UNIVERSITAT ROVIRA I VIRGILI

DEPARTAMENT D'ECONOMIA

CREIP — CENTRE DE RECERCA EN ECONOMIA INDUSTRIAL I ECONOMIA PÚBLICA

WORKING PAPERS

Col·lecció "DOCUMENTS DE TREBALL DEL DEPARTAMENT D'ECONOMIA - CREIP"

An overlapping generations approach to price policies in privatehealthcare insurance. The Catalan case.

Martí Oliva
Misericòrdia Carles

Document de treball n.21- 2013

DEPARTAMENT D'ECONOMIA – CREIP
Facultat d'Economia i Empresa

UNIVERSITAT
ROVIRA I VIRGILI
DEPARTAMENT D'ECONOMIA

creip
CENTRE DE RECERCA EN ECONOMIA INDUSTRIAL I ECONOMIA PÚBLICA

Edita:

Departament d'Economia
www.fcee.urv.es/departaments/economia/public_html/index.html
Universitat Rovira i Virgili
Facultat d'Economia i Empresa
Avgda. de la Universitat, 1
43204 Reus
Tel.: +34 977 759 811
Fax: +34 977 300 661
Email: sde@urv.cat

CREIP
www.urv.cat/creip
Universitat Rovira i Virgili
Departament d'Economia
Avgda. de la Universitat, 1
43204 Reus
Tel.: +34 977 558 936
Email: creip@urv.cat

Adreçar comentaris al Departament d'Economia / CREIP

Dipòsit Legal: T - 1193 - 2013

ISSN edició en paper: 1576 - 3382
ISSN edició electrònica: 1988 - 0820

DEPARTAMENT D'ECONOMIA – CREIP
Facultat d'Economia i Empresa

An overlapping generations approach to price policies in private healthcare insurance. The Catalan case.

Martí Oliva[a] and Misericòrdia Carles[a]*
[a] Department of Economics - Universitat Rovira I Virgili
Avda. Universitat num.1, 43204 Reus – Spain
Tl. 34.977 75 98 53 / FAX 34.977 30 06 61
*Corresponding author.
martin.oliva@urv.cat / misericordia.carles@urv.cat

Abstract
We analyze premium policies and price dispersion among private healthcare insurance firms from an overlapping-generations model. The model shows that firms that apply equal premium to all policyholders and firms that set premiums according to the risk of insured can coexist in the short run, whereas coexistence is unlikely in the long run because it requires the coincidence of economic growth and interest rates. We find support for the model's results in the Catalan health insurance industry.

Keywords: Economic theory, price policies, health insurance, health economics, overlapping-generations.

JEL Classifications: I11 / L11 / L23

1. **Introduction.**

More than a fifth part of the Spanish population pay an insurance premium to use private healthcare services, in addition to the taxes they pay to finance the *National Health System* (or "*Sistema Nacional de Salud*"), that provides universal coverage. They pay a double coverage for the greater number of healthcare providers to choose from, the better hospital accommodations, and the shorter waiting lists offered by private healthcare providers.

The private insurance entities that provide healthcare are corporations, which account for more than 85% of all health insurance premiums, and mutual organizations, which keep a market share of the 15% remaining. The sector evolved from early co-operatives of doctors who gave people comprehensive healthcare in exchange for a fixed fee (or *iguala*).

In the last decades, insurers already operating in other branches of the insurance business have incorporated into the health insurance industry and they have introduced an innovation in price policy, which consisted in setting premiums according to the risk of the insured, rather than applying the same premium to all policyholders, used by insurers specialized in healthcare management.

This innovation bases risk primarily on age, since an older age is associated with a higher disease rate. Most traditional insurers in the health sector progressively adopt this price policy. Price lists vary between companies, but in general, older aged insured means higher premium, without any benefits for long lasting clients. The price difference between the premium paid by an insured 60 years old and the one charged on another who is 40 years old can reach 170%.

Conversely, with a policy of equal premiums, all insured pay the same amount, regardless of age. Only if the insured contracts insurance in old age for the first time, the price includes a charge that can be 120% higher. In addition, insurance companies will only accept the new member if he demonstrates that he has no chronic disease.

