Credit and Economic Recovery: Demystifying Phoenix Miracles

Michael Biggs
Deutsche Bank

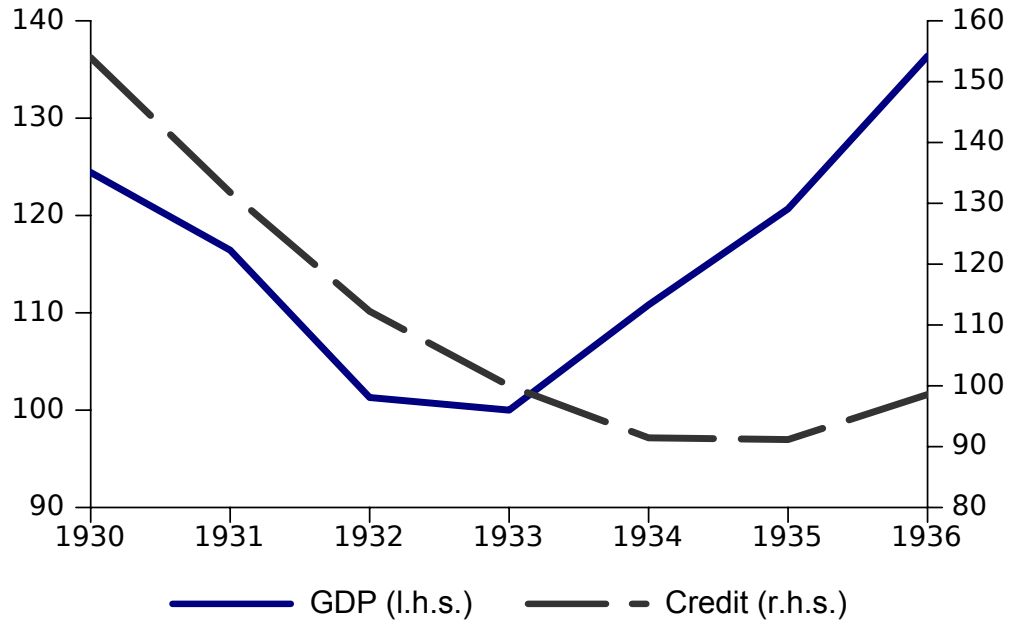
Thomas Mayer
Deutsche Bank

Andreas Pick
Erasmus University Rotterdam
De Nederlandsche Bank

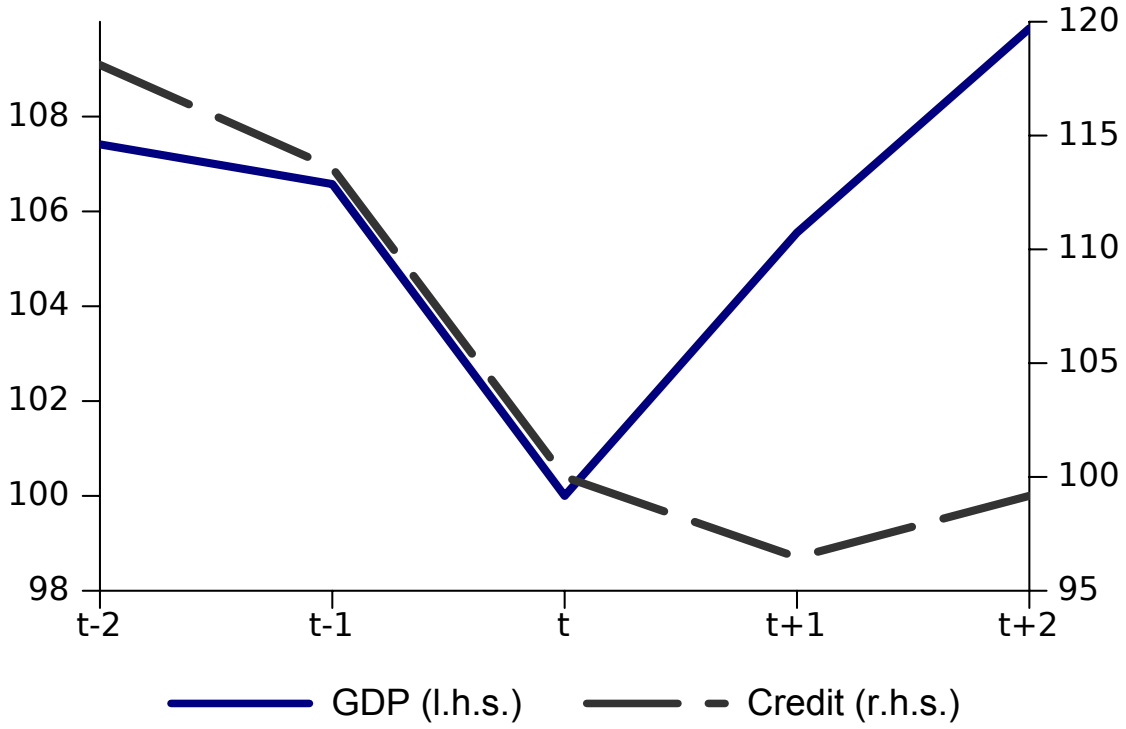
Stylized fact:

After severe recessions economies recover without a rebound in credit – credit-less recoveries or Phoenix miracles.

Calvo et al. (2006a, 2006b):
Credit and economic recovery from the Great Depression

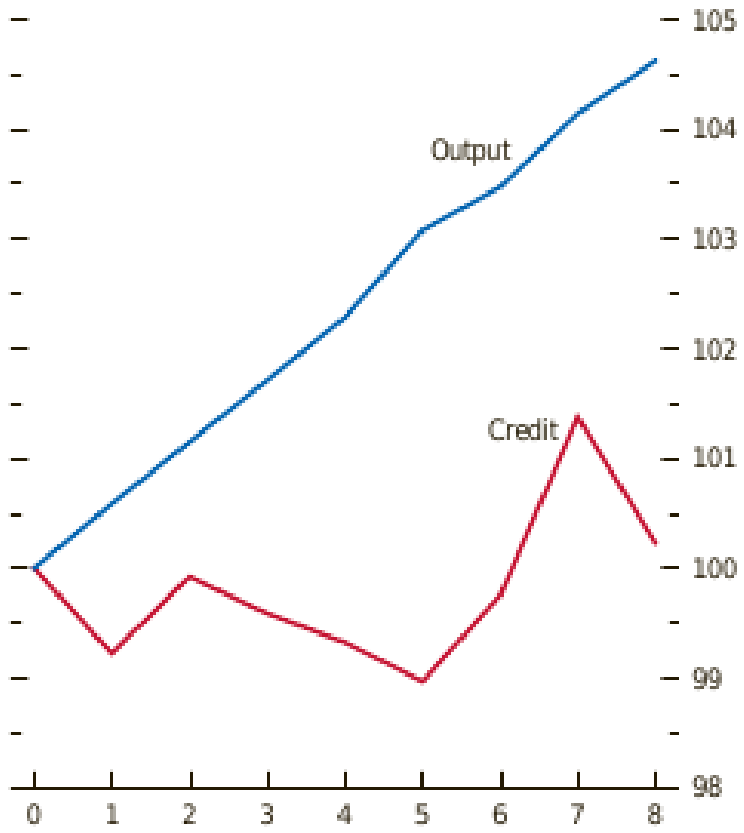


Calvo et al. (2006a, 2006b):
Credit and economic recovery from Systemic Sudden Stops



The Behavior of Credit during Recoveries from Recessions Associated with Financial Crises

(Median = 100 at t = 0; trough in output at t = 0; quarters on the x-axis)



Source: IMF staff calculations.

If decline in credit is so closely related to growth, how does the economy recover without a rebound in credit?

Are developments in the credit market not important for economic recovery?

In this paper we argue that developments in credit markets are tremendously important for economic recovery.

In this paper we argue that developments in credit markets are tremendously important for economic recovery.

