Controlling primary income distribution and employment under increasing returns

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   Kennedy – Goodwin model (KGM)
2. Hypothetical law (HL)
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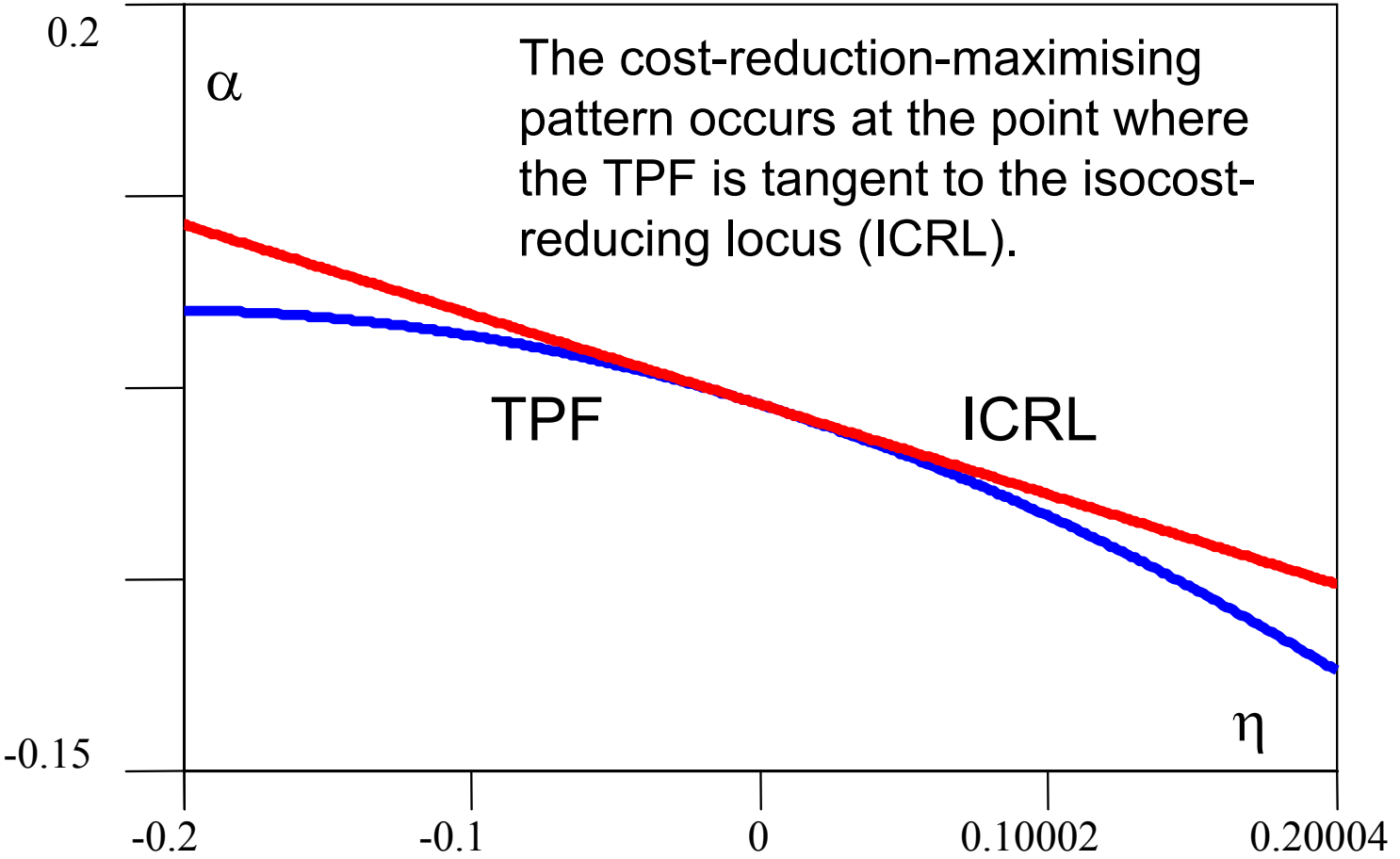
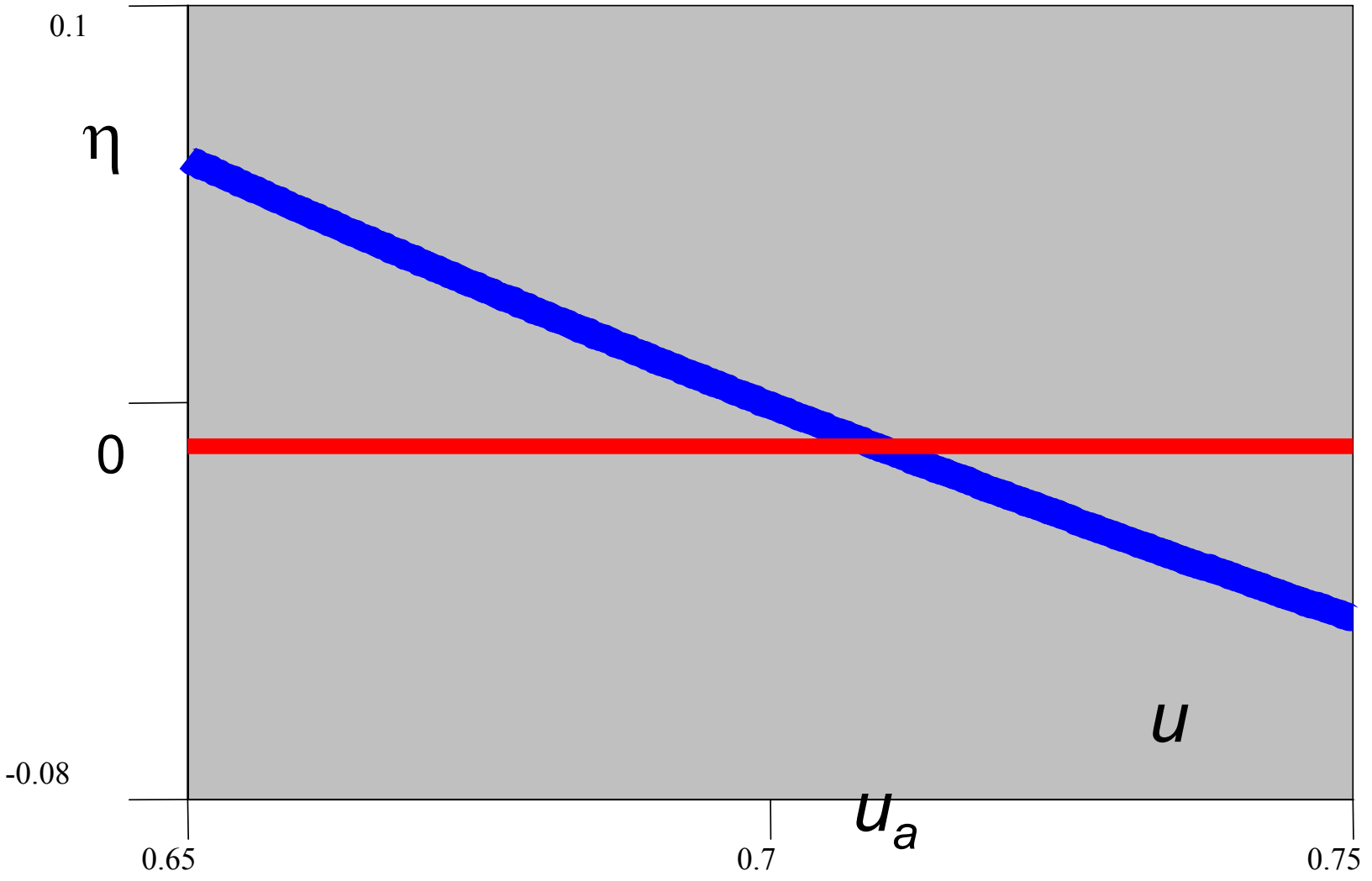
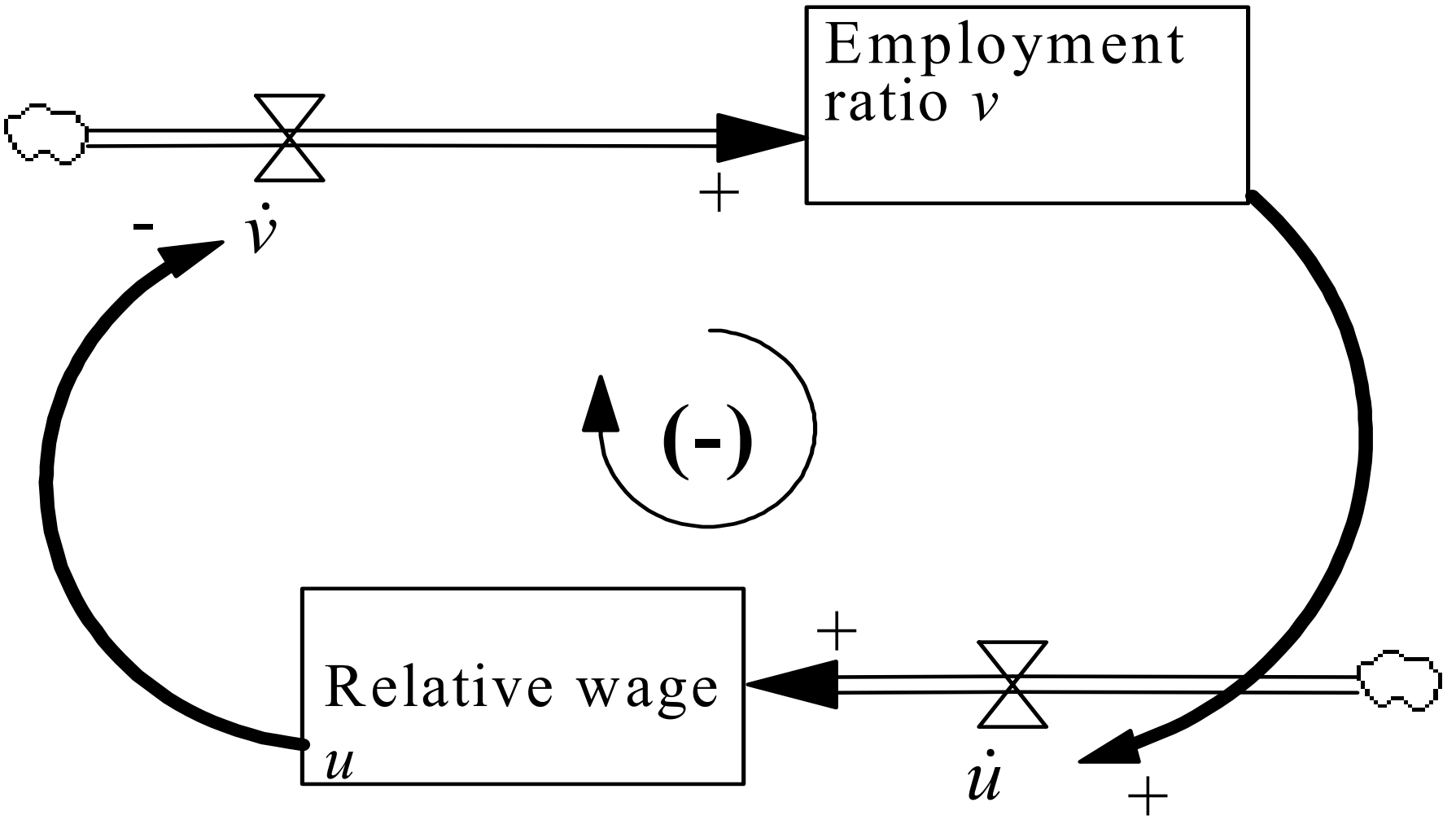
Bounded rationality in KGM under given factors prices



