1. Title and who I am
2. Motivating problem: How to price risky corporate bonds is an unresolved problem
3. Different approaches, z-score, reduced form and structural models
4. Early approaches using option pricing theory and contingent claims on company assets
5. Graphs of asset evolution, share price and debt evolutions… pure proxy implied asset dynamics
6. What is option pricing theory, and the resulting bond price formula
7. Assumptions of Merton’s model, based on Black Scholes
8. Criticisms and failings of Mertons model when subjected to testing – constant asset volatility, constant interest rates, difficulty of observing liabilities values etc
9. New models, their intentions and their failings
10. New MLE approach to estimating input parameters, after studies suggest that parameter estimation might be a large source of error
11. How MLE works… coin flip example?
12. The likelihood functions of Merton and LS
13. Application to real life data, step by step instructions for practitioners. Include modelling interest rate dynamics by using Vasicek
14. Comparison plot of our pure proxy, versus MLE asset estimates for yearly volatilities
15. Comparison plot of our pure proxy versus MLE historic bond pricing estimates
16. Summary of my results thus far. Talk about how the models still appear to be too flawed to price risky debt.

Abstract:

**The Effectiveness of Structural Bond Pricing Models with Maximum Likelihood Estimation of Asset Dynamics Parameters**

**Dale Holborow**

Increasingly, companies issue bonds when raising funds to finance their operations. Such bonds are subject to credit risk, that is, the risk that borrowers will be unable to repay their loans. How to fairly price this risk is still unresolved.

Option pricing theory developed in the 1970’s by Black, Scholes and Merton lead to a new analytical approach, ‘contingent claims analysis’, and the Merton structural model of risky bond pricing. However, empirical testing suggests that this and subsequent generations of models are of little use in practice.

Recent research suggests that using different techniques to estimate input parameters improves model performance. We examine the use of maximum likelihood estimation and numerical optimisation to see whether structural model performance is improved to the point where structural models can be applied in real markets.