

Effects of factor shares and wage inequality on capacity utilization, capital accumulation and the trade balance – a simple post-Kaleckian model with regime endogeneity

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Abstract

I present a simple post-Kaleckian open-economy model of distribution and growth that demonstrates in a simple way how the macroeconomic effects of simultaneous changes in factor shares and income inequality can either reinforce or dampen each other, depending especially on implicitly assumed consumption and financing behaviour. Furthermore, the paper discusses an endogeneity effect that is usually ignored by the literature even though it is present in basic, as well as in more complex Kaleckian models: the wage-ledness or profit-ledness of Kaleckian models is endogenous to changes in the profit share due to a profit share dependent multiplier. This endogeneity channel is extended when wage inequality is introduced to Kaleckian models.

Key words: Personal and functional income distribution, Kaleckian open economy model

JEL codes: D31, D33, E11, E12, F41

1 Introduction

Macroeconomic models in the tradition of Rowthorn (1981), Dutt (1984, 1987), Bhaduri/Marglin (1990) and Kurz (1990) have predominantly focused on the functional distribution of income in their analyses of macroeconomic effects of distributional changes and stressed the partially depressive consumption effect of a falling wage share. Yet, the observation of falling aggregate household saving rates and increasing growth contributions from aggregate consumption despite a stagnating or even falling wage share and strongly increasing personal income inequality in a number of countries in the decades before the Great Recession, especially in the US, has motivated the inclusion of personal income distribution combined with some form of Veblenian emulation effects in a number of more recent post-Keynesian/Kaleckian models (Belabedet al. 2017, Detzer 2016, Kapeller and Schütz 2014, 2015, Kapeller et al. 2017, Setterfield and Kim 2016, Zezza 2008).¹ However, while the inclusion of emulation effects is especially important in the context of debt-led private consumption growth regimes, in which the emulation effects induced by personal income inequality overcompensate for potentially negative effects of a falling wage share, it should not be overemphasized as the general mode of aggregate consumption behaviour. Increasing inequality can also reinforce the negative effects of falling wage shares, if aggregate consumption is dominated by absolute income hypothesis type of behaviour due to relatively restrictive consumption and financial norms.

Another relatively recent strand of the literature on personal income distribution in Kaleckian models is arguing that the inclusion of personal income (and sometimes also wealth) inequality combined with a traditional absolute income hypothesis type of consumption behaviour into Kaleckian distribution and growth models makes the regime of capacity utilization and capital accumulation with respect to functional income distribution (i.e. the famous wage-led vs. profit-led distinction) endogenous to changes in personal income distribution (Carvalho/Rezai 2016, Palley 2015, 2017). What is usually not discussed

¹ Many of these models, use wage inequality as a proxy for personal income distribution.

in the literature, is that the size of the macroeconomic effects of redistribution is not stable in basic Kaleckian models either (i.e. in models without personal income distribution).

In this paper, I want to transfer the basic insights of both strands in the literature to a very basic Kaleckian open economy model to widen its theoretical flexibility and to make these insights more accessible and bring them closer to the simple models discussed in recent post-Keynesian textbooks (Hein 2014, Lavoie 2014). Of course, such an endeavour will necessarily leave aside many very important complications which have been included in the more complex models, nevertheless, it can be valuable, since it fills a hole that has been left by the exclusion of personal income distribution and interdependent consumption behaviour from basic Kaleckian models. This analytical lack was especially unfortunate, because personal income inequality has been identified as one root cause of the global financial and economic crisis (see van Treeck and Storn 2012; van Treeck 2014 for extensive surveys of the literature).

Therefore, a number of amendments should be included into basic models, especially in order to be able to illustrate the developments in the decades preceding the Great Recession: First, basic Kaleckian models should include personal income distribution, in order to allow for distinct effects of redistribution at the personal and the functional level, and, second, the relationship between personal income distribution and aggregate consumption should be open to traditional Keynesian absolute income hypothesis types of behaviour, but also to Veblenian emulation effects, at least in the short- to medium run, thereby stressing the importance of consumption and financing norms in determining these relationships. In this paper, asking the question of macroeconomic effects of a simultaneous increase in the profit share and wage inequality, I am trying to present a simple Kaleckian open economy model that features these points.

