

# Introduction to Input-Output and Applied General Equilibrium Models

**Semester:** Spring semester 2026

**Root Number:** 477683

**ECTS:** 3 (20 hours)

**Lecturers:** Patrick Tomberger

**Dates:** 6 – 10 July, 2026

## Course description

This course addresses international economic (trade) relations in the framework of multi-country, multi-sector, general-equilibrium models. The course introduces the quantitative tools that underlie economic analysis in open economies and, in particular, economic analysis of trade. The emphasis of this course is twofold. The first one focuses on the basics of input-output matrices and their extensions to multi-region input-output (MRIO) tables. This part will be complemented by a discussion on recent applications of the MRIO framework to measure trade in value added and to construct environmental footprints. It will culminate into a discussion on how introducing different institutional accounts (household, firms, the government, savings/investment, rest of the World) the input-output framework can be extended to create a social accounting matrix (SAM), which constitute the data basis for applied, or computable general equilibrium models (AGE/CGE), the subject of the second emphasis of this course.

In this block a general introduction to AGE/CGE models is given, followed by theoretical and hands-on sessions where we analyze the economic effects of several policy measures such as changes in national or international shocks in such models. We will work with the AGE model developed and maintained by the global trade analysis project (GTAP).

## Lecturer

### Patrick Tomberger

Patrick Tombergers a Postdoctoral Researcher at the University of Innsbruck. With a PhD in Economics and Master's degrees in Political Economy and Political Science, his career spans tenures at the University of Linz and the World Trade Institute in Bern.

Beyond academia, Patrick has served as a consultant for the World Bank and worked on research projects funded by the EU and SNSF. An expert in global value chains and environmental economics, he has published extensively in international journals such as *Applied Economics*, *Empirical Economics*, and *Environmental and Resource Economics*.

## Learning objectives

The students will gain a solid understanding of the theoretical foundations of input-output analysis and CGE models. They will also develop practical skills in applying CGE models to address basic economic questions.

## Grading

Grading will be based on a take home exam where the participants have to work on a small applied project using input-output matrices and the AGE model discussed in class. More information will be provided during the course.

## Literature

The course will rely mainly on the following sources, which the students can find in the ILIAS system:

- Aguiar, A., Chepeliev, M., Corong, E. L., McDougall, R., & van der Mensbrugghe, D. (2019). The GTAP Data Base: Version 10. *Journal of Global Economic Analysis*, 4(1), 1–27. <https://doi.org/10.21642/JGEA.040101AF>
- Antràs, P. and G. Chor (2022): Global value chains, in: Gopinath, G., Helpman, E. and K. Rogoff (eds.): Handbook of International Economics, Vol. 5. Elsevier.
- Burfisher, M. (2016): Introduction to Computable General Equilibrium Models. Second Edition. Cambridge University Press.
- Cardenete M.A., Guerra, A-I., and F. Sancho (2017): Applied General Equilibrium -- An Introduction, Second Edition, Springer. Chapter 2.
- Corong, E. L., Hertel, T. W., McDougall, R., Tsigas, M. E., & van der Mensbrugghe, D. (2017). The Standard GTAP Model, Version 7. *Journal of Global Economic Analysis*, 2(1), 1–119. <https://doi.org/10.21642/JGEA.020101AF>
- Dixon, P.B. and D.W. Jorgenson (2013): Handbook of Computable General Equilibrium Modeling, Elsevier. Chapters 1 and 2.

- Hertel et al. (1997) Global trade analysis. Modelling and applications. Hertel and Tsigas. Chapter 2.
- Miller, R.E. and P.D. Blair (2022): Input-Output Analysis – Foundations and Extensions, 3<sup>rd</sup> edition, Cambridge University Press. Chapters 1 – 3.

## Software requirements

For the exercises in the IO part we encourage the usage of the free software “R” and the, also free, IDE “RStudio”. This software is available for download at:

- <https://www.rstudio.com/>

In the AGE part we will work in class and for the project with the software “RunGTAP”, which can be downloaded for free at (though a registration is required):

- <https://www.gtap.agecon.purdue.edu/products/rungtap/default.asp>

**Important:** “RunGTAP” will only run on Windows OS out of the box. We strongly encourage the participants to work with that OS in the course.

## Course Overview

Class	Date	Lecturer	Time	Hours	Topic
1	06.07.	Tomberger	14:00-16:30	2.5	Introduction to input-output tables
2	07.07.	Tomberger	10:00-12:30	2.5	Multi-region IO tables and Applications
3	07.07.	Tomberger	14:00-16:30	2.5	Hands-on session on IO tables
4	08.07.	Tomberger	10:00-12:30	2.5	Introduction to AGE/CGE models
5	08.07.	Tomberger	14:00-16:30	2.5	Hands-on session AGE/CGE 1
6	09.07.	Tomberger	10:00-12:30	2.5	Further topics in CGE models
7	09.07.	Tomberger	14:00-16:30	2.5	Hands-on session AGE/CGE 2
8	10.07.	Tomberger	10:00-12:30	2.5	Hands-on session AGE/CGE 3, Preparation for take home projects