Private Equity and Basel II

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Motivation

- Several large banks (like ABN-AMRO) invest directly in Private Equity
- Advanced modelling techniques for Private Equity investments allowed in Basel II
- Advanced modelling techniques for Private Equity investments required for EC
- To our knowledge, no actual portfolio figures available
- 'Validate' results from implemented model with RWA weights (or v.v.)
Preview results

- Basel II proposal and CRD differ substantially in RWA weights and minimum risk weights
- Internal model gives average capital charge of 20%
- Basel II is too high, CRD is too low
- Findings are robust to parameter changes and adverse market conditions
Literature so far

- Most literature on PE funds rather than direct investments
- Danielsson, Embrechts, Goodhart, Keating, Muennich, Renault, and Shin (2001) discuss fundamental problems of the Basel accord
- We are the first ones to show realistic RC figures based on real PE data
## Basel II and CRD on PE I

<table>
<thead>
<tr>
<th></th>
<th>Basel II</th>
<th>CRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC public RWA</td>
<td>24%</td>
<td>24%</td>
</tr>
<tr>
<td>CC private RWA</td>
<td>32%</td>
<td>16%</td>
</tr>
<tr>
<td>CC min public</td>
<td>16%</td>
<td>7.8%</td>
</tr>
<tr>
<td>CC min private</td>
<td>24%</td>
<td>5.6%</td>
</tr>
<tr>
<td>LGD public</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>LGD private</td>
<td>90%</td>
<td>65%</td>
</tr>
</tbody>
</table>

**Table**: Differences Basel II and CRD
Basel II and CRD on PE II

- Internal model (both): 99% 3 month VaR with Rf benchmark
- Objectives
  - Banking stability by risk based pricing
  - Prevent too large impact of regulation on competition
  - Stimulate use of state-of-the-art risk models
Stylized facts

- Focus: buy-outs since 80% of the market in 2005
- High initial leverage (goes down if successful)
  - Amplify returns
  - Increase default risk
  - Use of covenants (default before maturity)
- Management incentives (extra leverage) by unequal holdings prefs/SHLs
- Part portfolio close to exit
- Illiquidity discount
Model setup: individual firm

- Use structural model as in Merton (1974)
- Intuition: equity and debt (and everything in between) contingent claim on assets
- Assumption: ROA normally distributed (assets follow Geometric Brownian Motion)
  - Asset value is (implicit) market value rather than book value
- Equity: down-and-out European Call option
- Prefs/SHLs: derived from Put-Call parity
Model setup: portfolio interdependence

- Normal copula for correlating asset returns
- Every investment assigned to exactly one index
- Equal correlation for all investments in same index
- Use Brownian Bridge for short maturity investments
  - Ensure correct correlations
- Setup allows diversification with rest banking book for EC calculations
Sequentially calibrate individual parameters

1. Asset volatility to (implied) public market counterpart per industry/sector
2. Asset value from FMV (corrected for illiquidity discount)
3. Asset growth rate from expected exit value of investment

Other individual parameters directly given

Correlations from public equity market
Data

- Individual private firm data from ABN-AMRO Private Equity portfolio
  - Wide dispersion in size, industry and time to exit
  - Only few ‘snapshots’
  - Sensitivity analysis for stability
- Public market data (7 years) for asset volatilities and correlations
Simulations

- Simulate profit and loss distribution
- Loss = investment value + risk-free return - simulated realization
- Portfolio = sum of all individual losses
- Simulate early defaults
- Simulate short maturity realizations
- Take 99% VaR
### Results

<table>
<thead>
<tr>
<th>Case</th>
<th>Average Capital Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>20.4%</td>
</tr>
<tr>
<td>With CRD floor</td>
<td>20.5%</td>
</tr>
<tr>
<td>With Basel II floor</td>
<td>27.0%</td>
</tr>
<tr>
<td>FMV - 5%</td>
<td>20.2%</td>
</tr>
<tr>
<td>ExpExit-5%</td>
<td>21.1%</td>
</tr>
<tr>
<td>IncLev</td>
<td>21.8%</td>
</tr>
<tr>
<td>StressedVol</td>
<td>22.9%</td>
</tr>
<tr>
<td>Disaster</td>
<td>28.3%</td>
</tr>
<tr>
<td>$r$ double</td>
<td>19.1%</td>
</tr>
</tbody>
</table>
Issues

- How should prefs and SHLs be classified?
  - Common stock CC: 30%, but endogenous
  - Split allows RC arbitrage and stimulates less accurate results

- Impact of accounting method (base for RWA and possible effect internal model)
  - IFRS: consolidated at cost and unconsolidated at fair value
  - Allows RC arbitrage

- 3 months horizon
  - Wrong perception of risk since credit basis is 1 year
  - More stable RC, less procyclicality
Conclusion

- Basel II RWAs are too high compared to internal models
- CRD RWAs are too low compared to internal models
- Findings robust to parameter uncertainty and adverse market conditions
- Different interpretations of accord details might lead to unwanted situations
