SUMMARY OF CURRENT PAPERS

WEI LIU
DEPARTMENT OF ECONOMICS
UNIVERSITY OF TORONTO

1. Risk management

My current research work in the risk management area includes two papers coauthored with my supervisor, Professor Christian Gourieroux. The first paper (also my job market paper), titled ***Sensitivity analysis of distortion risk measures***, studies nonparametric estimation of distortion risk measures (DRM) and their sensitivities with respect to parameters measuring pessimism. This class of risk measures was introduced in Wang (1996) from the insurance literature and includes Value-at-Risk and Tail-VaR as special examples. We derive the general formula for calculating the asymptotic distribution of these estimators and provide closed form expressions when further assumptions are specified. Moreover, we analyze the link between two popularly suggested risk measures, Value-at-Risk and Tail-VaR. We characterize the underlying distributions under which the two risk measures are linearly related through their risk levels. Then, a test procedure is proposed to examine this linearity. Finally, the theoretical results are applied to a currency portfolio. It is seen that this linearity relationship between Value-at-Risk and Tail-VaR is a surprisingly common phenomenon for the portfolio considered. In the second paper, ***Efficient portfolio analysis using distortion risk measures***, we analyze the distortion risk measures in a multivariate framework, which makes it convenient for portfolio analysis. We propose two nonparametric estimators for the sensitivity of risk measures with respect to portfolio allocations, also known as the risk contribution of a particular portfolio component. Asymptotic properties of both estimators are studied. In the second part of this paper, we apply the distortion risk measure to the optimal portfolio choice problem in a DRM-DRM framework. We further explain how the sensitivity estimators can be used to calculate numerically the optimal portfolio allocations. Based on the asymptotic properties derived earlier, three test statistics are developed for evaluating the DRM-DRM efficiency of a given portfolio, analogous to the Wald, Lagrange Multiplier, and Likelihood Ratio tests.

2. Asset return predictability

Two published papers concern asset return predictability, ***Testing for forward rate unbiasedness allowing for persistent regressors*** (*Journal of Empirical Finance (2005)*) and ***A new application of exact nonparametric methods to long-horizon predictability tests*** (*forthcoming in Studies in Nonlinear Dynamics and Econometrics (2007)*). Both are joint work with Professor Alex Maynard (School of Business and Economics, Wilfrid Laurier University). The first paper revisits the forward premium puzzle, in which the forward rate unbiasedness hypothesis suggested theoretically in the international finance literature is empirically rejected under the linear regression framework. However, the poor

finite sample performance of standard asymptotic theory provides a potential explanation to this puzzle. Indeed, due to the uncertainty about the integration order of the forward premium, the standard t-test may substantially over-reject the null hypothesis in finite samples. To solve this difficulty, we apply the robust bounds tests proposed by Cavanagh et al. (1995), which are explicitly designed to provide accurate size under near-unit root assumptions, to six currencies priced by the U.S. Dollar. The forward premium puzzle seems to be more robust than previously imagined, as we can still reject unbiasedness at the 5% level, even when using appropriately sized bounds tests. The second paper investigates the robustness of long-horizon stock return predictability documented in the finance literature. Due to sample overlapping, the long-horizon framework creates additional problems for the predictability regression besides the one generated by the near-unit root regressors. When the horizon length is large relative to the sample size, the distribution of the statistics can be seriously distorted. Motivated by the works of Jegadeesh (1991) and Cochrane (1991), we propose an alternative specification of the long-horizon framework, to which we can apply the nonparametric tests (sign and signed rank tests) suggested by Campbell and Dufour (1995, 1997). While imposing few restrictions on the regressors, both nonparametric approaches yield exact finite sample sizes. For various data generating processes of the regressors, our simulation results suggest that the nonparametric tests compare well to some existing long-horizon tests such as the scaled statistics proposed by Valkanov (2003). Applying our nonparametric tests to stock returns, we find evidence of predictability using short-term interest rates, but little evidence using dividend-price ratios.

3. Applications of the copula in finance

Copulas have gained increasing attention in financial applications, such as derivative pricing, portfolio choice and credit risk analysis. The paper, ***Currencies portfolio return: a copula methodology***, studies an application in modeling currencies portfolio returns. Instead of evaluating the goodness-of-fit of various copulas in sample, I evaluate them based on their ability to forecast specific statistics of interest in the finance literature. Standard criteria usually rank the goodness-of-fit of a model based on its average performance. However, particular statistics of interest may assign more weight to specific risk levels, where the best model can fit poorly as compared to others. I consider Value-at-Risk, defined as a quantile value of a currency portfolio return as an example. Both in-sample and out-of-sample analysis are implemented, using different portfolio allocations to represent various interesting subareas of the underlying distribution. The results confirm that no uniformly best model is available when we consider different portfolio allocations. This calls for more case specific criteria for model selection. Moreover, since a copula allows for the decomposition of marginal distributions and dependence structure, I conduct an experiment to analyze the effects of misspecification in dependence structure on the Value-at-Risk prediction. The findings suggest that the errors created by misspecified dependence structure are rather small as compared to their counterparts from misspecified marginal distributions.

References

Campbell, B. and J.-M. Dufour, 1995. Exact Nonparametric Orthogonality and Random Walk Tests. *The Review of Economics and Statistics*, 77: 1–16.

Campbell, B. and J.-M. Dufour, 1997. Exact Nonparametric Tests of Orthogonality and Random Walk in the Presence of a Drift Parameter. *International Economic Review*, 38(1): 151–173.

Cavanagh, C. L., G. Elliott, and J. H. Stock, 1995. Inference In Models With Nearly Integrated Regressors. *Econometric Theory*, 11: 1131–1147.

Cochrane, J., 1991. Volatility Tests and Efficient Markets: A Review Essay. *Journal of Monetary Economics*, 27: 463–487.

Jegadeesh, N., 1991. Seasonality in Stock Price Mean Reversion: Evidence from the U.S. and the U.K. *Journal of Finance*, 46: 1427–1444.

Valkanov, R., 2003. Long-Horizon Regressions: Theoretical Results and Applications. *Journal of Financial Economics*, 68: 201–232.

Wang, S., 1996. Premium Calculation by Transforming the Layer Premium Density. *ASTIN Bulletin*, 26: 71–92.