

# Stock-Flow-Consistent Circuits

## On Godley's methodology and the TMC

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# Topics

- Key features of Godley's stock-flow-consistent approach
- The relevance of Godley's empirical work
- SFC and TMC
  - The finance motive, and the endogeneity of money
  - Ex-ante and ex-post accounting
  - The role of interest payments on loans for closing the monetary circuit
  - The paradox of profits

# Motivation for addressing TMC & SFC

- Augusto Graziani is the major representative of the Italian *Circuitists* school (and the Professor who introduced me to economics!)
- The circuitist approach stresses the role of finance for production. Godley's approach does the same, from a different point of view
- The circuitist approach has some debated puzzles, that I believe can usefully be addressed with Godley's methodology
- My attempt to address some of these points (in a 2004 Levy WP) led to mixed results, so I have decided to revise my early WP, with a view of paying a tribute to both Graziani and Godley

# The SFC approach

- In my view, Godley's work and methodology had two motivations:
  - Addressing problems in some “real world” economy
  - Provide a consistent framework for understanding how the macro-economy works. Models as “tools for thinking”
- It follows that the level of detail in models is tailored on specific problems, although all models belong to the same class.

# Stocks and flows

Wealth is a stock concept. A model aimed at studying how wealth evolves through times – both for a country or for specific sectors – requires a stock-flow framework.

On the contrary, many macro approaches only model flows, and the link between the long-run (growth) and the short-run is broken or weak. Some mainstream models ultimately treat short-run “problems” as deviations of the economy from the long-run growth path.

Stock-flow models can be used to show how wealth (as well as credits and debts) arises from sequences of short-run (non) equilibrium sequential processes.

# Accounting consistency: stocks

	Hous.	Firms	Banks	C. Bank	Government	Rest of the world	Total
<b>Real assets</b>	$+H$	$+K_f$	$+K_b$		$+K_g$		$RA$
<b>Cash</b>	$+HP_h$		$+HP_b$	$-HP$			$0$
<b>C. Bank advances</b>			$-A$	$+A$			$0$
<b>Bank deposits</b>	$+M$		$-M$				$0$
<b>Loans to firms</b>		$-L$	$+L$				$0$
<b>Mortgages</b>	$-MO$		$+MO$				$0$
<b>Treasury bills</b>	$+B_h$		$+B_b$	$+B_c$	$-B$	$+B_w$	$0$
<b>Equities</b>	$+E \cdot pe$	$-E \cdot pe$					$0$
<b>Foreign assets</b>			$+FA_b$	$+FA_c$		$-FA$	$0$
<b>TOTAL</b>	$V_h$	$V_f$	$V_b$	$0$	$-B$	$FD$	$RA$

# Accounting consistency: flow of funds

	Hous.	Firms	Banks	C. Bank	Government	Rest of the world	Total
<b>Real assets</b>	$+INh$	$+INf$	$+INb$		$+INg$		$+IN$
<b>Cash</b>	$+\Delta HPh$		$+\Delta HPb$	$-\Delta HP$			$0$
<b>C. Bank advances</b>			$-\Delta A$	$+\Delta A$			$0$
<b>Bank deposits</b>	$+\Delta M$		$-\Delta M$				$0$
<b>Loans to firms</b>		$-\Delta L$	$+\Delta L$				$0$
<b>Mortgages</b>	$-\Delta MO$		$+\Delta MO$				$0$
<b>Treasury bills</b>	$+\Delta Bh$		$+\Delta Bb$	$+\Delta Bc$	$-\Delta B$	$+\Delta Bw$	$0$
<b>Equities</b>	$+\Delta E \cdot pe$	$-\Delta E \cdot pe$					$0$
<b>Foreign assets</b>			$+\Delta FAb$	$+\Delta FAc$		$-\Delta FA$	$0$
<b>TOTAL</b>	$Sh$	$Sf$	$Sb$	$0$	$DEF$	$-BPC$	$+IN$

