The GRACE model used for estimation of global rebound effect caused by energy efficiency improvement

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Wei and Liu (2017) have presented an estimation of global rebound effect caused by energy efficiency improvement. The study used a computable general equilibrium (CGE) model GRACE updated from Aaheim and Rive (2005). This document includes all the programming codes of the version of GRACE used by Wei and Liu (2017). The codes can be run with GAMS/MCP and GAMS/MPSGE (Rutherford 1998). The model calibrates the base year economy (2011) with Global Trade Analysis Project (GTAP) v9 database (Badri et al. 2015), where the cost structure of electricity generation technologies is estimated from Tables 4.1A and 4.2A of OECD/NEA (2010). The original and aggregated GTAP v9 database are excluded from this document. The original GTAP database is available from the GTAP website (<https://www.gtap.agecon.purdue.edu/>) and the aggregated database can be obtained by the aggregation codes in the folder “GTAP9GAMS” that is a simplified modification of the GTAP9GAMS codes written by Rutherford (2005). The aggregated database includes data on economic flows, physical energy consumption, and carbon dioxide (CO2).

Starting with the aggragated database, which is called iaee.gdx in the document, we construct the GRACE model in the folder “grace.” In the GAMS software ([www.gams.com](http://www.gams.com)), we can run the model by executing the file “core.gms.” The following steps should be followed.

1. Run the “single run” alone to obtain base-year initial BAU equilibrium.
2. For interested users, the calibration of BAU scenario can be rebuilt by switching off the “single run” and switching on the “multiple run.” Calibrate BAU scenario over time to get values of parameters by activating the code “calib\_toggle = 1;”. This will generate/overwrite a file “efftfp.gdx” containing all the calibrated parameter values for the BAU scenario.
3. Switch off the calibration mode by setting “calib\_toggle = 0; “ and run the codes in the file “core.gms” to obtain simulation results of Figures 2, 4-6 in Wei and Liu (2017).
4. For the sensitivity analysis, activate only two scenarios: BAU and SN2 (“FxiLinR”) in the file “scenarios\_declare.gms.” Adjust values of parameters “eKLE(i,r)“ and “eJTOP(j,r)” within the codes in the session of “multiple run” of the file “core.gms.” Then run the “core.gms” to obtain results corresponding to changed parameter values.

Any questions and comments can be delivered to Taoyuan Wei by email address: taoyuan.wei@cicero.uio.no

# References.

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