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The principle of effective demand in the short and the long run: Marx, Kalecki, Keynes, and beyond

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Abstract

The principle of effective demand, and the claim of its validity for a monetary production economy in the short and in the long run, is the core of heterodox macroeconomics, as currently found in all the different strands of post-Keynesian economics (Fundamentalists, Kaleckians, Sraffians, Kaldorians, Institutionalists) and also in some strands of neo-Marxian economics, particularly in the monopoly capitalism and underconsumptionist school. In this contribution, we will therefore outline the foundations of the principle of effective demand and its relationship with the respective notion of a capitalist or a monetary production economy in the works of Marx, Kalecki and Keynes. Then we will deal with heterodox short-run macroeconomics and provide a simple short-run model, which is built on the principle of effective demand, as well as on distribution conflict between different social groups (or classes): rentiers, managers and workers. Finally, we will move to the long run and we will review the integration of the principle of effective demand into some variants of heterodox/post-Keynesian approaches towards distribution and growth, the Kaldor-Robinson, the Kalecki-Steindl and the Sraffian Supermultiplier model.

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Key words: Effective demand, employment, distribution, growth, Marx, Kalecki, Keynes

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1. Introduction

The principle of effective demand, and the related claim that economic activity in a monetary production economy is demand-determined, is the core of heterodox macroeconomics. This includes all the different strands of post-Keynesian economics, encompassing the fundamentalists, the Kaleckians, the Sraffians, the Kaldorians, and the institutionalists (Lavoie 2022: 33–49), as well as some strands of Neo-Marxian economics, particularly in the monopoly capitalism and under-consumptionist school (Foster 2014). The foundations of the principle of effective demand cannot only draw on Keynes's contributions, but can already be found in Marx's and Kalecki's work, where they are closely linked with the notion of distributional conflict between classes or social groups. Therefore, the second section of this chapter outlines the foundations of the principle of effective demand and its relationship with the respective notion of a capitalist or a monetary production economy in the works of Marx, Kalecki, and Keynes. The third section provides a simple short-run macroeconomic 'workhorse model', which is built on the principle of effective demand, as well as on the distributional conflict between different social groups (or classes): rentiers, managers, and workers. In the fourth section we move to the long run and review the integration of the principle of effective demand into heterodox, particularly post-Keynesian, approaches to distribution and growth. The fifth and final section briefly summarizes and concludes.

2. The rejection of Say's law and the principle of effective demand in Marx, Kalecki, and Keynes

The rejection of Say's law and its replacement with the principle of effective demand in the works of Marx, Kalecki, and Keynes is based on their respective views of capitalist economies as monetary production economies. Following Schumpeter's (1954: 277–278) distinction, all three contributions can be classified as following 'monetary analysis', as opposed to 'real analysis'. Whereas in the former, money and monetary variables are essential for the determination of the real variables of the system, both in the short and in the long run, in the latter money is a veil, which has no long-run effects on the real economy.

Karl Marx[1]

In *Capital, Volume I*, Karl Marx (1867: 97–144) discusses three principal roles of money—money as a standard of value, money as a means of circulation, and 'money as money,' including money as a store of value, as a means of payment, and as universal money. Money as a medium of circulation means that the succession of sales (C-M) and purchases (M-C) in the circuit C-M-C (commodity–money–commodity) of simple commodity production is interrupted. This function of money provides Marx with the first argument to explicitly reject Ricardo's version of Say's law in his *Theories of Surplus Value* and it constitutes Marx's 'possibility theory of crisis' (Marx 1861–63: 499–508).[2] In this 'possibility theory of crisis', the existence and use of money is the reason why a general crisis of over-production *may* occur;

[1] This section draws on Hein (2008: 16–29). See also Hein (2023a: Chapter 3).

[2] Ricardo's version of Say's law differs from the neoclassical version, because it is neither associated with full employment of labor nor is there an economic mechanism equating saving and investment. It simply implies that saving and investment are identical, capitalists save in order to invest (Garegnani 1978, 1979).

it is not yet an explanation why an actual crisis *will* occur.[3] Since 'money as money' includes its potential function as a store of value (hoarding), an increase in the willingness to hoard causes a lack of aggregate demand for the economy as a whole and may therefore trigger a general crisis. Of course, this will only hold true if the demand for holding money does not constitute a demand for production and output. If money were a produced commodity, an increase in the demand for money would not generate a deficiency of aggregate demand. Therefore, money cannot be a reproducible commodity—a conclusion Marx did not seem to be aware of, because he built his theory of money on the assumption of a money-commodity—that is, gold.

Marx's second argument against Say's law derives from the function of money as a means of payment, when the sale of a commodity and the realization of its price are separated (Marx 1861–63: 511). The seller becomes a creditor, the buyer a debtor, and money is the standard and the subject of a creditor-debtor contract. In such a system, on the one hand, the demand for commodities is no longer limited by income created in production. On the other hand, money as a means of payment increases the vulnerability and fragility of the system. Capitalists not only have to find appropriate demand for their produced commodities, but they have to find it within a certain period of time in order to be able to meet their payment obligations. If there are unanticipated changes in market prices for final products between the purchase of a commodity as an input for production and the sale of the final product, capitalists may be unable to meet their payment commitments. The default of individual units of capital may interrupt credit chains and trigger a general crisis.[4]

The rejection of Say's law and its necessary replacement with a theory of effective demand, as well as the need for endogenous money for the expansion of capitalist economies, become clear in Marx's discussion of simple and expanded reproduction in *Capital, Volume II* (Marx 1885: 396–527). In the schemes of reproduction, Marx analyzes the conditions for capitalist reproduction in a two-sector model without foreign trade or economic activity by the state. Sector 1 produces means of production and Sector 2 produces means of consumption. The supply price of each sector is given by constant capital costs expended in production (K_c), wage costs (W) and normal profits (Π), either determined by the rate of surplus value, if relative prices are determined by labor values, or by the general rate of profit for the economy as a whole, if relative prices are determined by prices of production. The demand for output of Sector 1 consists of gross investment (I^g) in constant capital for both sectors, while the demand for output of Sector 2 consists of consumption demand out of profits (C_Π) and out of w ages (C_w). For the values of aggregate demand and aggregate supply, we therefore have:

$$(1) \qquad K_{c1} + W_1 + \Pi_1 + K_{c2} + W_2 + \Pi_2 = I_1^g + I_2^g + C_{W1} + C_{W2} + C_{\Pi 1} + C_{\Pi 2}.$$

Assuming that wages for the workers' class as a whole are completely spent on consumption goods, and hence $W_1 + W_2 = C_{W1} + C_{W2}$, we get:

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[3] On Marx's rejection of Say's law see more explicitly Kenway (1980) and Sardoni (2011: 11–23).

