Stock Flow Consistency, more than an Accounting Framework (Preliminary)

Antoine Godin

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Network of authors in 2013

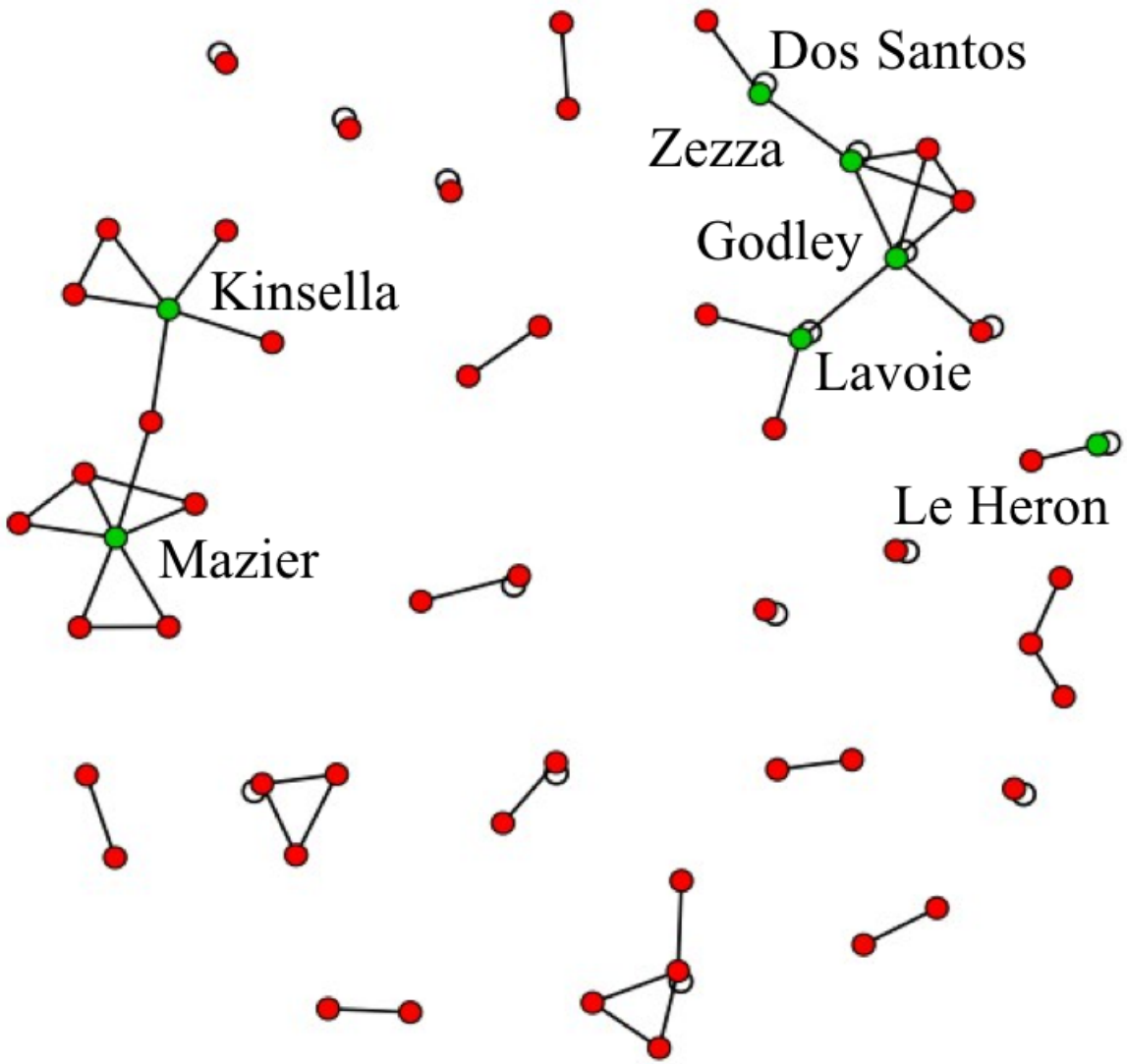


Figure 1: Network of authors in 2013, source: Caverzasi and Godin (2015)

