Economic Valuation and Financial Management of an Insurance Firm

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Should insurers take (liquid) investment risk?

- Only few academic papers on the topic
  - Froot/Stein (1998), Froot (2007) say NO
  - Azcue/Muler (2010) say YES
- Most insurance companies take investment risk
  - Warren Buffett (Berkshire Hathaway, 2016) says YES

What drives these different views?

A discrete-time insurance model

- Insurer with broad shareholder base sells insurance policies and can invest in risky traded assets
- Insurance losses are independent of the financial market (of Black–Scholes type with infinite time horizon)

Assets	Liabilities
risky asset	insurance policies
risk-free asset	capital (equity)

- Several financial frictions (e.g., double taxation, agency costs, recapitalization costs)
- Minimum regulatory capital requirements
- *Firm value* is the *NPV of cash flows to shareholders* (dividends minus capital injections)

Two important questions

1. Which valuation measure $\mathbb{Q}$?
2. What are the firm value components?

Which valuation measure $\mathbb{Q}$?

- Cash flows to shareholders depend on traded financial assets when insurer invests in those assets

  $\rightsquigarrow$ $\mathbb{Q}$ has to be market-consistent, i.e., reproduce financial market prices

- Shareholders are indifferent to idiosyncratic risk (broad shareholder base)

  $\rightsquigarrow$ $\mathbb{Q}$ has to coincide with $\mathbb{P}$ for risks orthogonal to the financial market

There exists a unique probability measure $\mathbb{Q}$ satisfying the above two requirements

What are the firm value components?

Three sources of firm value:

1. Profit from current business assuming no default
   $\rightsquigarrow$ Net Tangible Value (NTV)

2. Amount by which the firm can default
   $\rightsquigarrow$ Default Option Value (DO)

3. Value of the expected profits from future business
   $\rightsquigarrow$ Franchise Value (FV)

Firm value components: $V = NTV + DO + FV$

What drives the investment strategy?

What drives the investment strategy

Investment risk has

- *no* impact on Net Tangible Value
- *positive* impact on Default Option Value
- typically *negative* impact on Franchise Value

Optimal amount of investment risk depends on the trade-off between Default Option and Franchise Value

What was driving the different academic opinions?

- Froot's model ignored Default Option Value but captured negative impact of investment risk on Franchise Value

  Therefore, taking investment risk was never optimal

- Azcue/Muler (2010) used the $\mathbb{P}$ measure, creating a bias towards risky investments (expected return of risky asset is larger under $\mathbb{P}$ than under $\mathbb{Q}$)

  Therefore, taking some investment risk was always optimal

Should insurers take investment risk?

- With costless recapitalization (firm's liquidation can still occur), the insurer invests fully in risky assets
  - To boost the value of the Default Option

- With costly recapitalization, there are circumstances in which investment risk is optimal
  - To boost the value of the Default Option at low capital levels
  - Interesting insight: Taking investment risk can substitute for capital injection