



The Impact of Introducing Insurance Guaranty Schemes on Pricing and Capital Structure

Prof. Dr. Joël Wagner

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Basic idea of Insurance Guaranty Schemes (IGS): customer protection through securing claims

Starting position

***Solvency II:
Run-off of financial
services companies
is intended as
transfer of portfolio
at the respective
market price***

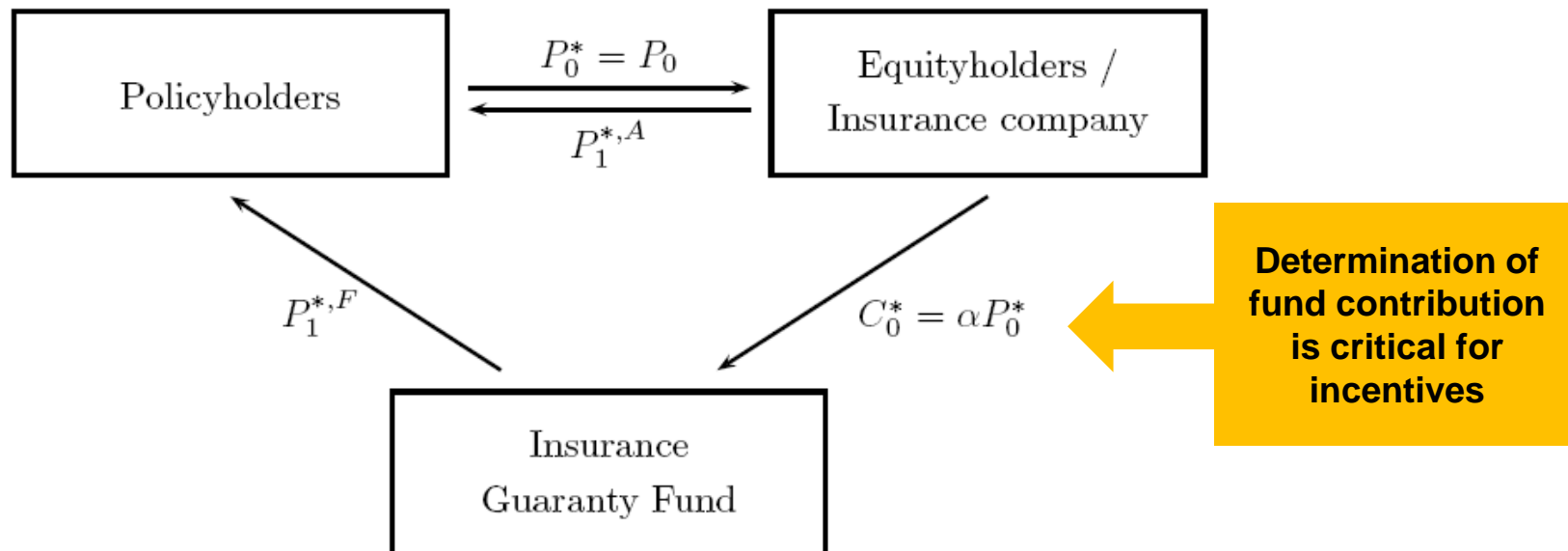


Implications

- Protection of policyholders interests mainly through the **protective function of the solvency regulation** (protection of the institution insurance)
- Reduction of the **insurer's ruin probability to a very low but still positive level**
- Policyholders interests are **not fully protected**

Structure of insurance guaranty schemes

Exemplary illustration



In this example:

- Insurance company pays premium to guaranty fund
- Ex-ante payment to fund
- Fund contribution is percentage of policyholders' premium P_0