The policy of equal premium spreads insurer costs over all insured people and the old ones pay a lower price. It implies intertemporal price discrimination, because although the health cost of old people is higher, all consumers pay the same price. Insurance firms that apply the same premium regardless of age have more population at risk than the others insurers. Therefore, they have higher average costs and charge higher prices. At first sight, this reasoning suggests that those insurance firms cannot compete with insurers that apply actuarial criteria to set premiums. However, in times of economic growth, insurers that set the same premium to all policyholders can lower premiums charged to them and keep market share.

In this paper, we analyze the circumstances under which two alternative insurance policies can coexist in equilibrium, premium by age or equal premium to all policyholders, regardless of insured risk[1]. We perform the analysis from an overlapping-generations (OLG) model[2], with the additional feature that any individual can become sick when he is old and can get insurance to cope with the loss that illness entails. The insurance sector is competitive, with two kinds of insurers that apply different price policies, equal premium to all, regardless of policyholder risk, or premiums by age.

---

1 In Oliva and Carles (2013) we perform the analysis of private health insurance industry from another approach based on product differentiation.

2 Typical applications of OLG models occur in monetary economics (Samuelson, 1958; Sargent, 1987) and public finance (Diamond, 1965; Artus and Legros, 1999). Geanakoplos (1987) and Weil (2008) provide general surveys. There are also applications of OLG models to economic sectors, as long term healthcare insurance (Meier, 1999; Johansson, 2000).

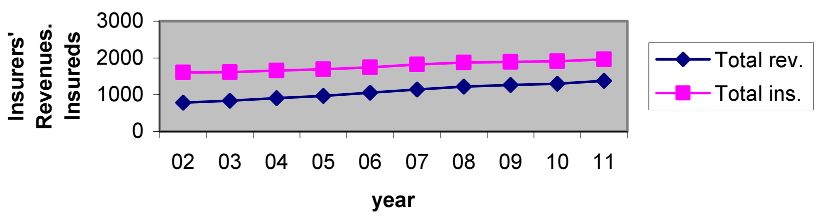
We illustrate the analysis in section 2 with data for the period 2002-2011 from Catalonia, a Spanish autonomous region with a private health system particularly developed, as about 25% of people have double coverage. Section 3 presents the explanatory model and section 4 is reserved for conclusions.

2. Catalonian Private Insurance entities which provide Healthcare services.

The Catalonian Government (*Generalitat de Catalunya*) has regulatory competences on the Catalan Health System, because the health system in Spain is decentralized among autonomous regions. The *Direcció General de Recursos Sanitaris* (DGRC) of the Catalonian government develops from 2002 an annual report of p*rivate* insurance entities which provide healthcare, that presents, in a systematic way, data for the firms operating in the health insurance industry (DGRC, 2002-2011). Since not all regions of Spain offer the same statistical information, we have limited the study to Catalonia.

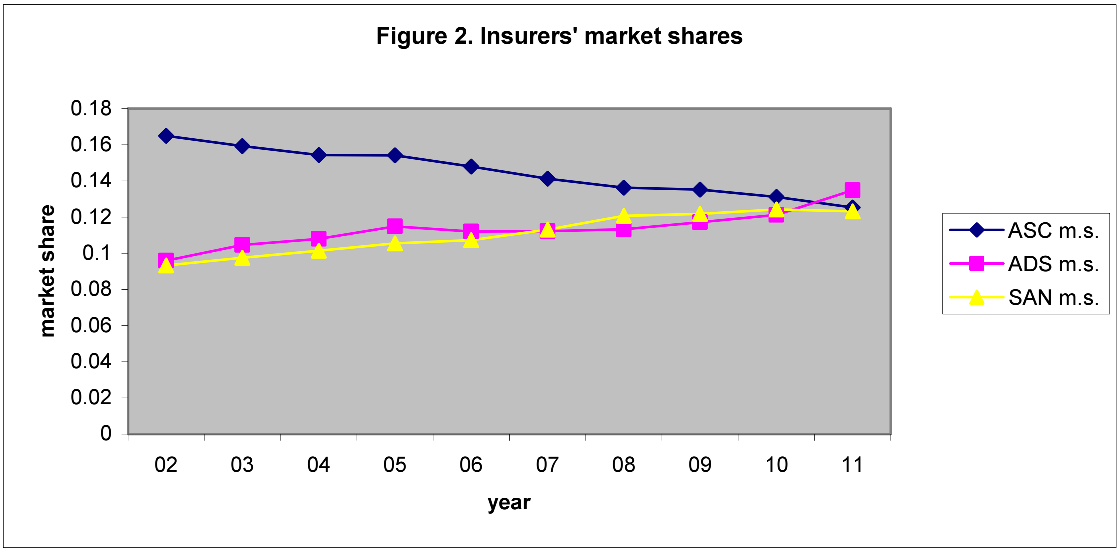
Further, we focus on insurance plans that provide health services, which establish a contractual relationship between healthcare providers, hospitals and doctors, and the insurance company (similar to USA 'managed care'). These contracts account for almost 90% of all health insurance plans in Catalonia as well as in Spain. Health insurance contracts that provide reimbursement of expenses ('traditional health insurance plans' in the USA) only account for the remaining 10%. This way, in year 2002, 1.604.251 Catalan consumers have insurance contracts with provision of health services, while only 213.636 have insurance plans with reimbursement of expenses, according to DGRC. Figure 1 shows that however the slowdown of the Spanish economic activity, the total insured people with insurance plans that provide healthcare as well as the insurers' total revenues from premiums have grown steadily throughout the period.

