Growth and Income Distribution: Neo-Kaleckian Models For Closed and Open Economies

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Outline for presentation

- Basic principles of Kaleckian macroeconomics
  - Distinctive features relative to other approaches
- A simple neo-Kaleckian model for a closed economy
  - Taking income distribution as given
- Conflicting claims inflation and endogenous income distribution
- Open economy extensions
  - Incorporating exchange rates and the trade balance
  - Managed and floating exchange rates
Basic Principles
Industrial goods are assumed to be sold by oligopolistic firms with power to set prices above marginal costs and make positive economic profits.

- Industrial prices are determined by mark-ups over average variable costs:
  \[ \text{Price} = (1 + \text{markup rate})\text{AVC} \]
  \[ \text{AVC} = \text{average variable costs (labor, energy, and raw materials costs per unit of output)}, \text{called “prime costs” by Kalecki} \]
  \[ \text{AVC are constant assuming excess capacity} \]

Primary products (agriculture, raw materials, energy) are sold in more competitive markets with prices that fluctuate with supply and demand.

- Updating this, we could allow for market power and speculative behavior in many primary commodity markets.
- Still, primary commodity prices vary with demand (including speculation) and are not set by cost-plus-markup pricing.
More about markup pricing

- The gross profit markup has to cover various sorts of fixed costs
  - So it’s not all net profit to the firm
  - Some of the income goes to rentiers as interest or dividends

- Markup rates depend on the “degree of monopoly,” which depends on
  - Industrial concentration
  - Overheads or fixed costs
  - Advertising and “sales effort” (product differentiation)
  - Strength of labor unions (negative effect)
  - External competition from a competitive fringe, nonunion producers, imports, etc. (negative effect)
  - Debt service costs (interest rate × debt burden)
Distinctive features of Kaleckian macro models

- The functional (wage-profit) distribution of income affects aggregate demand
  - The marginal propensity to consume (MPC) is higher out of wages than out of profits or other capital income
    - Hein’s focus on rentier income and debt adds another important dimension
  - Investment is a function of profits, as well as demand (capacity utilization or accelerator effect)
    - Investment is financially constrained by cash flow or internal funds of corporations (external funds are more costly)
    - hence, realized profits affect or limit investment
- Net exports may also be linked to income distribution
  - Because labor costs and profit mark-ups affect international price competitiveness and foreign investment flows
What’s *unique* in Kalecki’s approach

- Other theories accept some of the pieces
  - There are mainstream models with mark-up pricing, financial constraints on investment, etc.
  - Everyone from Alan Greenspan to Larry Summers knows that the rich have a lower MPC

- What’s unique is *the way the Kaleckian tradition puts all this together*
  - Especially the nexus of
    Mark-ups $\Rightarrow$ profit/wage shares $\Rightarrow$ consumption and investment spending $\Rightarrow$ macroeconomic outcomes
  - No other approach makes these connections!
Conflicting claims inflation

- Later economists extended Kalecki’s approach to analyze inflation
  - Including S. Weintraub, B. Rowthorn, M. Lavoie, L. Taylor, etc.
- Inflation results when workers and firms have targets for their wages and profits that would more than exhaust the net social product (national income)
  - Workers bargain for higher nominal wages and firms raise nominal prices in efforts to achieve their respective targets
  - The economy reaches an equilibrium inflation rate that corresponds to an equilibrium distribution of income (wages vs. profits) that partially or completely frustrates the ambitions of each group
- Other inflationary factors can be incorporated in such models
  - Exchange rates, interest rates, unemployment or utilization rates, raw materials and energy costs, inertial inflation (expectations or indexing), etc.
Nomenclature and notation

- Similar types of models are sometimes referred to as structuralist, post-Keynesian, Kalecki-Steindl, heterodox, or Marglin-Bhaduri
  - Obviously the label is less important than the content
- Aside from the name, the notation for these models also varies widely
  - My notation is closest to that of Lance Taylor (2004)
  - Other aspects of the presentation follow Marglin & Bhaduri (1990), Dutt (1990), Lavoie (1992), Hein (2008), etc.
- I have produced a “notation translation table” to help you compare my models with the work of others
### Notation Translation Table for post-Keynesian/neo-Kaleckian Macro Models

