

# Econometric Research in Finance Workshop 2021

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Workshop program

**17.09.2021**





**Session 1: Model averaging methods**

Christian Brownlees, Vladislav Morozov

*Unit-Model Averaging for Heterogeneous Panels*

We introduce a model averaging estimator to recover unit-specific parameters in heterogeneous panel models. Our proposal is to estimate the parameters of a given unit using a weighted average of all the unit-specific parameter estimators in the panel. The weights of the unit-model averaging estimator are chosen to minimize the estimated asymptotic MSE. The large sample properties of the unit-model averaging estimator are analyzed and we characterize its asymptotic distribution. A local heterogeneity framework inspired by the literature on frequentist model averaging is used to obtain useful analytical approximations. Additionally, we propose a procedure for constructing valid confidence intervals for the averaging estimator. The resulting estimator performs favorably in simulations.

**Session 2a: Factor models**

M. Hashem Pesaran, Ron P. Smith

*Factor Strengths, Pricing Errors, and Estimation of Risk Premia*

This paper examines the implications of pricing errors and factors that are not strong for the Fama-MacBeth two-pass estimator of risk premia and its asymptotic distribution when  $T$  is fixed with  $n \rightarrow \infty$ , and when both  $n$  and  $T \rightarrow \infty$ , jointly. While the literature just distinguishes strong and weak factors we allow for degrees of strength using a recently developed measure. Our theoretical results have important practical implications for empirical asset pricing. Pricing errors and factor strength matter for consistent estimation of risk premia and subsequent inference, thus an estimate of factor strength is required before attempting to estimate risk. Finally, using a recently developed procedure we provide rolling estimates of factor strengths for the five Fama-French factors, and show that only the market factor can be viewed as strong.

Paolo Zaffaroni

*Factor Models for Conditional Asset Pricing*

This paper develops a methodology for inference on conditional asset pricing models robust to omitted risk factors and to misspecified conditional dynamics. All the features of the asset pricing model, such as risk premia, factors' exposures, idiosyncratic risk, and number of risk factors, are potentially time-varying. The limiting results hold when the number of assets diverges but the time-series dimension is fixed, possibly very small, applicable to a variety of data frequencies. An extensive empirical application based on individual asset returns data demonstrates the powerfulness of the methodology, allowing to tease out the empirical content of the time-variation elicited by asset pricing theory.

Massimo Guidolin, Martin Lozano, Juan Arismendi-Zambrano

*The Efficiency vs. Pricing Accuracy Trade-Off in GMM Estimation of Multifactor Linear Asset Pricing Models*

Even though a multi-factor linear asset pricing model can be equivalently represented in a Beta or in a stochastic discount factor (SDF) form, its inferential efficiency and pricing accuracy features may differ when estimated by the generalized method of moments (GMM), both in small and in large samples. We test the estimated variance of the equivalent Beta and the SDF parameters under GMM with small sample bootstrapped simulations and derive the analytical asymptotic variance and find that the SDF approach is likely to be less efficient but to yield more accurate pricing than the Beta method. We show that the main drivers of this trade-off are the higher-order moments of the factors that play an important role in the estimation process.

## Session 2b: Modelling returns

Aakriti Mathur, Rajeswari Sengupta, Bhanu Pratap

*Saved by the bell? Equity market responses to surprise Covid-19 lockdowns and central bank interventions*

Negative equity market reactions at the onset of the Covid-19 crisis raised questions about financial vulnerabilities in non-financial firms, and the role of the central bank in preventing system-wide stresses due to exogenous shocks. We study these questions in the Indian context, where the announcement of a surprise, strict lockdown in March 2020, was followed by an unanticipated policy package by the central bank just a few days later. Using natural language processing on quarterly earnings call reports, we construct a new firm-specific measure of exposure to the pandemic for a set of Indian non-financials. We find that firms more exposed to the pandemic in early 2020 had worse stock market performance when the lockdown was announced. These results are almost entirely driven by the implications of pandemic-related uncertainty for future cash flows. The central bank's policy package reversed the impact of the lockdown announcement in the short-term.

Jan Jakub Szczygielski, Janusz Brzeszczyński, Ailie Charteris, Princess Rutendo Bwanya

*The COVID-19 storm and the energy sector: The impact and role of uncertainty*

Prior research has shown that energy sector stock prices are impacted by uncertainty. The coronavirus (COVID-19) pandemic has given rise to widespread health and economic-related uncertainty. In this study, we investigate the magnitude and the timing of the impact of COVID-19 related uncertainty on returns and volatility for 20 national energy indices and a global energy index using ARCH/GARCH models. We propose a novel 'overall impact of uncertainty' (OIU) measure, explained using a natural phenomenon analogy of the overall impact of a rainstorm, to gauge the magnitude and intensity of the impact of uncertainty on energy sector returns. Drawing upon economic psychology, COVID-19 related uncertainty is measured in terms of searches for information relating to COVID-19 as captured by Google search trends. Our results show that the energy sectors of countries further west from the outbreak of the virus in China are impacted to a greater extent by COVID-19 related uncertainty. A similar observation is made for net energy and oil exporters relative to importers. We also find that the impact of uncertainty on most national energy sectors intensified and then weakened as the pandemic evolved. Additional analysis confirms that COVID-19 uncertainty is part of the composite set of factors that drive energy sector returns over the COVID-19 period although its importance has declined over time.

Chaeshick Chung, Sukjin Park

*Deep Learning Market Microstructure: Dual-Stage Attention-Based Recurrent Neural Networks*

This paper applies the Dual-Stage Attention-Based Recurrent Neural Network(DA-RNN) model to predict future price movements using microstructure variables. The biggest feature of the DA-RNN model is that it adaptively selects relevant variables according to market conditions. We analyze whether microstructure variables have predictive power for future price movements, and what factors influence this predictive power. We find that microstructure variables possess predictive power against the direction of future price movements. This predictive power depends on how many uninformed traders exist in the market. Moreover, the importance of microstructure variables is negatively related to market liquidity. Thus, while microstructure variables are more important in severe market conditions with high transaction costs, the effect of trading on price dynamics depends on market structure.

