



International Center for
Insurance Regulation

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Capital Requirements or Pricing Constraints? —An Economic Analysis of Measures for Insurance Regulation¹

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1: Title of a former version: Optimal Risk Management for Insurance Companies
in Regulated and Deregulated Markets



Agenda

- **Motivation**
- Model
- Results
- Conclusion



Motivation (1/2)

Different mechanisms for insurance regulation are in use

- Move towards risk-based capital requirements:
 - E.g., Canada (1994), the U.S. (1994), Japan (1996), Australia (2001), U.K. (2004), the Netherlands and Switzerland (2006), E.U. (presumably as from 2013 on)
- Regulators constrain insurers' product and pricing policies
 - E.g., in the U.S. or in the E.U. before 1994
 - E.g., in German life insurance the guaranteed interest rate may not exceed 2.25% (as from 2012 on: 1.75%)
 - upper bound for the guaranteed pay-off for 1 Euro of insurance premium paid
 - lower bound for the premium corresponding to 1 Euro guaranteed insurance benefit (price floor)

Motivation (2/2)

Price regulation in theory

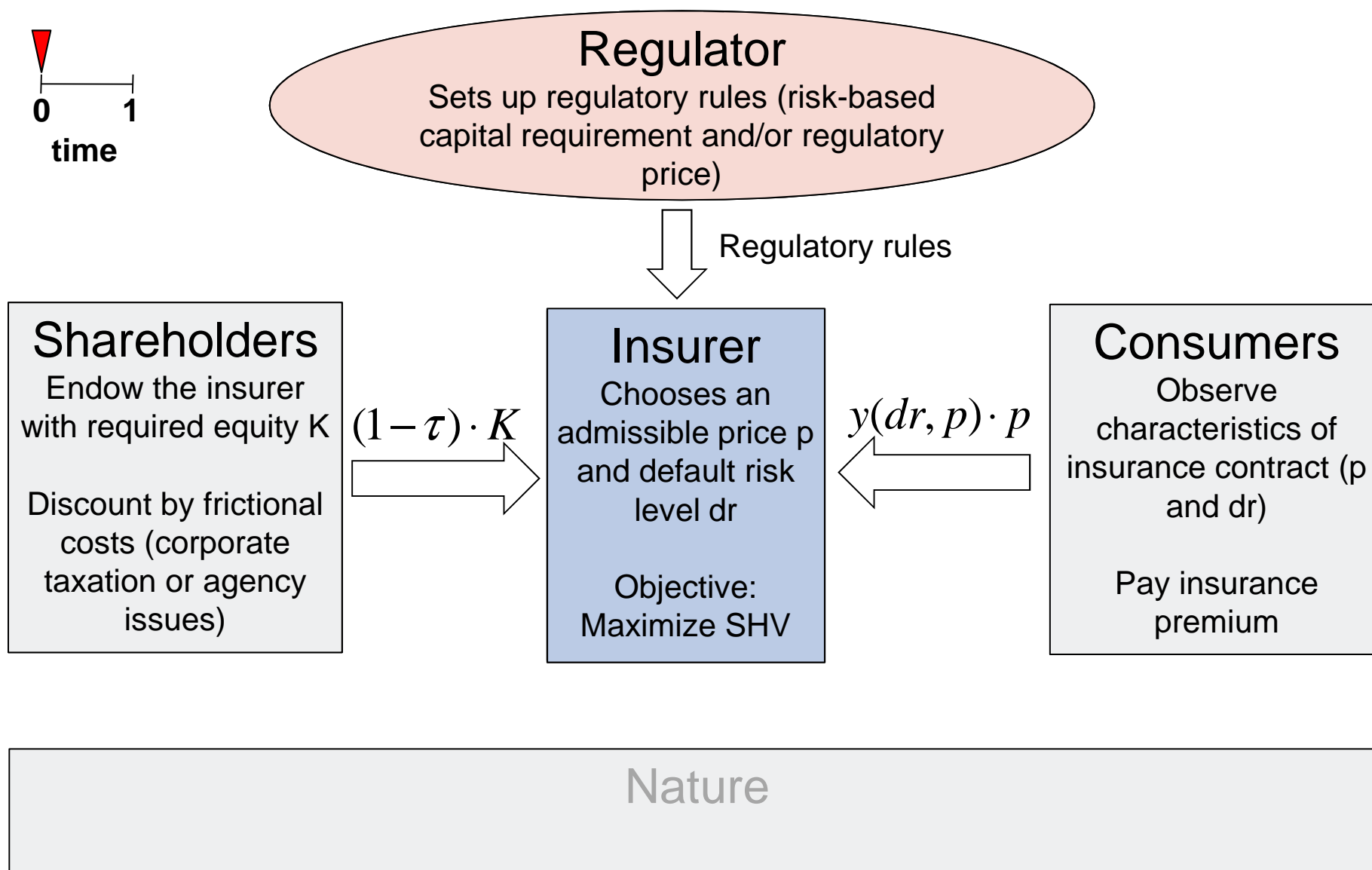
- Price floors are considered as an instrument for solvency regulation, by preventing “go-for-broke” strategies and “destructive competition” (Joskow, 1973; Hanson et al., 1974; Grace and Klein, 2009)
- However, the interaction between price regulation and insurer safety levels has hardly been considered in the theoretical literature so far
- This paper...
 - provides an explanation for the interaction between price regulation and insurer safety levels.
 - compares the efficiency between capital requirements or price floors.
 - detects whether capital requirements and price floors can both be effective at the same time.

