Thammasat University Research Unit in Deep Learning and Advanced Econometrics

The Thammasat University Research Unit in Deep Learning and Advanced Econometrics focuses on advancing research at the intersection of economics, finance, business analytics, artificial intelligence, and econometrics. The unit integrates deep learning techniques with advanced econometric methods to analyze complex, high-dimensional, and nonlinear data relevant to real-world economic and financial systems.

Our research focuses on AI-driven econometric modeling, time-series analysis, forecasting, risk assessment, and policy evaluation. These methods are applied across a wide range of domains, including financial markets, macroeconomic stability, climate change, health economics, and business decision-making. The unit also aims to develop future-ready researchers, promote international publications, and foster collaboration with policymakers, industry, and global research networks.

Keywords: Deep Learning, Advanced Econometrics, Economic & Financial Analytics, AI-Driven Policy Research

Expected benefits

1. Enhanced analytical efficiency: Improved accuracy in the analysis and forecasting of economic, financial, and business phenomena.
2. Future workforce development: Contributing to the development of knowledge and human capital for Thailand's future workforce.
3. Driving innovation: Transferring knowledge on the application of deep artificial intelligence models and advanced econometric methods for economic, financial, and business analysis, as well as disseminating this knowledge and providing training to capable and skilled individuals.

Research Plan

The research unit aims to become a leader in the application of advanced techniques from deep learning and advanced econometrics to enhance research analysis of highly complex issues in economics, finance, and business. The focus is on applying these techniques to in-depth data analysis, big data, and unstructured data, in order to generate high-quality results that are practically applicable for both policy-making and business decision-making.

Main Research Theme

"AI-Driven Models for Complex Economic, Financial, and Business Analysis"

Under this research theme, the unit will focus on studying economic uncertainty, financial market volatility, the impacts of macroeconomic policies, as well as consumer and business behavior. The research will employ techniques such as Recurrent Neural Networks (RNNs), Transformer-based time series models, deep generative models, and advanced econometric models, among others.

Publications of Members of the Research Unit

Leelahanon, S., Amornratananukroh N., and Jithitikulchai T. (2025), Technical Efficiency Estimation of Rubber Farming in Thailand, *Southeast Asian Journal of Economics*, *13*(3). 113-159.

Huang, Y. K., McCarl, B. A., Fei, C. J., Attavanich, W., Jithitikulchai, T., & Han, D. B. (2025). Dilemma of CO2 Mitigation: Effects of Climate, CO2, and Technological Progress on Rice Yields. *Climate Change Economics, 16*(02), 1-19.

Fernandes Antunes, A., Jithitikulchai, T., Hohmann, J., & Flessa, S. (2024). Revisiting a decade of inequality in healthcare financial burden in Cambodia, 2009–19: trends, determinants and decomposition. *International Journal for Equity in Health*, *23*(1), 196.

Prommawin, B., Svavasu, N., Tanpraphan, S., Saengavut, V., Jithitikulchai, T., Attavanich, W., & McCarl, B. A. (2024). Impacts of climate change and agricultural diversification on agricultural production value of Thai farm households. *Climatic Change*, *177*(7), 112.

Jithitikulchai, T. (2023). The effect of climate change and agricultural diversification on the total value of agricultural output of farm households in Sub-Saharan Africa. *African Journal of Agricultural and Resource Economics*, *18*(2), 152-170.

Jithitikulchai, T. (2022). Improving allocative efficiency from network consolidation: A solution for the health workforce shortage. *Human Resources for Health, 20*(1), 59.

Fernandes Antunes, A., Jacobs, B., Jithitikulchai, T., Nagpal, S., Tong, K. and Flessa, S. (2022). Sensitivity analysis and methodological choices on health-related impoverishment estimates in Cambodia, 2009–17. *Health Policy and Planning, 37*(6), 791-807.

Jithitikulchai, T. (2022). Inequity by the universal coverage cube: Findings from the 2020 household socioeconomic survey (in Thai), *Journal of Health Systems Research, 16*(1), 5-15.

Jithitikulchai, T., Feldhaus, I., Bauhoff, S. and Nagpal, S. (2021). Health equity funds as the pathway to universal coverage in Cambodia: Care seeking and financial risk protection. *Health Policy and Planning, 36*(1), 26-34.

Jithitikulchai, T. (2020). Area-based network allocations: A solution to mitigate the shortage of health workforce (in Thai), *Journal of Health Systems Research, 14*(3), 243-73.

Chonabayashi, S., Jithitikulchai, T. and Qu, Y. (2020). Does agricultural diversification build economic resilience to drought and flood? Evidence from poor households in Zambia. *African Journal of Agricultural and Resource Economics, 15*(311-2020-1781), 65-80.

Jithitikulchai, T., Mccarl, B.A. and Wu, X. (2019). Decadal climate variability impacts on climate and crop yields. *Journal of Agricultural and Applied Economics, 51*(1), 104-125.

