Economic Valuation and Financial Management of an Insurance Firm

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Conference in honor of Nicole El Karoui’s birthday
May 21–24, 2019, Sorbonne University, Paris
Should insurers take (liquid) investment risk?

▷ Only few academic papers on the topic
  ▷ 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)

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>risky asset</td>
<td>insurance policies</td>
</tr>
<tr>
<td>risk-free asset</td>
<td>capital (equity)</td>
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</tbody>
</table>

- 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 \( Q \)?

2. What are the firm value components?
Which valuation measure $Q$?

- Cash flows to shareholders depend on traded financial assets when insurer invests in those assets
  $\leadsto Q$ has to be market-consistent, i.e., reproduce financial market prices

- Shareholders are indifferent to idiosyncratic risk (broad shareholder base)
  $\leadsto Q$ has to coincide with $P$ for risks orthogonal to the financial market

There exists a unique probability measure $Q$ satisfying the above two requirements
What are the firm value components?

Three sources of firm value:

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

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

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

Firm value components: \(V = NTV + DO + FV\)
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