Insights into Income Policy for Enhancing Employment and Stability of Capital Accumulation

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LGM-I belongs to best Goodwinian models

The Lordon model, named LGM-I, is intellectual achievement. It explains endogenous cycle of capital accumulation similar in important aspects to the Marx industrial cycle.

This and subsequent models provide extreme conditions tests of structural robustness of policy rules developed by the author of present paper for more sophisticated and realistic models.
The causal structure of LGM-I

Employment ratio $v$

Growth rate of employment ratio $v_{\hat{}}$

Growth rate of wage share $u_{\hat{}}$

Growth rate of fixed capital $g$

Growth rate of output per worker $a_{\hat{}}$

Growth rate of profit sharing wage term $w_{\hat{}}$

Growth rate of bargain wage term $w_{m_{\hat{}}}$

Growth rate of wage $w$

Growth rate of wage share $u_{\hat{}}$

Profit rate $r$

The causal structure of LGM-I
The first negative loop of 2\textsuperscript{nd} order in LGM-I

\[ \text{Employment ratio } v \]

\[ \text{Growth rate of employment ratio } v' \]

\[ \text{Growth rate of employment ratio } v'' \]

\[ \text{Growth rate of bargained wage term } w_{\text{m hat}} \]

\[ \text{Growth rate of wage } w' \hat{\text{hat}} \]

\[ \text{Growth rate of wage share } u' \hat{\text{hat}} \]

\[ \text{Growth rate of fixed capital } g \]

\[ \text{B1} \]

\[ \text{Wage share } u' \]

\[ \text{Wage share } u'' \]
The second negative loop of 1st order in LGM-I

Growth rate of profit sharing wage term \( w_b \hat{u} \)

Growth rate of wage \( w \hat{u} \)

Growth rate of wage share \( u \hat{u} \)

\( u \dot{u} \)
The first positive loop of 1\textsuperscript{st} order in LGM-I
The second positive loop of 2\textsuperscript{nd} order in LGM-1

\[ v_{\text{dot}} \quad \rightarrow \quad \text{Employment ratio } v \quad \rightarrow \quad \text{Growth rate of bargained wage term } w_{m\text{hat}} \]

\[ v_{\text{dot}} \quad \rightarrow \quad \text{Growth rate of employment ratio } v_{\text{hat}} \]

\[ \text{Wage share } u \quad \rightarrow \quad \text{Growth rate of output per worker } a_{\text{hat}} \]

\[ u_{\text{dot}} \quad \rightarrow \quad \text{Growth rate of wage share } u_{\text{hat}} \]

\[ \text{Growth rate of fixed capital } g \quad \rightarrow \quad \text{Growth rate of wage } w_{\text{hat}} \]

\[ R2 \]

\[ + \]

\[ + \]

\[ + \]

\[ + \]
Dynamics near limit cycle in LGM-I and LGM-II

<table>
<thead>
<tr>
<th>Variable</th>
<th>Crisis</th>
<th>Depression</th>
<th>Recovery</th>
<th>Boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit rate $r$</td>
<td>min</td>
<td>$r^*$</td>
<td>max</td>
<td>$r^*$</td>
</tr>
<tr>
<td>Surplus value $S$</td>
<td>min</td>
<td>$S^*$</td>
<td>max</td>
<td>$S^*$</td>
</tr>
<tr>
<td>Employment ratio $v$</td>
<td>$v^*$</td>
<td>min</td>
<td>$v^*$</td>
<td>max</td>
</tr>
</tbody>
</table>

* means stationary magnitude
Over-accumulation of capital

Relative over-accumulation of capital:
growing capital \((K)\) is accompanied by declining profit rate of \(r\).

In LGM-I, a declining profit rate of \(\leftrightarrow\) growing relative wage.

Two forms (I) and (II) of absolute excess of capital:
I) the increased capital \((K)\) produced just as much, or even less, profit \((M)\) than it did before its increase.
II) the increased capital \((K)\) produced just as much, or even less, surplus value \((S)\) than it did before its increase.
Relative → Absolute II → Absolute I
capital over-accumulation near limit cycle

From l. to r., $u$ goes up from $u_{\text{min}}$ to $u_c = \omega$
(42% of the cycle period)
Some doubtful relationships in LGM-I

- Constancy of capital-output ratio, constant labour supply
- Negative dependence of growth rate of capital intensity on unit labour value
- No workers’ competition for jobs
- A surrogate Kaldor – Verdoorn relation between growth rates of fixed capital and output per worker
- Excessive destruction of fixed capital by crises of over-production – to be cured in LGM-II and LGM-III
Possibilities of investment glut and dearth in LGM-I

For $0,1 \leq u \leq 0,8$

Max investment
$\approx 1,5 \times \text{Net output}$

Min investment
$\approx -1 \times \text{Net output}$

For $0,21 \leq u \leq 0,91$

Calamity

Rate of accumulation $c$
Relative wage $u$
Growth rate of fixed capital $g$
Growth rate of output per worker
Relative wage \((u)\), investment ratio \((c)\) and growth rate of fixed capital \((g)\) in LGM-I and LGM-II for relative wage \(0.1 \leq u \leq 0.8\)

Local equivalence of LGM-I and LGM-II dynamics, still transients to distant attractors differ.
Bargaining and profit sharing in LGM-I & LGM-II

Growth rate of real wage sums up two terms
\[ \hat{W} = \hat{w}^m + \hat{w}^b. \]  

