The economic and environmental effects of an EU ban on illegal logging imports. Insights from a CGE assessment

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Online Appendix

Table A1. *Data for forest carbon release calculations*

Region	Carbon in Above-Ground Biomass (tonnes/ha)	Wood m^3/ha
Oceania	36	35
XAsia	63	76
Japan	61	171
China	23	67
Indonesia	50	59
Myanmar	79	85
Malaysia	136	251
India	27	69
CAN_XNA	-	106
USA	52	116
LACA	90	101
Brazil	81	170
EU	61	166
EST_LTV	59	201
Finland	30	96
XEUR	61	174
Russia	32	100
AFRICA	73	94

Source: Elaboration from FAO (2006)

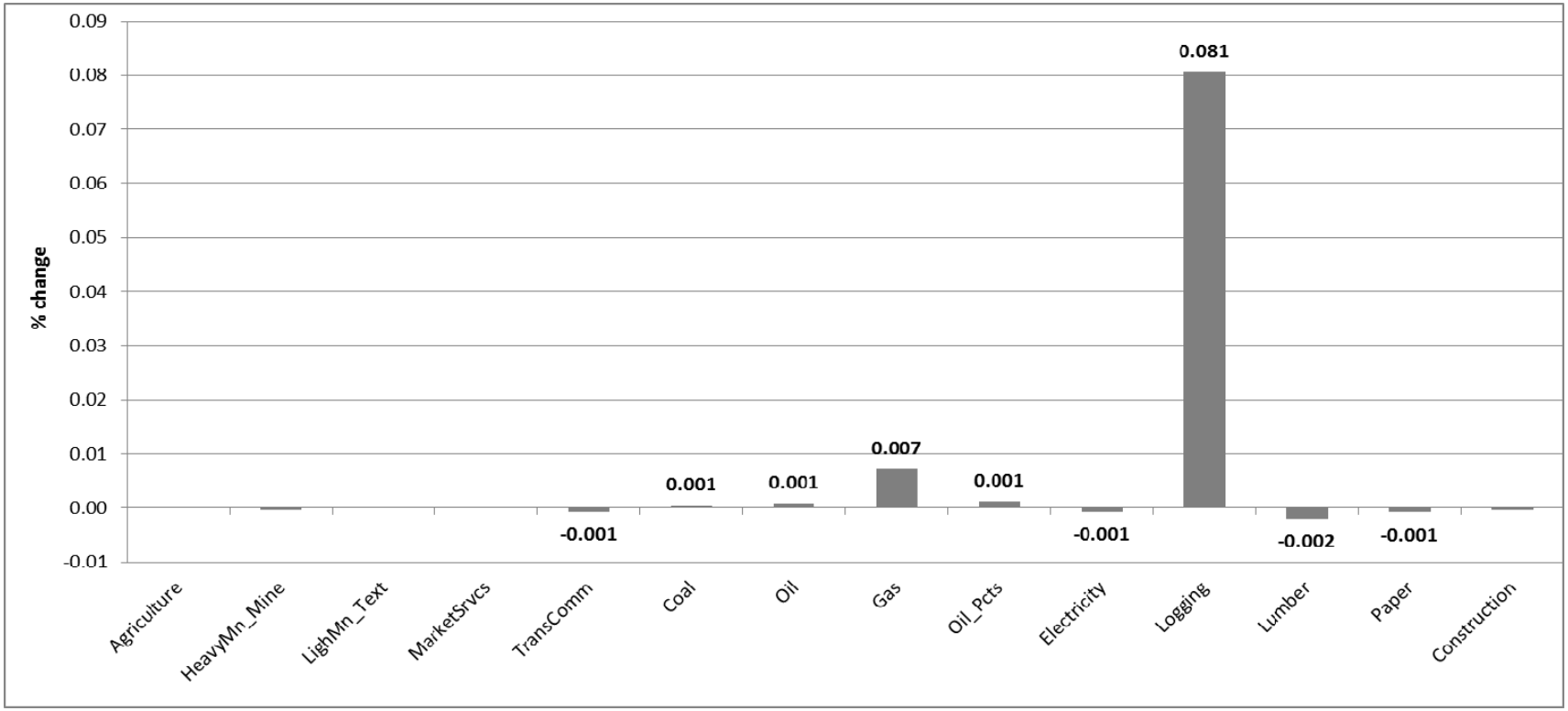

