Minutes of the Gekko steering comittee meeting, Sept. 16, 2019, at Statistics Denmark[1]

Participants:

- Asger Olsen (JAO, Statistics Denmark/ADAM)
- Tony Maarsleth Kristensen (TMK, Statistics Denmark/ADAM)
- Michael Osterwald-Lenum (MOL, Statistics Denmark/ADAM)
- Nikolaj Mose Hansen (NMH, Statistics Denmark/ADAM)
- Anette Borge (AB, Statistics Denmark/ADAM)
- Rasmus Bjerre (RB, Ministry of Finance)
- Philip Groes (PG, Ministry of Finance)
- Jesper Christiansen (JC, Ministry of Finance)
- Sofie Holme Andersen (SHA, Economic Council of the Labour Movement)
- Morten Werner (MOW, Central Bank of Denmark)
- Dorte Grinderslev (DGR, Economic Councils)
- Martin Kirk Bonde (MKB, DREAM/MAKRO)
- Grane Høegh (GHH, DREAM/MAKRO)
- Daniel Freyr Gustafsson (DFG, Statistics Denmark /Quarterly National Accounts)
- Thomas Thomsen (TT, Gekko editor)

Re 1. Welcome + choice of minute taker + approval of last year's minutes.

JAO bid the participants welcome. TT was chosen as minutes taker. Regarding last year's minutes, DGR asked about user-defined procedures in databanks, and noted that MOL had spoken about a guide regarding smaller models in Gekko 3.0.

Re 2. Brief account of 2018-19.

Note that on the following pages, "Gekko 2.4" is generally used as a synonym for the 2.3.x series (currently version 2.3.12).

TT summed up the editor's report regarding 2018-19. Decomposition (DECOMP) will be improved soon for Gekko 3.0. Regarding 2.4, some solver augmentations are imminent (will be ported to 3.0, too). The intenition is to keep 3.0 stable syntax-wise for a longer period than hitherto, so that the users can build systems and documentation around it. A later version 3.2 may correct a few things, but stability is a main focus presently.

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[1] Links: Gekko main webpage: www.t-t.dk/gekko, organization: www.t-t.dk/gekko/organization. Gekko on GitHub: https://github.com/thomsen67/GekkoTimeseries.

Re 3. Status regarding Gekko 2.4 and 3.0

Version 2.4 should be fully compatible with 2.2, and as mentioned, some solver improvements for 2.4 are planned. Apart from that, 2.4 will be frozen in time, except for bug-fixes. Version 3.0 is stable regarding the core parts, but some glitches are still present, and further polishing will be done. Since 3.0 encompasses all of the functionalities of 2.4, there is no reason not to switch – apart from the inconvenience of translating the command files and familiarizing oneself with the syntax changes. There is an automatic translator from 2.2/2.4 to 3.0 which deals with much of the syntax changes.

Re 4. Feedback regarding Gekko 2.4 and 3.0

MWE/Central Bank are in a transition phase, with some of the systems still running in a rather large AREMOS system, while other parts like assembling and solving models runs in Gekko 3.0. They were pleased to hear that the Quarterly National Accounts are using Gekko. TT mentioned that there were a few corner cases where AREMOS yielded surprising results: a list of such cases could be of value.

PG/Ministry of Finance mentioned that the Ministry of Finance is using 2.2 for ADAM, which meets their needs, but they are considering to switch to 3.0 in the foreseeable future, in order to run ADAM and MAKRO on the same software version. RB mentioned that they are not doing any data-handling. They are looking forward to the improved DECOMP for MAKRO-type models.

SHA/Economic Council of the Labour Movement mostly uses Gekko 2.4 for simulation and shocks with ADAM.

DREAM/MAKRO uses Gekko 3.0 to report and examine the underlying GAMS equations, browse these, show array-series, etc.

DFG/Quarterly National Accounts mentioned that they are transitioning their systems from AREMOS to Gekko 3.0, and are now testing the translated system. Apparently, the combination of Windows 10 and Office poses problems for the AREMOS installation. Issues with Gekko have mostly been related to data formats, for instance interfacing with JDemetra+.

DGR/Economic Councils were generally pleased about the transition to 3.0, also because they had the change to influence some of the functionalities. PLOT has been used quite a lot for in-house reporting. They have asked TT to provide higher frequencies for Gekko (daily/weekly observations), and he will also help them with the translation of some of their AREMOS procedures. They hope to phase out AREMOS by the end of 2019. Gekko error messages for 3.0 could be improved, to which TT agreed.

MOL mentioned that there had been a limited number of participants in the pure Gekko courses (data-mode), in contrast to the simulation courses with the ADAM model. It had been considered to provide the data-handling courses in an online fashion, for Gekko 3.0. DGR thought the idea had some prospects, also regarding students.

JAO mentioned that for ADAM, the priorities were

1. A version 2.4 to release together with the up-coming new ADAM version
2. A special symbol to denote structural levels (for instance '¤', currency sign). MAKRO could also use more symbols. TT suggested that special symbols could be discussed at a later technical meeting.
3. Solver augmentations: uneven number of goals and means, etc. This could perhaps eliminate long iterative procedures that try to accomplish such things. Maybe start out with one goal and several means to start out with.
4. Handling of submodels/modules inside model files.
5. Possibilities regarding solving statically for the long run, without actually solving for all the years (in a sense: ignoring lags).
6. Good automatic translator from Gekko 2.4 to 3.0.