Agenda

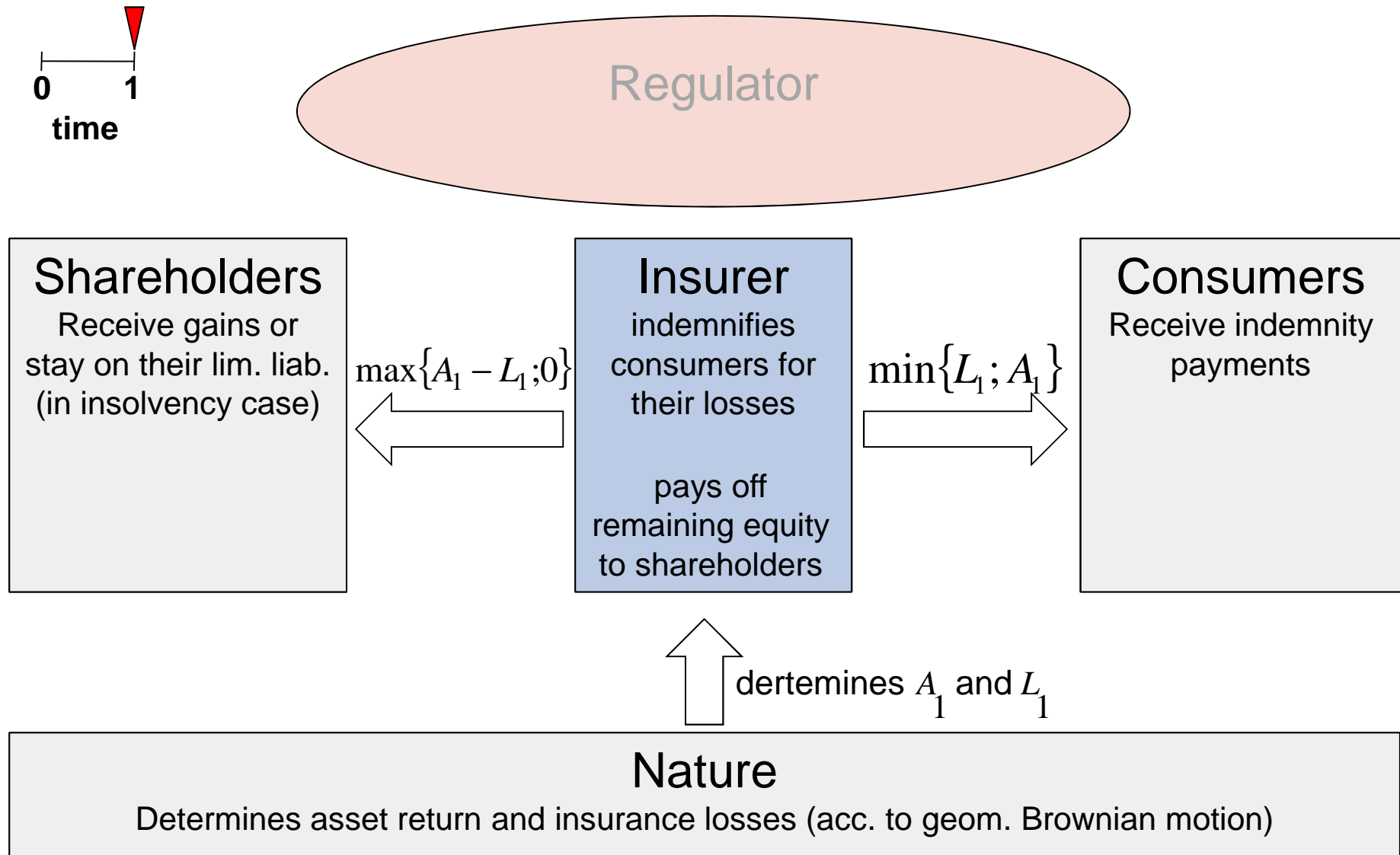
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Model setup