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| <b>Session 2c: Lending markets and banks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>Sylwester Kozak, Agata Wierzbowska<br/> <i>Income diversification and profitability of the European banks during the COVID-19 pandemic</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>Burkhard Raunig, Michael Sigmund, Lea Steininger<br/> <i>Bank supervision and profitability: Euro area evidence</i></p> <p>Current banking supervision seeks to limit individual financial institution's risk, and to ultimately promote macroeconomic stability. We exploit a institutional change in the conduct of banking supervision in the euro area to analyze its impact on bank's regulatory capital and profitability as key determinants of both financial stability and banking soundness. A size-dependent introduction of the Single Supervisory Mechanism (SSM) in 2014 permits a difference-in-difference design as empirical strategy. We find that supranational, harmonized, centralized supervision under the SSM i) decreases risk-weight, ii) increases credit risk-weight and iii) increases profitability of treated banks vis-a-vis locally supervised ones. We suggest that the results are driven by a change in perception by market participants who may view banks supervised via the SSM as safer compared to non-treated banks, leading to higher margins and lower funding costs for the former.</p> |
| <p>Said Kaawach<br/> <i>Peer-to-peer Investor Performance and Automatic Bidding</i></p> <p>Using unique data from a leading P2P lending platform in China, Renrendai.com, we investigate how past loan portfolio performance affects individual investors' decisions to use the auto-investing tool. The estimates suggest that poorly performing investors are likely to switch to the auto-bidding tool after a spell of investment mistakes. At the same time, good performers prefer making decisions themselves in the manual mode. The findings also provide evidence that the auto-bidding toolbox helps investors to make better decisions, and it does not discriminate against borrowers with a specific gender, marital status, and financial literacy characteristics.</p>                                                                                                                                                                                                                                                                                                                                                   |

**Session 2d: Microeconomic modelling**

Andrzej R. Stopczyński, Marika Ziemba

*Disfunctions in the financial services market vs consumer decisions in the light of Ajzen's theory of planned behaviour*

The problem of consumer protection should be considered in the context of factors that determine the decisions of individuals on the financial services market, which is why the theory of Ajzen's planned behavior, so far not used in Poland in relation to financial products, fits perfectly into this trend. The main objectives of the publication was to identify determinants of consumers' decisions in the financial market. The research was carried out on the basis of the CAWI questionnaire survey, conducted on a group of 100 respondents reflecting the structure of Polish society, and a group of 200 randomly selected respondents in the period March-June 2021.

Paulina Roszkowska

*Women on Boards: Does Corporate Culture Influence Board Gender Diversity?*

We examine the link between corporate culture and the company's willingness to appoint women to the Boards of Directors. We proxy corporate culture by how companies communicate with investors in the 10-K filings. Our findings provide persistent evidence for a causal link between competitive and collaborative corporate culture and board gender balance. Companies characterized by a high degree of competing culture tend to appoint fewer female directors, consistent with the stylized fact that women shy away from competition. Companies with a high degree of collaborative culture appoint on average more women to their Boards. Companies that score high on collaborative culture, care about achieving goals as a team and long-term human development are likely to be genuinely interested in appointing female directors because they oftentimes have more than one woman on the Board. We also show that, in line with tokenism theory, companies characterized by a less collaborative (more competitive) culture are more likely to appoint female directors only to 'tick-the-box' rather than to truly benefit from board gender diversity. We use a dynamic approach to address the reverse causality issue and show that female directors have the potential to affect corporate culture only when they constitute a critical mass in the board.

Neha Gupta

*Monetary Policy, User Cost and Inequality: Homeowners versus Renters*

ser costs of housing are a major part of a household's expenditure. I empirically investigate the heterogeneous impact of an unanticipated expansionary monetary policy on housing markets and household tenorial decision by exploiting the user cost of housing channel. Drawing on a Swiss household panel data and daily interest rate futures, I find that the less financially constrained households are 3.45 percentage points more likely to become homeowners in case of unexpected decrease of 100 basis points in 3-month CHF Libor. The households in the upper income quartile with pillar 3a savings benefit the most in case of an unanticipated negative monetary policy shock. The real user cost expenses of renting also benefits significantly by a decrease of on average 19% from an unexpected expansionary monetary policy. Single family houses do not benefit from the shocks in the monetary policy. The findings highlight the importance of apartments and multifamily housing.

### Session 3a: Asset pricing

Gregory Boadu-Sebbe

#### *Effect of Exchange-Traded Funds Arbitrage Transactions on Their Underlying Holdings*

One important aspect of trading exchange-traded funds (ETFs) is the arbitrage trading strategy taking by authorized participants (APs) to keep ETFs prices in line with their NAVs. However, the effect of the ETF arbitrage transaction on the underlying assets of an ETF has not been fully exploited by researchers. This paper develops a dynamic econometric state-space model to examine the effect of the ETF arbitrage trading on the underlying assets of an ETF. The model combines the price dynamics of an ETF, the price dynamics of the underlying assets, and the ETF arbitrage mechanism. The model is estimated individually for Dow Jones industrial average ETF (DIA) and VanEck Vectors Semiconductor ETF (SMH), and for each of their underlying assets. The datasets comprise of the best ask and best bid quotes for the ETFs and their underlying assets. The datasets cover the first quarter of 2018 sampled on milliseconds frequency. I find that ETF liquidity shocks propagate to the underlying assets via both the ETF arbitrage mechanism and the adjustment in the ask and bid quotes of the underlying assets. These ETF liquidity shocks add a permanent layer of transitory volatilities to the underlying asset prices. Furthermore, I find that ETF arbitrage transaction speeds up the price discovery process of the underlying assets.