Network of authors in 2016

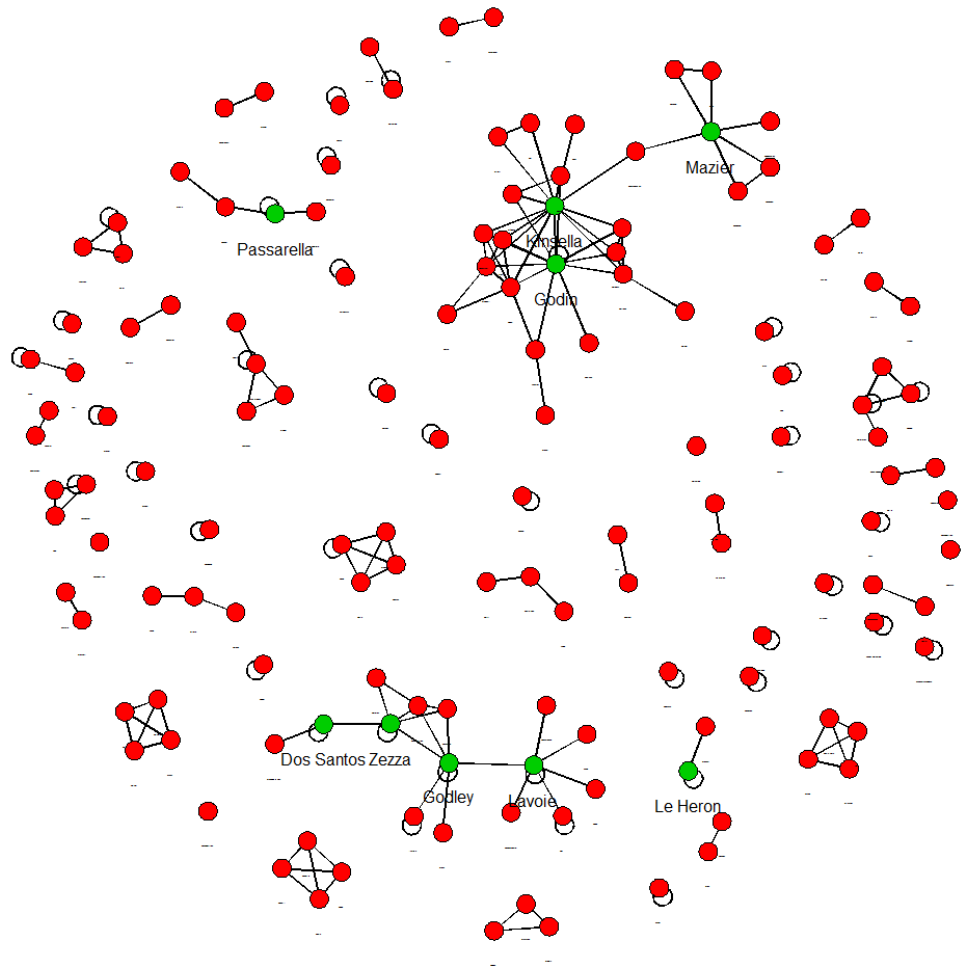


Figure 2: Network of authors in 2016, source: author's computation

Evolution of the approach

Booming litterature, how and why?

- Approach has reached its maturity (Caverzasi and Godin, 2015)
  - Intrinsic value added of Stock-Flow Relevance
  - Inclusive value added of common framework
  - Generative value added of convergence
- Approach applied to many different topics and issues but yet confined
  - Dispersed field?
  - Limitations?

Stocks, Flows and Consistency

- A name that undermines its strengths (Lavoie, 2014, Michel, 2016)
- Stock-Flow Accounting and Stock-Flow relevance.
  - Ensuring Stock-Flow Accounting is relatively straightforward, most macro-models could easily claim to be Stock-Flow Consistent.
  - Stock-Flow Relevance (Connected?): dynamic feedbacks between all stocks and flows.