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Output, national income</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Full capacity output</td>
<td>Y^v</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Labor coefficient (hours/actual output)</td>
<td>1 or ω</td>
<td>b</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>Capital coefficient (capital/full capacity output)</td>
<td>v</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Money wage rate</td>
<td>w</td>
<td>w</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Real wage rate</td>
<td>w^r = w/p</td>
<td>ω = w/P</td>
<td>-</td>
<td>w</td>
</tr>
<tr>
<td>Price level</td>
<td>p</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Capital stock</td>
<td>K</td>
<td>K</td>
<td>K</td>
<td>K</td>
</tr>
<tr>
<td>Saving rate (S/K)</td>
<td>σ</td>
<td>g^s</td>
<td>g^s</td>
<td>σ</td>
</tr>
<tr>
<td>Investment rate or growth rate of capital stock (I/K)</td>
<td>g</td>
<td>g^i, g</td>
<td>g^i, g</td>
<td>g</td>
</tr>
<tr>
<td>Utilization rate(^1)</td>
<td>u = Y/Y^v</td>
<td>u = X/K</td>
<td>u = Y/K</td>
<td>u = Y/K</td>
</tr>
<tr>
<td>Mark-up rate</td>
<td>m</td>
<td>τ</td>
<td>φ−1</td>
<td>τ</td>
</tr>
<tr>
<td>Profit share</td>
<td>h</td>
<td>π</td>
<td>π</td>
<td>π</td>
</tr>
<tr>
<td>Wage share</td>
<td>1−h</td>
<td>ψ = 1−π</td>
<td>1−π</td>
<td>ψ = 1−π</td>
</tr>
</tbody>
</table>

- indicates variable not included.

\(^1\) Hein’s u is a true capacity utilization rate, such that 0 < u ≤ 1. In the other readings listed, utilization is proxied by the (actual) output-capital ratio.
A few side comments

- After the commodity price inflation (boom and bust) of the last few years, this deserves more attention in neo-Kaleckian models
  - Most recent versions have tended to omit this
  - Including this presentation
  - If it’s included, commodity price inflation should be modeled at the global level while the other forces tend to operate more at the national level
- Some early versions (Harris, 1974; Asimakopulos, 1975) also included overhead labor explicitly
- More recently economists in this framework have worked more on incorporating debt and financial instability
  - e.g., Hein, Dutt, Charles, etc.
- My specialty is open economy versions of these models and I will focus on those, after developing a basic framework
Simple closed economy model
The basic neo-Kaleckian model

- **Mark-up pricing**
  
  \[ P = (1 + \tau) aW \]

  - \( \tau > 0 \) is the gross profit mark-up rate,
  - \( a \) is the labor coefficient (hours/unit of output),
  - \( W \) is the money wage rate (per hour),
  - \( aW \) is nominal unit labor cost (raw materials are ignored).

- With no raw materials, price = value added and the (gross) profit share is
  
  \[ \pi = \frac{P - aW}{aW} = \frac{\tau}{1 + \tau} \]

- We assume excess capacity \((u < v = \text{output-capital ratio with full utilization})\)
Distribution, consumption, and saving

- Defining $K$ as the capital stock, the profit rate is
  \[ r = \frac{(P - aW)Y}{PK} = \frac{\tau}{1 + \tau} u = \pi u \]

- And the real wage is
  \[ w = \frac{W}{P} = \frac{1}{a(1 + \tau)} = \frac{1 - \pi}{a} = \frac{\psi}{a} \]
  where $\psi = 1 - \pi$ is the wage share [for future use]

- Saving depends on income distribution:
  \[ \sigma = S/K = [s_r \pi + s_w (1 - \pi)]u \]
  - Profit recipients save at a higher rate than workers:
    \[ 0 \leq s_w < s_r < 1 \]
  - In some formulations, savings out of profits are subdivided into retained profits of firms (which are saved 100%) and savings of rentier households ($s_h$), with $0 \leq s_w < s_h < 1$. 