Overview of existing insurance guaranty funds

Country	Since	Segments	Contributions	Ex	RW	Compensation	Further funding
Belgium	1972	NL*	Once 1.4 Mio. EUR	Ante	No	100%	Ex-post
Canada	1988	L&H, P&C	n/a	Ante	No	85%, 70%, both w/cap	Ex-post, borrowing power
Denmark	2003	NL	Fixed per policy*	Ante	No	100%	State-guaranteed loans
Finland	1997	NL*, H	Cap 2% of premiums	Ante	No	100%	Ex-post (policyholders)
France	1999	L, NL, H	0.05% math. prov.*	Ante	No	100% w/cap, 90%*	Borrowing power
Germany	2002	L, H	0.02% net reserves*	Ante, Post	Yes*	100%*	Ex-post*
Ireland	1964	NL	Cap 2% of premiums	Post	No	65% w/cap	Borrowing power
Italy	2006	NL*	5% of premiums	Ante	No	100% w/cap	None
Japan	1998	L, NL	% of premiums	Ante	No*	80 – 100%	None
Korea	1996	L, NL	% of premiums	Ante	No	100% w/cap	None
Latvia	1999	L, NL, H	1% of gross premiums	Ante	No	100%, 50%, both w/cap	None
Malta	1986	L, NL	0.125% of gross prem.	Ante	No	75% w/cap*	Borrowing power
Norway	1996	NL	1% of gross premiums	Ante	No	90 – 100%	None
Poland	1991	L, NL*	1% of gross premiums*	Post*	No	50%, 100%, both w/cap	None
Romania	2001	L, NL	0.3%, 0.8% of gross pr.*	Ante	No	100%	None
Spain	2004	L, NL	0.3-3% of premiums*	Ante*	No	Up to 100% w/cap*	None
U.K.	2001	L, NL	Cap 0.8% of net prem.	Ante	No	90%*	Borrowing power
U.S.	1983	L&H, P&C	% of premiums*	Post*	No	100% w/cap*	National associations/funds

Why guaranty schemes?

Point of view of the European Union

- IGS provide **last-resort protection to consumers** when insurance undertakings are unable to fulfill their contractual commitments (e.g., in case of insolvencies)
- **Only a few E.U. member states** have one or more insurance guaranty schemes in place
- **Lack of harmonization** in this area may hinder effective and equal **consumer protection**. This may lead to a **loss of consumer confidence** in the relevant markets and may ultimately put at risk market stability. It may also impede the functioning of the internal insurance market by **distorting cross-border competition**
- In the **banking** and the securities sectors specific directives on guarantee schemes have been adopted **since 1994**
- Recent financial turmoil has made **people** far more **aware of the existence and limits of consumer protection/guarantee schemes** in all financial sectors

E.U. White Paper on insurance guaranty schemes published in 2010 –
comments published February 2011

Review of status quo and current discussions

Background & status quo

- Guaranty funds with different coverage in different countries
- In the E.U., 26% of all life and 56% of all non-life insurance policies unprotected
- E.U.-wide harmonization in discussion, in other countries discussion about introduction
- **Fund contributions mostly (premium) volume-based**
- Why harmonization?
- Why introduction?
- Discussion boosted due to financial crisis

Known incentives

Adverse incentives

- Effects of ex-post premiums
- Non-risk-adequate ex-ante premiums
- Basically danger of wealth transfers among insureds of different insurance companies
- Increase of risk appeared in practice on listed insurers in the U.S. (Lee et al., 1997)
- Difficult interaction with other regulation tools (solvency capital requirements)

Positiv incentives

- Strengthening trust / consumer confidence (customer perspective)

Note: compulsory membership

- See Akerlof's argument on adverse selection

Systemic
risk?



(Further) reasons for insurance guaranty schemes?

