Minsky - Godley and the Financial Balances Approach

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Outline

1. Reasons to be interested
2. Historical background
3. Main principles of SFC modeling
4. Model closures
5. The *New Cambridge* approach to financial balances

Why is it of interest?

- The SFC approach provides a tight framework for modeling the interactions between real and financial markets
- It has a rigorous, yet flexible structure to accommodate alternative theoretical – and empirical – closures
- In its post-Keynesian version, it has been found to be effective to understand/predict financial or economic crisis (Bezemer 2010)

Minsky and Godley

Minsky and Godley both clearly emphasize the relationship between the financial sector and the real sector, how investment decisions may imply debt accumulation, and how "excessive" debt may trigger a crisis.

Macro models without an explicit representation of the financial sector are useless, out of long-run equilibria.

Relevance of Flow of Funds analysis

"The biggest financial crisis in a lifetime has shown how important it is to have a deep understanding of the financial balance sheets of the main sectors of the economy and the financial flows that take place between them."

(From the Foreword in *A Flow-of-Funds Perspective on the Financial Crisis*, edited by Bernhard Winkler, Ad Van Riet, and Peter Bull, 2014)

Origins

- Copeland (1947)
- Godley and Cripps (1983)
- Tobin (1969)
- Others include Davidson (1968); Eichner (1987); Taylor (1983); Skott (1989); Foley (1982)
- Main reference: Godley and Lavoie (2007)
- Recent survey in Nikiforos – Zezza (2017)

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Main principles: #1

1) Everything comes from somewhere and goes somewhere: no black holes (income for somebody is a payment from somebody else)

This principle is relative to monetary flows.

Variables which are meaningful only in an interval of time are «flows». An example is monthly income.

A Social Accounting Matrix (SAM) is a good way to ensure that the first principle is respected

A simple Social Accounting Matrix

	Prod.	Hous.	Non-fin.	Fin.I firms	Gov.	RoW	C/A	Total
Production		C			G	E	I	Q
Households	W		TRfh	TRbh	TRgh	TRwh		Yh
Non-fin.firms	Π			TRbf	TRgf	TRwf		Yf
Fin.firms		TRhb	TRfb		TRgb	TRwb		Yb
Government	Ti	TRhg	TRfg	TRbg		TRg		Yg
Rest of world	M	TRhw	TRfw	TRbw	TRgw			Yw
Capital acc.		**Sh**	**Sf**	**Sb**	**Sg**	**Sw**		S
Total	Q	Yh	Yf	Yb	Yg	Yw	I	

Flow accounting

Note that the SAM incorporates the first sections of National Accounting, but to a greater level of detail

A good example of a complete set of national accounts which follows the SNA conventions (see E.C. et al. 2009) is the U.S. Integrated Macroeconomic Accounts (US_IMA), available at http://www.bea.gov/national/nipaweb/Ni_FedBeaSna/Index.asp

Flow accounting

The SAM represents:

- Production Account
- Primary income account
- Secondary income account
- Use of income account
- Saving account (with no detail)

But in the US_IMA we have, for example, total receipts of interest payments by households, but we don't know who is paying them out, among the government, banks, non-financial firms or foreigners

However, more detailed data can be obtained or estimated to go from the published US_IMA to the SAM

The transactions matrix

An alternative approach to the SAM is provided by the Transactions matrix

Pros:

- Easier to compare to NIPA
- Possibility of mapping data without reaching who-to-whom classification

Cons:

- Less intuitive for checking who-to-whom consistency

A sample transactions matrix

	Hous.	Non-financial b.		Banks	Gov.	RoW	Total
		Ca	Ka				
Consumption	-C	+C					0
Gov. Expenditure		+G			-G		0
Net exports		+NX				-NX	0
Investment		+I	-I				0
Memo: output		*GDP*					
Wages	+W	-W				-Ww	0
NF profits	+Div	-Π	+RP			+RPw	0
Net indirect taxes		-IT			+IT		0
…							

The capital account

Receipts and expenditure for each sector are detailed in the National Income and Product Accounts (NIPA) in the Capital account

- Gross saving -
- Gross investment +
- Net incoming capital transfers =
- Net lending/borrowing

Net lending is also called *Financial balance*. The analysis of financial balances has played a crucial role in Godley's approach to understanding crisis.

