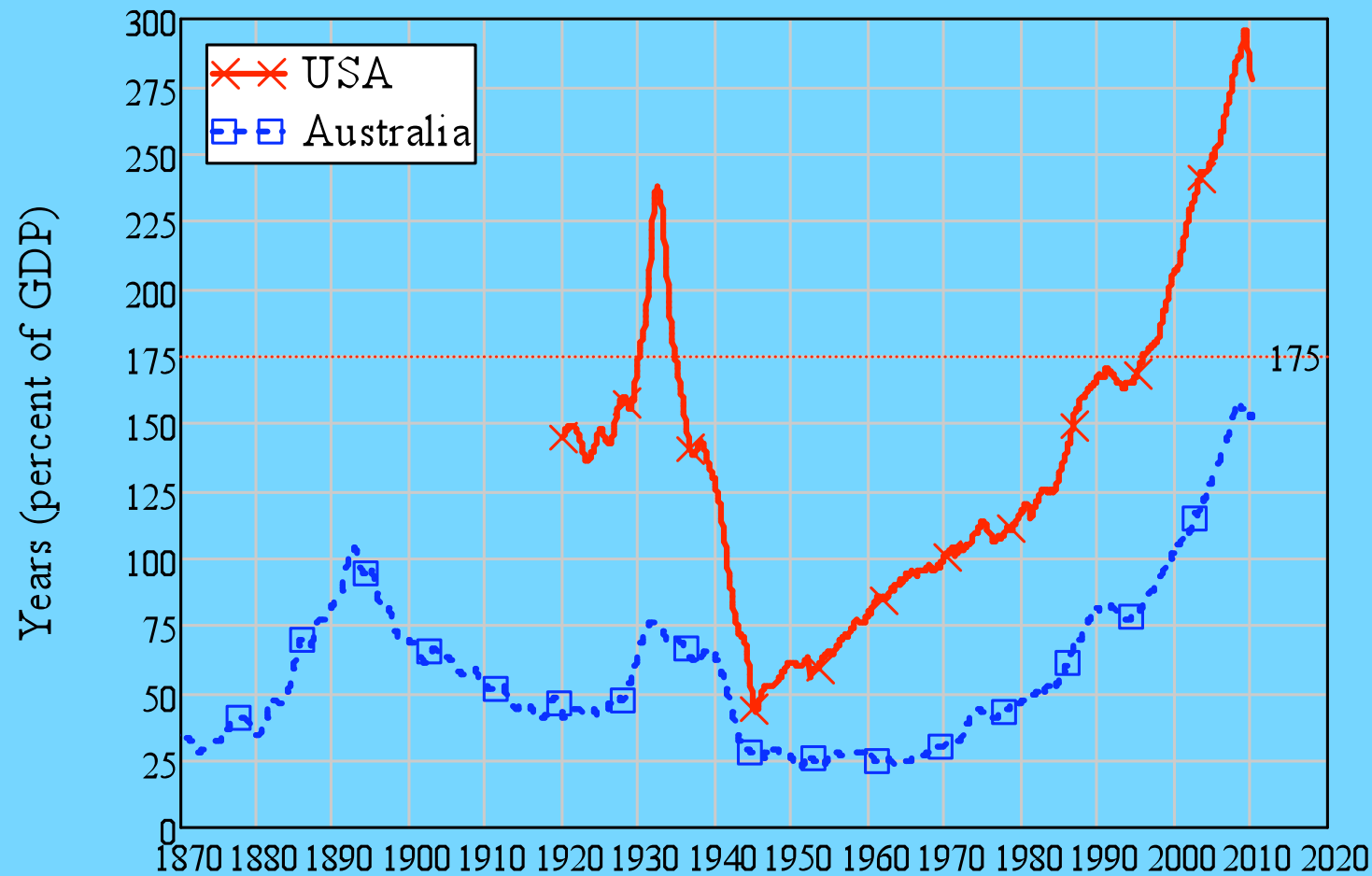


Are We "It" Yet?

Steve Keen
University of Western Sydney
Debunking Economics
www.debtdeflation.com/blogs
www.debunkingeconomics.com

Are We "It" Yet?

- Biggest debt bubbles in history...
Private debt to GDP ratios



Flow of Funds Table L1+Census Data; RBA Table D02

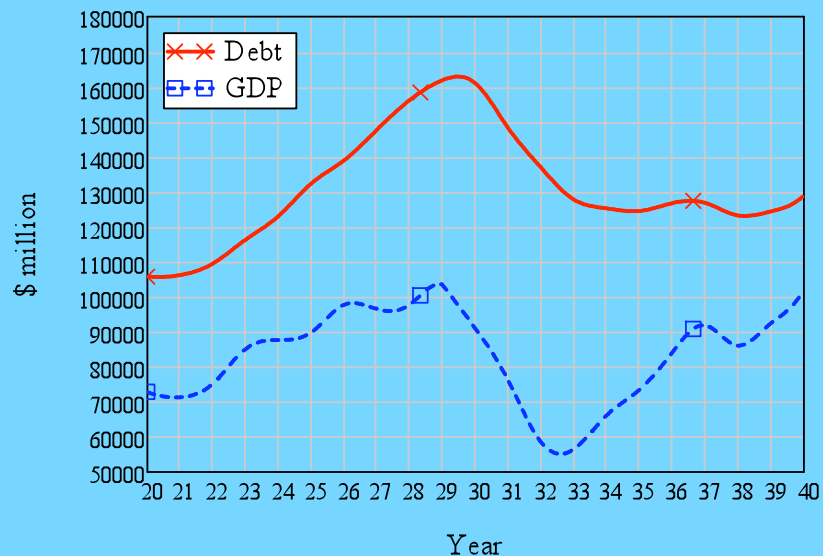
Are We "It" Yet?

- "If income is to grow, the 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, summed over all sectors, 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.
- *It follows that over a period during which economic growth takes place, at least some sectors finance a part of their spending by emitting debt or selling assets."* (Minsky 1982, p. 6; emphasis added)

Are We "It" Yet?