[4] The role of credit in economic crises is explored in more detail by Marx in *Capital, Volume III* (Marx 1894: 476–519).

(2) $$\Pi_1 + \Pi_2 = I_1 + I_2 + C_{\Pi 1} + C_{\Pi 2},$$

where $I = I^g - K_c$ denotes net investment. From this, Kalecki's (1968) interpretation of Marx's schemes of reproduction arises. As capitalists cannot determine their sales and profits, but can only decide about their expenditures on investment and consumption goods, these expenditures have to ensure that *produced* profits will become *realized* profits. Therefore, net investment determines saving (S) in Marx's schemes of reproduction:

(3) $$S = S_1 + S_2 = \Pi_1 - C_{\Pi 1} + \Pi_2 - C_{\Pi 2} = I_1 + I_2 = I.$$

The capitalists' investment and consumption thus determine their aggregate profits—it is the capitalists who have to advance the required amount of money in order to realize their produced and expected profits. A realization failure, the inability to sell commodities at predetermined prices, may occur if there is insufficient investment or consumption demand by capitalists. Aggregate supply will then exceed aggregate demand and the economy will suffer from unused productive capacity and unemployment, and hence from a crisis.

Whether Marx's principle of effective demand provides the conditions for an underemployment equilibrium, or a state of rest, is a matter of debate. Whereas Sardoni (2011) argues that Marx's microeconomics only allows for dynamic disequilibrium processes, we suggest that Marx's contributions are, in principle, consistent with an under-employment equilibrium or state of rest of the post-Keynesian/Kaleckian type (Hein 2006), which we discuss below.

Michał Kalecki[5]

Michał Kalecki did not elaborate on the monetary and financial system of a capitalist economy in any systematic way (Sawyer 2001). But his "laconic" (Sawyer 2001: 487) writings on the subject are perfectly compatible with post-Keynesian endogenous money and credit theory, as several authors claim (Sawyer 1985: 88–107, 2001; Dymski 1996). In two early papers, Kalecki (1932, 1969: 26–33) supposes that an economic expansion requires the simultaneous expansion of the volume of credit as a precondition to allow for financing of increasing production and investment, independently of prior saving. The volume of credit is determined by credit demand, and the banking sector is capable of supplying the required amount of credit at a given rate of interest. Therefore, Kalecki follows the post-Keynesian causality in monetary theory—credit demand determines credit supply, generating deposits with the commercial banks and making credit money an endogenous variable, which is determined by credit creation and repayment. The rate of interest is a monetary category exogenous to the income generating process, which is mainly under the control of the monetary authorities and the banking sector.

Based on these monetary foundations and Kalecki's determination of functional income distribution by mark-up pricing on roughly constant unit variable costs up to full capacity output (Kalecki 1954: 11–41; Hein 2014: 183–192), we can outline Kalecki's theory of effective demand following the elaborations in Kalecki (1954: 45–52). Assuming a closed economy

[5] This section partly draws on Hein (2014: 192–199). See also Hein (2023a: Chapter 3).

without government activity, production takes place in three departments of the economy. Department 1 produces investment goods, Department 2 consumption goods for capitalists, and Department 3 consumption goods for workers. Each department is vertically integrated, and hence produces all required raw materials and intermediate products within the department. Total national income (Y) is divided between workers and capitalists. Workers receive wages (W) and capitalists receive profits (Π), including retained earnings, dividends, interest, and rent. Since the national product is equal to the sum of investment expenditures (I), consumption out of profits (C_Π), and consumption out of wages (C_W), it follows that:

$$(4) \qquad Y = W + \Pi = C_W + C_\Pi + I .$$

The respective price levels for consumption goods and investment goods, and the weighted average price level for aggregate output are determined by mark-up pricing in incompletely competitive goods markets. Marginal and average variable costs marked up by firms are constant up to full capacity output, and hence prices are constant as long as the sectors of the economy operate below full capacity utilization. Subtracting wages from both sides of Equation (4), we obtain:

$$(5) \qquad \Pi = C_\Pi + I - S_W .$$

Profits are thus equal to consumption out of profits plus investment minus saving out of wages ($S_W = W - C_W$). If workers do not save and rather spend their income entirely on consumption goods ($W = C_W$), Equations (4) and (5) become:

$$(6) \qquad \Pi = C_\Pi + I .$$

Profits are thus equal to consumption out of profits plus investment in capital stock. Kalecki (1954: 46) reads the causality of this equation from right to left:

> 'Now, it is clear that capitalists may decide to consume or to invest more in a given period than in the preceding one, but they cannot decide to earn more. It is, therefore, their investment and consumption decisions which determine profits, and not vice versa.'

It should not come as a surprise that Kalecki's results so far do not diverge from those of Marx, because Kalecki's considerations are based on Marx's schemes of reproduction in *Capital, Volume II* (Marx 1885: 396–527).