Basic SFC principles: #2 & #3

2. Every transaction implies a quadruple entry in the accounting: when a U.S. firm imports goods from Japan, say, the accounting registers an increase in income in Japan, an increase in expenditure in the U.S., as well as an increase in Japanese bank deposits and a corresponding decrease in U.S. bank deposits. Current account payments and receipts imply a change in at least one stock of real of financial assets/liabilities.
3. From (2) – and from logic! – it follows that every financial asset for a sector is a liability for a different sector: net financial wealth for the system as a whole is zero;

Flow of funds

Net lending/borrowing implies a change in holdings of some financial asset/liability.

These are detailed in the Flow of funds matrix

Note that for each asset we should be able to identify which sector is issuing it (borrowing funds) and which sectors are acquiring it (lending funds).

Borrowing and lending for each asset must be equal

The Flow of funds matrix can be read vertically to identify the sources of funds for real investment

A simple Flow of funds matrix

	Hous.	Non-fin. firms	Financial firms	Gov.	Rest of the world	Total
Real assets	+Ih	+If		+Ig		+I
Deposits	+ΔD		-ΔD			0
Loans	-ΔLh	-ΔLf	+ΔL			0
Government debt	+ΔBh		+ΔBb	-ΔB	+ΔBw	0
Equities	+pe*ΔEh	-pe*ΔE	+pe*ΔEb		+pe*ΔEw	0
Foreign debt			+ΔFb		-ΔF	0
Total	Sh	Sf	Sb	Sg	Sw	+I

Basic SFC principles: #4

4. End-of-period stocks are obtained by cumulating the relevant flows, eventually taking capital gains into account. In general, $St = St\text{-}1 + Ft + CGt$, where S is the end-period monetary value of a stock, F the corresponding flow during the period, and CG net capital gains given by the change in the market value of S over the period

These flows-to-stocks identities provide the first dynamic component of any SFC model.

From the Flow of funds and capital gains we can therefore build the balance sheet for each sector in the economy

A simple Balance sheet matrix

	Hous.	Non-fin. firms	Financial firms	Gov.	Rest of the world	Total
Real assets	+Kh	+Kf		+Kg		+K
Deposits	+D		-D			0
Loans	-Lh	-Lf	+L			0
Government debt	+Bh		+Bb	-B	+Bw	0
Equities	+pe*Eh	-pe*E	+pe*Eb		+pe*Ew	0
Foreign debt			+Fb		-F	0
Total	Vh	Vf	Vb	Vg	Vw	+K

Implications

- Wealth for the world as a whole is only composed of real assets
- Wealth for a single country is given by real wealth plus foreign assets, less foreign debt

Basic SFC principles: #5

5. Financial assets imply future income streams (financial liabilities imply future income payments)

These stocks-to-flow links provide a second dynamic component to any SFC model.

Example: when a country has foreign debt, its future interest payments made abroad will worsen its current account balance

Example: an increase in government debt held domestically implies larger future interest payments to domestic creditors (not necessarily a problem)

Basic SFC principles: #6

5. All stock variables in a SFC model should feed back on some behavior

Assume that we model the economy so that the financial sector has non-zero net wealth.