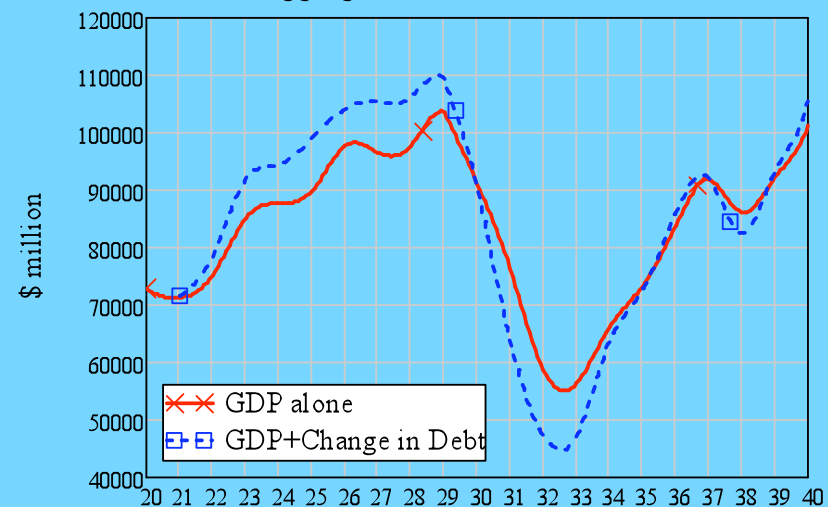
• Debt and GDP

US Private Debt and GDP 1920-1940

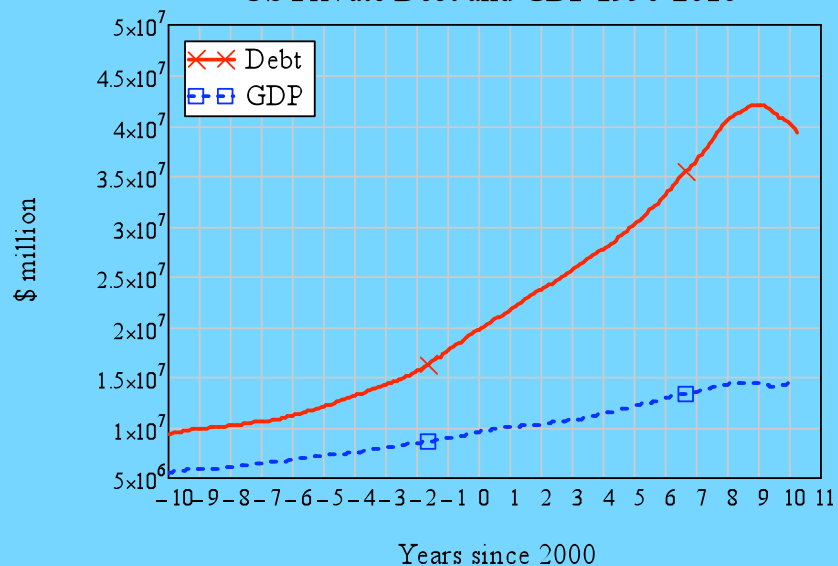


• Aggregate Demand

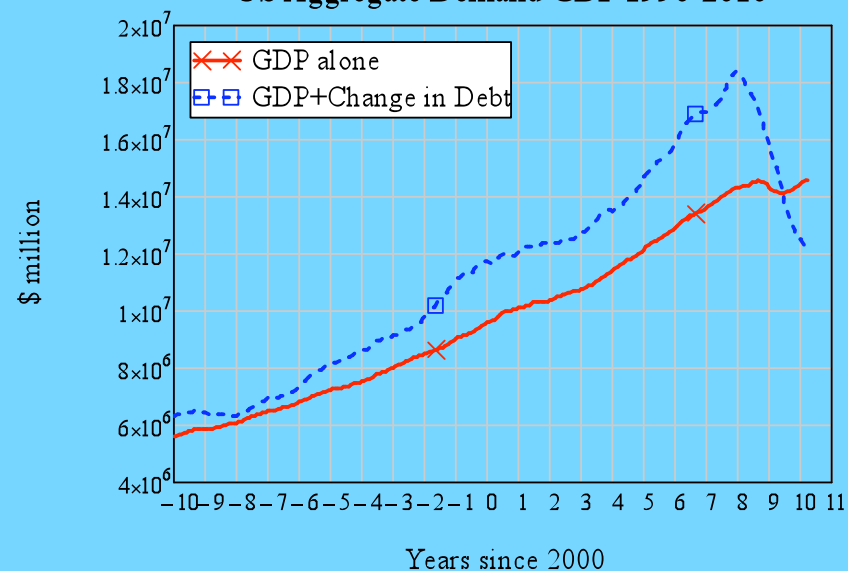
US Aggregate Demand GDP 1920-1940



US Private Debt and GDP 1990-2010

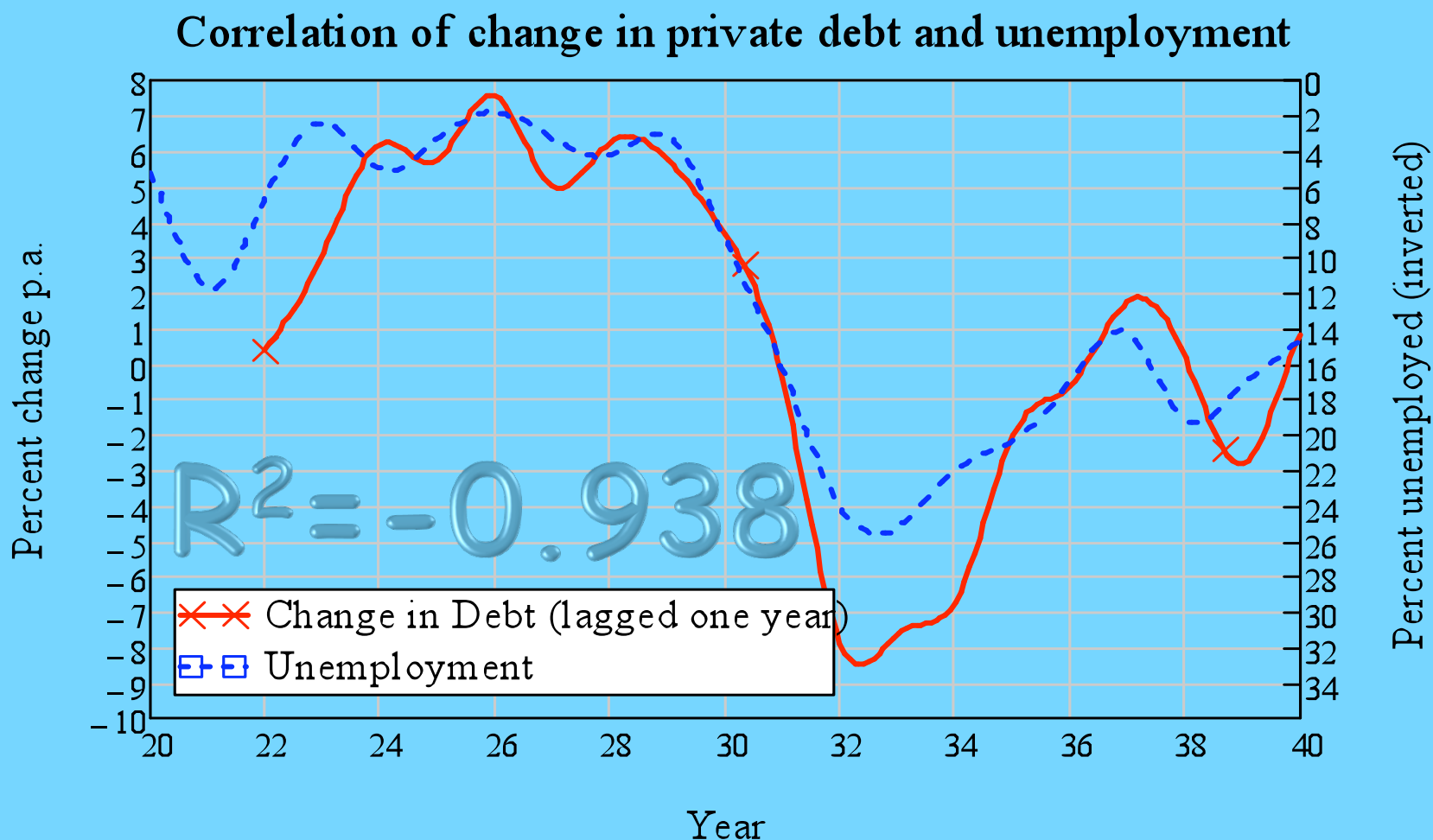


US Aggregate Demand GDP 1990-2010



Are We "It" Yet?

