



Debt, inequality and economic stability

Steve Keen

www.debtdeflation.com/blogs

www.debunkingeconomics.com

Neoclassical economics ignores debt, banks & money

- “Keen ... asserts that putting banks in the story is essential.
- *Now, I’m all for including the banking sector in stories where it’s relevant;*
 - ***but why is it so crucial to a story about debt and leverage?...”***
 - ([Krugman 2012](#))
- Ignorance of finance sector due to false model of money & lending
 - “If I decide to cut back on my spending
 - and stash the funds in a bank,
 - which lends them out to someone else,
 - this doesn’t have to represent a net increase in demand.”
 - ([Krugman 2012](#))
- “Loanable Funds” model of lending
 - Fixed stock of money (amount controlled by Federal Reserve)
 - Two types of agents (“patient” & “impatient”)
 - Patient generally lenders—high interest rate encourages high volume of Loanable Funds
 - Impatient generally borrowers—demand rises as interest rate falls

Sustainable development & financial instability

- Sees lending as occurring between non-bank “agents”
- Banks mere intermediaries
- Money absent from analysis: lending effectively of commodities today in return for more commodities in the future:
 - “In what follows, we begin by setting out a flexible-price endowment model in which “impatient” agents borrow from “patient” agents, but are subject to a debt limit... (p. 3)
 - “We assume initially that borrowing and lending take the form of risk-free bonds denominated in the consumption good” (p. 5)
 - Krugman & Eggertsson (2010)
- Ignore aggregate debt because of asset-liability balance
 - “to a first approximation debt is money we owe to ourselves...
 - looking at the world as a whole, the overall level of debt makes no difference to aggregate net worth
 - one **person’s** liability is another **person’s** asset.” (p. 3)
- Treat lending as “person to person”—not “bank to person”
 - But real lending *is* bank to person...

Sustainable development & financial instability

- Aggregate debt can't be ignored in a genuine monetary economy
 - ***Money is a liability of bank sector to non-bank sectors of economy***
- Debt an asset of banking sector that sets servicing/repayment obligations on non-bank sectors
- Expansion of bank assets & liabilities therefore increases aggregate demand
 - Growth of assets & liabilities is not economic-growth-neutral
 - If growth of debt results in debt servicing/repayment obligations that exceed capacity of non-bank sectors, economic collapse ensues.
- Banks, debt & money must play essential roles in economic models
- Illustrating difference between false Neoclassical vision of lending and accurate “Post Keynesian” vision...

Sustainable development & financial instability

- Neoclassical vision of lending would *ultimately* appear to bank sector...

Assets	Liabilities (Deposits)		Equity	Row Sum
Nothing over here...	Patient	Impatient		
	+Loan	-Loan		0
	No change in aggregate money supply			

Increase in liabilities shown as minus in double-entry bookkeeping

- As lending *ultimately* appears in Post Keynesian model of lending...

Assets		Liabilities (Deposits)		Equity	Row Sum
Loans	Reserves	Patient	Impatient		
+Loan			-Loan		0
		<i>Money supply grows by size of the loan</i>			

Sustainable development & financial instability

- In Open Source simulation program “[Minsky](#)” ([developers click here](#))
 - Loanable Funds:

7% Godley Table:

✓ Double Entry		+	+	-	+	-	+	-	+	-	+	-	
			asset		liability		liability		liability		noAssetClass		
Flows V / Stock Variables ->			Reserves		Patient		Impatient		Workers		Safe		Row Sum
+	-	Initial Conditions	100		-100								0
+	-	Lend money			Lend		-Lend						0
+	-	Interest payment			-Int		Int						0
+	-	Wage Payment					Wages		-Wages				0
+	-	Consume					-ConsW		ConsW				0
+	-	Consume by patient			ConsP		-ConsP						0

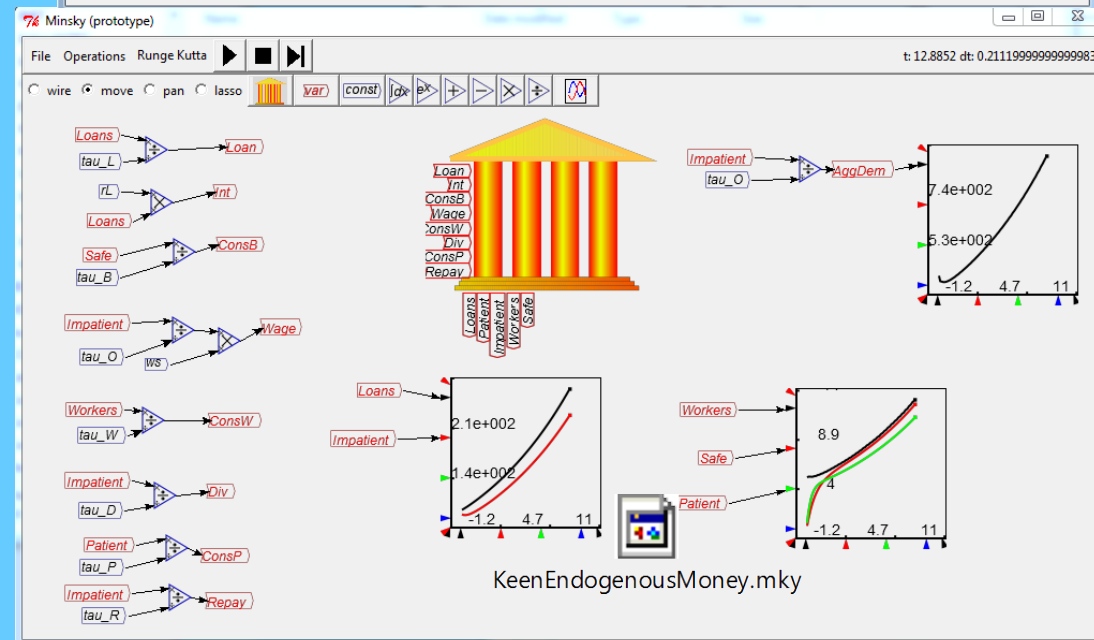
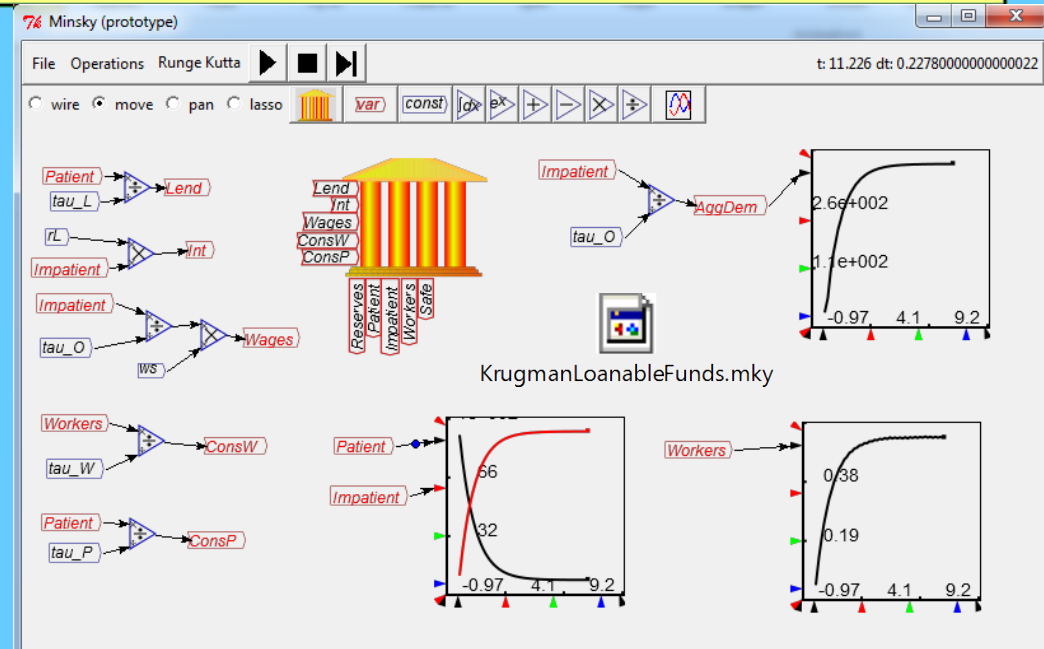
- Endogenous Money:

7% Godley Table:

✓ Double Entry		+	+	-	+	-	+	-	+	-	+	-	
			asset		liability		liability		liability		equity		
Flows V / Stock Variables ->			Loans		Patient		Impatient		Workers		Safe		Row Sum
+	-	Initial Conditions	100				-100						0
+	-	Lend	Loan				-Loan						0
+	-	Interest					Int				-Int		0
+	-	Consume					-ConsB				ConsB		0
+	-	Wages					Wage		-Wage				0
+	-	Consume					-ConsW		ConsW				0
+	-	Dividends			-Div		Div						0
+	-	Consume			ConsP		-ConsP						0
+	-	Repay	-Repay				Repay						0

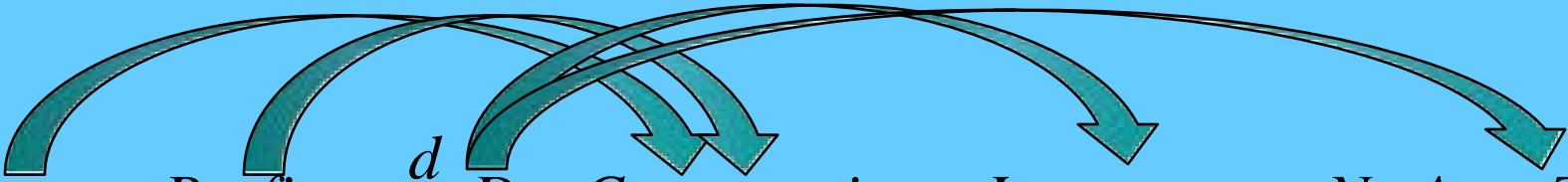
Sustainable development & financial instability

- Why does it matter?
- Neoclassical “Loanable Funds” vision—no change in aggregate demand:
- Post Keynesian “Endogenous Money” vision—***aggregate demand grows as debt grows***
- Macroeconomic impact:
- Aggregate debt & change in debt have extreme impact on economic growth
- Growing debt creates additional demand
- Causes asset bubbles...



Sustainable development & financial instability

- How does change in debt feed into economic activity?
- Two sources of monetary demand
 - Income (Wages + Profits)
 - Borrowing (Change in Debt)
- Two categories of supply
 - Goods & Services (Consumer + Investment Goods/Services)
 - Net new financial assets
- Schumpeter:
 - Incomes mainly spent on consumption
 - Change in debt main source of funds for investment
- **Minsky:** Change in debt also finances Ponzi behavior



The diagram consists of five curved teal arrows pointing from the terms in the equation above to their corresponding terms in the equation below. The arrows originate from 'Wages + Profits', $\frac{d}{dt}D$, 'Consumption', 'Investment', and 'NetAssetTurnover' in the top equation and point to the same terms in the bottom equation.

$$Wages + Profits + \frac{d}{dt}D = Consumption + Investment + NetAssetTurnover$$

Sustainable development & financial instability

- Aggregate Demand = Income + **Change in Debt**
- Aggregate Supply = Good & Services + **Net Asset Turnover**

$$Y + \frac{d}{dt} D = GDP + NAT$$

- Implications for macro & finance: $NAT = P_A \cdot Q_A \cdot T_A$
 - Change in debt a factor in level of employment, output
 - Debt acceleration drives change in GDP & asset prices

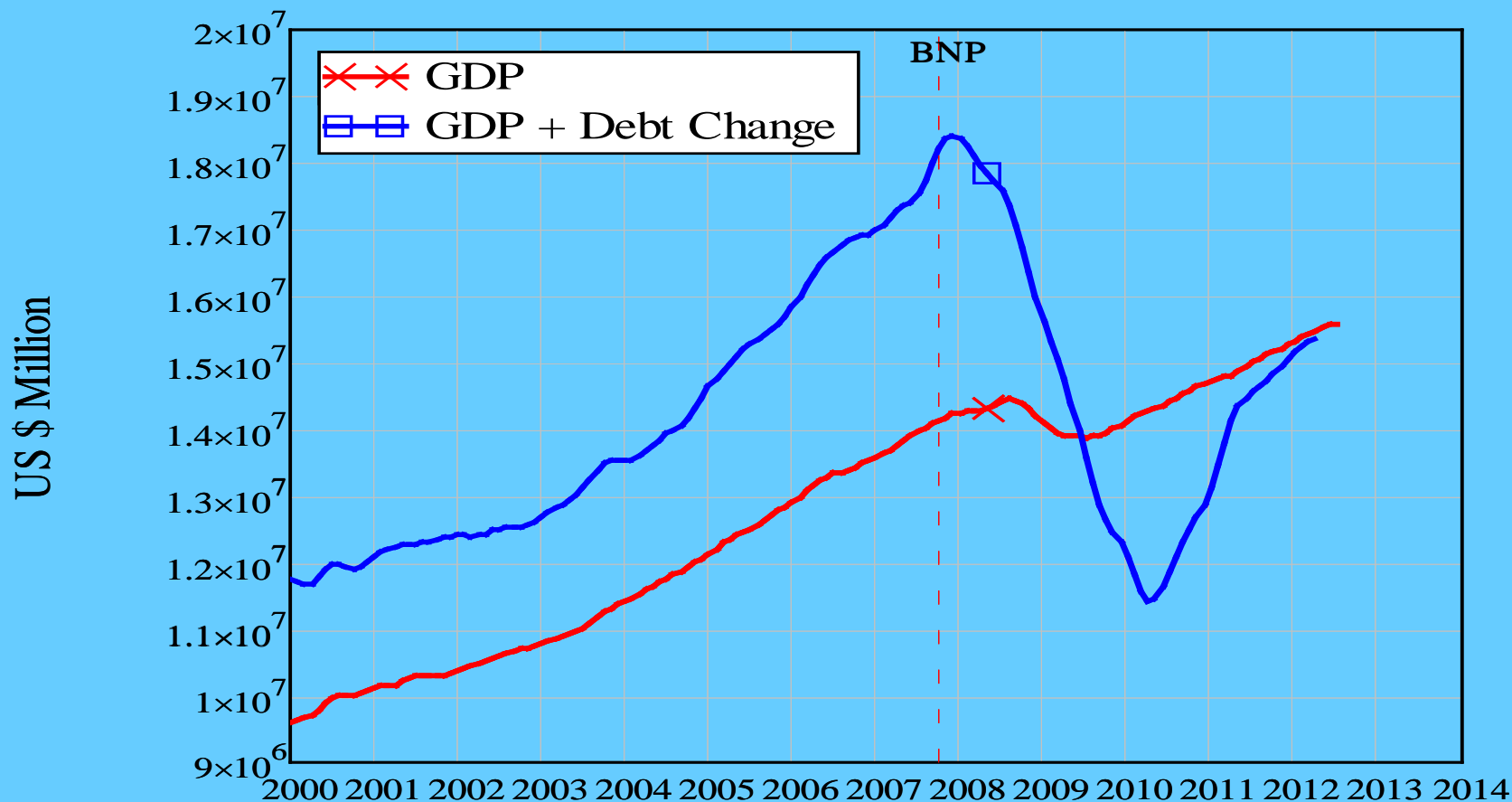
$$\frac{d}{dt} Y + \frac{d^2}{dt^2} D = \frac{d}{dt} GDP + \frac{d}{dt} (P_A \cdot Q_A \cdot T_A)$$

- Change in debt explains crisis (& “Great Moderation” before it)
- Accelerating debt explains why asset bubbles **must** burst

Sustainable development & financial instability

- Crisis can only be understood from dynamics of debt
 - Decline in income relatively mild...
 - But decline in debt change huge...