We can further elaborate on Kalecki's approach (1954: 45–52), assuming that capitalists' consumption expenditures contains an autonomous part ($C_{\Pi a}$) and a part which is proportional to profits. Therefore, we obtain the following simple function for consumption out of profits, with c_Π representing the constant marginal propensity to consume out of profits:

(7) $C_{\Pi} = C_{\Pi a} + c_{\Pi}\Pi, \qquad 0 \leq c_{\Pi} < 1.$

Inserting Equation (7) into Equation (6) yields the following determination of the equilibrium level of profits in the economy as a whole:

(8) $$\Pi = \frac{C_{\Pi a} + I}{1 - c_{\Pi}} = \frac{C_{\Pi a} + I}{s_{\Pi}}, \qquad 0 \leq c_{\Pi} < 1,\ 0 < s_{\Pi} \leq 1.$$

Profits are thus determined by capitalists' investment in capital stock, their autonomous consumption, and by the propensity to consume or the propensity to save out of profits ($s_{\Pi} = 1 - c_{\Pi}$). As Equation (8) shows, we arrive at a first Kaleckian multiplier, which contains the sum of profits realized by the firms as a multiple of their autonomous consumption and investment expenditures. Since income distribution and hence the share of profits in national income is mainly determined by the mark-up in firms' price setting, the change in profits takes place through a change of aggregate production, thus the degree of utilization of the capital stock, and in national income. Taking into account that the share of gross profits in national income is defined as $h = \Pi / Y$, Equation (8) becomes:

(9) $$Y = \frac{C_{\Pi a} + I}{(1 - c_{\Pi})h} = \frac{C_{\Pi a} + I}{s_{\Pi} h}, \qquad 0 \leq c_{\Pi} < 1,\ 0 < s_{\Pi} \leq 1.$$

Equation (9) displays a second Kaleckian multiplier, linking capitalists' autonomous consumption and investment expenditures with GDP or national income. The multiplier effect depends inversely on the propensity to save out of profits and the profit share in national income. Therefore, the Kaleckian approach contains both a paradox of saving—that is, an increase in the propensity to save lowers profits and national income, and a paradox of costs—that is, a higher profit share and a lower wage share are detrimental to national income without affecting the sum of profits.

John Maynard Keynes[6]

John Maynard Keynes's research program of a monetary theory of production is at the very root of his principle of effective demand. In particular, the drafts preceding the *General Theory* (Keynes 1979), but less so the *General Theory* itself (Keynes 1936), aim at providing a monetary theory of production, which Keynes (1933: 408–409, italics in the original) outlines as follows:

> 'In my opinion the main reason why the problem of crises is unsolved . . . is to be found in the lack of what might be termed a *monetary theory of production*. . . . The theory which I desiderate would deal . . . with an economy in which money plays a part of its own and affects motives and decisions and is, in short, one of the operative factors in

[6] This section partly draws on Hein (2008: 30–43). See also Hein (2023a: Chapter 3).

the situation, so that the course of events cannot be predicted, either in the long period or in the short, without a knowledge of the behaviour of money between the first state and the last.'

In the drafts of the *General Theory*, Keynes distinguishes a monetary economy from a barter economy, a real-wage or cooperative economy, and a neutral economy (Keynes 1979: 76–101). In the barter economy there cannot be any deviation of aggregate demand from aggregate supply, because in real exchange nobody can sell without buying simultaneously and hence demand is always equal to supply by definition. In the real-wage or cooperative economy, economic agents use money, but only as means of allocation of the social product. Therefore, there are no leakages from the circuit of income, and aggregate demand always equals aggregate supply. In the neutral economy, money may additionally be used as a store of value and there may be leakages from the circuit of income. However, these leakages are exactly offset by injections of the same amount through an endogenous economic process, and aggregate demand therefore corresponds to aggregate supply.[7] In a monetary or entrepreneur economy, however, there may be leakages from the circuit of income, which are not exactly compensated for by injections; aggregate demand may therefore deviate from aggregate supply, and the latter will have to adjust to the former. Say's law will therefore not hold, mainly for two reasons, and has to be replaced by the principle of effective demand:

First, income may be used by households for other purposes than direct spending on consumption goods. It is the specific nature of money, which may cause leakages from the circuit of income and create insufficient aggregate demand. Money can neither be fully substituted nor can it be reproduced by means of employing factors of production (Keynes 1979: 86).

Second, monetary injections may not automatically offset monetary leakages from the circuit of incomes, as they are independent of current income in a modern credit economy. In particular, firms' production and investment decisions are geared towards monetary profits, and firms' spending for investment purposes may therefore be insufficient to make aggregate demand equal to aggregate supply at the level of full employment (Keynes 1979: 81–82).

In Chapter 3of the *General Theory,* Keynes (1936: 23—34) explains the principle of effective demand by distinguishing the aggregate supply function [$Z = Z(N)$] and the aggregate demand function [$D = D(N)$]. The Z-function represents the aggregate supply price of output as a function of employment (N). The supply price per unit of output (p) consists of unit production costs plus unit normal profits, and aggregate supply is then given by the level of employment and labor productivity ($y = Y^r / N$), real output (Y^r) per unit of labor employed, in the following way:

(10) $\quad Z = Nyp$.

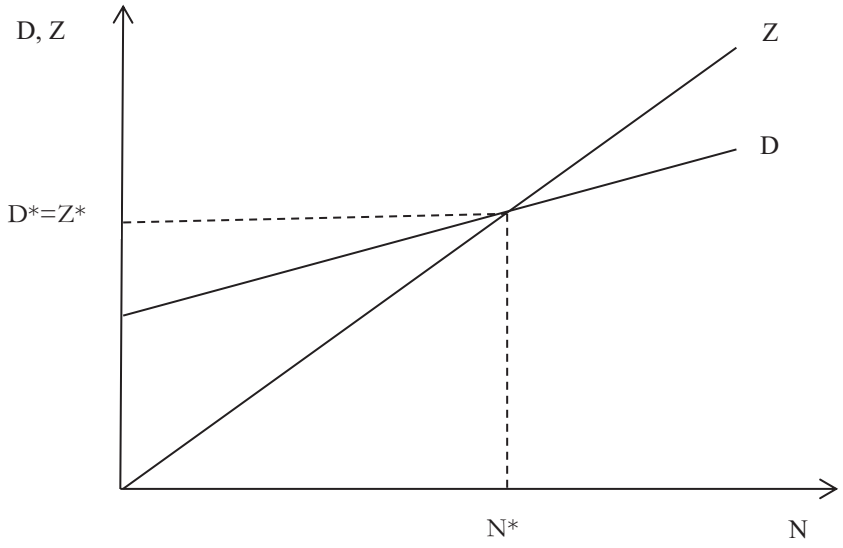
The Z-function will therefore be shaped by the productivity of labor, determined by the technology of production, and output prices, which are affected by the price-setting behavior of

[7] In a neoclassical model this endogenous mechanism is the real rate of interest in the capital market which is supposed to equilibrate real saving and real investment.

firms. With constant marginal and hence average labor productivity, constant nominal wage rates and thus constant unit labor costs, as well as constant mark-ups and therefore constant output prices, the Z-function will be linear, as in Figure 1.

