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OMI Research Newsletter – February 2026

The Oxford-Man Institute of Quantitative Finance (OMI) is a world-leading centre for interdisciplinary research in financial markets. The OMI addresses fundamental problems in quantitative finance with a strong focus on machine learning and data driven models.

*The **OMI Research Newsletter** is a curated summary that covers the most recent research, insights, and tools related to financial decision making.*

Announcements

The Workshop on "Microstructure & Financial Economics" will be held at OMI on 7–8 May 2026. Please find the schedule and register here.

Highlights

Key contributions in this month's edition: Hoekstra and Windmeijer (2026) develop a weak-instrument-robust Anderson-Rubin test with better size and power performance. Ge et al. (2026) show how auxiliary network data can guide thresholding/banding to improve high-dimensional covariance estimation and related portfolio performance. Li et al. (2026) propose new tick-level liquidity and order-imbalance measures, and show liquidity deteriorates sharply around FOMC announcements, especially on surprise days. Drissi, Feinstein and Williams (2026) develop a macro-finance model to study the role of liquid staking and how it affects the interaction between issuance policy, economic productivity, and security in proof-of-stake blockchains. Aretz et al. (2026) show that firms become reluctant to invest and disinvest when uncertainty induces creditors to convert distressed rivals into zombies. Chen, Li and Zheng (2026) propose a linearly constrained regression plus constrained LASSO approach that directly estimates mean–variance efficient portfolios in large universes of risky assets without estimating means and covariances.

Statistics, Econometrics & Machine Learning

Best Feasible Conditional Critical Values for a More Powerful Subvector Anderson-Rubin Test

J. HOEKSTRA, F. WINDMEIJER
UNIVERSITY OF OXFORD

For subvector inference in the linear instrumental variables model under homoskedasticity but allowing for weak instruments, Guggenberger, Kleibergen, and Mavroeidis (2019) (GKM) propose a conditional subvector Anderson and Rubin (1949) (AR) test that uses data-dependent critical values that adapt to the strength of the parameters not under test. This test has correct size and strictly higher power than the test that uses standard asymptotic chi-square critical values. The subvector AR test is the minimum eigenvalue of a data dependent matrix. The GKM critical value function conditions on the largest eigenvalue of this matrix. We consider instead the data dependent critical value function conditioning on the second-smallest eigenvalue, as this eigenvalue is the appropriate indicator for weak identification. We find that the data dependent critical value function of GKM also applies to this conditioning and show that this test has correct size and power strictly higher than the GKM test when the number of parameters not under test is larger than one. Our proposed procedure further applies to the subvector AR test statistic that is robust to an approximate kronecker product structure of conditional heteroskedasticity as proposed by Guggenberger, Kleibergen, and Mavroeidis (2024), carrying over its power advantage to this setting as well.

Should We Augment Large Covariance Matrix Estimation with Auxiliary Network Information?

S. GE, S. LI, O. LINTON, W. LIU, W. SU
NANKAI UNIVERSITY, PEKING UNIVERSITY, UNIVERSITY OF CAMBRIDGE, UCL, UNIVERSITY OF OXFORD

For subvector inference in the linear instrumental variables model under homoskedasticity but allowing for weak instruments, Guggenberger, Kleibergen, and Mavroeidis (2019) (GKM) propose a conditional subvector Anderson and Rubin (1949) (AR) test that uses data-dependent critical values that adapt to the strength of the parameters not under test. This test has correct size and strictly higher power than the test that uses standard asymptotic chi-square critical values. The subvector AR test is the minimum eigenvalue of a data dependent matrix. The GKM critical value function conditions on the largest eigenvalue of this matrix. We consider instead the data dependent critical value function conditioning on the second-smallest eigenvalue, as this eigenvalue is the appropriate indicator for weak identification. We find that the data dependent critical value function of GKM also applies to this conditioning and show that this test has correct size and power strictly higher than the GKM test when the number of parameters not under test is larger than one. Our proposed procedure further applies to the subvector AR test statistic that is robust to an approximate kronecker product structure of conditional heteroskedasticity as proposed by Guggenberger, Kleibergen, and Mavroeidis (2024), carrying over its power advantage to this setting as well.