Jithitikulchai, T. and Andreyeva, T. (2018). Sugar-sweetened beverage demand and tax simulation for Federal Food Assistance Participants: a case of two New England states. *Applied Health Economics and Health Policy, 16*, 549-558.

Jithitikulchai, T. (2018). Influence of decadal climate variability on growing degree day, precipitation, and drought in crop-growing seasons. Climate, 6(2), 43.

Jithitikulchai, T. (2018). Gender wage inequality in Thailand. *Applied Economics Journal, 25*(1), 79-97.

Rogers, G., Saginor, J., and Jithitikulchai, T. (2013). Dynamics of Lake-Level Fluctuations and Economic Activity, *Journal of Environmental Planning and Management*, 57(10): 1497-1514.

Sharkey, J., and Dean, W. (2012). Variations in the Availability and Price of Healthier Food Options by Store Type and Urban-Rural Setting. *Journal of Hunger and Environmental Nutrition*, 7(4): 381-400.

Jithitikulchai, T. (2008). Forecasting on Dynamic Panel Regression with Cross Section Dependency: Asian Exchange Rates and Simulation. Thailand Statistician (Former: *Journal of Thai Statistical Association)*, 6(2): 143-161.

Baillie, R.T., Kapetanios, G., and Kongcharoen, C. (2012) "Prediction from ARFIMA Models: Comparisons between MLE and Semi Parametric Estimation Procedures," *International Journal of Forecasting, 28*(1): 45-53.

Rabeya, B. and Kongcharoen, C. (2022) "Factors Contributing CO2 Emissions: A Linear, Nonlinear, and Panel ARDL Model," *International Journal of Economy Energy and Environment. 6*(2): 46-66.

Chongwilaikasaem S, Ayaragarnchanakul E, Kongcharoen C, Pongajarn C, Rehm J. (2025) The predicted impact of the proposed alcohol production deregulation policy on consumption in Thailand.

International Journal of Health Economics and Management. 2025 Mar 19. doi: 10.1007/s10754-025-09395-6.

Kanjamapornkul, K., Pincak, R., and Bartos, E. (2016). The study of Thai stock market across the 2008 financial crisis. *Physica A: Statistical Mechanics and its Applications, 462*, 117–133.

Kanjamapornkul, K., and Pincak, R. (2016). Kolmogorov space in time series data. *Mathematical Methods in the Applied Sciences, 39*(15), 4463–4483.

Kanjamapornkul, K., Pincak, R., Chunithipaisan, S., and Bartos, E. (2017). Support spinor machine. *Digital Signal Processing, 70,* 59–72.

Capozziello, S., Pincak, R., and Kanjamapornkul, K. (2017). Anomaly on superspace of time series data. *Zeitschrift für Naturforschung A, 72*(12), 1077–1091.

Pincak, R., and Kanjamapornkul, K. (2018). GARCH (1, 1) model of the financial market with the Minkowski metric. *Zeitschrift für Naturforschung A, 73*(8), 669–684.

Capozziello, S., Pincak, R., Kanjamapornkul, K., and Saridakis, E.N. (2018). The Chern-Simons Current in Systems of DNA-RNA Transcriptions. *Annalen der Physik, 530(*4), 1700271.

Pincak, R., and Kanjamapornkul, K. (2019). GARCH in spinor field. *International Journal of Geometric Methods in Modern Physics, 16*(07).

Pincak, R., Kanjamapornkul, K., and Bartos, E. (2019). Forecasting Laurent polynomial in the Chern–Simon's current of V3 loop time series. *Annalen der Physik, 531*(7), 1800375.

Pincak, R., Kanjamapornkul, K., and Bartos, E. (2020). A theoretical investigation on the predictability of genetic patterns. *Chemical Physics, 535*, 110764.

Pincak, R., Kanjamapornkul, K., and Bartos, E. (2020). Cohomology theory for biological time series. *Mathematical Methods in the Applied Sciences, 43*(2), 552–579.

Kanjamapornkul, K., Pincak, R., and Bartos, E. (2020). Cohomology theory for financial time series. *Physica A: Statistical Mechanics and its Applications, 546*, 122212.

Kanjamapornkul, K., Rungrotmongkol, T., and Hannongbua, S. (2023). Detection and Classification of Mutational field between Omicron BA.5 and 1 other SARS-CoV-2 Variants of Concern with Support Vector Machine. *ScienceAsia. 49*, 1513-1874.

Srisuay, S., Kanjamapornkul, K., and Fongngen, W. (2024). Directional prediction of financial time series using SVM and Wilson loop perceptron. *SN Computer Science, 5*(4), 395.

Fongngen, W., Kanjamapornkul, K., and Petharn, S. (2024). Machine Learning Framework with Wilson Loop Perceptron for Measuring the Rate of Mutation Patterns between DNA and RNA Viruses. *SN Computer Science, 6*(2), 131.

Pincak, R., Kanjamapornkul, K., Pigazzini, A., and Jafari, S. (2025). Theoretical investigation of Higgs mechanism in mutational behavior field of monkeypox virus. *Indian Journal of Physics*, 1–24.