Figure A1. *World sectoral production (% change wrt baseline)*

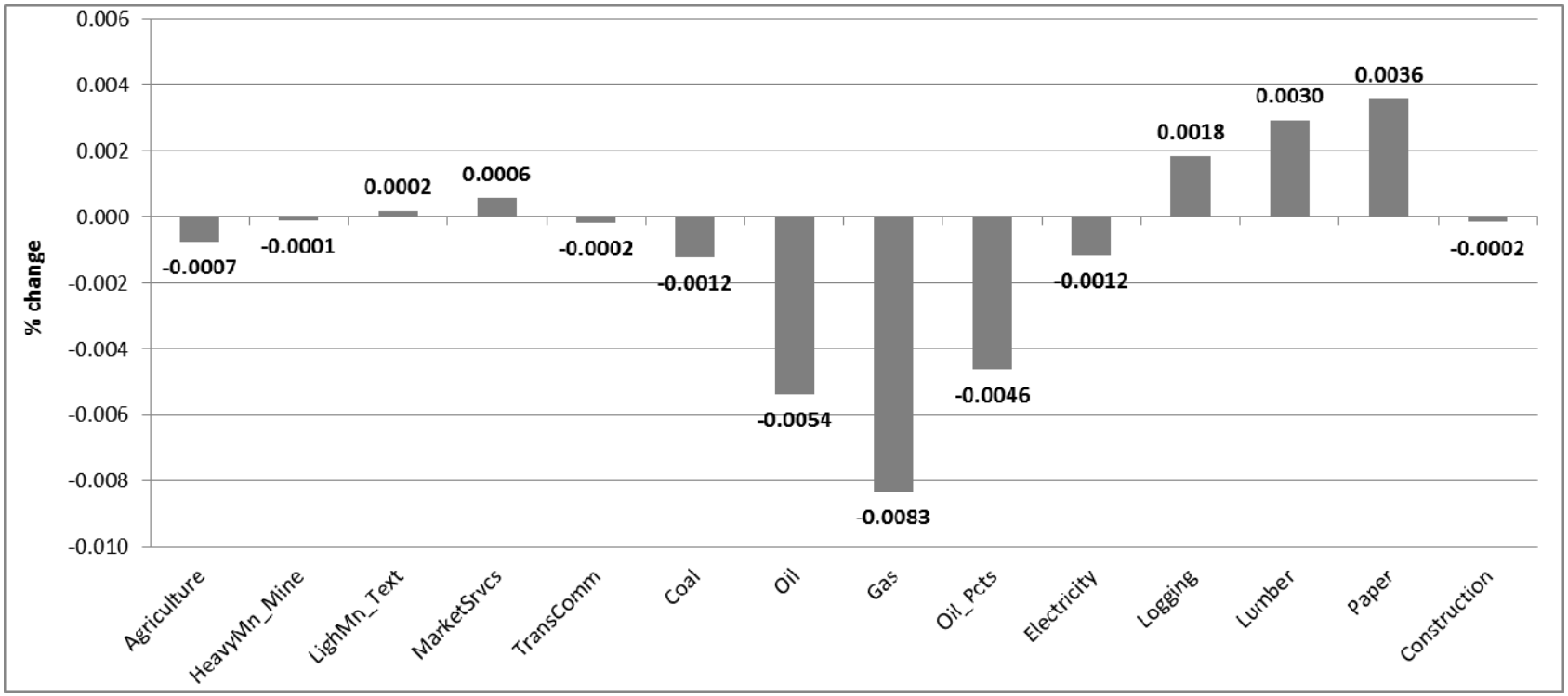

Figure A2. *World prices (% change wrt baseline)*

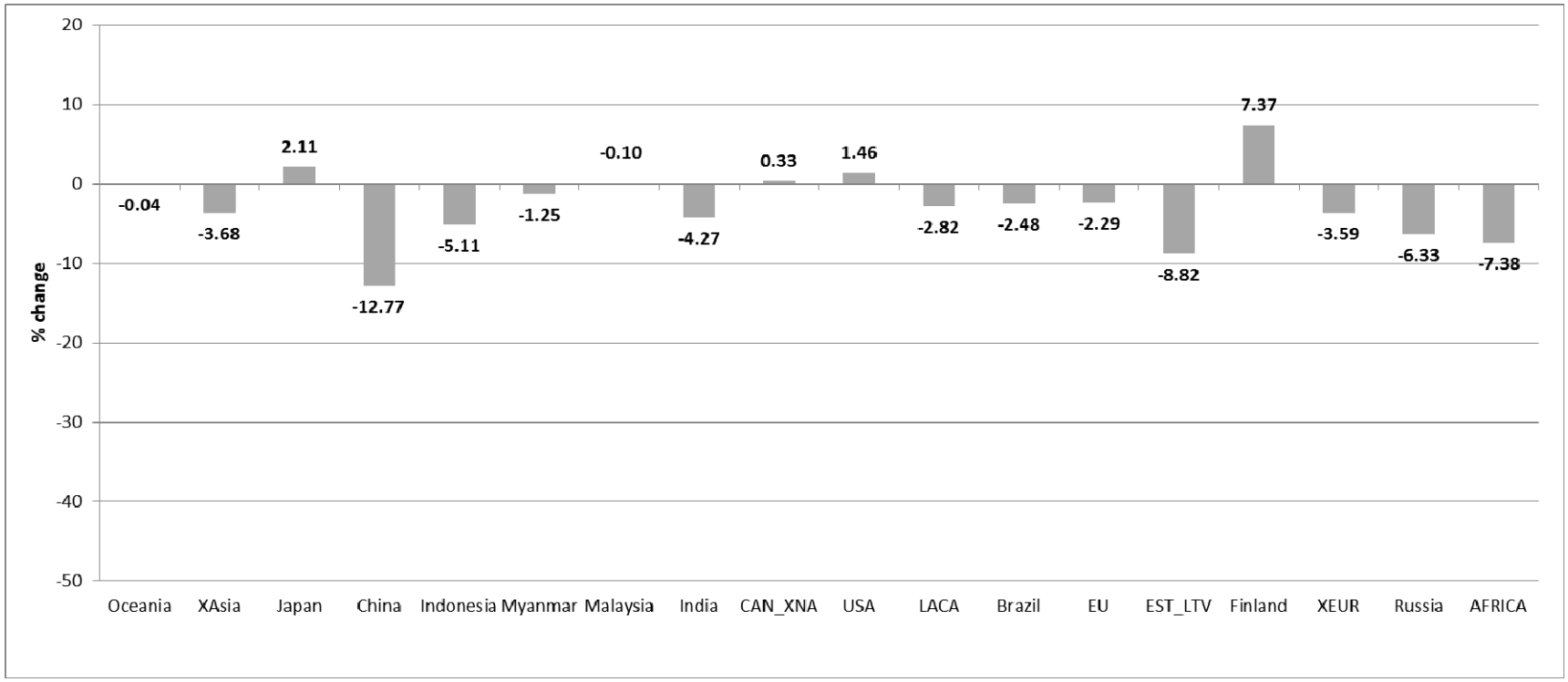

Figure A3. *Timber exports: % change wrt baseline (low illegal logging share estimates)*