Model setup



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Regulatory frameworks

- 1 Risk-based capital regulation
- 2 Price regulation
- 3 Combination of capital and price regulation; comparison

1 Risk based capital requirements (1/2)

Insurer's best response function

- Regulator restricts the insurer's default-value-to-liability ratio at the specified level dr^{reg}

$$dr = \frac{DPO_0}{L_0} = dr^{reg}$$

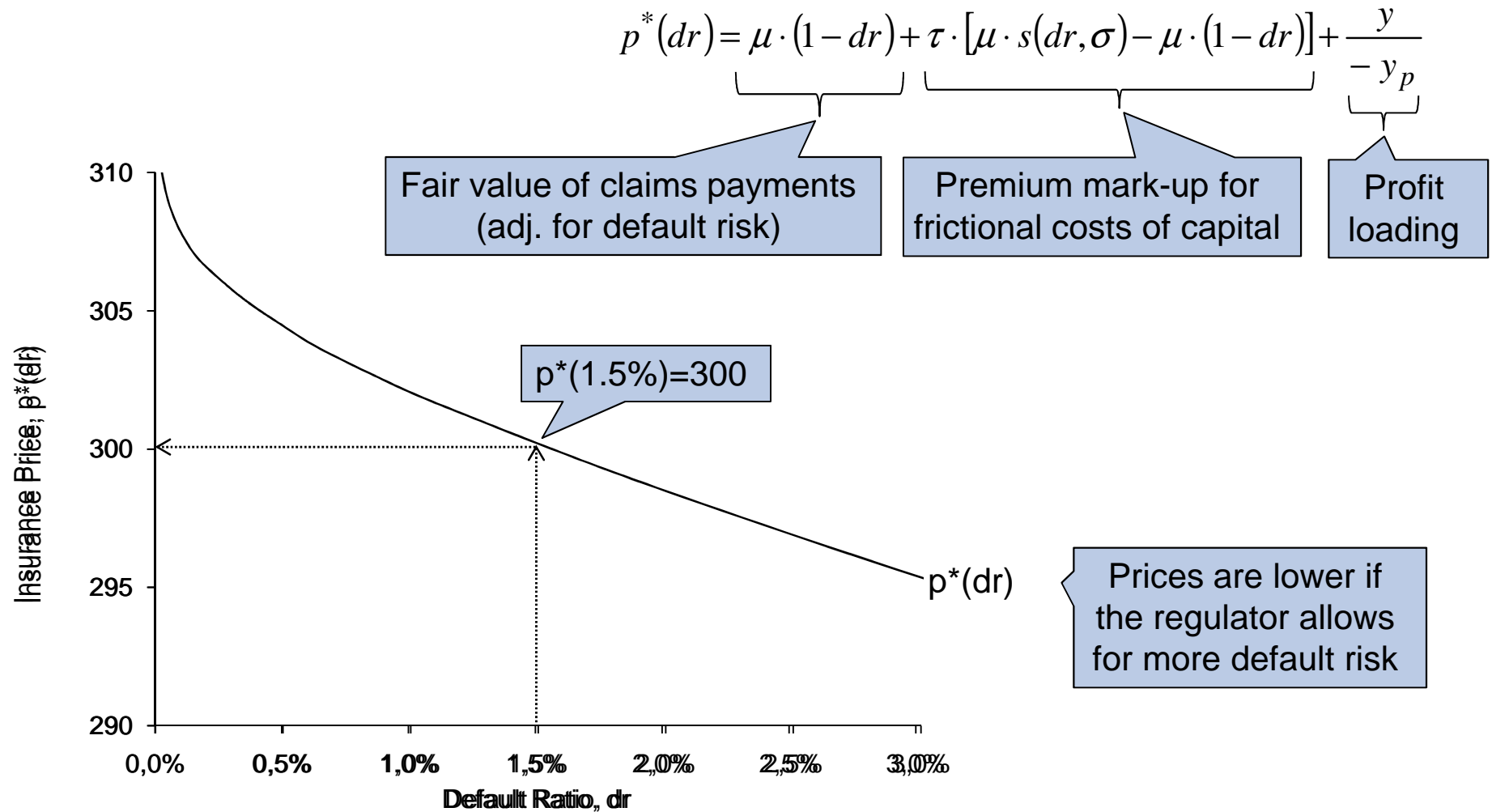
Analog under Solvency II:
Restrict the annual ruin probability

- Insurer's best response: Adjust the premium.