Recoveries only appear credit-less when the stock of credit is compared with the flow of economic activity.

In recovery phases the flow of credit is more important to the flow of economic activity.

Shift attention from the stock of credit to the flow of credit.

This paper:

1. We introduce a measure of change in the flow of credit: "credit impulse"

2. relate it to economic growth in a simple model,

3. confirm the results from our simple model in a larger DSGE model,

4. show that empirically it is well correlated with economic growth, particularly in recovery periods.

A simple model

Firms own capital K_t and use it to produce non-durable consumption goods

$$Y_{c,t} = F(K_t) = AK_t.$$

The capital good depreciates at rate δ and firms invest I_t

$$K_t = (1 - \delta)K_{t-1} + I_t.$$

Firms make no profit and need to borrow to invest, I_t.

Profit maximization implies that the interest rate on loans is

$$r = A - \delta$$

Price of consumption good is set to 1, so that firms income is:

$$(r + \delta)K_t.$$

Thus, the firm can replay δK_t each period.

Hence, $D_t = (1 - \delta D_{t-1}) + I_t$,

or $I_t = \Delta D_t + \delta D_{t-1}$

Households consume $C_t = AK_t = (r + \delta)K_t$,

Now, write GDP as

$$\begin{aligned} Y_t &= C_t + I_t && (1) \\ &= (r + \delta)K_t + \Delta D_t + \delta D_{t-1} && (2) \\ &= (1 - \delta)\Delta D_t + (2\delta + r)D_t && (3) \end{aligned}$$

Hence, GDP is a function of the stock of credit, D_t, and the flow of credit, ΔD_t.

For a reasonable size of δ and r, the coefficient of the flow of credit is much larger that that of the stock of credit.

Rearrange to obtain the growth rate of GDP, $y_{t,}$,

$$y_t = \frac{Y_t - Y_{t-1}}{Y_{t-1}} = \frac{(2\delta + r)\Delta D_t}{Y_{t-1}} + (1 - \delta)\frac{\Delta D_t - \Delta D_{t-1}}{Y_{t-1}}.$$

Hence, GDP growth is a function of the change in the stock of credit, ΔD_t, or credit growth, and the change in the flow of credit $\Delta D_t - \Delta D_{t-1}$ or "credit impulse".

Assume for a second that $r = 0$ and that credit grows at rate α_t, then

$$\frac{(1-\delta)K_{t-1} + I_t}{K_{t-1}} = 1 + \alpha_t$$

or

$$I_t = (\alpha_t + \delta)K_{t-1}$$

Hence,

$$Y_t = (\alpha_t + \delta)K_{t-1} + \delta K_t = \frac{(\alpha_t + \delta) + (1 + \alpha_t)\delta}{(1 + \alpha_t)} K_t,$$

Economic growth is

$$y_t = \frac{\alpha_t(1+\delta)+2\delta}{\alpha_{t-1}(1+\delta)+2\delta}(1+\alpha_{t-1})-1.$$

Observe that

$$\frac{\partial y_t}{\partial \alpha_t} = \frac{(1+\delta)(1+\alpha_{t-1})}{\alpha_{t-1}(1+\delta)+2\delta} > 0,$$

and

$$\frac{\partial y_t}{\partial \alpha_{t-1}} = -\frac{[\alpha_t(1+\delta)+2\delta](1-\delta)}{[\alpha_{t-1}(1+\delta)+2\delta]^2} < 0.$$

1. Under constant credit growth, the growth in the credit stock and GDP is equal to α.

2. GDP growth is increasing in α_t and decreasing in α_{t-1}.
- GDP growth is function of the level and the change in credit growth.
- If credit growth has been stable at α_H and then falls to α_L,
- GDP growth falls from α_H to a level *below* α_L,
- it then rebounds to α_L.
- If credit growth falls but then stabilizes,
  GDP growth rebounds without a rebound in credit growth.