Figure 1. Insurers' Total Revenues (milion €). Total Insureds (thousands).

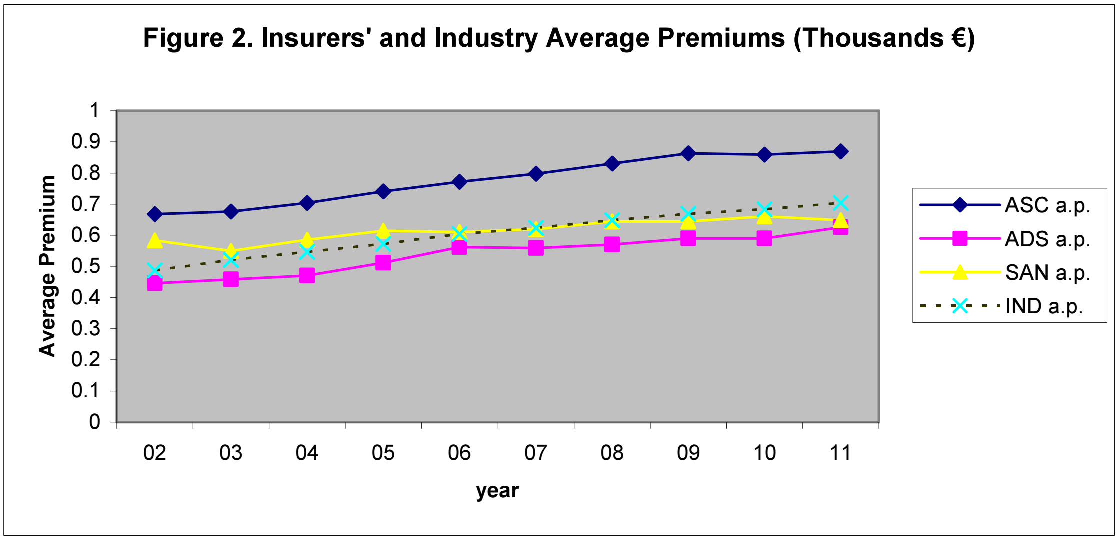


The series of annual reports "*Entitats d'Assegurança Lliure d'Assistència Sanitària*" show that the three larger insurance companies control almost a 40% of the health insurance market that provides health services, a 38%, to be precise, in 2011. Two of them, *Sanitas* (SAN) and *Adeslas* (ADS), set premiums with actuarial standards and the other, *Assistència Sanitària Col·legial* (ASC), uses the price policy of the same premium for all policyholders, independent of the insured risk characteristics. The data from these three companies in the period 2002-2011 can thus illustrate the effects of different pricing policies.

In 2011 the higher revenues insurer's is ADS with a 13% of the market; ASC and SAN have a market share of 12% each. In 2002 ASC controlled the 16% of the market, while the two other insurers, ADS and SAN, kept a 19% distributed equally. The share increase of ADS and SAN arises from a perceptible decrease in the market share of ASC, and to lesser extent, to the loss of market share of small insurance companies.