Tom L. Dudda, Tony Klein, Duc K. Nguyen, Thomas Walther

#### *Common Drivers of Commodity Futures*

This paper analyzes potential economic drivers of commodity futures returns in a novel mixed data sampling (MIDAS) framework to assess if more information unveils important relations and leads to better prediction. In contrast to commodity futures prices, which are readily available at daily frequency, macroeconomic indicators are typically published monthly or quarterly. Studying the linkage between fundamental economic variables and commodity prices with traditional time series models requires aggregating the data to a common lower frequency. MIDAS techniques allow to utilize valuable information of the higher-frequency series that would be otherwise lost through aggregation. We collect daily data from 37 commodity futures (softs, grains, livestock, energy, industrial metals, precious metals) and various monthly-published macroeconomic indicators from 1998 to 2019. To identify the main drivers, we study in-sample Granger causality based on bivariate mixed-frequency Vector Autoregressive (MF-VAR) models for each pair of commodity futures and their potential economic drivers. We repeat the in-sample Granger causality analysis for different stages of the financialization as well as on a portfolio basis and compare our results to low-frequency Granger causality. We are not able to identify “common” drivers for the entire cross-section of commodities but find that (de-)financialization affects interdependences between commodities and economic variables. Our results indicate dissipating impact of macroeconomic factors on commodity returns in recent years. Furthermore, Granger causalities show different patterns depending on the frequency at which the data is sampled. In an out-of-sample trading study build upon VAR-based commodity return predictions, we show the economic value of accessing information at a higher frequency. Using MF-VARs enhances the directional prediction accuracy compared to traditional low-frequency VARs for most commodities and results in higher risk-adjusted returns. Our findings uncover new research opportunities concerning the importance of commodity return drivers using mixed-frequency data analysis.

Lucia Alessi, Elisa Ossola, Roberto Panzica

#### *When do investors go green? Evidence from a time-varying asset pricing model*

This paper studies the evolution of the greenium, i.e. a risk premium linked to firms’ greenness and environmental transparency, based on individual stock returns. We estimate an asset pricing model with time-varying risk premia, where the greenium is associated to a priced ‘greenness and transparency’ factor, which considers both companies’ greenhouse gas emissions and the quality of their environmental disclosures. We show that investors in the European equity market tend to accept lower returns, ceteris paribus, to hold greener and more transparent assets when the shift of the economy towards low-carbon becomes more credible. This happened after the Paris Agreement, the first Global Climate Strike and the announcement of the EU Green

Deal. Signals going in the opposite direction, such as the US withdrawal from the Paris Agreement and rising oil prices, are associated with increases in the greenium.

### **Session 3b: Investor behavior**

Dóra Sallai, Mercédesz Mészáros, Gábor Dávid Kiss

*How stock indices respond to market shocks? Examining stock market contagion in European countries with minimum spanning trees*

This paper analyzed the structural changes of the European stock markets by using a minimum spanning tree graph to analyze topological changes from Central and East European point of view. The aim was to point on the similarities and differences of the previous recessions, namely the Subprime crisis around 2008, the European sovereign debt crisis of the 2010s and the recent COVID-19 period. Focusing on the structural changes of the graph, we were looking for the emergence of shock-propagating hub. All the three examined recession periods we could see a constant change in the stock market network, where stock market indices are connected mainly through one central index during turbulent times, while the connections became more diverse in calm periods.

Lucia Alessi, Stefano Battiston, Virmantas Kvedaras

*Over with carbon? Investors' reaction to the Paris Agreement and the US withdrawal*

How financial investor may react to policy events related to sustainability and climate change mitigation in particular, is a key question with implications for sustainable finance and financial stability. We address this question by carrying out a dynamic difference-in-difference approach on a supervisory database of securities holdings of the European Central Bank, and we provide evidence of several effects related to the 2015 Paris Agreement on climate change action. In aggregate, investors reduced their exposure to carbon-intensive assets in response to the agreement sealing, and the trend reverted after the US withdrawal announcement. However, the extent of the reaction varies across categories and geography of the securities holders. The change in trend is largely driven by households' investments, while a sharper decrease of participation is observed for more traditional financial institutions and holders from developed countries. Our results are consistent with the interpretation that the redirection of global financial flows towards climate action, as stipulated in the Paris Agreement requires a clear and unanimous signal from the global community of policy makers.

Michał Wójtowicz

*Application of Kelly criterion in trading shares*

**Session 3c: Distribution of asset prices**

Maria Debora Braga, Consuelo R. Nava, Maria Grazia Zoia  
*Resorting Portfolio Kurtosis for Risk Parity Allocation*

The distinguishing feature of portfolios based on risk-parity strategy is that of allocating wealth among asset classes in such a way that each of them contribute to the portfolio volatility to the same extent. Here, we expand the research on risk parity with a new version of the strategy where we replace volatility of the portfolio's return with the portfolio kurtosis as reference measure. Thus the investor still aims, when setting up the portfolio, at disseminating equally among asset classes the responsibility for portfolio returns' dispersion but she/he is focused on the huge dispersion as evidenced by relying on the fourth moment that puts more weight on extreme values /outcomes (either positive or negative) than standard deviation does. We contribute deriving mathematically the portfolio kurtosis and the contribution of each asset to it. Moreover, we apply on real market data the proposed methodology and we compare it with the classical risk parity allocation strategy based on volatility in order to explore the differentiating properties of "Equally Weighted Kurtosis Contribution Portfolios".

Massimiliano Bondatti, Giovanni Rillo  
*Commodities Tail-Risk in Exchange Rates*

In this paper we assess exchange rates' vulnerabilities to downside tail-risks in a broad set of individual commodities. We use the novel MCoVaR with Elastic-Net of [Bonaccolto et al., 2020] to simultaneously account for the potential ties among all the different commodities when they pose tail-risk threats to each currency, and to perform variable selection. We show that several different commodities pose downside tail-risk threats to exchange rates of both emerging and developed countries. Overall, we document heterogeneous results across currencies, with different exchange rates being vulnerable to a state of distress of different commodities. Our findings provide additional evidence in overcoming the longstanding puzzle of exchange rates disconnect, as well as in documenting financial assets' returns co-movements, and have implications for portfolio risk management of international investors.