Wage-bargained term
\[ \hat{w}^m = \gamma(v) - \pi_b, \]  
\[ \pi_b = \text{const}; \text{ the } 1^{\text{st}} \text{ and } 2^{\text{nd}} \text{ derivatives of } \gamma(v) \text{ are positive}; \]
profit-sharing term
\[ \hat{w}^b = \eta(r) = \delta(u) + \pi_b, \]
\[ \eta'_r > 0 \text{ and } \delta'_u < 0, \]
\[ \delta(u) = -\delta u + \pi, \]  
\[ \delta > 0. \]
Policy optimization in scenario II based on LGM-II

Maximise \(- \int_1^{16} |v - X| \, dt\)

subject to
\[
\dot{x} = f_{\text{restricted}}[x(t), \delta, \pi],
\]
given initial \(x_0, X = 0.95,\)
\(0 \leq \delta \leq 10 << \delta_1, \quad -10 \leq \pi \leq 0.\)

Parameters found
\(\pi = -0.534, \delta = 10, \pi_b = 7.253, v^* = X = 0.95,\)
\(T_c = 0.505.\)
The causal structure of LGM-III

Target employment ratio \( X \)

Growth rate of employment ratio \( v \hat{\text{dot}} \)

Growth rate of employment ratio \( v \hat{\text{dot}} \)

Growth rate of fixed capital \( g \)

Growth rate of output per worker \( a \hat{\text{dot}} \)

Wage share \( u \)

Growth rate of profit sharing wage term \( w \hat{b} \)

Growth rate of bargained wage term \( w \hat{m} \)

Growth rate of wage \( w \hat{\text{dot}} \)

Growth rate of wage share \( u \hat{\text{dot}} \)

Target employment ratio \( X \)

Growth rate of profit sharing wage term \( w \hat{b} \)

Growth rate of bargained wage term \( w \hat{m} \)

Growth rate of wage \( w \hat{\text{dot}} \)

Growth rate of wage share \( u \hat{\text{dot}} \)
The additional 1st order negative loop in LGM-III

\[ \text{Growth rate of profit sharing wage term } w \dot{b} \text{ hat } \]

\[ \text{Growth rate of fixed capital } g \]

\[ \text{Growth rate of wage } w \text{ hat } \]

\[ \text{Growth rate of wage share } u \text{ hat } \]

\[ u \dot{u} \]

\[ w \dot{w} \]

\[ g \]

\[ B3 \]
The next additional 1\textsuperscript{st} order negative loop in LGM-III

Growth rate of output per worker $a$ hat

Growth rate of fixed capital $g$

Growth rate of profit sharing wage term $w b$ hat

Growth rate of wage $w$ hat

Growth rate of wage share $u$ hat

Wage share $u$

$udot$

B4
The additional 1st order positive loop in LGM-III

Growth rate of bargained wage term \( \dot{w}_m \hat{w} \)

Growth rate of wage \( \dot{w} \hat{w} \)

Growth rate of wage share \( \dot{u} \hat{u} \)

Wage share \( u \)

\( \dot{u} \hat{u} \)
The main policy rule in LGM-III

Owners of capital, trade-unions and state officials agree on growth rate of profit depending on indicated \((X_1)\) and current \((v)\) employment ratios

\[
\hat{M} = g - \frac{u}{1-u} = c_2(X_1 - v),
\]

target employment ratio

\[
X = X_1 - \frac{g}{c_2}, \quad v < 1 < X_1; \quad c_2 = \text{const} > 0.
\]
## Wage components growth rates in LGM-III

<table>
<thead>
<tr>
<th>Bargained term $\hat{w}_m$</th>
<th>$c_2(v - X_1) \frac{1-u}{u} + c_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit sharing term $\hat{w}_b$</td>
<td>$\hat{a} + g \frac{1-u}{u} - c_1$</td>
</tr>
<tr>
<td>Each stationary</td>
<td>$g^<em>/2$ for $u^</em> = 2/3$</td>
</tr>
</tbody>
</table>
Output (P) and employment ratio (v) in scenarios I, II, III
Profit rate and surplus value in scenarios I, II and III

- **Graph 1:**
  - Axis: (1-u)/s
  - Values: 0.1, 0.2, 0.3, 0.4
  - Time: 1, 4, 7, 10, 13, 16

- **Graph 2:**
  - Axis: S
  - Values: 10000, 20000, 30000, 40000, 50000, 60000
  - Time: 1, 4, 7, 10, 13, 16
Rate of capital accumulation on transients to limit cycle in scenario I and to stationary state in scenarios II and III.
Total profit (M) and wage (w) in scenarios I, II and III
Employment ratio ($v$) and growth rate of profit ($Mhat$) in scenarios I, II and III
Bargained wage term (l.) and profit sharing term (r.) in scenarios I & III
Conclusion

LGM-I includes the embryonic stabilization policy without targeting employment.

LGM-I + low and high bounds on rate of capital accumulation = LGM-II.

LGM-II illustrates pitfalls of policy optimization within deficient structure of capitalist reproduction.

LGM-II + targeting employment accurately = LGM-III. Profit sharing and bargained wage terms redesigned. Eradicated absolute over-accumulation of capital (I & II), relative over-accumulation is alleviated.

**Extreme condition tests strengthen confidence in the invented policy rules against austerity trap!**
References


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