Beyond Validity: SVAR Identification Through the Proxy Zoo

J. Huang, L. Neri

The Hong Kong University of Science and Technology, UCLouvain

This paper develops a framework for robust identification in SVARs when researchers face a zoo of proxy variables. Instead of imposing exact exogeneity, we introduce generalized ranking restrictions (GRR) that bound the relative correlation of each proxy with the target and non-target shocks through a continuous proxy-quality parameter. Combining GRR with standard sign and narrative restrictions, we characterize identified sets for structural impulse responses and show how to partially identify the proxy-quality parameter using the joint information contained in the proxy zoo. We further develop sensitivity and diagnostic tools that allow researchers to assess transparently how empirical conclusions depend on proxy exogeneity assumptions and the composition of the proxy zoo. A simulation study shows that proxies constructed from sign restrictions can induce biased proxy-SVAR estimates, while our approach delivers informative and robust identified sets. An application to U.S. monetary policy illustrates the empirical relevance and computational tractability of the framework.

Designing High-Frequency Market Liquidity Measures with Applications to Monetary Policy

Z. M. Li, O. Linton, Y. Zhai, H. Zhang

The Chinese University of Hong Kong, University of Cambridge

We propose a new family of liquidity measures-including order imbalance metrics-based on the dispersion and persistence of transitory gaps between transaction prices and the underlying efficient price. We devise an estimation method that renders these latent gaps observable, allowing plug-in estimates of the new measures from intraday trades alone, along with an inference method that allows us to quantify the sampling uncertainty in our estimates. We apply the approach to the S&P 500 equity portfolio, as well as to individual stocks. We use event study methodology to capture heterogeneous liquidity responses to FOMC announcements, which reveals distinct order-persistence patterns on surprise versus non-surprise days, highlighting how markets anticipate and react to monetary policy via the liquidity channel.

Double Machine Learning Inference for Conditional Latent Factors

P. Gagliardini, H. Ma

University of Lugano, Swiss Finance Institute, Queen Mary University of London

This paper deals with identification and asymptotically normal inference in conditional latent factor models for large, unbalanced panels of asset returns. The setting is nonparametric regarding the time-variation of risk exposures. For a general class of parameters of interest relevant for asset pricing with latent factors, we show identification via a semiparametric moment condition involving an unknown vector function containing the conditional moments of portfolio returns given (high-dimensional) predictors. We use a doubly-robust moment restriction for serially dependent data and establish feasible asymptotic normality of the estimators. For a panel of monthly returns of U.S. stocks, the number of conditional factors is large and counter-cyclical, and the spanning of the latent space involves dynamically e.g. leverage, time-series reversal and liquidity on top of Fama-French factors. The implied SDF outperforms competitors in pricing benchmark universes of test assets. Conditioning information plays an important role when estimating moments of conditional risk premia.

A Robust Similarity Estimator

I. Archakov

York University

We construct and analyze an estimator of association between random variables based on their similarity in both direction and magnitude. Under special conditions, the proposed measure becomes a robust and consistent

estimator of the linear correlation, for which an exact sampling distribution is available. This distribution is intrinsically insensitive to heavy tails and outliers, thereby facilitating robust inference for correlations. The measure can be naturally extended to higher dimensions, where it admits an interpretation as an indicator of joint similarity among multiple random variables. We investigate the empirical performance of the proposed measure with financial return data at both high and low frequencies. Specifically, we apply the new estimator to construct confidence intervals for correlations based on intraday returns and to develop a new specification for multivariate GARCH models.

Systemic Risk Surveillance

T. Dimitriadis, Y. Hoga

Goethe University Frankfurt, University of Duisburg-Essen

Following several episodes of financial market turmoil in recent decades, changes in systemic risk have drawn growing attention. Therefore, we propose surveillance schemes for systemic risk, which allow to detect misspecified systemic risk forecasts in an "online" fashion. This enables daily monitoring of the forecasts while controlling for the accumulation of false test rejections. Such online schemes are vital in taking timely countermeasures to avoid financial distress. Our monitoring procedures allow multiple series at once to be monitored, thus increasing the likelihood and the speed at which early signs of trouble may be picked up. The tests hold size by construction, such that the null of correct systemic risk assessments is only rejected during the monitoring period with (at most) a pre-specified probability. Monte Carlo simulations illustrate the good finite-sample properties of our procedures. An empirical application to US banks during multiple crises demonstrates the usefulness of our surveillance schemes for both regulators and financial institutions.