If we don't include any implication from the level of net wealth on the sector's expenditure or portfolio decisions, the model may generate ever increasing (decreasing) net wealth

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Closing the model

Steps to follow in developing a SFC model:

1. Take a decision on the level of detail, depending on your research question
2. Lay down the matrices: SAM, FoF, Balance sheets
3. Write down the corresponding identities.
4. At least one identity for each matrix is implied by the others: it should be dropped by the model (*hidden equation*)
5. Verify which variables are determined by the model at this stage, and which are not

Simple, general linear model

All (linear) models can be expressed in matrix form as

$$B \cdot Y_t = G(L) \cdot Y_t + F(L) \cdot X_t + u_t$$

which is the structural form of the model

Here *L* is the lag operator such that

$$L \cdot Y_t = Y_{t-1}$$

A first problem is how to determine if a variable can be treated as exogenous (in *X*) or should be determined by the model (in *Y*)

A common solution – not adopted as such in the PK-SFC world – is to treat all variables as potentially endogenous

Simple, general linear model #2

$$B \cdot Y_t = G(L) \cdot Y_t + F(L) \cdot X_t + u$$

If the B matrix is triangular, the model is called recursive, and we can find a solution one equation at a time.

This results extends to the case of random shocks *u*

If we have simultaneity, the B matrix has one or more elements above the diagonal which are non-zero

Closures

$$B \cdot Y_t = G(L) \cdot Y_t + F(L) \cdot X_t + u$$

A *closure* implies the choice of a methodology for finding parameter values in the B, G and F matrices

One possibility is calibration

Godley's line of research has always been empirical. He used a «pragmatic» approach based on econometrics, which we still adopt in our work at the Levy Institute for our models of the United States and Greece

Closures (continued)

In theoretical models, Godley & Lavoie choose parameters loosely based on econometric estimates

Parameter choice is also guided by logical consistency

An example is the determination of parameters for portfolio choice in a theoretical model

Portfolio choice

Assume three financial assets: Money M, Bonds B, Equities E

$$\begin{bmatrix} M \\ B \\ E \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \cdot \begin{bmatrix} 0 \\ r \\ re \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} \cdot Y$$

Divide everything by V (the stock of wealth), and the three equations determine the share of each asset in the ex-post (expected) stock of wealth (while the liquidity prefrence terms will depend on the income-to-wealth ratio)

Portfolio choice #2

$$\begin{bmatrix} M \\ B \\ E \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \cdot \begin{bmatrix} 0 \\ r \\ re \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} \cdot Y$$

$$\lambda_{i0}\ represent \text{ normal } shares$$

$$\lambda_{11}; \lambda_{22}; \lambda_{33} > 0$$

$$\lambda_{12} = \lambda_{21}; \lambda_{13} = \lambda_{31}; \lambda_{23} = \lambda_{32} < 0$$

$$\lambda_{14} > 0; \lambda_{24} < 0; \lambda_{34} < 0$$

Portfolio choice #3

$$\begin{bmatrix} M \\ B \\ E \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \cdot \begin{bmatrix} 0 \\ r \\ re \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} \cdot Y$$

$$\begin{aligned} \lambda_{10} + \lambda_{20} + \lambda_{30} &= 1 \\ \lambda_{11} + \lambda_{21} + \lambda_{31} &= 0 \\ \lambda_{12} + \lambda_{22} + \lambda_{32} &= 0 \\ \lambda_{13} + \lambda_{23} + \lambda_{33} &= 0 \\ \lambda_{14} + \lambda_{24} + \lambda_{34} &= 0 \end{aligned}$$

Vertical constraints

Portfolio choice #4

$$\begin{bmatrix} M \\ B \\ E \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \cdot \begin{bmatrix} 0 \\ r \\ re \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} \cdot Y$$

$$\lambda_{11} + \lambda_{12} + \lambda_{13} = 0$$
$$\lambda_{21} + \lambda_{22} + \lambda_{23} = 0$$
$$\lambda_{31} + \lambda_{32} + \lambda_{33} = 0$$

Horizontal constraints

Post-Keynesian closure

The closures adopted by Godley – Lavoie are usually based on an out-of-equilibrium approach

Each sector has a target level for the variable to be determined, based on expectations

In each period expectations may not be fulfilled, so that at least one variable will differ from target

