

A neo-Kaleckian model of capital accumulation, income distribution and financial fragility

(Rafael Saulo Marques Ribeiro, Alex Wilhans Antonio Palludeto - 2016)

1 Introduction

- Contribution: "developing a neo-Kaleckian dynamical model of capital accumulation, functional income distribution [...] and financial fragility for a closed economy with no government activity."
- Two classes:
 - Workers;
 - Capitalists:
 - "constituted by entrepreneurs and rentiers".
- "[P]roduction is carried out by oligopolistic firms that operate with excess capacity":
 - "[It] means that capacity utilisation adjusts to maintain the equilibrium in the goods market".
 - "Investments decisions depend on the expected profit rate, and the propensity of firms to save".
- "[C]apital goods can be financed either by retained profits or external funds from commercial banks".
 - "Commercial banks calculate the nominal market interest rate by setting a mark-up over the base nominal interest rate, which is determined by the monetary authority".
 - "[T]he Central Bank's supply of money accommodates any increase in firms' demand for loans".
 - "From the commercial bank perspective, the higher the firms debt as proportion of their stock of capital, the higher the default risk, which leads to a higher risk and liquidity premia, and a higher market interest rate, thus discouraging firms to financing (*sic*) new capital goods".
- "The model examines the impact of changes in the base interest rate on the investment rate and income distribution".
 - "Changes in the benchmark interest rate affect negatively the expected profitability of current investments and the actual value of firms' collateral, thus reducing the investment rate".
 - "A rising debt service also reduces the wage share of income due to its negative effect on the employment rate and firms' retained profits, thus undermining the bargaining power of workers in the wage decision-making process".
- "[W]e investigate the impact of a financially unstable economy on capital accumulation and income distribution in the long run".
 - "[W]e explore the stability conditions of the steady-state equilibrium solution of the three-dimensional dynamical system formed by the capital-effective labour ratio supply, the wage share, and the debt-capital ratio".
 - Contribution: "setting the conditions in which (*sic*) the debt-capital ratio, the income distribution and process of capital accumulation can be simultaneously stable".

2 The structure of the model

- "We assume a closed economy that produces only one good for both consumption and investment".
 - "We also assume a fixed-coefficient production function where homogeneous labour (L) and capital (K) are used as factors of production".
 - "Since the capital-potential output ratio is assumed to be constant and normalised to unity, the capacity utilisation (u) is given by the output-capital ratio".
 - "Given that domestic firms are assumed to be operating below full capacity, the rate of capacity utilisation must adjust to accommodate excess demand or supply".

2.1 Classes

- Workers: "earn only wages (W) and consume all their income".
- Capitalists: "divided into entrepreneurs and rentiers".
 - Entrepreneurs: "earn profits of their firms and save a constant fraction of their income".
 - Rentiers: "earn income from the stock of credit granted to firms at a given market interest rate (i) and also save a constant fraction of their income".
- "Total income is given by:

$$Y = \left(\frac{W}{P}\right)L + \Pi \quad (1)$$

$$u = \sigma u + r \quad (2)$$

$$\sigma = \left(\frac{W}{Pa}\right) \quad (3)$$

$$r = \frac{\Pi}{K} = (1 - \sigma)u \quad (4)$$

where P is the price level, σ is the wage share of income, Π is total profit, r is the profit rate and $a = Y/L$ is the labour productivity.

- "[W]e split total profits (Π) into profits of firms (Π_c) and income of rentiers (Π_f):

$$\Pi = \Pi_c + \Pi_f = \Pi_c + iB \quad (5)$$

where B is the stock of credit granted to firms".

- "The debt-capital ratio is":

$$\lambda = \frac{B}{K} \quad (6)$$

2.2 Interest rate and the endogenous risk premium

- "[C]ommercial banks calculate the nominal market interest rate (i) by marking up the base nominal interest rate set by the Central Bank (i_{CB})".
- "[A]ny increases in the demand for loans and, consequently, deposits with commercial banks is full accommodated by the Central Bank's supply of monetary reserves."
 - "Ergo, i_{CB} is [...] exogenous.

$$i = hi_{CB} \quad (7)$$

where $h > 1$ is the mark-up set by commercial banks".

- "This mark-up is a risk and liquidity premia set by commercial banks and depends on the debt-capital ratio, as follows:

$$h = \mu\lambda \quad 0 < \lambda < \lambda_{max} \quad (8)$$

where $\mu > 0$ is a constant of proportionality and λ_{max} is the maximum amount of credit as a proportion of the capital stock that lenders are willing to grant to firms".

- "For simplicity, let us set μ equal to unity henceforth ($\mu = 1$)".

2.3 Capital accumulation

- "[T]he rate of capita accumulation desired by firms depends on the expected rate of retained profit on investment".
 - "[T]he higher the expected profit rate, the higher the propensity of firms to invest".
 - "[T]he profits expected by firms are equal to current profits. Thus, the linear function of the capital accumulation plans is given by

$$g^d = \frac{\Delta K}{K} = \frac{I}{K} = g_0 + \alpha_1 u + \alpha_2 s_c (r - i\lambda) \quad (9)$$

where g_0 is the autonomous investment rate, $\alpha_1 > 0$ is the sensitiveness of desired investment to capacity utilisation, $\alpha_2 > 0$ accounts for the responsiveness of the desired investment to retained profits of firms, and s_c is entrepreneurs' propensity to save out of retained profits".

2.4 Aggregate saving

- "If domestic firms operate below full capacity the equality between investments and savings is brought about by the adjustment of the capacity utilisation".
 - "[T]he aggregate savings normalised by the stock of capital is given by

$$g = \frac{S}{K} = \frac{S_c + S_f}{K} \quad (10)$$

where S is total savings, S_c is the entrepreneurs' saving out of retained profits, and S_f is the financial capitalists' saving out of the income received from the stock of credit granted to firms at a given market interest rate".

"From Eqs. (4) – (6), we obtain

$$\frac{S_c}{K} = s_c \frac{\Pi_c}{K} = s_c \frac{\Pi - \Pi_f}{K} = s_c [r - i\lambda] \quad (11)$$

Rentiers also save a constant fraction, s_f , out of the income they receive from the loans

$$\frac{S_f}{K} = s_f \frac{\Pi_f}{K} = s_f i\lambda \quad (12)$$

Substituting from (12) and (11) into (10), we have

$$g = s_c [r - i\lambda] + s_f i\lambda = s_c r + (s_f - s_c) i\lambda \quad (13)$$

Assuming, for simplicity, $s_f = s_c = s$, we obtain

$$g = sr \quad (14)$$

Eq. (14) is the so-called Cambridge equation".

3 The model in the short run