# Accounting consistency: flows

	Prod.	Hous.	Firms	Banks	C. Bank	Govt	Rest of world	Capital Acc.	Total
<b>Production</b>		+C				+G	+E	+IN	Y
<b>Households</b>	+WB		+FD	+iM +Fb		+iBh	+TRwh		+Yh
<b>Firms</b>	+FT								+FT
<b>Banks</b>		+iMo	+iL			+iBb			+Yb
<b>Central Bank</b>				+iA		+iBc	+iFA		+Yc
<b>Government</b>	+Ti	+Td	+Tf		+Fc		+TRwg		+Yg
<b>Rest of world</b>	+M								+Yw
<b>Capital Account</b>		+Sh	+Sf	Sb	0	+Sg	-BPC		+SAV
<b>TOTAL</b>	+Y	+Yh	+FT	+Yb	+Yc	+Yg	+Yw	+IN	



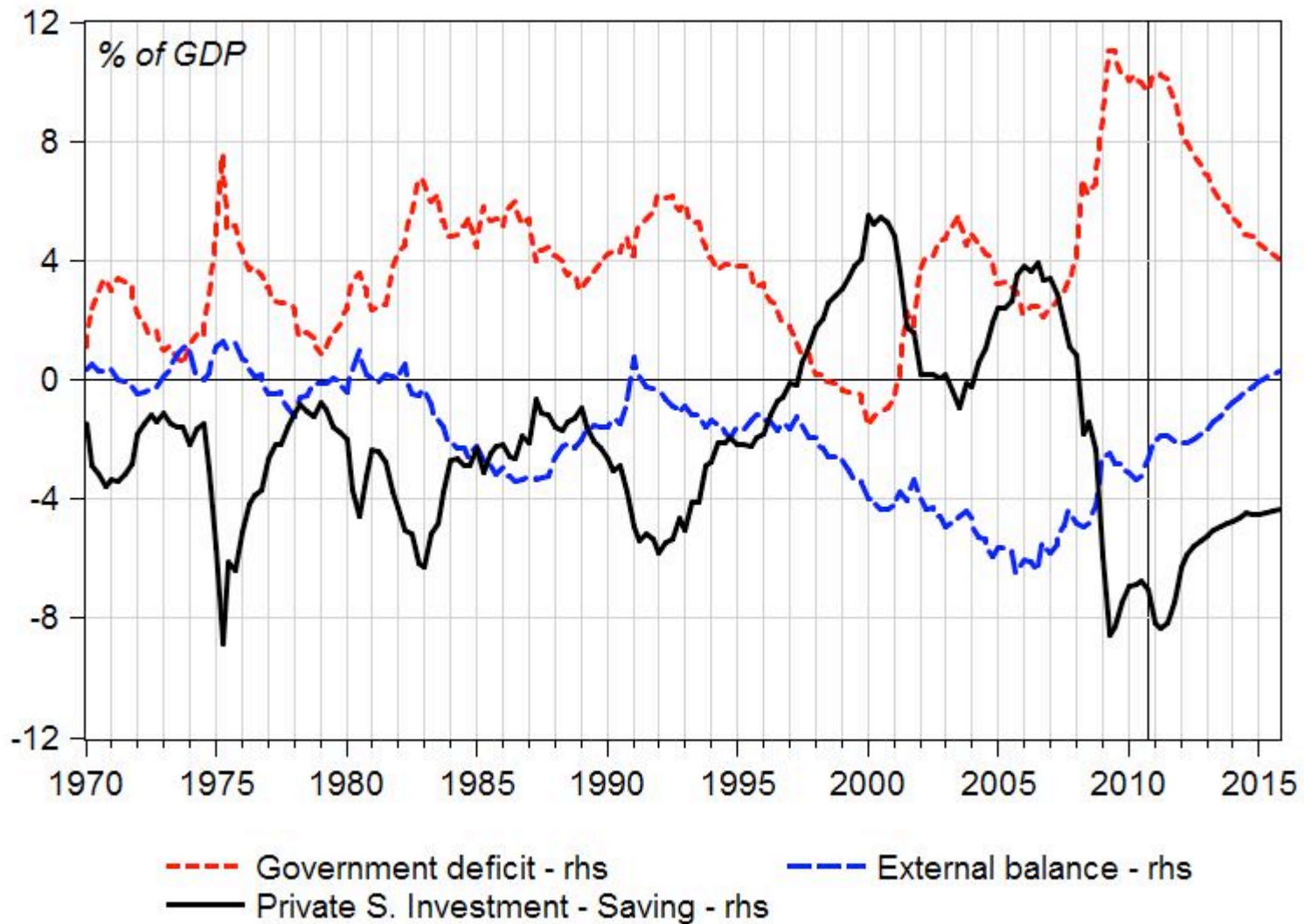
# Relevance of accounting consistency

- Possibility to track national accounts
- Determination of stocks and stock-flow norms
- Tracking feedbacks from stocks to flows (interest payments etc.)
- Relevance of stock-flow norms for sustainable growth