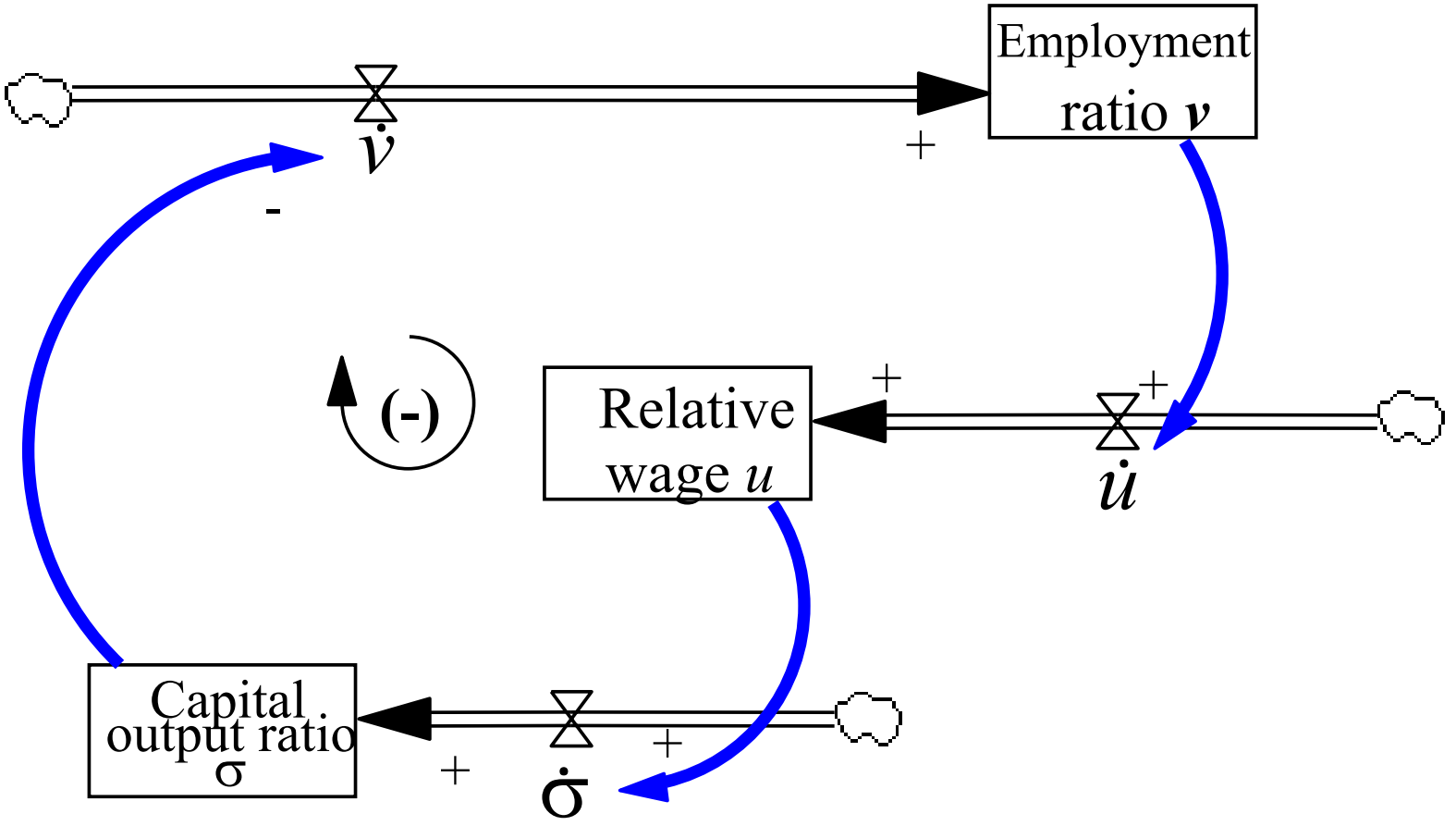
KGM: Mechanization function



Feedback loop in GM & KGM

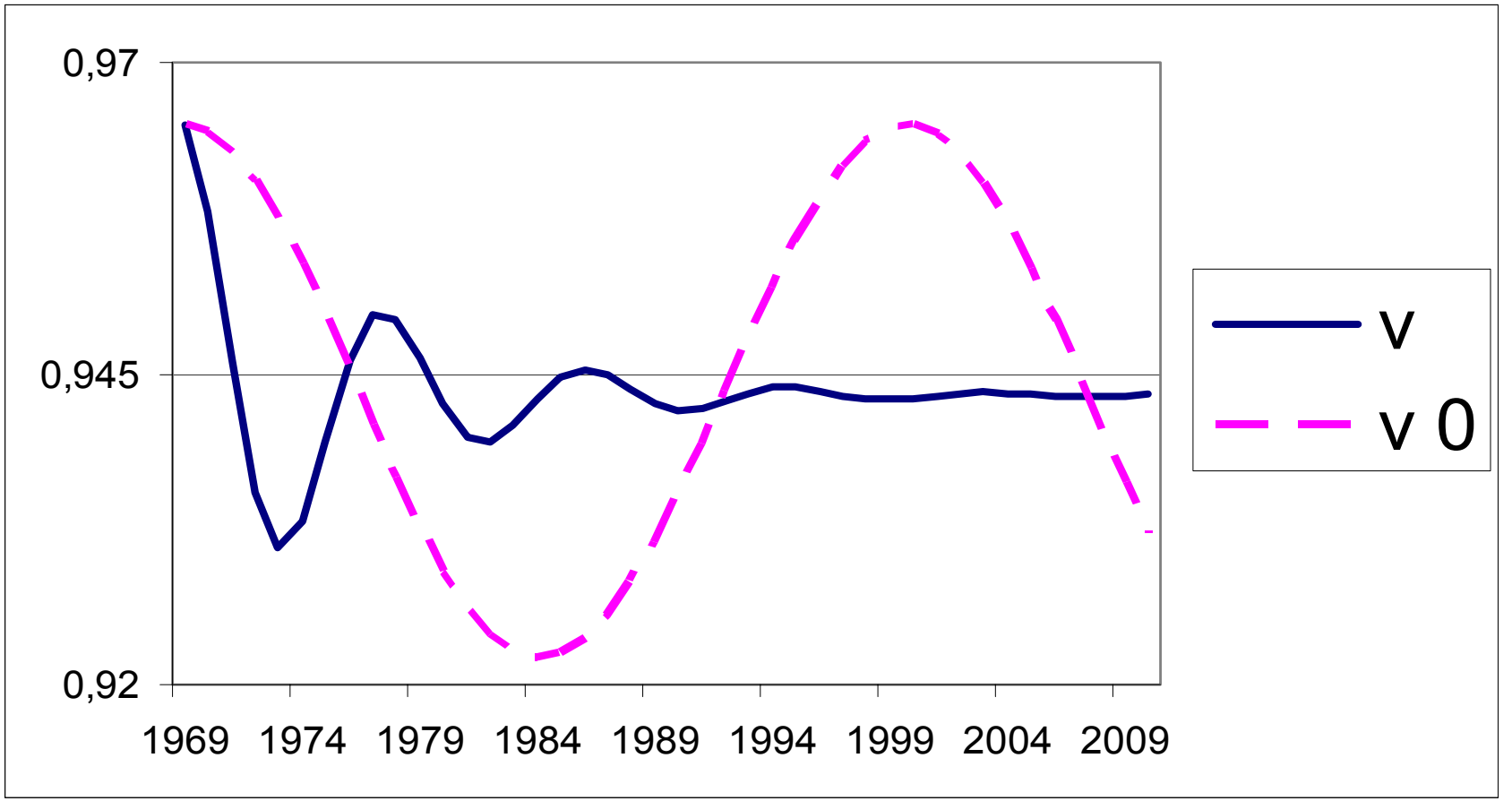


Additional main feedback loop in KGM