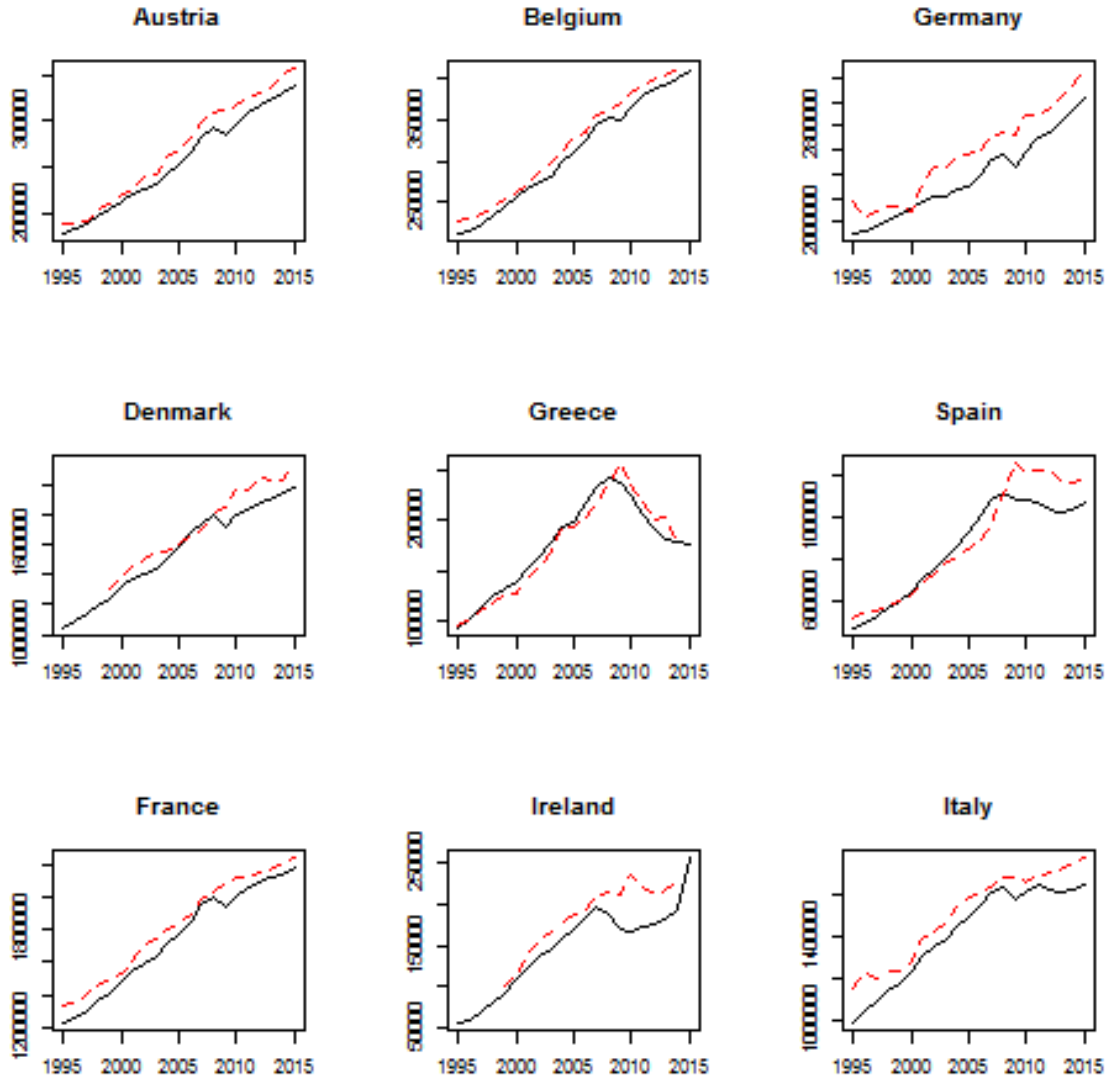
Common framework, language and norms

- Importance of having a common framework, language and identical set of norms.
  - Ease of exposition
  - Ease of comparison between models
  - Ease of replication
- Tool for structuring thoughts (Lavoie 2004, Passarella 2012, Zezza 2012, among many others)

Tool for convergence?

- Common ground for heterodox schools (Lavoie 2008, Caverzasi and Godin, 2015)
- Within pK economics:
  - Kaleckian and Kaldorian approaches (Lavoie and Godley 2001-2002)
  - Tobin, Gordon and the Cambridge corporate model (Bernardo, 2016)
- Between schools of thoughts
  - Combining post-Keynesian and Schumpeterian approaches (Caiani et al. 2014a, b)
  - Compare and contrast on different closure (Skott and Ryoo 2007, Alvares Carrion and Ehnts 2014)
  - Compare different theories (Le Heron 2008)
- Data is the same format for different countries

Godley's Combined Fiscal-Trade Ratio vs GDP for selected European countries



Limitation

- Cumbersome with the equations, too much focus on the existing math/formalisation?
- Focus on the steady/stationary state
- Complex and/or complicated?
- Godley and Lavoie (2007) layed out the methodology and the framework, need for a more practical reference
  - Courses, online courses
  - Dedicated software(s)
  - Community building: summer/winter schools, workshops

Recent Litterature and debates

Recent contributions: Agent-Based and Ecological Economics

- Agent Based
  - Focus on credit and finance: EURACE (Deisseberg et al. 2008, Raberto et al. 2012), JMAB-Ancona (Caiani et al. 2016), Russo et al., Pisa (Dosi et al. 2010, 2013, 2015)
  - Explicit focus on PK economics:
    - Seppecher et al.(2016) on learning, etc. . .
    - Caiani et al. (2016) on credit and endogenous money
    - Schasfoort et al. (2016) on monetary policy channels
- Ecological
  - Offer an explicit framework (Jackson et al. 2016, Dafermos et al. 2016)
  - Focus on finance and banking (Campiglio 2016, Godin et al. 2016)
  - Path dependency and Irreversibility of Capital (Kemp-Benedict, 2014, Godin et al. 2016)

Empirics and estimation/calibration

- Ciuffo and Rosenberg (2015) on domain exploration and numerical stability analysis
- Connection with macro structural econometric model (SEM)
  - Levy model (Papadimitriou et al. 2016)
  - Bank of England model (Burgess et al. 2016)
  - CBR macroeconomic model of the UK (Gudgin et al. 2015)

Engaging with the mainstream

- Intrinstic difference between inter-temporal optimisaton with perfect foresight vs. backward looking satisficing behaviour with path dependency
- Need to re-connect with large structural econometric models
- Not forget the justification of behavioural rules (consumption, investment, credit supply) after having a broadening of the approach
- Can we answer (partialy) the Lucas critique at the macro level: the role of stock-flow norms

Didactics

- Interactions with economists (mainstream and less)
  - Importance of stock and flow dimensions (Bezemer et al. 2015)
  - Importance of clearing mechanisms for markets under uncertainty (Foley 1975)
  - Importance of disequilibrium mechanics, path dependency, etc. . .
- Interactions with students
  - Undergrad level, with dynamic models without coding (Shiny, Mathematica, . . .): simple pK results such as endogenous money, paradox of thrift, Minskian dynamics, etc.
  - Postgrad level, integrated with R: sectorial accounts (empirical), mathematical properties (causal structure, soutions), more complex pK results and model building (PKSFC package)
- Interactions with policy makers
  - Importance of visualisation (results, causal structure)
  - Importance of interactions with the model
  - Importance of real-world structures