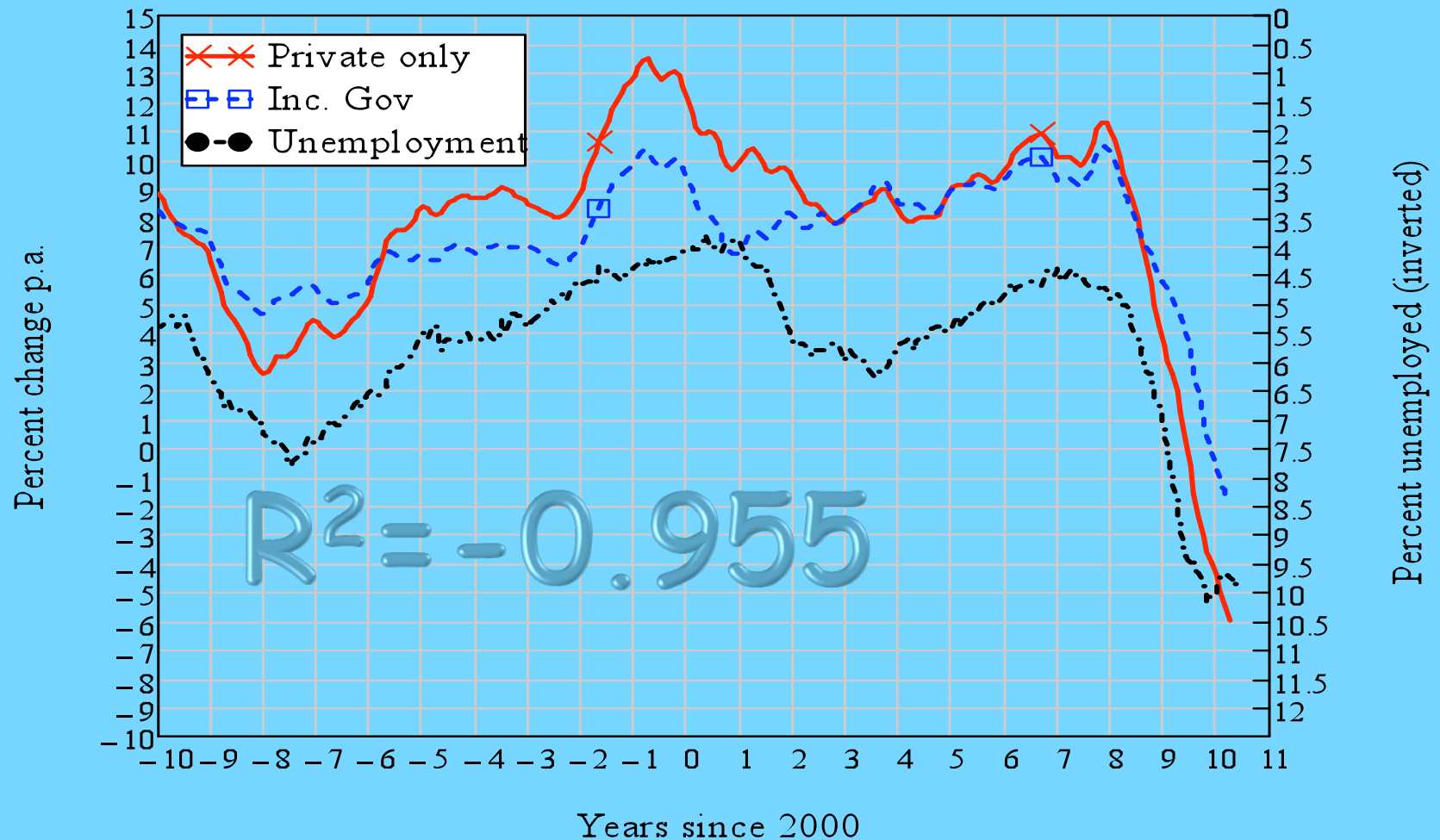
- Aggregate demand & unemployment 1920-1940



Are We "It" Yet?

- Aggregate demand & unemployment 1990-2010

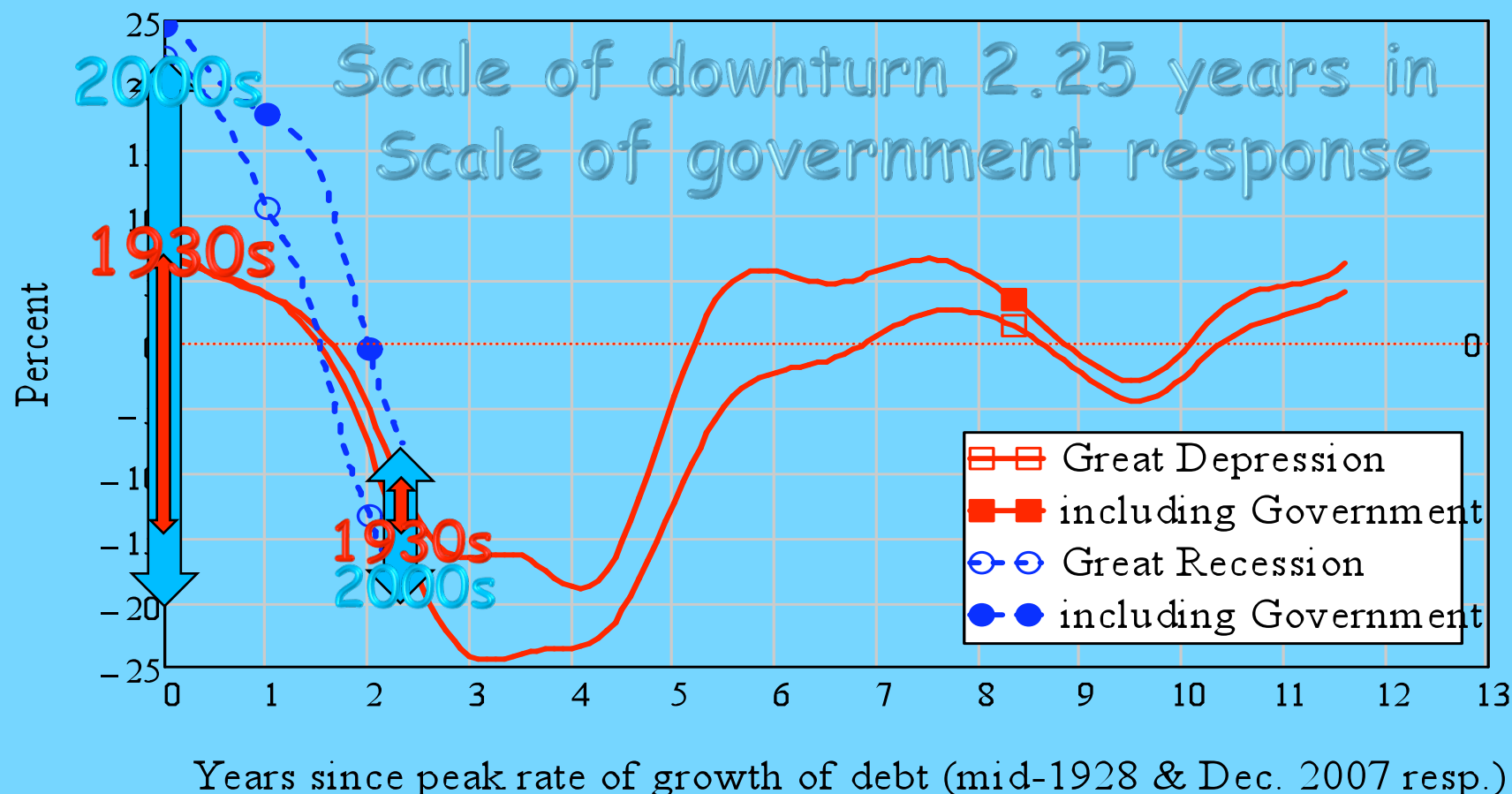
Correlation of change in private debt and unemployment



Are We "It" Yet?

