

Economic Dynamics: Two Years from Completion

Bob Eberlein

isee systems

The Economic Dynamics Collection

- Just what George has described
 - A curated collection that Jay selected of work that he had written
 - From the same Lunches, but with a twist
- The Social Dynamics collection is largely a standalone works
 - Referencing different models
 - Some pedigree, but no real dependence
- The Economic Dynamics collection centers around the National Model Project
 - Many graphs and insights were derived from that work
 - Jay wanted others to be able to replicate the results
 - But the graphs are not from any single model
 - Tried several approaches to writing this up
 - Two failed first chapters – more gracious in no
- Jay's Request
 - Take the current model and make sure it can do these things
 - Modest, but potentially fraught, undertaking
 - ...don't change much... but maybe add some more supply chain dynamics...

Two Steps

1. Get the national model ready
2. Collate the papers into a publishable form

The National Model was long in the making

- Jay started thinking about this around the time *Industrial Dynamics* was published
- Later he developed a significant research project at MIT
 - Lots of people worked on it over the years including Alan Graham, Peter Senge, John Sterman, Nat Mass, Jim Hines and lots more
- When I got to MIT I asked Jay to work on it
 - He said no
 - I Asked again
 - He said no
 - Third time was a charm
 - Worked on equilibrium analysis
 - Lots of other people working on the model

The First Migration of the National Model

- Jay retired and stopped using his MIT office
- Moved the model from Dynamo to Vensim
 - Quite straightforward translation
 - The model does not use anything special
 - It is the only model of Jay's I know of that uses arrays
- Technical Support for Jay
 - Running on a DEC workstation
 - Windows NT on Alpha
 - Had to build the software on his computer
 - Basement office
 - Floppy disks
 - Cookies
 - Would call up with bugs
 - I would walk him through fixes

```

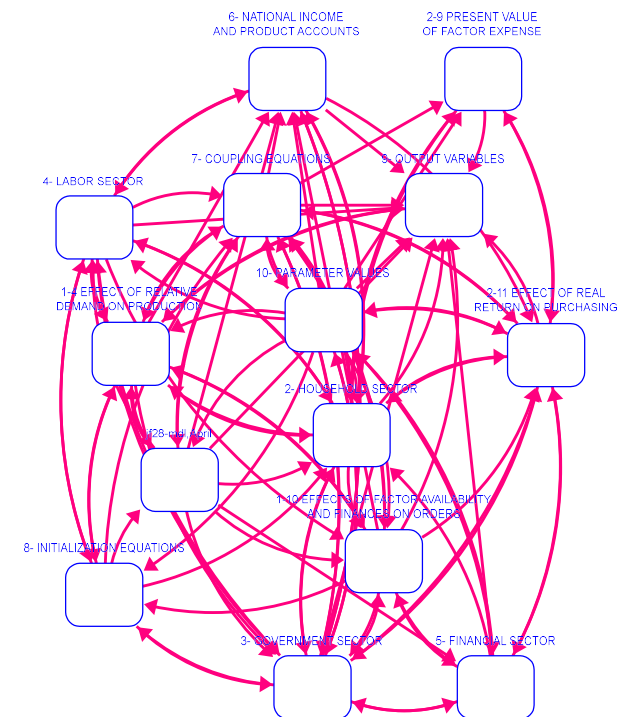
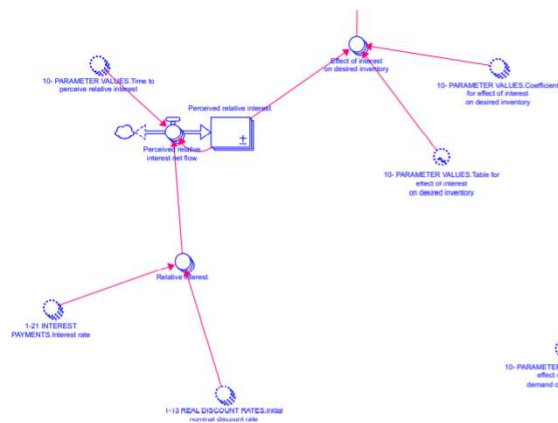
UOR,K=UOR,J+(DT)*(RRR,JK-SSR,JK)
IAR,K=IAR,J+(DT)*(SRR,JK-SSR,JK)
STR,K=UOR,K/DFR,K
NIR,K=IAR,K/DT
SSR,KL=CLIP(STR,K,NIR,K,NIR,K,STR,K)
DFR,K=(MNR,K/IAR,K)+DMR
MNR,K=(DUR)*(IDR,K)
IDR,K=(AIR)*(RSR,K)
RSR,K=RSR,J+(DT)*(1/DRR)*(RRR,JK-RSR,J)
PDR,KL=RRR,JK+(1/DIR)*(IDR,K-IAR,K+LDR,K-LAR,K+UOR,K-UNR,K)
LDR,K=(RSR,K)*(DCR)+(RSR,K)*(DMR)+(RSR,K)*(DFD,K)+(RSR,K)*(DTR)
LAR,K=CPR,K+PMR,K+UOD,K+MTR,K
UNR,K=(RSR,K)*(DHR+DUR)
CPR,K=CPR,J+(DT)*(PDR,JK-PSR,JK)
PSR,KL=DELAY3(PDR,JK,DCR)
PMR,K=PMR,J+(DT)*(PSR,JK-RRD,JK)
RRD,KL=DELAY3(PSR,JK,DMR)
MTR,K=MTR,J+(DT)*(SSD,JK-SRR,JK)
SRR,KL=DELAY3(SSD,JK,DTR)
    
```

```

FA=BB+(PVQ*SVQ+CVQ*(1-SVQ)+HM)*CFA
~$
~ FINANCIAL ASSETS |
CVQ=Initial(PVQ)
~DOLLARS
~ CONSTANT VALUE OF EQUITY |
PVQ=Integ(((1/TPVQ)*(VQ-PVQ),VQ)
~DOLLARS
~ PERCEIVED VALUE OF EQUITY
|
VQ=IVQ*XMQ
~DOLLARS
~ VALUE OF EQUITY |
    
```