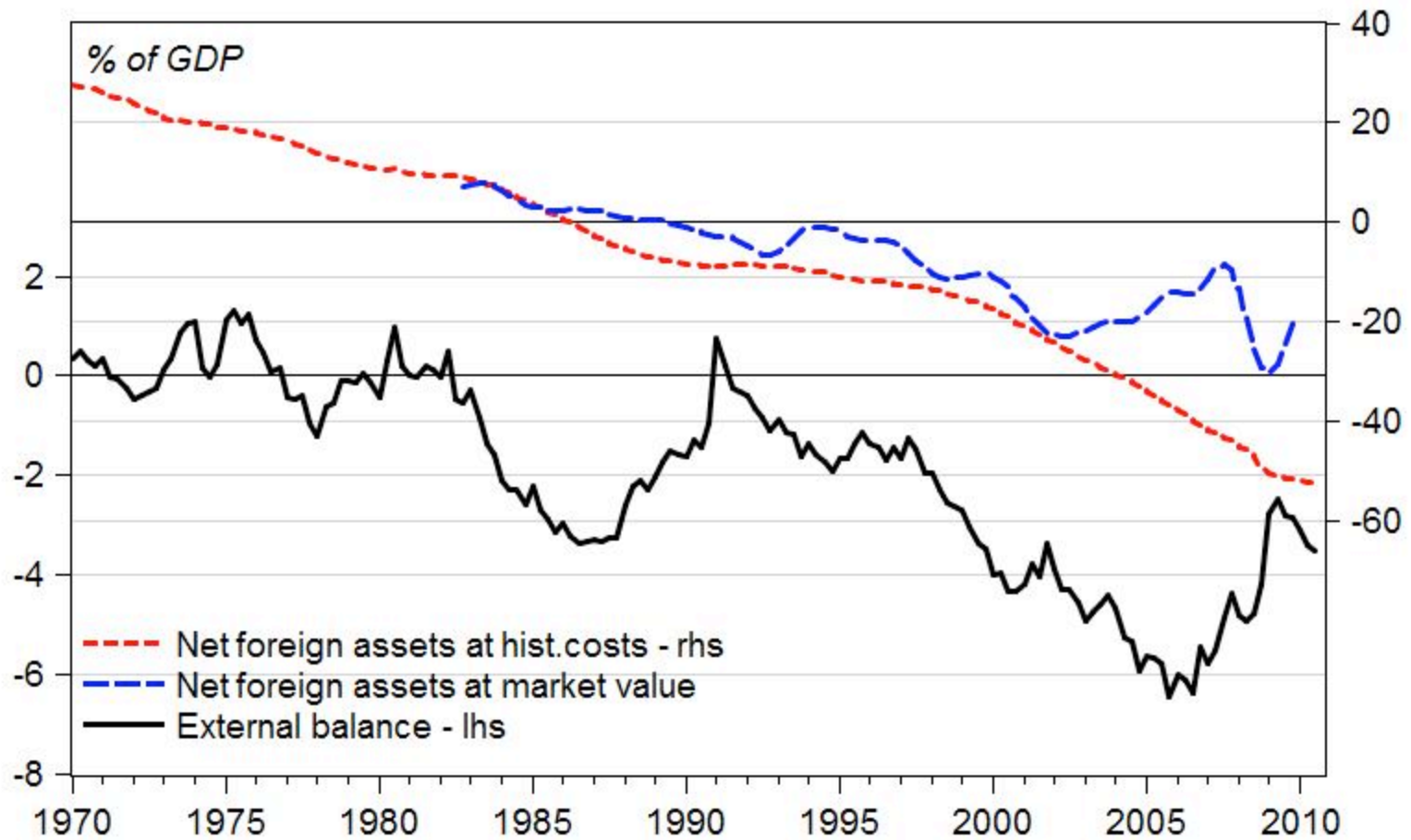
# Godley's work and the crisis

- “New Cambridge”: the private sector as a whole has a stable ratio of financial wealth to income
- It follows that private sector NAFA is stable relative to income. As a consequence, government deficit and the BPC are related
- The (Levy) model showed that growth was not sustainable when NAFA diverged from its historical mean. Meanwhile, U.S. BPC went into a growing deficit, and the corresponding stocks of debt increased relative to income

## U.S. Main Sector Balances



## U.S. net foreign assets and external balance



# The Levy model

- Originally developed as an annual model (1992)
- Emphasis on the external balance (in my previous empirical work with Wynne he always chose to study countries with growing external deficits)
- Accounting consistency not easy, even for a country with detailed stock-flow data
  - Treatment of interest payments in the NIPA
  - Discrepancies between NIPA and FoF

# Econometrics

- Godley did not really trust econometrics
- However, econometrics are crucial in estimating any empirical SFC model
- Godley showed me, in a number of occasions, that “fashionable” econometric techniques provided unsatisfactory results when plugged into a model
- A very good knowledge of how the macro-economy works is crucial for validating econometric results