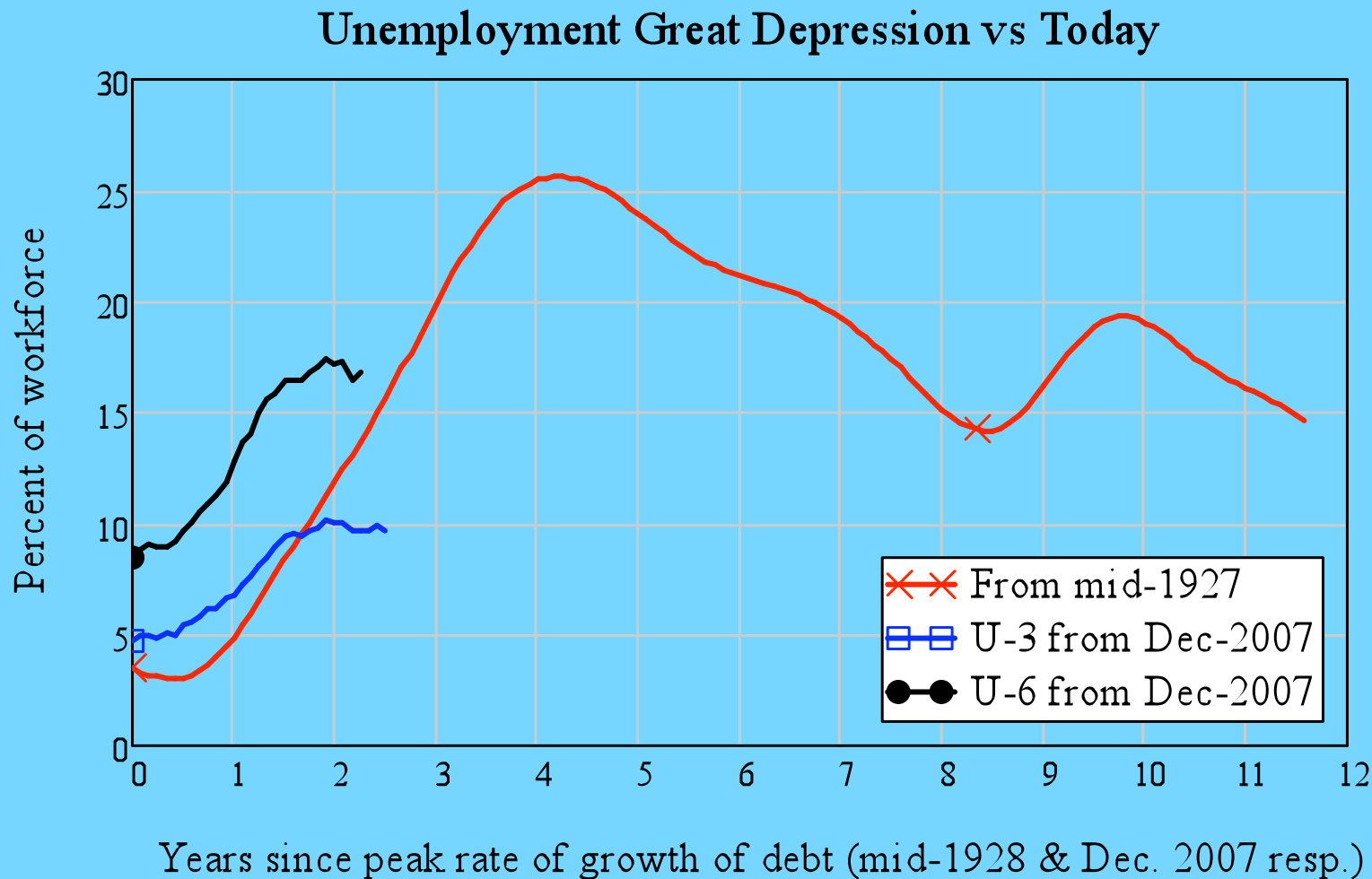
- Debt-financed proportion of aggregate demand: $\frac{\Delta Debt}{GDP + \Delta Debt}$

Debt-financed demand percent of aggregate demand



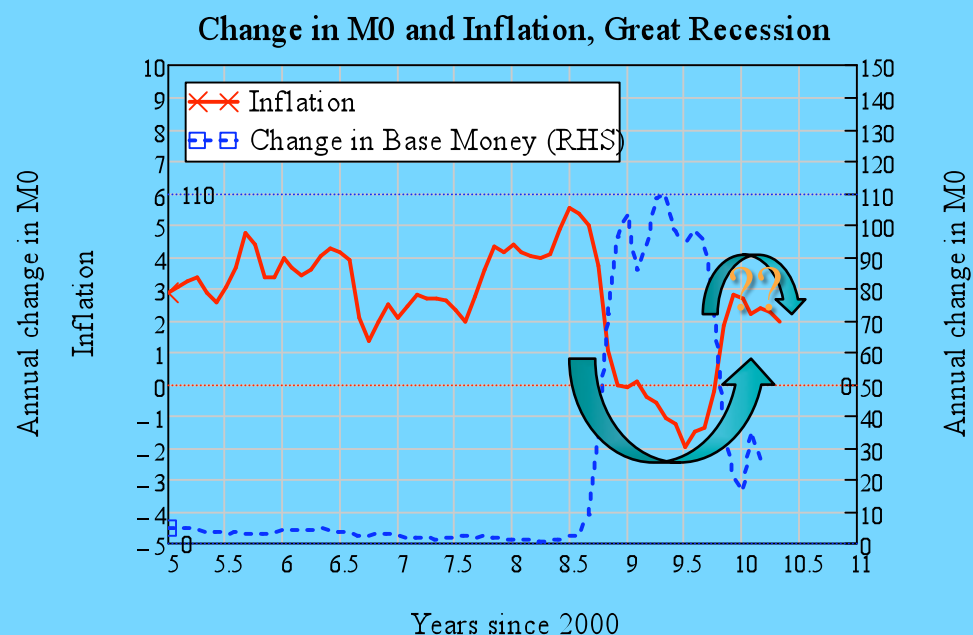
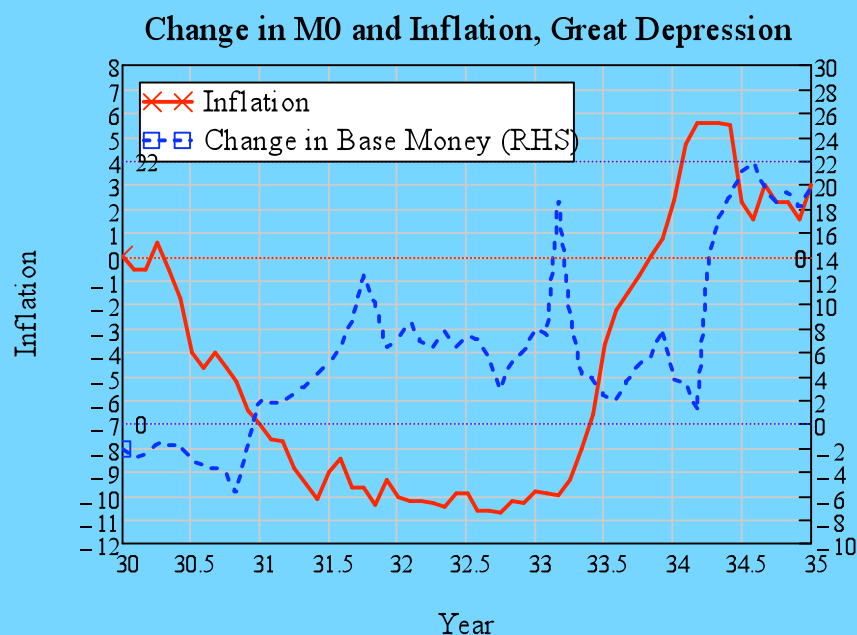
Are We "It" Yet?

- Unemployment: end of the storm or just a lull?



Are We "It" Yet?

- Far larger Fed response: quantitative easing then & now



- "Printing press" may have stopped nascent deflation
- But will it be sustained?
- Over to modelling...

Are We "It" Yet?

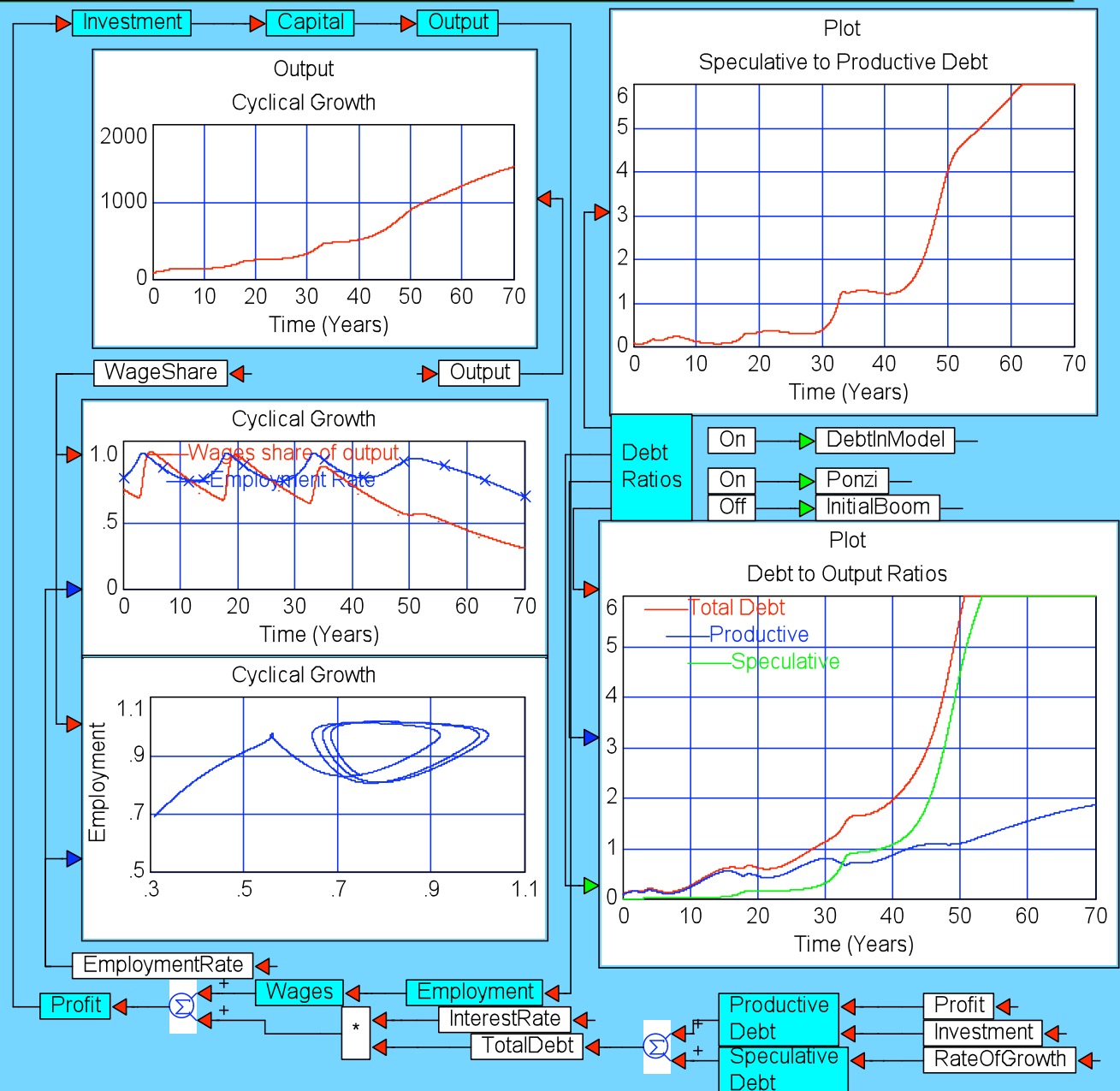
- Minsky: Ponzi finance extension to Keen 1995

