Private Equity and Basel II

Dion Bongaerts and Erwin Charlier

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Universiteit van Amsterdam
Amsterdam Business School

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
- Suarez, Dhaene, Henrard, and Vanduffel (2006) investigate RC for banking book equity using public equity data
- We are the first ones to show realistic RC figures based on real PE data

Basel II and CRD on PE I

	Basel II	CRD
CC public RWA	24%	24%
CC private RWA	32%	16%
CC min public	16%	7.8%
CC min private	24%	5.6%
LGD public	90%	90%
LGD private	90%	65%

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

Calibration

- 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

Case	Average Capital Charge
Base	20.4%
With CRD floor	20.5%
With Basel II floor	27.0%
FMV - 5%	20.2%
ExpExit-5%	21.1%
IncLev	21.8%
StressedVol	22.9%
Disaster	28.3%
r double	19.1%

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 procycality

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

Danielsson, J., P. Embrechts, C. Goodhart, C. Keating, F. Muennich, O. Renault, and H. Shin (2001): "An Academic Response to Basel II," LSE Financial Markets Group ESRC Research Center Special Paper Series no 130.

Merton, R. (1974): "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance*, 29(2), 449–470.

Suarez, F., J. Dhaene, L. Henrard, and S. Vanduffel (2006): "Basel II: Capital requirements for equity investment portfolios," FETEW Research Report, K.U.Leuven.