EC 7025: Kaleckian Growth

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Basic Kaleckian Growth Model

- We are following Blecker (2002) in the reading list and we will use the model presented there as our standard Kaleckian growth model.
- Closed economy, no government or trade, no worker's saving and a single good
- Firms pricing takes the form of simple mark-up pricing over average (labour) cost, assuming no overhead labour.

$$P = \varphi a W,$$

where W denotes nominal wage rate, $a = 1/y$ where $y = Y/L =$ Output-labour ratio (labour productivity) and $\varphi > 1 = (1 + m)$ where $m =$ mark-up.

Basic Kaleckian Growth Model

- The profit share can be written as

$$\pi = (P - aW)/P,$$

- Using the pricing equation above,

$$\pi = (\varphi aW - aW)/\varphi aW,$$

$$\pi = 1 - 1/\varphi = \frac{\varphi - 1}{\varphi}, \frac{d\pi}{d\varphi} > 0,$$

- So as the mark-up increases, the profit share increases.

Basic Kaleckian Growth Model

- The profit rate can be written as

$$r = (P - aW)Y/PK = \frac{(P - aW)}{P}\frac{Y}{K} = \pi u, \tag{1}$$

where $Y =$ real output, and Y/K can be used as a proxy for capacity utilization.

- Another way to see this is to use the decompisition presented in the Macroeconomics module. With $\Pi =$ *Aggregate* real *profits* to avoid confusion with prices,

$$r = \frac{P\Pi}{PK} = \frac{\Pi}{K} = (\frac{\Pi}{Y})(\frac{Y}{Y_{Fc}})(\frac{Y_{Fc}}{K}) = \pi u/v,$$

where $\frac{\Pi}{Y} = \pi$, $\frac{Y}{Y_{Fc}} = u$ and $\frac{K}{Y_{Fc}} = v$ Using Y/K as a proxy for utilization as Blecker instead of Y/Y_{fc} would give the result in (1).

Basic Kaleckian Growth Model

- The Kaleckian growth model in its standard form consists of two growth rate equations, one for savings to ensure goods market equilibrium and one for investment.

$$g^s = S/K,$$

with $S =$ Aggegate savings of firms out of profits , as workers do not save by assumption.

$$S = s_r \Pi \Rightarrow g^s = \frac{s_r \Pi}{K} = s_r r,$$

- The next equation we need is the desired investment growth equation.

$$g^I = \dot{K}/K = I/K = f_0 + f_1 r + f_2 u, \tag{2}$$

where $f_0, f_1, f_2 > 0$.

Basic Kaleckian Growth Model

- Equating the two growth rates to ensure goods market equilibrium (since on g^S the equilibrium holds), we get

$$g^S = g^I \Rightarrow s_r r = f_0 + f_1 r + f_2 u,$$

Using $r = \pi u$,

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$$s_r \pi u = f_0 + f_1 \pi u + f_2 u,$$

and solving for u gives

$$u^* = \frac{f_0}{(s_r - f_1)\pi - f_2}$$

- For the Keynesian goods market stability, we impose that the response of savings to changes in utilization must be larger than the response of investment, so $s_r \pi > f_1 \pi + f_2$. This condition ensures that the denominator is positive.

Basic Kaleckian Growth Model

- What happens to capacity utlization rate when mark-up falls?
- A fall in the markup implies that real wages increase, as well as the wage share. Remember that wage share is given by
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$$Wage\ Share = \frac{WL}{PY}$$

  our pricing equation is
$$P = \varphi a W,$$

  with $\varphi = (1+m)$, $a = 1/y$ and $y = Y/L$.

$$P = (1+m)\frac{WL}{Y},$$

$$\frac{1}{(1+m)} = \frac{WL}{PY},$$

- As the markup m falls, wage share increases.

Basic Kaleckian Growth Model

- So an increase in real wages as a result of class struggle will mean lower mark-ups and lower profit shares.
- Going back to the question in the previous slide, what is the impact of this on the utilization rate?
- $$u^* = \frac{f_0}{(s_r - f_1)\pi - f_2}$$
- $$\frac{du^*}{d\pi} = \frac{-f_0(s_r - f_1)}{\left[(s_r - f_1)\pi - f_2\right]^2}$$
- In order to determine the sign of this derivative, we need the sign of $(s_r - f_1)$ since $f_0 > 0$ by assumption. The stability condition dictates that $s_r\pi > f_1\pi + f_2$, or equivalently $(s_r - f_1)\pi > f_2$. With $f_2 > 0$ by assumption, we have $(s_r - f_1) > 0$, which implies that $\frac{du^*}{d\pi} < 0$.