The paper is structured as follows: Section 2 presents the model, section 3 discusses the effects of a simultaneous rise in the profit share and wage inequality, section 4 discusses the basic endogeneity channel that is present in basic Kaleckian models and how it is maintained in the open economy model presented here, section 5 concludes.

2 A basic post-Kaleckian model with wage inequality

I model an open economy without economic activity of the state which produces a homogeneous real output that can be used for investment or consumption.² Output is produced assuming a constant capital-potential output ratio ($v = K/Y^P$) and constant labour productivity (Y/L), with labour supply not constraining output. Domestic production competes in international markets and depends on imported inputs. Furthermore, there is no overhead labour and the capital stock is not depreciating.

Firms set domestic prices by applying a mark-up on unit direct costs, which include unit direct labour costs and unit costs for imported raw material and semi-finished product inputs. This implies that the profit share is determined by the mark-up (m) and by the ratio between unit imported material costs and unit labour costs (z). The mark-up is mainly determined by the importance of price competition in the goods market and by the bargaining power of firms and workers in wage negotiations.

$$(1) \quad h = h(m, z)$$

The nominal exchange rate (e),³ foreign (p_f) and domestic prices (p) determine the real exchange rate ($e^r = ep_f/p$). Since a change in the profit share will be associated with a change of the domestic price level, we will have a relationship between international competitiveness and functional income distribution. The effect of an increasing profit share on the real exchange rate will depend on the source of the distributional change. *Ceteris paribus*, the effect will be positive if the profit share increases due to a falling nominal wage rate (w) or due to a nominal depreciation of the domestic currency. And it will be negative if the rise in the profit share is caused by a higher mark-up (Hein 2014, pp. 286–288). Therefore, we have:

$$(2) \quad e^r = e^r(h, \dots), \frac{\partial e^r(h)}{\partial h} > 0, \text{ if } dz > 0 \text{ and } dm = 0, \frac{\partial e^r(h)}{\partial h} < 0, \text{ if } dz = 0 \text{ and } dm > 0$$

² The model provided in this section is based on the basic (post-)Kaleckian open economy model (see for example Bhaduri/Marglin 1990, Hein 2014 chap. 7, Hein/Vogel 2008, Lavoie 2014, chap. 6).

³ An increase of e implies a nominal depreciation.

Profits and wages are partly saved and partly consumed, assuming the propensity to save out of profits (s_π) is higher than the propensity to save out of wages (s_W). The largest part of the capital stock is owned by entrepreneurs and rentiers, but workers might also own a part of the capital stock and therefore earn a part of profit income too. Personal income distribution is approximated by wage inequality (Γ) and enters the model by its effect on the propensity to save out of wages as in Prante (2017) and similar to Carvalho/Rezai (2016):

$$(3) \quad s_W = s_{W0} + \eta\Gamma, \quad 0 \leq s_{W0} \leq 1$$

where s_{W0} is the propensity to save out of wages if there is no effect of wage inequality and η is the social norms parameter, which is determined by consumption and financing norms in the model economy.

The social norms parameter η represents the responsiveness of the propensity to save from wages to increasing wage inequality. The sign and absolute value of η are determined by the specific consumption and financial norms prevailing in the economy. These norms determine the willingness of households to lower or increase their savings in the face of a relative income decline and the ability to go into debt for consumption purposes. Factors influencing the willingness are related to different consumption theories which stress various influences on consumption decisions. These encompass socially interdependent consumption norms and habit persistence (Duesenberry 1949, Frank et al. 2014, Veblen 1899), interdependent financial norms of households (Thaler and Shefrin 1981, Cynamon and Fazzari 2008) and absolute income effects (Keynes 1936). The ability to go into debt to increase or maintain consumption expenditures is determined by the financial norms of the credit system and can be related to financialisation, deregulation, originate and distribute business models of banks, new financial instruments, etc. (Barba and Pivetti 2009; Cynamon and Fazzari 2008). Both, the consumption and the financial norms will be influenced by the institutional setting of an economy (e.g. specificities of the labour market, the educational system and the financial market) which determine the importance of positional goods and the availability of private consumption credit (Belabed et al. 2017, van Treeck and Sturn 2012).