Finance and Economics

Liquid Staking and the Limits of Policy

F. Drissi, Z. Feinstein, B. Williams

Oxford-Man Institute, University of Oxford, Stevens Institute of Technology, Imperial College London

We study the role of liquid staking and how it affects the interaction between issuance policy, economic productivity, and security in proof-of-stake blockchains. In a dynamic macro-finance framework, we show that issuance redistributes resources from productive on-chain activity to validators, which effectively acts as a tax on productive capital. This mechanism generates a Laffer-curve-type tradeoff: beyond an interior optimum, higher issuance weakens the productive base that finances security and reduces staking rewards. We then introduce liquid staking, which allows users to earn staking rewards while retaining liquidity for productive use. Liquid staking collapses the traditional tradeoff between staking and DeFi. When liquid staking tokens (LSTs) closely substitute for the native asset and benefit from strategic complementarities, issuance reallocates productive activity toward LSTs, compresses the feasible policy space, and can render issuance and slashing ineffective as policy instruments.

Uncertainty Creates Zombie Firms: Implications for Industry Dynamics and Creative Destruction

K. Aretz, M. Campello, G. Kankanhalli, K. Schneider

University of Manchester, University of Florida, NBER, University of Pittsburgh, Oxford-Man Institute, University of Oxford

We show that firms become reluctant to invest and disinvest when uncertainty induces creditors to convert distressed rivals into zombies. We validate our model combining firm-and loan-level data with dynamic, industry estimates of uncertainty-led zombification. Empirically, higher uncertainty-led zombification prompts healthy firms to reduce (dis)investment, establishmentlevel hiring, openings, and closures. Granular data on shipping companies' asset allocation show that investment irreversibility amplifies these effects (new ship orders and demolitions are most affected). Our results are distinct from general effects of uncertainty and reveal a "zombie-uncertainty multiplier" with nuanced implications for creative destruction: while asset (dis)investment slows, innovation accelerates.

Efficient Portfolio Estimation in Large Risky Asset Universes

L. Chen, Y. Li, X. Zheng

The Hong Kong University of Science and Technology

This paper addresses the challenge of constructing efficient portfolios within a large investment universe composed exclusively of risky assets. We derive a linearly constrained regression representation of the efficient portfolio, which circumvents the need to estimate the mean vector and covariance matrix. Instead, we apply constrained sparse regression techniques to estimate portfolio weights directly. Theoretically, we establish the asymptotic mean-variance efficiency of the estimated portfolio as both the number of assets and the sample size proportionally approach infinity. In extensive simulations and empirical studies using SP 500 constituents, our method yields

portfolios that satisfy specified risk levels, achieve superior Sharpe ratios, and outperform various benchmarks, both net and gross of transaction costs.

Machine Learning Meets Markowitz

Y. Wang, H. Gao, C. R. Harvey, Y. Liu, X. Tao
Tongji University, Tsinghua University, Duke University, NBER, New Jersey Institute of Technology

The standard approach to portfolio selection involves two stages: forecast the asset returns and then plug them into an optimizer. We argue that this separation is deeply problematic. The first stage treats cross-sectional prediction errors as equally important across all securities. However, given that final portfolios might differ given distinct risk preferences and investment restrictions, the standard approach fails to recognize that the investor is not just concerned with the average forecast error - but the precision of the forecasts for the specific assets that are most important for their portfolio. Hence, it is crucial to integrate the two stages. We propose a novel implementation utilizing machine learning tools that unifies the expected return generation process and the final optimized portfolio. Our empirical example provides convincing evidence that our end-to-end method outperforms the traditional two-stage approach. In our framework, each investor has their own, endogenously determined, efficient frontier that depends on risk preferences, investor-specific constraints, as well as exposure to market frictions.