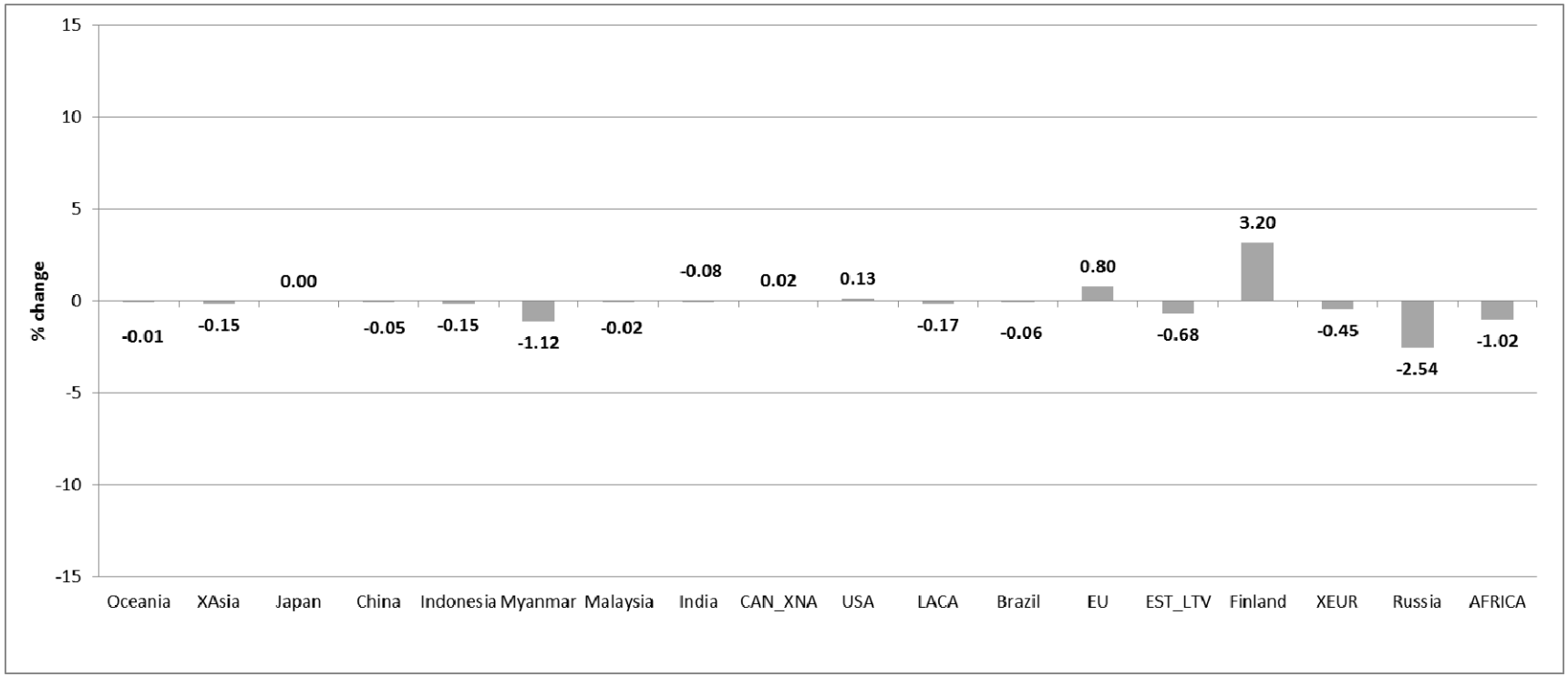

Figure A4. *Timber production: % change wrt baseline (low illegal logging share estimates)*

The ICES model description

ICES is a recursive-dynamic CGE that shares the production structure of GTAP-E model (Burniaux and Truong, 2002) using data for the year 2004 available from the Global Trade Analysis Project (GTAP) database version 7 (Narayanan and Walmsley, 2008).

The main features of the model are:

- Top-down recursive growth model: a sequence of static equilibria are inter-temporally connected by endogenous investment decisions
- Detailed regional and sectoral disaggregation.
- Inter sectoral factor mobility and international trade. International investment flows.
- Representation of emissions of main GHG gases: CO_2, CH_4, N_2O.

As in all CGE models, ICES makes use of the Walrasian perfect competition paradigm to simulate adjustment processes, although the inclusion of some elements of imperfect competition is also possible.

Industries are modelled through a representative firm, minimizing costs while taking prices as given. In turn, output prices are given by average production costs. The production functions are specified via a series of nested CES functions. Domestic and foreign inputs are not perfect substitutes, according to the so-called “Armington” assumption (figure A5).