This loop is absent in GM

Employment ratio in GM (v 0) and KGM (v)



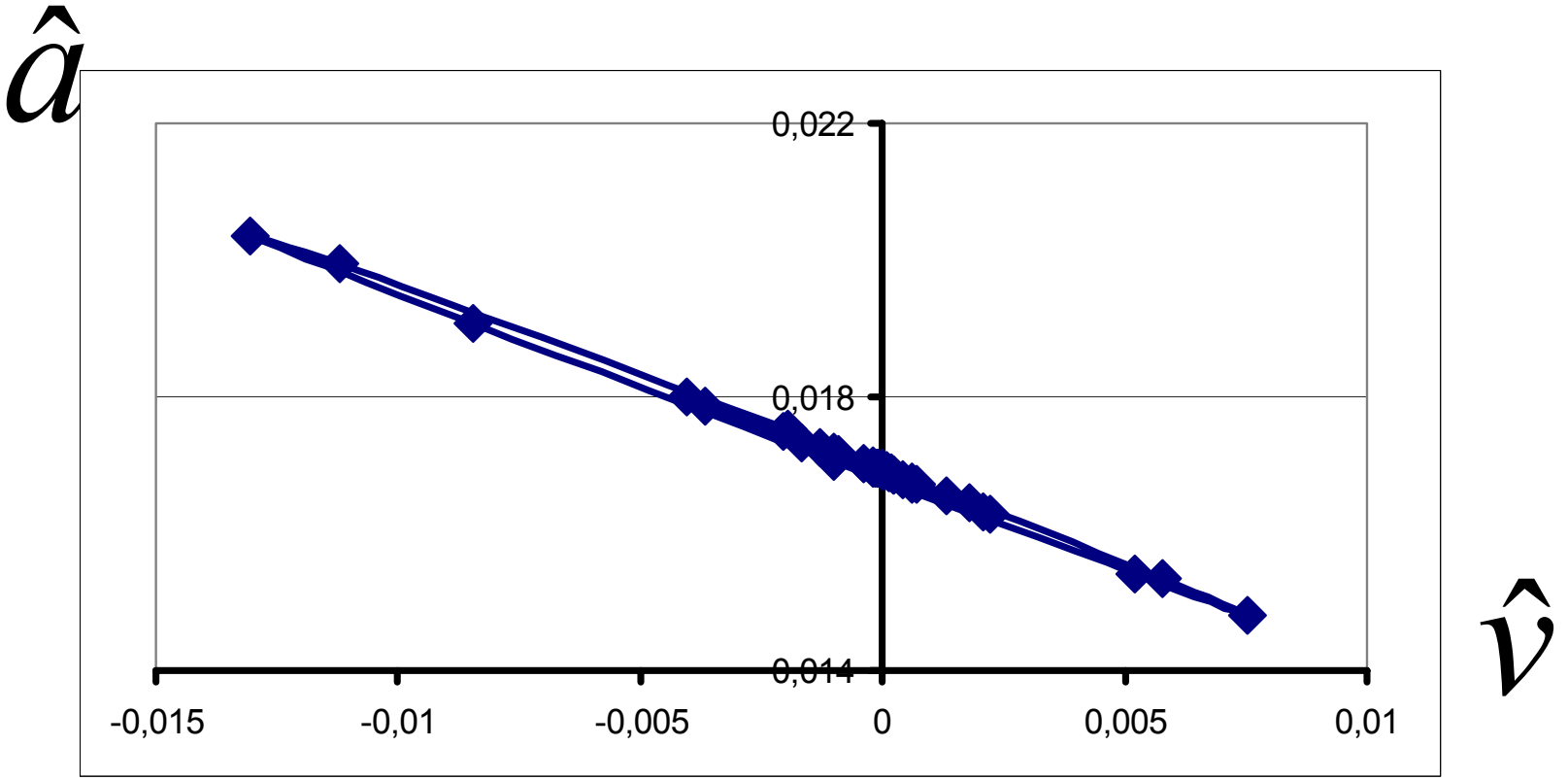
Economy of scale (increasing return) is *reinforcing*