Stagnation or Exhiliration?

- Bhaduri and Marglin (1990) classifies economies depending on whether or not capacity utilization increases when profit share increases (i.e mark-up increases, real wage and wage share fall).
- An increase in the profit share has two effects on our economy above. On the one hand, a higher profit share reduces aggregate demand as savings increase. On the other hand, a higher profit share has a positive effect on investment and hence aggregate demand. In the opposite case, a higher real wage rate increases costs to firms, reducing profitability per unit of output (lower markups) but it also increases aggregate demand with no workers' saving or when saving rate of workers, s_w is smaller than s_p.
- In a "stagnationist economy", capacity utilization falls when profit share increases i.e $\frac{du^*}{d\pi} < 0$ whereas in an "exhilirationist" economy, a higher profit share implies a higher capacity utilization rate, i.e. $\frac{du^*}{d\pi} > 0$. So the basic Kaleckian growth model presented above is stagnationist.
- Stagnationism is also called "wage-led aggregate demand".

Cooperative or Conflictive?

- Another classification relates to whether or not class interests clash in the economy.
- While we analyzed the effect of an increase in profit share on utilization above, capitalists and workers care about profits and wages.
- So whether or not the economy is cooperative depends on if one class benefits from the strengthening of the other or loses due to it.
- In a stagnationist regime, this would necessitate that aggregate profits, and hence the profit rate increases when real wages and wage share increases/profit share falls. Mathematically, this would imply $dr/d\pi < 0$, meaning that an increase in mark-up (a decrease in real wages and wage share, an increase in the profit share) **reduces** the profit rate. So capitalists lose more in quantity than they earn additionally per unit of output and aggregate profits fall when mark-ups increase.
- In an exhilirationist regime on the other hand, cooperativeness would require the total real wage bill to increase as a response to an increase in the profit share ($d(WL/P)/d\pi > 0$).

Cooperative or Conflictive?

- In order to see if our basic Kaleckian model is cooperative, we need to analyze the sign of $dr^*/d\pi$.
- Using $r^* = \pi u^*$,

$$\frac{dr^*}{d\pi} = u^* + \pi \frac{du^*}{d\pi}$$

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$$\frac{dr^*}{d\pi} = \frac{f_0}{(s_r - f_1)\pi - f_2} + \frac{-f_0(s_r - f_1)\pi}{\left[(s_r - f_1)\pi - f_2\right]^2}$$

$$\frac{dr^*}{d\pi} = \frac{-f_0 f_2}{\left[(s_r - f_1)\pi - f_2\right]^2} < 0$$

Wage-led growth or Profit-Led growth?

- The final distinction we make is whether or not the accumulation rate, or in other words the growth rate of capital increases when profit share increases.
- In an economy with wage-led growth, the growth rate of capital stock ($g^I = g^S = g^*$) increases when profit share falls, i.e $dg^*/d\pi < 0$. Similarly, with a profit-led growth, the accumulation rate increases when profit share increases, i.e $dg^*/d\pi > 0$.
- In our model,

$$g^S = s_r r$$

- Total differentiation of this equation gives

$$dg^* = s_r dr^*$$

Wage-led growth or Profit-Led growth?

- Dividing both sides with $d\pi$,

$$dg^* / d\pi = s_r (dr^* / d\pi) < 0$$

- So our basic Kaleckian growth model is a stagnationist cooperative economy with wage-led growth.
- A stagnationist cooperative economy with wage-led growth has strong political economy and economic policy implications: capitalists can realize higher aggregate profits and accumulate faster while workers can enjoy high employment and higher wages only if capitalists accept a lower share of the output.
- If profit earners attempt to increase their share of the pie by increasing mark-ups, this will instead lead to a fall in utilization, accumulation rate and the profit rate.

Bhaduri-Marglin (1990)

- The model we analyzed above implicitly imposes a very strong assumption in the investment function.
- This strong assumption can be intuitively grasped as follows. Take the investment function in (2) repeated below

$$g^I \Rightarrow s_r r = f_0 + f_1 r + f_2 u,$$

- We assumed that $dg^I/dr = f_1 > 0$ and $dg^I/du = f_2 > 0$.
- Since these are partial derivatives, mathematically, when we are calculating them, we need to hold the other variable constant, That is, $dg^I/du_{r=\bar{r}} = f_2$.
- Considering that $r = \pi u$, holding r constant at $\bar{r}$ while taking the derivative means that we need to assume π changes at the same rate with u in the opposite direction.