Some variables therefore act as *buffers*

Consumption

A simple approach

$$C_t = \alpha_1 \cdot YD_t^e + \alpha_2 \cdot \frac{Vh_{t-1}}{p_t}$$

When

$$YD_t^e = YD_t$$

Implies simultaneity between C and YD, while

$$YD_t^e = YD_{t-1}$$

Makes the system possibly recursive

Note the dynamics between YD-C=Saving >> ΔVh

(C=real consumption, YD=real disposable income, Vh=nominal stock of wealth)

Investment

$$g_t = \frac{I_t}{K_{t-1}} = \beta_0 + \beta_1 \cdot \frac{RP_t}{p_t \cdot K_{t-1}} - \beta_2 \cdot \frac{L_{t-1}}{p_t \cdot K_{t-1}} + \beta_3 \cdot u_{t-1}$$

(possibly plus additional effects)

(I=real investment, K=real stock of capital, RP=retained profits; L=stock of debt outstanding; u=utilization rate)

Where

$$u_t = \frac{Y_t}{K_t}$$

(Y=real output)

Other closures

SFC models can obviously be closed through other adjustment processes.

However, our experience with price clearing markets shows that models exhibit too much volatility to be realistic

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The *New Cambridge* approach

"The fact that money stocks and flows must satisfy accounting identities in individual budgets and in an economy as a whole provides a fundamental law of macroeconomics analogous to the principle of conservation of energy in physics". (Godley and Cripps 1983)

No need for microfoundation

Example of lake and rivers

The *New Cambridge* hypothesis

- Private sector NAFA is stable relative to income
- Implications: an expansionary fiscal policy to achieve full employment will generate a CA deficit. Another instrument (exchange rate management?) should be used as well
- The New Cambridge hypothesis did not hold in the "short run", but…

Financial balances

From the row and column of the capital account, we get

$$Sh + Sf + Sb + Sg + Sw = I$$

$$\{Sh + Sf\} + 0 - DEF - CA = I$$

Net acquisition of financial assets of the private domestic sector (NAFA)