if a *positive* feedback loop connects the growth rate of labour productivity with employment ratio and (or) its growth rate.

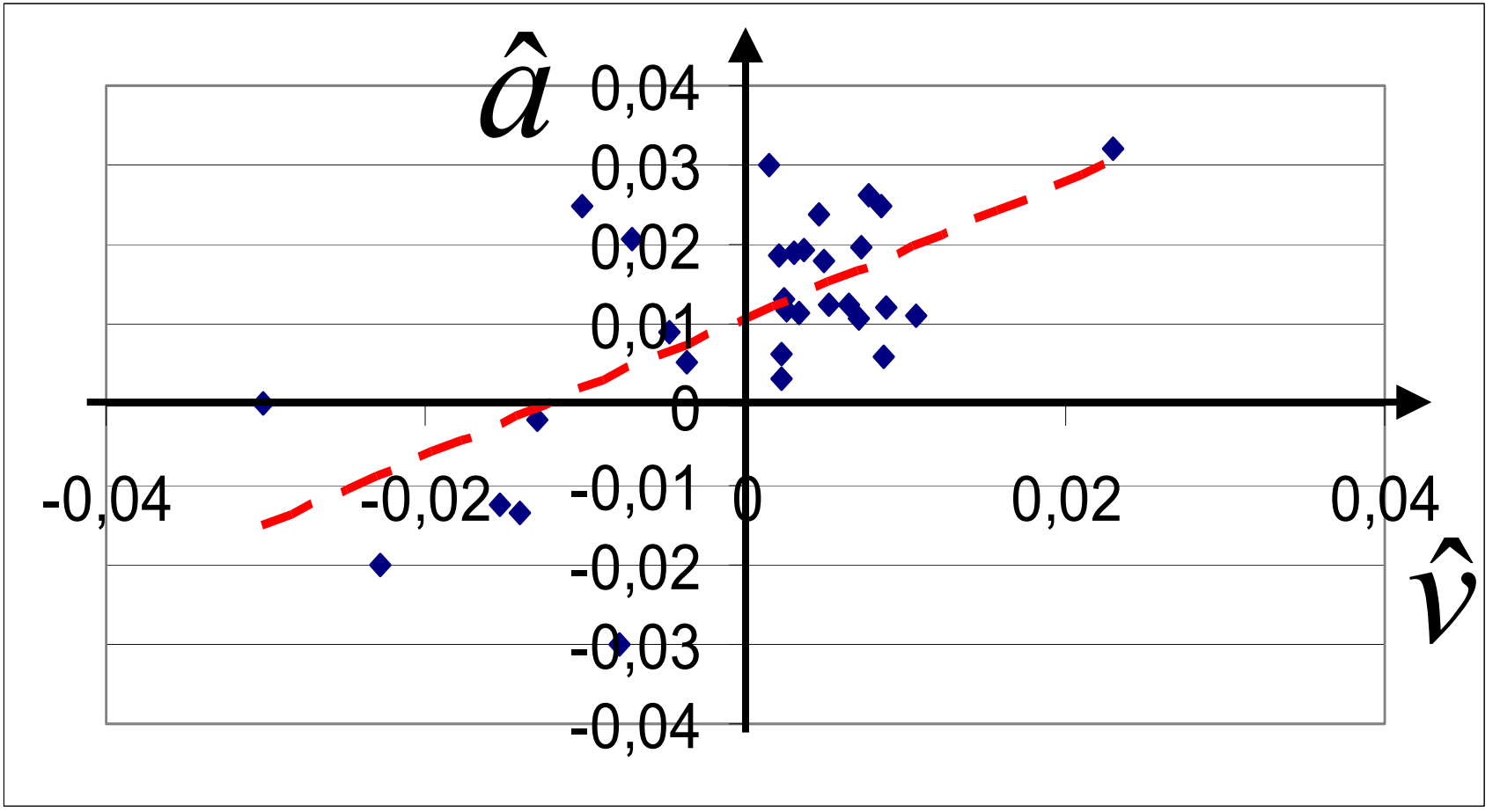
Economy of scale (increasing return) is *weakening*

if a *negative* feedback loop connects the growth rate of labour productivity with employment ratio and (or) its growth rate.