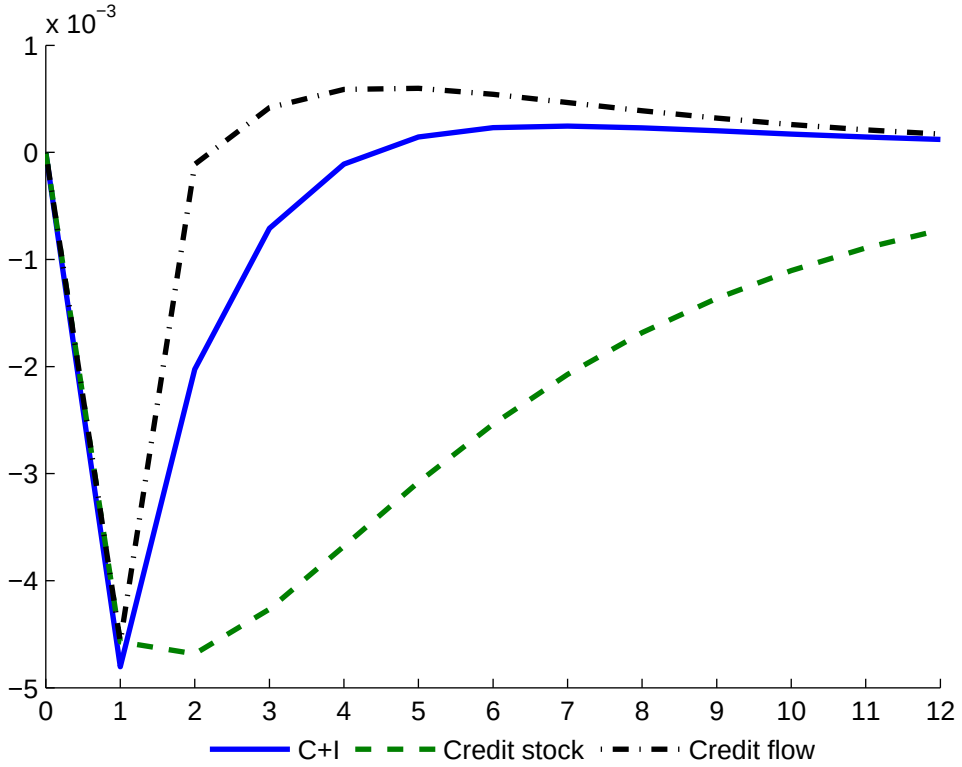
3. An implication of 1) and 2) is that if credit growth falls from α_H to α_L and then rebounds back to α_H, GDP growth will rebound to a level above α_H. For GDP growth to return to its pre-crisis level, credit growth needs to increase but only to a level below α_H.

Does the result depend on the assumptions made in our simple model?

