Minutes of the Gekko steering committee meeting, September 4, 2023, at Statistics Denmark[1]

Participants:

- Asger Olsen (Statistics Denmark/ADAM)
- Michael Osterwald-Lenum (Statistics Denmark/ADAM)
- Christian Retoft (Statistics Denmark/ADAM)
- Søren Gjedsted (Statistics Denmark /Quarterly National Accounts, QNA)
- Tetiana Melnyk (Statistics Denmark /Quarterly National Accounts, QNA)
- Mads Harslund (Ministry of Economic Affairs)
- Anders Køhlert Larsen (Ministry of Economic Affairs)
- Grane Høegh (DREAM/MAKRO)
- Dorte Grinderslev (Danish Economic Councils, DØRS)
- Nikolaj Mose Dreisig Hansen (Central Bank of Denmark)
- Sofie Holme Andersen (The Economic Council of the Labour Movement, ECLM)
- Thomas Thomsen (Gekko editor)

Note: In the following, version "2.4" covers Gekko versions 2.2, 2.4, and 2.5.x, whereas version "3.0" covers Gekko versions 3.0 and 3.1.x. Most current development is on 3.1.x.

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

Thomas was chosen as minutes taker, and Michael as moderator. There were no comments regarding last year's minutes.

Item 2. Editor's report regarding 2022-23.

Thomas provided an overview. Michael tried to keep him from digressing.

Error messages in Gekko versions >= 3.1.14: Thomas said that they ought to be quite a lot less bad. Dorte confirmed that the messages seem to work better. Thomas noted that users can just send him examples of bad error messages, and he will try to fix the messages.

Data tracing is up and running from Gekko version >= 3.1.16. Dorte asked if traces also works if the series are from different databanks and different files, which Thomas confirmed. Dorte asked if it slowed down Gekko, which needs to be tested, but ought not to

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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.

be too bad.[2] Size-wise Thomas thought that databanks could occasionally be "trimmed" of traces (for instance if these are very indirect or old), and such traces could be stored in some central databank/database/archive. Finally, Dorte proposed a kind of "clear" method so that traces can be removed from a databank.

Regarding reading speed and RAM requirements of .gdx databanks, Thomas said that after implementing a databank cache in Gekko 3.1.14, gdx databanks read much faster. The cache also works for models and is set up to use 5 processors/kernels (that number could become a setting later on). Thomas has also tested that a standard 8 GB pc can open up about 50 normal-sized gdx databanks of 127 MB at the same time, before running out of RAM. Grane thought that should more than suffice.

Regarding auto-complete Dorte said that it perhaps ought to show variable suggestions, even if the variables do not reside in first-position databank (or at least some kind of warning could be issued). Auto-complete is essentially an INDEX, and INDEX tells the user if there are hits outside the first-position databank. Thomas said that auto-complete works anywhere in the Gekko input window, not just for certain commands.

Migration-wise, QNA has been using Gekko (and no AREMOS) since 2022q4, and most of the AREMOS programs of the Central Bank are also running in Gekko now. The MAKRO databank programs have migrated from GAMS to Gekko, and it is the intention that the MAKRO databank system is henceforward run in Gekko. The ADAM databank systems have not yet migrated from Gekko 2.4 to 3.0, but this is ongoing, and Thomas is helping out with the translation.

Regarding the Gekko syntax cheat sheet (from 2.4 to 3.0), Dorte said that she would also hand it out to users that are completely new to Gekko.

Regarding INTERPOLATE (lower to higher frequencies) and more advanced seasonal adjustment (JDemetra+), these projects tend to not be prioritized because the largest contributors financially mostly use annual models. But with some funding, these projects could be doable in the coming period. Sofie mentioned that regarding a project like "Jobindsats" from StatBank Denmark, good seasonal adjustment would probably be a requirement.[3]

Regarding the html equation browser (DOC <browser>), Dorte said that one of its strongest advantages is that it is just basically a web page where the users can look up data and graphs immediately without opening a databank. The system works for ADAM/SMEC/MONA, but implementing it for MAKRO is somewhat harder because MAKRO does not operate with explicit left-hand sides, and because of the dimensionality of MAKRO. But the new DECOMP module can offer a lot of these things regarding MAKRO, so a html equation browser for MAKRO is a question of wiring it up to the relevant parts of DECOMP. The demand for a MAKRO html equation browser is clearly present.

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[2] Among other things because traces typically span several periods, so there is not a single trace for each and every observation in a timeseries.

[3] Gekko *can* do X12A, but the fancier methods of JDemetra+ are lacking.

Regarding graphs, Grane mentioned that being able make plots with the age dimension on the x axis would be a plus in Gekko, and perhaps also handling cohorts (tracing persons with the same birth year over time). There is an existing function rotate() that can transform an array-series so that it can be plotted with age dimension on the x axis, but doing this automatically would be easier.

Thomas made a demo of the new DECOMP module, and Michael tried to limit the level of digressions.

Syntax colouring of .gcm files: While mentioning VS Code (and the in-built Gekko extension for it) as a great editor, Thomas mentioned that for the equally great Sublime text editor a Gekko extension also exists. VS Code is free though and could end up taking off in a big way regarding editors/IDE's.

Item 3. Status regarding Gekko 2.4 and 3.0

Thomas said that for all practical purposes he had not developed anything in Gekko 2.4 in the current period. Release of a Gekko version 3.1.16 is imminent, with among other things data tracing.

