

## ModEco – NetLogo Platform – Diary of changes

### Outstanding Issues

1. Is there some way to open or close the command centre under software control? No.
2. Death by emaciation (lownrg) has been suppressed pending stable PMM. Reactivate or remove.
3. Check all ‘TODO’ issues. Only two remain:
  - a. One re bug in attaching new agent to patch during birth. Kludge fixes it in post-tick.
  - b. The other is in reference to use of Stirling’s approximation for entropy. Replace with GammaLn function.
4. Once I know what the steady-state asset level is per agent, start all agents at that level. I.e. start the PMM close to steady state.
5. Rethink rescaling of entropy time series.
6. Possibly, try to make PMM work without intervention of MMgr.
7. Suppress the ASSERTs.

### Version Changes

#### Version 1.39 (141216)

- Built rest of the ‘Per Transaction’ data collection. Did do grants, bio functions in addition to commercial transactions.
- Added Lorenz curves for wrkrs, frmrs and all. Added Gini coefficients. Based on demo of wealth distributions by Uri Walenski.
- Made dumps of CSV data self-limiting in size, and self-renewing, allowing for more extensive collection of data in the range of millions of records. Each file terminates collection above 500,000 records, and closes and reopens. It’s not as discriminating as in the C++ version. E.g. I can’t just collect birth or death records. I would have to sieve them out from among all of the ‘eat’ and ‘grant’ records that flow by the hundreds out of every tick.
- Made data file names yymmdd-hhmmss in form.
- Added processing instructions to CSV files so I don’t forget how to make the data usable.
- Fixed some typos in info tab.
- Added reference to ODD description in info tab.
- Changed email to new [orrery@rogers.com](mailto:orrery@rogers.com) (160701)

#### Version 1.38 (141116)

- Uploaded to the NetLogo Modelling Commons hoping for comment.
- Also uploaded ODD description, and other ModEco C++ documents.

#### Version 1.37 (141114)

- Built more of the ‘Per Transaction’ (DPT) data collection. Did not do grants, or bio functions; just commercial transactions.
- Tested and released a variety of things suppressed previously in search of sustainability. They have an effect, but do not remove sustainability.
- Added two histograms for age of agents (wrkrs and frmrs).

- Added clear, setup, one tick and go buttons on each panel in the interface, for ease of use.

#### Version 1.36 (141114)

- I added some 'experimental' computations of entropic indices: one for wrkrs, one for frmrs, and one for all turtles. There is a plot associated with it. Some aspects (e.g. rescaling, are partially implemented. I need to think about that a little more.

#### Version 1.35 (141112)

- I added three kinds of CSV output, in addition to the debug output (aif trace, step trace), being data per transaction (DPX), data per tick (DPT), and data per generation (DPG).
- The framework for the per-transaction (DPX) data was built, but I need to build the actual data collection steps and the record headers for each type of transaction.
- I added a version number in the output of CSV data files.
- The tick counter was moved from the Post-tick step to the Pre-tick step. Then, all transactions during a tick can be marked as occurring during that tick in the data dump files.

#### Version 1.34 (141105)

- I substantially altered the setup routines as I turned most of the soft-coded parameters into slider parameters. This allows me to use the 'BehaviorSpace' tool.
- The working set of parameters were coded as a default set.
- Somehow I damaged the debug for Setup step in the last version. I fixed that bug.
- Debt for the MMgr can now be toggled on or off.
- I suppressed validity checks between steps, but left it there for the 'Post-tick' step.
- I re-arranged the interface into panels of controls that are related.
- I added a variety of 'instructions' and notes to the interface to remind myself how things work.

#### Version 1.33 (141105)

- I rationalized all of the debug features, which were rather obtuse and disjointed. I will leave them in the release version, for now. I cannot easily suppress them without damaging the model significantly. All of the conditional check slow it down, I suppose, along with the checks on data collection. Oh well!

#### Version 1.32 (141103)

- Rationalized the EMgr grant message signatures with other 'do-' step signatures.
- Added titles to different parts. Altered fonts.
- Constructed an ASSERT-like mechanism to help find anomalous values such as negatives when they are invalid. Effective to find bug in Fmr's cash flow, below.
- Constructed a series of validity checks for wrkrs and frmrs. Applied them after every step.
- Fmr's cash was not checked before hiring, with the result that frmrs sometimes had negative cash. Bug fixed.
- Discovered that sometimes frmrs returned the entire cash grant in Do-ByR step. Bug fixed.
- Re-enabled g-GTT (gestation time threshold) to try to suppress the synchronization of births and deaths. It sort of worked.

#### Version 1.31 (141026)

- Changed the name to ModEco\_V1.31.nlogo from The\_PMM\_V1.31.nlogo because there is part of the parameter space that is clearly NOT permanent. The PMM occupies part of the parameter space only.
- Test results: with seed=7; MMgr on and EMgr on, seems stable; if either is turned off, it collapses very quickly. The cause is obvious for the EMgr, as the economy starves for lack of resources, which are all sequestered in the dead estate pools. The cause is far less obvious for the MMgr, and far more sudden than expected. The code that handles that was rewritten to simplify it, and then debugged again, and seems ok. I.e. it seems to work as intended. I'll have to do some research on that to see if the MMgr is really necessary for sustainable dynamics, and if so, why.
- Converted the 'cash' line graph to a 'sector sizes' line graph showing wrkrs, frmrs, MMgr and EMgr.
- Adjusted line colours in asset class line graphs to be consistent.
- Added a third 'go' button near the asset class line graph area.
- Added three sliders to enable user control of amount loaded into EMgr at setup, or during 'behaviour space' runs.
- Moved f-update-aggregates into debug buttons so it will be called less frequently during a real run. Eliminated gb-aggregates-on switch.
- Search-all 'set energy' and ensured 'available-energy was always updated.
- Moved 'return unused grants' inside loop for SII.
- This one is stable again but the trajectories are different than for V1.30.
- Found bug "if( gb-EMgr = 1 )" sb "if( gb-EMgr = true )". Fixed. Grants were not being cleared or returned.
- Found bug. Waste grants both sold and returned, giving agents a profit on every transaction. Fixed. Removed gratuitous profit.
- Ensured all instances of g-no-of-hires-max were soft-coded. Should not change trajectories.
- Added graph for 'number of agents'.
- Computed y range for histograms to make them taller.