Employment-productivity trade-off in KGM, 1969-2010



Economy of scale, USA, 1970–2000



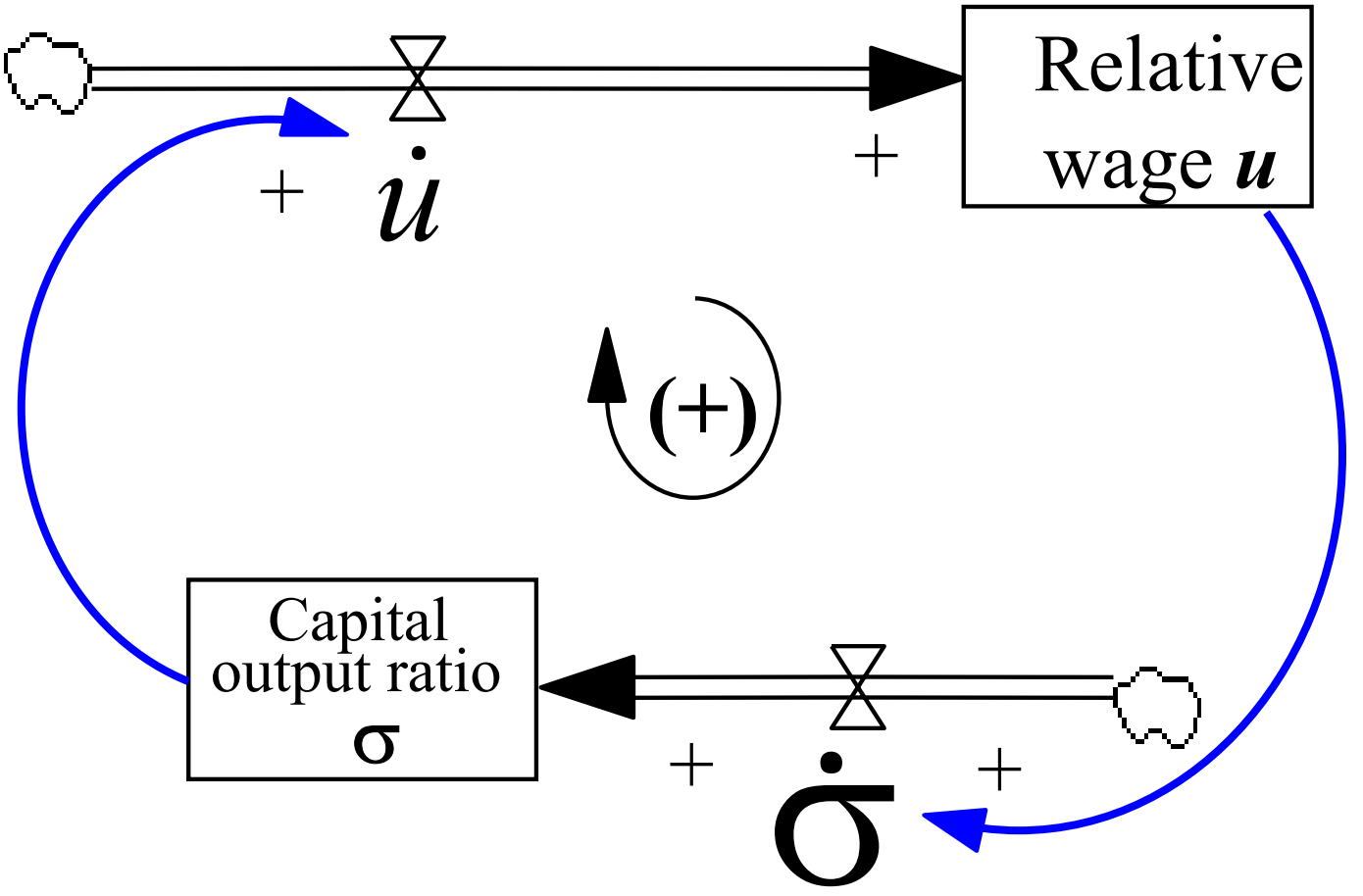
R = 0.62

Direct scale effect in HL

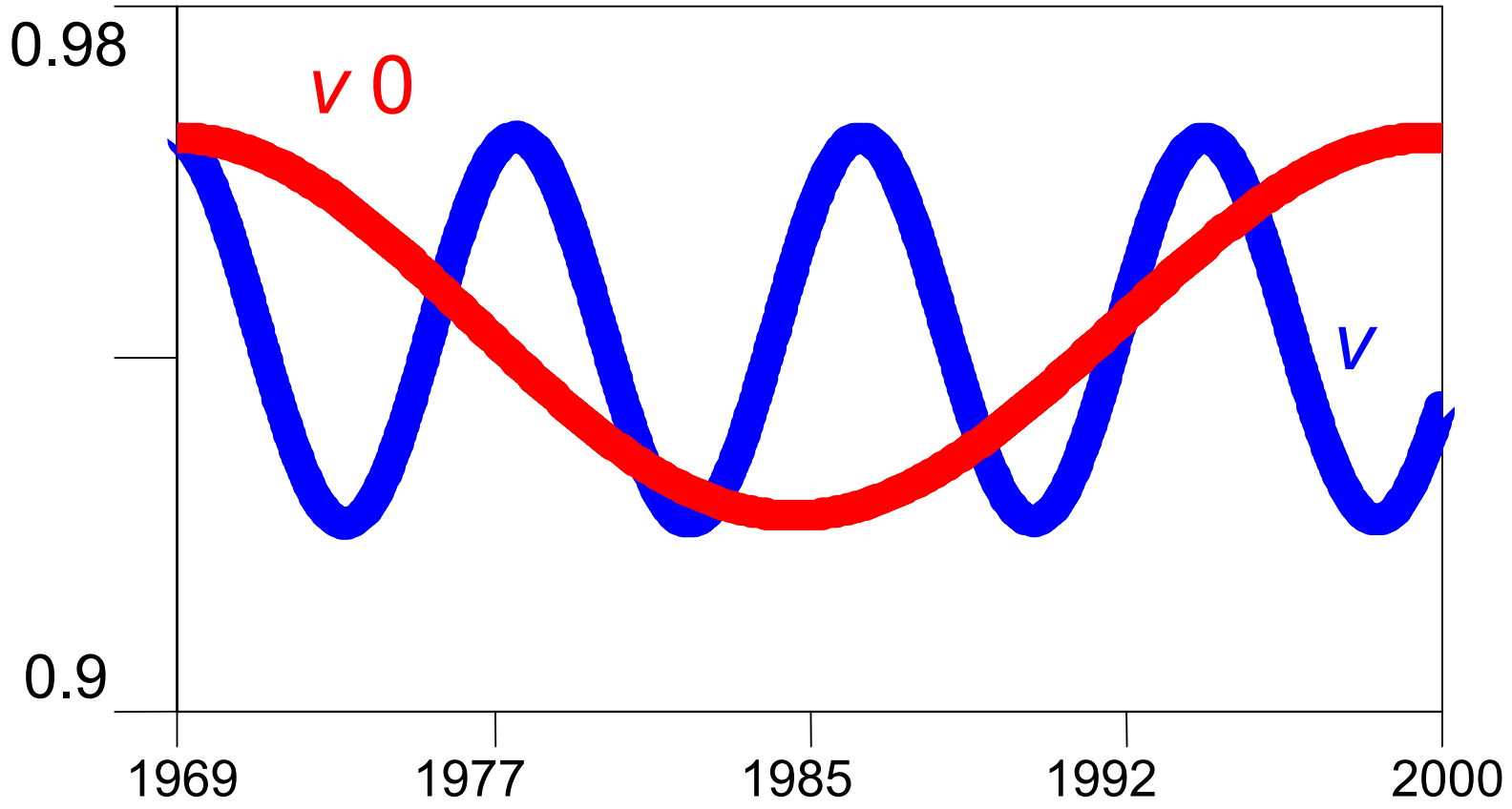
- Modified Technical Progress Function

$$\hat{a} = \Omega(K \hat{/} L) + \boldsymbol{m}\hat{\boldsymbol{v}}.$$

Main ***positive*** feedback loop in HL



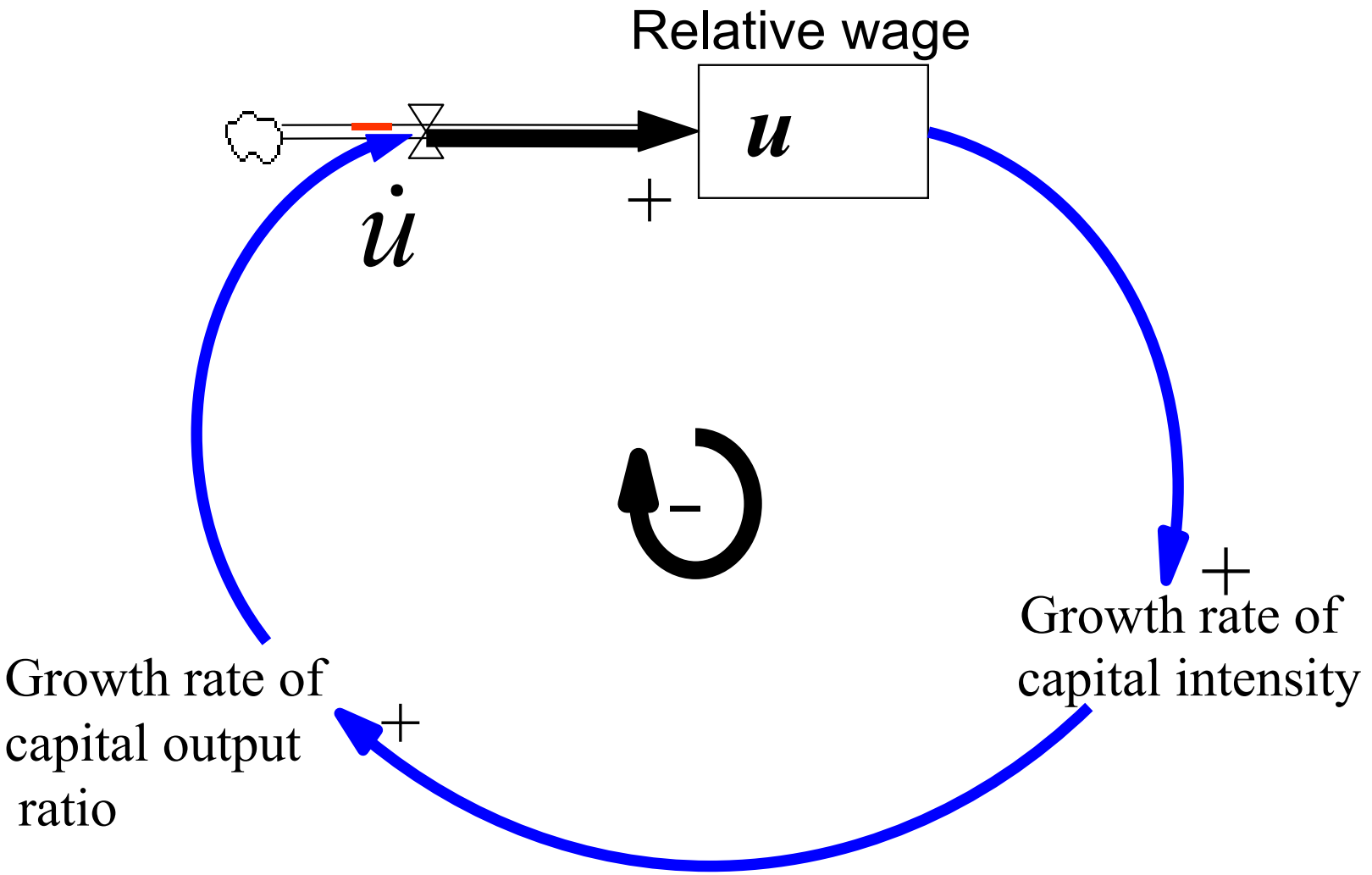
Employment ratio in GM (v 0) and in HL (v) for critical $m_0 > 0$



Sustaining profitability and employment under increasing returns

- The strong economy of scale, if not checked, destabilises growth cycle and leads to escalation of distributional conflict.
- Closed loop control turns increasing returns from foes into helpers of pro-growth stabilization policy.

