

# Stock flow consistent models – an introduction to theory and technique

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# Course Programme

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<b>Session 1</b>	<b>Session 2</b>	<b>Session 3</b>	<b>Session 4</b>
<b>Weds 29 May 1300-1430</b>	<b>Weds 29 May 1530-1700</b>	<b>Thurs 30 May 1000-1130</b>	<b>Thurs 30 May 1330-1500</b>
<b>Neil Lancaster</b>	<b>Eugenio Caverzasi</b>	<b>Antoine Godin</b>	<b>Antoine Godin</b>
The crisis in mainstream  From Aristotle to Godley	SFC models in a nutshell  Salient features  A Schumpeterian model	Simulating models: PK-SFC package  From model SIM to model PC	From model PC to model INSOUT  Wrap-up: Structuralism and SFC

# The Crisis in Mainstream

- Circular flow without banks (Gärtner, 2003)
- Over-emphasis on monetary policy and inflation targeting (Arestis and Sawyer, 2006)
- An absence of banks and stocks (Arestis, 2009)
- What else is missing? (Kinsella, 2011; Keen, 2013)
- Empirical problems: the failure of UIP and EH; wealth concentration and inequality; forecast errors in mainstream models
- Institutional factors: sovereignty, central banks and governments

# From Aristotle to Godley

- Who got it right? (Galbraith, 2009; Bezemer, 2009)
- SFC basics: money and debt
- SFC basics: the 'Marx-Schumpeter-Keynes-Minsky tradition' (Keen, 2010)
- SFC examples (Keen, 2010; Lancaster, 2012)
- SFC successes and predictions
- Private debt in Europe
- Summary
- Some challenges for young scholars

# Circular Flow Without Banks

By adding money to a barter economy 'transactions between households and firms... (are) now complemented by an outer circle flowing clockwise which records the payment streams' (Gärtner, 2003)

The circular flow identity, the consumption function and gross national product:

1.  $(S - I) + (T - G) + (M - X) = 0$
2.  $C = cY = Y - T - S$
3.  $Y = C + I + G + X - M$

*Where  $S$ = savings,  $I$ =planned investment,  $T$ = taxes,  $G$  = government spending,  $X$ = exports,  $M$ = imports,  $C$ = household consumption,  $c$ = marginal propensity to consume, and  $Y$  = gross national income or gross national product*

**What does a direct reading of these equations imply?**

# Alternative monetary policy

**Arestis and Sawyer, 2006**

Two main schools of thought on endogenous money... NCM and the 'Keynesian endogenous money approach'

NCM implies that the 'correct' interest rate brings equality between savings and investment'

Other issues with NCM:

Survey evidence

The zero lower bound

Broader channels affect demand for money

Inflation is not just a monetary phenomenon

On the basis that 'one policy instrument can, at most, achieve one policy objective' and monetary policy is known to impact the exchange rate... then fiscal policy should target aggregate demand and monetary policy should target the exchange rate

# An absence of banks and stocks

**Arestis, 2009**

NCM equation for the exchange rate:

$$rer_t = d_0 + d_1 [(R_t - E(p_{t+1})) - (R_{wt} - E(pw_{t+1}))] + d_2(CA_t) + d_3 E(rer_{t+1}) + S_4$$

*Where  $rer_t$  = real exchange rate,  $R_t$  = nominal rate of interest,  $E(p_{t+1})$  = expected domestic price levels,  $R_{wt}$  = world rate of interest,  $E(pw_{t+1})$  = expected world price levels,  $CA_t$  = current account position,  $E(rer_{t+1})$  = expected future real exchange rate,  $S_4$  = stochastic shocks,  $d_0 - d_4$  = adjustment factors*

Central banking as 'the management of private expectations' where debts are paid in full and there is 'no need for financial intermediaries'. 'In the real world many economic agents are liquidity constrained' with multiple interest rates