The D-function presents the proceeds expected by the entrepreneurs, also as a function of employment. In an economy in which Say's law holds, the Z- and D-functions coincide, and the level of employment can then be determined by the neoclassical full employment labor market equilibrium based on utility-maximizing labor supply of households and profit-maximizing labor demand of firms (Keynes 1936: 26). In a monetary production economy, however, aggregate demand may diverge from aggregate supply, as explained above, and the D-function will thus be different from the Z-function, and this will give rise to the principle of effective demand.

Figure 1: Keynes's (1936) 'principle of effective demand'



Source: Author's presentation.

With Keynes (1936: 28—32) we can distinguish two components of the D-function: the first is affected by income—that is, income-dependent consumption (C); the second is independent of income—that is, autonomous or exogenous investment (I). For the first component, we can assume a constant marginal propensity to consume out of income (c) for the economy as a whole, which is positive but below unity. Total nominal income (Y) is given by employment, labor productivity, and the price level ($Y = Y^{r}p = Nyp$), and aggregate demand is hence:

$$(11) \qquad D = c(Nyp) + I, \qquad 0 < c < 1 .$$

The point of intersection (E) of the Z- and D-curves in Figure 1 is "the effective demand" (Keynes 1936: 25). Aggregate demand at this level of employment is exactly equal to aggregate

supply, and firms can sell the level of output associated with this level of employment at the expected or required prices. For this equilibrium level of employment (N^*) we have:

$$(12) \qquad Z(N^*) = D(N^*),$$

and hence:

$$(13) \qquad N^* = \frac{I}{(1-c)yp}.$$

An increase in investment (or any other autonomous demand component, like income-independent consumption, government expenditures, or exports) will raise the equilibrium level of employment. The same is true for an increase in the propensity to consume out of income—and we have the paradox of saving again.

As can easily be seen, our derivation of equilibrium employment in the D-Z-model can be translated into equilibrium income from the textbook income-expenditure model, because from Equation (13) we also get:

$$(14) \qquad Y^* = (Nyp)^* = \frac{I}{(1-c)},$$

with Y^* as equilibrium income and $1/(1-c)$ as the income multiplier for investment.

The volume of employment determined by the point of effective demand in Figure 1 and by Equation (13) may well deviate from full employment in the labor market. However, any response in the labor market, that is any change in nominal wages affecting output prices, real wages, and/or income distribution, will only have an impact on employment through aggregate demand and aggregate supply in the goods market. For a closer examination of the features and determinants of the goods market equilibrium, we will therefore outline a simple post-Keynesian short-run macroeconomic model in the following section.

3. A simple post-Keynesian/Kaleckian short run macroeconomic model based on the principle of effective demand

The post-Keynesian/Kaleckian short run macroeconomic model to be outlined in this section provides an endogenous determination of investment, income, and profits (Hein 2023: Chapter 4). It includes some monetary and financial variables—that is, a stock of debt and a monetary rate of interest, which is required for a model driven by effective demand, and it explicitly considers functional income distribution.

Let us assume, for the sake of simplicity, that in a closed economy without a government, a homogeneous output is produced with a fixed coefficient production technology, using labor and a non-depreciating capital stock as inputs. Workers receive wages, which they entirely

consume. Firms receive profits, which are partly retained in the firms, and hence saved, and partly distributed to rentiers in the form of interest payments. Rentiers consume part of their income and save the rest. Long-term finance of the capital stock consists of accumulated retained earnings of the firms, on the one hand, and external finance in terms of long-term credit granted by rentiers, on the other hand. The capital stock, as well as the stock of debt and the stock of accumulated retained earnings, are treated as constants in our short run macroeconomic model—for an analysis of the long run dynamics of these variables in distribution and growth models based on similar foundations, see for example Hein (2008: 100–123, 2014: 337–374).

Firms have some price setting power and they determine prices (p) in the goods market by applying a mark-up (m) to unit labor costs, the ratio of the nominal wage rate (w) and labor productivity (y), which are assumed to be constant up to full capacity output:

$$(15) \qquad p = \left[1 + m(i)\right]\frac{w}{y}, \qquad m \geq 0, \frac{\partial m}{\partial i} \geq 0 .$$

The mark-up is affected by the degree of competition in the goods market and the bargaining power of workers in the labor market, which each constrain the price setting power of the individual firm (Kalecki 1954: 11–27; Hein 2014: 183–192). Furthermore, apart from profits, the mark-up has to cover overhead costs and is thus potentially affected by changes in interest costs. The rate of interest in our model (i) is a monetary category, with the short-term rate determined by central bank policies and the long-term rate also affected by liquidity and risk assessments of banks and financial wealth holders (Lavoie 20: Chapter 4). The relevant rate of interest in our model is the long-term rate of interest corrected for inflation, which we will call the real rate of interest. The mark-up determines the profit share in national income:

$$(16) \qquad h = \frac{\Pi}{Y} = \frac{m(i)}{1 + m(i)} .$$

Saving consists of retained earnings of firms, the difference between total profits and rentiers' income (R), and saving out of rentiers' income (S_R):

$$(17) \qquad S = \Pi - R + S_R = hY - (1 - s_R)iB, \qquad 1 \geq s_R > 0 .$$

Rentiers' income is determined by the rate of interest and the stock of debt (B), and the propensity to save out of rentiers' income (s_R) is assumed to be positive and constant.

In a monetary production economy, investment of firms is independent of any prior saving in the economy, because firms have access to finance generated endogenously by the financial sector.[8] The investment function proposed here contains Keynesian and Kaleckian features.

[8] See Hein (2008: Chapter 10; 2023a: Chapter 3.5) for a more detailed discussion distinguishing initial finance and final finance, or finance and funding, based on a monetary circuit approach in the tradition of Graziani (1989), Seccareccia (1996), and others.