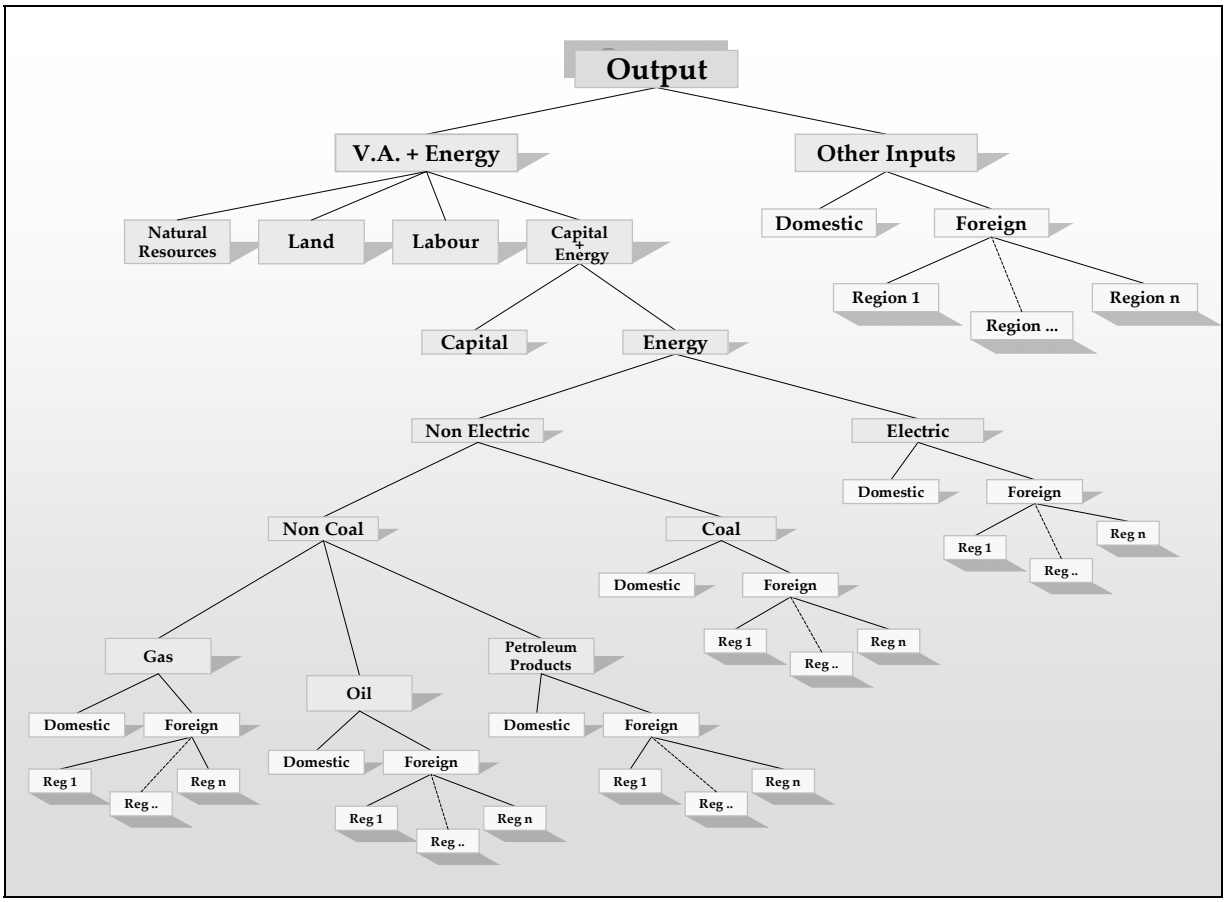

Figure A5. *Nested tree structure for industrial production processes*

A representative consumer in each region receives income, defined as the service value of national primary factors (natural resources, land, labour, capital). Capital and labour are perfectly mobile domestically but immobile internationally. Land and natural resources, on the other hand, are industry-specific.

This income is used to finance three classes of expenditure: aggregate household consumption, public consumption and savings. The expenditure shares are generally fixed, which amounts to saying that the top-level utility function has a Cobb-Douglas specification.

