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Ph.D. Course 41062

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EMPIRICAL APPROACHES FOR MANAGEMENT RESEARCH

Period: a.y. 2024/25 – II sem.

Class times: Room 101. 08:30-11:50

Instructor:

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Course description

This advanced econometric course has three goals: a) learn the fundamentals of the theory of econometrics about: regression analysis, generalized least square estimators, instrumental variables, count dependent variables, qualitative dependent models, text analysis, and machine learning; b) learn a framework to specify econometric models to test theories; c) learn how to produce an empirical paper in business research building on a) and b).

Course Material

See below.

Classes/Topics

Class 1-2 (March 24 – 830:1150AM)

Introduction

- How do we learn? Description, correlations, causality
- Priors and p-values

Review of econometrics theory: OLS, Maximum Likelihood, GLS, SURE, IV

- Class notes

Model specification: Interpretation of regression estimates

- Class notes

Class 3-4 (April 7 – 830:1150AM)

Model specification: Framework

- Camuffo, A., Gambardella, A. and Pignataro, A. (2024) "Theory-Driven Strategic Management Decisions," *Strategy Science*, 9 (4), 382-396, available at https://pubsonline.informs.org/doi/epdf/10.1287/stsc.2024.0173

Class 5-6 (April 14 – 830:1150AM)

Model specification: Applications (testing theories using stories or tables)

- Kortum, S., and Lerner, J. (1999) "What is Behind the Recent Surge in Patenting" *Research Policy* 28, 1-22.
- Bresnahan, T. and Gambardella, A. (1998) "The Division of Inventive Labor and the Extent of the Market" in Helpman, E. (ed.) *General-Purpose Technologies and Economic Growth*, MIT Press, Cambridge.
- Greenstein, S. (2017) "The Reference War: Encyclopedia Britannica's Decline and Encarta's Emergence" *Strategic Management Journal* 38 (5), 995-1017.

Model Specification: Practical session

- Students apply framework to design a theory to be tested

Class 7-8 (April 28 – 830:1150AM)

Correlations – no causality

- Bresnahan, T., Brynjolfsson, E. and Hitt, L. (2002) "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence" *Quarterly Journal of Economics* 117, 339-376.

Causality – Instruments

- Bascle, G. (2008) "Controlling for Endogeneity with Instrumental Variables in Strategic Management Research" *Strategic Organization* 6 (3), 285-327
- Bennedsen, M., Nielsen, K.M., Perez-Gonzalez, F. and Wolfenzon, D. (2007) "Inside the Family Firm: The Role of Families in Succession Decisions and Performance" *Quarterly Journal of Economics* 122 (2), 647-691.

Causality – fixed effects

- Stern, S. (2004). "Do Scientists Pay to Be Scientists?" *Management Science* 50 (6), 835-853.
- Jaffe, A., Trajtenberg, M. and Henderson, R. (1993) "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations" *Quarterly Journal of Economics* 108 (3), 577-598.
- Thompson, P. (2006) "Patent Citations and the Geography of Knowledge Spillovers: Evidence from Inventor and Examiner-Added Citations" *Review of Economics and Statistics* 88 (2), 383-388.

Causality – diff-in-diff

- Conti, R. (2014) "Do Non-Competition Agreements Lead Firms to Pursue Risky R&D Projects?" *Strategic Management Journal* 35 (8), 1230-1248.
- Waldinger, F. (2010) "Quality Matters: The Expulsion of Professors and the Consequences for PhD Student Outcomes in Nazi Germany" *Journal of Political Economy* 118 (4), 787-831.

