

The role of money and the banking sector in the transition to a sustainable society

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Introduction: Banks create money

- What is money and who creates it? Monetary aggregates:
 - M0 (monetary base, or narrow money): Notes and coins (not in the model) + Central Bank reserves.
 - M4, (broad money): M0 + Stock of deposits.

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- **Credit is created by private banks:** every loan creates a deposit. Banks are able to autonomously expand their balance sheets by creating new credit.

"By far the largest role in creating broad money is played by the banking sector.. When banks make loans they create additional deposits for those that have borrowed."

(Bank of England Quarterly Bulletin, 2007)

The money multiplier theory

- Money multiplier theory implies that the central bank controls the amount of credit existing in the economy through the monetary base;

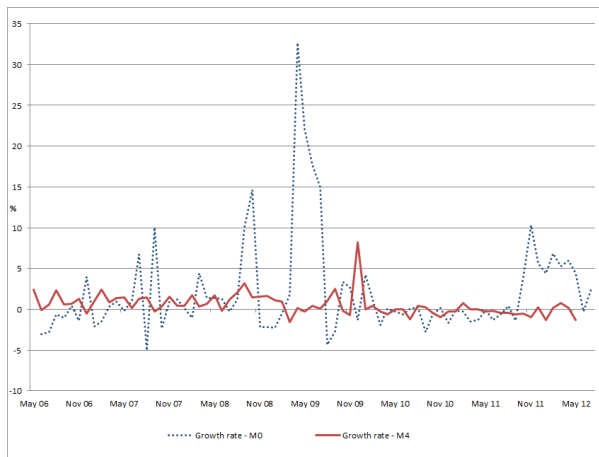
The money multiplier theory

- Money multiplier theory implies that the central bank controls the amount of credit existing in the economy through the monetary base;
- The money multiplier theory is wrong:
 - First, banks decide how much credit to create (how many loans to grant), independently of how many reserves they have;
 - Then, they ask for reserves to the Central Bank, who satisfies any demand.

For each reserves maintenance period (...) the Monetary Policy Committee sets the reserves remuneration rate (Bank Rate) and each scheme participant sets a target for the average amount of reserves they will hold, taking into account their own liquidity management needs.

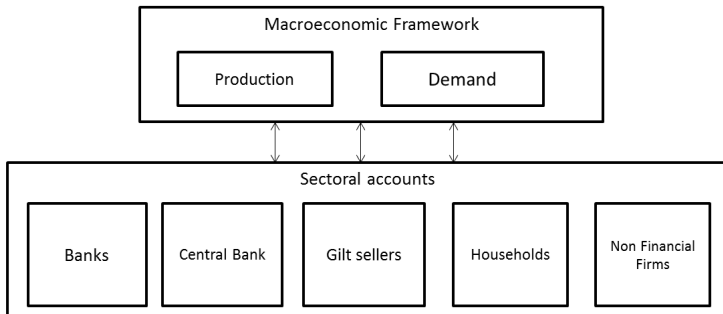
(Bank of England Red Book, 2012)

The growth rate of narrow (M0) and broad money (M4)



The model structure

- We present a novel theoretical treatment of the process of credit creation together with some numerical simulations;
- A "core" macroeconomic model + a set of sectoral accounts:



Double-entry bookkeeping

Each agent is built using its balance sheet:

Balance sheet	
Assets	Liabilities
Asset 1	Liability
Asset 2	Net worth
Total assets = Total liabilities	
Total change in assets = Total change in liabilities	

Overview of agents

	Assets	Liabilities
Non Financial Firms	Deposits (Df_t)	Loans (L_t)
	Physical Capital (K_t)	
Household	Deposits (Dhh_t)	
Central Bank	Bonds (Bcb_t)	Reserves (R_t)
Gilts Sellers	Bonds (Bgs_t)	
	Deposits (Dgs_t)	
Private Banks	Reserves (R_t)	Deposits (D_t)
	Loans (L_t)	

The model (1)

- We assume no supply bottleneck: output Y is equal to aggregate expenditure and to aggregate income. Income is then distributed to wages and profits:

$$W_t = \alpha Y_t; \quad \Pi_t = (1 - \alpha) Y_t$$

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$$W_t = \alpha Y_t; \quad \Pi_t = (1 - \alpha) Y_t$$

- Firms also have to repay part of the debt they accumulated (if any). Net profits are equal to:

$$\Pi_t^n = \Pi_t - DR_t$$

where

$$DR_t = \frac{L_t}{\rho}$$

The model (2)

- We assume households consume their entire wage:

$$C_t = W_t$$

while firms may want to invest more than their profits:

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- The bank will satisfy the demand for credit according to a parameter that represents their confidence level:

$$CC_t = \beta * L_t^d$$

The model (3)