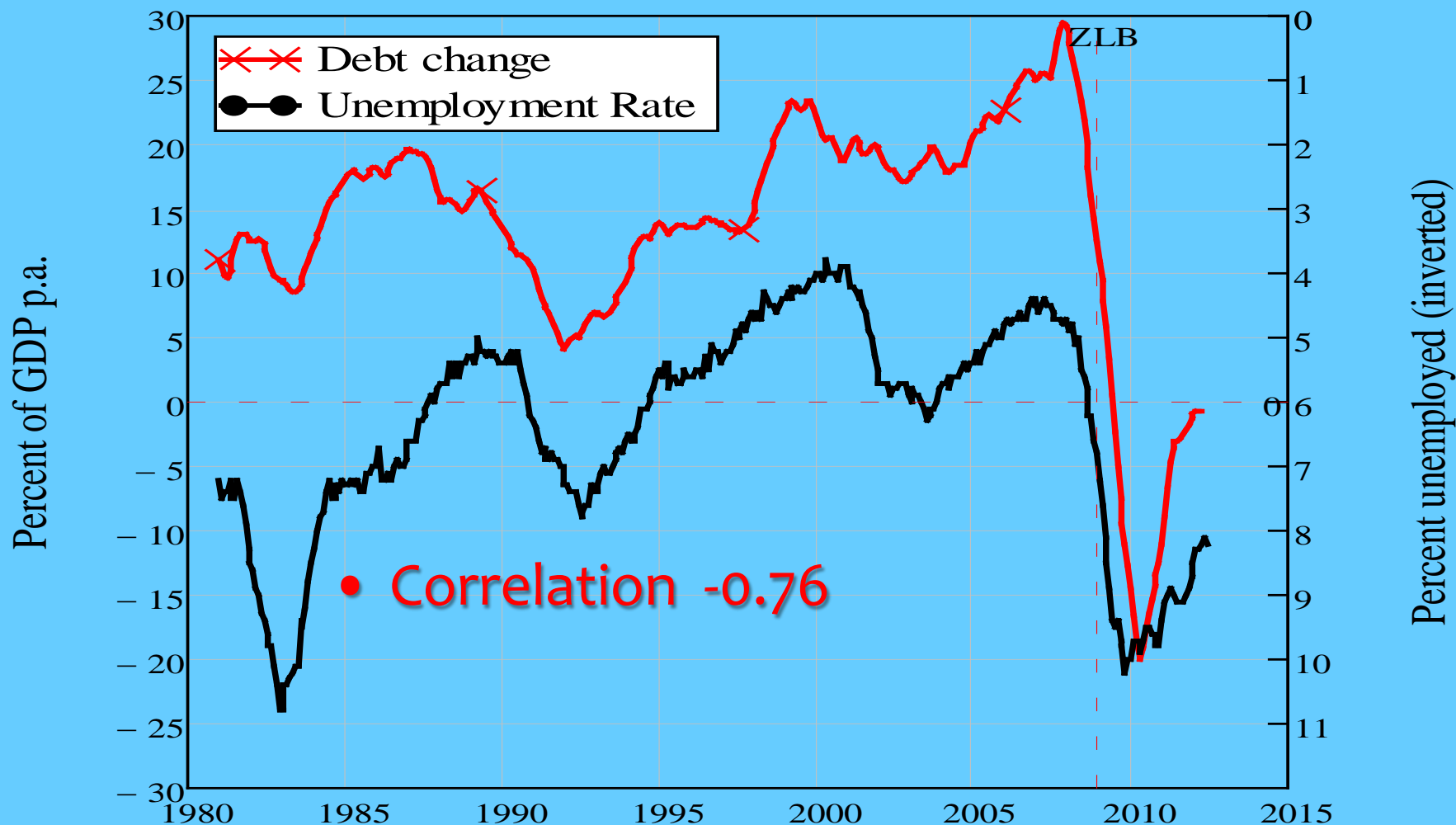
USA GDP



Sustainable development & financial instability

- Change in debt & unemployment...