$$NAFA = S - I = DEF + CA$$

Financial balances #2

Again, from

$$Sh + Sf + 0 - DEF - CA = I = Ih + If$$

We get

$$(Sh - Ih) + (Sf - If) = DEF + CA$$

$$NAFAh + NAFAf = DEF + CA$$

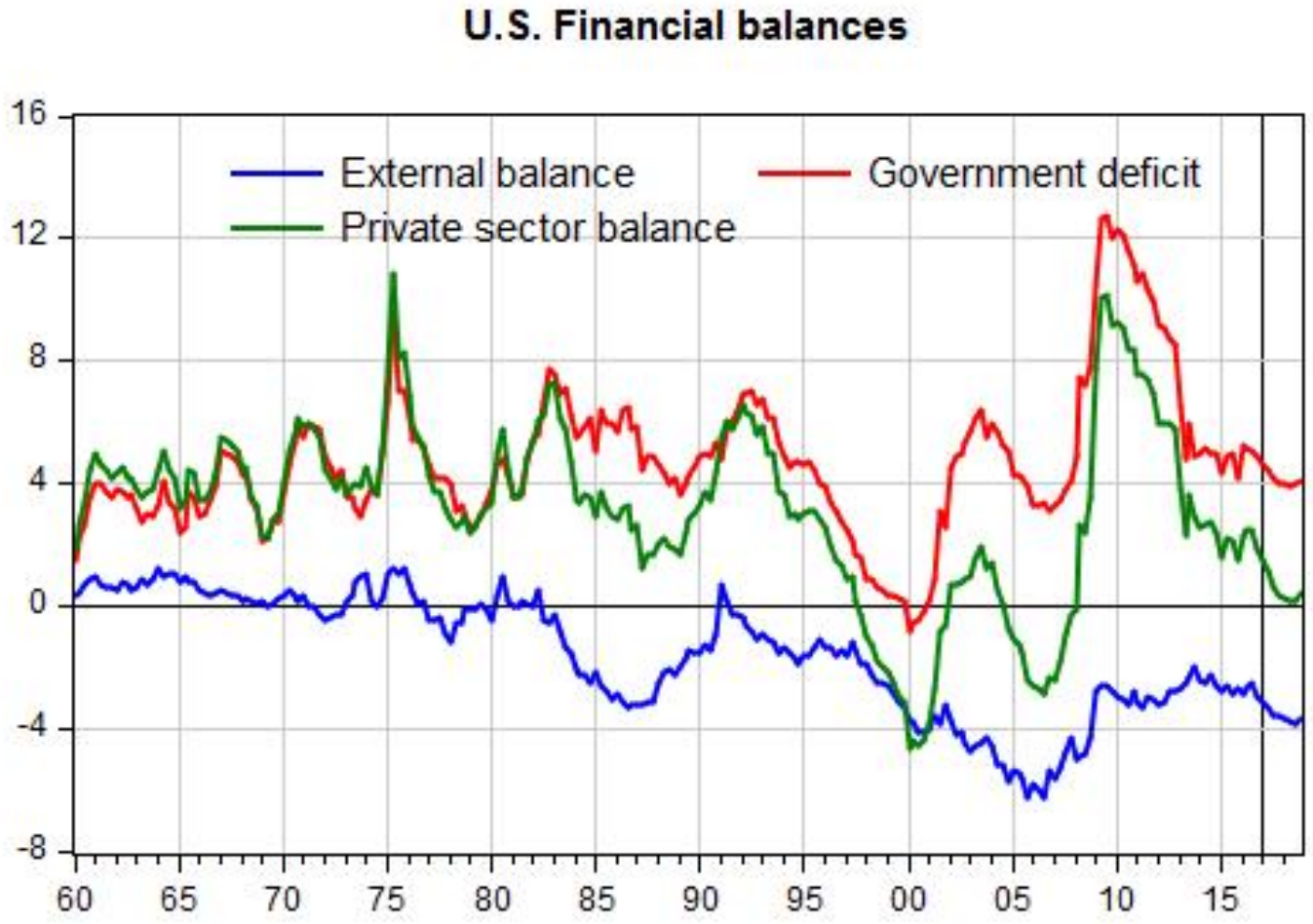
In the US economy before financialization NAFAf was negative but small, i.e. firms financed investment out of retained profits, while NAFAh was positive, and matched by government debt