**How do you quantify expectations and the CA position?**

# What else is missing?

## Kinsella (2011) and Keen (2013)

- Money is not neutral
- Mainstream models are over-simplified (especially out of equilibrium)
- Post-Keynesians emphasise expectation formation under uncertainty... i.e.: rule setting
- Most (non-financial) actors are liquidity constrained
- Complex, dynamic systems have emergent properties
- Marginal costs often fall, so prices fall/profits rise with higher volumes
- Monetary expansion is a vital component of a growing economy
- There should not be accounting 'black holes'
- More attention should be paid to capital gains/losses
- Taxes

Unlike SFC, however, DSGE models 'predict' the role of policies on unemployment and inflation (Kinsella, 2011)

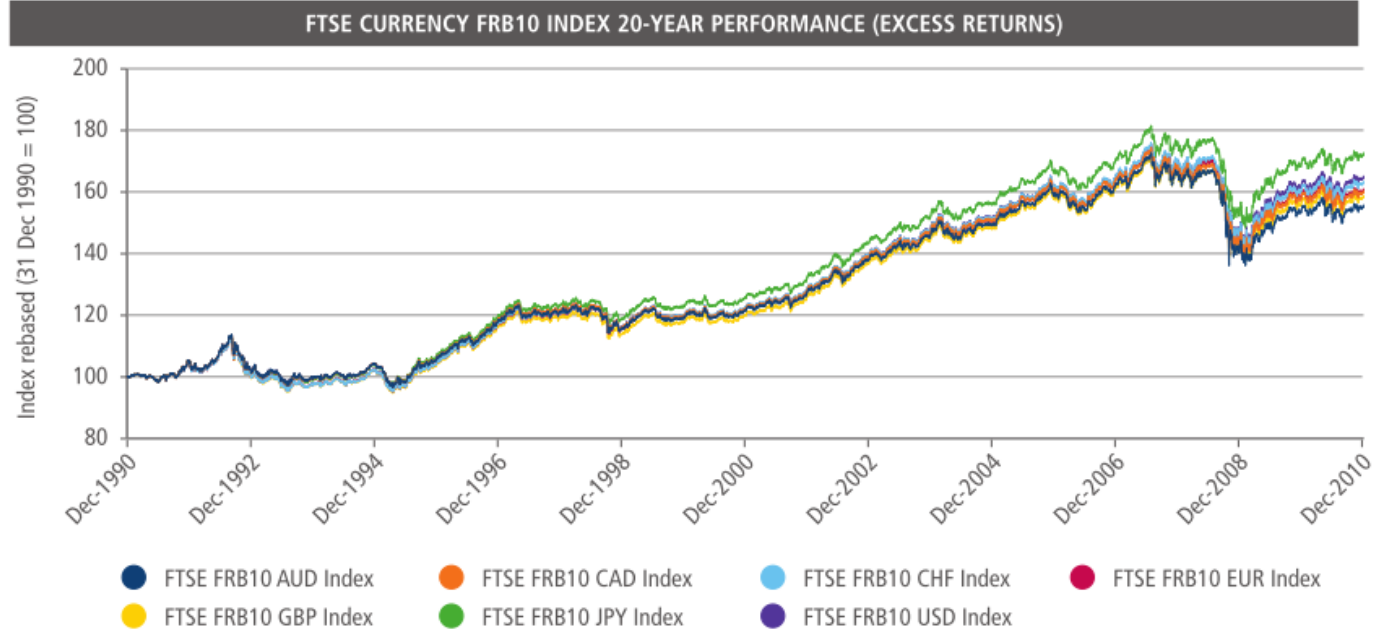
**Are SFC models more than 'thought experiments' or 'teaching tools'?**



# Empirical problems (1)

Explaining market anomalies such as the failure of UIP:

## HISTORICAL INDEX PERFORMANCE

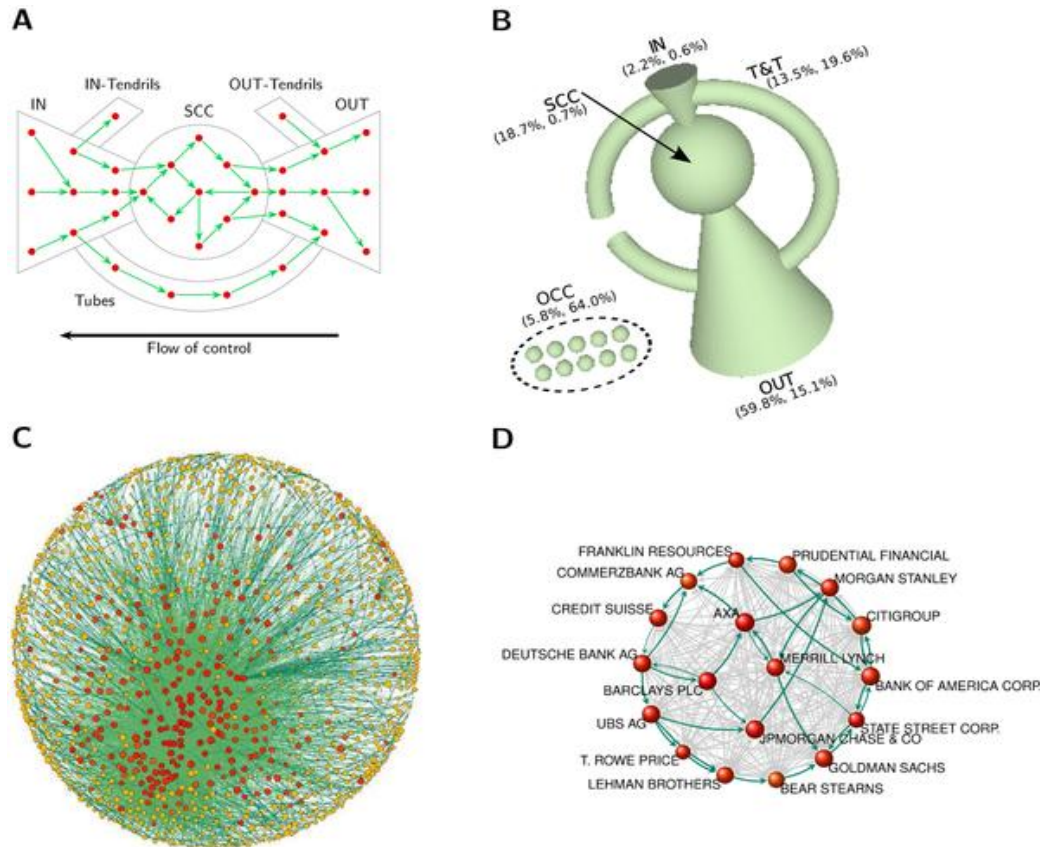


SOURCE: FTSE Group, data as at 31 December 2010

## What other market anomalies exist?

# Empirical problems (2)

Wealth and financial control have become concentrated (and inequality has grown)

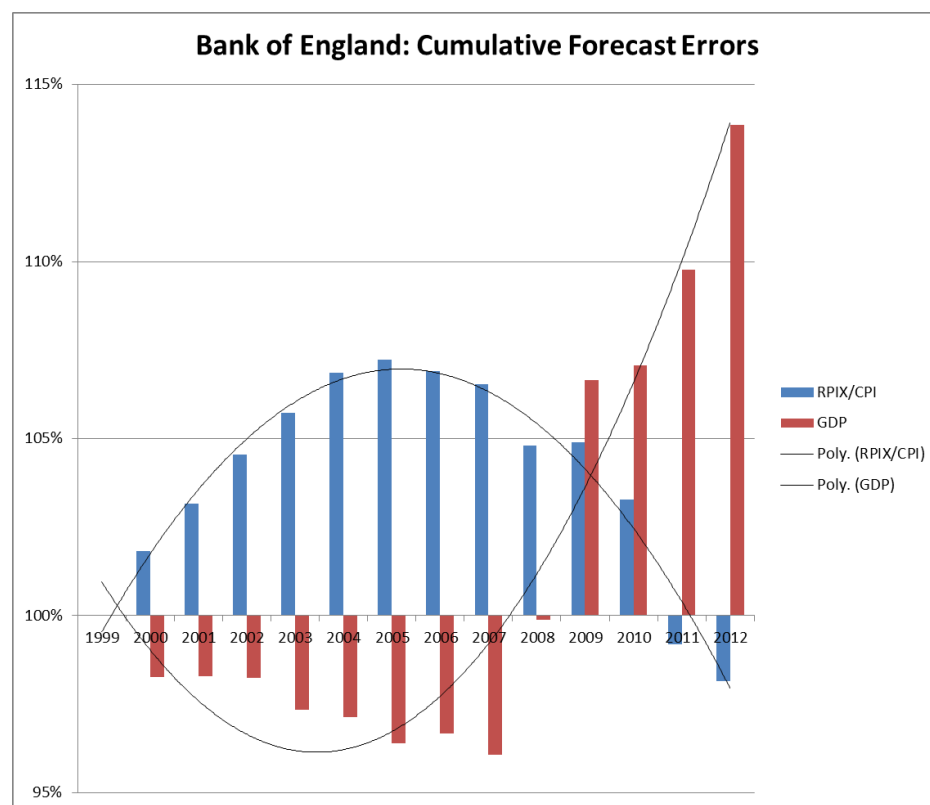
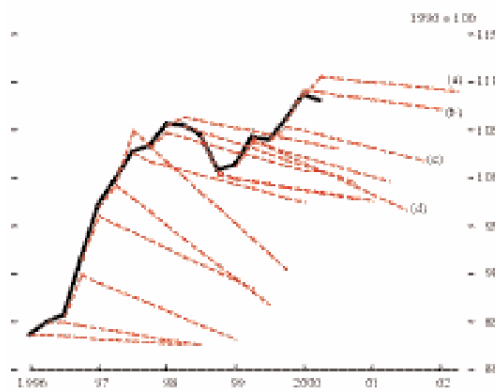