Emanuel Moench, Tobias Stein  
*Equity premium predictability over the business cycle*

The equity premium follows a pronounced v-shape pattern around the beginning of recessions. It sharply drops into negative territory just before business cycle peaks and then strongly recovers as the recession unfolds. Recessions are preceded by an inverted yield curve. Thus probit models using the term spread as predictor time the beginning of recessions well. We show that such model-implied recession probabilities strongly improve equity premium prediction out-of-sample. We document a structural break in the mean of the term spread in 1982. When correcting for this break, the forecast performance further strengthens, outperforming other recently proposed benchmark predictors.

**Session 3d: Macro-financial links**

Asma Boussetta, El Moctar Laghlal, Réda Marakbi  
*Microfinance, Competition and Growth*

This paper analyzes the relationship between microfinance, competition and growth in a sample of 119 countries over the period 1999-2018. Our results are fourfold. First, we show that microfinance increases economic growth. Second, we identify investment as the main channel explaining the positive effect of microfinance on growth. Third, our study highlights that the conventional financial sector and microfinance are substitutes and not complements in emerging and developing countries. Finally, we show that competitive microfinance markets allow increasing the positive effect of microfinance on growth.

Ekundayo Peter Mesagan, Precious Muhammed Emmanuel

*The Technological Role in the Growth Enhancing Financial Development: Evidence from African Nations*

We conduct a panel analysis for 46 African economies to ascertain the role of technology in the link between financial development and output growth in Africa between 1990 and 2019. The study, therefore, employs the panel dynamic heterogeneous regression as the estimation technique and finding reveals that financial development exerts an insignificant positive impact on the African economy in long-run, while having a negative and significant impact in the short-run. It also confirms that technology has a positive and significant effect on output growth in Africa, in the long run while it is insignificantly positive over the short run. Again, the result confirms the crucial role of technology as it interacts with financial development to positively and significantly enhance growth in the long run. Lastly, we find mutual causality between financial development and growth, as well as between technology and financial development. The implication of this result is that the African continent needs to re-evaluate its development stance by incorporating high technological inputs into its financial development goals.

Jakub Rybacki, Michał Gniazdowski

*Macroeconomic forecasting in Poland: lessons from Covid-19 outbreak*

The aim of this paper is to analyze forecast errors of Polish professional forecasters under the Covid-19 crisis in 2020 based on the Parkiet competition. The analysis shows that after initial disruption related to imposed lockdown in March and April, commercial economists were capable to lower their forecasts errors of the industrial production and retail sales. On the other hand, the much worse performance has been seen in case of the market variable – either size of errors and the disagreement were elevated throughout whole 2020. Furthermore, long-term forecasts produced during the first year of pandemic was characterized with visible inconsistencies i.e. projections of economic growth were similar either when forecasters assumed strong growth of unemployment and when they do not.

**Session 4: Portfolio selection**

Jorge Guijarro-Ordóñez, Markus Pelger, Greg Zanolini

*Deep Learning Statistical Arbitrage*

Statistical arbitrage identifies and exploits temporal price differences between similar assets. We propose a unifying conceptual framework for statistical arbitrage and develop a novel deep learning solution, which finds commonality and time-series patterns from large panels in a data-driven and flexible way. First, we construct arbitrage portfolios of similar assets as residual portfolios from conditional latent asset pricing factors. Second, we extract the time series signals of these residual portfolios with one of the most powerful machine learning time-series solutions, a convolutional transformer. Last, we use these signals to form an optimal trading policy, that maximizes risk-adjusted returns under constraints. We conduct a comprehensive empirical comparison study with daily large cap U.S. stocks. Our optimal trading strategy obtains a consistently high out-of-sample Sharpe ratio and substantially outperforms all benchmark approaches. It is orthogonal to common risk factors, and exploits asymmetric local trend and reversion patterns. Our strategies remain profitable after taking into account trading frictions and costs. Our findings suggest a high compensation for arbitrageurs to enforce the law of one price.

**Session 5a: Asset pricing**

Ge Gao, Oleksandr Talavera

*Information Arrival and Asset Repricing*

This paper studies how augmented Spanish COVID-19 (C19) information affect decisions of European investors holding Spain originated P2P loans. We provide the evidence of C19 information's impact on Bondora, a leading European P2P lending platform. We find that sellers quickly react to the key changes in restriction stringency. Investors also react to the official C19 announcements, as both asset prices and market liquidity decrease with ongoing C19 case counts. Moreover, investors consume more general country-wide C19 information than regional updates. In addition, the information about economic insights further enhances negative C19 effect. Our results are robust to various placebo and statistical tests.

Robert L. Czudaj

*Heterogeneity of Beliefs and Information Rigidity in the Crude Oil Market: Evidence from Survey Data*

This paper assesses information contained in the micro data set of the ECB Survey of Professional Forecasters regarding quarterly Brent crude oil price forecasts. We examine the expectations building mechanism by referring to the processing of information and confirm the presence of information rigidity within the crude oil market. However, our findings also show that simple models of imperfect information considered in the previous literature are insufficient to explain the behavior of professional forecasters. We provide additional stylized facts which are helpful to design more elaborate imperfect information models. In addition, we also derive a new measure of ex post forecast uncertainty related to the Brent crude oil price and analyze its effect on the real economy.

Andrea Bucci, Vito Ciciretti

*Market Regime Detection via Realized Covariances: A Comparison between Unsupervised Learning and Nonlinear Models*

The transition between different market regimes is mirrored in correlation matrices, whose time-varying coefficients usually jump higher in stressed periods. In this article, we aim to identify market regimes from realized covariance matrices, with the goal of improving tail-risk hedging. The regime detection is implemented via Vector Logistic Smooth Transition Autoregressive (VLSTAR) model, Threshold Vector Autoregressive (TVAR) model and Markov-Switching Vector Autoregressive (MSVAR) model, and through an unsupervised learning methodology, the agglomerative hierarchical clustering. The ability of correctly detecting market regimes is validated on simulated data and through an empirical application based on two investment strategies that foresee the use of regimes in a portfolio optimization and in a mean reversion strategy. The results point to the VLSTAR as the best performing model for labelling market regimes in simulated data, and to the hierarchical clustering for the empirical application.