Click here to download Vissim viewer program

- Click on icon to run simulation after installing Vissim Viewer



MinskyFlowchart.vsm



Are We "It" Yet?

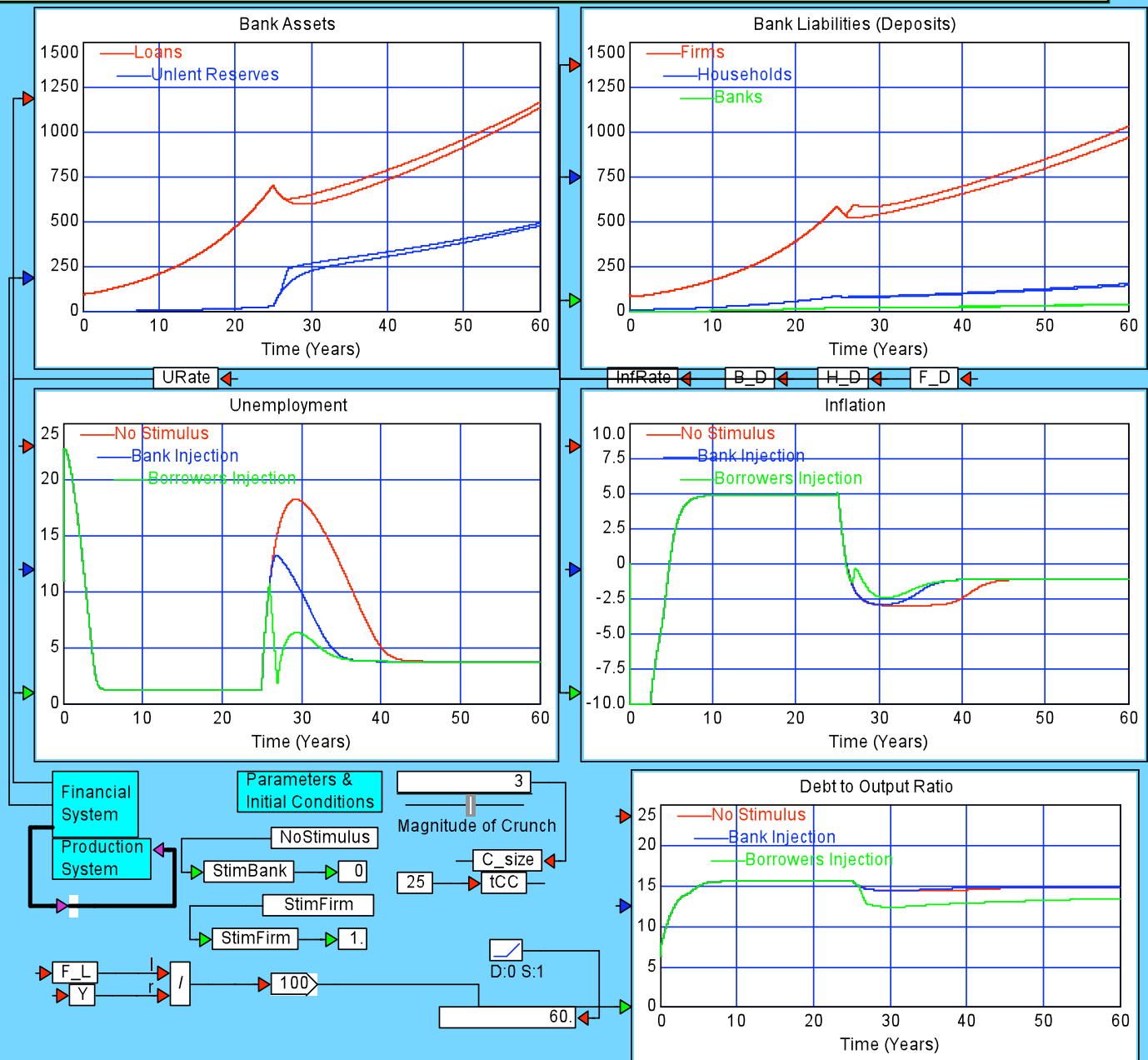
- Circuit:
Which gives
more "bang
for buck"
—rescuing
bankers or
debtors?

- Click on icons
to run

 CreditCrunchGovRescue.vsm

 CreditCrunchGovRescue.vsm

 CreditCrunchGovRescue.vsm



Are We "It" Yet?

- Integrating Minsky & the Circuit

Financial Sector

$$\frac{d}{dt}B_C(t) = \frac{F_L(t)}{\tau_{RL}(g(t))} - \frac{B_C(t)}{\tau_{LC}(g(t))}$$

$$\frac{d}{dt}B_{PL}(t) = r_L \cdot F_L(t) - r_D \cdot F_D(t) - r_D \cdot W_D(t) - \frac{B_{PL}(t)}{\tau_B}$$

$$\frac{d}{dt}F_L(t) = \frac{B_C(t)}{\tau_{LC}(g(t))} - \frac{F_L(t)}{\tau_{RL}(g(t))} + P_C(t) \cdot Y_I(t) \cdot \text{Inv}(\pi_I(t))$$

$$\frac{d}{dt}F_D(t) = r_D \cdot F_D(t) - r_L \cdot F_L(t) + \frac{B_C(t)}{\tau_{LC}(g(t))} - \frac{F_L(t)}{\tau_{RL}(g(t))} + \frac{B_{PL}(t)}{\tau_B} + \frac{W_D(t)}{\tau_W} - \frac{Y_I(t) \cdot W(t)}{a(t)} + P_C(t) \cdot Y_I(t) \cdot \text{Inv}(\pi_I(t))$$

$$\frac{d}{dt}W_D(t) = r_D \cdot W_D(t) - \frac{W_D(t)}{\tau_W} + \frac{Y_I(t) \cdot W(t)}{a(t)}$$

System states and algebraic relations

Level of output $Y_I(t) = \frac{K_I(t)}{v}$

Rate of Profit $\pi_I(t) = \frac{P_C(t) \cdot Y_I(t) - W(t) \cdot \frac{Y_I(t)}{a(t)} - r_L \cdot F_L(t)}{v \cdot P_C(t) \cdot Y_I(t)}$

