Abstracts (FBE Sessions)

Adjustments with Many Regressors under Covariate-Adaptive Randomizations

Yichong ZHANG, Singapore Management University

Our paper discovers a new trade-off of using regression adjustments (RAs) in causal inference under covariate-adaptive randomizations (CARs). On one hand, RAs can improve the efficiency of causal estimators by incorporating information from covariates that are not used in the randomization. On the other hand, RAs can degrade estimation efficiency due to their estimation errors, which are not asymptotically negligible when the number of regressors is of the same order as the sample size. Ignoring the estimation errors of RAs may result in serious over-rejection of causal inference under the null hypothesis. To address the issue, we construct a new ATE estimator by optimally linearly combining the estimators with and without RAs. We then develop a unified inference theory for this estimator under CARs. It has two features: (1) the Wald test based on it achieves the exact asymptotic size under the null hypothesis, regardless of whether the number of covariates is fixed or diverges no faster than the sample size; and (2) it guarantees weak efficiency improvement over estimators both with and without RAs.

Identification and Estimation in a Time-Varying Endogenous Random Coefficient Panel Data Model

Ming LI, National University of Singapore

This paper proposes a correlated random coefficient linear panel data model, where regressors can be correlated with time-varying and individual-specific random coefficients through both a fixed effect and a time-varying random shock. I develop a new panel data-based identification method to identify the average partial effect and the local average response function. The identification strategy employs a sufficient statistic to control for the fixed effect and a conditional control variable for the random shock. Conditional on these two controls, the residual variation in the regressors is driven solely by the exogenous instrumental variables, and thus can be exploited to identify the parameters of interest. The constructive identification analysis leads to three-step series estimators, for which I establish rates of convergence and asymptotic normality. To illustrate the method, I estimate a heterogeneous Cobb-Douglas production function for manufacturing firms in China, finding substantial variations in output elasticities across firms.

The Granular Origin of Tail Dispersion Risk

Yi DING, University of Macau

We study tail risk in the cross-section of asset prices at high frequencies. The tail behavior of the cross-section depends on whether a systematic jump event occurred. If so, the cross-sectional return tail is governed by assets' exposures to the systematic event while, otherwise, it is determined by idiosyncratic jumps. An estimator for the tail shape of the cross-sectional distribution displays distinct properties with and without systematic jumps. We show empirically that shocks to the cross-sectional tail shape are a source of priced risk: fat idiosyncratic tails are favored by investors, while fat-tailed exposures to systematic jumps are disliked.

Sequential Cauchy Combination Test for Multiple Testing Problems with Financial Applications

Shuping SHI, Macquarie University

We introduce a tool that controls false discoveries and identifies individual signals in scenarios involving many tests, dependent test statistics, and potentially sparse signals. This tool applies the Cauchy Combination test in a stepwise manner to increasingly large subsets of sorted p-values. While the original Cauchy combination test aims to make a global statement about a set of null hypotheses by aggregating transformed p-values, our stepwise version determines which p-values trigger the rejection of the global null. The stepwise Cauchy combination test achieves strong familywise error rate control, is less

conservative compared to current multiple testing corrections when dealing with dependent test statistics, and provides a power boost. As illustrations, we revisit two well-known large-scale multiple testing problems in finance for which the test statistics have either serial dependence or cross-sectional dependence, namely monitoring drift bursts in asset prices and searching for assets with a nonzero alpha. In both applications, the stepwise Cauchy combination test proves to be a preferable alternative. It overcomes many of the drawbacks inherent to inequality-based controlling procedures, extreme value approaches, resampling and screening methods, and it improves the power in simulations, leading to distinct empirical outcomes.

Maximum Likelihood Estimation of Fractional Ornstein-Uhlenbeck Process with Discretely Sampled Data

Jun YU, University of Macau

This paper derives two analytic formulae for the autocovariance of the discretely sampled fractional Ornstein-Uhlenbeck (fOU) process. Utilizing the expressions, we demonstrate three main applications: (1) investigating the accuracy of the log-likelihood approximation by the Whittle method; (2) constructing the full maximum likelihood (ML) estimation of fOU with discretely sampled data; (3) obtaining the optimal forecasts with fOU based on discretely sampled data. The finite performance of the ML method is compared with that of three existing methods using simulated data. The long-span asymptotic theory of the ML estimator is established for fOU, which is surprisingly different from that for the ARFIMA model. Our results indicate that the ML method provides more accurate parameter estimates than all the existing methods and the optimal forecast formula provides more accurate forecasts than the existing formula. The ML method is applied to daily realized volatility (RV) series and daily trading volume series. When we forecast future RV with fOU, we find that the ML estimates together with the optimal forecast formula outperform forecasts generated by the alternative estimation methods and the alternative forecast formula.