In a situation in which η is negative the social norms are such that, on the aggregate, increasing wage inequality encourages working households as a whole to increase their propensity to consume from total wage income. That means the consumption norms must be such that a sufficiently large number of working households who lost wage income relative to others are willing and able to maintain or even increase their relative consumption expenditures, and, thus, cause a fall of the aggregate propensity to save from wages. While we are not modelling a financial system explicitly here, this can be associated with increasing debt of these households if the financial norms of the economy allow for it. A negative η is equivalent to the assumption that any negative absolute income effects on consumption, stemming from increasing wage inequality, are overcompensated by relative income effects or effects of habit persistence (including subsistence consumption) at the aggregate level.

In contrast, a positive η implies that the consumption and financial norms of the model economy are such that in the case of increasing wage inequality households who lost relative income are not willing and/or not able to maintain or increase their consumption expenditures to such an extent that it overcompensates the savings of households who gained relative income. Hence, the aggregate propensity to save from wages increases. In this case, any positive relative income or habit effects on consumption are overcompensated by negative absolute income effects. Of course, we could also think of a situation in which relative and absolute income effects exactly compensate each other at the aggregate ($\eta = 0$), i.e. there is no aggregate effect of wage inequality on the propensity to save from wages.

With (3) the saving rate (σ) becomes:

$$(4) \quad \sigma = \frac{S_{\Pi} + S_W}{pK} = \frac{s_{\Pi}\Pi + s_W(Y - \Pi)}{pK} = [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{u}{v}, \quad s_{W0} + \eta\Gamma < s_{\pi} \leq 1$$

where S_{Π} , S_W , p , K , Π , Y , u , v denote aggregate saving out of profits, aggregate saving out of wages, the general price level, the capital stock, profit income, real output, capacity utilization ($u = Y/Y^p$) and the capital-potential output ratio ($v = K/Y^p$), respectively.

I assume a post-Kaleckian investment function in which the accumulation rate (g) is determined by capacity utilization (u), the profit share and exogenously given animal spirits (α):

$$(5) \quad g = \alpha + \beta u + \tau h, \quad \beta, \tau > 0$$

The net export rate depends on international competitiveness (represented by e^r) and domestic as well as foreign economic activity (u and u^f , respectively). I assume that the Marshall-Lerner condition holds, and therefore, that a real depreciation, i.e. an increase in the real exchange rate will result in a higher net export rate through its depressing effect on imports and its positive effect on exports. An increase in domestic demand, *ceteris paribus*, will decrease net exports, while an increase in foreign demand, *ceteris paribus*, will increase net exports. Foreign economic activity is exogenously given.

$$(6) \quad b = \frac{NX}{pK} = \psi e^r(h) - \phi u + \zeta u_f, \quad \psi, \phi, \zeta > 0$$

The equilibrium condition for the goods market is that the saving rate equals the sum of the investment rate and the net export rate.

$$(7) \quad \sigma = g + b$$

This gives us the equilibrium values for our slightly extended post-Kaleckian open economy model.

$$(8) \quad u^* = \frac{\alpha + \tau h + \psi e^r(h) + \zeta u_f}{[s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi}$$

$$(9) \quad g^* = \frac{(\alpha + \tau h) \{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} + \phi \} + \beta [\psi e^r(h) + \zeta u_f]}{\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \}}$$

$$(10) \quad b^* = \frac{[\psi e^r(h) + \zeta u_f] \{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta \} - \phi(\alpha + \tau h)}{\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \}}$$

A stable goods market equilibrium will be achieved if the response of the saving rate to a change in capacity utilization is stronger than the response of the accumulation rate and the net export rate taken together. Since the responsiveness of the saving rate to a change in capacity utilization depends on wage inequality, a change of the wage inequality variable therefore has the potential to invalidate the stability condition (11), which would imply that the model produces cumulatively unstable processes. For the results discussed below we assume however, that this will not be the case, i.e.:

$$(11) \frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} - \frac{\partial b}{\partial u} > 0 \Rightarrow \left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\} > 0$$