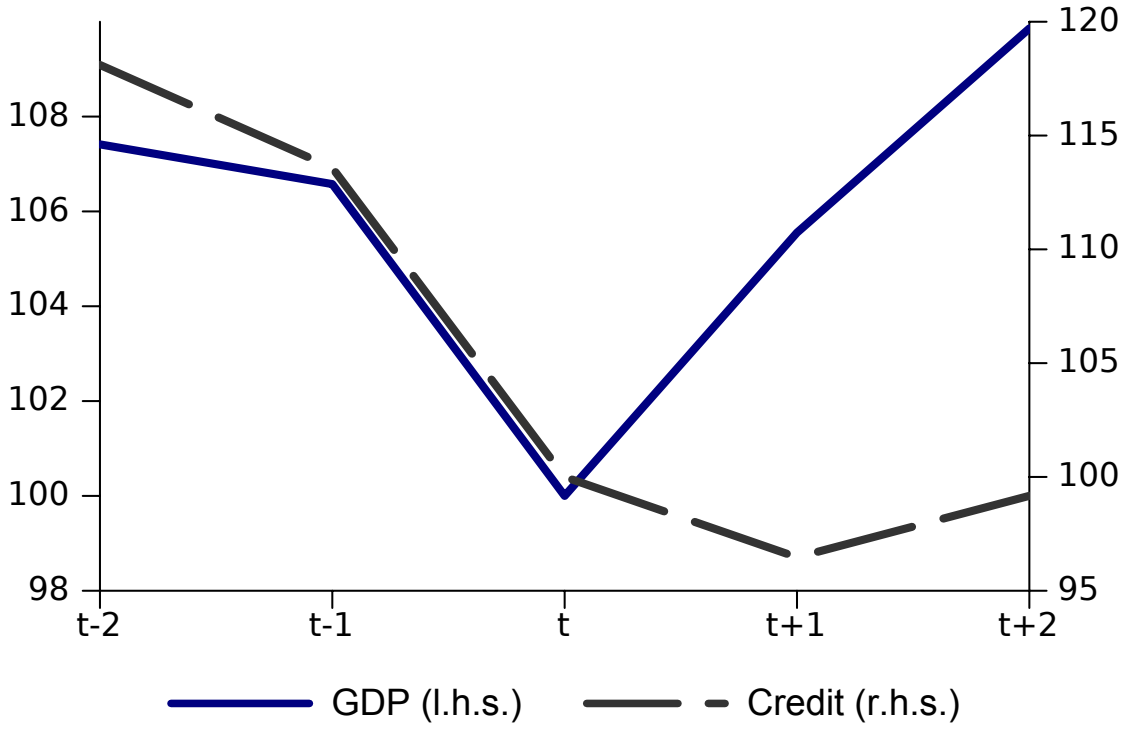
No, it can be seen as the implication of budget constraint where consumption and investment are related to the change in credit.

Revisit DSGE model of Monacelli (2009, JME).

Impulse response of GDP, the flow and the stock of credit



Calvo et al. (2006a, 2006b):
Credit and economic recovery from Systemic Sudden Stops



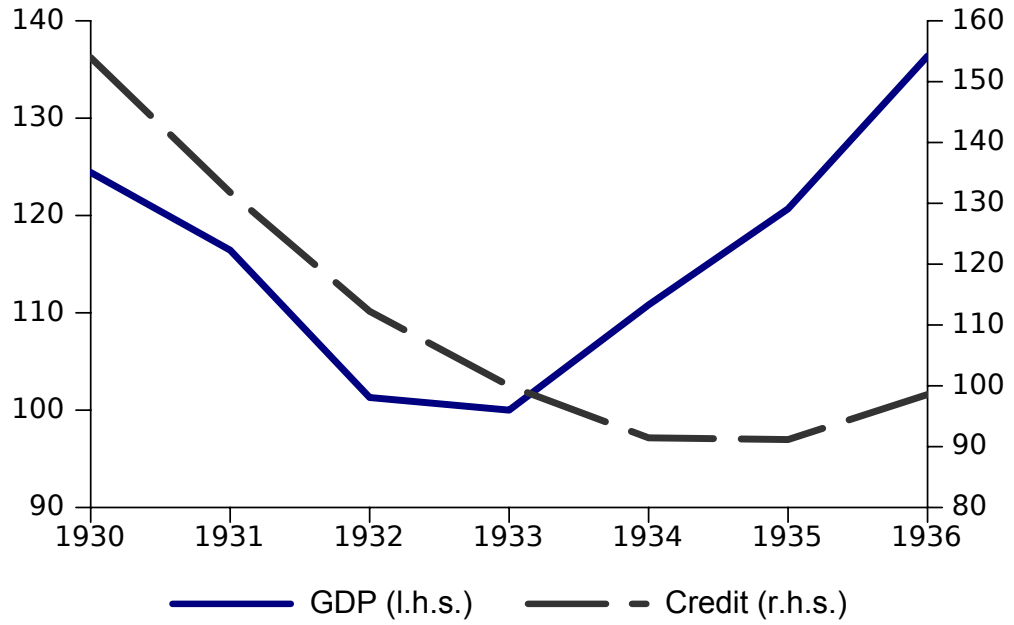
Empirical evidence

Two remarks:

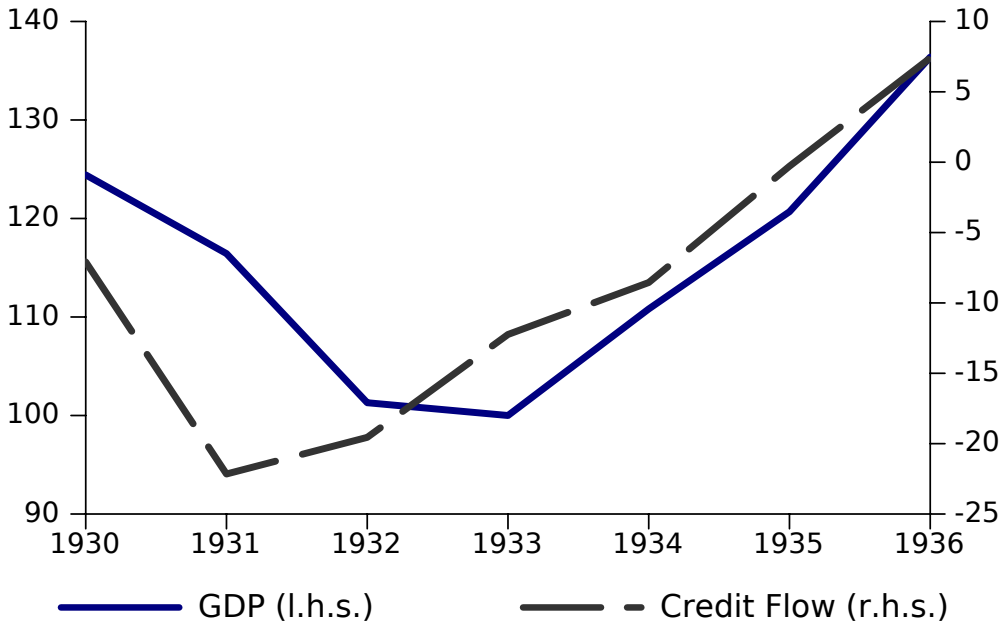
1. The model above is a closed economy model, and any moves in demand are reflected in moves in GDP. In an open economy the direct impact of credit developments is likely to be felt on domestic demand and the empirical work will focus on the link between credit and real domestic demand.

2. The model does not suggest a causal direction from either credit to economic growth or vice versa.

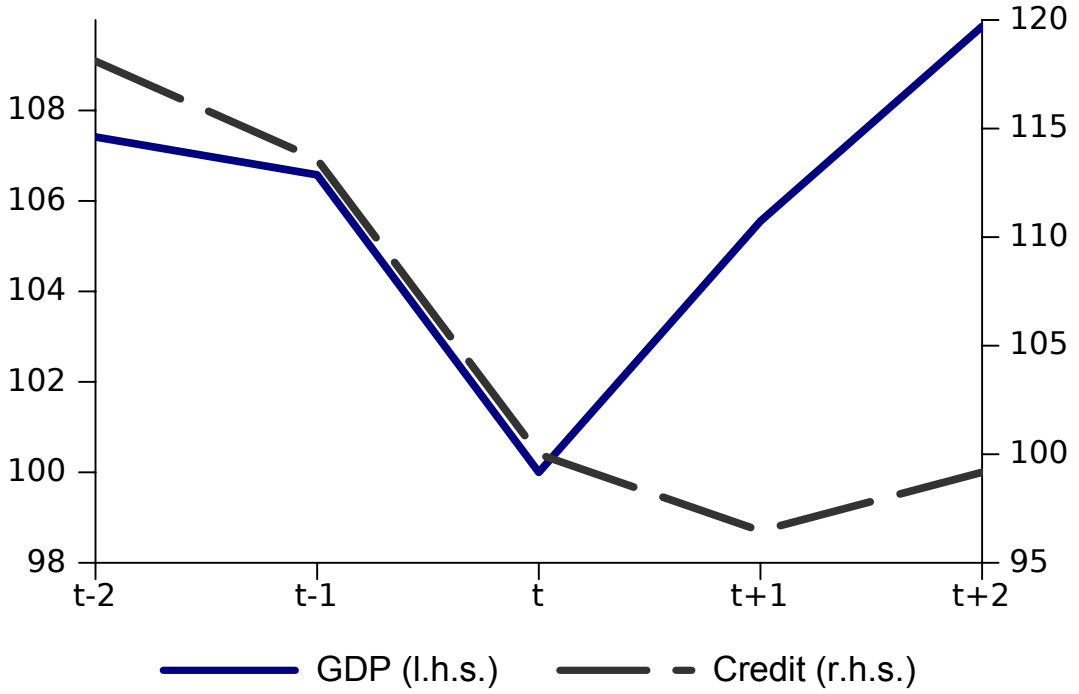
Calvo et al. (2006a, 2006b):
Credit and economic recovery from the Great Depression



