MANAGING EXTREMES Willis Re

SUSTAINABILITY OF EARNINGS

A Framework for Quantitative Modeling of Strategy, Risk, and Value

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Four questions

- Strategy: what's it all about?
- What are key buckets of strategy risk to consider?
- How can one incorporate strategy risk into a company's probabilistic risk model?
- How can one integrate strategy risk into
  - Computation of value and
  - Decisions about strategic maneuvers?

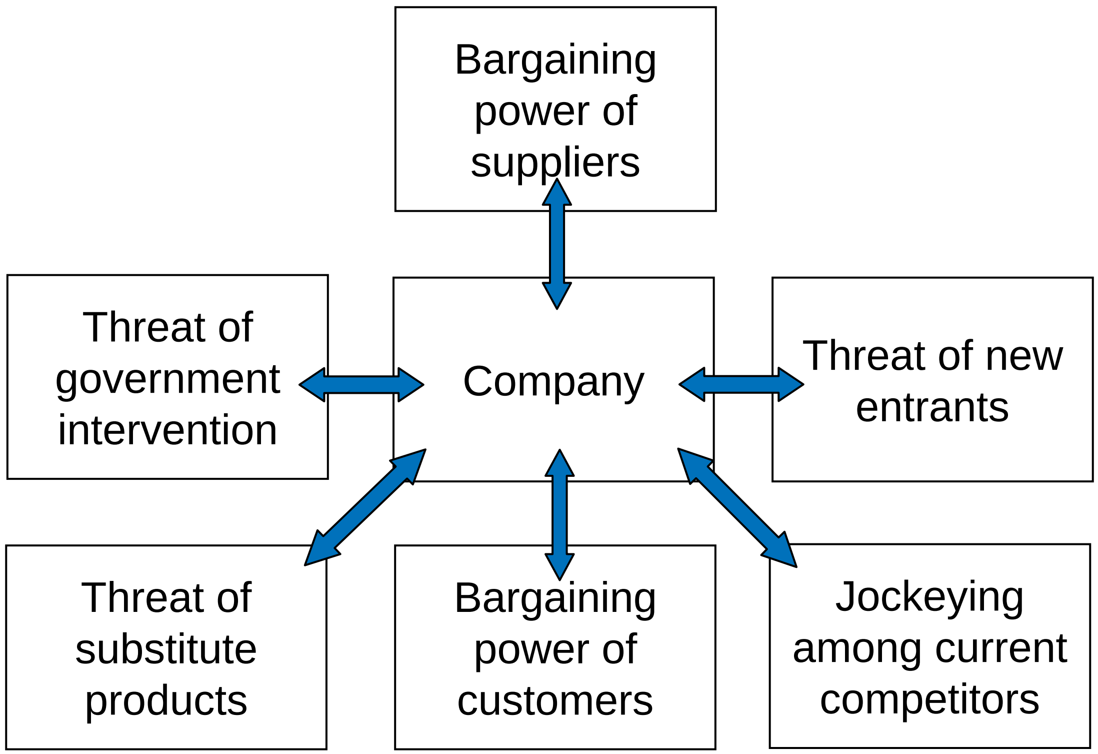
Strategy: what's it all about?

- Strategy relates to competitive forces
- Schelling:
  - "Best course of action for each player depends on what the other players do"
- Buffet:
  - How wide is the "economic moat" that protects your business

