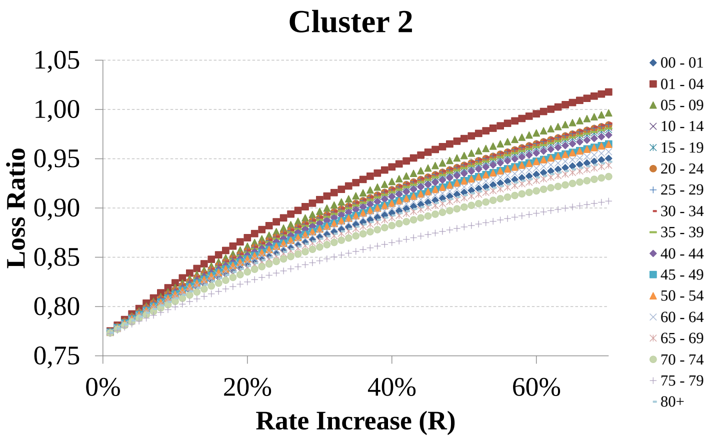
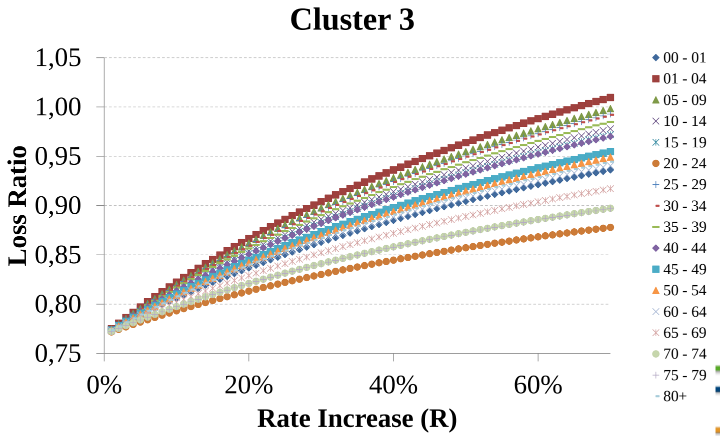
- In Cluster 1: age groups “1 to 4”, ”20 to 24” and “35 to 39” have quick response of the anti-selective lapse even with low R rates. The age group with the smallest answer was “75 to 79 years old”;
- In Cluster 2: the behavior of the age groups is more homogeneous. The group “5 to 9” is the one with the fastest response, and “75 to 79” with a least elastic response to variation in R;
- In Cluster 3: the group “20 to 24” as the steepest curve and again the group “75 to 79” as the least elastic one.

Loss Ratio by age group and by cluster







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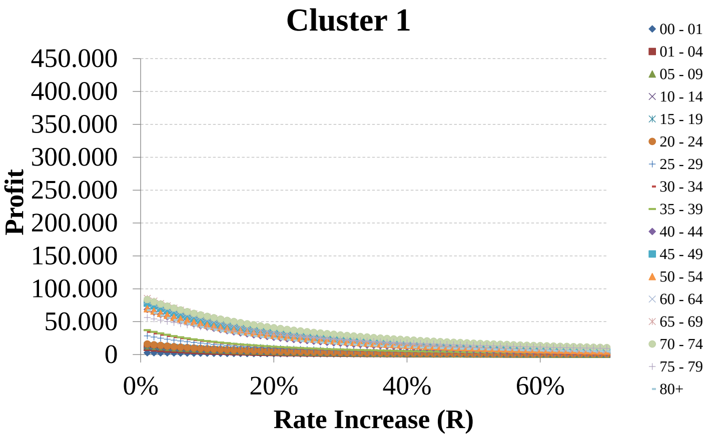
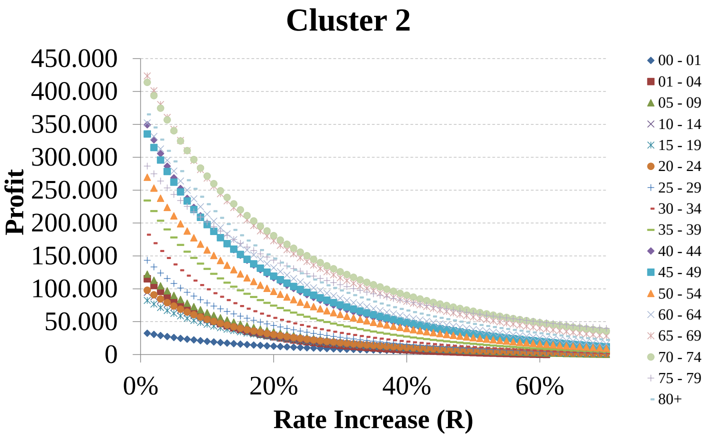
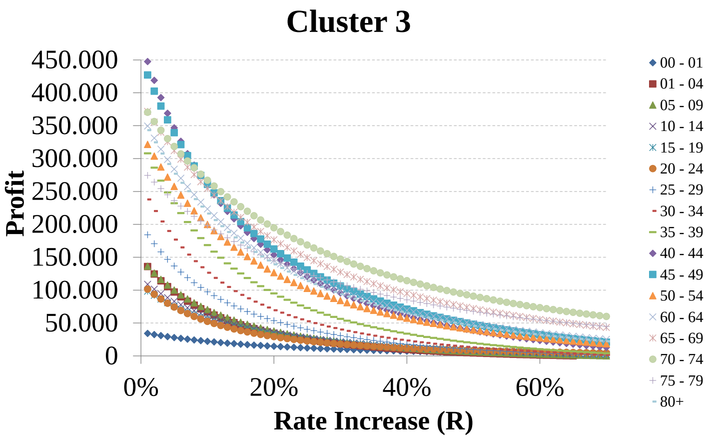
Results summary (II)

- The results by cluster are not qualitatively different;
- Cluster 3 has a more accelerated tendency of loss ratio's deterioration;
- The intermediate age groups normally correspond to the most positively inclined curves, meaning a quick response of the Loss Ratio to changes in R for each rating class;
- The more advanced age groups have slower response in terms of Loss Ratio;
- Hence, for a same rate R, the spiral is quicker for younger and intermediate ages.

Aggregate profit by age group and by cluster







Results summary (III)

- Although the loss ratios of the more advanced age groups respond slowlier to increases in R, the effects of lapses are very significant on the profit, once such groups deal with more elevated premium risks;
- The age pyramid of the clusters shows a great proportion of individuals in older groups. This reflects the relevance of this contingent according to the volume of their financial income (they pay higher risk premiums).

Final remarks (I)

- This work has evaluated possible effects of introducing a new product in the Brazilian market of individual health insurance;
- However, the pool of current contracts can get into an anti-selection spiral, due to the adverse retention of insured individuals, with perverse effects for the sustainability of the portfolios;
- The estimated costs, by age group, attend to the maximum ratio of 6 times, suggesting that the intergenerational subsidy does not occur at the moment of accession to the policy.

Final remarks (II)

- The spiral effect, defined as the deterioration of the Loss Ratio, was observed in the three clusters of insurance companies and for all age groups. It was more or less intense depending on the group and on the cluster;

- The evidences show that the effects of the introduction of new products can compromise the economic-financial viability of the current portfolios.

Thank you very much for your attention!

Contact details:

Ana Carolina Maia / João Vinícius de França Carvalho

address: Luciano Gualberto Avenue, 908
05508-010, São Paulo, Brazil
phone: +55 (11) 3091-5822
mail: anacmaia@usp.br / jvfcarvalho@usp.br
web: www.fea.usp.br