Between 2002 and 2011, ASC has an increase of 3% in the number of insured, up to 199,000 people, located exclusively in the two first years. From 2004 to 2011 the number of insured in ASC remains unchanged. The average premium calculated as the ratio between revenues and number of insured increased by 30%, from 668 to 869 € and the revenue from premiums grew a 34%, reaching 173 million € in 2011. In annual rate, ASC revenues increased almost 3.5%. For the set of the other two insurers, the average premium increased in the period 2002-2011 a 26%, from € 505 to € 637, the number of policyholders grew by 48%, up to 559,000 consumers, and revenue increased 141%, with an annual revenue growth rate of 10%.



Average premiums of ASC are significantly higher than average premiums of firms that set them according to actuarial criteria, ADS and SAN, which have taken upon part of ASC market share through the better prices they offer to young consumers, who are the bulk of the new policyholders[3].

Today, most of the insurance companies set premiums according to the insured risk. For the set of all insurance companies, the average premium increased by 45% in

---

[3] Of course, health insurance firms also offer partial insurance contracts at lower price, but we analyze only full insurance contracts, which are the more frequent ones.

the period 2002-2011, from € 487 to € 704, the number of insured people by 22% and revenue by 76%, with an annual revenue growth rate of 6.5%. Despite the crisis of last years, the industry's average performance has been positive: In the same period, the Euribor, the European benchmark interest rate, has fluctuated between 1.2% and 5.2%, with an average of 2.45%, well below industry annual revenue growth rate.

3. An OLG model of Insurance firms that provide Healthcare services.

We introduce first the assumptions of a two periods OLG model in which young people can contract health insurance from two types of insurers and then we solve it to explain its coexistence and price dispersion in the health insurance market.

Assumptions

The economy consists of overlapping generations of two-period-lived individuals. There is an infinite sequence of time periods, $t = 0, 1, 2, \ldots$ In each t there are born N_t young people, generation t, who live two periods, are young in period t and old in period $t + 1$. There is no last generation and in period 0 there are N_{-1} old people, born before the model starts. Population grows geometrically at a constant rate $n > -1$. In a period there is only one commodity, a perishable consumption good. An agent born at t, consumes c_{1t} in the period 1 of his life and c_{2t+1} in the period 2. His consumption is from a random endowment bundle

$$\mathbf{w} = \begin{bmatrix} w_{1t} \\ W_{2t+1} \end{bmatrix} = \begin{bmatrix} w_t & w_t \\ 0 & -\tau w_t \end{bmatrix} \quad w_t > 0 \quad \tau \in (0,1)$$

The wealth of a young individual will be certain, w_t. However, when the consumer is old, in the last period of his life, he may become unhealthy[4] and he must face the cost of illness, which we assume to be proportional to his wealth when young[5]. We denote by τ the constant of proportionality. The probability of falling sick when a consumer is old is constant among generations, and is worth $\theta, 0 < \theta < 1$. We suppose also that the first period endowments grow at gross rate γ, $w_t = \gamma w_{t-1} = \gamma^t w, w = w_0$.

A young individual can save s_t at $t, 0 \le s_t \le w_t$, by investing in a linear storage technology with exogenous gross return $R \ge 0$, next period, at $t + 1$, when he is old[6].

A consumer born in period t has preferences on consumption sequences over his life defined by a separable intertemporal utility function with a constant discount factor of time preference:

$$U_t(c_{1t}, c_{2t+1}) = E_\theta[u(c_{1t}) + \delta u(c_{2t+1})],\ u(c) = (1-\sigma)^{-1} c^{1-\sigma},\ \sigma > 0, \sigma \ne 1,\ c_{1t}, c_{2t+1} \ge 0$$

where E_θ stands for expected value with probability distribution θ. As c_{2t+1} is random at t, we assume preferences according to expected utility for second period consumption. Then, the felicity function $u(c_{2t+1}) = (1-\sigma)^{-1} c_{2t+1}^{1-\sigma}$ works as a von-Neumann – Morgenstern utility function with a coefficient of relative risk aversion equal to σ^{-1}. Moreover, for consumption sequences under certainty, σ^{-1} is also the elasticity of substitution between consumption at t and consumption at t+1.

All consumers of the same generation are alike; i.e., all consumers born at t have the same preferences and endowments.