**Session 5b: Modelling stock returns**

Piotr Fiszeder, Marcin Fałdziński, Peter Molnár

*Modeling and forecasting dynamic conditional correlations with high-low range*

Models for variances and covariances of asset returns are crucial in risk management and asset allocation. Traditionally, these models were based on daily returns. Daily high and low prices have been sometimes used in models for variances, but not for correlations. We therefore modify the widely used Dynamic Conditional Correlation (DCC) model by utilizing information from daily high and low prices in both variance and correlation equations. The model is evaluated for two datasets: five exchange traded funds and five currencies. The results show that this model significantly outperforms (both in-sample and out-of-sample) not only the DCC model, but also models that incorporate high and low prices only in the variance equation.

Marian W. Moszoro

*Incomplete Contracts, Price, and Quality: Hedge Funds' Fees and Performance*

When sellers set the price for ex-ante unobservable and ex-post unenforceable quality, price signals credence quality. Hedge funds resemble incomplete long-term contracts for credence goods under buyer-determined auctions. I show that hedge funds' ability to solicit investments at higher management fees signals their capacity to generate higher net returns. This result is more pronounced during bust cycles and closer to financial hubs, i.e., when signaling management quality is more valuable.

Yoosoon Chang, Youngmin Choi, Soohun Kim, Joon Park

*Stock Market Return Predictability Dormant in Option Panels*

This paper offers a novel approach to identify the relationship between extensive option panels and market returns using functional predictive regression. Employing our approach on the options and realized returns of the S&P 500, we achieve a remarkable performance in predicting S&P 500 monthly returns, yielding a 4.720% (6.198%) in-sample (out-of-sample)  $R^2$ . The performance of our approach is superior to that of other well-known predictors and equilibrium models. The out-of-sample performance delivers substantial utility gains over historical averages. We find that both the use of option panels and the adoption of functional regression are indispensable for the outperformance.

### **Session 5c: Banking and lending**

Oskar Kowalewski, Dorota Skala

*Does bank ownership matter for CEO dismissal?*

We study executive turnover using a unique database that covers all the commercial banks in a country over a period of 25 years. We find that probability of CEO turnover increases when a bank is underperforming to its peers. In contrast, we find some evidence that bank overperformance may secure a position or induce also a turnover in domestic owned banks, yet we assume for a better paid job in a foreign owned bank. Hence, we find that the type of shareholder matters, both for CEO turnover per se but also for the decision to dismiss a CEO after weak performance. Overall probability of CEO turnover is lower at foreign banks than at domestic banks. Government-owned banks have higher CEO turnover than private domestic banks. However, state owned banks are less likely to dismiss a CEOs for low profitability, in contrast to foreign banks and private domestic banks.

James R. Barth Kang Bok Lee, Xuan Shen, Yeo Song Yoon

*Application of Difference-in-Differences Strategies in Finance The Case of Natural Disasters and Bank Responses*

Natural disasters are negative shocks that can severely disrupt the communities in which they occur. Disasters like hurricanes, tornados, floods, wildfires, and earthquakes, moreover, can cause severe property damage, including damages to homes, businesses, and automobiles. An important issue that arises is whether branches of banks in communities affected by natural disasters raise deposit rates to attract additional deposits in response to any deposit withdrawals and to meet any increase in loan demand for the rebuilding that takes place. Studies of the responses of banks to natural disasters increasingly find it useful to rely on a difference-in-differences (DID) identification strategy. The contribution of our paper is to examine how different choices that can be made affect the empirical results. Importantly, as our empirical results indicate, the discretion that a researcher uses in terms of the choices made at different stages do indeed produce different conclusions about the impact of natural disasters on bank deposit rates. If we do not match branches affected by natural disasters with those in adjacent communities not affected the results indicate that natural disasters have a statistically negative effect on deposit rates without matching and with a low degree of matching. However, when we use a medium or a high degree of matching there is no statistically significant effect. Moreover, when we use two different matching methods, the results differ. In the case of PSM, we find a statistically significant effect, but no effect in the case of CEM.

Luca Guerrieri, Michele Modugno

*The Information Content of Stress Test Announcements*

We exploit institutional features of the U.S. banking stress tests to disentangle different types of information garnered by market participants when the stress test results are released. By examining the reaction of different asset prices, we find evidence that market participants value the stress test announcements not only for the information on possible future capital distributions but also for the signals about bank resilience. These results back the use of stress tests by central banks to inform the broader public about the soundness of the banking system.