First, following Keynes (1936), we assume that investment decisions of firms are determined by long-term expectations and by animal spirits—that is, the "spontaneous urge to action rather than inaction" (Keynes 1936: 161), which are represented by a shift parameter I_a in Equation (18). Second, investment is affected by (expected) sales and hence income, represented by the accelerator term βY. And third, we have included a negative effect of the rate of interest and interest payments on investment, represented by $-\theta iB$. Here, we follow Kalecki's (1937) 'principle of increasing risk.' Higher interest payments have a negative effect on investment, because they reduce the firms' own means of finance, which are important because they affect creditworthiness and access to external means in imperfect financial markets We thus arrive at the following investment function:

$$(18) \qquad I = I_a + \beta Y - \theta iB, \qquad I_a, \beta, \theta \geq 0 .$$

Equation (19) presents the goods market equilibrium condition, the equality of investment and saving, and in Equation (20) we have the Keynesian stability condition:

$$(19) \qquad I = S ,$$

$$(20) \qquad \frac{\partial S}{\partial Y} > \frac{\partial I}{\partial Y} \Rightarrow h - \beta > 0 .$$

The goods market equilibrium values for income, investment (as well as saving) and profits are as follows:

$$(21) \qquad Y^* = \frac{I_a + (1 - s_R - \theta) iB}{h - \beta} ,$$

$$(22) \qquad I^* = S^* = \frac{I_a h + [\beta(1 - s_R) - \theta h] iB}{h - \beta} ,$$

$$(23) \qquad \Pi^* = \frac{h[I_a + (1 - s_R - \theta) iB]}{h - \beta} .$$

As summarized in Table 1, an increase in long-term expectations and animal spirits—or in autonomous deficit-financed expenditures by the government or an external sector in a more elaborated model—will have expansionary effects on all endogenous variables. An increase in the propensity to save out of rentiers' income reduces equilibrium income, investment, and profits; the paradox of saving is thus valid with respect to all three endogenous variables. A rise in the profit share will have negative effects on equilibrium income, investment, and profits. Aggregate demand in our model is thus wage-led and we have a 'paradox of costs' (Rowthorn

1981), whereby lowering the real wage rate and the wage share, and thus increasing the profit share is detrimental to aggregate profits. Finally, a change in the real interest rate has ambiguous effects on the equilibrium values of the model:

$$\text{(21a)} \quad \frac{\partial Y^*}{\partial i} = \frac{\left(1 - s_R - \theta\right) B - Y^* \frac{\partial h}{\partial i}}{h - \beta},$$

$$\text{(22a)} \quad \frac{\partial I^*}{\partial i} = \frac{\left[\beta\left(1 - s_R\right) - \theta h\right] B - \beta Y^* \frac{\partial h}{\partial i}}{h - \beta},$$

$$\text{(23c)} \quad \frac{\partial \Pi^*}{\partial i} = \frac{\left(1 - s_R - \theta\right) hB - \beta Y^* \frac{\partial h}{\partial i}}{h - \beta}.$$

If the mark-up is interest-inelastic and the propensity to consume out of rentiers' income exceeds the marginal effect of internal funds on investment ($1 - s_R - \theta > 0$), a higher interest rate will trigger higher equilibrium values for income and profits. A positive effect on equilibrium investment would also require a strong accelerator effect of income on investment decisions. This constellation is known as the 'puzzling case' (Lavoie 1995). Even when a change in the interest rate has only a mild impact on the mark-up and the profit share, which has dampening effects on equilibrium income, investment, and profits, the puzzling case effects may persist, in particular for equilibrium income and profits. With strong effects of a change in the interest rate on the profit share, the impact of a higher rate of interest on equilibrium income, investment, and profits may turn negative. And if the 'normal case' (Lavoie 1995) conditions prevail, which means that the propensity to consume out of rentiers' income falls short of the marginal effect of internal funds on investment ($1 - s_R - \theta < 0$), a higher interest rate will trigger lower equilibrium values for income, profits, and investment at any rate, irrespective of an interest-elastic or -inelastic profit share.

Table 1: Responses of equilibrium output/income (Y*), investment/saving (I*=S*) and profits (Π*) towards changes in exogenous variables and parameters

	Y*	I*=S*	Π*
I_a	+	+	+
s_R	–	–	–
h	–	–	–
i	+/–	+/–	+/–

These are the principal features of the income generation process in a short-run macroeconomic model based on the principle of effective demand and on distribution conflict in a monetary production economy. They should also be at the core of more elaborated heterodox macroeconomic models, furthermore including the inflation generating process, and featuring the discussion of macroeconomic policies, that is monetary, fiscal, and wage/incomes policies and their coordination, as shown for example in Hein (2023a: Chapters 4-6).

4. The long run principle of effective demand in heterodox distribution and growth models

As is well known, several Cambridge post-Keynesians were mainly concerned with extending Keynes' and Kalecki's principle of effective demand from the short period, with given productive capacities, to the long period applying it to distribution and growth issues (Harcourt 2006, Pasinetti 2001). Joan Robinson (1962: 82–83) famously summarizes the credo of post-Keynesian growth theories as follows:

> 'The Keynesian models (including our own) are designed to project into the long period the central thesis of the *General Theory*, that firms are free, within wide limits, to accumulate as they please, and that the rate of saving of the economy as a whole accommodates itself to the rate of investment that they decree.'

Basically, we can distinguish three approaches applying the principle of effective demand to long-run growth and distribution.[9] There are the first generation post-Keynesian distribution and growth models by Nicholas Kaldor (1955–56, 1957) and Joan Robinson (1956, 1962) relying on flexible prices in the goods market and full utilization of productive capacities given by the capital stock in the long run, or even also on full employment (Kaldor). In these models, in the long run, saving adjusts to investment through changes in income distribution and the profit share becomes endogenous with respect to capital accumulation. Alternatively, the second generation post-Keynesian models (Rowthorn 1981; Dutt 1984; Bhaduri & Marglin 1990; Kurz 1990), based on the works of Michał Kalecki (1954) and Josef Steindl (1952), contain cost-determined prices, which are inelastic with respect to demand, and variable rates of capacity utilization (and employment). Also in the long run, saving adjusts to investment through changes in output growth and utilization of growing productive capacities. Third, we have the Sraffian supermultiplier models, pioneered by Serrano (1995). In these models, the autonomous growth rate of a non-capacity creating component of aggregate demand, i.e. autonomous consumption, residential investment, exports or government expenditures, determines long-run growth (Freitas & Serrano 2015, 2017). Capacity utilization is assumed to be at the normal or the firms' target rate in the long run. Income distribution is given by distribution conflict, either in the Kaleckian way by mark-up pricing or in a more classical vein by workers defending a certain real wage rate. Therefore, neither functional income, like in the Kaldor-Robinson variant, nor capacity utilization, as in the Kalecki-Steindl variant, can assume the role adjusting saving to investment in the long run. This adjustment rather takes place through the autonomous expenditure-capital ratio, as will become clear below.