Rate of employment $\lambda(t) = \frac{Y_I(t)}{a(t) \cdot N(t)}$

Rate of real economic growth $g(t) = \frac{\text{Inv}(\pi_I(t))}{v} - \delta$

Rate of change of wages $\frac{d}{dt}W(t) = W(t) \cdot \left[\text{Ph}(\lambda(t)) + \left[\frac{-1}{\tau_{Pc}} \left[1 - \frac{W(t)}{a(t) \cdot (1-s) \cdot P_C(t)} \right] \right] \right]$

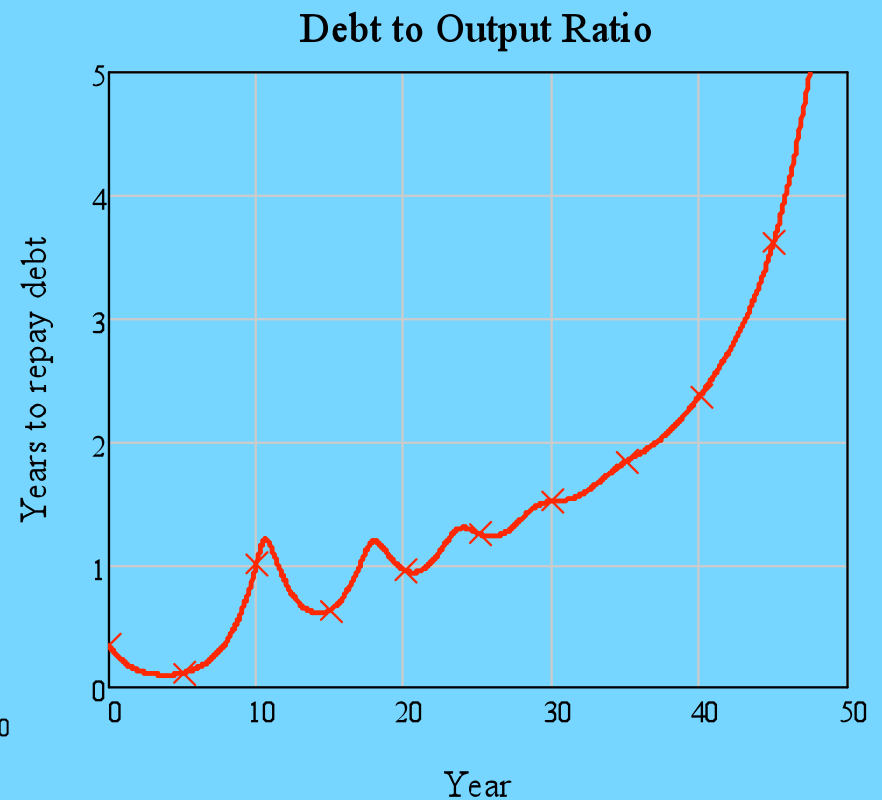
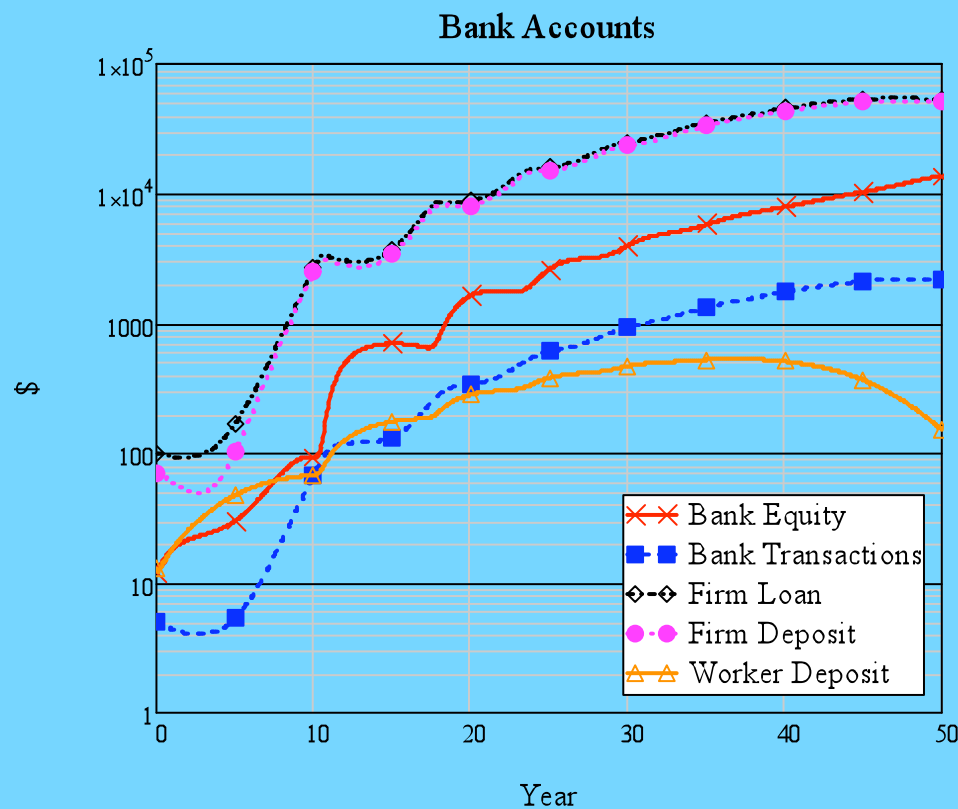
Rate of change of prices $\frac{d}{dt}P_C(t) = \frac{-1}{\tau_{Pc}} \cdot \left[P_C(t) - \frac{W(t)}{a(t) \cdot (1-s)} \right]$

Rate of change of capital stock $\frac{d}{dt}K_I(t) = K_I(t) \cdot g(t)$

Rates of growth of population and productivity $\frac{d}{dt}a(t) = \alpha \cdot a(t) \quad \frac{d}{dt}N(t) = \beta \cdot N(t)$

Are We "It" Yet?

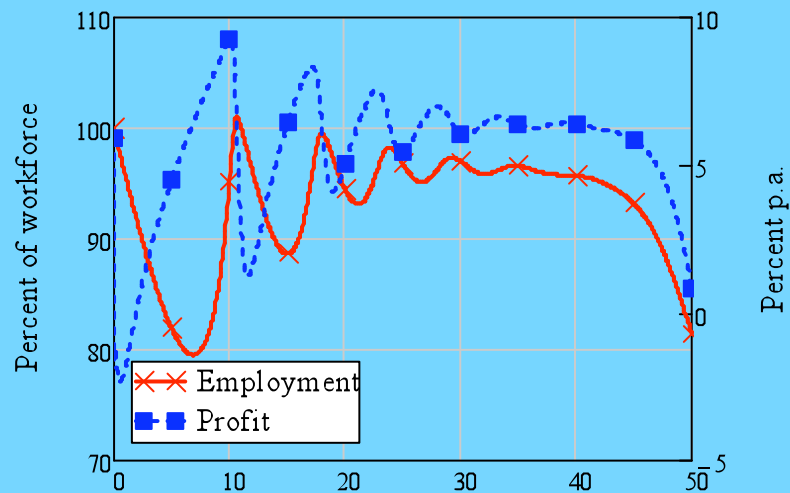
- Debt-deflationary dynamics in strictly monetary Minsky-Circuit model
- "The Great Moderation", then "The Great Crash"



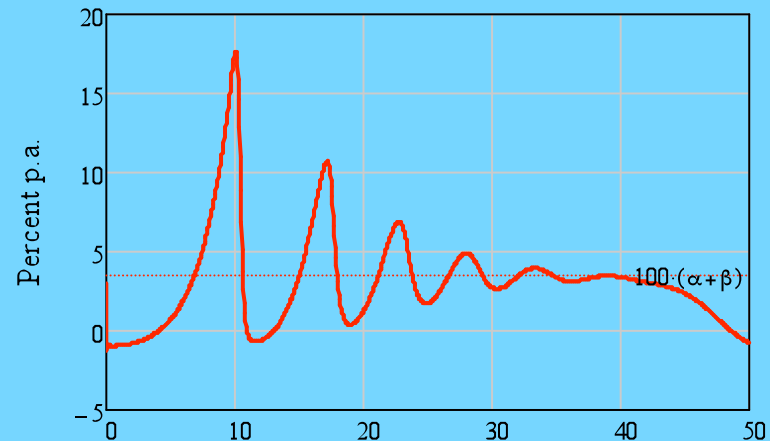
Are We "It" Yet?