Debt contribution to demand & unemployment

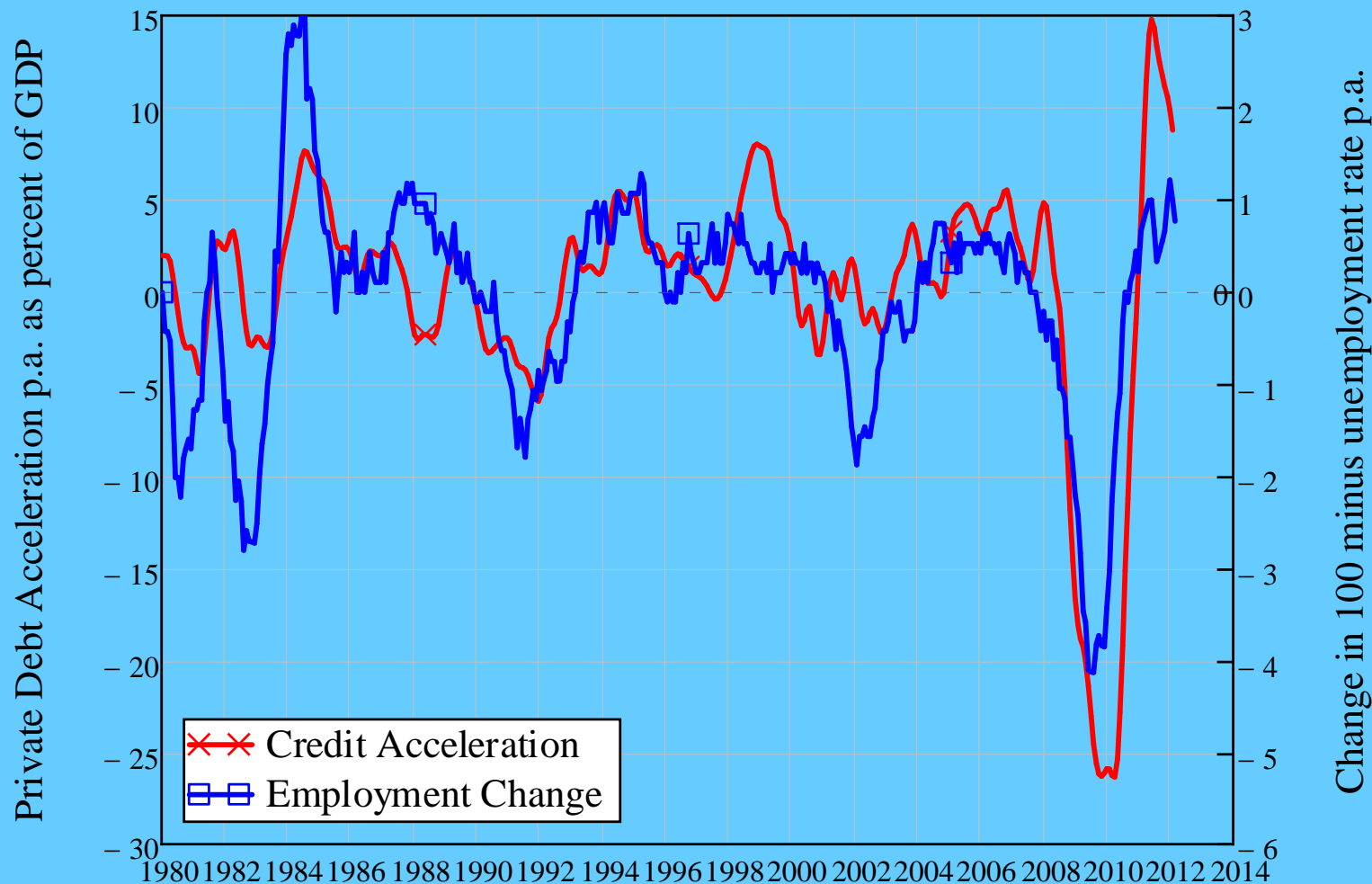


Sources: As for Figure 3 plus BEA GDP

Sustainable development & financial instability

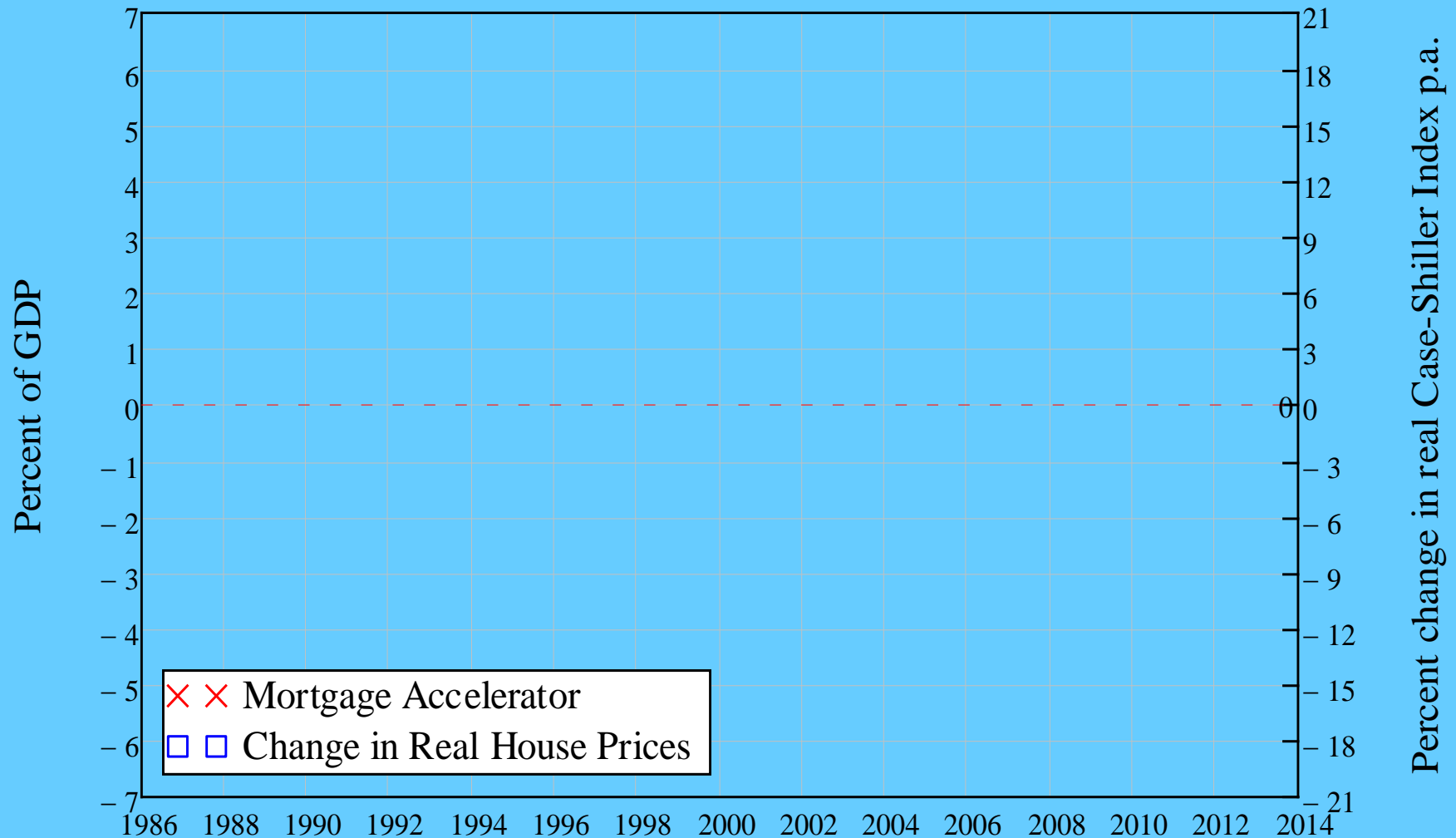
- Acceleration of debt drives change in economic activity

Credit Acceleration & Employment Change (Corr=0.69)



Sustainable development & financial instability

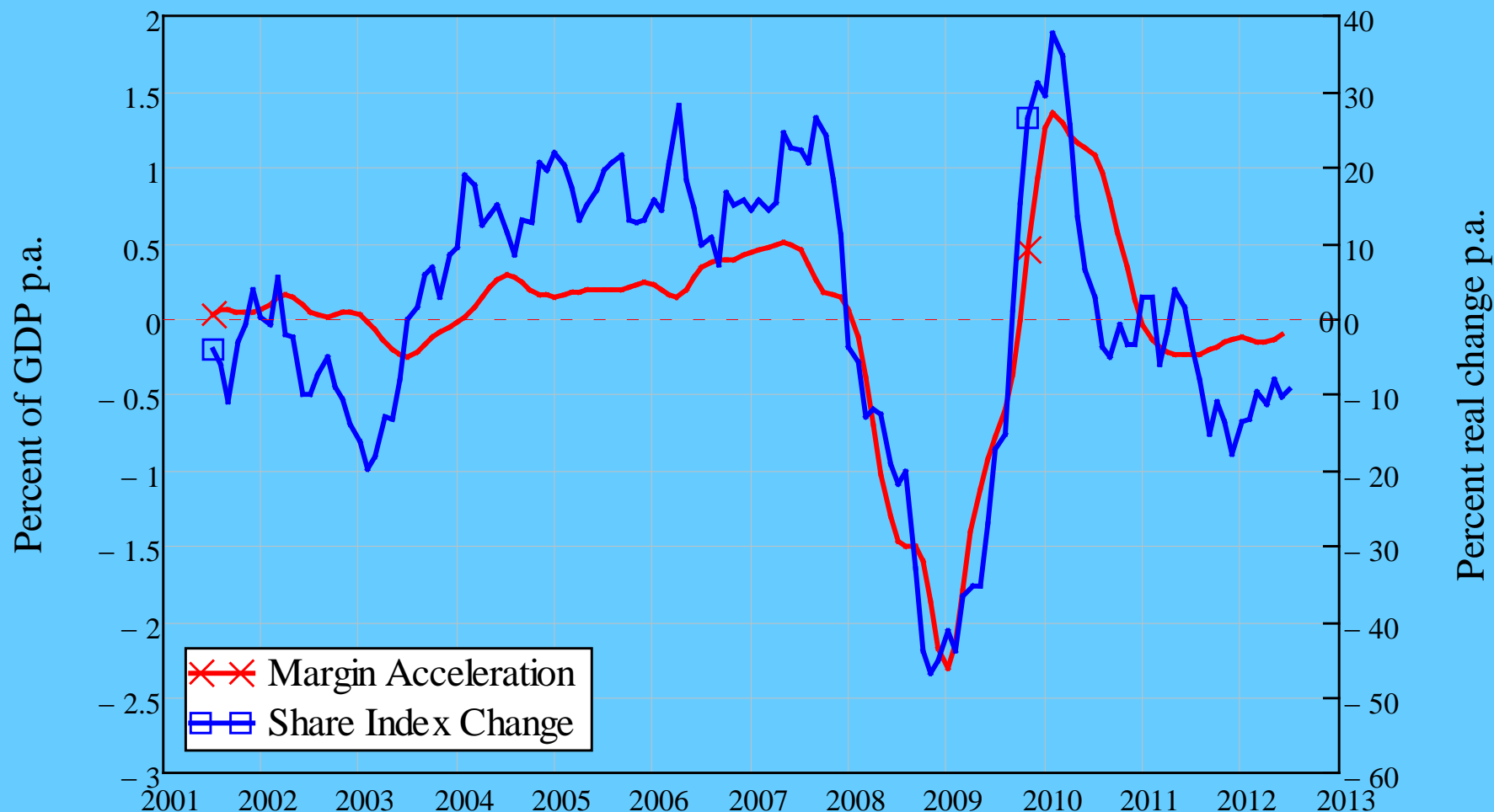
Mortgage Acceleration & House Price Movements (Corr=0.78)



Sustainable development & financial instability

- Accelerating debt drives change in stock market prices

Margin Debt Acceleration & Share Price Change (Corr = 0.81)



The Financial Instability Hypothesis

- Minsky has best verbal model of debt & instability
 - Economy in **historical time**
 - Debt-induced recession in recent past
 - Firms and banks conservative re debt/equity, assets
 - Only conservative projects are funded
 - Recovery means most projects succeed
 - Firms and banks revise risk premiums
 - Accepted debt/equity ratio rises
 - Assets revalued upwards...
 - “Stability is destabilising”
 - Period of tranquility causes expectations to rise...
 - Self-fulfilling expectations
 - Decline in risk aversion causes increase in investment
 - Investment expansion causes economy to grow faster
 - Rising expectations leads to “The Euphoric Economy”...