The principal differences between the three approaches can be explained in a simple closed private economy, one good modelling framework, following Hein (2023a: Chapter 7). By

[9] For a detailed presentation and discussion of post Keynesian distribution and growth models, see Blecker & Setterfield (2019), Hein (2014), and Lavoie (2022: Chapter 6).

definition, the rate of profit (r) is given by the profit share, the rate of capacity utilization (u), and the capital-potential output ratio (v):

$$(24) \qquad r = \frac{\Pi}{K} = \frac{\Pi}{Y}\frac{Y^r}{Y^p}\frac{Y^p}{K^r} = hu\,\frac{1}{v},$$

with K for the nominal capital stock, K^r for the real capital stock, Y for nominal output, Y^r for real output, and Y^p for potential output given by the capital stock.

With a fixed coefficient production technology (or with Harrod neutral technical change) the capital-potential output ratio is a constant:

$$(25) \qquad v = \bar{v}\,.$$

Assuming the propensity to save out of wages to be zero, saving only draws on profits and we obtain for the saving-capital ratio or the saving rate (σ):

$$(26) \qquad \sigma = \frac{S}{K} = s_\Pi \frac{\Pi}{K} = s_\Pi hu\,\frac{1}{v}, \qquad 1 \geq s_\Pi > 0\,.$$

The saving rate is thus determined by the propensity to save out of profits and the profit rate, or its components. With an independent investment function, which is different in each of the three variants, we need the equality of the accumulation rate (g=I/K) and the saving rate as long-run equilibrium condition:

$$(27) \qquad g = \sigma,$$

To this basic framework, we can now apply different closures to present the respective approaches.

The post-Keynesian Kaldor-Robinson model

In the post-Keynesian Kaldor-Robinson model, the utilization of productive capacities given by the capital stock is assumed to be at its normal or target rate in the long run (u_n):

$$(28) \qquad u = u_n,$$

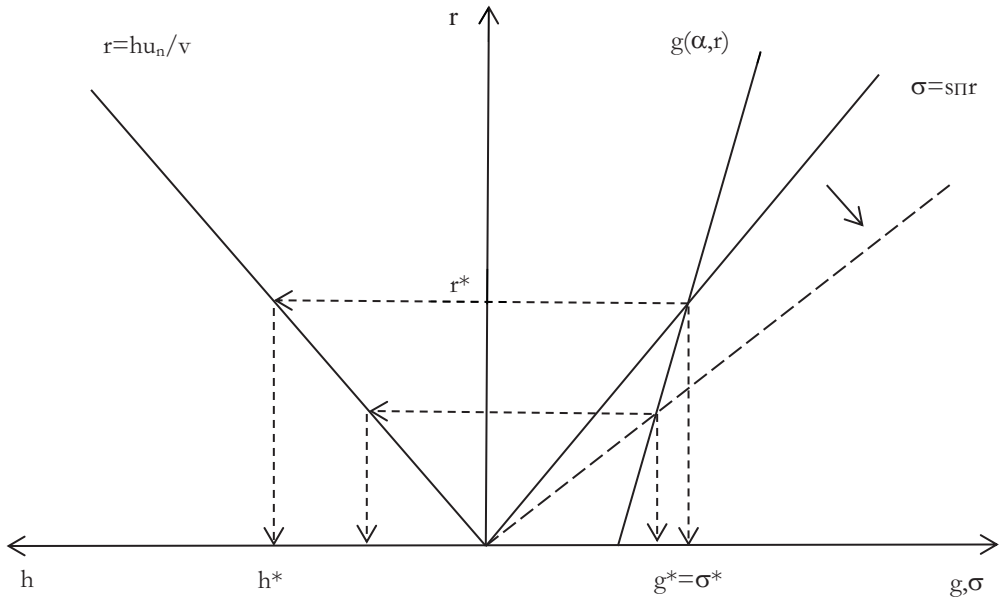
Investment decisions are determined by firms' 'animal spirits' (α) and by the (expected) rate of profit. Profits and thus the profit rate are considered to have a positive influence on investment decisions, because retained profits provide internal funds for investment, and

furthermore they alleviate the access of firms to external funds in incompletely competitive financial markets:

$$(29) \qquad g = g(\alpha, r), \qquad \frac{\partial g}{\partial \alpha} > 0, \frac{\partial g}{\partial r} > 0 .$$

With a constant and given normal rate of utilization and a given capital-potential output ratio, the profit share becomes the variable adjusting the saving rate to the accumulation rate in the long run, and hence the profit rate to its equilibrium value. Figure 2 displays the Kaldor-Robinson post-Keynesian demand-led growth model. The g-σ equilibrium includes the determination of the equilibrium accumulation rate, saving rate, profit rate, and hence profit share. An improvement in animal spirits, that is a shift of the g-function to the right, or a fall in the propensity to save out of profits, that is a counter clockwise rotation of the σ-function, as shown in Figure 2, will raise the equilibrium accumulation and growth rate, as well as the profit rate and the profit share. Therefore, we have a long run version of the paradox of saving in this model. However, the paradox of costs from the short run model of the previous section has disappeared. Functional income distribution is not a parameter but an endogenous variable, and the wage share is now inversely related to the equilibrium accumulation and growth rates. A higher equilibrium accumulation and growth rate generates and requires a higher profit share and thus a lower wage share in national income.

Figure 2: The Kaldorian/Robinsonian post-Keynesian distribution and growth model



Note: The rotation of the σ-curve shows the effect of a rise in the propensity to save out of profits.