- Stability is destabilizing...

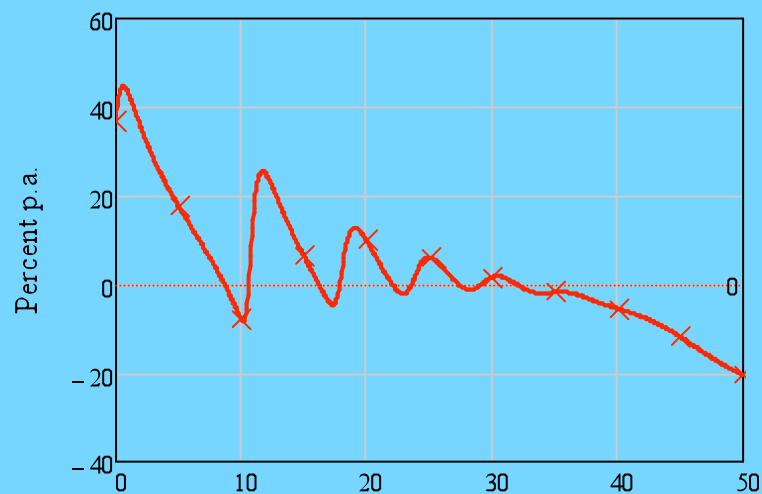
Rate of employment and rate of profit



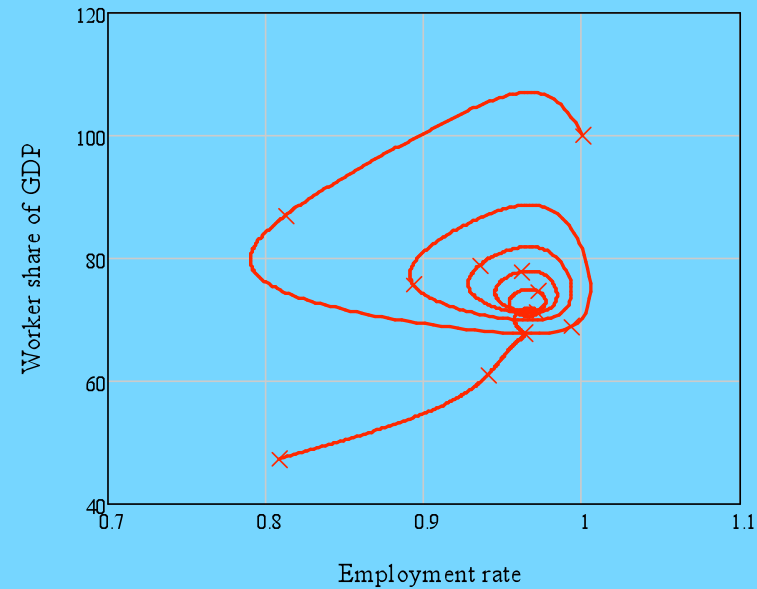
Real growth rate



Inflation Rate

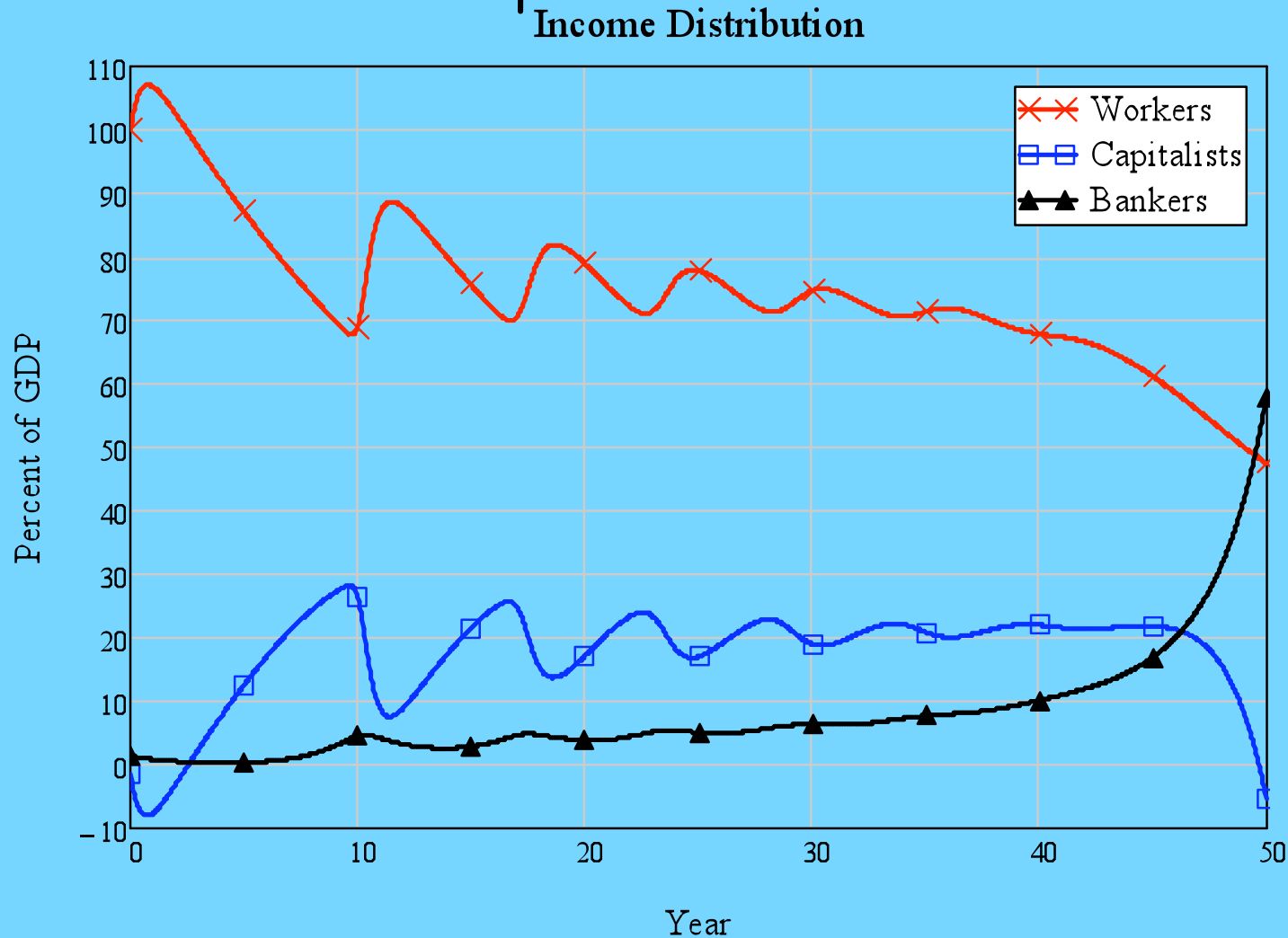


Employment and wage share dynamics



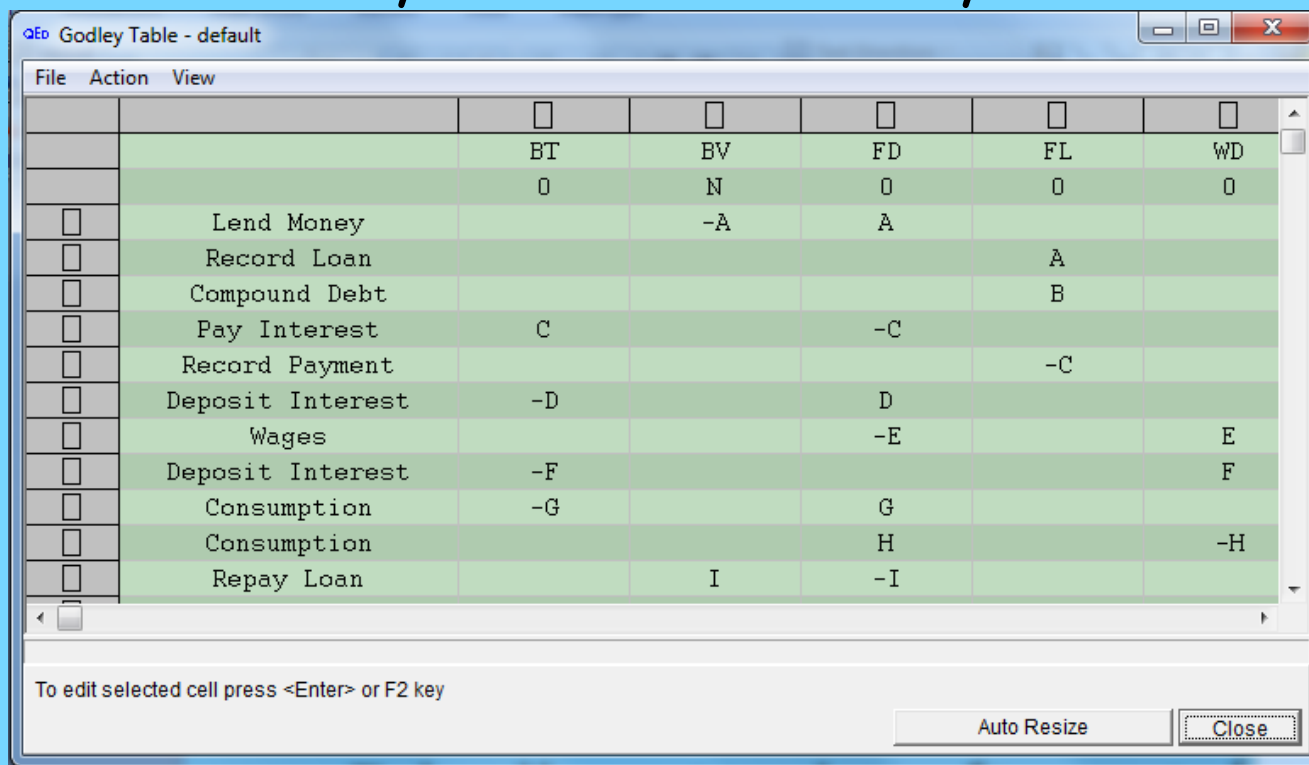
Are We "It" Yet?

- Income inequality
 - Not worker vs capitalist but worker vs banker



Are We "It" Yet?

- QED: a new approach to dynamic modelling
- Inspired by Godley SAM approach
 - Extended to continuous time
- Ideally suited to financial flows
 - Model dynamics via a GodleyTable:



The screenshot shows a software window titled "QED Godley Table - default". It contains a table with 7 columns and 12 rows. The first column has checkboxes. The table is as follows:

		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BT	BV	FD	FL	WD
		0	N	0	0	0
<input type="checkbox"/>	Lend Money		-A	A		
<input type="checkbox"/>	Record Loan				A	
<input type="checkbox"/>	Compound Debt				B	
<input type="checkbox"/>	Pay Interest	C		-C		
<input type="checkbox"/>	Record Payment				-C	
<input type="checkbox"/>	Deposit Interest	-D		D		
<input type="checkbox"/>	Wages			-E		E