The Financial Instability Hypothesis

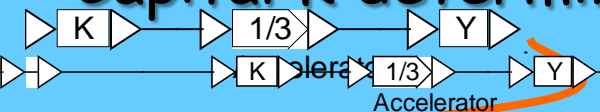
- Asset prices rise: speculation on assets profitable
- Increased willingness to lend increases money supply
 - Money supply endogenous, not controlled by CB
 - Riskier investments enabled, asset speculation rises
- The emergence of “Ponzi” financiers
 - Cash flow less than debt servicing costs
 - Profit by selling assets on rising market
 - Interest-rate insensitive demand for finance
- Rising debt levels & interest rates lead to crisis
 - Rising rates make conservative projects speculative
 - Non-Ponzi investors sell assets to service debts
 - Entry of new sellers floods asset markets
 - Rising trend of asset prices falters or reverses

The Financial Instability Hypothesis

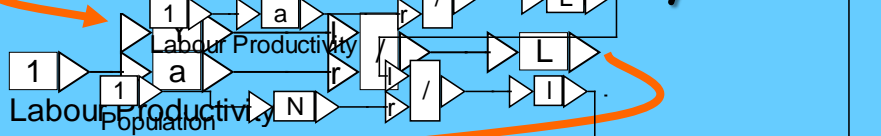
- Boom turns to bust
- Ponzi financiers first to go bankrupt
 - Can no longer sell assets for a profit
 - Debt servicing on assets far exceeds cash flows
- Asset prices collapse, increasing debt/equity ratios
- Endogenous expansion of money supply reverses
- Investment evaporates; economic growth slows
- Economy enters a debt-induced recession
 - Back where we started...
- Process repeats once debt levels fall
 - But starts from higher debt to GDP level
- Final crisis where debt burden overwhelms economy
 - Modeling Minsky...

Keen 1995 Model Foundations: Nonlinear dynamics

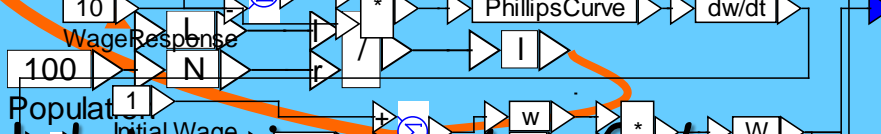
- Growth Cycle model (Goodwin 1967, Blatt 1983)
- Capital K determines output Y via the accelerator:



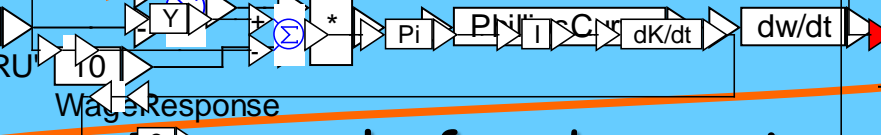
- Y determines employment L



- L determines employment rate w



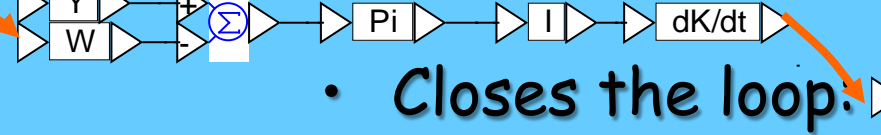
- dw/dt determines rate of change of w



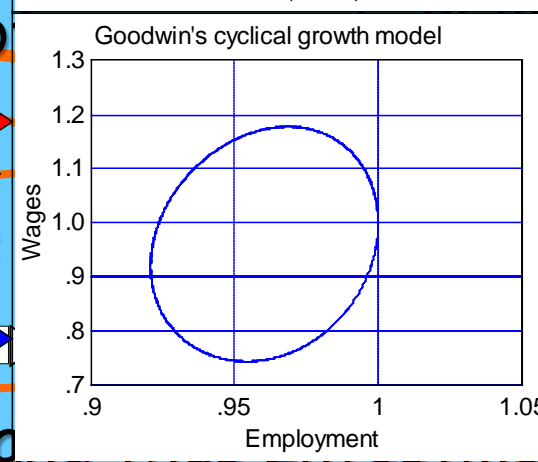
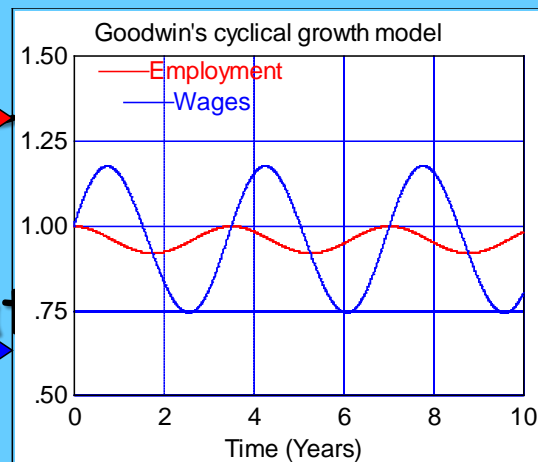
- Integral of w determines



- $Y - W$ determines profits P



- Closes the loop:

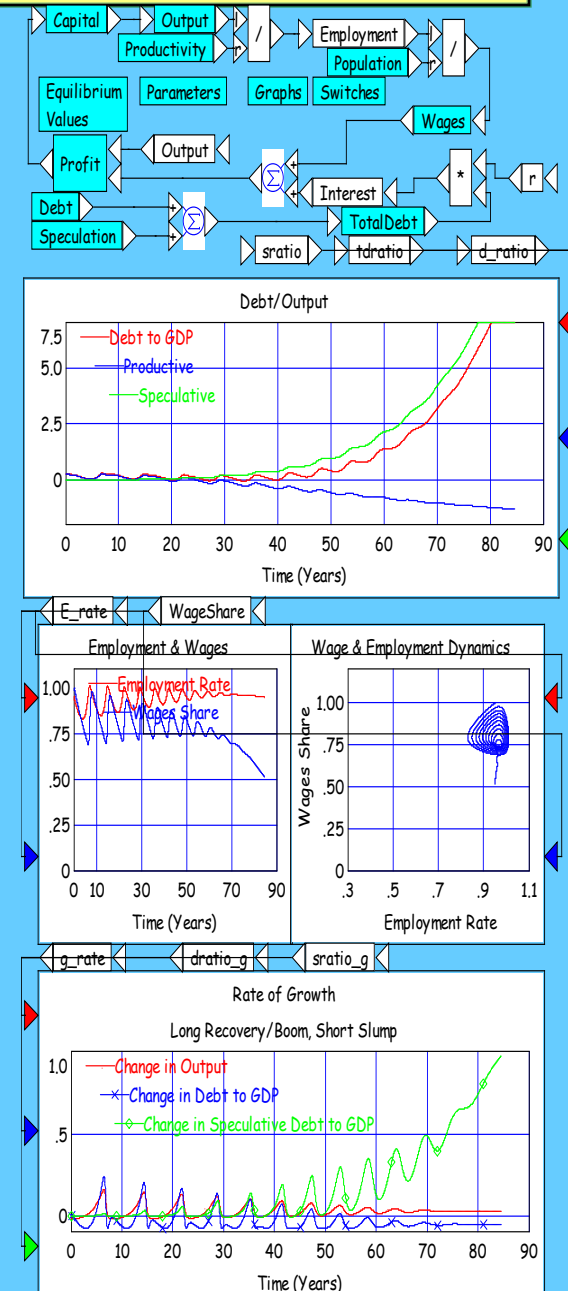


Adding Ponzi Finance

- Realism: Capitalists invest more than profits during boom
 - Debt needed to finance excess
 - Embellishment: Distinguish productive from unproductive debt
- As systems dynamic model:
- Model predicts systemic breakdown as feasible outcome
- But still only implicitly monetary
- Explicitly monetary model (Graziani): Capitalism not barter (2-sided, 2 commodity exchange) but monetary (3 sided—seller, buyer, bank—1 commodity), money a non-commodity token