# Policies

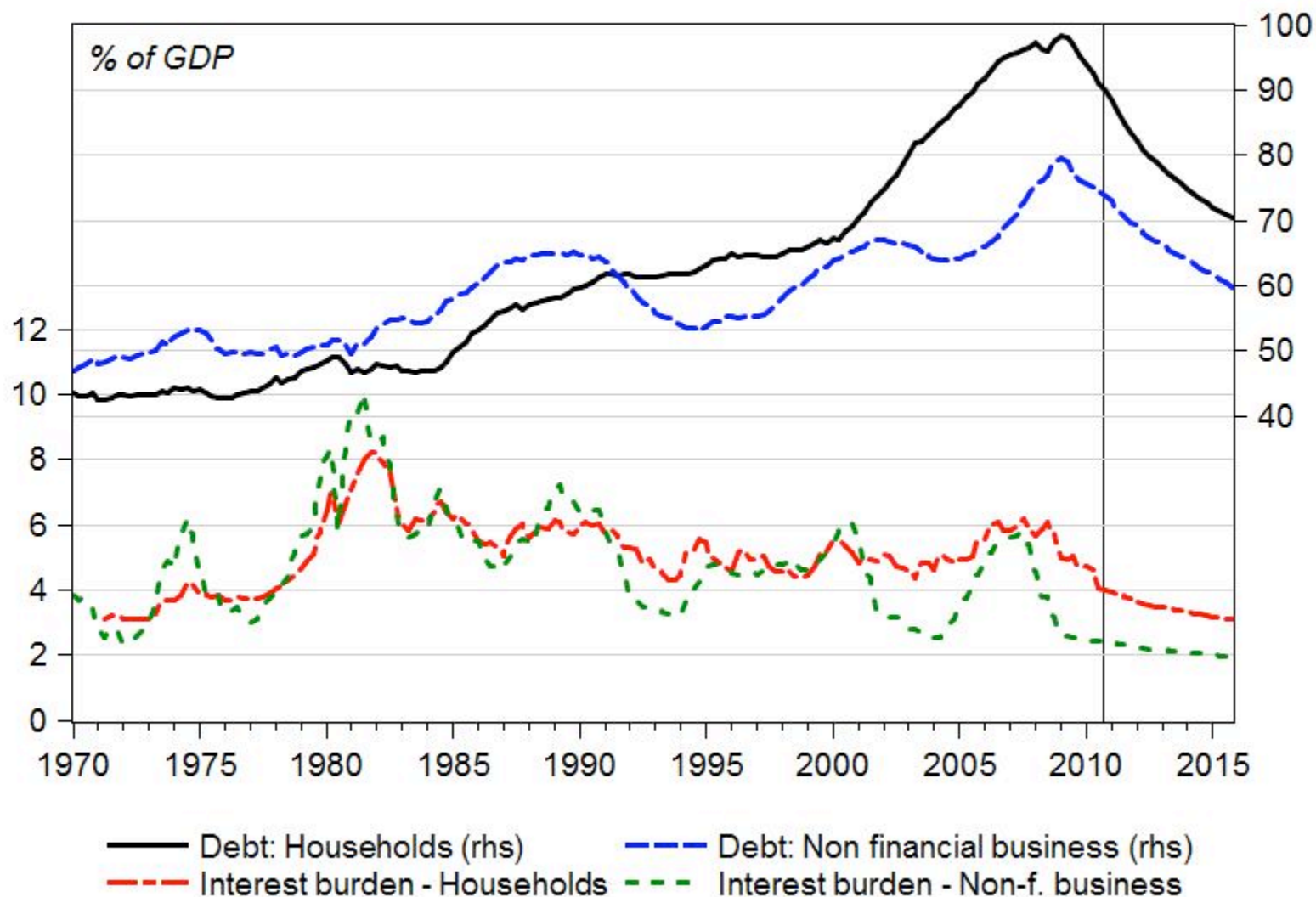
- Godley saw the crisis coming: “Seven Unsustainable Processes” (1999)
- The 2007-? crisis has the same roots
- For policies, special attention was always given to (net) external demand, while public deficit was always suggested as a “short run” instrument
- Growth could be based on domestic investment, but at the risk of growing external imbalances

# Prospects

- Last year Godley thought that the economy could now be moving towards sustainable growth, and that we could finally issue a more optimistic *Strategic Analysis*
- Provided that:
  - a weak dollar helped the recovery in the external position
  - low interest rates kept the interest burden on private debt to a low level
  - and public deficit sustained employment



## Private sector debt outstanding and implied interest burden



# SFC and TMC

## The finance motive

- Godley stresses that the need for finance arises because *production takes time*
- If production and sales could happen instantaneously, money would just be a medium of exchange, as ultimately in mainstream models

# The finance motive in the *Circuit*

Standard assumptions of circuitists are that:

- Production takes time
- Wages must be paid in advance
- Firms need to borrow to pay for the wage bill
- It follows that the amount of money injected in the economy at the beginning of the production period equals the wage bill

This assumption generates two puzzles:

How can interest on loans be paid?

How can firms realize monetary profits?

# The finance motive in Godley

- Production takes time
- Firms need to borrow to cover for the change in inventories

Godley's approach uses end-of-period accounting. He would not deny that firms may need to borrow to pay for the wage bill. But if all consumer goods are sold, and households do not save, firms will entirely recover the money paid out in wages, ending the period with no debt against the banking sector.