Visualisation - Sankey Diagram

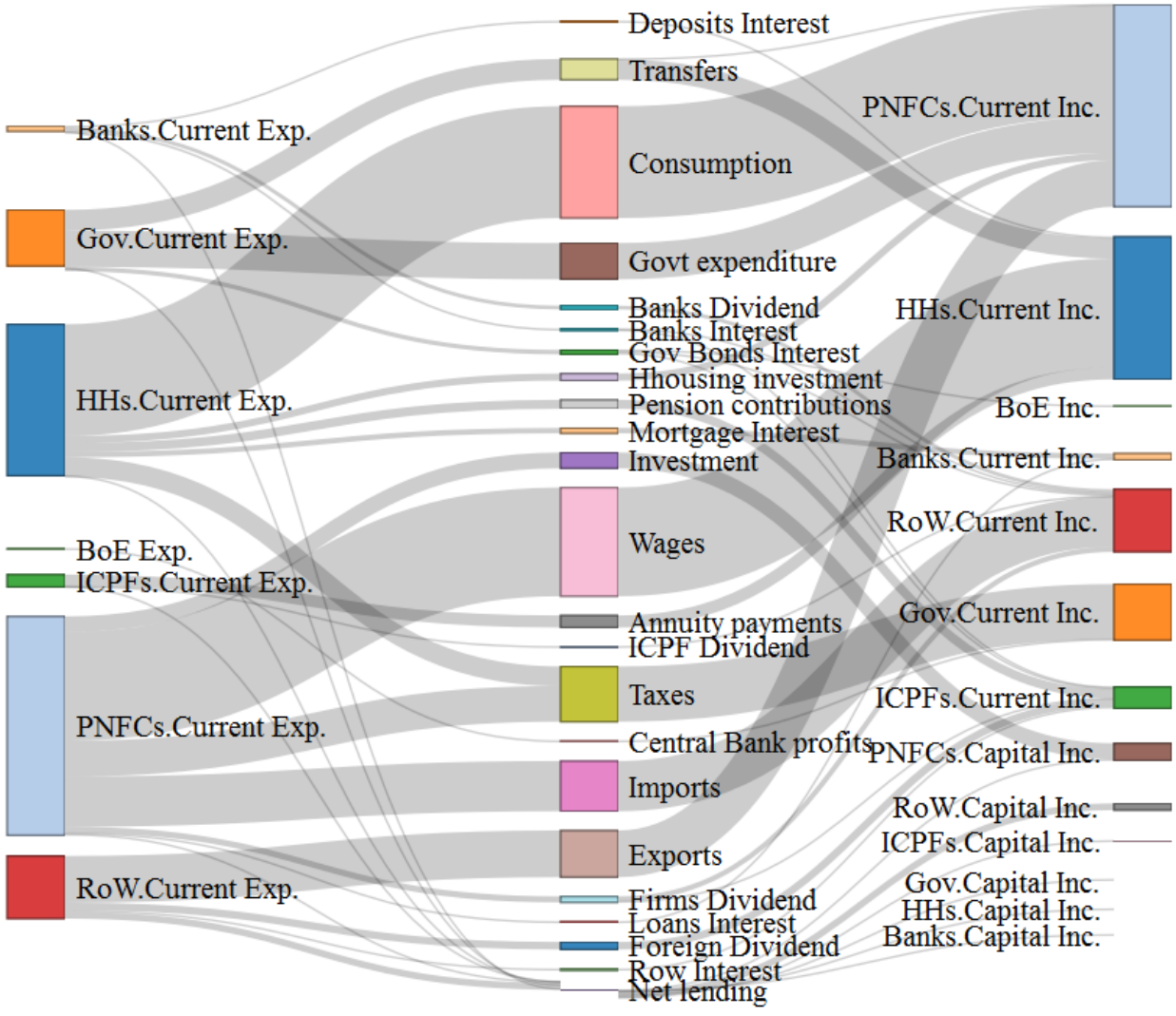
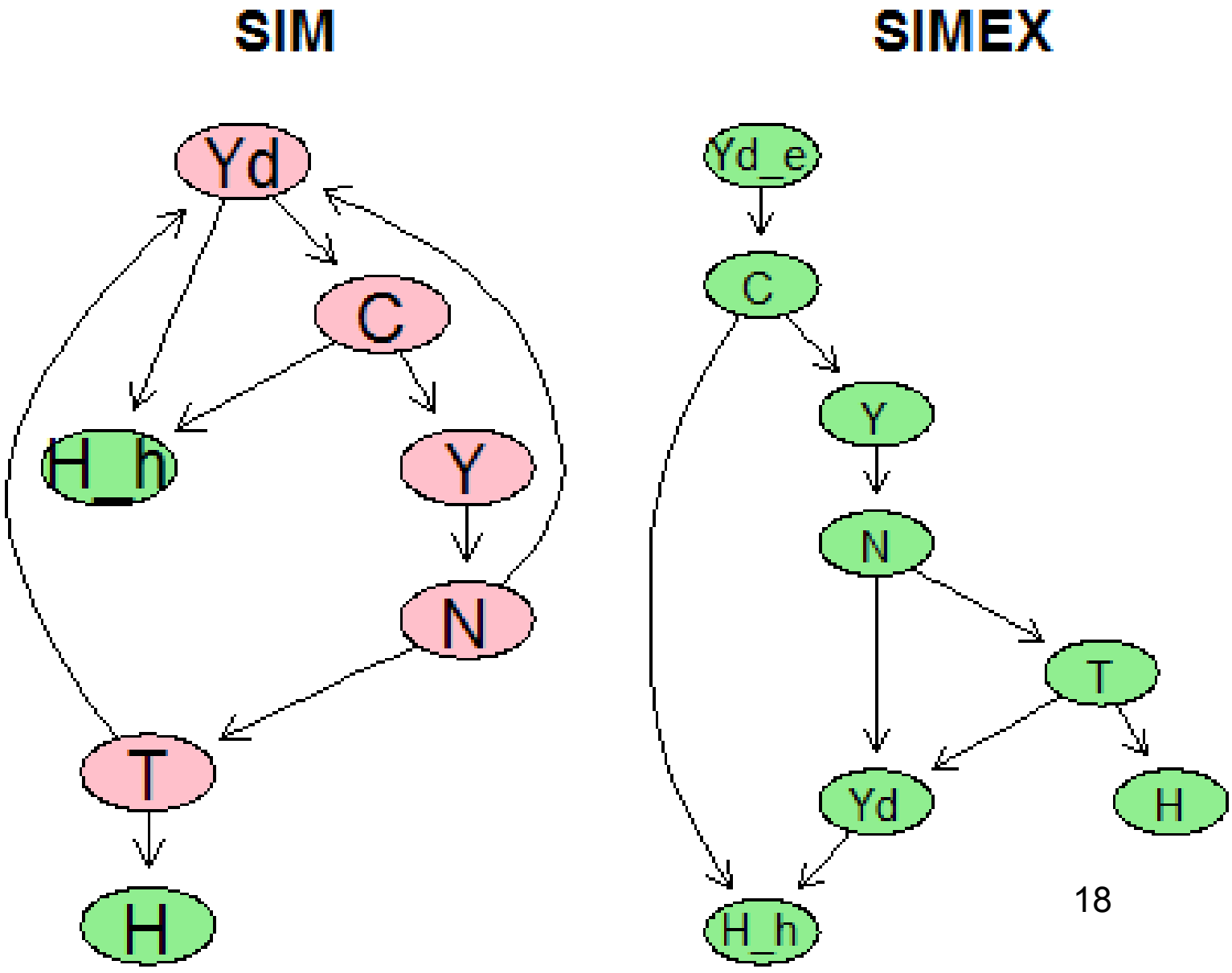