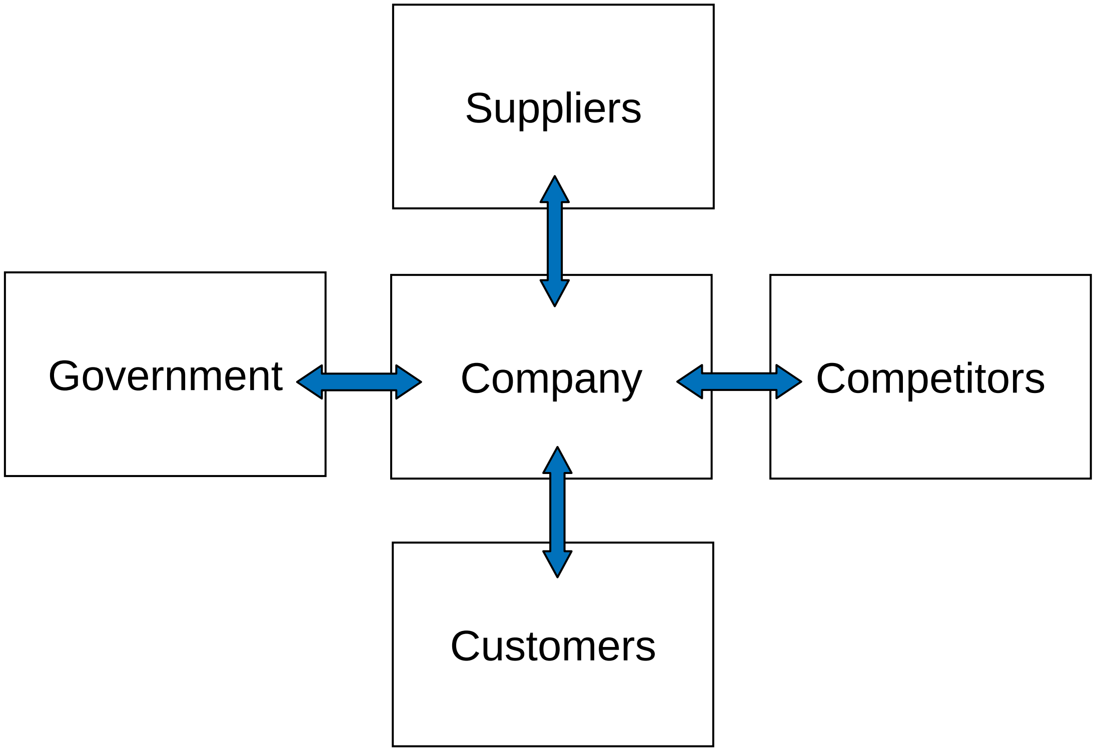
Buckets of strategy risk

- Porter’s 5 forces:
  - Threat of new entrants
  - Jockeying for position among current competitors
  - Bargaining power of suppliers
  - Bargaining power of customers
  - Threat of substitute products
  - [Threat of government intervention]