Bhaduri-Marglin (1990)

- If we impose $f_2 > 0$ on this investment function (2), we are implicitly saying that when u increases and π falls at the same rate leaving r constant, firms still invest more.
- This is equivalent to assuming a very strong accelerator effect compared to a profitability effect in investment and Bhaduri-Marglin (1990) argues there is no theoretical or empirical ground for this assumption.
- So the sign of f_2 should not imposed a priori in the investment function as in the basic Kaleckian model.
- Bhaduri-Marglin (1990) analytically show why the investment function (2) rules out exhilirationism and imposes cooperative stagnationism in their Appendix A, but their demonstration is not really very clear.

Bhaduri-Marglin (1990)

- In order to motivate a new investment function, we assume that investment function depends on expected profit rate.

$$g^I = h(r^e)$$

- The expected profit rate has two components: profitability per unit of output, π, and demand conditions, u.

$$r^e = r^e(\pi, u)$$

- $$g^I = h\left[r^e(\pi, u)\right]$$

  Therefore,

$$g^I = h(\pi, u), dh/d\pi > 0, dh/du > 0$$

- This type of formulation for the investment function and the assumption of $dh/du > 0$ now imposes a much weaker condition than the investment function (2) that holding profitability (π) constant,

Bhaduri-Marglin (1990)

- Therefore, instead of the investment function of the basic Kaleckian model, we start with an implicit form function defined as

$$g^I = h(\pi, u), h_\pi = dh/d\pi > 0, h_u = dh/du > 0$$

- As before, the growth rate of savings is given by

$$g^S = s_r r = s_r \pi u$$

- The equlibrium condition $g^I = g^S$ gives

$$s_r \pi u = h(\pi, u) \tag{3}$$

- Since the investment function is in implicit form, we cannot solve for equilibrium values and differentiate to analyze the signs of $\frac{du^*}{d\pi}$, $\frac{dr^*}{d\pi}$ and $\frac{dg^*}{d\pi}$.

Bhaduri-Marglin (1990)

- However, in such cases, we can still inquire about the signs of these partial derivatives using total differentiation.
- Totally differentiating (3) to find $\frac{du^*}{d\pi}$, we get

$$(s_r u^*)d\pi + (s_r \pi)du^* = h_\pi d\pi + h_u du^*$$

$$(s_r \pi - h_u)du^* = (h_\pi - s_r u^*)d\pi$$

$$\frac{du^*}{d\pi} = \frac{h_\pi - s_r u^*}{s_r \pi - h_u} \tag{4}$$

- Remember that for the stability of the model, savings should respond more strongly to changes in utilization than investment. This implies $dg^S/du > dg^I/du$ must hold for stability and convergence to equilibrium values.

Bhaduri-Marglin (1990)

- We have

$$g^S = s_r \pi u \Rightarrow dg^S / du = s_r \pi$$

and

$$g^I = h(\pi, u) \Rightarrow dg^I / du = h_u$$

- So goods market equilibrium will require that $s_r \pi > h_u$ and the denominator of $\frac{du^*}{d\pi}$ in (4) is positive. This implies that the sign of $\frac{du^*}{d\pi}$ depends on $h_\pi - s_r u^*$. With a strong effect of profitability on investment (high h_π), it is possible to get $\frac{du^*}{d\pi} > 0$. Therefore, an exhiliratonist regime is possible if the positive effect of the increase in investment on aggregate demand due to higher profitability is stronger than the negative effect of the reduction in consumption spending on aggregate demand so that overall AD increases.
- In this case, aggregate demand is profit-led, and there is a positive relationship between utilization rate and profit share.

Bhaduri-Marglin (1990)

- We showed that an exhilirationist regime is a possibility with the new investment function.
- Does this new investment function imply a cooperative or conflictive regime?
- In order to figure this out, we will have to identify the sign of $\frac{dr^*}{d\pi}$ from the implicit forms and this is not an easy task!
- Beginning with the definition of profit rate $r = \pi u$, taking logs gives

$$\log r = \log \pi + \log u$$

- Differentiating with respect to time,

$$dr/r = d\pi/\pi + du/u$$

Bhaduri-Marglin (1990)

$$dr/r = d\pi/\pi + du/u$$

- Dividing both sides with $d\pi/\pi$,

$$\frac{dr/r}{d\pi/\pi} = 1 + \frac{du/u}{d\pi/\pi}$$

or equivalently

$$\frac{dr/r}{d\pi/\pi} = 1 + \frac{du}{d\pi}(\frac{\pi}{u})$$

- So the sign of $\frac{dr^*}{d\pi}$ in our model depends on the sign and size of $\frac{du^*}{d\pi}(\frac{\pi}{u})$.
- This term shows the elasticity of utilization rate with respect to profit share $(\frac{du/u}{d\pi/\pi})$.