---

4 The assumption that young people do not face risk of loss is for simplifying purposes.

5 We spend more on health than our grandparents.

6 The Catalan health-care insurance industry is a small sector in UE Economy. Then, it is appropriate to take return as exogenous.

Every consumer has access to the credit market and can lend or borrow to other households of the same generation, but he has not the possibility of intergenerational transfers because their lifespan does not match.

There is also a competitive health insurance sector in the overlapping-generations economy[7], to cope with the risk of illness every individual faces in the old stage. In each period coexist two sets of competitive insurance firms that differ in the pricing policy used.

−Policy *a*: *premium according to risk* or *premium based on actuarial criteria* or *premium by age*. To prevent the loss τw_t, each consumer pays in each age an insurance premium that depends on the risk in that age. Insurance companies that fix premiums according to actuarial approaches apply this price policy. The old consumers have more risk of illness and pay more. In our model only old people can be unhealthy and we have $p_{a2t} = p_{at} > p_{a1t} = 0$.

−Policy *b*: *equal premium for everyone* or *the same premium for all*. The insurer sets premiums independent of the illness risk of the insured. All consumers, young and old, pay the same premium p_{bt} to the insurance companies. Therefore, young people finance old people who have a higher chance of falling ill.

The pricing policies show that a consumer can pay a positive health insurance cost only in the age in which he faces risk, or, conversely, can spread the cost over his life[8]. The individual, when young, has the option of hiring one of two insurance policies.

Group *a* insurers use the policy *a* and group *b* insurers the policy *b*. All the companies in each group are identical, so they use the same policy. We use the parameter $\lambda \in (0,1)$ to denote both, the proportion of insurance firms that apply policy *a* and the proportion of consumers who have signed contracts with these companies.

Also for simplicity, we suppose that insurers' operative unit costs are zero. That is, unit costs of insurance firms are only due to pay the coverage when the insured suffers the loss.

<u>Results</u>

With policy *a* each insured born at *t* pays nothing in this period, $p_{a1t} = 0$. A consumer pays only when he is aged and faces a strictly positive probability of falling sick. Given a competitive market, as people of the same generation are alike, the expected value of profits for each insurance contract will be zero.

$$E_\theta \pi_{at+1} = p_{at+1} - E_\theta \tau w_t = 0$$

Therefore, the premium charged on an old insured equals the expected value of the loss $E_\theta \tau w_t = \theta \tau w_t$.

$$p_{at+1} = \theta \tau w_t$$

The premium is actuarially fair, so that the risk-averse individual will insure fully.

With policy *b* every insured, old and young, pays the premium p_{bt+1} to the insurer, so that revenue of the set of type *b* insurers (or insurers' *b* representative insurance firm) in period $t+1$ is:

---

7 The assumption of competitiveness seems reasonable. Insurance firms typically engage in price competition that is more aggressive that quantity competition, and leads to more competitive outcomes, i.e., to lower prices and higher quantities.

8 Among insurers that operate in the Spanish healthcare market, the insured payment in per capita terms, i.e., the insured payment of only an annual premium, presents a continuous decline. It is usual that, besides the annual premium, the policyholder pays for medical act, but this quantity is, in general, purely symbolic, very small in relation the policy price. For simplicity, we ignore the payment for medical act.

$$I_{bt+1} = \lambda p_{bt+1}\left(N_{t+1} + N_t\right) = \lambda p_{bt+1} N_{t+1}\left(1 + \frac{1}{1+n}\right)$$

In competitive equilibrium, the expected profit of type b representative insurance firm is zero:

$$E_\theta \pi_{bt+1} = \lambda p_{bt+1} N_{t+1}\left(1 + \frac{1}{1+n}\right) - \frac{\lambda N_{t+1}\theta\tau w_t}{1+n} = 0$$

Therefore, type b insurers charge at $t+1$ a premium worth:

$$p_{bt+1} = \frac{\theta\tau w_t}{2+n}$$

The expected value of the loss of each old individual is financed by the premium charged to the own individual, p_{bt+1}, and from the premiums paid for $1+n$ young people, $p_{bt+1}(1+n)$.

Proposition 1. The average premium paid in $t+1$ by a consumer type a equals the one charged in the same period to a type b insured.