Current research topics on IGS

1. Under What Conditions is an Insurance Guaranty Fund Beneficial for Policyholders?

P. Rymaszewski, H. Schmeiser, J. Wagner
Forthcoming in: The Journal of Risk and Insurance

2. The Impact of introducing Insurance Guaranty Schemes on Pricing and Capital Structure

H. Schmeiser, J. Wagner
I.VW-HSG Working Paper No. 80

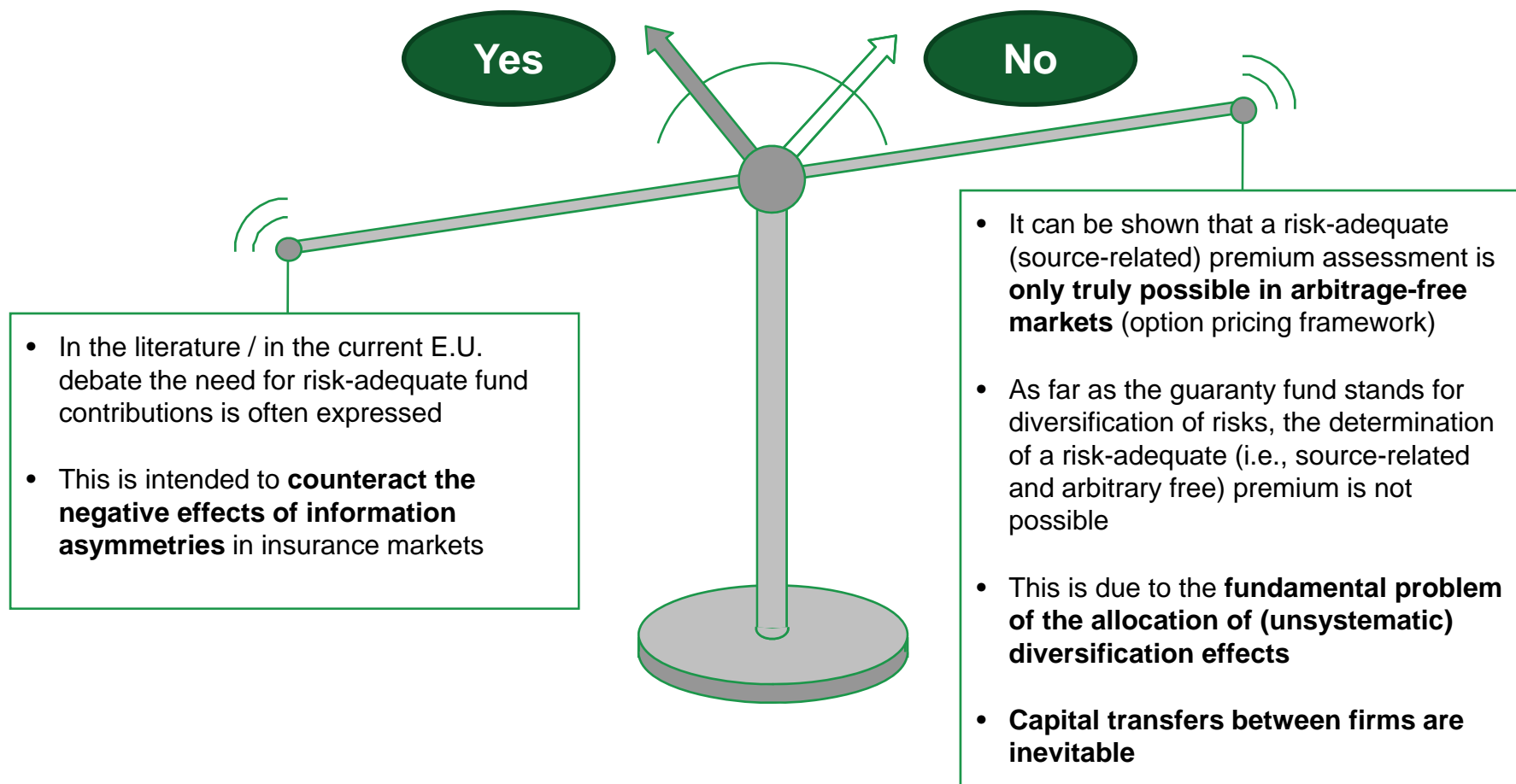
3. A Proposal for a Capital Market-Based Guaranty Scheme for the Financial Industry

H. Schmeiser, J. Wagner, A. Zemp
I.VW-HSG Working Paper No. 85

Background: Most IGS contributions are ex-ante and premium volume-based

Country	Since	Segments	Contributions	Ex	RW	Compensation	Further funding
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Do risk-adequate fund contributions assure advantageousness? – If yes, for whom?