Do Investors Overvalue Startups? Evidence from the Junior Stakes of Mutual Funds

Allaudeen HAMEED, National University of Singapore

We show that mutual funds report their junior stakes in startups at 43% higher valuation than model fair values that consider multi-tier capital structures of startups. The latest-issued and most senior security is worth 48% more per share than junior securities held by mutual funds, implying that mutual funds mark junior securities close to par with the senior securities. Our findings are robust to model assumptions. Identical valuations reported for dual holdings of senior and junior securities imply 37% discrepancy in implied values of the firm. Overvaluation is lower for fund families with longer experience in private startup investments, and higher for junior securities purchased in secondary transactions. Overvaluation declines after down rounds (new financing rounds with purchase prices lower than previous rounds) and near IPOs. The results are consistent with mutual funds neglecting the probability of negative outcomes in which junior securities are paid less than senior securities and overweighting successful exits where all securities convert to common equity and are paid equally.

Machine Learning as Arbitrage: Can Economics Help Explain AI?

Hong ZHANG, Singapore Management University

Machine learning algorithms have shown to be remarkably successful tools for predicting asset returns. However, the underlying economic mechanisms behind their performance remain unclear. This paper proposes a model-based dynamic arbitrage trading strategy that combines economic and statistical nonstationarity to demystify this black box. In predicting stock returns based on 153 firm characteristics (anomalies), our strategy ranks anomalies similarly to neural networks in the cross-section. Overall, it accounts for approximately 87.9 bps monthly alphas of the high-minus-low portfolios selected by neural networks in the time series. When unpublished anomalies and microcap stocks are excluded from trading, this strategy can fully explain the performance of neural networks. Our results reveal three economic

sources of neural-network performance: a time varying strategy analogous to dynamic arbitrage, a tendency to weight portfolios on unpublished anomalies, and exposure to microcaps.

Economic Links from Bonds and Cross-Stock Return Predictability

Xin LIU, University of Macau

Identifying firms' bond-market-specific economic links through credit-rating comovement of their corporate bonds, a long-short strategy for stocks based on these links generates a risk-adjusted alpha of 0.45% per month, which cannot be explained by existing economic links in the literature. Market segmentation between the equity and bond markets appears to be the underlying mechanism: (i) The cross-return predictability is muted in the bond market; (ii) The cross-return predictability is mitigated in the presence of cross-holding investors; (iii) Equity analysts slowly incorporate information from rating-comovement links to their forecasts.

Risk Seeking

Kai LI, Macquarie University

People are risk-seeking in certain situations, though they are normally risk-averse. The loss aversion utility function provides such an example. Risk seeking is largely understudied, probably because it usually does not allow optimal choices and are not tractable. In this paper, we study the implications when risk seeking is incorporated into the agent's preferences. We show that risk seeking dramatically alters the agent's behaviors in stressed scenarios. It is optimal to take large long or short positions and shun positions involving moderate levels of risk. The agent can swing between sizable long and short positions with minor changes in market conditions. The agent may short an asset with a positive risk premium. These behaviors are consistent with findings in experimental and market settings but cannot be explained by risk-averse preferences.

The New Governance Role of Corporate Boards: Sustainability Committees

Jianfeng SHEN, UNSW Sydney

With hand-collected information on board sustainability committees for the S&P1500 companies, this paper investigates both drivers and effects of firms' decisions to establish the committee from the perspective of investor demand for corporate sustainability. We find that firms under pressure to attract institutional investors and enhance environmental and social (ES) reputation are more likely to establish a sustainability committee at the board level. Using a difference-in-difference event study approach, we find that firms experience an increased equity ownership by socially responsible institutional investors and a decline in ES-related shareholder proposals after adopting a sustainability committee, relative to non-adopting firms matched on the ex-ante adoption propensity.

The shareholder responses in adopters can be ascribed to elevated ES reputation and reduced ES risk after adopting the committee. Finally, we find evidence for a lower cost of equity capital for firms with a sustainability committee than those without. Overall our findings indicate that the presence of a sustainability committee serves to reconcile shareholder interests and stakeholder claims on corporate sustainability.