Stock vs. Mutual Insurers: Who Should and Who does Charge more?

Working Paper by A. Braun, P. Rymaszewski, H. Schmeiser

EGRIE 2012
Structure

• Introduction

• Model framework

• Comparison of competitive premia

• Empirical Results and Economic Implications
Introduction

- Mutuals vs. Stock insurance companies: Different rights and obligations should theoretically imply diverging marginal insurance premiums

- Aim of the paper: Pricing and breakdown of the competitive insurance premium in a contingent claims setting

- Reflection with empirical findings: Comparing the competitive premium with market premiums
Structure

• Introduction

• Model framework

• Comparison of competitive premia

• Empirical Results and Economic Implications
Stock insurer

Equityholder stake

\[ EC_0^S = e^{-r} E_0^{Q} \max[A_1 - L_1; 0] \]
\[ = e^{-r} E_0^{Q} (A_1 - L_1) + DPO_0^S \]

Default put option

\[ DPO_0^S = e^{-r} E_0^{Q} \max[L_1 - A_1; 0] \]

Policyholder stake

\[ P_0^S = e^{-r} E_0^{Q} (L_1) - DPO_0^S \]
Mutual insurer: Full participation in equity payoff

**Equityholder stake**

\[ EC_{0}^{Mf} = e^{-r} E_{0}^{Q} (A_{1} - L_{1}) + RO_{0} + DPO_{0}^{M} \]

**Default put option**

\[ DPO_{0}^{M} = PO_{0}^{X} + BPO_{0} \]

where

\[ PO_{0}^{X} = e^{-r} E_{0}^{Q} \left( PO_{1}^{X} \right) = e^{-r} E_{0}^{Q} \left( \max \left[ X - A_{1}; 0 \right] \right), \]

\[ BPO_{0} = e^{-r} E_{0}^{Q} \left( BPO_{1} \right), \]

\[ BPO_{1} = \begin{cases} C_{\text{max}} & \text{for } A_{1} \leq X \\ 0 & \text{for } A_{1} > X \end{cases}, \]

and

\[ X = L_{1} - C_{\text{max}} \]
Recovery option

\[ RO_0 = \lambda DPO_0^S - \lambda PO_0^{X^*} - BPO_0, \]

where

\[ PO_0^{X^*} = e^{-r} E_0^Q \left( PO_1^{X^*} \right) = e^{-r} E_0^Q \left( \max [X^* - A_1; 0] \right) \]

and

\[ X^* = L_1 - \frac{1}{\lambda} C^{\max} \]

with the special case for \( \lambda = 1 \):

\[ RO_0^{\lambda=1} = DPO_0^S - DPO_0^M \]

\[ = DPO_0^S - PO_0^{X^*} - BPO_0 \]
Mutual insurer: Full participation in equity payoff

Policyholder stake

\[ P_0^M = e^{-r} E^Q_0 (L_1) - RO_0 - DPO_0^M \]

Arbitrage-free premium

\[ \Pi_0^M = P_0^M + EC_0^{Mf} \]
\[ = e^{-r} E^Q_0 (L_1) - RO_0 - DPO_0^M \]  
  \text{policyholder stake} \\
\[ + e^{-r} E^Q_0 (A_1 - L_1) + RO_0 + DPO_0^M \]  
  \text{equityholder stake} \\
\[ = e^{-r} E^Q_0 (A_1) \]
Arbitrage-free premium

$$\Pi_0^M = P_0^M + EC_0^M + EC_{0n}^M$$

$$= e^{-r} E_0^Q (L_1) - RO_0 - DPO_0^M$$

<table>
<thead>
<tr>
<th>policyholder stake</th>
</tr>
</thead>
<tbody>
<tr>
<td>$$+ \gamma e^{-r} E_0^Q (A_1 - L_1) - (p_L - \gamma) DPO_0^S + p_L \left( RO_0 + DPO_0^M \right)$$</td>
</tr>
<tr>
<td>realizable equity stake</td>
</tr>
<tr>
<td>$$+ (1 - \gamma) e^{-r} E_0^Q (A_1 - L_1) + (p_L - \gamma) DPO_0^S + (1 - p_L) \left( RO_0 + DPO_0^M \right)$$</td>
</tr>
<tr>
<td>non-realizable equity</td>
</tr>
</tbody>
</table>

$$= e^{-r} E_0^Q (A_1)$$
Structure

• Introduction

• Model framework

• Comparison of competitive premia

• Empirical Results and Economic Implications
Schematic overview
Structure

• Introduction

• Model framework

• Comparison of competitive premia

• Empirical Results and Economic Implications
A quick look in the empirical analysis

- Annual account figures for the German motor vehicle liability insurance sector
- 99 stock and 14 mutual insurance companies
- 2000-2006, unbalanced panel data covering 532 and 87 firm years for stock and mutual insurance companies respectively
- Price measured by the average annual gross premium (amount of losses in the motor insurance line divided by the number of contracts)
- We control for various additional factors which are likely to influence the insurance price (too)
- None of the three used tests* find evidence that mutuals charge higher premiums than stock insurers

* Hausman-Taylor, FEVD (Fixed Effects Vector Decomposition), FE (Fixed Effects Model)
Interpretation and Implications

• Given the Figure on Slide 11, the premium charged by a mutual should exceed the one charged by a stock company

- This may not be the case, if the capitalization of the mutual companies and the safety levels (measured by the value of the default put option) are very low

- Not the case here (data are tested in respect to capitalization); in addition, the same solvency requirements for both legal forms take place

• Possible explanations:

- Market faced no competitive pricing; wealth transfer between different stakeholder groups and stakeholder generations take place

- Asymmetric information: Policyholders are not aware of their rights in a mutual / in a stock company and hence are not willing to pay different prices

- Former mutual members paid for a part of non-realizable assets without being granted in form of an adequate compensation → current market premiums can be lowered → wealth transfer between generations of policyholders in the mutual

Room for additional research!