MinskyPrivateWithSwitches.vsm



Explicitly Monetary Minsky Model

- Input financial relations in Table:

d	Assets	Liabilities	Equity
$\frac{d}{dt} \text{Reserves}$	$\text{Reserve} + \text{Loan}$	Firm Deposit	Bank Equity
$\frac{d}{dt} \text{Loan}$	$F_L - AB_V$	A	
$\frac{d}{dt} \text{Firm Deposit}$	$A - \tau_V(\pi_r)G$		
$\frac{d}{dt} \text{Worker Deposit}$	$F_L - r_D \cdot (F_D + H_D) - \frac{B_T}{\tau_B}$	-B	B
$\frac{d}{dt} \text{Bank Equity}$	$A - B - C + D + E - F + G$		
$\frac{d}{dt} \text{Wages}$	$\frac{B_V}{\tau_Y(\pi_r)} - \frac{F_L}{\tau_L(\pi_r)} + Y \cdot \text{Inv}(\pi_r)$	-C	C
$\frac{d}{dt} \text{Consumption}$	$C - D$	D+E	-E
$\frac{d}{dt} \text{Worker Deposit}$	$C - D$		
$\frac{d}{dt} \text{New Money}$	$B_H E$	G	
$\frac{d}{dt} \text{Bank Equity}$	H_D		

- System of dynamic equations derived automatically:
 - Placeholders replaced by behavioural functions:

Explicitly Monetary Minsky Model

- Full system of 14 coupled differential equations

Financial Sector

$$\frac{d}{dt}B_V(t) = \frac{F_L(t)}{\tau_{RL}(\pi_r(t))} - \frac{B_V(t)}{\tau_{LC}(\pi_r(t))} \quad B_V(0) = B_{V0}$$

$$\frac{d}{dt}B_T(t) = r_L \cdot F_L(t) - r_D \cdot F_D(t) - r_D \cdot H_D(t) - \frac{B_T(t)}{\tau_B} \quad B_T(0) = B_{T0}$$

$$\frac{d}{dt}F_L(t) = \frac{B_V(t)}{\tau_{LC}(\pi_r(t))} - \frac{F_L(t)}{\tau_{RL}(\pi_r(t))} + P(t) \cdot Y_I(t) \cdot \text{Inv}(\pi_r(t)) \quad F_L(0) = F_{L0}$$

$$\frac{d}{dt}F_D(t) = r_D \cdot F_D(t) - r_L \cdot F_L(t) + \frac{B_V(t)}{\tau_{LC}(\pi_r(t))} - \frac{F_L(t)}{\tau_{RL}(\pi_r(t))} + \frac{B_T(t)}{\tau_B} + \frac{H_D(t)}{\tau_W} + P(t) \cdot Y_I(t) \cdot \text{Inv}(\pi_r(t)) - \frac{W(t) \cdot Y_I(t)}{a(t)} \quad F_D(0) = F_{D0}$$

$$\frac{d}{dt}H_D(t) = r_D \cdot H_D(t) - \frac{H_D(t)}{\tau_W} + \frac{W(t) \cdot Y_I(t)}{a(t)} \quad H_D(0) = H_{D0}$$

Physical output, labour and price systems

Level of output

$$Y_I(t) = \frac{K_I(t)}{v} \quad Y_I(0) = Y_{I0}$$

Employment

$$L(t) = \frac{Y_I(t)}{a(t)} \quad L(0) = L_0$$

Rate of Profit

$$\pi_r(t) = \frac{P(t) \cdot Y_I(t) - W(t) \cdot L(t) - (r_L \cdot F_L(t) - r_D \cdot F_D(t))}{v \cdot P(t) \cdot Y_I(t)} \quad \pi_r(0) = \pi_{r0}$$

Rate of employment

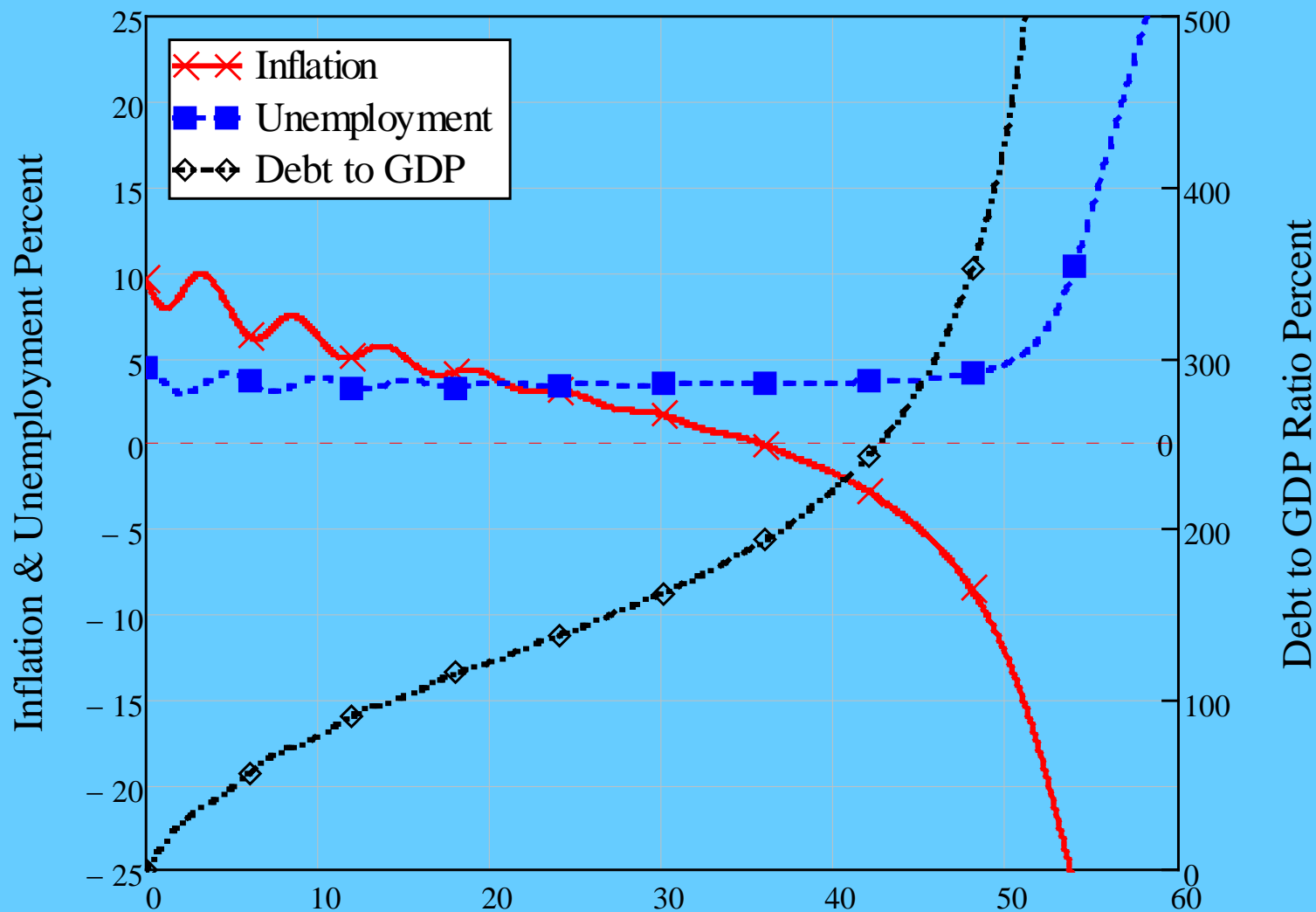
$$\frac{d}{dt}\lambda(t) = \lambda(t) \cdot [g(t) - (\alpha + \beta)] \quad \lambda(0) = \lambda_0$$