$$p^*(dr^{reg}) = \arg \max_p SHV(dr^{reg}, p)$$

1 Risk based capital requirements (2/2)

Insurer's best response function



2 Price regulation (1/2)

Insurer's best response function

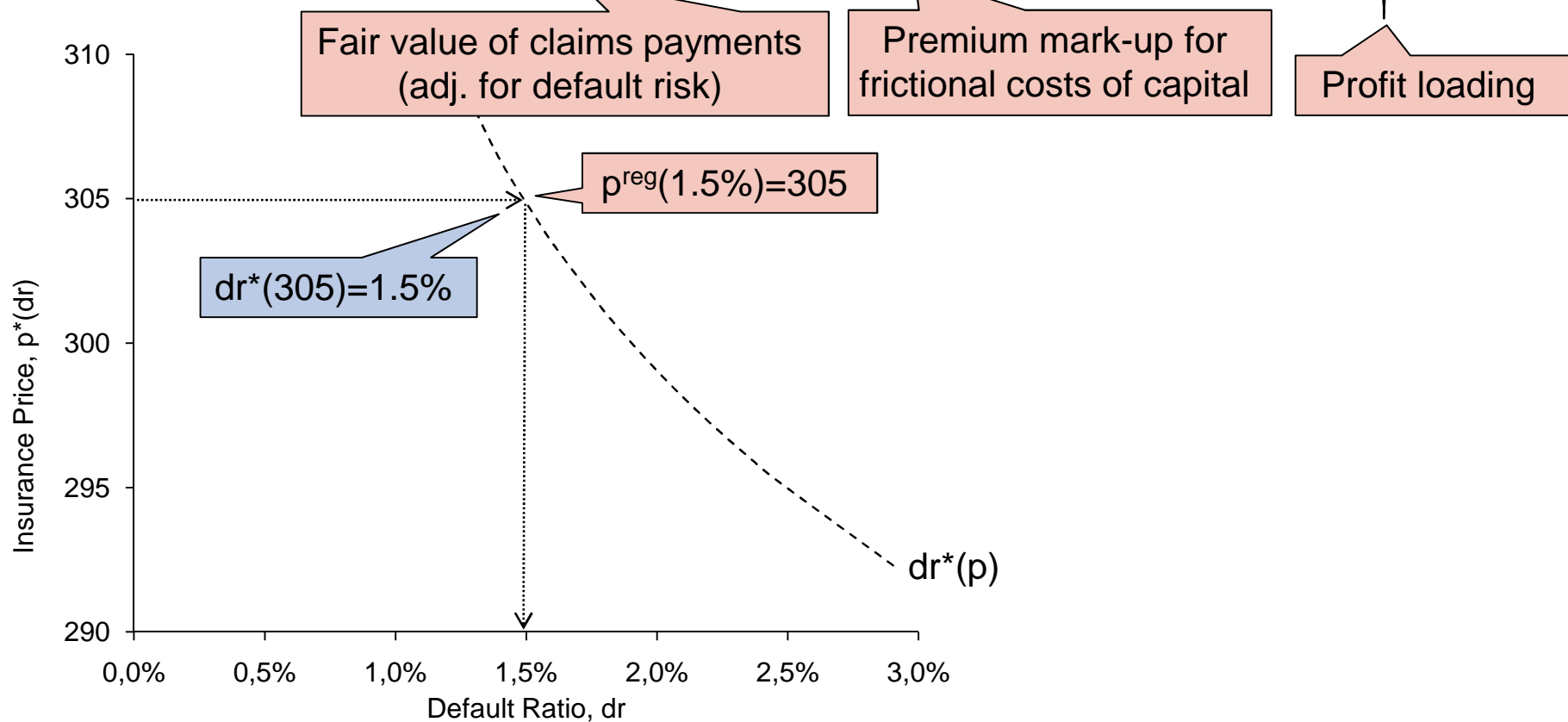
- The regulator fixes the price, but not the default risk level
- Insurer's best response:

$$dr^*(p^{reg}) = \arg \max_{dr} SHV(dr, p^{reg})$$

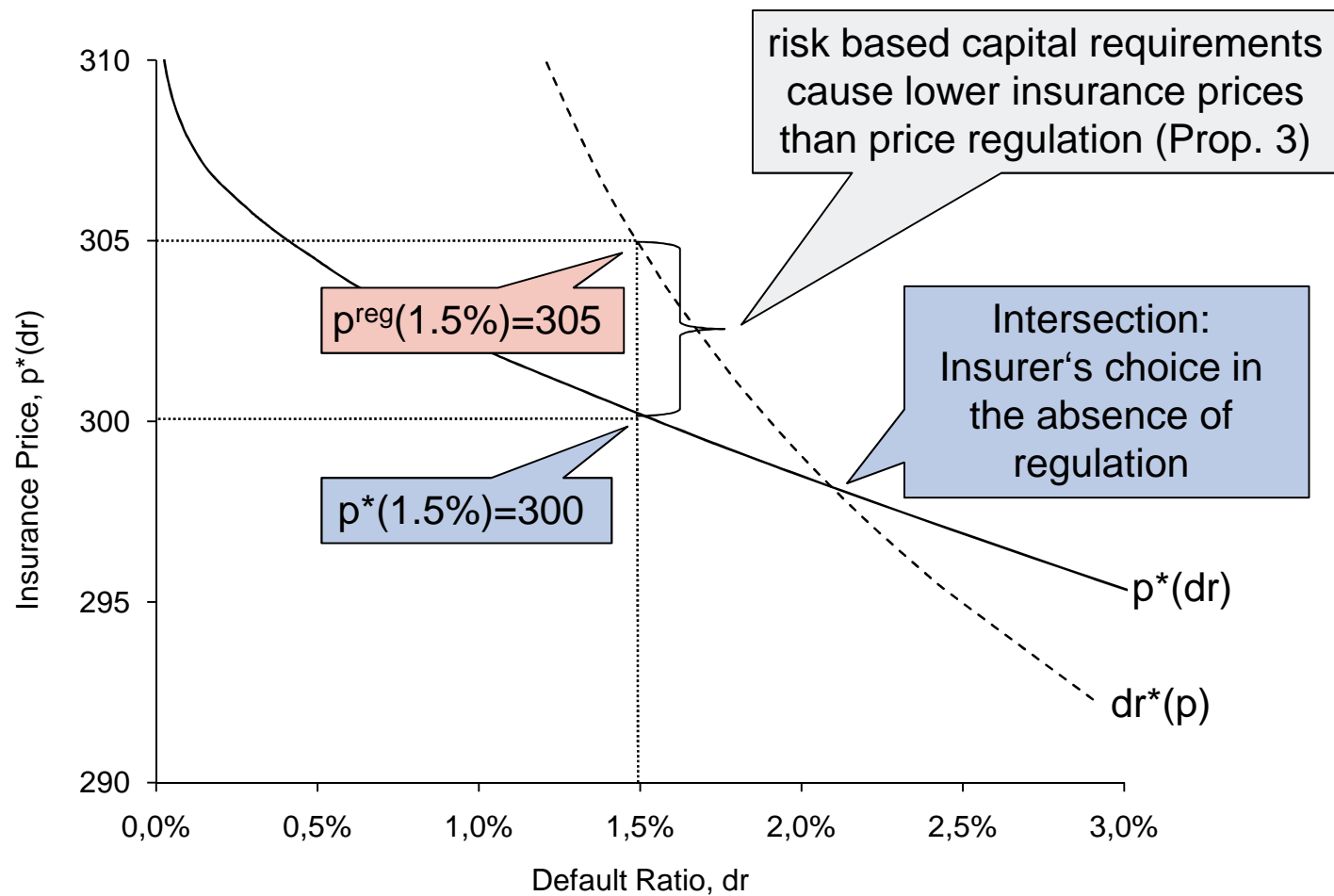
2 Price regulation (2/2)