Is an IGS beneficial for policyholders, for the insurance company / equity holders, or for the guaranty scheme (state, tax payers)?

Research focus: Analysis of the impact / incentives following the introduction of IGS

Definition of model framework and analyses

Model

- Model framework with two stakeholders: **policyholders** and **equity holders**
- Consideration of **premium payments** and **claims**, as well as **equity capital endowment**; default risk is explicitly considered
- Starting position: **competitive market with equity-premium equilibrium**

Guaranty funds

- Risk-adequate equilibrium disturbed by the **introduction of a guaranty scheme, requiring ex-ante premium based contributions**
- **Scheme guarantees complete protection (100%) of policyholders claims without cap**
- **Assumption: Guaranty funds remains solvent**, if necessary through additional contributions from a third source (e.g., state, tax payers)

Analyses

- **Incentives for policyholders and insurance companies** immediately after the introduction of the fund
- Implications on the **safety level** of the companies
- Analysis of **three situations with different origin and magnitude of the contributions**

Basic contingent claim model

Policyholders

$$P_1 = \min(L_1, A_1) = L_1 - (L_1 - A_1)^+ \quad \rightarrow \quad \Pi_0^P = PV[P_1] = PV[L_1] - PV[(L_1 - A_1)^+] = \Pi_0^L - \Pi_0^{DPO}$$

Insurance company

$$E_1 = A_1 - P_1 = (A_1 - L_1)^+ \quad \rightarrow \quad \Pi_0^E = PV[E_1] = PV[(A_1 - L_1)^+]$$

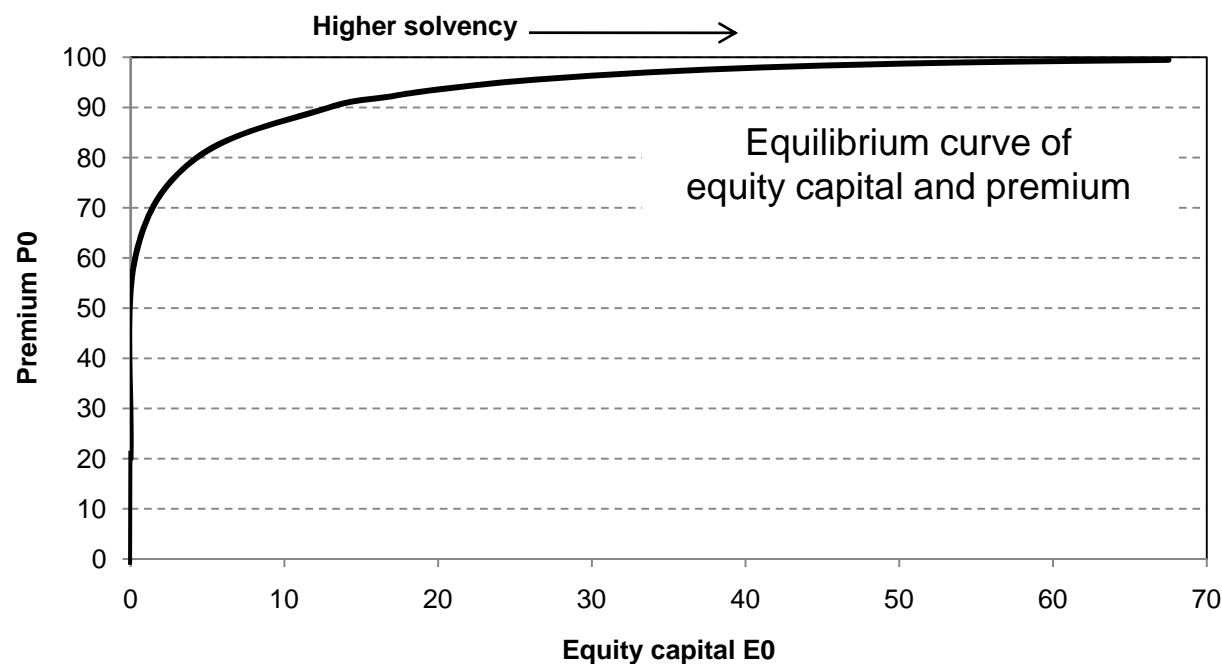
Valuation using Margrabe/
Fischer option pricing
formula



