2025 Workshop in Honour of Professors Heather Anderson and Farshid Vahid

Department of Econometrics and Business Statistics, Monash University

Venue: The Pavilion, Floor 8, Building H, Monash University, Caulfield Campus

Friday, 7 March, 2025

DETAILED PROGRAM

Friday 7th March

08.30 - 08.50: Arrival / Refreshments

08.50 - 09.10: Opening Address / Welcome – George Athanasopoulos (Monash University)

Session I

09.10 - 09.20: Chair – Natalia Bailey (Monash University)

09.20 – 10.15: Keynote Address – **M Hashem Pesaran** (USC and Cambridge University)

Title: Estimation of Average Effects in Short T Heterogenous Panels

Abstract: The commonly used two-way fixed effects estimator is biased under correlated heterogeneity and can lead to misleading inference. The mean group estimator proposed by Pesaran and Smith (1995) is robust to correlated heterogeneity but requires the underlying individual estimates to have second-order moments that could fail if the number of estimated coefficients (k) are too close to the time dimension (T) of the panel. This paper focuses on panels where k is close to T (including k = T), and proposes a trimmed mean group (TMG) estimator that shrinks individual estimates most likely to fail the second-order moment condition. The TMG estimator is shown to be consistent and asymptotically normally distributed even if T = k. Extensions to panels with time effects are provided, and a new Hausman test for correlated heterogeneity is proposed. The slope homogeneity test by Pesaran and Yamagata (2008) requires a large T and, more importantly, does not distinguish between correlated and uncorrelated heterogeneity. To our knowledge, no other test of correlated heterogeneity is proposed in the literature for short T panels. Small sample properties of the TMG estimator (with and without time effects) are investigated by Monte Carlo experiments and shown to be satisfactory. The proposed test of correlated heterogeneity is also shown to have the correct size and satisfactory power. The utility of the TMG approach is illustrated with an empirical application.

10.15 – 10.30 Discussant – **Jiti Gao** (Monash University)

10.30 - 10.50: Refreshments

Session II

10.50 - 11.00: Chair – Rob Hyndman (Monash University)

11.00 – 11.30: **Ryan Thomson** (University of Technology Sydney)

Title: ProDAG: Projection-Induced Variational Inference for Directed Acyclic Graphs

Abstract: Directed acyclic graph (DAG) learning is a rapidly evolving area with significant implications for causal inference. Despite recent advances, learning a single DAG from data—let alone quantifying graph uncertainty—remains statistically and computationally challenging. To address this issue, we propose a Bayesian variational inference framework based on novel distributions that have support directly on the space of DAGs. These distributions, which serve as our prior and variational posterior, are induced by a projection operation that maps a continuous distribution onto the space of acyclic adjacency matrices. Although this projection is a combinatorial optimisation problem, it is solvable at scale using recently developed continuous relaxations of acyclicity. We demonstrate that our method, ProDAG, delivers higher quality Bayesian inference than existing state-of-the-art alternatives.

11.30 – 12.00: **Han Li** (University of Melbourne)

Title: Boosting Domain-Specific Models with Shrinkage: An Application in Mortality forecasting

Abstract: This paper extends the technique of gradient boosting with a focus on using domain-specific models instead of trees. The domain of mortality forecasting is considered as an application. The two novel contributions are to use well-known stochastic mortality models as weak learners in gradient boosting rather than trees, and to include a penalty that shrinks the forecasts of mortality in adjacent age groups and nearby geographical regions closer together. The proposed method demonstrates superior forecasting performance based on US male mortality data from 1969 to 2019.

12.00 – 12.30: **Anastasios Panagiotelis** (University of Sydney)

Title: Probabilistic Forecast Reconciliation Targeting Quantiles using Bilevel Optimisation

Abstract: Collections of time series where some series are aggregates of one another, are known as hierarchical time series. When forecasting hierarchical time series, the linear constraints due to this aggregation structure may not hold. Forecast reconciliation allows for the adjustment of such forecasts ex post, to ensure that aggregation constraints are satisfied, i.e. forecasts are coherent. In the probabilistic setting, this implies that regions of points that do not satisfy the constraints are assigned zero probability, or alternatively, that a sample from the predictive distribution only contains coherent points. In this work, an algorithm for forecast reconciliation is proposed targeting optimality with respect to a given quantile level. This framework builds upon the score optimisation framework introduced by Panagiotelis et al (2023) but uses the pinball loss as the objective function. Due to the fact that the reconciled quantiles are themselves the solution to an optimisation

involving pinball loss, the problem become one of bilevel optimisation. While we show that the problem can be solved by mixed integer linear programming, this proves to be slow to compute even with modern solvers and moderately sized hierarchies. Therefore, we propose an approximate technique based on a smooth version of the pinball loss function. By exploiting a lemma that allows gradients to be found in bilevel optimisation problems, we show that the problem can be tackled using gradient based methods such as stochastic gradient descent. The proposed method will be demonstrated with an application to Australian tourism data.