Insurer's best response function

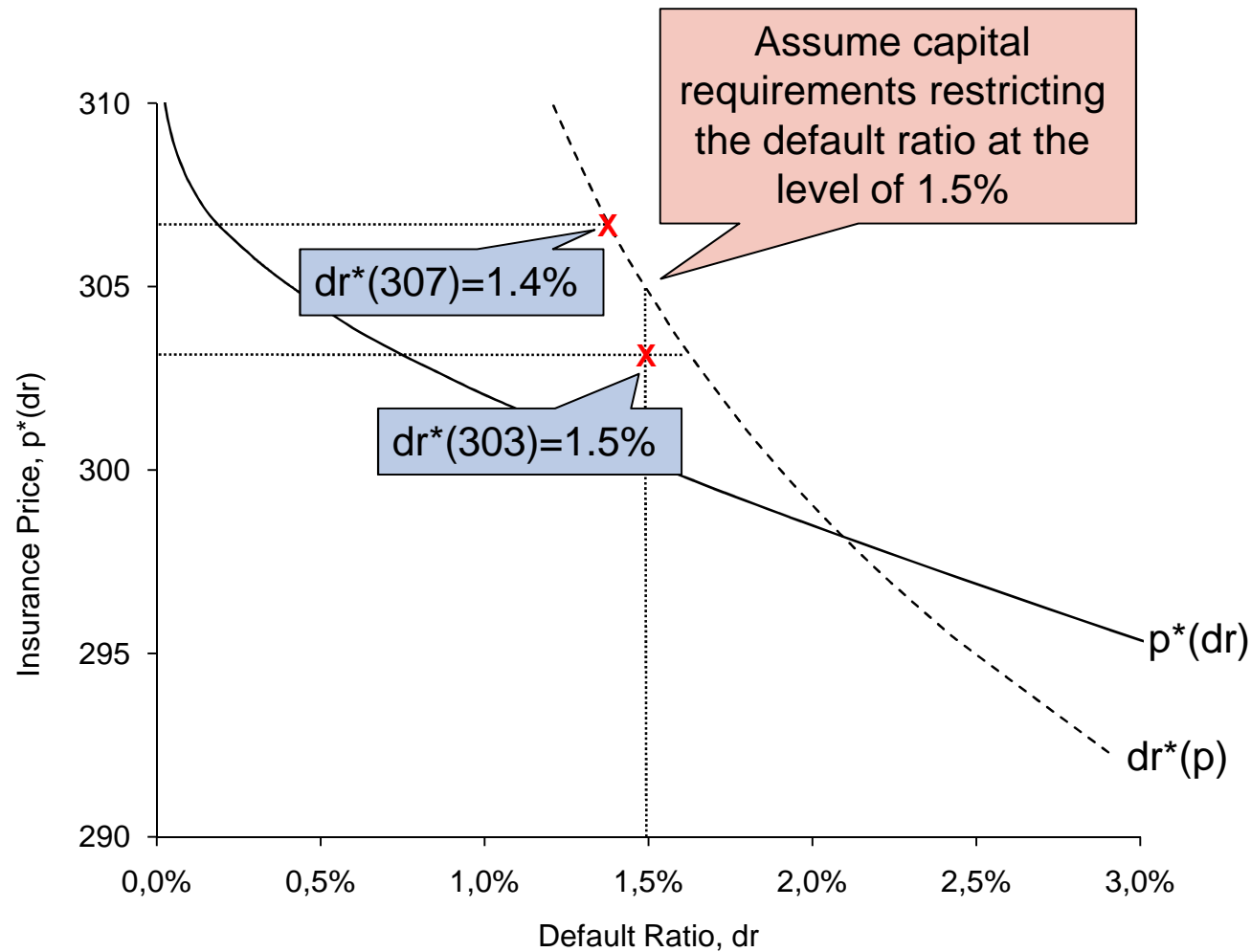
$$p^{reg}(dr) = \underbrace{\mu \cdot (1 - dr)}_{\text{Fair value of claims payments (adj. for default risk)}} + \underbrace{\tau \cdot [\mu \cdot s(dr, \sigma) - \mu \cdot (1 - dr)]}_{\text{Premium mark-up for frictional costs of capital}} + \underbrace{\mu \cdot \left(1 + \tau \cdot \left(1 + \frac{\partial s}{\partial dr} \right) \right) \frac{y}{-y_{dr}}}_{\text{Profit loading}}$$