$$P_0 = \Pi_0^P \Leftrightarrow E_0 = \Pi_0^E$$

Notes on model / assumptions

- Model Doherty/Garven (1986)
- Complete and arbitrage-free markets
- Risk-adequate positioning of all stakeholders (policyholders, insurer, IGS)

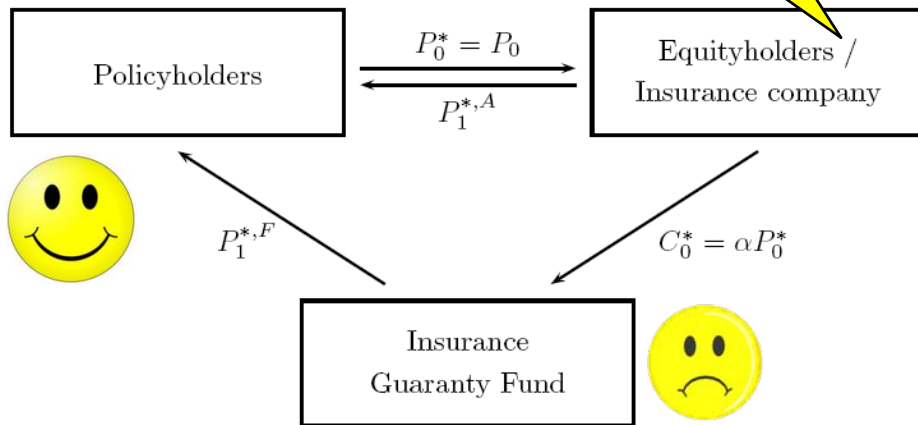


**Safer companies should pay c.p. lower premiums in the IGS –
in a volume-based system this can be reversed!**

Results (I/III): Premium-based contribution from insurer incentivizes equity capital reduction

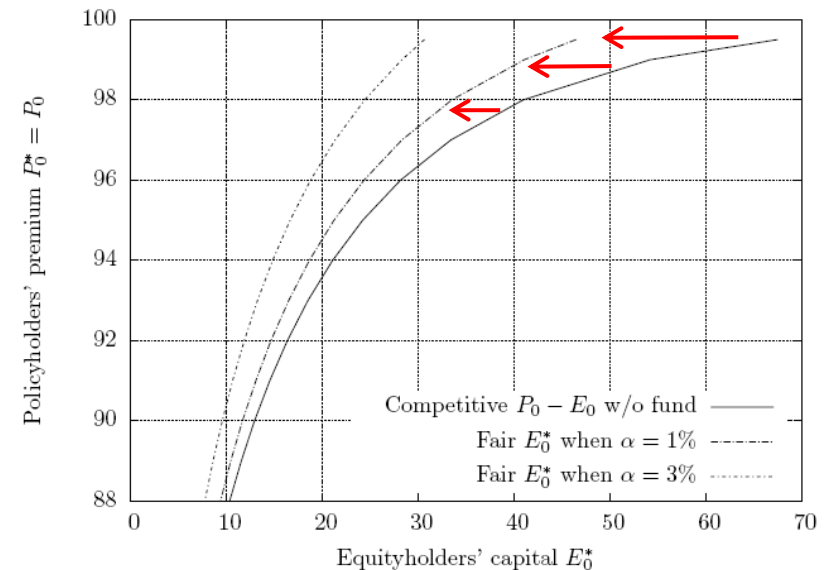
Situation A

Contribution influences solvency/
safety level (Solvency II / SST)



- Insureds pay same premium as before IGS introduction (and get full 100% protection)
- Insurance company pays contribution of α percent of its premium volume
- In case of insurer's insolvency, the guaranty fund pays remaining policyholders claim