Figure 4: Flows in the UK Economy 2014, source: Burgess et al. (2016)

Visualisation - Graph representation

- Fenell et al. (2015) show that each SFC model can be percieved as a Directed Aciclical Graph, which allows to understand the internal causal structure of the model (imposed).
- Practically, all endogenous variables are nodes and there if a variable appears in the equation determining another, there is vertex between the two nodes.
- Its is then possible to plot the graph and observe the structure of the model.
- In the following graphs, nodes that are part of a system of dependent equations are highlighted in pink.

Example with models SIM-SIMEX



Shock propagation in more complex models

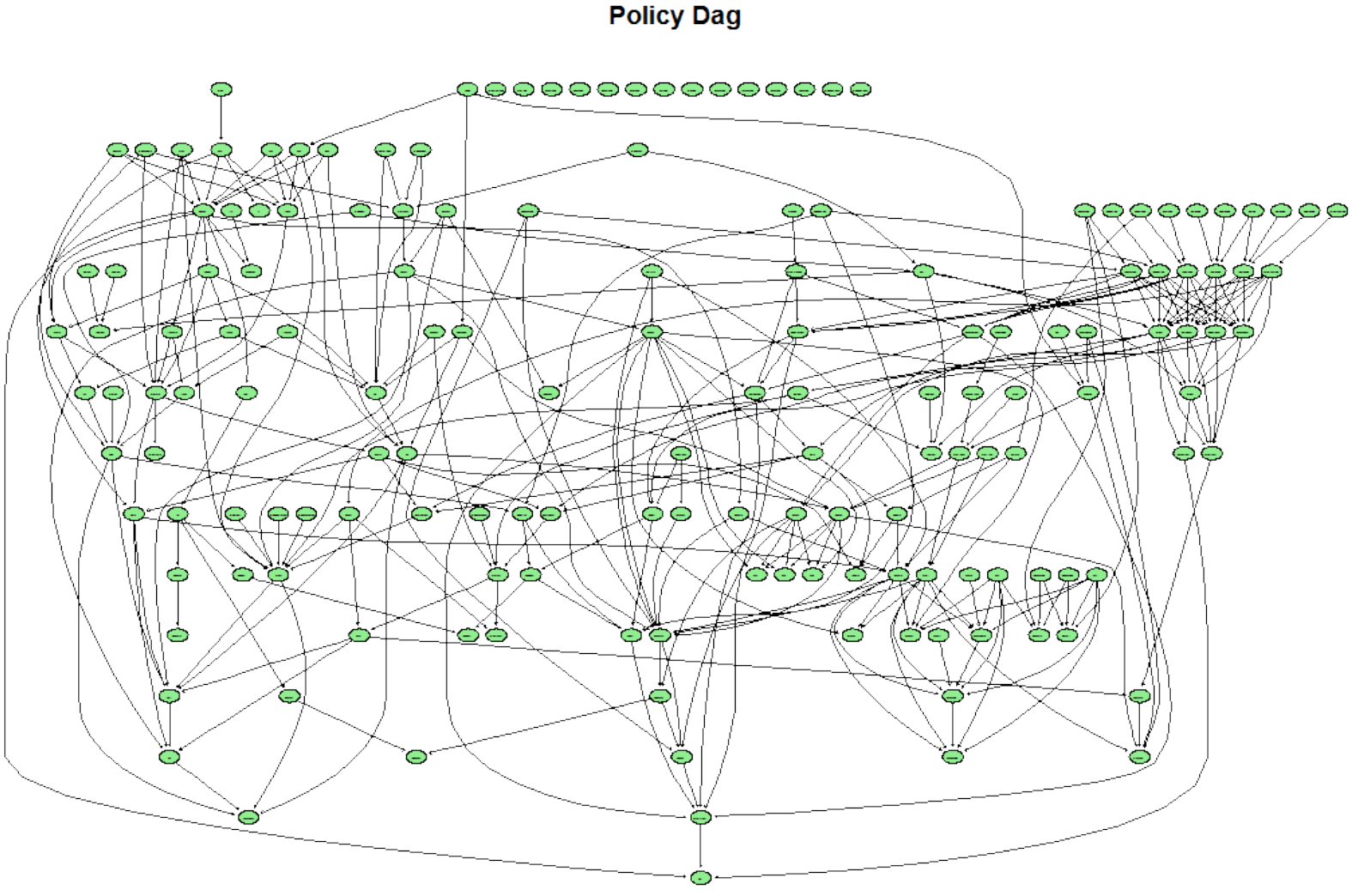


Figure 6: Graph representation of Burgess et al. (2016)