Item 4. Feedback regarding Gekko 2.4 and 3.0

Michael asked if other people than the ADAM group use Gekko 2.4? Sofie said that ECLM use Gekko 2.4 when they simulate ADAM, whereas they sometimes use Gekko 3.0 for other purposes. Mads said that the Ministry of Economic Affairs (and the Ministry of Finance, too) use Gekko 2.2. Last year Mads tried to translate their programs with the Gekko translator, which worked ok. So the expectation for their types of simulation-related programs is that migration ought to be relatively smooth. The Gekko interface for GAMS models like MAKRO only works in Gekko 3.0.

Thomas reminded people that it is perfectly possible to load a Gekko 2.4 model (.frm) and databank (.gbk) into Gekko 3.0 and simulate the model there, since the .frm format has not changed, and since Gekko 3.0 reads Gekko 2.4 databanks. However, the satellite modules (Gekko 2.4 .gcm files) surrounding a given model cannot just run in Gekko 3.0 – for this, a translation is necessary. Nikolaj said that they could easily read the ADAM model and databank into Gekko 3.0 and simulate (but the Gekko 2.4 .gcm file updating exogenous variables had to be translated).

Primary Gekko 3.0 users at the moment are QNA, DØRS, MAKRO and the Central Bank. QNA and the Central Bank use Gekcel (Gekko add-in for Excel) extensively, and have built modules in VBA (Visual Basic, which they code themselves). The plan is to fetch the best of these VBA modules and make them available for other Gekko users.

Item 5. Prioritization of main lines regarding 2023-24

- (1) Error messages: no major work on these is planned right now, but stupidities will be addressed. Just send examples to Thomas, and he will look at it.
- (2)+(3): Is in demand and will be pursued.
- (4): Will be implemented and tried out.
- (5): Is prioritized within the coming period, because it can serve as supplement to other kinds of MAKRO materials/documentation etc.
- (6): Offering a practical VBA module inspired by QNA and/or the Central Bank would not be too time-consuming and could perhaps be done.
- (9)+(12): PLOT: Support age dimension (and cohorts) on the x axis. Also being able to do easy indexing with PLOT<i> (scaling different variables so their levels make sense in the same graph) will be done. As the last point, it would be practical to have an option PLOT <v> x; that is interpreted as PLOT @x, x;, to easily show the reference and first-position levels ("v" for "verbose", similar to PRT<v>). The PLOT window also ought to use the same look and buttons as the DECOMP window. These PLOT enhancements are relatively easy to do.

Not directly prioritized, or needs funding:

- Points (7) and (8) would probably need extra funding in order to be done in the coming period. The Central Bank uses the R package tempdisagg together with Gekko, and QNA knows a lot about JDemetra+ and the so-called "Java cruncher". So perhaps (7) and (8) are in reality not that large as projects?
- Point (10) is not really a Gekko question but a question about how the MAKRO databank is made regarding missing values. Expected to be done.
- Point (11) probably awaits that the ADAM modelling environment migrates to Gekko 3.0.
- Point (13): template files for table construction is still being contemplated.
- Regarding (14): at some point Thomas will take time out to read the complete documentation and make sure that all parts are up to date.

Item 6. Organization and choice of editor for the next period

Thomas was elected as editor for the next period.

Item 7. Date of the next meeting + any other business

Dorte felt that June in general is better than September. But regarding 2024 in particular, Sofie mentioned that there is a main audit at Statistics Denmark ("hovedrevision") around June 2024, and it was therefore decided that September 2024 was a good date for the next meeting.

Item 8. Commentaries regarding detailed checklist + prioritization of this

Migration (translation) of the Gekko source code to the newer .NET Core would be wise in the longer run, but is still not that pressing.

Asger proposed a news mail, to announce new components etc. But Dorte said that when downloading a new Gekko version, there is already a description of new components in that version (and Dorte tends to skip that description, and would probably skip a news mail, too). Instead a kind of "rolling log" in the main Gekko window regarding important enhancements could perhaps be useful and less prone to skimping. An example could be that Gekko now supports right-click copy-pasting a GAMS equation (copy) translated to Gekko syntax (paste). This is hard to find in the documentation, even though it *is* mentioned. Michael proposed in that case that when a user does something with a gdx file or something else GAMS related, Gekko could write out "Did you know…" (with an option to click "Understood" so the message does not reappear again).

Users generally use the help system quite a lot, so announcements could perhaps be available there. The help system examples are appreciated.

Re (2): Dorte uses Gekko libraries at DØRS. It works well, including the ability to bundle plot schemas, Excel sheets and other files inside the libraries. In the longer run the idea is that users can share libraries, but right now mostly DØRS use it.

Re (3) + (4): Arrow files: Gekko writes those files, and in the longer run it may be an important format. Think of Arrow files as "better" (binary) csv files for data transfer. In the longer run, to support table-like Arrow files, Gekko could get a dataframe variable type, too.

(5) Options tree view not important right now.

(6): .NET Core. Michael asked which Windows versions .NET Core supports? The answer is that Windows 7 and later seems to be supported, but not Vista, XP or older. Migrating Gekko sometime in the future would be wise.

Thomas mentioned some points mentioned in the DECOMP paper. Thomas would pursue some of these points together with, among others, the MAKRO users.

Item 9. Other potential users

Confederation of Danish Industry (DI) apparently has a large AREMOS system.

Item 10. Status regarding documentation, help systems, etc.

There was a general discussion about this. The pressing issue is perhaps that Gekko has become a quite large system with many statement types, functions, etc. There is a user guide for beginners, but how do existing users become aware of (new) functionality that would make some task easier to do?

Examples in the help system are very useful in that regard. Firstly, a good example regarding some statement/function is often more useful than a long explanation. Secondly, the example may highlight other useful functionality.

In general, mentioning "related statements", "related functions", "related options" is helpful, making the user more aware of what this or that subset of Gekko is capable of.