Bhaduri-Marglin (1990)

- $$\frac{dr/r}{d\pi/\pi} = 1 + \frac{du/u}{d\pi/\pi}$$
- When the economy is stagnationist and therefore demand is wage-led, we have $\frac{du}{d\pi} < 0$. In this case, if the elasticity of utilization rate to profit share, which is negative, is smaller than 1 in absolute value, we have $\frac{dr^*}{d\pi} > 0$. This implies that although the demand regime is stagnationist, the economy is conflictive. Since rate of accumulation is given by $g^* = s_r r$, we necessarily have $dg^*/d\pi > 0$ and the accumulation is therefore profit-led.
- In such a conflictive regime, capitalists can increase their profits and accumulation rate by pushing real wages down (hence increasing the profit share), although that results in less capacity utilization, less employment and less demand.

Bhaduri-Marglin (1990)

- On the other hand, if $\frac{du^*}{d\pi} < 0$ (The regime is stagnationist) and$|\ \frac{du^*/u^*}{d\pi/\pi}\ | > 1$, that is utilization rate is elastic with respect to the profit share and we have $\frac{dr^*}{d\pi} < 0$. The economy is cooperative in this case, as capitalists cannot increase profits and profit rate by suppressing wages. As above, the growth regime is also wage-led under these conditions since $g^* = s_r r$.
- These correspond the basic Kaleckian model we analyzed in the beginning with profit rate and utilization determining investment. So the basic Kaleckian model is only one of the many possible cases.
- Let us use these results with the $\frac{du^*}{d\pi}$ we found in (4), repeated below, to obtain a more intuitive condition for cooperative and conflictive regimes under stagnationism.

Bhaduri-Marglin (1990)

$$\frac{du^*}{d\pi} = \frac{h_\pi - s_r u^*}{s_r \pi - h_u} < 0$$

- In order to obtain a cooperative regime, we require $\left| \frac{du^*/u^*}{d\pi/\pi} \right| > 1$ or equivalently $\frac{du/u}{d\pi/\pi} < -1$ or $-\frac{du/u}{d\pi/\pi} > 1$.

$$-\frac{du}{d\pi}\frac{\pi}{u} > 1$$

- Using (4),

$$\frac{s_r u^* - h_\pi}{s_r \pi - h_u}\left(\frac{\pi}{u}\right) > 1$$

Bhaduri-Marglin (1990)