Shock to CAR - Direct

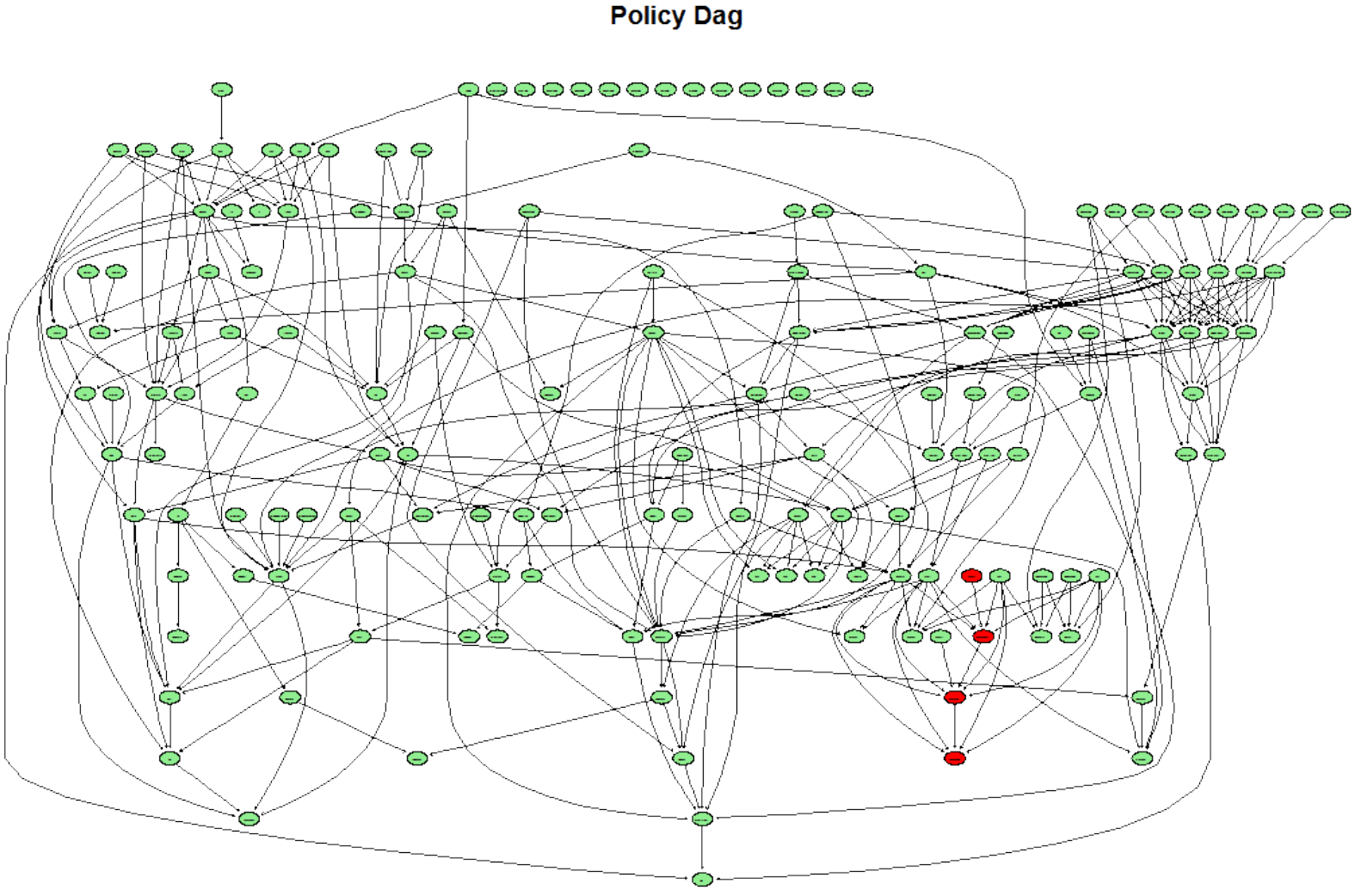


Figure 7: Graph representation of Burgess et al. (2016)