Proof. The premium paid in $t+1$ by type b insured is $p_{bt+1} = \frac{\theta\tau w_t}{2+n}$ which equals the average price paid in $t+1$ under policy a, $\overline{p}_{at+1} = \frac{N_t p_{at+1} + N_{t+1}0}{N_t + N_{t+1}} = \frac{p_{at+1}}{2+n} = \frac{\theta\tau w_t}{2+n}$ ■

In fact, the expected loss by consumer, old and young, in $t+1$ is $\frac{\theta\tau w_t}{2+n}$ which will be the premium charged to the average consumer by competitive insurance firms of either type in this period. A consumer can pay insurance once or spread the payments over his life. Assume, for a moment, that the individual insures also fully with policy b.

The consumption-saving problem of an agent born at t is:

$$\max_{c_{1t},c_{2t}} \ (1-\sigma)^{-1}(c_{1t}^{1-\sigma} + \delta c_{2t+1}^{1-\sigma}) \quad \text{s.t.} \ c_{2t+1} + p_{t+1} \le R(w_t - c_{1t} - p_t), \qquad c_{1t}, c_{2t+1} \ge 0$$

Savings of a young consumer at t are $s_t = w_t - c_{1t} - p_t$ whereas p_t stands for p_{at} or p_{bt}, according to the insurance contract.

Demands (c_{1t}^*, c_{2t+1}^*) solve first-order conditions:

$$\frac{1}{\delta}\left(\frac{c_{2t+1}^*}{c_{1t}^*}\right)^\sigma = R \qquad\qquad Rc_{1t}^* + c_{2t+1}^* = x_{t+1}$$

where x_{t+1} is the individual capitalized net wealth, that is, final endowment, Rw_t, minus the capitalized value of the premiums the insured pays over his life, according to the insurance policy he has chosen, $x_{at+1} \equiv Rw_t - p_{at+1}$ or $x_{bt+1} \equiv Rw_t - Rp_{bt} - p_{bt+1}$. Solving:

$$c_{1t}^* = x_{t+1}\left(\frac{1}{R + (\delta R)^{1/\sigma}}\right) \qquad c_{2t+1}^* = x_{t+1}\left(\frac{(\delta R)^{1/\sigma}}{R + (\delta R)^{1/\sigma}}\right)$$

We highlight that gross return R will be also the equilibrium gross interest rate: Though each household has access to the credit market and can freely borrow and lend, in equilibrium there is neither lending nor borrowing and private debt must be zero, because all consumers of the same generation are alike.

The profile of consumptions on consumer life will be increasing if $\delta R > 1$, constant if $\delta R = 1$, or decreasing if $\delta R < 1$. However, the discount factor of time preference has not to do with the relative advantages of both insurance policies; the discount factor does not cause any difference between them.

Coexistence of both insurance policies implies price dispersion and requires the compatibility of the gross rate of economic growth, composition of the gross rates of growth of wealth per capita and population, with gross return.

Proposition 2. Both insurance policies will coexist in equilibrium if and only if $\gamma(1+n)=R$. If $\gamma(1+n)>R$ only policy *b* will exist and if $\gamma(1+n)<R$ only policy *a*.

Proof. This amounts to saying that these insurance policies will coexist if and only if individual net wealth is the same, $x_{at+1}=x_{bt+1}$. If $x_{at+1}<x_{bt+1}$ only policy *b* will exist and if $x_{at+1}>x_{bt+1}$ only policy *a*. If the condition $x_{at+1}=x_{bt+1}$ is satisfied, consumptions of any individual in the two stages of his life are the same using either of the two policies, as follows from demands. The condition is also necessary, because demands show that if consumptions coincide in both pricing policies in any of the two periods, then $x_{at+1}=x_{bt+1}$. Analogously for $x_{at+1}<x_{bt+1}$ and $x_{at+1}>x_{bt+1}$ when only one price policy exists. Then, substituting parameters values we have:

- If the consumer subscribes the insurance policy *a*: $x_{at+1}=w_t(R-\theta\tau)$
- If the consumer chooses policy *b*: $x_{bt+1}=w_t\left(R-\frac{\theta\tau}{2+n}\left(\frac{R}{\gamma}+1\right)\right)$

The proposition follows from relating these values ■

In particular, if γ=1 and there is not growth of wealth per capita, both insurance policies will coexist in equilibrium if and only if $(1+n)=R$. Alternatively, if the rate of population growth is null, $n=0$, coexistence requires $\gamma=R$.