Pincak, R., Kanjamapornkul, K., Pigazzini, A., and Jafari, S. (2025). Exchanged flying ring of homochiral bosonic field in the genetic code. *International Journal of Geometric Methods in Modern Physics, 22*(02), 2450278.

Kijjanapanich, P., and Benyaapikul, P. (2020). Monopoly Pricing and Eco-labeling Signaling. *Thailand and The World Economy, 38*(2), 23–40.

Rubas, N. C., Peres, R., Kunihiro, B. P., Allan, N. P., Phankitnirundorn, K., Wells, R. K., and Maunakea, A. K. (2024). HMGB1 Mediates Microbiome-Immune Axis Dysregulation Underlying Reduced Neutralization Capacity in Obesity-Related Post-Acute Sequelae of SARS-CoV-2. *Scientific Reports, 14*(1), 355.

Allan, N. P., Yamamoto, B. Y., Kunihiro, B. P., Nunokawa, C. K. L., Rubas, N. C., Wells, R. K., Umeda, L., Phankitnirundorn, K., Torres, A., Peres, R., et al. (2024). Ketogenic Diet-Induced Shifts in the Gut Microbiome Associate with Changes to Inflammatory Cytokines and Brain-Related miRNAs in Children with Autism Spectrum Disorder. *Nutrients, 16*, 1401.

Umeda, L., Torres, A., Kunihiro, B. P., Rubas, N. C., Wells, R. K., Phankitnirundorn, K., and Maunakea, A. K. (2024). Immuno-Microbial Signature of Vaccine-Induced Immunity Against SARS-CoV-2. *Vaccines, 12*(6), 637.

Maunakea, A. K., Phankitnirundorn, K., Peres, R., et al. (2024). Socioeconomic Status, Lifestyle, and DNA Methylation Age Among Racially and Ethnically Diverse Adults: NIMHD Social Epigenomics Program. *JAMA Network Open, 7*(7), e2421889.

Becerra, C. Y., Wells, R. K., Kunihiro, B. P., Lee, R. H., Umeda, L., Allan, N. P., Rubas, N. C., McCracken, T. A., Nunokawa, C. K., Lee, M.-H., Pidlaoan, F. G., Phankitnirundorn, K., Dye, C. K., Yamamoto, B. Y., Peres, R., Juarez, R., and Maunakea, A. K. (2023). Examining the Immunoepigenetic-Gut Microbiome Axis in the Context of Self-Esteem Among Native Hawaiians and Other Pacific Islanders. *Frontiers in Genetics, 14*, 1125217.

Juarez, R., Phankitnirundorn, K., Ramirez, A., Peres, R., Maunakea, A. K., and Okihiro, M. (2022). Vaccine-Associated Shifts in SARS-CoV-2 Infectivity Among the Native Hawaiian and Other Pacific Islander Population in Hawaii. *American Journal of Public Health, 112*(S9), S896-S899.

Juarez, R., Phankitnirundorn, K., Okihiro, M., and Maunakea, A. K. (2022). Opposing Role of Trust as a Modifier of COVID-19 Vaccine Uptake in an Indigenous Population. *Vaccines, 10*(6), 968.

Juarez, R., Kang, Z., Okihiro, M., Garcia, B. K., Phankitnirundorn, K., and Maunakea, A. K. (2022). Dynamics of Trust and Consumption of COVID-19 Information Implicate a Mechanism for COVID-19 Vaccine and Booster Uptake. *Vaccines, 10*(9), 1435.

Wells, R. K., Kunihiro, B. P., Phankitnirundorn, K., Peres, R., McCracken, T. A., Umeda, L., and Maunakea, A. K. (2022). Gut Microbial Indicators of Metabolic Health Underlie Age-Related Differences in Obesity and Diabetes Risk Among Native Hawaiians and Pacific Islanders. *Frontiers in Cellular and Infection Microbiology, 12*, 1035641.

Sherstyuk, K., Phankitnirundorn, K., and Roberts, M. J. (2021). Randomized Double Auctions: Gains from Trade, Trader Roles, and Price Discovery. *Experimental Economics, 24*(4), 1325-1364.

Ahmad, Leelahanon and Li (2005), Efficient Estimation of a Semiparametric Partially Linear Varying Coefficient Model, *Annals of Statistics, 33*, 258-283.

Bachmeier, Leelahanon and Li (2007), Money Growth and Inflation in the United States, *Macroeconomic Dynamics, 11*, 113-127.

Leelahanon and Chaisuriya (2009), C* -Algebra Sequence Spaces and Bounded Linear Operators, *Journal of Analysis and Applications, 7*(1),31-52.

ข้อมูลทั่วไป

ชื่อหน่วยวิจัย

(ไทย) *หน่วยวิจัยด้านการวิเคราะห์ทางเศรษฐศาสตร์ การเงิน และธุรกิจด้วยปัญญาประดิษฐ์เชิงลึกและเศรษฐมิติขั้นสูงแห่งมหาวิทยาลัยธรรมศาสตร์*

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