Financial balances

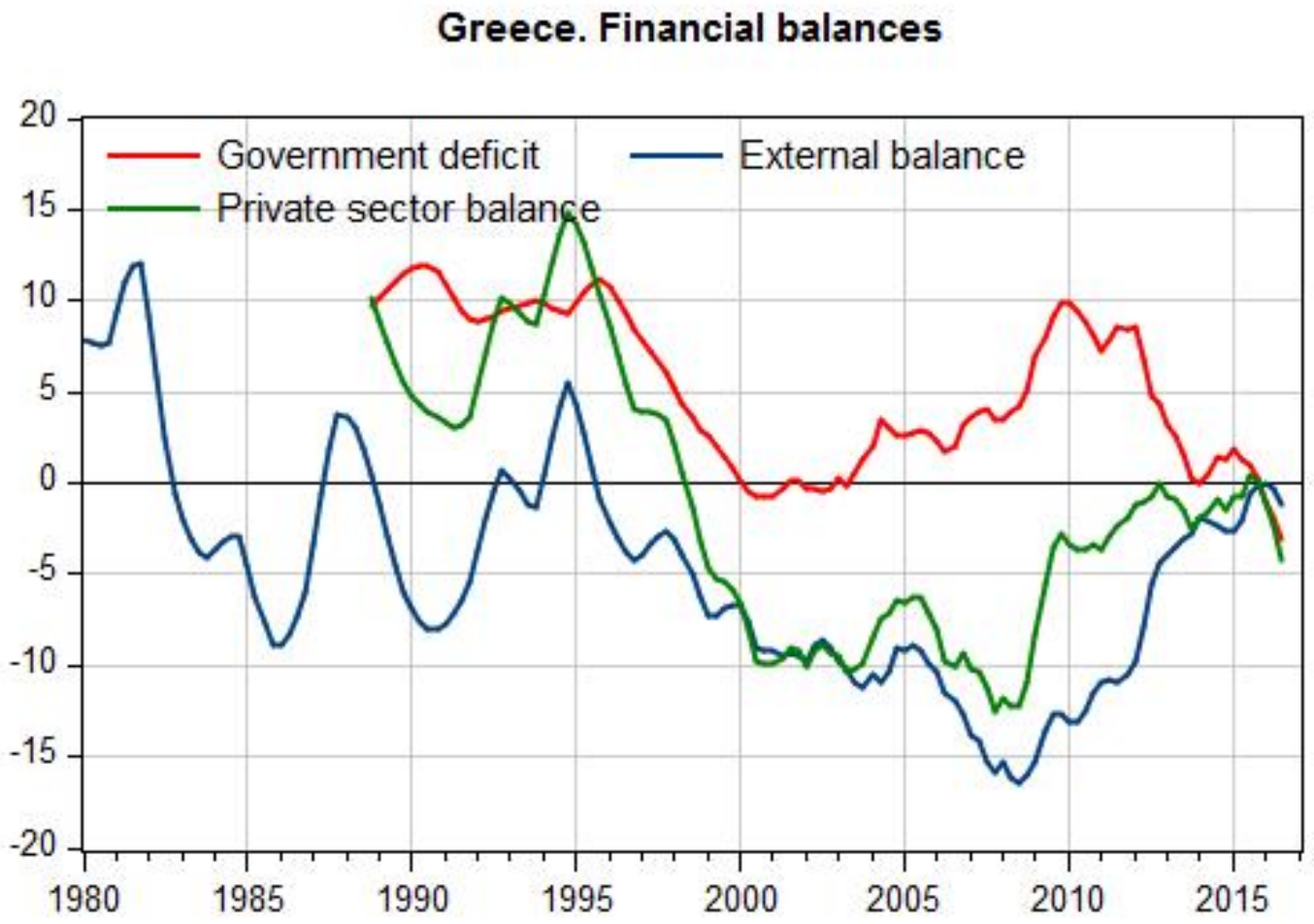
Possible configuration of financial balances

1. Balanced CA; government deficit > private surplus [U.S. and other countries pre-1980s]
2. Balanced gov.budget; CA surplus > private surplus [Germany]
3. Balanced gov. budget; private deficit > CA deficit
4. CA deficit > Gov deficit -> Private sector deficit [U.S. post 1990; Greece]

Financial balances in the U.S.



Greece


Greece. Financial balances
Government deficit
External balance
Private sector balance
20
15
10
5
0
-5
-10
-15
-20
1980
1985
1990
1995
2000
2005
2010
2015

Stock-flow norms

In a model where stocks feed back on flows, in a stable growth path stock-flow ratios are stable, since stocks and flows grow at the same rate.

An empirical SF model can therefore be used to analyze the deviations from the steady-growth path.

Parameters in the model help understand if (and when) stock-flow norms are shifting.

There is no strong mechanism which gets the model (or the economy!) quickly back to the steady-growth path: unbalances can last for long periods, usually implying accumulation of debt for at least one sector.

It is difficult – maybe impossible – to incorporate a turning point into the model (to formalize when debt becomes "excessive")

Where is the SFC literature going?

(1) Integration with Agent-Based models

(2) More complex analysis of financial markets

(3) Open economy models

(4) Empirical models for whole countries

   (1) Levy > U.S.; Greece; Ecuador

   (2) Other groups: UK; Austria

(5) Industry detail (I-O); supply-side constraints

(6) Endogenizing the interaction with the environment

Links

- http://sfc-models.net
- FB group: Stock-Flow Consistent (SFC) Modeling