Vitali S, Glattfelder JB, Battiston S (2011) The Network of Global Corporate Control. PLoS ONE 6(10): e25995. doi:10.1371/journal.pone.0025995  
<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0025995>

# Empirical problems (3)

- Multiplier forecast errors (Blanchard and Leigh, 2013)
- Inflation forecast errors
- Exchange rate forecast errors (Wadwhani, 2000)

**Chart 5**  
*Inflation Report ERI forecasts relative to outturn*



# Institutional factors (1)

Central banking:

'The world of the new modern finance theory was a world in which both expectations hypothesis (EH) and uncovered interest parity (UIP) were expected to hold' (Mehrling, 2011)... if UIP and EH do not hold, what does that tell us about the 'dealer of last resort'?

Government spending:

'Increases in the quantity of government debt may decrease rather than increase the required rate of return on capital. There may be "crowding in" rather than "crowding out"' (Backus et al., 1980)

'Changes in the ex post public sector deficit are... fully reflected in the external surplus on current account' (Fetherston and Godley, 1978) so balance of payments disequilibria are not transitory

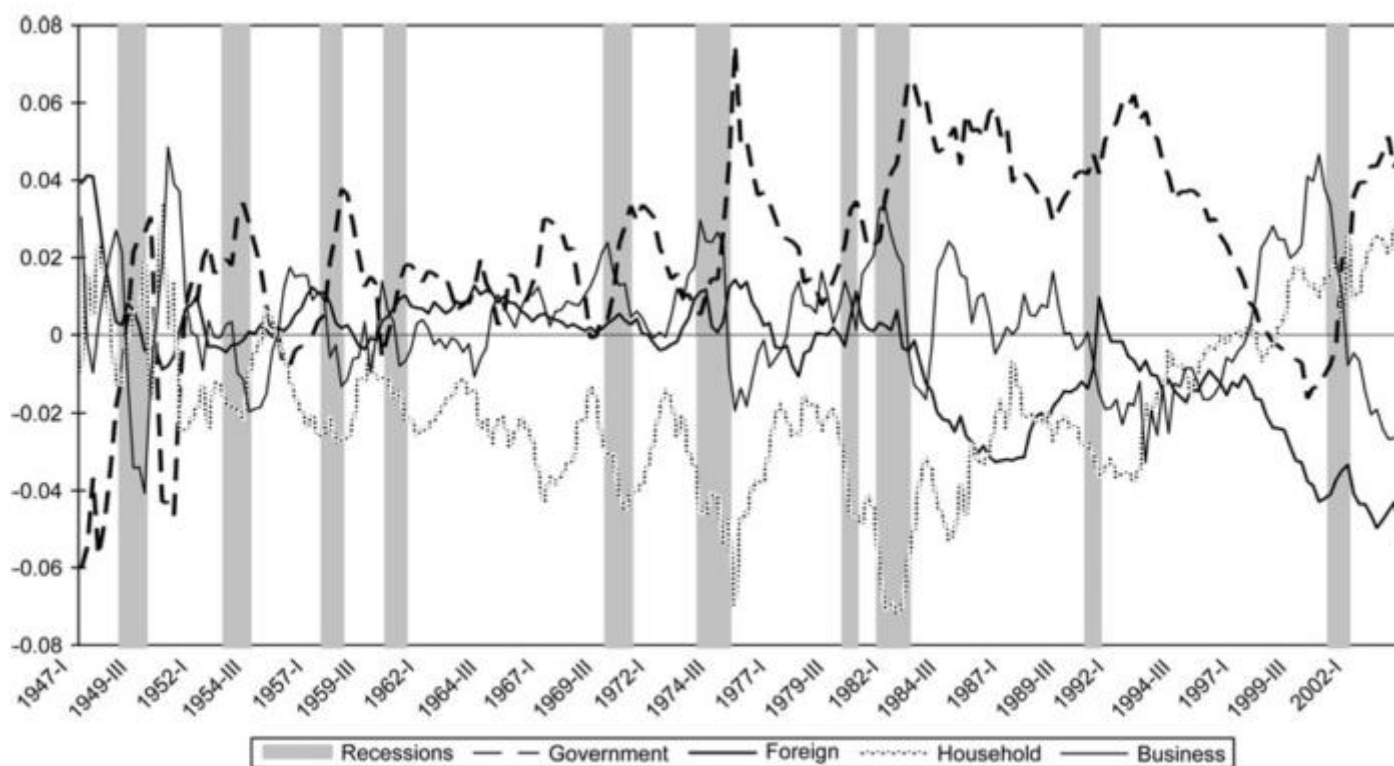
The 'New Cambridge' hypothesis:

Private savings = government debt - net exports

**What does this say about central banks and sovereignty?**

# Institutional factors (2)

‘Counter-cyclical expansionary effects of Bush II fiscal policy (tax cuts and war) early this decade’ (Taylor, 2008)



**Fig. 2.** *Superimposed net borrowing flows normalised by GDP and NBER reference cycles.*

# Who got it right?

Galbraith (2009) offers five alternatives:

Radical (Marxian crisis) theory; bubble detectors; SFC models; Hyman Minsky and himself (a focus on organisational form, much like 'Looting: the economic underworld of bankruptcy for profit' (Akerlof, 1993)

Bezemer (2009) identifies SFC economists... such as Keen, Hudson, Godley, Lavoie, Wray and Zezza.. based on four criteria i) a theoretical basis ii) transmission from housing to the whole economy, including an explanation iii) a public record of their claims iv) some accuracy in terms of the timing of the crisis

**But...** Heterodox News, has 5,000 subscribers and identifies 150 journals that are sympathetic to publications. The two larger journals (Journal of Post-Keynesian Economics (JPKE) and Review of Keynesian Economics (ROKE)) have about 50 editors and co-editors between them

# SFC Basics: What are Money and Debt

- Graeber (2009) emphasises the power of creditors over debtors
- Flows and stocks: 'Stocks have come to dominate economic dynamics, in particular the large stocks of assets and, above all, debt' Borio, 2012)
- Modern Monetary Theory (MMT) argues that 'the State must spend or lend its HPM into existence before banks, firms, or households can get hold of coins, paper notes, or bank reserves' (Fulwiler, Kelton and Wray, 2003)
- In 'Politics', Aristotle (384-322BC) suggests three monetary circuits that arise simultaneously: trade in goods (separated in time) or C-M-C, speculation/accumulation or M-C-M and usury or M-M

# SFC basics

- A sectoral analysis... as a minimum, banks, households, firms and government
- A cyclical vision of capitalism... speculative or Schumpeterian
- Methodological diversity (Caverzasi and Godin, 2013)
- ‘Everything comes from somewhere and goes somewhere’
- The ‘Marx-Schumpeter-Keynes-Minsky’ tradition (Keen, 2010)