Shock to CAR - Lag 1: Interest rates

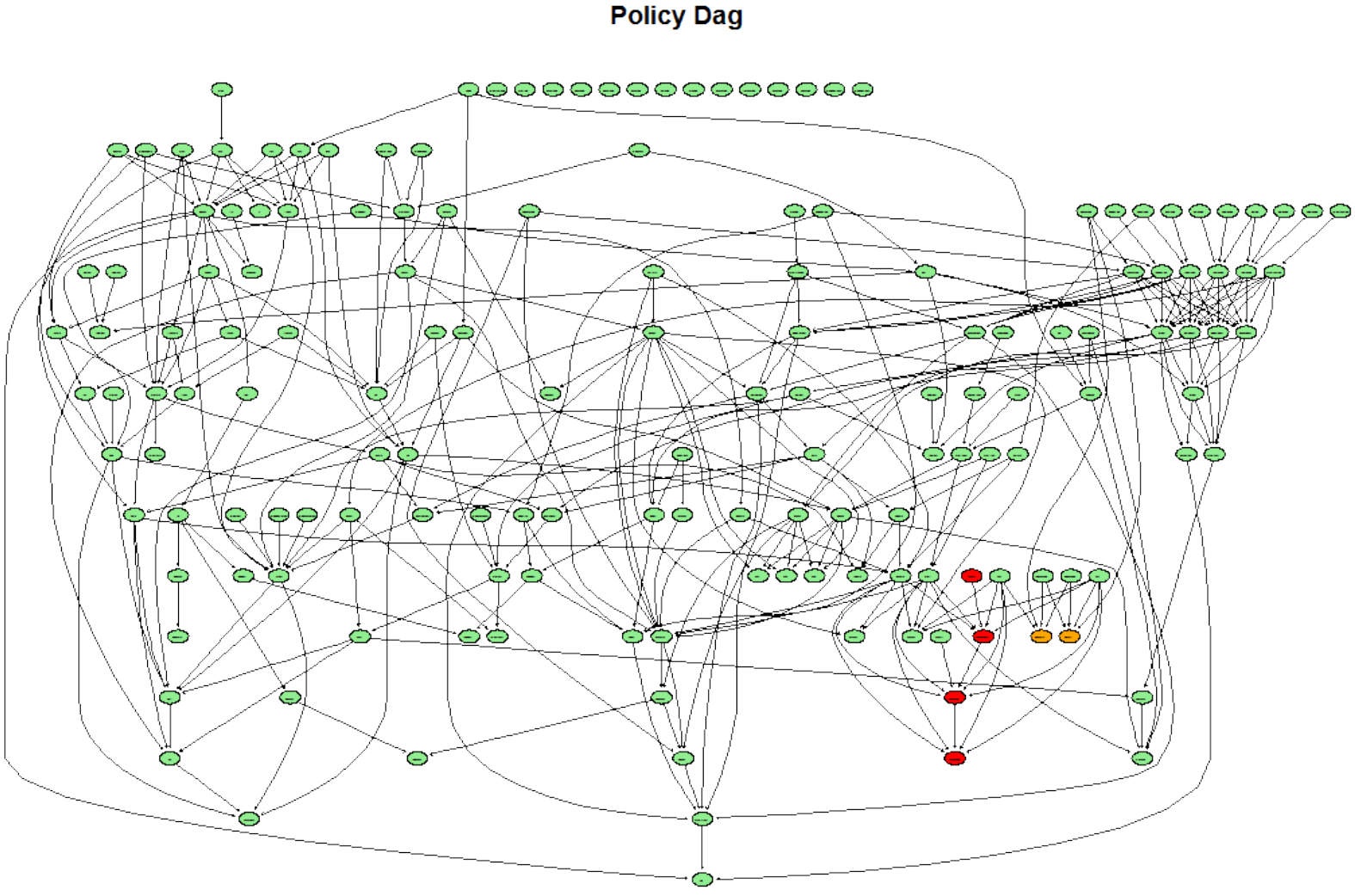


Figure 8: Graph representation of Burgess et al. (2016)