3 Simultaneous changes in functional income distribution and wage inequality

Since we have two distributional variables in our model, we can not only calculate the partial effects with respect to a change in functional income distribution, but also with respect to wage inequality. The partial effects of an increase in the profit share on the rate of capacity utilization, accumulation and net exports are similar to the standard post-Kaleckian open economy model. They allow for either wage-led or profit-led results for each of the endogenous variables depending on the specific parameter constellation and the source of the distributional change.

$$(12) \frac{\partial u^*}{\partial h} = \frac{\tau \cdot (s_{\pi} - s_{W0} - \eta\Gamma) \frac{u^*}{v} + \psi \frac{\partial e^r(h)}{\partial h}}{\left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\}}$$

$$(13) \frac{\partial g^*}{\partial h} = \frac{\tau \left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} + \phi \right\} - \beta (s_{\pi} - s_{W0} - \eta\Gamma) \frac{u^*}{v} + \beta \psi \frac{\partial e^r(h)}{\partial h}}{\left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\}}$$

$$(14) \frac{\partial b^*}{\partial h} = \frac{\psi \frac{\partial e^r(h)}{\partial h} \left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta \right\} + \phi \left[(s_{\pi} - s_{W0} - \eta\Gamma) \frac{u^*}{v} - \tau \right]}{\left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\}}$$

The sign of the partial effects of a change in wage inequality on the endogenous variables depends solely on the sign of η , as can be seen in equations (15) to (17). For the normal case that η is positive, an increase of wage inequality will have a contractionary effect on capacity utilization and investment and a positive effect on the net export rate (18). If η is negative, implying that relative income effects play an important role, utilization and accumulation will accelerate when wage inequality increases and the net export rate will decline (19).

$$(15) \frac{\partial u^*}{\partial \Gamma} = \frac{-(\alpha + \tau h + \psi e^r(h) + \zeta u_f)(1-h) \frac{\eta}{v}}{\left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\}^2}$$

$$(16) \frac{\partial g^*}{\partial \Gamma} = \frac{-\beta (\alpha + \tau h + \psi e^r(h) + \zeta u_f)(1-h) \frac{\eta}{v}}{\left\{ [s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h] \frac{1}{v} - \beta + \phi \right\}^2}$$

$$(17) \quad \frac{\partial b^*}{\partial \Gamma} = \frac{\phi(\alpha + \tau h + \psi e^r(h) + \zeta u_f)(1-h)\frac{\eta}{v}}{\{[s_{W0} + \eta\Gamma + (s_{\pi} s_{W0} - \eta\Gamma)h]\frac{1}{v} - \beta + \phi\}^2}$$

$$(18) \quad \frac{\partial u^*}{\partial \Gamma}, \frac{\partial g^*}{\partial \Gamma} < 0 \text{ and } \frac{\partial b^*}{\partial \Gamma} > 0, \text{ if } \eta > 0$$

$$(19) \quad \frac{\partial u^*}{\partial \Gamma}, \frac{\partial g^*}{\partial \Gamma} > 0 \text{ and } \frac{\partial b^*}{\partial \Gamma} < 0, \text{ if } \eta < 0$$

