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

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21 October 2016
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 literature, 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

Figure 3: Source: Eurostat and Author’s computation
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) laid 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 Literature and debates
Recent contributions: Agent-Based and Ecological Economics

- **Agent Based**
  - 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 (Bergess et al. 2016)
  - CBR macroeconomic model of the UK (Gudgin et al. 2015)
Engaging with the mainstream

- Intrinsinc difference between inter-temporal optimisation 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 (partially) 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, solutions), 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
Figure 4: Flows in the UK Economy 2014, source: Burgess et al. (2016)
Fenell et al. (2015) show that each SFC model can be perceived as a Directed Acyclic 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.

It 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)
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

**Figure 10: Shiny application**

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<table>
<thead>
<tr>
<th>Variable</th>
<th>Equation</th>
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</thead>
<tbody>
<tr>
<td>1 C_s</td>
<td>C_d</td>
</tr>
<tr>
<td>2 G_s</td>
<td>G_d</td>
</tr>
<tr>
<td>3 T_s</td>
<td>T_d</td>
</tr>
<tr>
<td>4 N_s</td>
<td>N_d</td>
</tr>
<tr>
<td>5 Y_d</td>
<td>W*N_s-T_s</td>
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<tr>
<td>6 T_d</td>
<td>theta<em>W</em>N_s</td>
</tr>
<tr>
<td>7 C_d_o</td>
<td>(alpha1*(1-theta)<em>G_d+alpha2</em>H_h_1)/(1-alpha1*(1-theta))</td>
</tr>
<tr>
<td>9 C_d</td>
<td>(alpha1*(1-theta)<em>G_d+alpha2</em>H_h_1)/(1-alpha1*(1-theta))</td>
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<tr>
<td>9 H_s</td>
<td>H_s_1+G_d-T_d</td>
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<tr>
<td>10 H_h</td>
<td>H_h_1+Y_d*C_d</td>
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<tr>
<td>11 Y</td>
<td>C_s+G_s</td>
</tr>
<tr>
<td>12 N_d</td>
<td>Y/I_W</td>
</tr>
</tbody>
</table>

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Variable:
- Consumption
- Disposable Income (checked)
- Taxes
- Government Expenditure
- GDP
- Household wealth

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Graph showing the relationship between $Y_d$. The graph indicates an increasing trend in $Y_d$ with respect to time, starting from a lower value and approaching an upper limit as time increases. The curve suggests a saturation effect where the growth of $Y_d$ slows down after a certain point.
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
References


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