Rate of real economic growth

$$g(t) = \frac{\text{Inv}(\pi_r(t))}{v} - \delta \quad g(0) = g_0$$

Explicitly Monetary Minsky Model

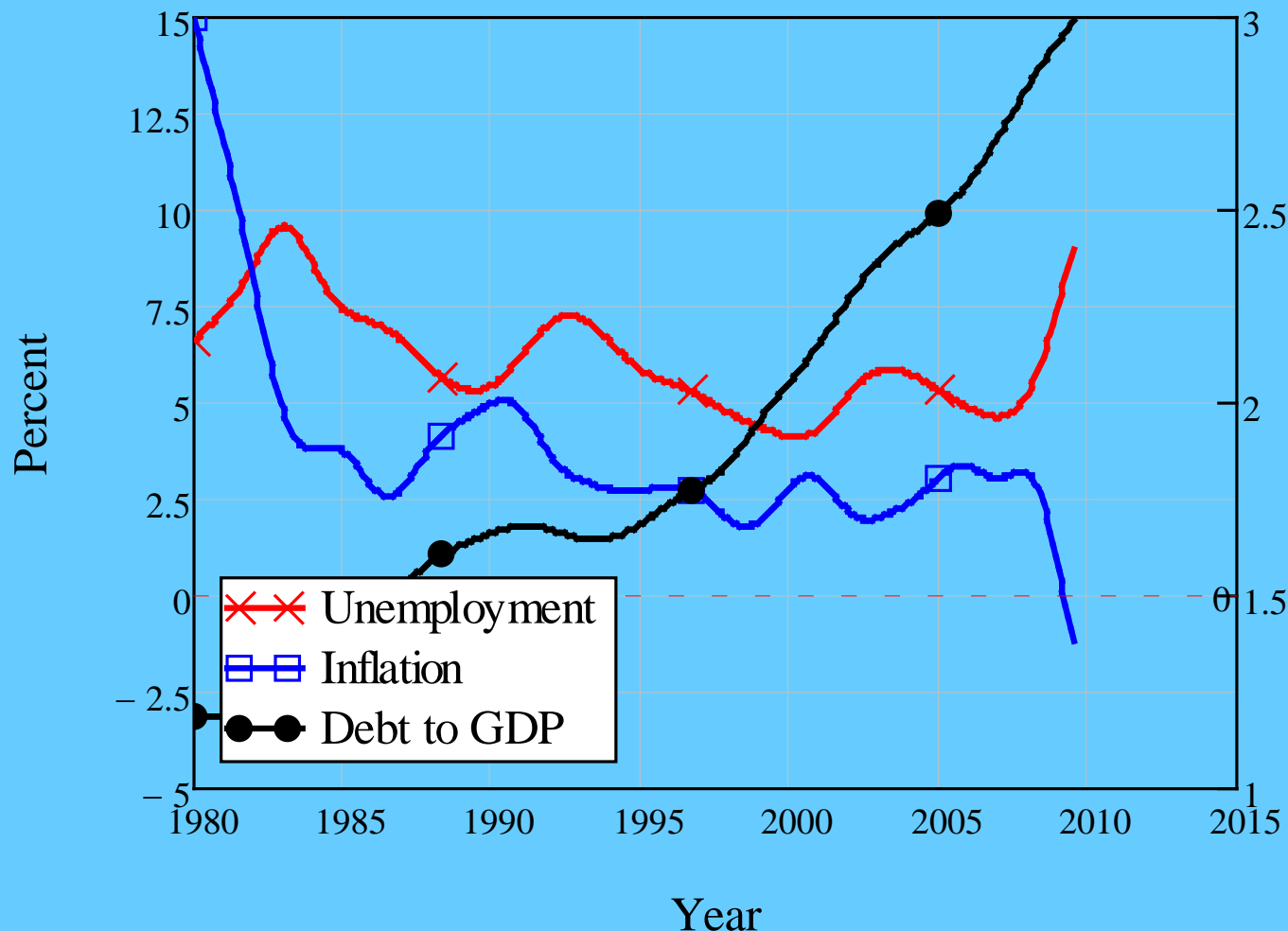
- Generates both “Great Moderation” & “Great Depression”
Inflation, Unemployment and Debt



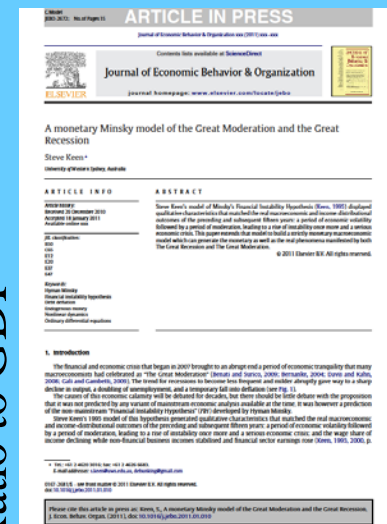
Explicitly Monetary Minsky Model

- Fits stylized facts of crisis

Unemployment, Inflation & Debt (smoothed)



Ratio to GDP

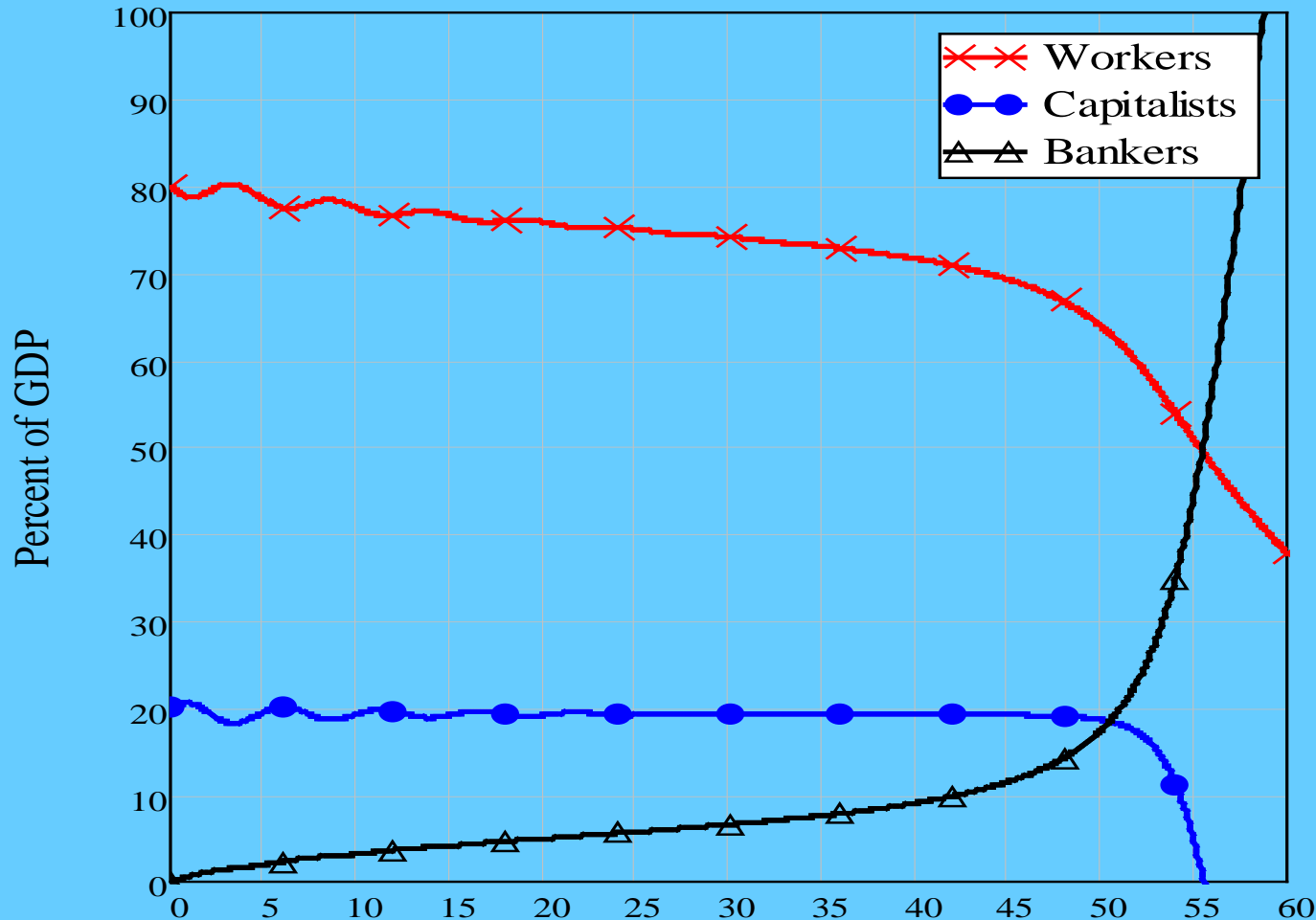


Debt and Inequality

- Model fundamentally has 3 system states:
 - Rate of Employment
 - Debt to GDP ratio
 - Workers' share of output
- Equilibria of model involve
 - Rate of Employment
 - Debt to GDP ratio
 - **Capitalists'** share of output
 - Workers income a residual after capitalists & bankers income
 - Residual **necessarily** falls as debt ratio rises
 - Workers pay for rising debt *even if they have no debt*
 - **Necessary** link between rising debt & rising inequality...