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| <p><b>Session 5d: Macroeconomic modelling (monetary policy)</b></p> <p>Paweł Macias, Damian Stelmasiak, Karol Szafranek</p> <p><i>Nowcasting food inflation with a massive amount of online prices</i></p> <p>The consensus in the literature on providing accurate inflation forecasts underlines the importance of precise nowcasts. In this paper, we focus on this issue by employing a unique, extensive dataset of online food and non-alcoholic beverages prices gathered automatically from the web since 2009. Using a highly disaggregated framework, we perform a real-time nowcasting experiment among popular, simple univariate approaches. We show that accounting for the information on online food prices in a simple, recursively optimized model leads to a substantial reduction in the nowcast errors, especially for products which online prices are highly volatile. Our framework outperforms a variety of other approaches, including the judgmental methods, traditional benchmarks and model combinations. After the outburst of the COVID-19 its nowcasting quality has relatively improved in comparison to other approaches and remained comparable with judgmental nowcasts. We also demonstrate that pure estimates of online price changes are already effective in nowcasting food inflation. Moreover, meticulous product selection and expenditure weighing is essential for providing accurate both in-sample fit as well as out-of-sample nowcasts. We conclude that the use of online prices can markedly aid the decision process at central banks.</p> |
| <p>Magdalena Szyszko, Agata Kliber, Aleksandra Rutkowska, Mariusz Próchniak</p> <p><i>Central bank communication and expectations. Evidence for inflation targeting economies</i></p> <p>In this paper, we sought to investigate the effect of communication by central banks on professional forecasters and consumers' inflation expectations. To this end, we ran investigations into 15 small open economies that implement inflation targeting. The communication tone of the central banks was derived from their minutes. We applied computational linguistics to quantify it. For three subsamples determined according to the central bank experience in inflation targeting, we estimated, controlling for other prospective drivers of expectation, panel models. The results suggest that the communication tone of a central bank significantly affects professional forecasters' expectations. This relation does not hold for consumers. Results are robust to model specifications.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>Ronald Mau</p> <p><i>Bond Pricing and Business Cycles with Central Bank Asset Purchases</i></p> <p>This paper studies the term premium in a general equilibrium model with a financial constraint and central bank asset purchases. Structural estimates of the term premium match past empirical measures. Term premium dynamics are policy dependent, with Federal Reserve quantitative easing programs reducing the term premium by 1.25% at peak and over 0.9% on average from 2009 to 2019. The model introduces household debt with a loan-in-advance constraint. Other models introduce household debt with relative impatience. The loan-in-advance specification nests the relative impatience setup. Endogenous debt rollover under the loan-in-advance specification dampens the estimated effect of asset purchases on GDP.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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| <p><b>Session 6a: Portfolio selection</b></p> <p>Christian Bongiorno, Damien Challet<br/> <i>Reactive Global Minimum Variance Portfolios with k-BAHC covariance cleaning</i></p> <p>We introduce a covariance cleaning method which works well in the very high dimensional regime, i.e., when there are many more assets than data points per asset. This opens the way to unconditional reactive portfolio optimization when there are not enough points to calibrate dynamical conditional covariance models, which happens for example when new assets appear in a market. The method is a k-fold boosted version of the Bootstrapped Average Hierarchical Clustering cleaning procedure for correlation and covariance matrices. We apply this method to global minimum variance portfolios and find that k should increase with the calibration window length. We compare the performance of k-BAHC with other state-of-the-art covariance cleaning methods, including dynamical conditional covariance (DCC) with non-linear shrinkage. Generally, we find that our method yields better Sharpe ratios after transaction costs than competing unconditional covariance filtering methods, despite requiring a larger turnover. Finally, k-BAHC yields better Global Minimum Variance long-short portfolios than DCC in a non-stationary investment universe.</p>                                  |
| <p>N'Golo Koné<br/> <i>Efficient mean-variance portfolio selection by double regularization</i></p> <p>This paper addresses the estimation issue that exists when estimating the traditional mean-variance portfolio. More precisely, the efficient mean-variance is estimated by a double regularization. These regularization techniques namely the ridge, the spectral cut-off, and Landweber-Fridman involve a regularization parameter or penalty term whose optimal value needs to be selected efficiently. A data-driven method has been proposed to select the tuning parameter. We show that the double regularized portfolio guarantees to investors the maximum expected return with the lowest risk. In empirical and Monte Carlo experiments, our double regularized rules are compared to several strategies, such as the traditional regularized portfolios, the new Lasso strategy of Ao, Yingying, and Zheng (2019), and the naive 1/N strategy in terms of in-sample and out-of-sample Sharpe ratio performance, and it is shown that our method yields significant Sharpe ratio improvements and a reduction in the expected utility loss.</p>                                                                                                                                                                                                                                        |
| <p>Gregory Connor, Shaoran Li, Oliver Linton<br/> <i>A Dynamic Semiparametric Characteristics-based Model for Optimal Portfolio Selection</i></p> <p>This paper develops a two-step semiparametric methodology for portfolio weight selection for characteristics based factor-tilt and factor-timing investment strategies. We build upon the expected utility maximization framework of Brandt (1999) and Aït-Sahalia and Brandt (2001). We assume that asset returns obey a characteristics based factor model with time-varying factor risk premia as in Ge et al. (2020). We prove under our return generating assumptions that an approximately optimal portfolio can be established using a two-step procedure in a market with a large number of assets. The first step finds optimal factor-mimicking sub-portfolios using a quadratic objective function over linear combinations of characteristics-based factor loadings. The second step dynamically combines these factor-mimicking sub-portfolios based on a time-varying signal, using the investor's expected utility as the objective function. We develop and implement a two-stage semiparametric estimator. We apply it to CRSP (Center for Research in Security Prices) and FRED (Federal Reserve Economic Data) data and find excellent in-sample and out-sample performance consistent with investors' risk aversion levels.</p> |
| <p>Sofonias Alemu Korsaye, Alberto Quaini, Fabio Trojani<br/> <i>Smart Stochastic Discount Factors</i></p> <p>We propose a novel no-arbitrage framework, which exploits convex asset pricing constraints to study the properties of investors' marginal utility of wealth or, more generally, Stochastic Discount Factors (SDFs). We establish a duality between minimum dispersion SDFs and suitable penalized portfolio selection problems, building the foundation for a nonparametric characterization of the feasible tradeoffs between a SDF's pricing accuracy and its comovement with systematic risks. Empirically, we find that a minimum variance correction</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

of a CAPM–SDF produces a Pareto optimal tradeoff. This Pareto optimal SDF only depends on two economically distinct risk factors: A market factor and a minimum variance excess return factor, which optimally bounds the aggregate mispricing of risks unspanned by market risk.

**Session 6b: Prediction and forecasting methods**

Dobrislav Dobrev, Derek Hansen, Paweł J. Szerszeń

*A Randomized Missing Data Approach to Robust Filtering and Forecasting*

We put forward a simple new randomized missing data (RMD) approach to robust filtering of state-space models, motivated by the idea that the inclusion of only a small fraction of available highly precise measurements can still extract most of the attainable efficiency gains for filtering latent states, estimating model parameters, and producing out-of-sample forecasts. In our general RMD framework we develop two alternative implementations: endogenous (RMD-N) and exogenous (RMD-X) randomization of missing data. A degree of robustness to outliers and model misspecification is achieved by purposely randomizing over the utilized subset of seemingly highly precise but possibly misspecified or outlier contaminated data measurements in their original time series order, while treating the rest as if missing. Time-series dependence is thus fully preserved and all available measurements can get utilized subject to a degree of downweighting depending on the loss function of interest. The arising robustness-efficiency trade-off is controlled by varying the fraction of randomly utilized measurements or the incurred relative efficiency loss. As an empirical illustration, we show consistently attractive performance of our RMD framework in popular unobserved components models for extracting inflation trends. We further consider model extensions that more directly reflect inflation targeting by central banks and reveal its effectiveness through improved inflation forecasting.