More on saving and investment

- It is convenient to group the profit share terms together: \( \sigma = [(s_r - s_w)\pi + s_w]u \)
- Investment depends on demand (utilization), the profit share, and Keynesian “animal spirits”:
  \[
g = \frac{I}{K} = f(\pi, u, \alpha), \quad f_{\pi}, f_u, f_\alpha > 0
\]
- This is a fairly general form (implicit function); more specific forms (e.g., linear or using \( r = \pi u \) in place of \( \pi \) may restrict the results
- Other variables can also be added (e.g., interest rate or debt service burden with a negative effect)
- I do not restrict \( u \) to return to a “normal” level in the medium run
  - These are not “long-run” models in the sense of a time period long enough for capital stocks to adjust to optimal levels
Goods market equilibrium (closed economy)

Saving = Investment + Government Deficit:

\[ \sigma = g + \gamma \]

where \[ \gamma = (G-T)/K \]

or \[ ((s_r - s_w)\pi + s_w)u = f(\pi, u, \alpha) + \gamma \]

- Note: no explicit solution possible due to implicit form of \( f(\cdot) \)
- If \( f(\cdot) \) is linearized, explicit solutions for \( u \) can be found

with stability analysis (condition):

\[ EDG = g + \gamma - \sigma \]

\[ = f(\pi, u, \alpha) + \gamma - [(s_r - s_w)\pi + s_w]u \]

\[ \partial EDG/\partial u = f_u - [(s_r - s_w)\pi + s_w] < 0 \]
Effect of distribution on utilization

- Totally differentiate the equilibrium condition to get

\[ \frac{\partial u}{\partial \pi} = \frac{-[(s_r - s_w)u - f_\pi]}{(s_r - s_w)\pi + s_w - f_u} \]

- Denominator > 0 for stability but numerator is ambiguous in sign

- \( \frac{\partial u}{\partial \pi} < 0 \) is “stagnationism” or wage-led demand
  - Depressing effect of \( \pi \) on workers’ consumption dominates
  - Also called the “paradox of cost” (higher wages \( \Rightarrow \uparrow u \))

- \( \frac{\partial u}{\partial \pi} > 0 \) is “exhilarationism” or profit-led demand
  - Positive effect of \( \pi \) on investment dominates, or else workers’ saving is relatively high
Effects on the profit rate and growth rate

- **Effect on profit rate**
  \[
  \frac{\partial r}{\partial \pi} = \frac{(s_w - f_u)u + f_\pi \pi}{(s_r - s_w)\pi + s_w - f_u}
  \]
  - may be < 0 if \( f_u u \) is relatively large ("strong accelerator" or "cooperative stagnationism")
  - otherwise > 0 (if \( s_w u \) or \( f_\pi \pi \) is relatively large)

- **Effect on growth rate**
  \[
  \frac{\partial g}{\partial \pi} = \frac{(s_r - s_w)(f_\pi \pi - f_u u) + s_w f_\pi}{(s_r - s_w)\pi + s_w - f_u}
  \]
  - may be < 0 if \( f_u u \) and the gap \( (s_r - s_w) \) are both large
  - otherwise > 0
Conclusions on the short run

- The conditions for utilization, the profit rate, and the growth rate to be wage-led vs. profit-led are different.
- But there are some common themes:
  - A strong accelerator effect \( (f_u) \) makes these more likely to be wage-led (negative derivatives).
  - Relatively high worker’s saving \( s_w \) or strong profitability effects on investment \( f_\pi \) make them more likely to be profit-led (positive derivatives).
    - If these are weak, then the “underconsumptionist” effect of a redistribution of income toward profits dominates.
- Different countries in different historical conditions are likely to have different distributional relationships.
Inflation and income distribution

Costs, prices, and income shares (profits/wages) were taken as given in the short run.

Now we study how they adjust over “medium-run” time periods.
In the short-run model, we took $W$ as given and $P$ was determined by the mark-up.