# SFC examples

Keen (2010)

	Transaction	Type	Bank vault	Bank transaction	Firm loan	Firm deposit	Worker deposit
1	Lend money	Flow	$-a$			$a$	
2	Record loan	Account			$a$		
3	Compound debt	Account			$b$		
4	Pay interest	Flow		$c$		$-c$	
5	Record payment	Account			$-c$		
6	Deposit interest	Flow		$-d$		$d$	
7	Wages	Flow				$-e$	$e$
8	Deposit interest	Flow		$-f$			$f$
9	Consumption	Flow		$-g$		$g + h$	$-h$
10	Repay loan	Flow	$i$			$-i$	
11	Record payment	Account			$-i$		
12	Government policy	Exogenous injection into either $B_v$ or $W_D$	$+ I$				$+ I$
	$\Sigma$		$i - a + I$	$c - d - f - g$	$a + b - c - i$	$a - c + d - e + g + h - i$	$e + f - h + I$

# SFC examples

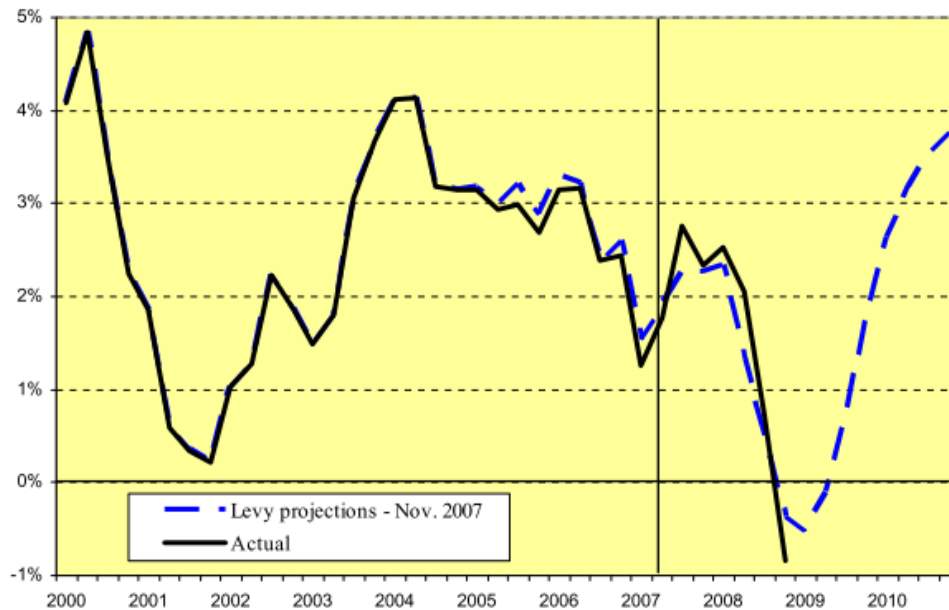
Lancastle (2012)

Transaction	Banks		Households		Businesses		$\Sigma$
	Current	Capital	Current	Investment	Current	Investment	
Create loan	$-\Delta \text{res}$	$+\Delta \text{res}$	$-\Delta a$	$+\Delta a$	$-\Delta a$	$+\Delta a$	0
Loan payment	$+2\Delta a.r_L$		$-\Delta a.r_L$		$-\Delta a.r_L$		0
Investment gain		$-\Delta a.(r_1 + r_2)$		$+\Delta a.r_1$		$+\Delta a.r_2$	0
Wages			$+\Delta a.w_r$		$-\Delta a.w_r$		0
Re-finance	$-\Delta a.(r_1 + r_2)$	$+\Delta a.(r_1 + r_2)$	$+\Delta a.r_1$	$-\Delta a.r_1$	$+\Delta a.r_2$	$-\Delta a.r_2$	0
Spending	$-\Delta a.(2r_L - r_1 - r_2)$		$-\Delta a.(w_r - r_L + r_1)$		$+\Delta a.(w_r + r_L - r_2)$		0
Repay principal	$+\Delta \text{res}$	$-\Delta \text{res}$	$+\Delta a$	$-\Delta a$	$+\Delta a$	$-\Delta a$	0
$\Sigma$	0	0	0	0	0	0	0