The premium under policy *a*, $p_{at+1}=\theta\tau w_t$, is independent of *n*, γ and *R*, but these parameters influence premiums of policy *b*. High values of the wealth per capita growth rate or population growth rate reduce the capitalized value of premiums paid under policy *b*, and make it more attractive to consumers. Conversely, high values of the gross return, *R*, are harmful for policy *b*, because increase the capitalized value of premiums paid with this policy.

Corollary 1. If $\gamma(1+n)\geq R$ an individual prefers full insurance with policy *b* to not being insured or being only partially insured.

Proof. Because then, from **Proposition 2**, price policy *b* is preferable to price policy *a*. As a risk-averse individual will insure fully with policy *a*, full insurance with policy *b* is preferable to partial or null insurance ■

Alternatively, if $\gamma(1+n)=R$ the capitalized value at $t+1$ of premiums paid by a type *b* policyholder born at *t*, $p_{bt}R+p_{bt+1}=\frac{\theta\tau w_t}{2+n}\left(\frac{R}{\gamma}+1\right)$, will equal his expected loss, $\theta\tau w_t$. Consequently, if $\gamma(1+n)>R$, policyholders would over insure with policy *b*, were this option available.

Summing up propositions so far, coexistence of both insurance policies in equilibrium is not a generic result, but an exceptional one, because it requires the coincidence of economic growth and interest rates. However, in the short run, switching[9] costs prevent consumers to change of insurer and allow different premium policies. The values of rates of growth of exogenous variables determine which premium policy has advantage in a period.

---

9 In the health insurance market, consumers face two types of switching costs (Klemperer, 1987) to change insurer that hinder their mobility among insurance companies. First, health insurance policies contain penalties in terms of waiting periods for some services. Secondly, if the insured changes of healthcare provider loses the benefits of an idiosyncratic relationship.

Proposition 3. Coexistence of efficient type *a* insurers with inefficient type *b* ones which have higher unit cost requires that the gross rate of economic growth exceeds gross return $\gamma(1+n) > R$.

Proof. Suppose that unit cost of type *b* insurers are $\kappa > 1$ times higher than before, $\kappa\theta\tau w_t$. Then, for coexistence, $x_{at} = w_t(R-\theta\tau) = \hat{x}_{bt+1} = w_t\left(R - \frac{\kappa\theta\tau}{2+n}\left(\frac{R}{\gamma}+1\right)\right)$, that is,

$\gamma(1+n) = R\kappa + \gamma(\kappa-1) \geq R \Leftrightarrow \kappa \geq 1$ ∎

Alternatively, if the inefficiency is large, $\kappa > \frac{\gamma(1+n)+\gamma}{R+\gamma}$ only type *a* insurers will exists. This proposition is interesting in the Catalan health insurance market, because policyholders are not distributed randomly among insurers. The proportion of aged policyholders is higher for type *b* health insurance firms than for type *a*. The reason is that in last years the flow of ASC new policyholders is negligible. As Figure 2 in the previous point shows in 2002 ASC has a market share of 16%, which climbs to 12% in 2011, because the people insured by ASC remains constant from 2004. Other reasons are, possibly, myopia or liquidity constraints of young people.

To cope with the lack of new insured and the loss of market share, recently ASC has begun to change its premium policy setting lower premiums to youth insured. On the other hand, although the revenues and insured population growth rates of ADS and SAN exceed the benchmark interest rate, these insurers do not change its price policy in order not to accumulate old policyholders and become inefficient type *b* insurers.

Further, in the real world, the gross interest rate is random and this penalizes policy *b*, as shows next proposition.

Proposition 4. If R_t is random and follows and adapted stochastic process, $\{R_t\}_{t=0}^{\infty}$, policy *b* only can exist if at *t* the gross rate of economic growth exceeds gross return.

Proof. The gross interest rate is know at *t* but not early, because R_t follows and adapted stochastic process. Further, consumers born at $t+1$ will subscribe policy *b* only if $\gamma(1+n) \geq R_{t+1}$. Consequently, at *t* consumers that adhere to policy *b* do not know the premium they will pay when old and will demand a discount (a negative risk premium) to subscribe a risky insurance policy. On the other hand, the randomness of R_t does not affect policy *a*. Type *b* competitive insurance firms can not afford the discount required by their policyholders if the economic growth rate does not exceed gross return.