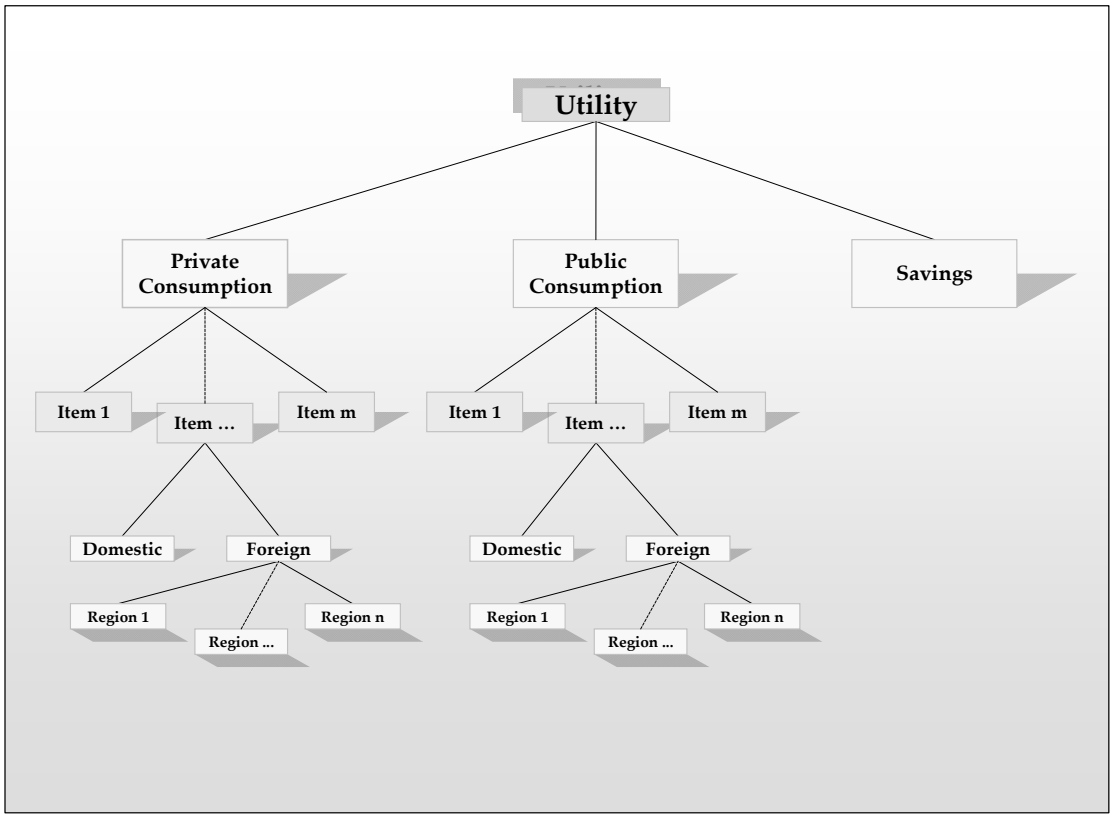

Figure A6. *Nested tree structure for final demand*

Public consumption is split in a series of alternative consumption items, again according to a Cobb-Douglas specification. However, almost all expenditure is actually concentrated in one specific industry: Non-market Services.

Private consumption is analogously split in a series of alternative composite Armington aggregates. However, the functional specification used at this level is the Constant Difference in Elasticities form: a non-homothetic function, which is used to account for possible differences in income elasticities for the various consumption goods.

Investment is internationally mobile: savings from all regions are pooled and then investment is allocated so as to achieve equality of expected rates of return to capital.

In this way, savings and investments are equalized at the world, but not at the regional

level. Because of accounting identities, any financial imbalance mirrors a trade deficit or surplus in each region.

References

Burniaux, J.M. and T.P. Truong (2002), 'GTAP-E: an energy-environmental version of the GTAP Model', GTAP Technical Paper n.16.

Narayanan, B.G. and T.L. Walmsley (2008), *Global Trade, Assistance, and Production: The GTAP 7 Data Base*, Center for Global Trade Analysis, Purdue University, West Lafayette, Indiana, USA.