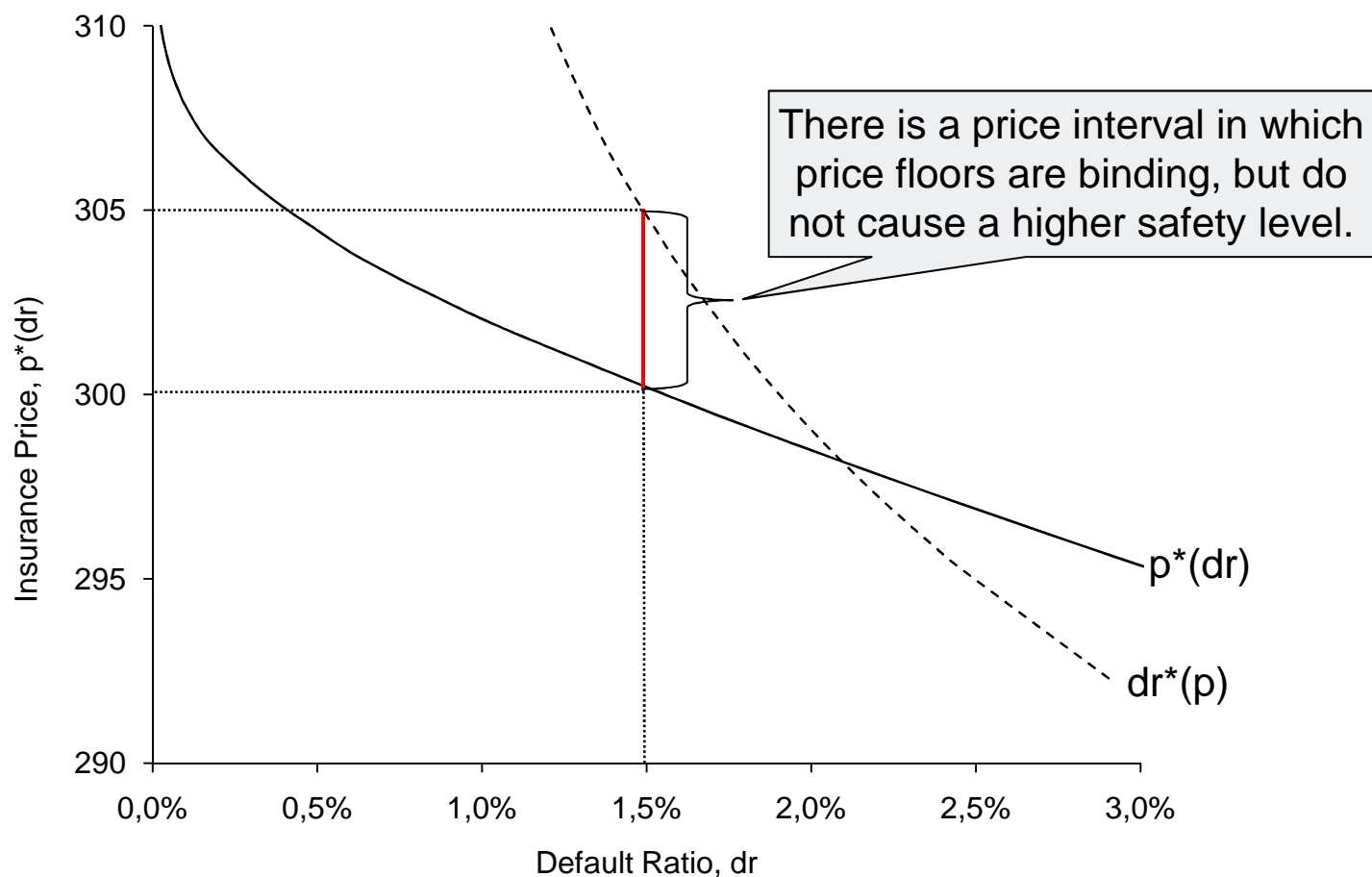
3 Capital requirements vs. price regulation – Comparison



3 Capital requirements and price regulation – Combination



3 Capital requirements and price regulation – Combination



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Conclusion (1/2)

Efficiency advantage of risk-based capital requirements

- Solvency regulation by means of risk-based capital requirements is more efficient than by means of price regulation
- Reason: Risk-based capital requirements allow for a more efficient combination of equity and premium income to compose the safety capital
- Starting point for designing welfare enhancing insurance regulation scheme (balance implementation costs of risk-based capital requirements against this efficiency advantage)

Conclusion (2/2)

Binding, but ineffective price floors

- In the presence of risk-based capital requirements, price floors can be binding but ineffective for insurer safety levels
- When Solvency II is in place, German life insurers will subject to capital requirements and price floor (upper bound for guaranteed interest rate)
- It would be interesting to adjust the model for life insurers:
 - Is the guaranteed interest rate restriction effective for safety?
 - Can we lower the efforts for capital requirements, since they are overruled by the interest rate restriction?