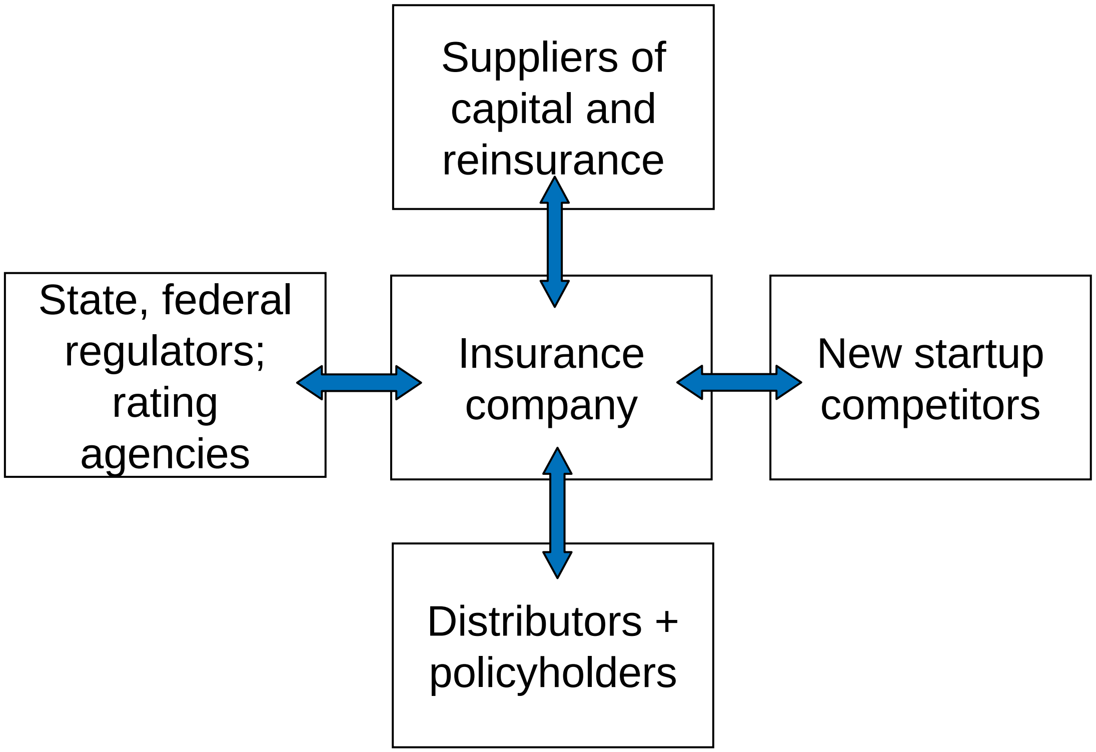
Strategic forces affecting the company



Strategic forces affecting the company



Strategic forces affecting the insurance company



MODELING

Incorporating strategy risk into a company's probabilistic risk model

Modeling

- We'd like to describe strategic forces via a mathematical model that is:
  - Probabilistic
  - Part of an enterprise-wide model of risk and economic capital
  - Interconnected with other types of risk

Modeling

- Proposal: model strategic forces as random variables
- Example: significant new competitor = Bernoulli trial

Probability	State	Description
p	Success	Significant new competitor does not enter the business
1-p	Failure	Significant new competitor does enter the business

Modeling

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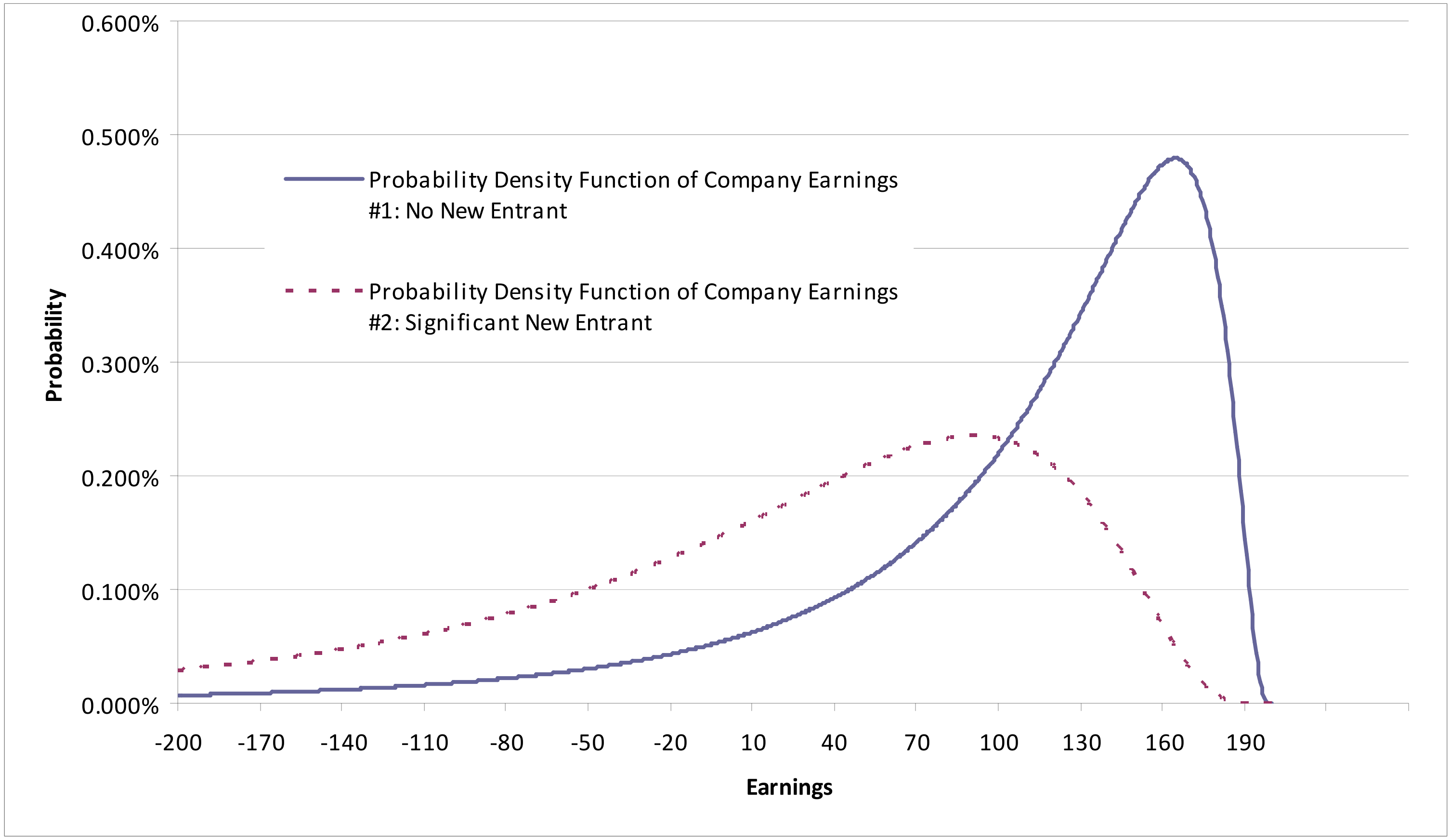
- Probability models for other types of risk ought to be interconnected with modeling of strategic forces
  - Example: if a significant new competitor enters the field, then
    - Profit decreases
    - Company takes on more insurance exposure to maintain revenues
    - Mean and variability of the company's loss distribution will shift