Christian Brownlees, Jordi Llorens-Terrazas

*Empirical Risk Minimization for Time Series*

Empirical risk minimization is a standard principle for choosing algorithms in learning theory. In this paper we study the properties of empirical risk minimization for time series. We introduce a general framework that allows to study different types of applications, and it includes ARMA and GARCH forecasting as special cases. We are concerned with 1-step-ahead prediction of a univariate time series generated by a parameter-driven process. A class of recursive algorithms is available to forecast the time series. The algorithms are recursive in the sense that the forecast produced in a given period is a function of the lagged values of the forecast and of the time series. The relationship between the generating mechanism of the time series and the class of forecasting algorithms is unspecified. Our main result establishes that the algorithm chosen by empirical risk minimization achieves asymptotically the optimal predictive performance that is attainable within the class of algorithms considered. Our result implies that ARMA/GARCH forecasting based on the standard Gaussian maximum likelihood estimator achieves asymptotically the optimal predictive performance even when the conditional mean/conditional variance equation of the model is misspecified.

Wolfgang Schadner

*Feasible Implied Correlation Matrices from Factor Structures*

Forward-looking correlations are of interest in different financial applications, including factorbased asset pricing, forecasting stock-price movements or pricing index options. With a focus on non-FX markets, this paper defines necessary conditions for option implied correlation matrices to be mathematically and economically feasible and argues that existing models are typically not capable of guaranteeing so. To overcome this difficulty, the problem is addressed from the underlying factor structure and introduces two approaches to solve it. Under the quantitative approach, the puzzle is reformulated into a nearest correlation matrix problem which can be used either as a standalone estimate or to re-establish positive-semi-definiteness of any other model's estimate. From an economic approach, it is discussed how expected correlations between stocks and risk factors (like CAPM, Fama-French) can be translated into a feasible implied correlation matrix. Empirical experiments are carried out on monthly option data of the S&P 100 and S&P 500 index (1996-2020).

Marek Kwas, Joscha Beckmann, Michał Rubaszek

*Are consensus FX forecasts valuable for investors?*

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| <p><b>Session 6c: Network linkages and asset comovements</b></p> <p>Md Lutfur Rahman, Victor Troster, Gazi Salah Uddin, Muhammad Yahya<br/> <i>Systemic risk contribution of banks and non-bank financial institutions across frequencies: The Australian experience</i></p> <p>The Australian financial sector (AFS) is highly concentrated and interconnected. Besides, Australian banks' lending portfolios are dominated by residential mortgage loans, and 70% of insurance companies' revenues arise from non-policyholder sources. The AFS also performed relatively well during the global financial crisis (GFC). Given these distinctive features, in this paper, we examine the systemic risk contribution of Australian banks, insurance companies, and other financial services providers. We use a novel copula-based delta conditional value-at-risk (<math>\Delta\text{CoVaR}</math>) method across different frequencies. Further, we study the systemic risk determinants in a panel setting. We find that the major Australian banks are systemically more important than all other financial institutions. Systemic risk is typically higher after the GFC than in the pre-crisis period, despite the introduction of more stringent capital requirements. In addition, the short-term <math>\Delta\text{CoVaR}</math> is significantly higher than the medium- and long-term <math>\Delta\text{CoVaRs}</math>. Finally, institutionspecific characteristics and market-wide variables explain the cross-sectional and time-series variation in systemic risk, and their explanatory power varies across frequencies.</p> |
| <p>Gazi Salah Uddin, Tianqi Luo, Md Lutfur Rahman, Ranadeva Jayasekera, Muhammad Yahya<br/> <i>Risk Network of Global Energy Companies</i></p> <p>This paper examines tails risk dependence and spillover between top energy companies across the globe. The sample includes 68 companies from four energy-related sectors (oil &amp; gas, oil &amp; gas related equipment and services, multiline utilities, and renewable energy). We create an ultrahigh dimensional network among the companies using a sparse vector autoregressive model and generalized variance decomposition. Further, we propose a novel modeling of systemic risk contribution and spillover risk by combining the connectedness with the idiosyncratic risk. Analysis reveals that during the continuous decline of crude oil prices in 2014-2016, the risk accumulation and connectedness exacerbation jointly lead to serious systemic risk. Among the four groups, the renewable energy firms exhibit the most risk contribution to other groups, mainly attributed to the high idiosyncratic risk instead of connectedness with others. The oil &amp; gas sector exports higher connectedness to oil &amp; gas related equipment and services firms than the opposite direction. The long-term network has lower connectedness than the short-term. The risk spillover also exhibits a time-varying characteristic. Finally, there is a higher possibility that spillover risk occurs between firms that belong to the same sectors with similar size, which could be attributed to competition and similarity.</p>                                           |
| <p>Mark Paddrik, Stathis Tompaidis<br/> <i>Intermediation Networks and Market Liquidity: Evidence from CDS Markets</i></p> <p>A growing theoretical literature predicts that over-the-counter intermediation networks affect market liquidity. Using supervisory data for the U.S. single-name credit default swap market, we empirically evaluate several predictions of this literature. We find that an intermediation network's density relates to the liquidity provision of dealers, both individually and collectively, as seen through trade volumes and inventory management. Further, we find a relationship between network density and the cost of trade, measured by execution costs and bid-ask spreads, though we note that the effects differ across the segmented trade channels of dealers and clients, and those between dealers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>Diana Joy Xiuyao Yang<br/> <i>Cross-Sector Comovements and Policy Impact in the COVID-19 Stock Market: A Dynamic Factor Approach</i></p> <p>This study investigates the anomalous comovements in U.S. equity returns during the COVID-19 pandemic. It constructs a dynamic factor model (DFM) to illuminate the sources of the comovements and their implications. Using the Markov Chain Monte Carlo (MCMC) estimation method, the study finds that the comovements had a weak daily oscillation pattern during the pandemic. With that pattern, the study also finds significant monetary</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

policy effects on the equity returns of several key sectors. In addition, it estimates the impact of news shocks, including monetary policy news, fiscal stimulus news, and unemployment news, on cross-sector equity returns. For any given sector, the conventional and unconventional monetary policy news shocked the sector in opposite directions. Among the positive monetary news shocks, the strongest were from interest rate policy surprises. Conversely, fiscal stimulus news had the most substantial positive impact and triggered all sectors to rebound from the bear market at the end of March 2020. Furthermore, by applying Natural Language Processing (NLP) sentiment analysis, this study sheds light on the positive correlation between comovements and news sentiment.