Main negative feedback loop in CL



Hypothesis

decision-makers set a desirable growth rate of profitability depending on indicated (*X*) and current (*v*) employment ratios:

$$\Pi = \frac{-\dot{u}}{1-u} - \hat{s} = c(X - v), \quad c > 0,$$

where $v < X$ is typical for recessions and depressions.

Structural change: real wage (*w*)

in KGM and HL

$$\hat{w} = -g + rv, g > 0, r > 0;$$

in CL

$$\hat{w} = [-\hat{K/L} + c(v - X)]\frac{1-u}{u} + \frac{\hat{a}}{u}$$

Reinforcing increasing returns in CL

as in HL

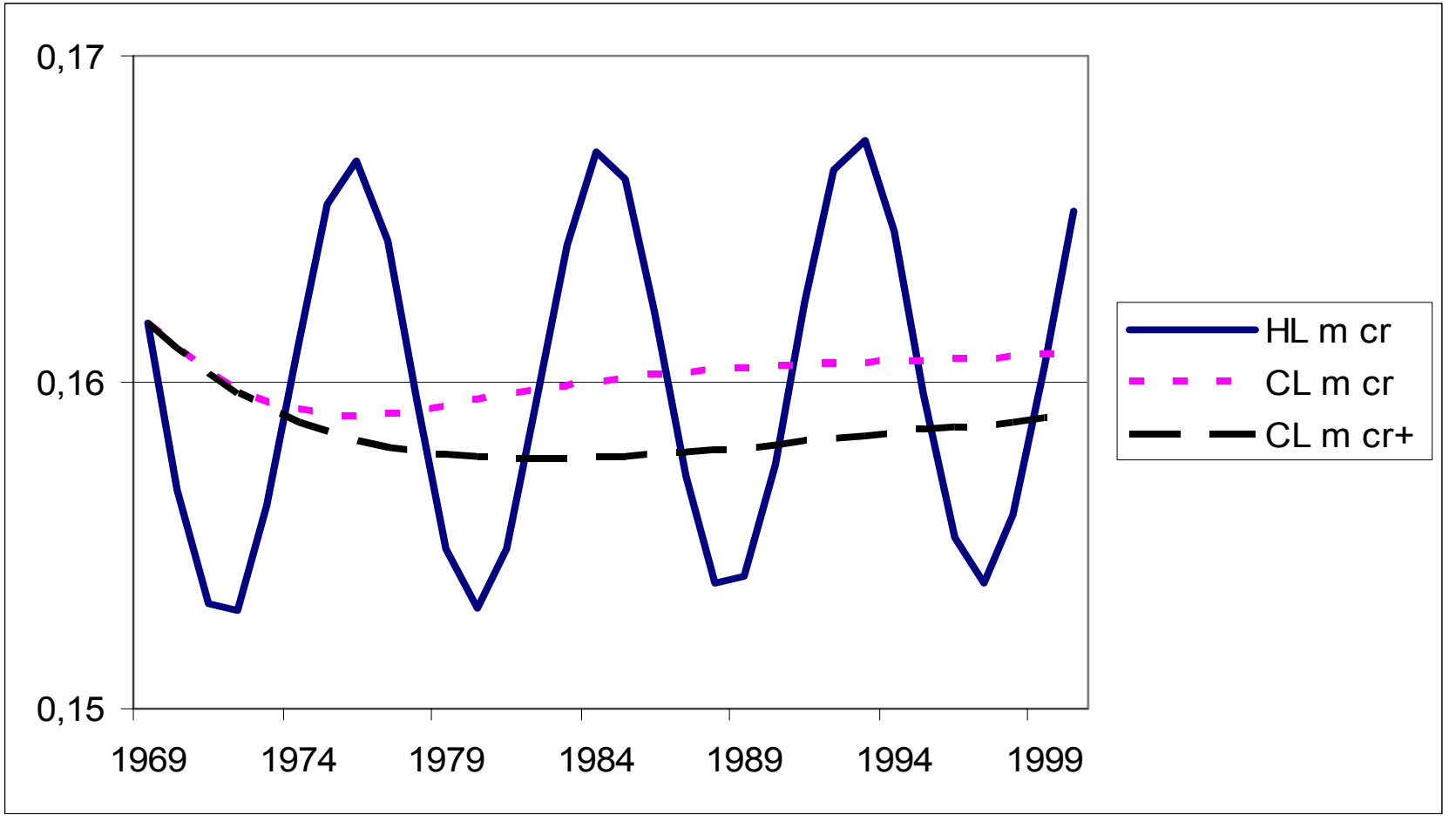
$$\hat{v} \rightarrow \hat{a} \xrightarrow{-} \hat{\sigma} \rightarrow \dot{\sigma} \rightarrow \sigma \xrightarrow{-} \frac{1-u}{\sigma} \rightarrow \hat{v}$$