Regarding (6), TT mentioned that quite some work had already been done, but the translator is far from perfect yet. For standard programs without too many specialitites, DØRS think the translator is already useful as it is. Migrating the ADAM data revision could benefit from an improved translator from 2.4. (There is also a translator from AREMOS to Gekko 3.0, which was used to translate the Quarterly National Accounts system).

DGR asked about versioning, since TT sometimes sends Gekko versions "on the side", so how are other people aware of such versions? TT answered that such versions are often bug-fix versions, or versions that are supposed to try out a particular new functionality, and by providing such a version, TT has a chance to know if the version works in the user's environment. Perhaps each institution could have a contact person that receives information also on minor changes/revisions in Gekko?

Re 5. Prioritization of main lines regarding 2019-20

TT mentioned that polishing off Gekko 3.0 is a main point for some time to come, for instance help systems, examples, guides, error messages etc. JAO envisioned a stable period of consolidation as a valuable project in itself.

MOW and others thought that (1) on the list was interesting (submodels). MAKRO does not use the Gekko solver, and as long as it cannot solve a MAKRO-style model, their interest in (1) is limited.

Regarding (2), MAKRO thought that it would be necessary to jump to 64-bit sooner of later. More and more packages, including GAMS, do not support 32-bit anymore. TT mentioned that 64-bit Gekko is perhaps best handled when migrating to cross-platform .NET Core, including the upgrade of the main Gekko window to WPF (vector-based). Gekko could also offer an API regarding reading/writing of Gekko databanks. If possible, a 64-bit version of the existing system could perhaps supersede the other possibilities. The third-party components of Gekko (7zip, gnuplot, etc.) are all available as 64-bit, so there are no roadblocks in that respect.

Regarding (5), the Central Bank uses Gekko together with R quite a lot, but the interface could be improved. DØRS thought that a convenient way of loading Gekko databanks from inside Excel would be convenient for less technically inclined users. Andreas Gotfredsen (formerly Ministry of Finance)

made a system like that, which could presumably be further developed. MKB supported the idea of offering a common dataformat readable by both Gekko, R, Python, Excel, etc.

Regarding (6), MKB thought that for instance Stack Overflow would be a more natural environment for these kinds of user questions. For TMK and others, the problem was that there was not much time for the reading of such "nerdy" discussion forums, however the format. TT envisioned writing a subset of future components as Gekko functions/procedures (instead of C#), which could also provide a starting point for Gekko users. DGR advocated for more examples. ADAM has guides for sim- and data-mode for ADAM and Gekko 2.4, which could perhaps be adapted for Gekko 3.0. In the shorter run, and as a stepping stone, TT could annotate these guides (so-called "The sun is always shining in Gekko") for 3.0, that is, describing how the Gekko code would look in 3.0.

Regarding (7), TT mentioned the following: Gekko originally drew its inspiration from simulation systems (PCIM), moved on to data handling (AREMOS), then dimensions and array-series (GAMS). So what are the next steps? TT sees a niche for timeseries-oriented "data wrangling" and general data handling, often in the form of tables (that is, rows with data, columns with dimensions). Some users use Excel for that, but packages like R and Python are increasingly being used for such cases (typically via dataframes). But for the users that do not feel completely at ease with R/Python, but where the problems are still too complicated for Excel to handle in a convenient way, Gekko could perhaps provide an alternative. To that end, the implementation of dataframes in Gekko is a next logical step, and an interesting inter-language dataframe project is the open formats Arrow (in-memory) and Parquet (on disk), both from the open-source Apache Software Foundation. As a first foray into this, TT has recently added a writer for the Parquet format, which can consumed by for instance R and Python (cf. libraries *arrow* in R, *pyarrow* in Python).

Re 6. Commentaries regarding detailed checklist + prioritization of this

DØRS could be interested in the discussion of (4)/(5), how to control Gekko in different ways, which could be further discussed amongst interested parties.

There are many nice-to-have features amongst these points, but JAO cautioned that the prioritization of such points also has to reflect who is paying for which components. Users can also contribute via own ressources, it does not have to be financial.

The main conclusion regarding prioritization is is that the primary priority is the consolidation of 3.0 (including all the different systems etc. related to it), providing a stable ground for users to familiarize themselves with. Apart from that, TT felt that he had a reasonably good idea of where to put the effort in the following period.

TT mentioned that as a kind of hobby project, he is looking at more general solver engines. This may or may not materialize into something useful. MAKRO mentioned that if they could write and solve their model in Gekko, they would skip GAMS entirely, reducing the number of programs they use.

Re 7. Other potential users

FH (Danish Trade Union Confederation) uses Gekko 2.4, mostly for downloading and reporting from Statistics Denmark (statbank.dk). Finance Denmark has gotten a version of that system for 3.0 for review. The up-coming "Green REFORM" developed by DREAM would be logical to interface with Gekko, like the MAKRO model – the project runs 2019-21.

Re 8. Status regarding documentation, help systems, etc.

The in-built help systems regarding 2.4 and 3.0 are up to date, and the 3.0 help system is generally improved compared to 2.4.

The source code documentation is written for Gekko 2.0. All of the Gekko source code is live on GitHub, but the source code documentation needs an upgrade to 3.0. MKB has looked a bit into it, and needed a more high-level introduction on how to get up and running, that is, a more general overview. TT could update these parts of the source code documentation before the rest of it.

Re 9. Organization and choice of editor for the next period

TT was elected as editor for the next period.

Re 10. Date of the next meeting + any other business

June 2020 suited people well.

TT announced that he would henceforth prefer to write the minutes in English, so that people outside of the Gekko steering committee can see where the project is going.