

Date: 02/06/2015

Time: 14:00-15:15

Place: Recanati building room 408

Speaker: Prof. Simon Benninga Tel Aviv University & Sharon Garyn-Tal Emek Izrael College

## Title: Monte Carlo Tests of the CAPM

### Abstract:

We simulate the capital asset pricing model (CAPM) using Monte Carlo (MC) data. Our data is "statistically perfect" and enables us to generate many data sets drawn from a given multi-variate normal distribution with a given set of means and variance-covariance matrix. We replicate the standard tests of the CAPM and examine the relation between sample size and convergence to the theoretical results of the second-pass regression.

For sample size of 60 monthly observations typically used in much financial research, our results show no convincing statistical evidence supporting the security market line (SML). This, despite the fact that all statistical assumptions underlying the CAPM are fulfilled by our data and that in theory (Merton 1973) the second-pass regression should hold perfectly. We cannot reject the hypothesis that beta is normally distributed and insignificantly different from zero or that the r-squared is uniformly distributed [0,1].

Reasonable approximations to the second-pass regression are achieved only for sample sizes equivalent to 5,000 years of data. Sensitivity analysis results suggest that using monthly instead of annual returns does not affect the significance levels: instead of 5,000 years of annual returns, we now need 60,000 months of simulated monthly returns. The risk free rate also does not affect the conversion to the theoretical results, but a higher maximum variance, a higher correlation in the variance-covariance matrix as well as higher expected returns result in speedier convergence to the theoretical values of the second pass regression. On the other hand, the speed of conversion dramatically decreases in the number of assets.



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