# SFC successes

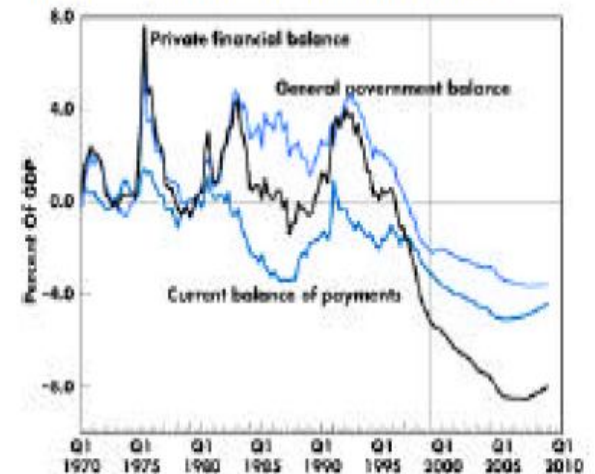
‘Seven unsustainable processes’  
(Godley, 1999) and Zezza/Levy  
Institute (2009)

Figure 1. U.S. Real GDP (Annual Growth Rate)



Sources: B.E.A. and author's calculations

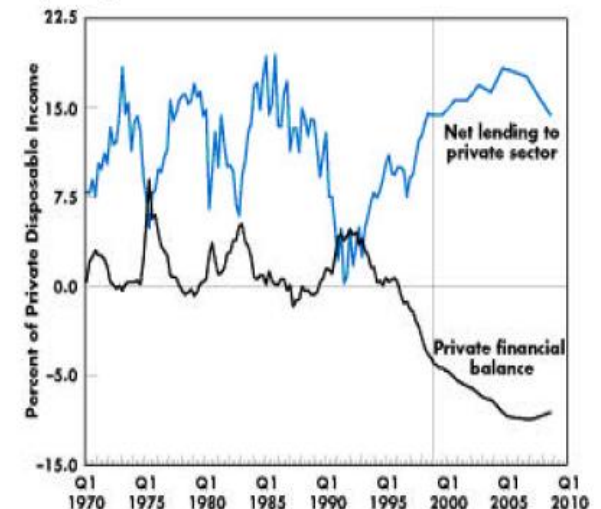
Figure 12 The Three Major Financial Balances, Actual 1970-1999Q1 and Projections Implied by CBO



Note: Data after 1999Q1, where the vertical line is now drawn, are author's projections.

Source: Citibase, Flow of Funds, and author's projections.

Figure 13 Private Financial Balance and Growth of Nonfinancial Debt, Actual 1970-1999Q1 and Projections Implied by CBO