Source: author's presentation

The post-Keynesian Kalecki-Steindl model

The closure of the Kalecki-Steindl post-Keynesian distribution and growth models, assumes that also in the long run, functional income distribution and hence the profit share are mainly determined by mark-up pricing of firms in the goods market:

$$h = h(m). \tag{30}$$

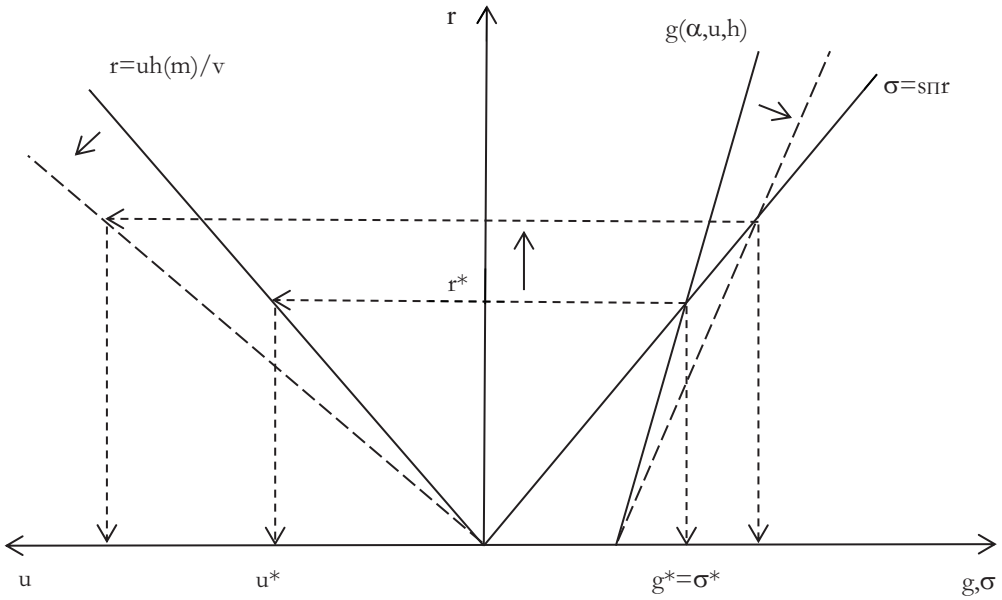
Investment decisions are determined by animal spirits and profit expectations, but now the components of the profit rate are explicitly considered:

$$g = g(\alpha, h, u, v), \qquad \frac{\partial g}{\partial \alpha} > 0, \frac{\partial g}{\partial h} \geq 0, \frac{\partial g}{\partial u} > 0, \frac{\partial g}{\partial v} = 0. \tag{31}$$

This means that the rate of capacity utilization becomes the endogenous variable adjusting saving to investment and the rate of profit to its equilibrium value in the long run.

Figure 3 shows the Kalecki-Steindl variant of the post-Keynesian demand-led growth model. Here the g-σ equilibrium includes the determination of the equilibrium saving rate, accumulation rate, profit rate, and rate of capacity utilization. Again, a positive shift in animal spirits and a reduction in the propensity to save out of profits are expansionary and increase the equilibrium accumulation and growth rate, as well as the profit rate and the rate of capacity utilization. On top of the paradox of saving, the Kalecki-Steind model also allows for the paradox of costs in long-run growth. A lower profit share, and thus a higher wage share, cause a counter clockwise rotation of the r-function in the left part of Figure 6.3, which will generate a higher equilibrium rate of capacity utilization associated with the g-σ equilibrium in the right part. The neo-Kaleckian variant, proposed by Rowthorn (1981) and Dutt (1984) in particular, includes a strong effect of the rate of capacity utilization and neglects a direct effect of the profit share on investment decisions. Therefore, any fall in the profit share will rotate the g-function clockwise, as shown in Figure 3, because each profit rate will then be associated with a higher rate of capacity utilization. As an overall result of a lower profit share, we get a higher rate of accumulation and growth, a higher rate of profit, and a higher rate of capacity utilization in the new equilibrium. The paradox of costs is fully valid, and demand (capacity utilization) and growth (capital accumulation) are unambiguously wage-led. In the post-Kaleckian model, suggested by Bhaduri & Marglin (1990) and Kurz (1990), however, these results may change, because the profit share has a positive effect in the investment function. This will dampen the redistribution-induced rotation of the g-function and may even reverse it. Therefore, different regimes may emerge, depending on the relative importance of capacity utilization and profitability in the investment function, and on the propensity to save out of profits: wage-led demand and wage-led growth; wage-led demand and profit-led growth; and profit-led demand and profit-led growth (Hein 2014: 258–267, 2023a: Chapter 7.8).

Figure 3: The Kaleckian/Steindlian post-Keynesian distribution and growth model



Note: The rotations of the r-curve and the σ-curve show the effect of a fall in the profit share.
Source: author's presentation

The Sraffian Supermultiplier growth model

According to the Sraffian Supermultiplier growth approach, the model economy operates at the normal or target rate of utilization in the long run (equation 28) and the profit share is given by mark-up pricing (equation 30) or by workers defending a certain real wage rate. Therefore, the rate of profit is already fully determined and does not assume the role of a variable adjusting saving and investment in the long run. Nonetheless, investment is independent of saving also in this long run. Firms' rate of capital accumulation follows the expected trend rate of growth of output and sales, given by the growth rate of autonomous demand, for example the growth rate of autonomous consumption (γ), as in Lavoie (2016). Firms slow down (accelerate) the rate of capital accumulation whenever the actual rate of capacity utilization falls short of (exceeds) the normal or the target rate of utilization, and we obtain the following investment function:

$$(32) \qquad g = g\left[\gamma, \left(u - u_n\right)\right], \qquad \frac{\partial g}{\partial \gamma} = 1, \frac{\partial g}{\partial \left(u - u_n\right)} > 0 .$$

In order to allow for a long-run adjustment of saving and investment with a given normal rate of profit ($r_n = h(m)u_n/\bar{v}$), autonomous consumption growth is included in the saving function, and the saving rate from equation (28) is modified by including an autonomous consumption-capital rate (c_a):

(33) $\sigma = s_{\Pi} r - c_a, \qquad 0 < s_{\Pi} \leq 1.$

The autonomous consumption-capital rate is given as:

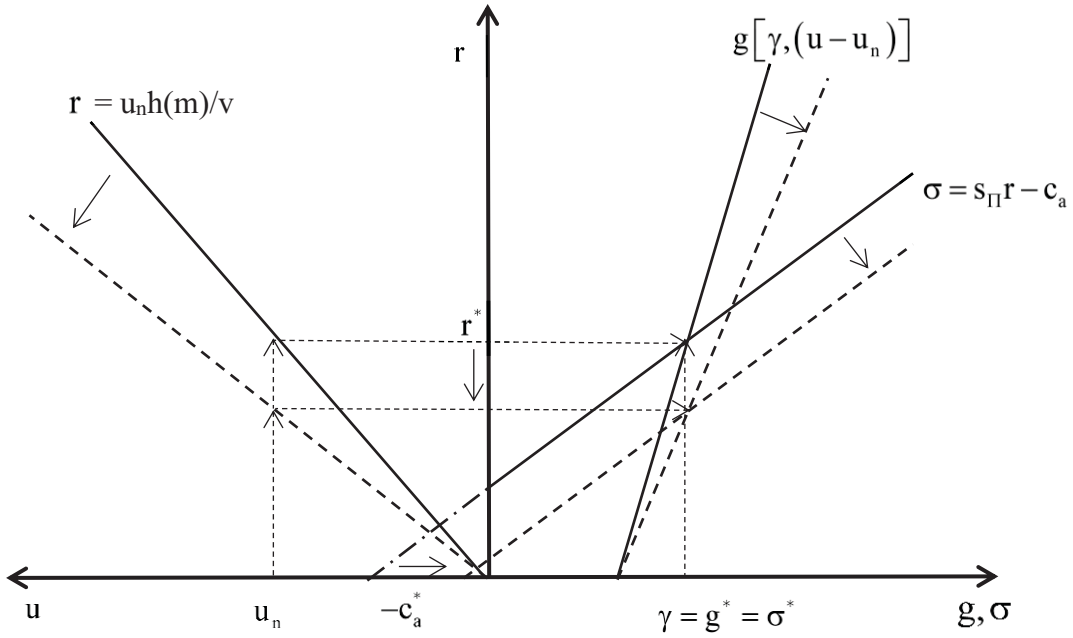
(34) $c_a = \frac{pC_{a0}e^{\gamma t}}{pK};$

with C_{a0} as autonomous consumption in period $t = 0$ and γ as the constant growth rate of autonomous consumption. The autonomous consumption-capital rate will hence rise (fall) whenever the growth rate of autonomous consumption exceeds (falls short of) the rate of capital accumulation in the disequilibrium process:

(35) $\hat{c}_a > 0, \text{ if : } \gamma > g.$

Figure 4 shows the Sraffian Supermultiplier growth model. The economy operates at the normal or target rate of utilization in the long-run equilibrium, which together with the mark-up and the given capital-potential output ratio determines the normal rate of profit. The long-run equilibrium rates of capital accumulation and growth are given by the growth rate of autonomous consumption. The autonomous consumption-capital rate is the adjusting variable, which shifts the saving rate function towards the long-run equilibrium. This is shown here for the case of a falling profit share. For any profit rate, we have a higher rate of utilization. This stimulates the rate of capital accumulation and leads to a short-run equilibrium rate of utilization exceeding the normal rate and a rate of capital accumulation exceeding the growth rate of autonomous consumption. The latter generates a fall in the autonomous consumption-capital rate, which shifts the saving rate function down, until the economy is back in the long-run equilibrium at the autonomous growth rate and the normal rate of capacity utilization. In the Sraffian Supermultiplier model, the paradox of costs and wage-led growth, as well as the paradox of saving, do not apply to the long-run equilibrium growth rate any more. However, they are still valid for the disequilibrium process towards the long-run equilibrium, and hence for the long-run growth path.

Figure 4: The Sraffian Supermultiplier growth model



Note: The rotation of r- and g-curves and the shift in the σ-curve show the effect of a fall in the profit share

Source: Author's presentation

5. Conclusions

This contributions reviewed the principle of effective demand from different angles. The second section demonstrated that the principle of effective demand can be found in, and is based on, the works of Karl Marx, Michał Kalecki, and John Maynard Keynes. Based on these works, it can be argued that viewing modern capitalist economies as monetary production economies necessarily implies the validity and importance of the principle of effective demand. The third section outlined a simple short-run macroeconomic model based on the principle of effective demand. The model provides an endogenous determination of investment, income, and profits; it explicitly includes some monetary and financial variables, that is, a stock of debt and a monetary rate of interest, and it considers functional income distribution. Within the context of this model, we could derive the paradox of saving and the paradox of costs. The fourth section considered the long-run importance of the principle of effective demand in heterodox distribution and growth models. We distinguished three main strands of post-Keynesian demand-driven growth models, the Kaldor-Robinson strand, the Kalecki-Steindl variant, and the Sraffian Supermultiplier model. Whereas the Kalecki-Steindl variant is able to retain both the paradox of saving and, depending on the precise accumulation function, the paradox of costs, the Kaldor-Robinson strand only preserves the paradox of saving in the long run, whereas the paradox of costs disappears. The Sraffian Supermultiplier model maintains the paradoxes of saving and costs only for the growth path but not for the long-run equilibrium growth rate.

Finally, we can point out that the determinations of capital accumulation, growth, and the rate of profit by the principle of effective demand (and distribution conflict in some models), have provided the foundations for more elaborated demand-driven distribution and growth models in heterodox macroeconomics. Several areas deserve mention:[10] the inclusion of an external sector generating export-led growth models (Kaldor 1970); the consideration of a balance-of-payments constraint to growth (Thirlwall 1979; Blecker 2013); the endogenous determination of technological progress and productivity growth (Kaldor 1957; Rowthorn 1981); the explicit integration and discussion of money, interest, and credit (Dutt 1995; Lavoie 1995; Hein 2008); elaborations on finance-dominated capitalism in the context of demand-led growth models (Hein 2012); and the recent post-Keynesian research on demand and growth regimes, which contains several links with the 'growth model' research in comparative and international political economy (Hein 2023b, Kohler & Stockhammer 2022).

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[10] More extensive literature reviews and model discussions on each of these areas can be found in Blecker & Setterfield (2019), Hein (2014) and Lavoie (2022: Chapter 6).

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