#### Version 1.30 (141026)

- This one is stable, a functional copy of 1.29. Keep it. Use it as the basis for tidy up actions and issue resolution.
- All stand-alone comments were capitalized and punctuated. The nlogo standard seems to be to leave out capitalization and punctuation, and I was trying to do it that way, but it just looks untidy to me. Reverted to my own style. But inline comments have not been tidied up. They are often sentence fragments, and are ok as is.

#### Version 1.29 (141020)

- Debugged all steps. All seem ok. Engine works as designed. Just does not stay sustainable. Wrkrs all dead by 2000 ticks. Die of old age. They cannot save enough energy to reach reproductive health. Drat!
- I have changed the -net-value calculation to a -real-value calculation for application of business factors, but not for the wealth histograms. The old code is still there. I can change it back if it doesn't work. Didn't help. Drat!
- At the same time, not only the purchase of supplies is controlled by HSL, but also the taking on of work is controlled by HSL. Energy is only spent on work when supplies are below the limit, below the threshold. Wrkrs much better. Frmrs all die. Drat!

- I put a hard absolute lower limit on hrl, hil, and hsl. These are in the form of global variables used as over-rides. Frmrs all dead by 191 ticks. Drat!
- Adjusted startup values for all asset classes to steady-state design values. Frmrs all dead by 1659 ticks. Supplies ran out. Drat!
- Raised HSL min for frmrs from 100 to 200, and initial supplies from 100 to 200. Frmrs all dead by 1117 ticks. Drat!
- Took HSL restriction off frmrs for Hwk. All frmrs died at 1410 ticks. Supplies ran out. It seems they run out of energy and cannot hire enough wrkrs. Drat!
- Altered Hwk and Hwk energy grants so that frmrs are always ‘deserving’, getting energy grants to ensure work continues. This will keep them alive, but may not enable them to build up enough energy to reproduce. All frmrs died at 2252 ticks. Drat!
- It seems that agents cannot retain enough energy to be healthy enough to reproduce. Added energy set point that increments from 0 to g-RAT. It reserves that amount of energy. The set point is the same as age, mostly, but if I put GTT back in, it would vary from age. Each agent also has available-energy = energy – energy-set-point. This is all that is available for work on each tick. AND VOILA. IT WORKED. IT RAN TO 155,000 TICKS. EUREKA!
- **I don’t know why all of this extra fiddling is needed to keep the frmrs alive in this NetLogo implementation when it is not needed in the C++ implementation. There is a difference in the trajectory in state space that works against saving energy. There seems to be an inclination for agents to save up energy in the C++ version that is not there in the NetLogo version, so it needed to be forcefully and explicitly ratcheted upwards as the agents grew older and approached the age of maturity.**

Version 1.28 (141015)

- Converted all debug calls to LOG-FILE and LOG-WITH-DISPLAY and LOG-AGENT
- EMgr eu grant to frmrs was 40, should be 20. Bug fixed.
- HSL of frmwr was used in place of HSL of wrkr when computing dynamic quota for purchase of supplies of wrkrs. Bug fixed.

Version 1.27 (141011)

- Max supplies purchased per frmwr per xaction raised from 40 to 160.
- HSL was for frmwr instead of customer. Bug fixed.
- Made all business factors and business limits consistent. E.g. hrf, hif, hsf, hrl, hil, hsl.
- Adjusted the business factors (soft coded) as hrf-f = .15; hif-f = .3; hsf-f = .3; hsf-w = .3. These are the target percentage asset values that guide purchases.
- Made limits hrl, hil and hsl stored variables in frmwr and wrkr.
- Serious inconsistencies exist in booleans and handling of true/false values. Only the native booleans from switches are now true/false. My own booleans are all 1/0. All tests are explicit (e.g. if( gb-debug-on = true ) ) or if( gb-debug-flow-on = 1 ) )

Version 1.26 (141009)

- Gave ‘toggles’ debug dump it’s own switch in code gb-debug-tog-on.
- Debug output marked by ‘do-’ step.
- Debug trace built for ‘agent-in-focus’ with agent dump to log file.

- Syntax of debug notices adjusted for each do-function within tick.
- Debug fixed for Setup. Cludge, but it works now. Debug setting is persistent in the switch but can be toggled with a button. So, both are needed. Cludge!!
- Adjusted usages of 'word' primitive with multiple inputs e.g. (word x y z)

Version 1.25 (141008)

- added line graphs for wrkrs' and frmrs' asset classes

Version 1.24 (141004)

- made debug output go to a log file instead of the command centre.
- made real-time graphs 'on' by default until I can determine why agents die off.
- improved efficiency of hire wrkrs routine; frmrs with 0 energy don't continue
- gave agents staggered ages when spawned/forked/born/sprouted.