Now we model them as adjusting over time in response to the bargaining power of labor vs. firms, labor market conditions, and other factors.

- Implicitly, markups also gradually adjust in this process.
- The labor coefficient $a$ (inverse of productivity) can also be made endogenous.

We model each “class” of agents as having a “reaction function” with a target variable:

- A target real wage or wage share for workers.
- A target markup rate or profit share for firms.

If these targets are incompatible, the conflict results in wage and price inflation as each class pursues its goal.
Math for conflicting claims

- It is more convenient to use the wage share instead of the profit share:
  \[ \psi = \frac{aW}{P} = 1 - \pi = \frac{1}{1+\tau} \]

- The medium-run equilibrium condition is

  \[ \hat{\psi} = \hat{a} + \hat{W} - \hat{P} = 0 \]

  where ^’s signify growth rates (log changes)

- Assume for simplicity that labor productivity grows at the exogenous rate, \( \epsilon = -\hat{a} \).

- The equilibrium wage share will be achieved at a constant rate of inflation

- It’s a type of “cost-push” inflation, but it can also incorporate demand pressures
Reaction functions

- Assuming workers have more bargaining power when unemployment is low (and, by Okun’s Law, utilization is high),
  \[ \hat{W} = \phi(\psi_w - \psi) + \lambda u \]

- Assuming producers can raise prices more when aggregate demand conditions are strong (utilization is high),
  \[ \hat{P} = \theta(\psi - \psi_f) + \eta u \]

- Note this translates the firms’ target for the markup \( \tau_f \) into the equivalent wage share, \( \psi_f = 1/(1 + \tau_f) \)

- Also note that \( \theta < \infty \implies \) some short-run price rigidity

Conflicting claims

Demand pressures

“Cost-push”
Medium-run solution

- Substitute the wage and price reaction functions into the equilibrium condition and solve for:

\[ \psi(u) = \frac{\phi \psi_w + \theta \psi_f - \varepsilon + (\lambda - \eta)u}{\phi + \theta} \]

- With slope

\[ \frac{\partial \psi}{\partial u} = \frac{\lambda - \eta}{\phi + \theta} \]

- The sign depends on whether wages or prices respond more strongly to changes in utilization (employment)
Putting the two parts of the model together

- Recall $u$ is also a function of $\psi = 1 - \pi$ from the short-run model
  - With derivatives having the reverse signs from what we found before:
    - Wage-led, $\partial u / \partial \psi > 0$
    - Profit-led, $\partial u / \partial \psi < 0$

- We can call the short-run equilibrium condition an “IS curve”
  - Assuming the goods market clears quickly, the economy is always on the IS curve

- The medium-run equilibrium condition can be called the “DC curve” (for distributive curve)
  - Assuming wages and prices adjust slowly, the economy moves toward this curve gradually over time
Stagnationist/wage-led utilization (stable cases)

Note: A horizontal DC curve would also be stable.
Exhilarationist/profit-led utilization (stable cases)

Note: A horizontal DC curve would again be stable.
Unstable cases are also possible

Wage-led demand with a strong wage response to $u$

Profit-led demand with a strong price response to $u$
Comparative dynamics

- Changes in aggregate demand conditions (e.g., fiscal stimulus, private sector boom, interest rate policy) shift IS
  - There is either undershooting or overshooting in the short run
  - Then the economy adjusts toward the medium-run equilibrium
- Changes in distributional/inflationary conditions shift DC
  - There is no over/under shooting and the economy adjusts directly but gradually toward the medium-run equilibrium
- The following are just a few samples of the possible cases
Example of overshooting

Demand is wage-led, but prices respond more strongly to utilization than wages.
Example of undershooting

Demand is wage-led, and wages respond more strongly to utilization than prices
Example of a distributional shift

Classic “stagnationism” when demand is wage-led (paradox of costs)
What happens to inflation

Simplest case with no demand effects* ($\lambda = \eta = 0$)

$$\hat{P} = \theta(\psi - \psi_f)$$

*Note this would correspond to a horizontal DC curve.
The open economy model

Revised version of Blecker (1989, 1999, 2002) with some new extensions
The short-run open economy model