Implications and incentives

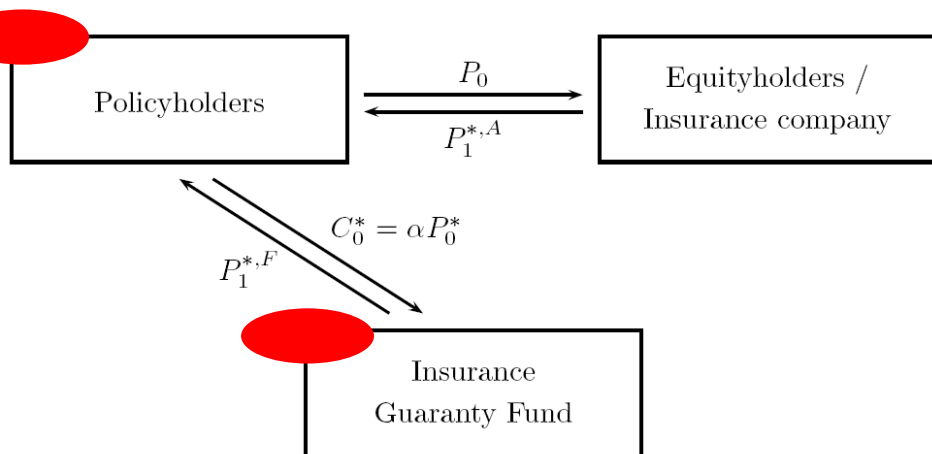


For the insurance company to get a "fair" risk-adequate return on the invested capital, an **incentive to reduce the equity capital** arises

Note on minimum equity capital requirements – companies may stop business / industry may disappear!

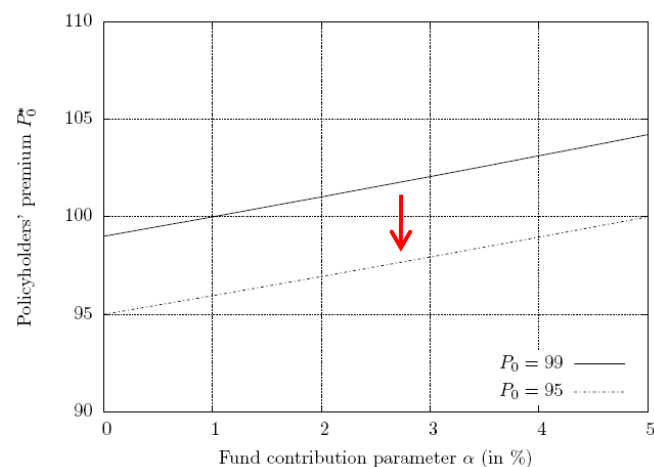
Results (II/III): Contributions by policyholders can incentivize changing insurance company

Situation B



- Policyholders pay premium to insurer and fund contribution equal to a fraction α of the premium (see, e.g., special motor liability insurance schemes)
- Insurance company / equity holders not affected directly
- In case of insurer's default, guaranty fund pays remaining policyholders claim