- Thus investments will be equal to the net profits of the firm plus the newly created bank credit:

$$I_t = \Pi_t^n + CC_t$$

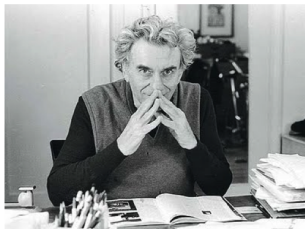
and planned expenditure is:

$$AD_t^p = C_t + I_t$$

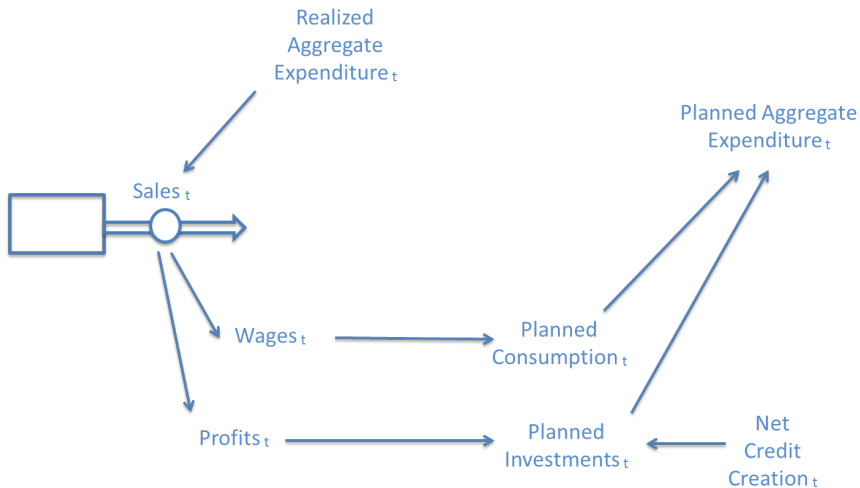
- Finally, the *planned* expenditure at time t becomes realized expenditure, that is output, at time $t + 1$:

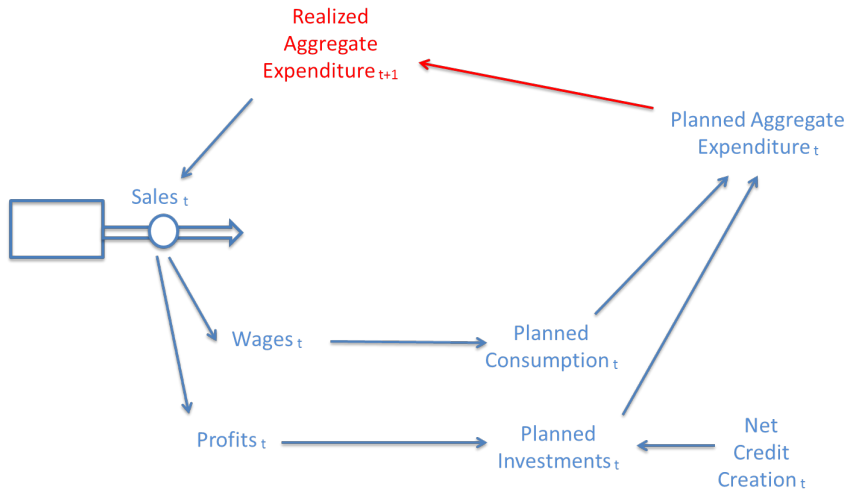
$$Y_{t+1} = AD_t^p$$

A Minskyian interpretation of aggregate demand



"If income is to grow, financial markets must generate an aggregate demand that, aside from brief intervals, is ever rising. (..)
For real aggregate demand to be increasing, it is necessary that *current spending plans be greater than current received income* and that *some market technique exist by which aggregate spending in excess of aggregate anticipated income can be financed*.

At time t 

At time $t + 1$ 

The dynamic system

- The model is governed by two dynamic equations:

$$L_{t+1} = \left[1 - \frac{1 + \beta(\eta - 1)}{\rho} \right] L_t + \beta(\eta - 1)(1 - \alpha)Y_t$$

$$Y_{t+1} = \left[-\frac{1 + \beta(\eta - 1)}{\rho} \right] L_t + [1 + \beta(\eta - 1)(1 - \alpha)]Y_t$$

- The system has an eigenvalue always equal to 1 and the other higher or lower than one according to:

$$\eta \gtrless 1 + \frac{1}{\beta[\rho(1 - \alpha) - 1]}$$

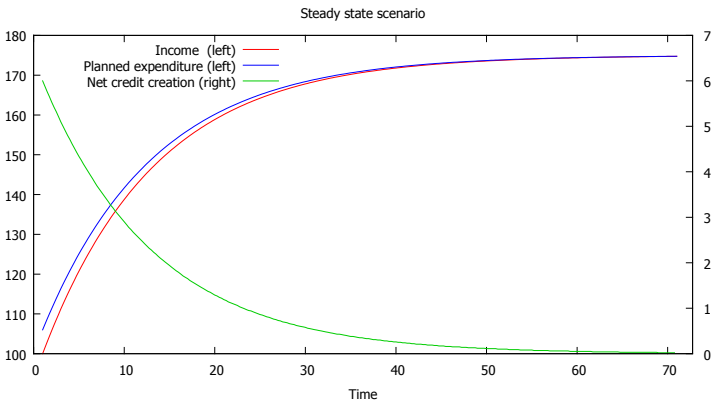
The dynamic system

- Two possible dynamics:
 - 1 Convergence to a steady state
 - 2 Balanced growth path (infinite growth)
- Convergence to a steady state numerical example:

Initial values		Parameters	
		η	1.5
Y_0	100	β	0.8
L_0	30	α	0.7
		ρ	7

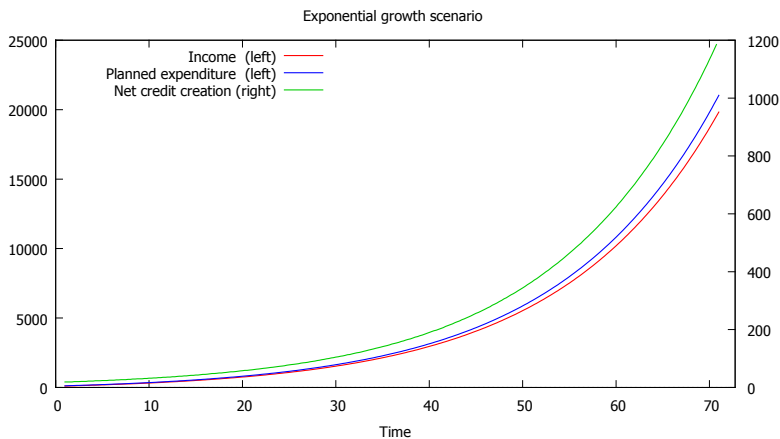
Steady State scenario

The economy grows until it reaches a plateau. What drives growth is positive net credit creation.

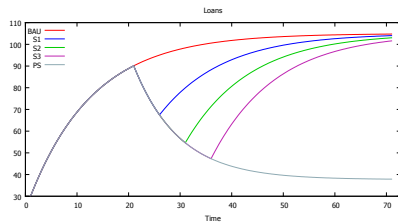
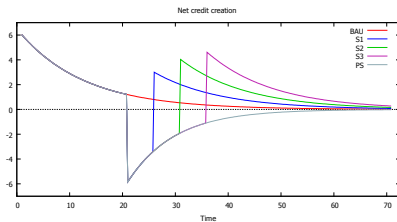
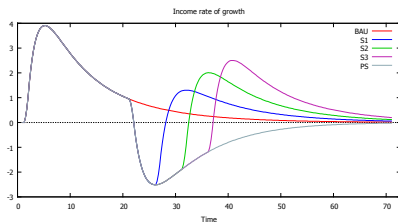
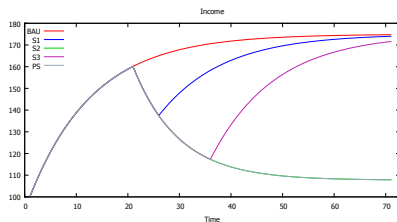


Balanced growth path

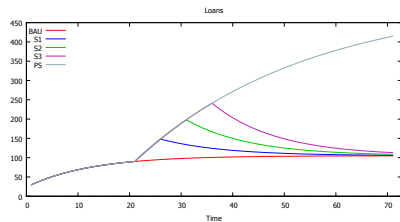
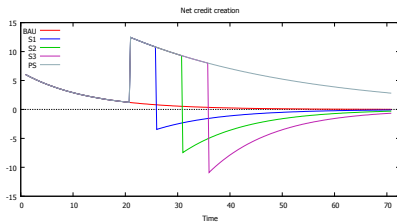
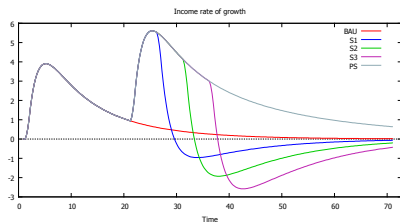
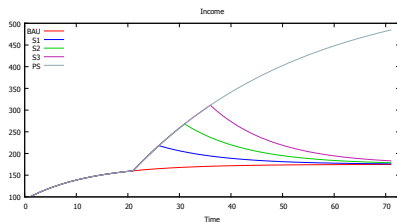
Changing some parameter values ($\alpha = 0.7$, $\beta = 0.8$, $\rho = 10$, $\eta = 2$) changes the dynamic of the system:



A shock in banks confidence β



A shock in the propensity to invest η



Conclusions and future research

- Modelling of credit creation process by private banks;
- Strong link between the availability of credit and growth;

Possible ways forward:

- Instability and cycles;
- Speculative vs productive investments;
- Green economy financing.

Thank you!

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