- For the short-run model, we add a trade balance function:
  \[ b = \frac{TB}{K} = b(q,u), \quad b_q > 0, \quad b_u < 0 \]

  where \( q = \frac{EP^*}{P} \) is the real exchange rate

- \( E \) is the nominal e. r. (home currency/foreign currency)
- Note \( q \) is the relative price of foreign goods
- So a higher \( q \) is a real *depreciation* of the home currency

- We assume that the Marshall-Lerner condition holds so \( b_q > 0 \)
  - But we can consider the consequences if M-L is violated
  - This is a partial derivative; the total effect on \( b \) also depends on what happens to \( u \) as a result of a change in \( q \)
Short-run solution

- The goods-market equilibrium condition becomes

\[ \sigma = g + \gamma + b \]

- After making appropriate substitutions and differentiating, we find that \( u \) is an increasing function of \( q \) (holding \( \psi \) constant):

\[
\frac{\partial u}{\partial q} = \frac{b_q}{(s_r - s_w)(1 - \psi) + s_w - f_u - b_u} > 0
\]

- So changes in \( q \) shift the IS curve in \( u \times \psi \) space
The exchange rate, inflation, and distribution

- Much evidence suggests that a real depreciation allows firms to raise markups and profit shares
  - In a dynamic context, this means that prices rise relatively faster compared to wages
- So the price and wage reaction functions are
  \[ \hat{P} = \theta(\psi - \psi_f) + \beta q \]
  \[ \hat{W} = \phi(\psi_w - \psi) \]
- Utilization effects are eliminated for simplicity
- Again the equilibrium condition is \( \hat{\psi} = \hat{W} - \varepsilon - \hat{P} = 0 \)
Real exchange rate adjustment

- I assume that in a medium-run equilibrium the real exchange rate must reach a stable level
  - It may or may not correspond to any particular concept of a long-run equilibrium real exchange rate
  - It is **NOT** necessarily a purchasing power parity rate!
  - We **ONLY** assume that $q$ stabilizes, i.e., does not rise or fall without limit

- By definition, $\hat{q} = \hat{E} + \hat{P}^* - \hat{P}$
  - So the equilibrium condition is $\hat{q} = \hat{E} + \hat{P}^* - \hat{P} = 0$
  - Assume $\hat{P}^* = p^*$ is exogenous (small country)
  - We already have an equation for $\hat{P}$
The nominal and the real exchange rate

- So we need an equation for nominal exchange rate adjustment
- The theory of nominal exchange rates is in a very unsettled state, so I will adopt a simple and mathematically convenient assumption
  - Hopefully it is also defensible
- I assume that there is a desired or expected level of the real exchange rate \( \bar{q} \)
  - In a managed system (e.g. crawling peg) this could be the target of the monetary authorities
  - In a floating rate system, it reflects the state of currency traders’ expectations and the monetary policy stance
Setting up the medium-run system

- Then I assume that the *nominal* rate adjusts as follows:

\[ \hat{E} = \mu(\bar{q} - q) \]

- Assuming \( \mu < \infty \)
- This is admittedly ad hoc but intuitively appealing

- Now we have 2 differential equations in 2 state variables, \( q \) and \( \psi \):

\[ \hat{\psi} = \hat{W} - \varepsilon - \hat{P} = F(q, \psi) = 0 \]
\[ \hat{q} = \hat{E} + \hat{P}^* - \hat{P} = G(q, \psi) = 0 \]

- Here I assume the speeds of adjustment are relatively similar

- After appropriate substitutions, we can solve for 2 demarcation curves in \( q \times \psi \) space:
The solution continued

- **Distributional Curve (DC):**
  \[\hat{\psi} = 0 \quad \Rightarrow \quad \psi = \frac{\phi \psi_w + \theta \psi_f - \varepsilon - \beta q}{\phi + \theta}\]

- **The Foreign Exchange curve (FE):**
  \[\hat{q} = 0 \quad \Rightarrow \quad q = \frac{\mu \bar{q} + p^* - \theta (\psi - \theta \psi_f)}{\beta + \mu}\]

- **Both DC and FE are downward sloping**
  - Under our assumed parameter values FE must be steeper so the equilibrium is necessarily stable.
Stable medium-run dynamics

The stability condition

\[ \frac{\beta + \mu}{\theta} > \frac{\beta}{\phi + \theta} \]

is necessarily satisfied so FE must be steeper.
Putting the short and medium runs together

Note: The upward-sloping IS curve assumes that domestic demand is wage-led.