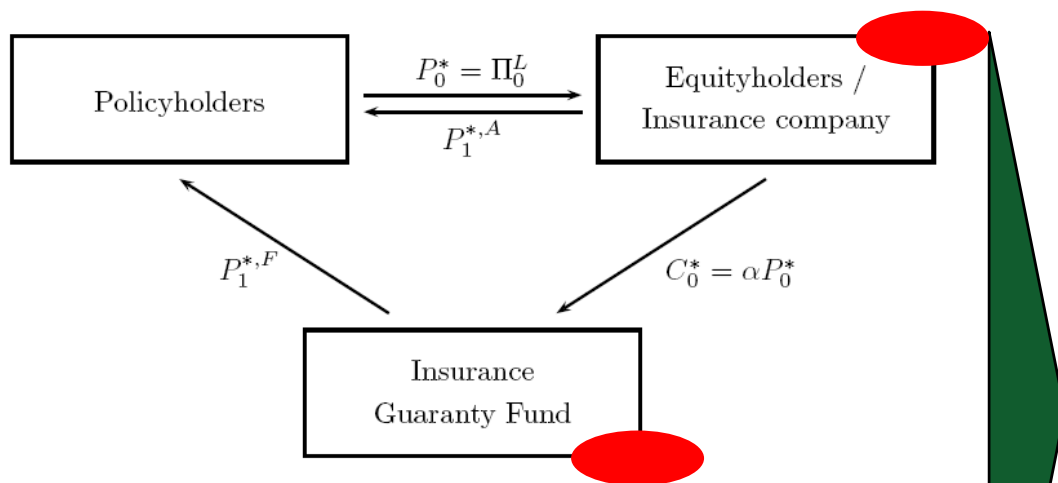
Implications and incentives



From the policyholders perspective the situation strongly depend on the magnitude of the contribution: hence, if the latter exceeds the risk-adequate premium, **insureds are incentivized to choose an insurance company with lowest premium, i.e. lower safety level / equity capital – to the detriment of the fund**

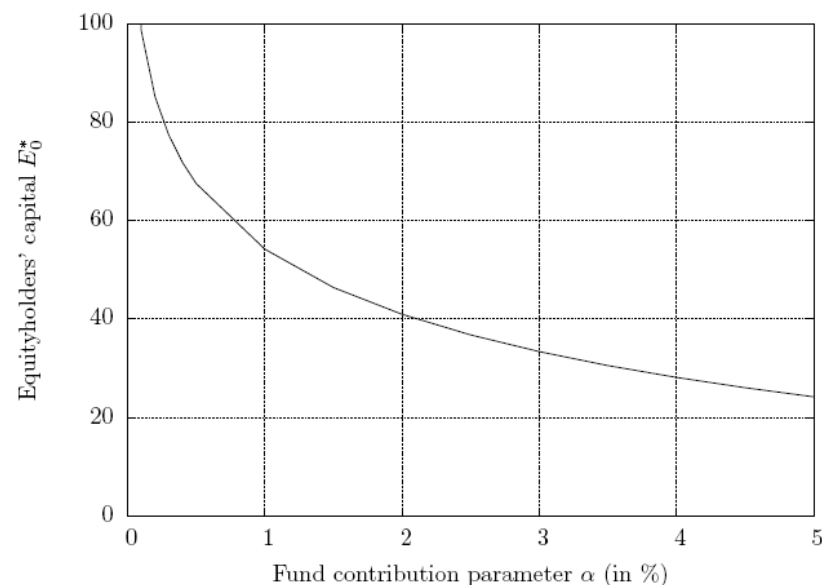
Results (III/III): Contribution magnitude defines overall safety level of the insurance companies

Situation C



- Policyholders pay default risk-free premium to the insurer
- Insurance company pays a contribution calculated as a fraction α of the premium volume
- In case of insurer's insolvency, guaranty fund pays remaining policyholders claim

Implications and incentives



The magnitude of the fund contribution defines the equity capital incentives of the insurers: in the analysed model, the fraction α defines the safety level (equity capital) and sets the target safety **equal for all** companies