$$\frac{s_r u^* - h_\pi}{s_r \pi - h_u}\left(\frac{\pi}{u}\right) > 1$$

Simplifying this inequality gives

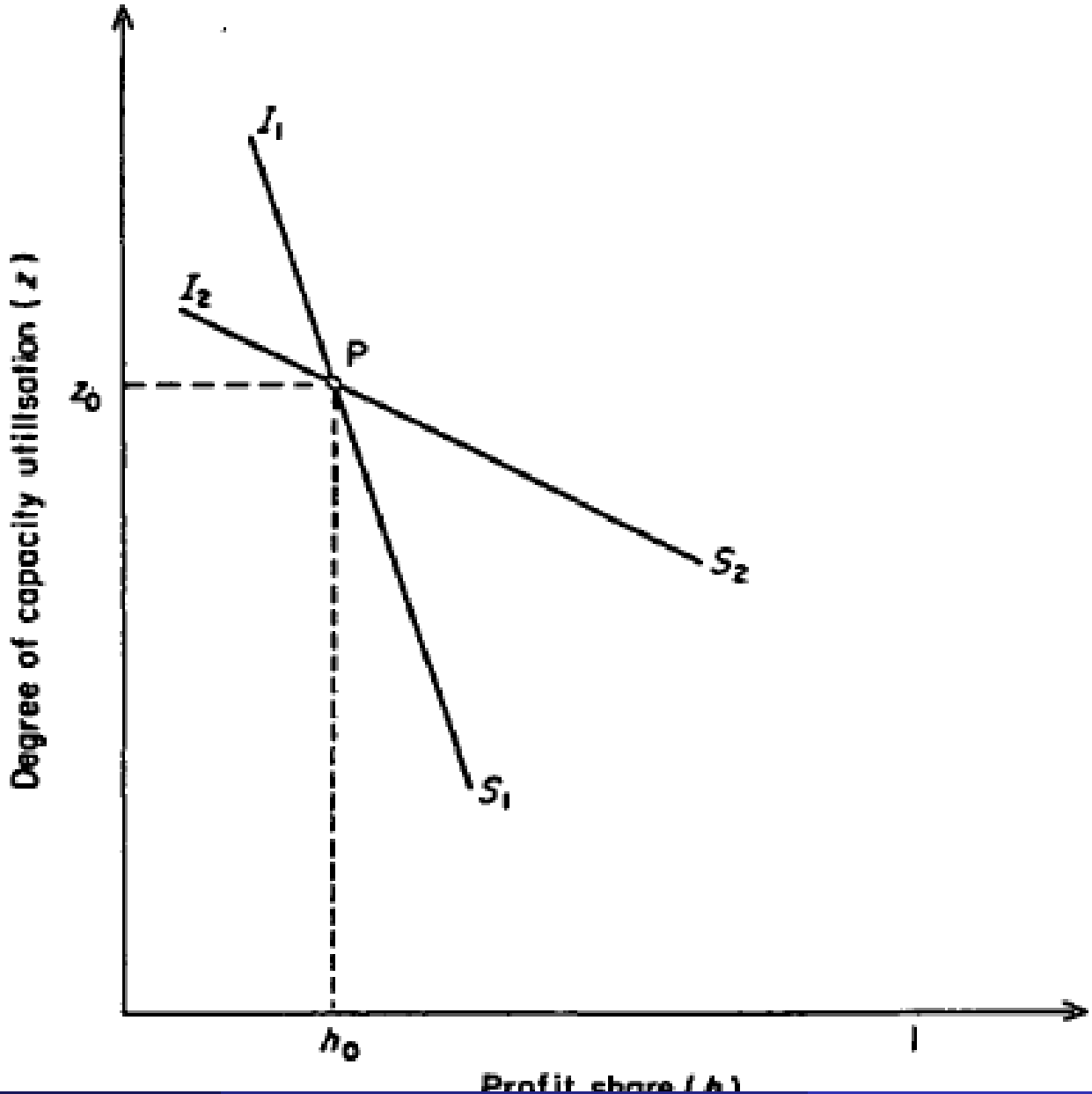
$$h_u u > h_\pi \pi \tag{5}$$

as the necessary condition for a cooperative stagnationist regime. This is equation 13 in Bhaduri-Marglin (1990).

- If we plot capacity utilization and profit share, $\frac{du^*}{d\pi} < 0$ implies that we have a negative slope. At any given level of (u^*, π), condition (5) says, investment should respond more strongly to changes in utilization than to changes in profitability for a cooperative stagnationist regime.
- See Fig1 in Bhaduri-Marglin (1990), which depicts one elastic & one inelastic I-S curve and is presented below. $I_1 S_1$ is the elastic where $\left| \frac{du^*/u^*}{d\pi/\pi} \right| > 1$, and $I_2 S_2$ is inelastic with $\left| \frac{du^*/u^*}{d\pi/\pi} \right| < 1$.

Bhaduri-Marglin (1990)

- "Economic cooperation between the classes envisaged in the social democratic ideology becomes problematic even in the stagnationist regime as condition (12) or equivalently (13) fails. A decline in the profit share bringsabout a small increase in capacity utilisation along an inelastic I-S curve, shown by I_2S_2 in Fig. 1, which is insufficient to compensate for the decline in profit margin per unit of sale. Consequently, both the total and the rate of profit decline as the real wage rate increases. The resulting model of profit squeeze (Glyn and Sutcliff, 1972; Goodwin, 1967) indicates the limit to cooperation in the stagnationist regime, despite the stimulating effect of a higher real wage on economic activity."
- "A profit squeeze due to a higher real wage rate is essentially a reinterpretation of the underconsumptionist argument from a radical point of view. Empirically, it is an appealing argument in the light of the experience of some OECD countries during the 1970s (Armstrong, Glyn and Harrison, 1984; Glyn, Hughes, Lipietz and Singh, 1988)."


Degree of capacity utilisation (z)
I_1
I_2
P
z_0
S_2
S_1
h_0
1
Profit share (h)