4. Conclusions.

In this paper we compare two health insurance price policies, from an overlapping-generations model where the old consumers face a positive probability of getting sick. To meet the illness costs, consumers have a competitive insurance sector, in which there are two types of insurance firms. Each type applies one of the two price policies. With *premiums according to actuarial criteria,* policyholders pay according to risk, i.e., only in old age in the model. This premium policy shows analogies to a fully funded social security system, because consumers have to adjust their savings, depending on interest rates, to face old age and likely costs of disease. With the policy of *equal premiums for all*, young consumers, who do not face risk of illness, finance old policyholders that pay the same premium and have a positive probability of getting a costly disease. The policy is analogous to a *pay-as-you-go* social security system.

The model allows us to prove that, even under ideal conditions, in a symmetric context, the coexistence of both price policies is unlikely in equilibrium, because it requires that the rate of economic growth, composition of the rates of growth of wealth per capita and population, equals the interest rate. We show that if the rate of economic growth exceeds the interest rate, the entry of young policyholders, which do not face risk allows the insurers that apply the policy of *equal premium for all* keep down insured's premiums and do not lose market share. Conversely, in times of slowdown of economic activity, when the growth rate of insured people decreases and becomes lower than the interest rate, these insurers only can compete by reducing the cost of care, i.e., the quality of service. Despite of this, coexistence can occur in the short run, because switching costs prevent consumers to change of insurer and allow price dispersion.

But history matters. Firms that employ the policy of *equal premiums for all* are the oldest in the sector and until few years ago have the highest market shares. In consequence, today they have a higher proportion of elderly, face higher unitary costs and have to charge higher average premiums than insurers that use actuarial criteria.

Also, uncertainty hurts the policy of *equal premiums for all*: A new insured does not know the premium he will pay when old, because it depends of entry of young policyholders then. Insured' risk aversion implies that he will only contract the insurance with a discount. Moreover, changes in economic conditions do not have symmetrical consequences on premiums: in a downturn, old policyholders will leave earliest insurance with *premiums according to actuarial criteria*, because they face highest premiums with this policy. Further, high premiums prevent the entry of liquidity constrained (or myopic) young policyholders.

Then, *equal premiums for all* insurers' are progressively losing market share, and in a long lasting process they are gradually changing their premium policies setting lower premiums to youth insured. To sum up, in the long run, all healthcare insurance firms will have to adopt the *premium according to risk* pricing policy.

References.

Artus P, Legros F. 1999. *Le Choix du système de retraite.* Economica.

Diamond P A. 1965. National Debt in a Neoclassical Growth Model. *American Economic Review***,** 55 (5-Dec); 1126-1150.

Direcció General de Recursos Sanitaris (DGRC). 2002-2008. *Entitats d'assegurança lliure d'assistència sanitaria*. In: Generalitat de Catalunya (eds), Memòries. Barcelona.

Geanakoplos, J. 1987. *The Overlappning Geneartions Model of General Equilibrium.* In The New Palgrave. A Dicctionary of Economics, ed. P. Newman, M. Milgate and J. Eatwell. Palgrave McMillan.

Johansson P O. 2000. Properties of actuarially fair and pay-as-you-go health insurance schemes for the elderly. An OLG model approach. *Journal of Health Economics*, 19; 477-498.

Klemperer P. 1987. Markets with consumer switching costs. *Quarterly Journal of Economics*; 15 (3); 485-504.

Meier V. 1999. Why the young do not buy long-term care insurance. *Journal of Risk and Uncertainty*; 8; 83-98.

Oliva M, Carles M. 2013. Price dispersion in the Spanish private health insurance industry: The case of Catalonia. *Economic Modelling,* 31, 177–182.

Samuelson, P. A., 1958. An Exact Consumption-Loan Model of Interest With or Without the Social Contrivance of Money. *Journal of Political Economy*, 66(6), 467-82.

Sargent, T.J., 1987. *Dynamic Macroeconomic Theory*. Cambridge. MA: Harvard UP.

Weil, P. 2008. Overlapping Generations: The First Jubilee. *Journal of Economic Perspectives*, Vol. 22, N. 4, Fall, 115-134.