Modeling



Probability
Earnings
0.600%
0.500%
0.400%
0.300%
0.200%
0.100%
0.000%
-200
-170
-140
-110
-80
-50
-20
10
40
70
100
130
160
190
Probability Density Function of Company Earnings #1: No New Entrant
Probability Density Function of Company Earnings #2: Significant New Entrant

VALUE

Measuring how strategy risk affects value

Maximizing value via strategic maneuvers

Value

- Panning's rule: ERM must connect risk to value

- Panning's model:

$$Value = \frac{Earnings * Probability\ of\ \ Sustainability * Discount\ \ Factor}{1 - Growth\ \ Factor * Probability\ of\ \ Sustainability * Discount\ \ Factor}$$

$$Value = Earnings * \frac{p * DF}{1 - GF * p * DF}$$

Strategy risk affects value

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		Company A	Company B
(1)	E = expected earnings	100	90
(2)	r	10%	10%
(3)	DF = 1/(1+r)	91%	91%
(4)	g = growth rate	5%	5%
(5)	GF = 1+g	1.05	1.05
(6)	p	96%	98%
(7)	1-p	4%	2%
(8)	Value	1,043	1,242
(9)	P/E multiple	10.4	13.8

Estimated probability of strategic success (sustainability of earnings)

Strategy risk affects value

Quantitative reflection of the differences in the companies' "economic moats"

Notes

(8) = (1) * { (6) * (3) } / {1 - (5) * (6) * (3) }

(9) = (8) / (1)

Strategic maneuvers

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		Company A: Initial Position	Company A, after spending on Strategic Maneuver
(1)	E = expected earnings	100	84
(2)	r	10%	10%
(3)	DF = 1/(1+r)	91%	91%
(4)	g = growth rate	5%	5%
(5)	GF = 1+g	1.05	1.05
(6)	p	96.00%	98.46%
(7)	1-p	4.0%	1.5%
(8)	Value	1,043	1,250
(9)	P/E multiple	10.4	14.9

Company considers spending on a new strategic maneuver to improve competitive position

Estimated impact of strategic maneuver on the probability of sustainability

Calculations suggest that the new expenditure should <u>increase</u> the value of the company

<u>Notes</u>

(8) = (1) * { (6) * (3) } / {1 - (5) * (6) * (3) }

(9) = (8) / (1)

Summary

- Strategy is about competitive forces
- Incorporate strategy risk as a random variable in the company's economic capital model
- Strategy risk relates to the company's sustainability of earnings
  - Quantify and incorporate into value to distinguish between businesses
  - Quantify and incorporate into value to decide among strategic choices

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