When Markowitz Meets Machine: Optimization of Large Portfolios with High-Dimensional Stock Characteristics

H. You, F. Zhang
Tsinghua University, Hong Kong University of Science and Technology

We propose a novel portfolio optimization framework that transforms the classic Markowitz mean-variance optimization into an unconstrained machine learning task. Our approach, Markowitz Meets Machine (MMM), directly utilizes high-dimensional firm characteristics as inputs to generate portfolio weights, without requiring explicit estimation of expected returns or covariance matrix. The MMM model balances the mean-variance tradeoff but circumvents many implementation challenges of traditional mean-variance optimization (MVO). Using China A-share market data with 267 proprietary signals, we construct long-only optimal portfolios that target outperformance relative to the CSI 300 and CSI 500 benchmarks. The MMM portfolio outperforms the CSI 500 benchmark by approximately 20% annually with tracking errors around 5%, significantly exceeding the performance of traditional multi-step MVO approaches after accounting for transaction costs. Our results demonstrate the importance of integrated modeling of expected returns, risk, and optimization.

Learning and the Emergence of Nonlinearity in Financial Markets

I. Dew-Becker, S. Giglio, P. Molavi
University of Chicago, Yale University, Northwestern University

Financial markets (and more generally the real economy) display a wide range of important nonlinearities. This paper focuses on stock returns, which are skewed left – generating crashes – and whose volatility moves over time, is itself skewed, is strongly related to the level of prices, and displays long memory. This paper shows that such behavior is almost inevitable when prices are formed by investors acquiring information about the true, but latent, value of stocks. It studies a general model of filtering in which agents receive signals about the fundamental value of the stock market and dynamically update their beliefs (potentially with biases). When those beliefs are non-normal and investors believe crashes can happen, prices generically display the range of nonlinearities observed in the data. While the model does not explain where crashes come from, it shows that investors believing that prices can crash is sufficient to generate the rich higher-order dynamics observed empirically. In a simple calibration with iid shocks to fundamentals, the model fits well quantitatively, and regression-based tests support the model's mechanism.

Mathematical and Computational Finance

Martingale Expansion for Stochastic Volatility

M. Fukasawa
University of Osaka

The martingale expansion provides a refined approximation to the marginal distributions of martingales beyond the normal approximation implied by the martingale central limit theorem. We develop a martingale expansion framework specifically suited to continuous stochastic volatility models. Our approach accommodates both small volatility-of-volatility and fast mean-reversion models, yielding first-order perturbation expansions under essentially minimal conditions.

Liquidation Dynamics in DeFi and the Role of Transaction Fees

A. Sadeghi, Z. Feinstein
Stevens Institute of Technology

Liquidation of collateral are the primary safeguard for solvency of lending protocols in decentralized finance.

However, the mechanics of liquidations expose these protocols to predatory price manipulations and other forms of Maximal Extractable Value (MEV). In this paper, we characterize the optimal liquidation strategy, via a dynamic program, from the perspective of a profit-maximizing liquidator when the spot oracle is given by a Constant Product Market Maker (CPMM). We explicitly model Oracle Extractable Value (OEV) where liquidators manipulate the CPMM with sandwich attacks to trigger profitable liquidation events. We derive closed-form liquidation bounds and prove that CPMM transaction fees act as a critical security parameter. Crucially, we demonstrate that fees do not merely reduce attacker profits, but can make such manipulations unprofitable for an attacker. Our findings suggest that CPMM transaction fees serve a dual purpose: compensating liquidity providers and endogenously hardening CPMM oracles against manipulation without the latency of time-weighted averages or medianization.

Gamma Hedging without Rough Paths

J. Armstrong, P. Das
King's College London

We show how the robustness of gamma hedging can be understood without using rough-path theory. Instead, we use the concepts of p-th variation along a partition sequence and Taylor's theorem directly, rather than defining an integral and proving a version of Itô's lemma. The same approach allows classical results on delta-hedging to be proved without defining an integral and without the need to define the concept of self-financing in continuous time. We show that the approach can also be applied to barrier options and Asian options.

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