# A simple example of a monetary circuit

- In this first example, we assume no investment
- Banks give firms a loan. This means that firms open a deposit account with banks, which can be overdraft.
- Until firms make payments, the value of their debt is zero, and the value of bank deposits is zero
- Assume that payments are made with bank cheques, and that bank deposits are the only form of money. As soon as firms pay wages  $WB$ , the value of their debt becomes  $WB$ , and the value of household deposits becomes  $WB$ . Money has been created, and loans generate deposits in the same amount
- As households buy consumption goods, firms deposit increase and household deposit decrease by the same amount

## A simple example (continued)

- When firms pay interest to banks, the value of their deposit decreases, and the value of deposits of *bank owners* increases by the same amount. Interest payments are the income of bankers, and money does not get destroyed when interests are paid!
- Income of bankers must be used somehow, for the circuit to be consistent. If we assume that only consumer goods are produced, then bankers will buy goods from firms. The value of firms' deposit increases (money is destroyed)
- What about firms profits? By setting the price appropriately, firms can obtain a share of consumer goods which are produced. Again, the logic of this simple circuit requires that income from profits is spent within the period. When the income of profit earners is spent on consumption goods, the entire initial loan is repaid, and money is completely destroyed

# Implications

- A critique from circuitists of this simple example is that it explains profits in real terms, and not in monetary terms. The example is not describing a monetary economy.
- But if we want the circuit to close in a single production period, why should anyone be interested in holding money at the end of the period?



## Implications #2

- What if expectations on sales are not met?
- This implies that households (or profit earners, or bank owners) do not spend their income entirely, and they are left with a positive amount of money
- By implication, firms will have a number of unsold goods (change in inventories), and will end the production period with an outstanding debt
- Graziani and Godley are reconciled

# A two sector model

Table 3. Social Accounting Matrix – Model 2: A two sectors model							
	Firms		Households		Banks	Capital account	Total
	Cons. goods	Inv. goods	Wage earners	Bank owners			
1. Cons. Goods			$C$				$C$
2. Inv. goods						$Ic + Ii$	$I$
3. Wage earners	$Wc$	$Wi$					$W$
4. Bank owners					$Fb$		$Yhb$
5. Banks	$r \cdot Lc$	$r \cdot Li$					$Yb$
6. Capital account	$\Pi c$	$\Pi i$	$Sh$		$\Pi b$		$Sav$
Total	$Yc$	$Yi$	$Yh$		$Yb$	$I$	

# A two sector model

<b>Table 4. Flow of funds for Model 2</b>					
	<b>Firms</b>		<b>Households</b>	<b>Banks</b>	<b>Total</b>
	<b>Cons. goods</b>	<b>Inv. goods</b>			
<b>Deposits</b>			$+\Delta D$	$-\Delta D$	$0$
<b>Loans</b>	$-\Delta Lc$	$-\Delta Li$		$+\Delta L$	$0$
<b>Equities</b>	$-\Delta Ec$	$-\Delta Ei$	$+\Delta Eh$	$+\Delta Eb$	$0$
<b>Capital</b>	$+Ic$	$+Ii$			$+I$
<b>Total</b>	$\Pi c$	$\Pi i$	$Sh$	$\Pi b$	

# The paradox of profits

Another implication of the monetary circuit approach is the “paradox of profits”. Using Marx’s notation

$$M - C - M'$$

If production is motivated by accumulation in monetary terms, where is the additional money (profits) coming from?

As I understand it, monetary profits arise – in Godley’s approach, from price setting which distributes income among workers, firms, banks, and the government.

Again, in a simple circuit which has to close within a single production period, profits will not take a monetary form.

# Summing up

1. The Monetary Theory of Production stresses the role of finance and the endogeneity of money. Both aspects are also stressed in Godley's SFC approach.
2. Some puzzles in the MTP arise because of accounting inconsistency: the use of interest payments as a source of income is neglected. Once we close a MTP circuit with SFC, these inconsistencies disappear.
3. Other apparent puzzles arise from models which have consistent accounting, but are logically inconsistent: the desire to hold (an end-of-period stock of) money is meaningful in a dynamic economy with uncertainty. It is not meaningful in a single, complete production period.