Introduction to Input-Output and Applied General Equilibrium Models

Draft 31.03.2023

Semester: Spring semester 2023

Root Number: 477683

ECTS: 3

Lecturers: Patrick Tomberger

Dates: 26 – 30 June, 2023

Audience:

The *CAS TradeMod* is aimed at professionals, researchers and graduate students (Masters and PhD), notably in Economics and Social Sciences. Undergraduate students will be considered only if their profile is outstanding.

Course description

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 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 Word) 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 Tomberger is a post-doc researcher at the University of Innsbruck, Austria, and the World Trade Institute, Switzerland. Before he joined the University of Innsbruck, he worked from 2010 to 2015 as a pre-doc researcher at the University of Linz, Austria. After he obtained his PhD in Economics he moved as pre-doc researcher to the World Trade Institute located in Bern, Switzerland, and stayed there until 2022. He also holds Master degrees in Political Economy and Political Science from the University of Innsbruck. During his career, Patrick also worked as consultant for the World Bank and has been part of projects funded by the European Union and the Swiss National Science Foundation (SNSF). His main research interests are international trade, global value chains, input-output analysis and environmental economics. In those fields, he published in international peer-reviewed journals such as Applied Economics, Empirical Economics, The World Economy, Ecological Economics, Economics Letters and Environmental and Resource Economics.

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, 3rd 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:

- 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. For Mac users we will additionally provide a version of "RunGTAP" specifically developed for that purpose by Joseph Francois. However, we had trouble with that software on some versions of Mac OS in the past, so it should be considered as a second best option only.

As yet another alternative, we suggest Mac users to install a trial version of Windows, which is available on the Microsoft website, in a virtual environment. As virtualization software we recommend the free available software "Virtualbox" for Ocracle, available at:

- https://www.virtualbox.org/

Course Overview

Class	Date	Lecturer	Time	Hours	Topic
1	26.06.	Tomberger	14:00-17:00	3.0	Introduction to input-output tables
2	27.06.	Tomberger	10:00-12:30	2.5	Constructing multi-region IO tables
3	27.06.	Tomberger	14:00-17:00	3.0	MRIO applications and introduction to social accounting matrices
4	28.06.	Tomberger	10:00-12:30	2.5	Introduction to AGE/CGE models
5	28.06.	Tomberger	14:00-17:00	3.0	Hand-on session 1
6	29.06.	Tomberger	10:00-12:30	3.0	Final demand/Supply in CGE models
7	29.06.	Tomberger	14:00-17:00	3.0	Hands-on session 2
8	30.06.	Tomberger	10:00-13:00	3.0	Hands-on session 3, Preparation for take home projects