Causality – experiments

- Bloom, N., Eifert, B., Mahajan, A., McKenzie, D., Roberts, J. (2013) "Does Management Matter? Evidence from India" *Quarterly Journal of Economics* 128 (1), 1-51, https://people.stanford.edu/nbloom/research

Class 9-10 (April 30 – 830:1150AM)

Practical session (data analysis, causality, fixed effects)

- Students replicate existing studies or design their own research

Class 11-12 (May 5 – 830:1150AM)

Review of econometric theory: Poisson, Negative Binomial, Probit & Logit (including ordered and multinomial), selection models

- Class notes

Class 13-14 (May 9 – 830:1150AM)

Applications

- Greene, W. (2010), "Testing hypothesis about interaction terms in nonlinear models" *Economics Letters* 107: 291-296
- Henderson, R. and Cockburn, I. (1996) "Scale, Scope and Spillovers: The Determinants of Research Productivity in Drug Discovery" *Rand Journal of Economics* 27 (1), 32-59.
- Bresnahan, T. and Reiss, P. (1991) "Entry and Competition in Concentrated Markets" *Journal of Political Economy* 99 (5), 977-1009.
- Cassiman, B. and Veugelers, R. (2006) "In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition" *Management Science* 52 (1), 68-82.
- Giuri, P. and Mariani, M. (2013) "When Distance Disappears: Inventors, Education and the Locus of Knowledge Spillovers" *Review of Economics and Statistics* 95 (2), 449-463.
- Arend, R. and Amit, R. (2005) "Selection in Strategic Alliance Activity: Effects on Firm Performance in the Computing Industry" *European Management Journal* 23 (4), 361-385.

Practical session (qualitative response models)

- Students replicate existing studies or design their own research

Class 15-16 (Monday May 12 – 830:1150AM)

Review of econometric theory: Regularization, cross-validation (random forest), text-analysis, machine learning

- Athey, S. and Imbens. G. (2019) "Machine Learning Methods that Economists Should Know About" Annual Review of Economics, 11, 685-725
- Gentzkow, M., Kelly, B. and Taddy, M. (2019) "Text as Data" *Journal of Economic Literature* 57 (3), 535-574.
- Ludwig, J., Mullainathan, S. and Rambachan, A. (2025) "Large Language Models: An Applied Econometric Framework" NBER WP 33344, www.nber.org

Applications: Text analysis

- Bandiera, O., Prat, A., Hansen, S. and Sadun, R. (2020) "CEO Behavior and Firm Performance" *Journal of Political Economy* 128 (4), 1325-1369.

Applications: Machine Learning and Econometrics

- Kleinberg, J., Lakkaraju, H., Leskovec, J., Ludwig, J. and Mullainathan, S. (2018) "Human Decisions and Machine Predictions" *Quarterly Journal of Economics* 133 (1), 237-293

Class 17-18 (Monday May 19 – 830:1150AM)

Practical session (text analysis, machine learning)

- Students replicate existing studies or design their own research

Assessment Methods

Take home practical applications of the topics studied in class. You will have from 9AM of May 26th to 11:59PM of May 27th to write the exam and email it to *marialuisa.ambrosini@unibocconi.it* & *alfonso.gambardella@unibocconi.it*. The exam is open book and should be performed by each student individually without any external communication.

Faculty Bio

Alfonso Gambardella obtained his PhD in 1991 from the Department of Economics of Stanford University. His work focuses on the economics and management of technological innovations and the technology strategies of firms. He was visiting professor in the Department of Economics, Stanford University (2003, 2005-6), and MIT's Sloan School (2015-16). In 2013-2019 he was co-editor of the Strategic Management Journal, and is currently Department Editor of Business Strategy of Management Science. He is a Fellow of the Strategic Management Society and a member of the Center for Economic and Policy Research (CEPR), London. In 2015-16 he was Chair of the Business Policy and Strategy Division of the US Academy of Management, and in 2023 this Academy bestowed upon him the TIM Distinguished Scholar Award. He participated in numerous research projects of the European Commission and other research agencies. In 2021 he was awarded an ERC advanced grant on "A Scientific Approach to Innovation Management." His website is https://mgmt-tech.unibocconi.eu/people/alfonso-gambardella.