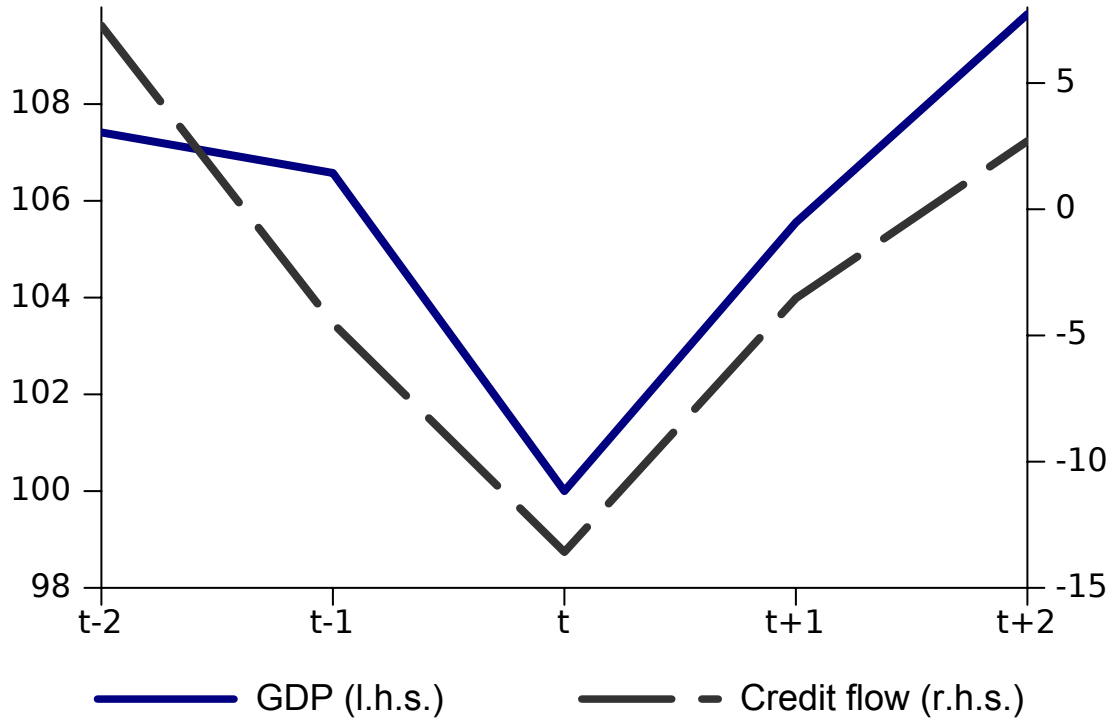
Calvo et al. (2006a, 2006b):
Credit flow and economic recovery from the Great Depression



Calvo et al. (2006a, 2006b):
Credit and economic recovery from Systemic Sudden Stops



Calvo et al. (2006a, 2006b):
Credit flow and economic recovery from Systemic Sudden Stops



Conclusion

- Recoveries are only credit-less when the stock of credit is compared to the flow of economic activity.

- Comparing flows of credit with flows of economic activity reveals that credit is well correlated with economic activity during periods of economic recovery.

- Important to shift attention from stock of credit to flow of credit, in particular when looking at more volatile periods.