What happens now, if there is a simultaneous increase of the profit share and of wage inequality? The potential regimes for such a simultaneous distributional shift under different parameter constellations are summarised in Table 1. The additional effect of wage inequality can either reinforce or dampen the effect of the profit share. This will obviously depend on the signs and the relative strength of the respective partial effects. For the case that η is positive, i.e. rising wage inequality will have negative effects on demand, growth and net exports, and if utilization and accumulation are wage-led, and an increase in the profit share is beneficial to net exports, this will mean that the macroeconomic effects of redistribution in both income dimensions reinforce each other. Capacity utilization (u) and capital accumulation (g) could be called accelerated wage-led, and the trade balance (b) could be called accelerated profit-led, compared to the standard wage-led (u, g) and profit-led (b) results in which only functional distribution plays a role (i.e. the case of η being zero). Instead, if utilization and accumulation are profit-led and a rising profit share has a negative effect on net exports, while η is still positive, the analysis becomes more complicated. In this case, a number of scenarios are possible, depending on the relative strength of the partial effects with respect to both distributional dimensions, because they are working in opposite directions. If the expansionary effect of the increasing profit share on investment and utilization overcompensates the contractionary effect of increasing wage inequality, the overall regime for utilization and investment can be called dampened profit-led, compared to the standard profit-led result, where wage inequality has no effect. If it is the other way around and the resulting overall effect on utilization and investment is contractionary, we could speak of a seemingly wage-led result. For net exports, if the contractionary effect of the profit share exceeds the expansionary effect of wage inequality, the regime could be characterised as dampened wage-led, and for the converse case it could be called seemingly

profit-led.⁴ Obviously, if the effects of the profit share and wage inequality on utilization, investment and net exports exactly compensate each other, we could speak of seemingly no effect of the distributional change.

For the cases in which η is negative and utilization and investment are wage-led, we have either a contractionary dampened wage-led scenario or an expansionary seemingly profit-led scenario or seemingly no effect, since the effects of the profit share and inequality are opposed to each other. Effects of the simultaneous distributional shift also dampen each other when η is negative and net exports are profit-led: we observe an expansionary dampened profit-led or a contractionary seemingly wage-led scenario, or we fail to observe an overall effect. In contrast, if utilization and investment are profit-led and net exports are wage-led, the effects of the profit share and inequality reinforce each other, leading to an accelerated profit-led outcome for utilization and investment and overall accelerated wage-led result for net exports. The variety of potential outcomes contrasts with the results of the basic post-Kaleckian model (i.e. $\eta = 0$) in which we only have the standard wage-led/profit-led distinction, since there are no effects of wage inequality.

Table 1 highlights the flexibility of theoretical outcomes of the post-Kaleckian open economy model that is gained by the simple variation that was introduced with (3). The macroeconomic effects of redistribution in the functional and in the personal dimension can either reinforce or dampen each other. It must be noted, however, that the above model is of very limited use for long-run analyses for the case that η is negative, since it does not consider any debt dynamics. At some point, the credit system might question the creditworthiness of highly indebted households, which could lead to decreasing credit supply and/or rising financial fragility and finally a financial crisis, and thus an end of the expansionary effect of increasing wage inequality and indeed might reverse it. Also, the increasing cost of interest and principal payments will be a burden on households. Such contradictory effects of household indebtedness have been modelled in various ways by

⁴ This case resembles the consumption-driven profit-led regime elaborated in Kapeller and Schütz (2015).

several authors (see for example Dutt 2005, 2006; Hein 2012; Belabed et al. 2017; Kapeller and Schütz 2014, 2015; Detzer 2016; Setterfield and Kim 2016).

Table 1: Potential scenarios for a simultaneous increase of wage inequality and the profit share under different parameter constellations

	$\eta = 0$ i.e.: $\frac{\partial u^*}{\partial \Gamma}, \frac{\partial g^*}{\partial \Gamma} = 0$ and $\frac{\partial b^*}{\partial \Gamma} = 0$	$\eta > 0$ i.e.: $\frac{\partial u^*}{\partial \Gamma}, \frac{\partial g^*}{\partial \Gamma} < 0$ and $\frac{\partial b^*}{\partial \Gamma} > 0$	$\eta < 0$ i.e.: $\frac{\partial u^*}{\partial \Gamma}, \frac{\partial g^*}{\partial \Gamma} > 0$ and $\frac{\partial b^*}{\partial \Gamma} < 0$
$\frac{\partial u^*}{\partial h} < 0,$ $\frac{\partial g^*}{\partial h} < 0$	Contractionary: wage-led	Contractionary: accelerated wage-led	Contractionary: dampened wage-led Seemingly no effect of distributional change Expansionary: seemingly profit-led
$\frac{\partial b^*}{\partial h} > 0$	Expansionary: profit-led	Expansionary: accelerated profit-led	Expansionary: dampened profit-led Seemingly no effect of distributional change Contractionary: seemingly wage-led
$\frac{\partial u^*}{\partial h} > 0,$ $\frac{\partial g^*}{\partial h} > 0$	Expansionary: profit-led	Expansionary: dampened profit-led Seemingly no effect of distributional change Contractionary: seemingly wage-led	Expansionary: accelerated profit-led
$\frac{\partial b^*}{\partial h} < 0$	Contractionary: wage-led	Contractionary: dampened wage-led Seemingly no effect of distributional change Expansionary: seemingly profit-led	Contractionary: accelerated wage-led