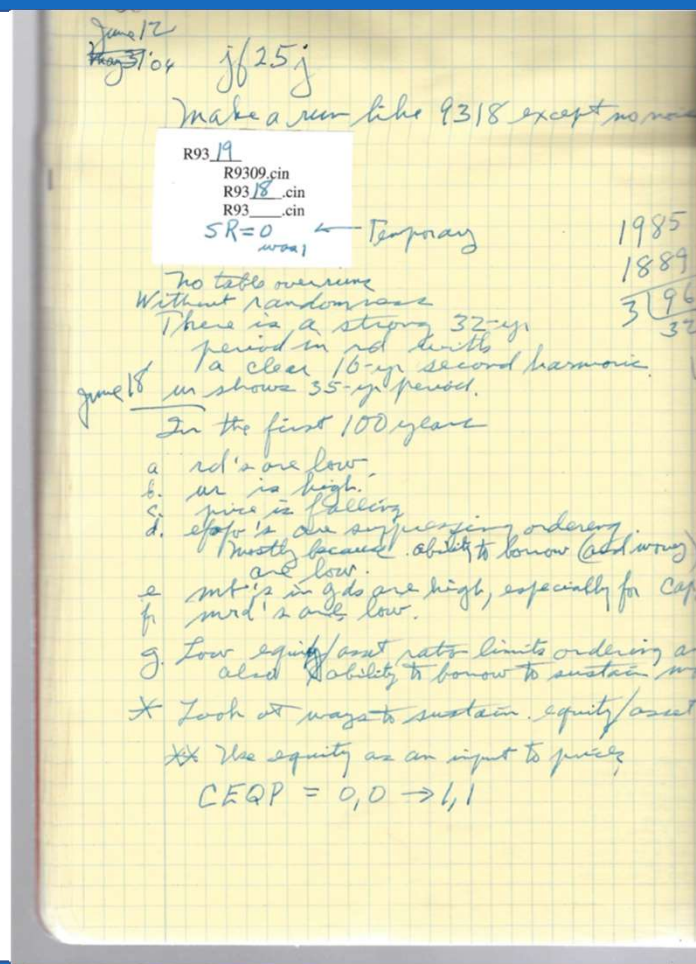
The Second Migration of the National Model

- Equations are still not a problem
 - Added a couple macros not in Dynamo
- Still using A, I as variable names
 - Jay's comments are perfect as variable names
- No diagrams to be had
 - Automated stock and flow to the rescue



Still to do

- Clean up and consolidate the diagrams
 - More software improvements
- Get the model behaving
 - Have notes from 2002
- Tie the paper graphs to the model
 - May be tricky
- Then step 2



Postscript

- Jay's running joke was that the National Model was two years from completion and had been for the last 10
 - It is still true today