new

$$\hat{v} \rightarrow \dot{v} \rightarrow v \xrightarrow{-} \Pi \xrightarrow{-} \dot{u} \rightarrow u \rightarrow \hat{K/L}$$

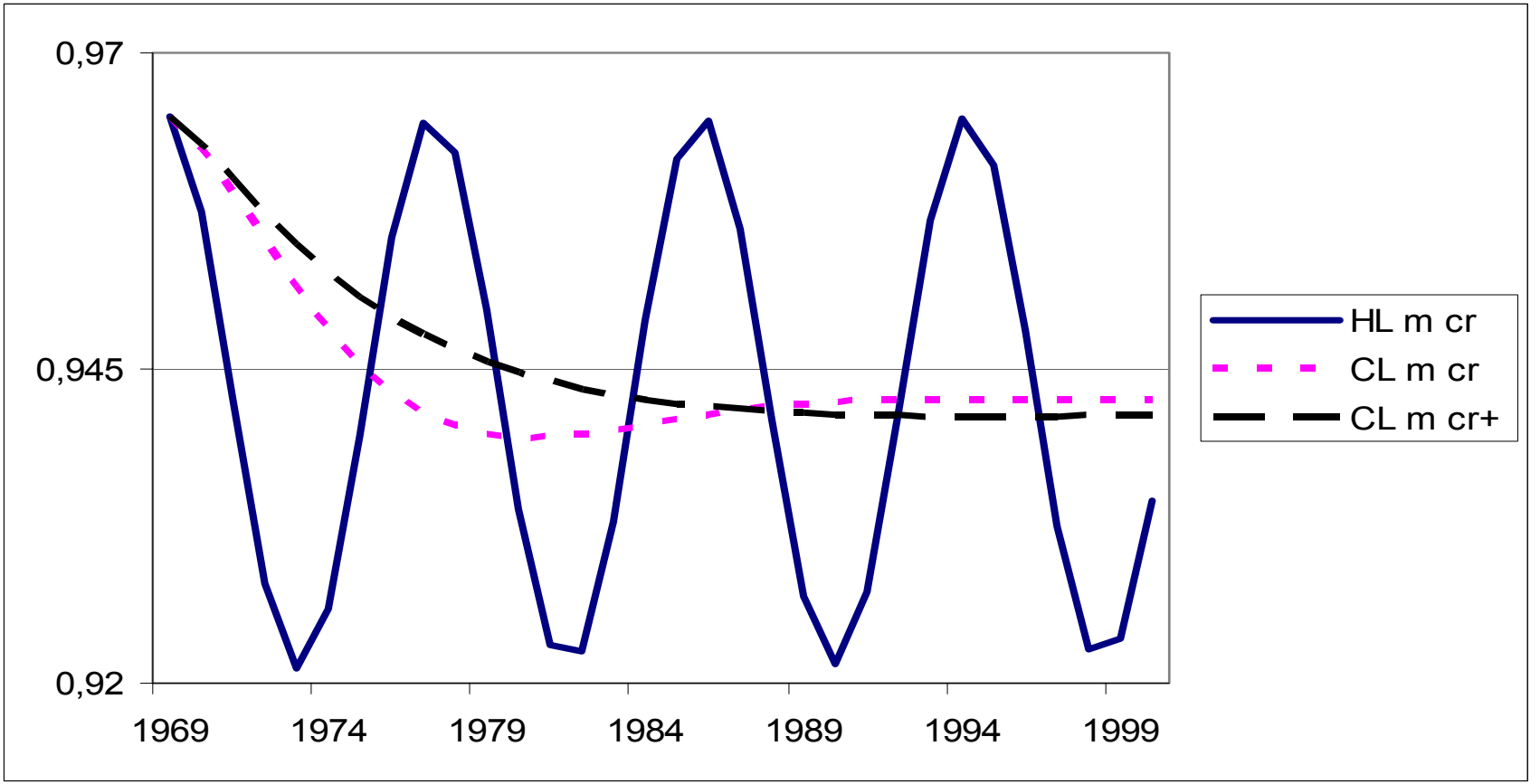
$$\rightarrow \hat{a} \xrightarrow{-} \hat{\sigma} \rightarrow \dot{\sigma} \rightarrow \sigma \xrightarrow{-} \frac{1-u}{\sigma} \rightarrow \hat{v}$$

Profit rate $(1 - u)/s$ for $X = v_a \approx 0.943$ in HL ($m = m_0$) and in CL ($m = m_0$, $m > m_0$)