Notes: Green (red) indicates overall expansionary (contractionary) effects on the respective variable.

4 Endogeneity of wage-led/profit-led regimes with respect to income distribution

There have been some recent attempts to show that the regime character (wage-led vs. profit-led) of an economy can depend on distributional variables. For example, by including a profit share-sensitive propensity to invest out of profits and a profit-share sensitive propensity to save out of profits into a post-Kaleckian growth model Nikiforos (2016) shows that an economy will experience continuous shifts from wage-led to profit-led regimes over time. In a different manner, Carvalho/Rezai (2016) and Palley (2015, 2017) show that personal

income distribution has an effect on the regime character in Kaleckian models, which can also lead to endogenous regime shifts.

While these endogeneity issues of wage-led and profit-led regimes either with respect to the profit share (Nikiforos 2016) or with respect to personal income and wealth distribution (Carvalho/Rezai 2016, Palley 2015, 2017) are important, there is one basic endogeneity channel that has (to my knowledge) been overlooked in the literature. Interestingly, this endogeneity channel is even present in the most basic Kaleckian models as I will briefly demonstrate here.

4.1 The distribution dependent multiplier in a basic neo-Kaleckian model

Consider a simple neo-Kaleckian model with a classical saving hypothesis (i.e. no saving out of wage income). The saving and investment rate of such a model are given by

$$(20) \quad \sigma = s_{\pi}r = s_{\pi}h\frac{u}{v}, 0 \leq s_{\pi} \leq 1$$

$$(21) \quad g = \alpha + \beta u, \alpha, \beta > 0$$

Given that the goods market equilibrium condition and the Keynesian stability condition hold, the following equilibrium values of the rate of capacity utilization and the rate of investment emerge:

$$(22) \quad u^* = \frac{\alpha}{s_{\pi}h\frac{u}{v}\beta}$$

$$(23) \quad g^* = \frac{\alpha s_{\pi}\frac{h}{v}}{s_{\pi}h\frac{u}{v}\beta}$$

The first order partial derivatives of these equilibrium values with respect to the profit share reveal the uniquely wage-led nature of the capacity utilization and investment regime in a neo-Kaleckian model without saving out of wages:

$$(24) \quad \frac{\partial u^*}{\partial h} = \frac{-\alpha\frac{s_{\pi}}{v}}{\left(s_{\pi}h\frac{u}{v}\beta\right)^2} < 0$$

$$(25) \quad \frac{\partial g^*}{\partial h} = \frac{-\alpha\beta\frac{s_{\pi}}{v}}{\left(s_{\pi}h\frac{u}{v}\beta\right)^2} < 0$$

This is where the analysis of basic Kaleckian models often stops. It is usually not investigated how the macroeconomic effects of redistribution change with a change of the profit share even though the profit share is a determinant of the strength of these effects as can easily be seen from equation (24) and (25). Calculating the second order partial derivatives reveals that the strength of the negative wage-led effects of an increase in the profit share, sometimes referred to as “wage-ledness” (Nikiforos 2016), is weakening as the profit share rises because the second order partial derivatives of capacity utilization and investment are both positive:

$$(26) \quad \frac{\partial^2 u^*}{\partial h^2} = \frac{2\alpha\left(\frac{s\pi}{v}\right)^2 u}{\left(s\pi h\frac{u}{v}\beta\right)^3} > 0$$