12.30 - 13.20: Lunch

Session III

13.20 - 13.30: Chair – Param Silvapulle (Monash University)

13.30 – 14.00: **Shuping Shi** (Macquarie University)

Title: Bubble Mitigation Policies: Counterfactual Analysis and Treatment Effect Inference

Abstract: To safeguard economic and financial stability policymakers regularly take actions designed to increase resilience to systemic risks and curb speculative market behavior. To assess the effectiveness of such mitigation policies, we introduce a counterfactual approach tailored to accommodate the mildly explosive dynamics that occur during speculative bubbles. We derive asymptotics of the estimated treatment effect under a common factor structure that allows for explosive, I(1), and stationary factors, thereby having applicability to a wide range of prevailing economic conditions. An inferential procedure is proposed for the policy treatment effect that has asymptotic validity and demonstrates satisfactory finite sample performance. An empirical analysis of leaning-against-the-wind (LAW) monetary policy is conducted, focusing on the interest rate hikes implemented by the Reserve Bank of New Zealand that were initiated in October 2021. This policy exerted a statistically significant cooling effect on all regional housing markets in New Zealand. Our findings show that this policy led to 20%-30% reductions in house prices in five out of six regions seven months after the enactment of the LAW policy.

14.00 – 14.30: **Wenying Yao** (Melbourne Business School)

Title: Impulse Dynamics under Partial Invertibility: A Hausman Test for Efficiency Improvement

Abstract: This paper proposes a Hausman-type test to determine the effective number of relevant factors to recover the impulse response functions (IRFs) in a dynamic factor model (DFM). By comparing the estimated IRFs from the DFM against the consistent but inefficient local projection (LP) estimates using external instruments, the test detects the minimum number of factors that is sufficient for the DFM estimates to be consistent. This leads to an efficiency gain by using the DFM with fewer number of factors. We propose a sequential test procedure that can be applied to partially identified models to recover specific IRFs of interest while remaining agnostic to other dynamics in the system. The efficacy of the proposed approach is demonstrated via several Monte Carlo experiments with different set-ups. The empirical application provides substantial evidence that supports our methodology, validating it as a practical tool for more accurate analysis in empirical macroeconomics.

14.30 – 15.00: **Yin Liao** (Macquarie University)

Title: Spending Habits and Investment Decision

Abstract: The automatic assessment of investor preferences from digital footprints allows researchers to study investor decision making at unprecedented scale and in settings of high ecological validity. In this research, we investigated whether spending records—a ubiquitous and universal form of digital footprint—can be used to infer investor preferences. We applied machine-learning technique (random-forest modelling; XGboost) to a data set combining two million spending records from bank accounts with real financial investment choices (risk level and prosocial level) from the account holders (N = 2,193). We compared the predictive accuracy of these models with the predictive accuracy of alternative digital behaviors used in past research, including those observed on social media platforms, and we found that the predictive accuracies were relatively stable across socioeconomic groups and over time.

15.00 - 15.20: Refreshments

Session IV

15.20 - 15.30: Chair – Brett Inder (Monash University)

15.30 – 16.00: **Benjamin Wong** (Monash University)

Title: How Important is Global r-star for Open Economies?

Abstract: We study the relevance of global shocks in determining r-star for a set of typically studied advanced open economies (Australia, Canada, Euro Area, New Zealand, Norway, Sweden, and the United Kingdom). To do so, we build on the multivariate Beveridge-Nelson decomposition to account for open economy features by developing an empirical two-country open economy model and also embedding restrictions used in the open economy literature to identify the role of foreign shocks. We document three key findings: (i) shocks driving r-star for the United States are almost entirely sufficient to understand the role of the global r-star for these open economies; (ii) domestic shocks are also important in determining domestic r-stars, leaving open the potential that local economic policy can complement or offset the global forces determining r-star; and (iii) even though domestic shocks are important, global forces have played a leading role in the long-term decline in r-stars for all seven open economies since the global financial crisis.

16.00 – 16.30: **Wei Wei** (Monash University)

Title: Does Climate Sensitivity Differ Across Regions? A Varying–Coefficient Approach

Abstract: Global mean surface temperature has been increasing in response to growing greenhouse gas concentrations (IPCC, 2021). While Earth is getting warmer overall, regions that have different local geographical features experience unequal increases in temperature. In this paper, we develop a varying-coefficient dynamic panel data model

and use it to measure local climate sensitivity, defined as the increase in temperature in a given location following a doubling of CO_2 concentration. The inference method proposed in this paper can accommodate heterogeneous co-integrating relationships between global and local variables, and it allows the co-moving climate time series to possess both stochastic and deterministic trending components. Using observational data of mean surface temperatures, solar radiation, and carbon dioxide concentrations between 1959–2017, our model provides heterogeneous estimates for climate sensitivity that range between increases of 2.5℃ and 5℃ over land, depending on the latitude. Our estimates indicate that high-latitude locations in the Northern Hemisphere are most susceptible to global warming.

16.30 – 17.00: **Jing Tian** (University of Tasmania)

Title: Disagreement over Whether Shocks Are Aggregate Demand or Aggregate Supply

Abstract: Do professional forecasters disagree over the nature of the dominant shocks affecting the economy? This paper explores this question by analysing heterogeneous signs of multivariate forecast revisions. Using a panel dataset from the Survey of Professional Forecasters (SPF) on CPI inflation, real GDP growth, and unemployment rates from 1981Q4 to 2021Q4, we propose a measure of disagreement regarding whether perceived dominant shocks are driven by aggregate demand or aggregate supply. We show that disagreement over shock types: (1) varies over business cycles; 2) is less pronounced during recessions and periods of heightened uncertainty; and 3) can help explain forecast disagreements and forecast uncertainty of key macroeconomic variables.

Closing remarks

Chairs – Natalia Bailey and George Athanasopoulos (Monash University)

17.00 - 17.15: **Adrian Pagan** (University of Sydney)

17.15 – 17.45: **Heather Anderson** and **Farshid Vahid** (Monash University)