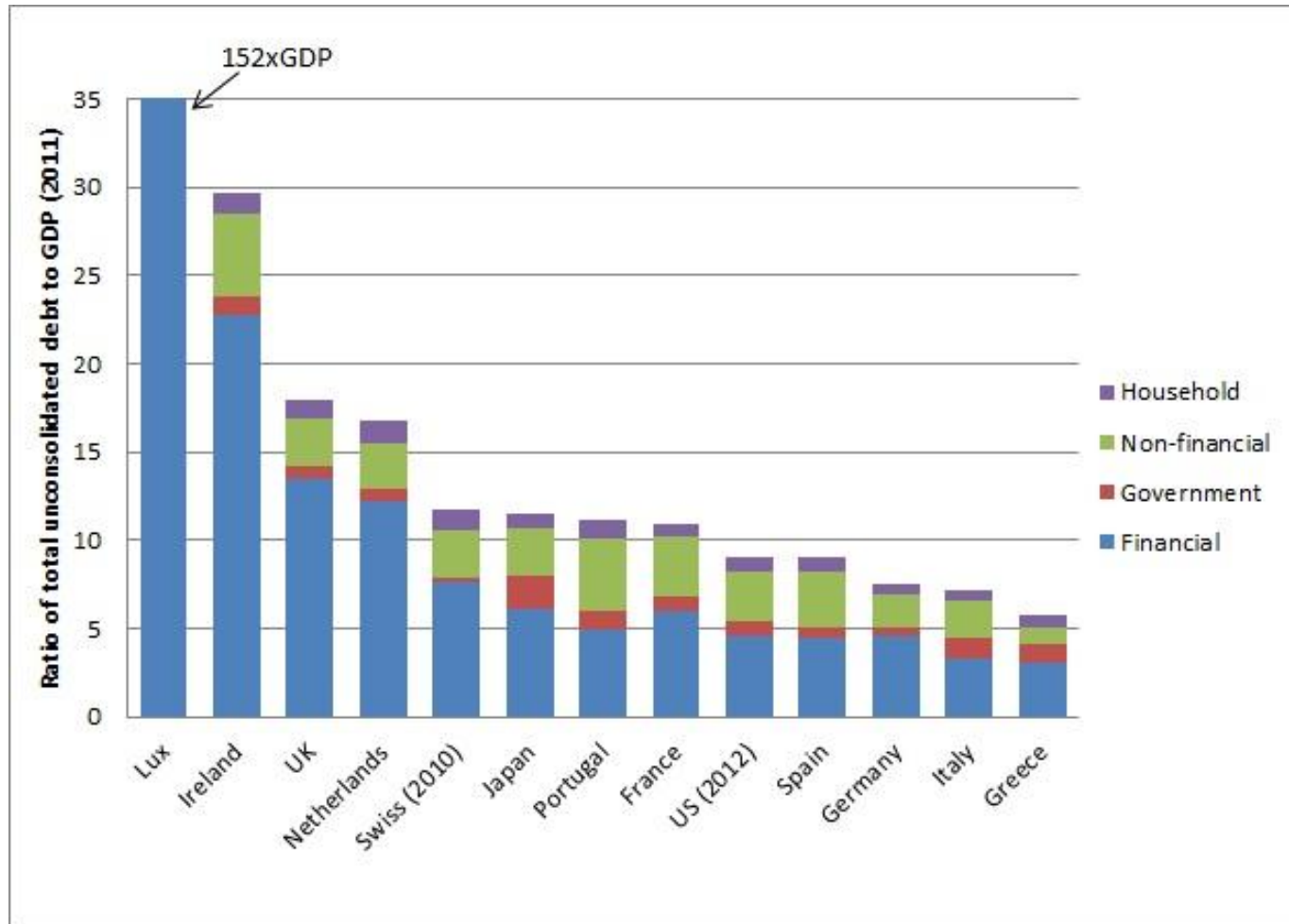
Note: Data after 1999Q1 are author's projections.

Source: Citibase, Flow of Funds, and author's estimates.

# SFC 'Predictions'

- 'Deleveraging today could swamp government attempts to reflate the economy' (Keen, 2009)
- interest yields of the securities issued by the various governments of the Eurozone are likely to diverge unless the ECB accepts to (sell) the securities for which there is a high net demand... and (by) the securities for which there is a relative lack of demand on private markets' (Lavoie, 2011)
- 'The immediate problem (in Europe) could be resolved if the ECB announced that it was ready and willing to purchase all out- standing Greek bonds at market prices.... the ECB's message would quickly calm the financial turbulence and solve the Eurozone markets' volatility problem until a permanent solution could be crafted' (Papadimtrou and Randall Wray, February 2012)
- The consequences of a (Euro) breakup would ripple throughout the EMU as well as the shaky US financial system, and could ultimately trigger the next global financial crisis ' (Papadimtrou and Randall Wray, February 2012)

# Private debt in Europe



# Summary

- You can model any historical series with enough bells and whistles
- Model assumptions matter
- NCM has empirical and theoretical weaknesses
- Institutional arrangements matter
- SFC economists 'got it right'
- But... models are still partial and varied
- Pay attention to everything: profits, markets, behaviour, ratios, taxes, institutions, regulation, leverage, default risk, wealth, inequality and so on

# Theoretical challenges for SFC scholars

- The investment decision
- Sovereignty... Currency, taxes, loan restructuring and central banks
- Incorporating markets (domestic and international)
- Instability, growth, inflation, defaults
- Regulatory arbitrage
- Fiscal-monetary policy