<input type="checkbox"/>	Deposit Interest	-F				F
<input type="checkbox"/>	Consumption	-G		G		
<input type="checkbox"/>	Consumption			H		-H
<input type="checkbox"/>	Repay Loan		I	-I		

At the bottom of the window, there is a status bar that says "To edit selected cell press <Enter> or F2 key". There are also two buttons: "Auto Resize" and "Close".

Are We "It" Yet?

- Equation entry:

Coupled Ordinary Differential Equatio...

A = $b_V * BV(t)$

B = $r_L * FL(t)$

C = $r_L * FL(t)$

D = $r_D * FD(t)$

E = $f_D * FD(t)$

F = $r_D * WD(t)$

G = $b_T * BT(t)$

H = $w_D * WD(t)$

I = $f_L * FL(t)$

To edit selected cell press <Enter> or F2 key

Close

Variables and Equati...

N = 100

$b_V = \frac{3}{4}$

$r_L = .05$

$r_D = .02$

$f_D = 2$

$b_T = 1$

$w_D = 26$

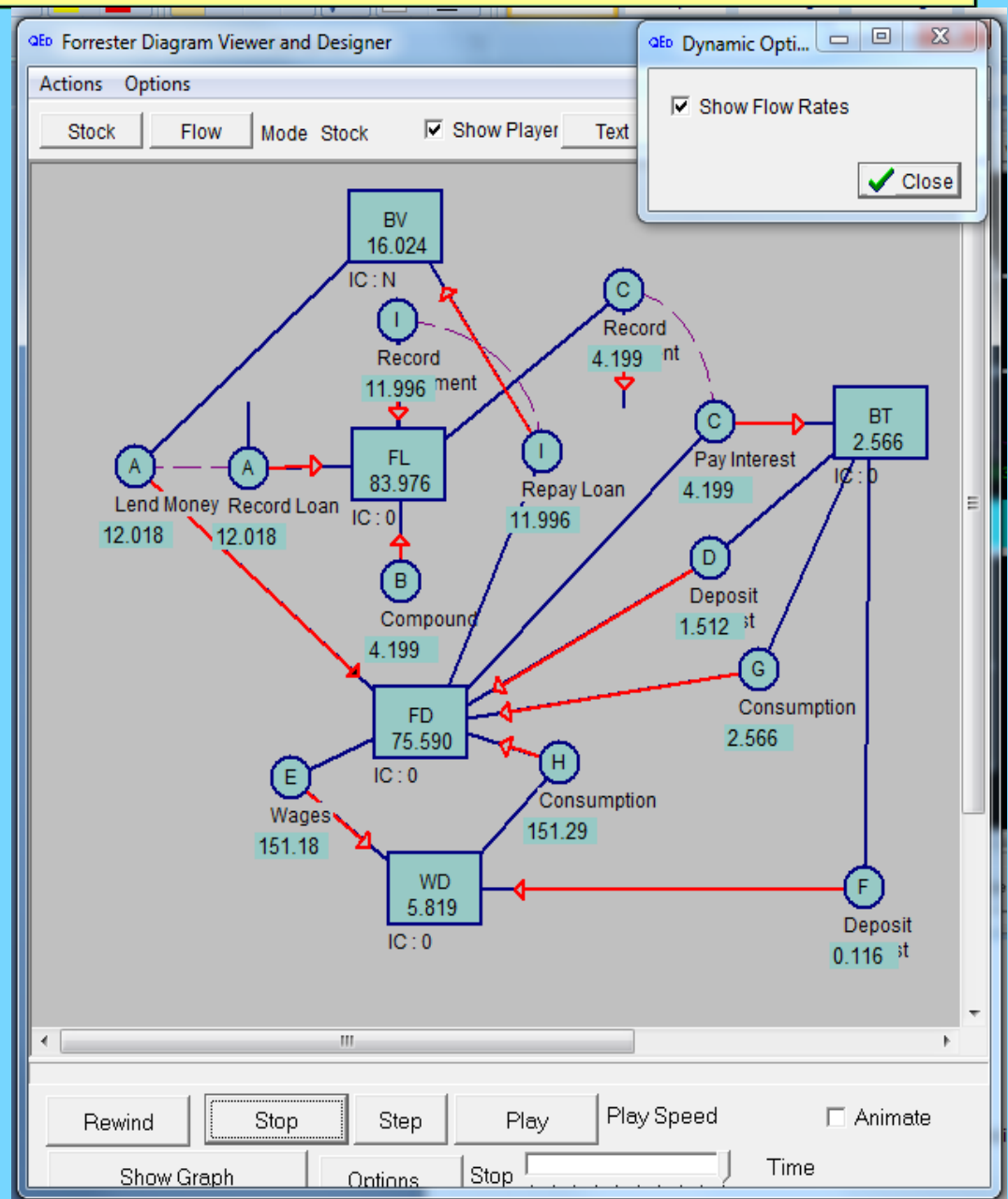
$f_L = \frac{1}{7}$

To edit selected cell press <Enter> or F2 key

Close

Are We "It" Yet?

- Automatically generate "Forrester Diagram"
- Similar to standard systems engineering
 - Simulink, Vissim, Ithink, Stella, Vensim
- And also "Phillips Diagram"...



Are We "It" Yet?

- Tribute to Bill Phillips...
- Freely available at www.debtdeflation.com/blogs/qed
- Updates will be posted there