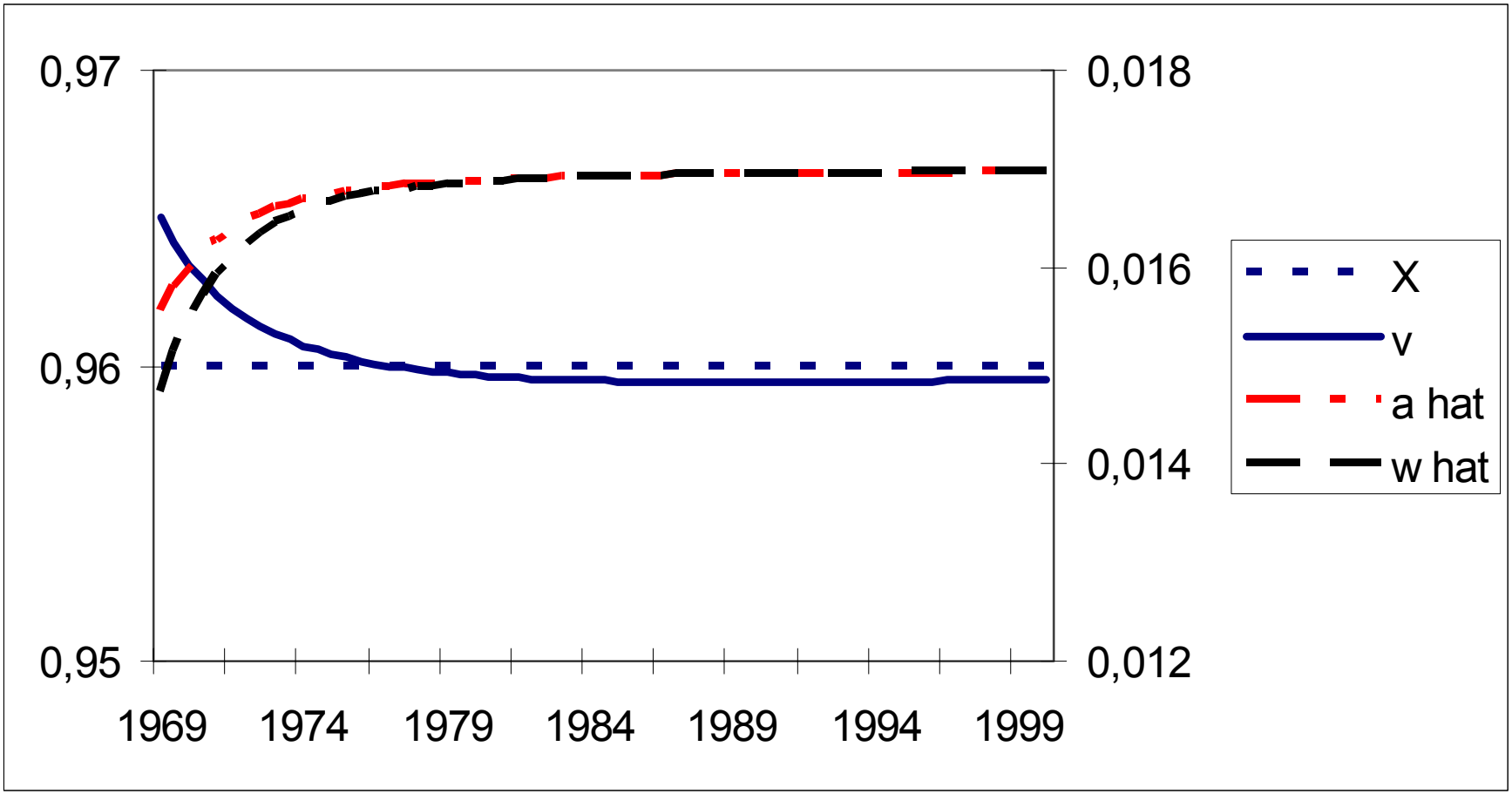


m cr = 0.2423
m cr++ = 1
ryzhenko; 18.07.2006

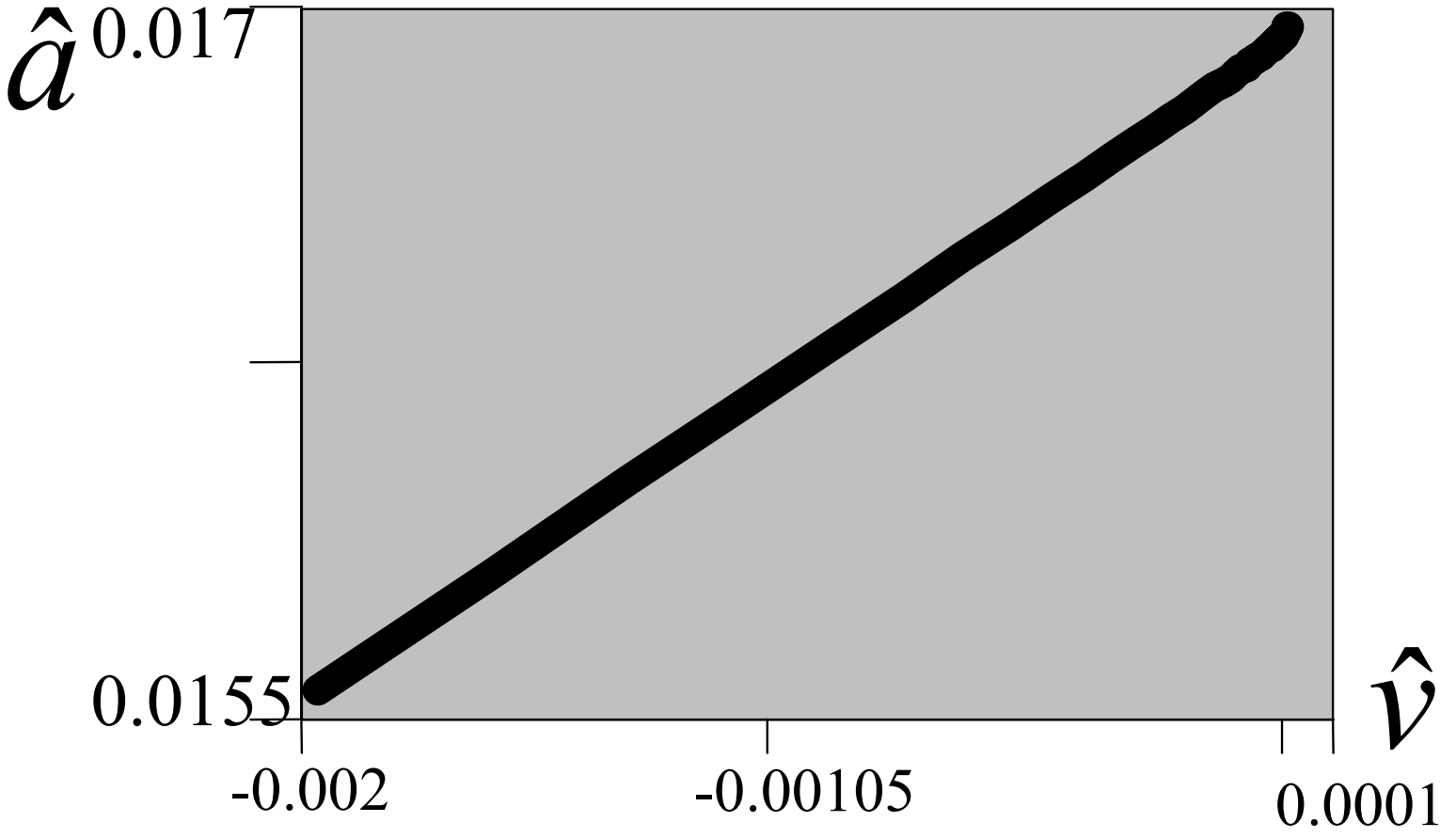
Employment ratio (v) for $X = v_a \approx 0.943$ in HL ($m = m_0$) and in CL ($m = m_0$, $m > m_0$)



Robust CL: $m = 1 > m_0$, $X = 0.96 > v_a \approx 0.943$, $c = 0.25$



Economy of scale in CL: 1969–2010, $m = 1$, $X = 0.96$, $c = 0.25$



Conclusion

- KGM contains no direct or reinforcing roundabout increasing returns. These counter-factual property facilitates local stability of stationary state.

•By focusing mostly on negative feedback loops and on trade-off between labour productivity and employment, KGM overlooks the society's need for pro-growth stabilisation policy.

¤ HL allows for direct increasing return. If this effect is strong enough, the stationary state bifurcates into closed orbits. Their period is estimated (about 8.5 years compared with 31.2 years in GM).

¤ The closed loop control in CL stabilizes the oscillatory dynamics, maintains targeted profitability and desired employment ratio under direct and reinforcing roundabout increasing returns in agreement with certain observable patterns.