Setting	Policyholder position	Equity holder position	Guaranty fund situation
A	<ul style="list-style-type: none"> Same premium payment $P_0^* = P_0$. Realistic when policyholders are unaware of change of default risk through the introduction of a guaranty fund. Positive NPV equals value of insurer DPO Π_0^{DPO}. 	<ul style="list-style-type: none"> Contribution $C_0^* = \alpha P_0$ to the fund (no charge back to policyholders) leads to negative NPV Incentive to lower equity to $E_0^* = E_0^{\text{fair}} \leq E_0$ to restore fair situation. If E_0^* is not allowed by solvency requirements, business is discontinued. 	<ul style="list-style-type: none"> NPV equals $\Pi_0^{*,\text{DPO}} - C_0^*$. Self-financing only if funds equal insurer's value of DPO. In case of positive NPV, additional funding is needed (e.g., from a third source).
B	<ul style="list-style-type: none"> Premium $P_0^* = P_0 + C_0^*$, $C_0^* = \alpha P_0^*$ as fund contribution. NPV equals to $(\Pi_0^{\text{DPO}} - \alpha \Pi_0^L) / (1 - \alpha)$. If $\alpha > \alpha^{\text{fair}} = \Pi_0^{\text{DPO}} / \Pi_0^L$, incentive to change to insurer with lowest premiums (equity) to restore fair situation. 	<ul style="list-style-type: none"> No contribution to the fund, $E_0^* = E_0$, and NPV is unaffected. In practice insurer would collect policyholder contribution and transfer to fund. Reduction of equity to regulatory minimum since policyholders switch to insurers with lowest premiums. 	<ul style="list-style-type: none"> NPV equals $\Pi_0^{\text{DPO}} - C_0^*$. Self-financing only if funds equal insurer's value of DPO ($\alpha \geq \alpha^{\text{fair}}$). In case of positive NPV, additional funding is needed.
C	<ul style="list-style-type: none"> Premium $P_0^* = \Pi_0^L = P_0 + \Pi_0^{\text{DPO}}$. NPV equals to zero. Policyholders pay default risk-free premium and get full protection through the combination of insurer and guaranty scheme. 	<ul style="list-style-type: none"> Contribution $C_0^* = \alpha P_0$ to the fund, $E_0^* = E_0$. NPV zero if $C_0^* = \Pi_0^{\text{DPO}}$. If situation is unfair, incentive to adapt (lower) equity capital (and hence increase Π_0^{DPO}) to restore fair situation (if allowed). Parameter α fixes target solvency level. 	<ul style="list-style-type: none"> NPV equals $\Pi_0^{*,\text{DPO}} - C_0^*$ (see setting A). If situation for insurers is fair, fund is self-financing (adequate value of assets in system equity holders-guaranty scheme). In case of positive NPV, additional funding is needed.

Fair only if contribution equals value of DPO

Fair only if α is

$$\alpha^{\text{fair}} = \frac{\Pi_0^{\text{DPO}}}{\Pi_0^L}$$

Fair only if α is

$$\alpha^{\text{fair}} = \frac{\Pi_0^{\text{DPO}}}{\Pi_0^L}$$

Note: companies are not homogeneous (identical), hence adverse incentives for some

Interaction between Solvency and IGS

- **Numerical illustration of the interaction and relationship**

Effect of incentives not to be neglected

- **Situation A**

Incentive: Equity holders lower equity capital in order to reestablish a risk-adequate return with respect to the magnitude α of the IGS contribution

Item	Without fund	Fund in setting A		
		with $\alpha = 0.5\%$	with $\alpha = 1\%$	with $\alpha = 2\%$
Equity holder capital	67.5	54.2	46.5	36.9
Available assets	167.0	153.3	145.0	134.4
Shortfall probability	0.59%	1.34%	2.17%	3.98%
Expected policyholder deficit	0.08	0.18	0.30	0.58



Conclusion and outlook

- **Adverse incentives after introducing an insurance guaranty scheme if the contributions are not risk-adequate and not all stakeholders contribute**
Generally, volume-based contributions, which are identical for all companies / customers, lead to adverse incentives
(Note: risk-adequate premium calculation only possible in this context)
- **Introduction of a fund in a competitive market and calculation of the contribution to be questioned**
Existing funds mostly charge volume-based contributions
Risk-weighting – however defined – is not used (exception: Germany with rudimental adjustment)
- **Incentives partially contrary to minimum capital requirements of solvency regulation**
Undesired incentives imply in most cases a reduction of the equity capital or customers choosing companies with a lower safety level (equity capital) – to the detriment of the fund

Contact information



Prof. Dr. Joël Wagner

E-Mail joel.wagner@unisg.ch

Phone +41 71 224 36 51

**Institute of Insurance Economics
University of St. Gallen**

Tannenstrasse 19

CH-9000 St. Gallen

<http://www.ivw.unisg.ch>