Debt and Inequality

- If income distribution ignored, all appears well until catastrophe strikes
Income distribution & economic breakdown



- Essential to restrain level of **private** debt to limit damaging inequality

References

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Not “Double-counting”...

- Income is wages plus profits

$$Y_I = W + \Pi$$

- Divide profits into

- Distributed profits
- Retained profits

$$Y_I = W + \Pi = W + \Pi_D + \Pi_R$$

- Expenditure (ignoring asset markets & government for the moment)
 - Is **money** spent buying either Consumer Goods or Capital Goods

$$Y_E = C + I$$

- Two sources of demand for Consumer Goods: Workers & Capitalists

$$C_W = W + \frac{d}{dt} D_{WC}$$

$$C_{\Pi} = \Pi_D + \frac{d}{dt} D_{\Pi C}$$

- Borrowing by workers for consumption
 - Can be negative (=“savings”)
- Borrowing by capitalists for consumption
 - Can also be negative (=“savings”)

Not “Double-counting”...

- Two sources of demand for Investment Goods
 - Retained earnings
 - New debt

$$I = \Pi_R + \frac{d}{dt} D_{FI}$$

- Borrowing by firms for investment
 - Can be negative (=“savings”)
- Comparing the two equations...

$$Y_E = C + I$$

$$Y_E = (C_W + C_\Pi) + \left(\Pi_R + \frac{d}{dt} D_{FI} \right)$$

$$Y_E = \left(\left(W + \frac{d}{dt} D_{WC} \right) + \left(\Pi_D + \frac{d}{dt} D_{\Pi C} \right) \right) + \left(\Pi_R + \frac{d}{dt} D_{FI} \right)$$

Not “Double-counting”...

- Rearranging...

$$Y_E = (W + \Pi_D + \Pi_R) + \left(\frac{d}{dt} D_{WC} + \frac{d}{dt} D_{\Pi C} + \frac{d}{dt} D_{FI} \right)$$

- Subtract income from expenditure

$$Y_E - Y_I = \left(\cancel{W} + \cancel{\Pi_D} + \cancel{\Pi_R} \right) + \left(\frac{d}{dt} D_{WC} + \frac{d}{dt} D_{\Pi C} + \frac{d}{dt} D_{FI} \right) - \left(\cancel{W} + \cancel{\Pi_D} + \cancel{\Pi_R} \right)$$

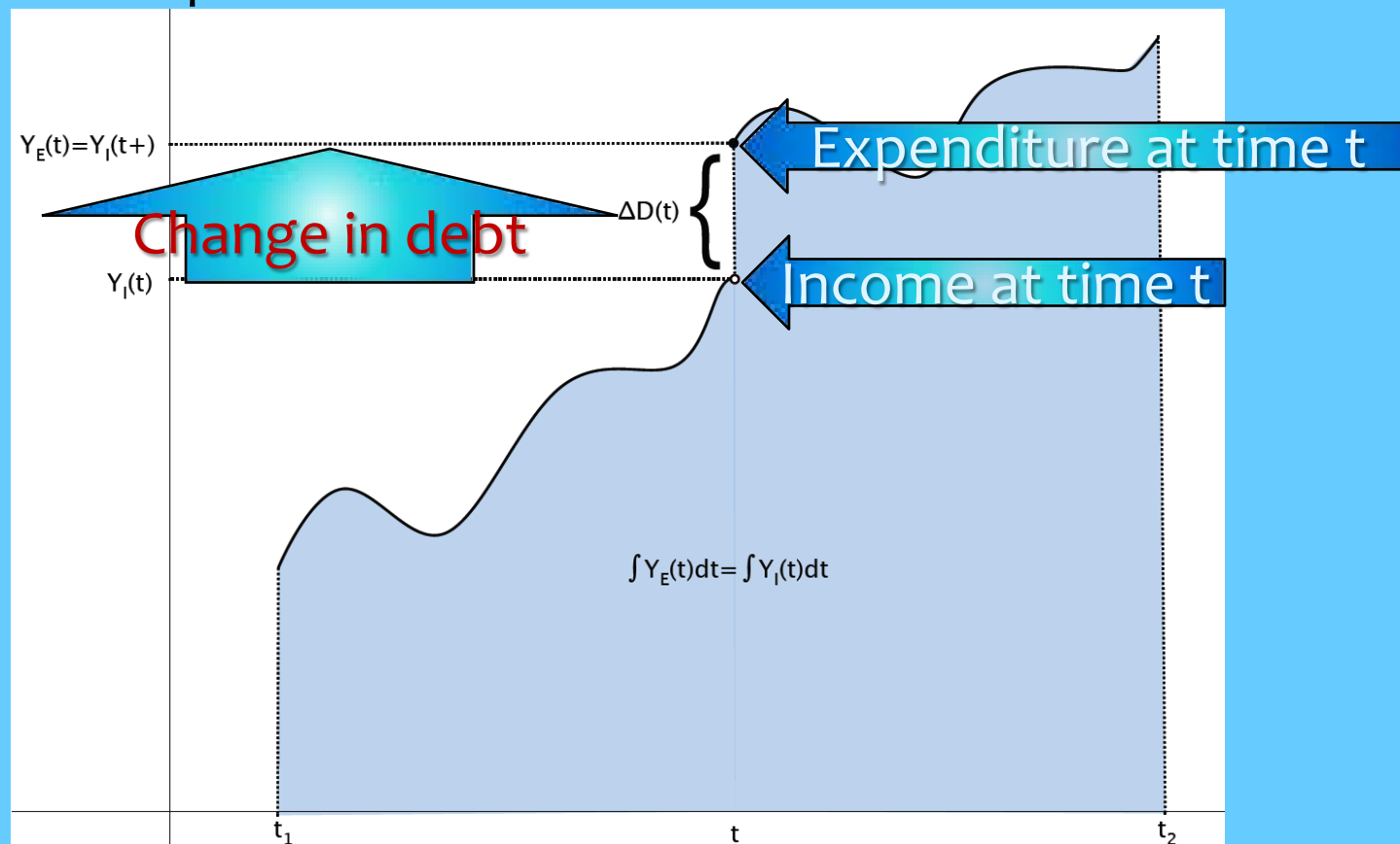
- So expenditure equals income plus the change in debt

$$Y_E = Y_I + \frac{d}{dt} D_{WC} + \frac{d}{dt} D_{\Pi C} + \frac{d}{dt} D_{FI}$$

- **Still** sounds like double-counting?
 - Yes probably: because of “ex-ante” vs “ex-post” confusion...
- Mathematical equality of **recorded** income & expenditure (“ex-post”)
 - Even though differ “ex-ante” (before the event)
- Debt injected at discrete points in time
- Added to spending from income at that time
- After that time, debt has boosted incomes
- *Recorded levels are the same...*

Not “Double-counting”...

- In a picture...



- Measured income at time t is “income looking back”

$$Y_I(t+) = \lim_{s \rightarrow t^+} Y_I(s)$$

- This is **identical to** expenditure at time t

$$Y_E(t) = Y_I(t+) = Y_I(t) + \Delta D(t)$$