Cass Business School
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– Longevity 5, New York –

Stochastic Mortality, Macroeconomic Risks, and Life Insurer Solvency

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Discussion

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Content

- Authors present dynamic asset-liability model for life insurer selling term life contracts

→ Key feature: Insurer's assets and liabilities (mortality) are correlated via a common dependence on the business cycle → GDP

- In a simulation study, "insolvency probability" as the risk measure is determined
- sensitivity analysis to age, portfolio size, equity level, and stock proportion

→ Key finding: Dependence between economic conditions and mortality considerably influence results

→ Conclusion: It's crucial to take this dependence into account

Issue I: Are the considered correlations significant?

- The authors use a correlation of approx. $\rho = -40\%$ between mortality index κ_t and the GDP

$\rightarrow$ Estimation results based on 1989-2005 $\rightarrow$ 16 data

$\rightarrow$ In Hanewald (2009), correlations of κ_t and $\Delta \log\{\text{GDP}\}$ are **not** found to be significant at the 10% level for 1991-2005

$\rightarrow$ In fact, the correlation is found to be approx. $\rho = +30\%$ for 1951-2005 period

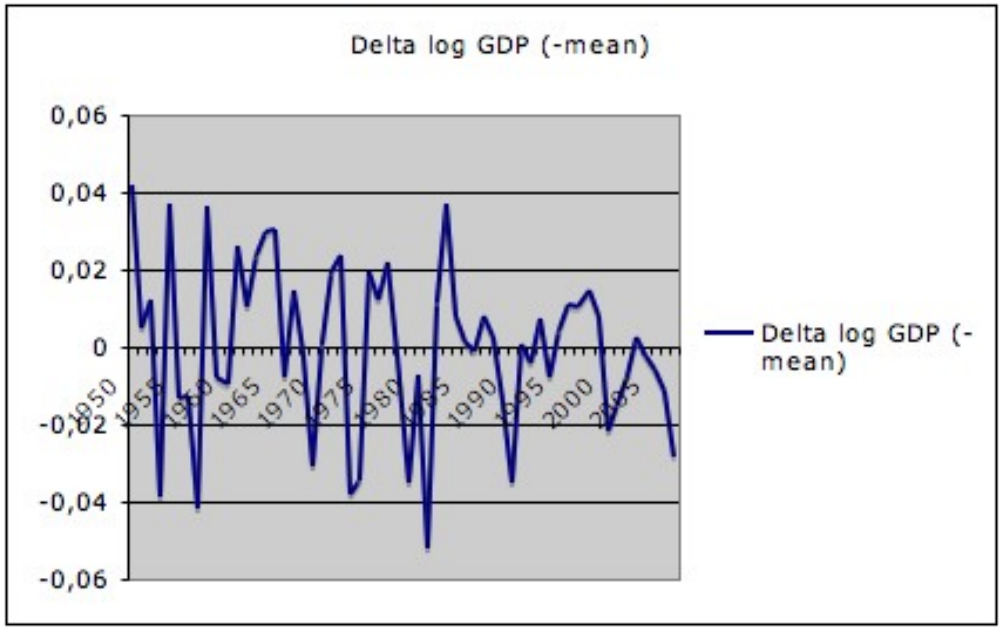
$\rightarrow$ With pos. correlation: stocks $\searrow$ mortality $\searrow$, $\Longrightarrow$ insolvency probability would decrease in comparison to uncorrelated case

- Argumentation "broken trend": Is there evidence that the trend will not be broken again? Structural explanation in Hanewald (2009) via "obesity" unsatisfactory

$\Longrightarrow$ Conclusions far too strong/distinct

Issue II: Model

- GDP modeled via geometric Brownian motion:



→ Business cycles... Impact on estimation, simulation results?

- Bond investment solely via GBM – no hedging possible
- Discounting in Equations (13) and (14) based on physical measure

"My conclusions"

√ Paper shows **how** correlations can be considered

√ Paper shows that the impact **may** be considerable

? I think more care is required when interpreting/analyzing the results, both quantitatively and qualitatively – conclusions too strong from my point of view

→ Suggestions:

- To convince me of significant correlations, in particular continuously positive ones, more work is required. Possibly employ "structural" arguments (see e.g. Suen (2009)[1])
- Part of the model could be improved. E.g. modeling of GDP, investment opportunities, etc.

[1] http://www.richardsuen.net/files/Tech_HCS3.pdf

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Thank you!