**Session 6d: Macroeconomic modelling**

Hardik A. Marfatia

*Which Sectors Hold the Key to Future Economic Growth? Insights from the Financial Markets*

This paper identifies sectors that hold the key to the economic growth of a major emerging economy - India. We obtain out-of-sample forecasts of economic growth using a model with different sectoral stock market returns and compare them against the benchmark autoregressive model's forecasts. Results show that sectoral stock returns significantly improve economic growth forecasts. However, the forecast superiority is not uniform across sectors and horizons. Auto, consumers' spending, materials, and realty sectors provide the most forecasting gains. In contrast, banking, capital goods, and industrial sectors provide superior forecasts, but only at horizons beyond one year. Only the model forecasts with fast-moving consumer goods and healthcare sectors are inferior to the benchmark model's forecasts. The highest forecasting gains at short, medium and long horizons are from energy (30%), consumers' spending (16%), and auto (10%) sectors, respectively. We find that forecast superiority of sectors at longer horizons are inversely related to volatility.

Mariusz Górajski, Zbigniew Kuchta

*'Leaning Against the Wind' versus Macroprudential Policy: Robust Analysis in a DSGE Model with Two Financial Frictions*

This paper offers a comparison of the 'leaning against the wind' strategy with coordinated and noncoordinated strategies of monetary and macroprudential policies in an estimated DSGE model for the U.S. economy. The model assumes two types of financial frictions: one in the contract between depositors and banks and the other between banks and entrepreneurs. Additionally, we include into the model four financial shocks. The first two affect the banking sector by tightening the terminal capital adequacy ratio and decreasing banks' wealth. The other two hit the non-financial sector by increasing the risk of gross return on capital and reducing entrepreneurial net worth. We analyze several policy regimes of the optimal macroprudential and monetary policy rules under the parameter uncertainty. To this end, we consider two macroeconomic authorities that use implementable instrument rules for their policies. We find robust policy feedback coefficients, which minimize the Bayesian risk of the welfare loss for each policy stance. Our analysis indicates that the coordination of monetary and macroprudential policies is the most welfare-improving strategy for a broad range of target variables. However, the robust 'leaning against the wind' monetary policy rule may yields benefits in terms of a decreased Bayesian risk of welfare losses if the coordination of both policies is unattainable and authorities do not perceive the target variables correctly.

Steve Pak Yeung Wu

*Corporate balance sheets and sovereign risk premia*

This paper studies sovereign debt pricing in the presence of corporate debt empirically and theoretically. We find that foreign currency (FC) corporate external debt empirically explains sovereign credit spreads in emerging countries, even after controlling for sovereign debt and global factors. Decomposing sovereign credit spreads into their default premium (default probability) and risk premium components, we find that a 1% increase in FC corporate external debt is associated with a 5 basis point increase in the sovereign risk premium but a small and insignificant change in the sovereign default premium. We incorporate a productive corporate sector and risk-averse foreign lenders into a quantitative sovereign default model. An increase in FC corporate external debt, has three effects on tax revenue, and thus sovereign spreads. It increases the mean of tax revenue due to higher investment, increases the variance of tax revenue due to higher exposure to exchange rate risk, and changes the covariance of sovereign defaults and the state of foreign lenders due to the safe currency property of FC. The first two effects counteract each other and help explain the insignificant change in the sovereign default premium, while the third effect results in a higher sovereign risk premium. Corporates do not internalize their effect on sovereign debt pricing and the social planner solution results in a lower external corporate debt.

Carlos Madeira

*The evolution of consumption inequality and risk-insurance in Chile*

Finance and public transfers affect the degree to which personal income fluctuations pass into consumption. Using micro survey data, I show that consumption inequality fell substantially in Chile since 1987. This evidence is consistent with the strong drop in income inequality, plus the reduction in real interest rates and the improvement in households' access to financial products. I also show that both the inequality between and within groups fell substantially in all these decades, especially for the within groups consumption inequality. This shows that the Chilean households are now much less impacted by temporary fluctuations in income and other idiosyncratic events. Therefore the consumption and income risk faced by households fell significantly, both in terms of permanent and temporary shocks. Estimating a standard consumption model, the results reject both the autarky and the full risk sharing frameworks. It is found that for services and non-durable goods, consumption is almost half-way between autarky and full risk-sharing. However, purchases of Semi-Durables and Durables goods are strongly affected by income fluctuations. Medical, insurance, and other financial product expenses are also strongly affected by income fluctuations.

**Session 7: Forecasting exchange rates**

Charles Engel, Steve Pak Yeung Wu

*Forecasting the U.S. Dollar in the 21st Century*

One of the most perplexing puzzles in international finance has been the near-random-walk behavior of exchange rates. We find that the level of the exchange rate appears to have strong forecasting power for dollar exchange rates against major currencies post-2000 at medium- to long-run horizons of 12-, 36- and 60-months both in-sample and out-of-sample. This is true using conventional asymptotic statistics correcting for serial correlation biases and non-standard distribution of parameters. In fact, using asymptotic statistics, the level of the exchange rate provides better forecasts than “global risk” measures that recent literature has found to be successful, and the measures of global risk do not improve the forecasting power beyond the level of the exchange rate. But correcting for small-sample bias using simulation methods, we find little evidence to reject a random walk. This small sample bias arises because of near-spurious correlation when the predictor variable is persistent and the horizon for exchange rate forecasts is long. Similar problems of spurious correlation may arise when other persistent variables are used to forecast changes in the exchange rate. We raise concerns about the benchmark of exchange rate forecasting, serious small sample bias in the recent sample, and offer a suggested correction.