Note: the position of IS depends on $q$!
A devaluation (higher real exchange rate target of monetary authorities)

Utilization may either rise or fall because IS also shifts!
Implications

- The devaluation can be either expansionary or contractionary
  - On the one hand it improves the trade balance
  - But it lowers the wage share and domestic demand is wage-led
  - The overall change in \( u \) depends on which effect is bigger

- The overall response of the economy may be exhilarationist (profit-led) even though domestic demand is wage-led
  - Then the devaluation is expansionary
  - This requires a large improvement in the trade balance

- If the economy is stagnationist (wage-led) overall then the devaluation is contractionary
  - Then the trade balance doesn’t improve much and consumption falls a lot
  - This is the case analyzed by Krugman and Taylor (1978)
Monetary policy with a flexible exchange rate

- Assume that the central bank targets the interest rate and lets the exchange rate float
- We can incorporate the interest rate in three places:
  - Investment function (negative effect on $g$)
    - Due to higher cost of capital, lower cash flow, or higher debt service burden
  - Price reaction function (negative effect on firms’ target wage share due to a positive effect on the target markup $\psi_f$)
    - Following Hein’s (2008) concept of the “interest elastic markup”
  - Exchange rate function (negative effect on the market’s expected real exchange rate, $\widetilde{Q}$)
    - A lower interest rate increases net financial outflows
    - Financial markets are “imperfectly” integrated so the home interest rate can be different from the foreign interest rate
Mathematically speaking...

- **Investment function, in implicit form**
  
  \[ g = f(1 - \psi, u, i, \alpha), \quad f_i < 0 \]

  - One specific version could be
    
    \[ g = f(r - i, \alpha), \quad r = (1 - \psi)u, \quad f_r > 0. \]

- **Price reaction function**
  
  \[ \hat{P} = \theta[\psi - \psi_f(i)] + \beta q \]

  - Assuming \( \psi_f = 1/[1 + \tau_f(i)] \) and \( \tau_f'(i) > 0 \)

- **Exchange rate function**
  
  \[ \hat{E} = \mu[\overline{q}(i - \overline{i}^*) - q] \quad \text{with} \quad \overline{q}' < 0 \]
An interest rate increase with a flexible exchange rate

IS shifts twice (direct effect of higher $i$ and indirect effect of lower $q$ if $q$ falls as seems likely)
Likely or possible outcomes

- It seems very likely that utilization $u$ will decline
  - But how much it falls depends on both the shifts in IS and the movement along IS as $\psi$ rises or falls
- The net effect on the wage share $\psi$ is hard to predict
  - On the one hand firms may wish to increase markups to pay for higher debt service costs (so $\psi$ would fall)
    - This is more likely if firms are highly indebted
    - Otherwise this effect would be weak (DC won’t shift much)
  - On the other hand the real exchange rate $q$ is likely to appreciate and this squeezes (tends to reduce) markups
    - There is much empirical evidence for this
    - If this effect is stronger then $\psi$ will rise
Future directions and extensions

- Better modeling of the exchange rate
  - Have to be careful, exchange rates are hard to predict
  - The exchange rate could depend on $r$ or $g$ (financial flows go to countries with high profit or growth rates)
  - Need to allow for speculative behavior, bubbles, and boom-bust cycles
- Need to link my open economy models with the new models with explicit financial sectors and stock-flow accounting
  - How to put this in historical (irreversible) time?
- Econometric tests of hypotheses
  - Estimate which direction various effects go in