Shock to CAR - Lag 2: Income and profits

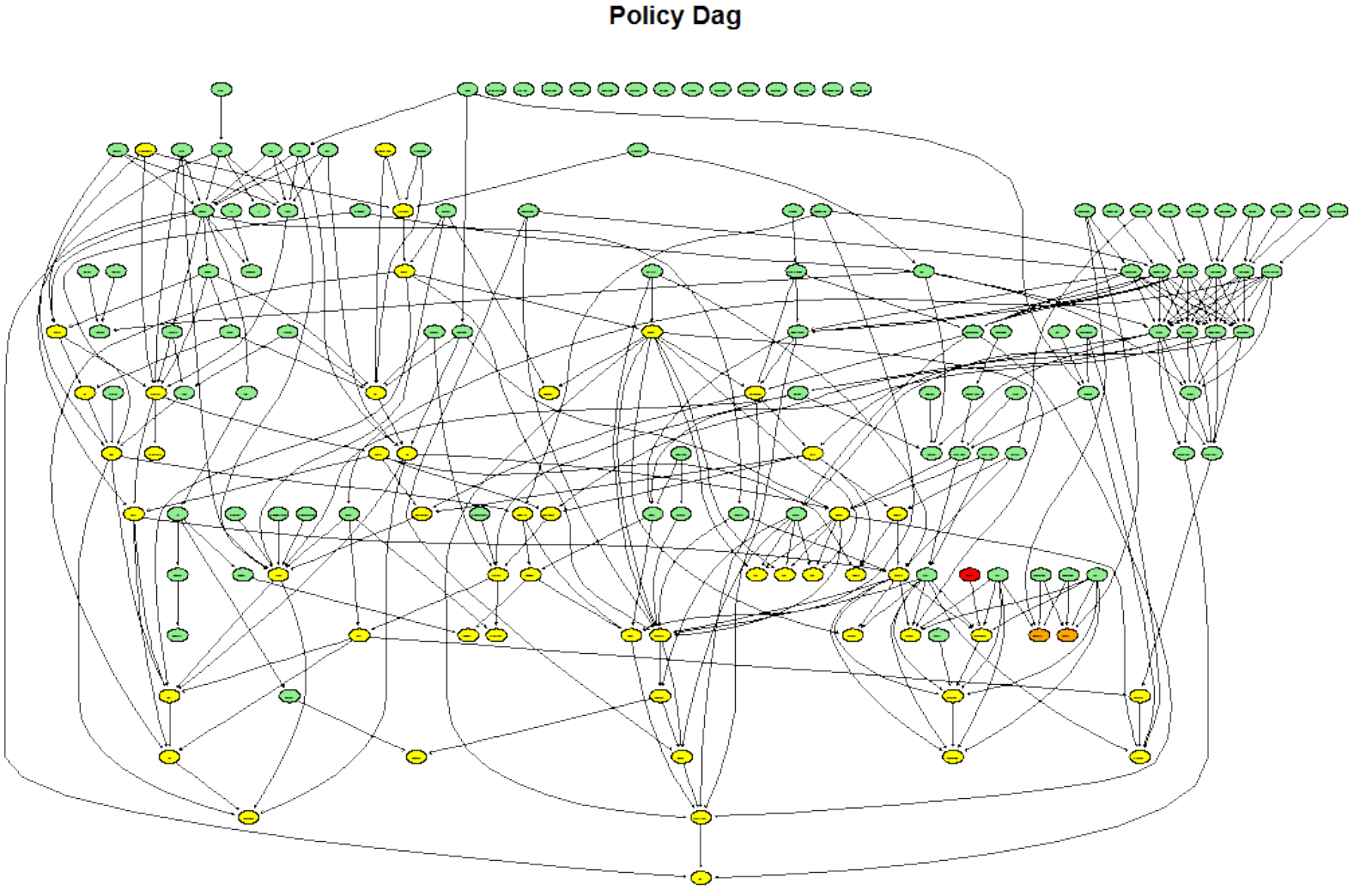
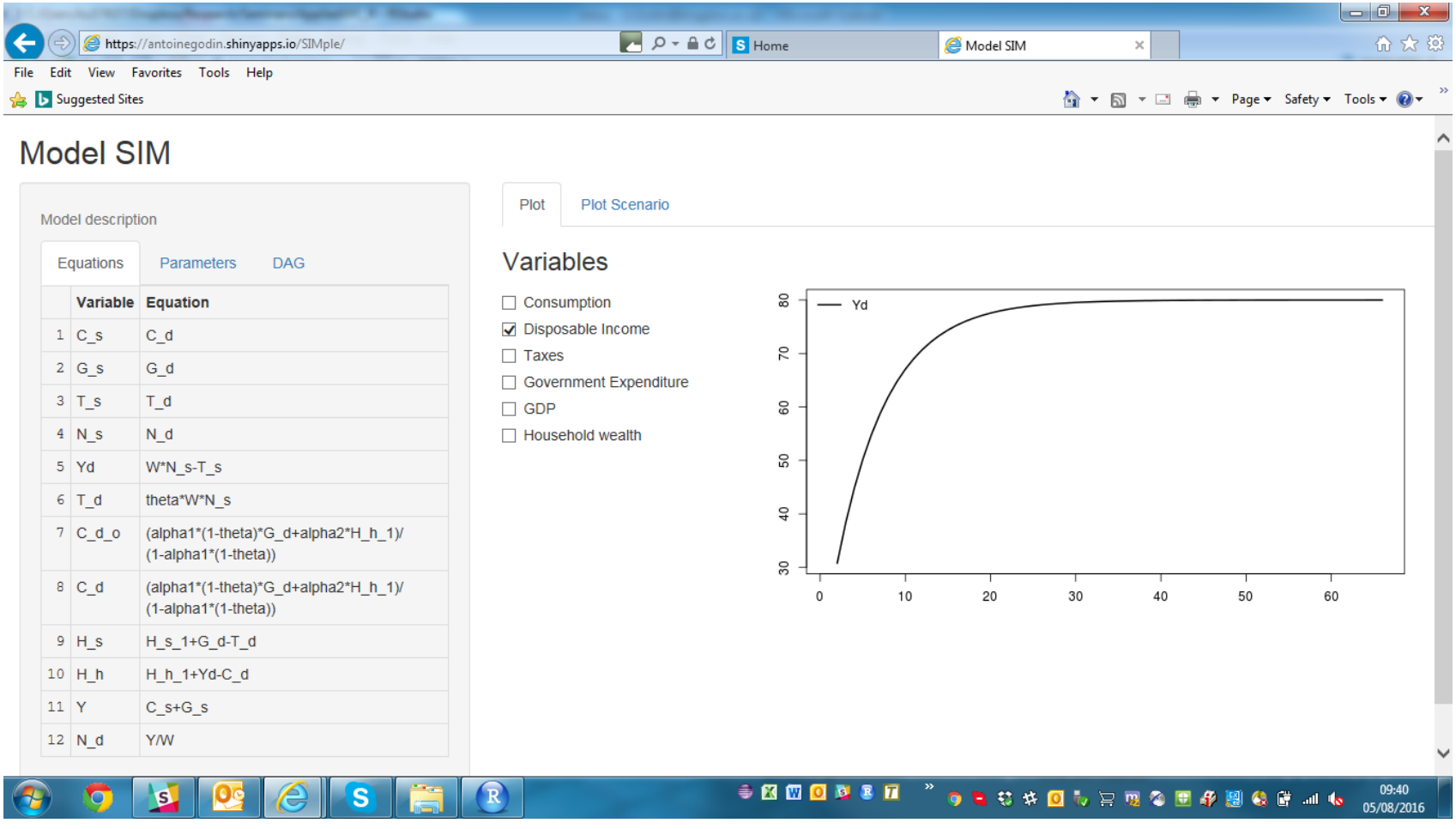


Figure 9: Graph representation of Burgess et al. (2016)

Dynamical interaction with models



	Variable	Equation
1	C_s	C_d
2	G_s	G_d
3	T_s	T_d
4	N_s	N_d
5	Yd	W*N_s-T_s
6	T_d	theta*W*N_s
7	C_d_o	(alpha1*(1-theta)*G_d+alpha2*H_h_1)/ (1-alpha1*(1-theta))
8	C_d	(alpha1*(1-theta)*G_d+alpha2*H_h_1)/ (1-alpha1*(1-theta))
9	H_s	H_s_1+G_d-T_d
10	H_h	H_h_1+Yd-C_d
11	Y	C_s+G_s
12	N_d	Y/W

Figure 10: Shiny application

Visualisation and Dissemination

- New tools: sankey, graph theory, heat maps (Kinsella, 2015)
- Causality structure and dynamical causality structure
- Shiny and dynamic interaction
  - SIM, SIMEX and simple AB-SFC SIMEX: `antoinegodin.shinyapps.io/AB-SFC`
  - BoE model will publish a ShinyApp
  - Complement `sfc-models.net`

Points for further research

What's the future of PK-SFC modelling?

The value of the approach is proportional to its ability to:

1. answer pertinent policy questions
2. highlight areas mainstream models can't

Thank you

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