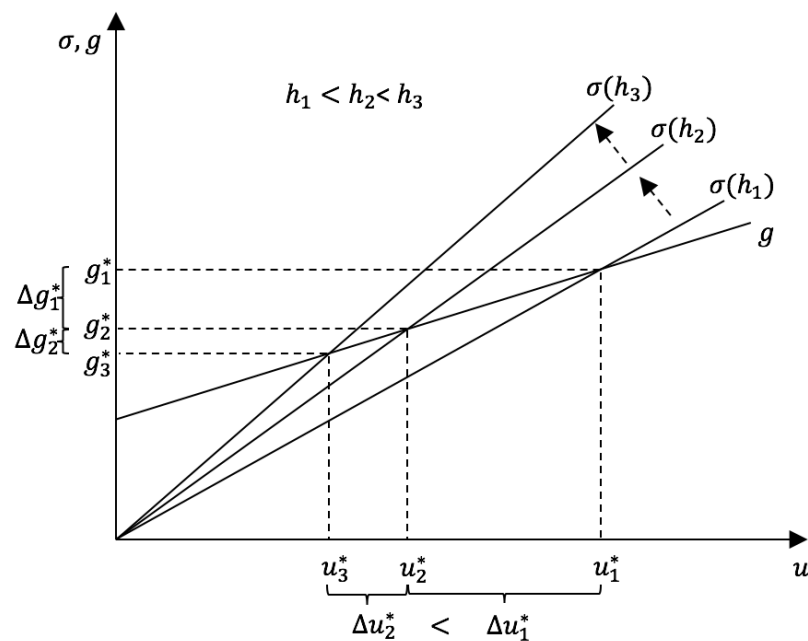
$$(27) \quad \frac{\partial^2 g^*}{\partial h^2} = \frac{2\alpha\beta\left(\frac{s\pi}{v}\right)^2 u}{\left(s\pi h\frac{u}{v}\beta\right)^3} > 0$$

Since the regime is uniquely wage-led, i.e. the first order partial derivatives are negative, positive second order partial derivatives imply that with an increasing profit share the first order partial derivatives are becoming “less negative”, i.e. the regime becomes less wage-led. The reason for this is that a change in the profit share is changing the multiplier (k) of the model. An increase in the profit share is decreasing the multiplier and a decrease of the profit share (i.e. an increase of the wage share) is increasing the multiplier.

$$(28) \quad \frac{\partial k}{\partial h} < 0$$

This endogeneity of the wage-ledness in a basic neo-Kaleckian model without saving out of wages is illustrated in Figure 1: the initial rotation of the saving rate function due to an increase of the profit share from h_1 to h_2 leads to a reduction of capacity utilization from u_1^* to u_2^* and a reduction of capital accumulation from g_1^* to g_2^* . A further increase of the profit share from h_2 to h_3 then again leads to a fall of capacity utilization and investment, however, the fall in both variables is lower in absolute terms than in the previous situation ($\Delta u_2^* < \Delta u_1^*$ and $\Delta g_2^* < \Delta g_1^*$) due to a lower multiplier.

Figure 1: Endogeneity of the wage-ledness in a basic neo-Kaleckian model without saving out of wage income.



4.2 Regime endogeneity in an open economy with wage inequality

Going back to the model I presented in the in section 2, it can be shown that the endogeneity mechanism of the macroeconomic effects of redistribution discussed in the previous subsection is maintained in more complex Kaleckian models. From equations (12) to (17) it can be seen that the strength of the respective partial effects of changes in wage dispersion or the profit share on the equilibrium values of the model will depend on the size of the distributional variables themselves. This means that a change in the profit share (holding wage inequality constant) will alter the strength of the effect of a potential further change in the profit share and the strength of the effect of a potential change in wage dispersion. Analogously, a change in wage dispersion (holding the profit share constant) alters the strength of the effect of a potential change in the profit share and the strength of the effect of a potential further change in wage dispersion. This implies, that changes in functional income distribution and wage dispersion can have effects on the wage- or profit-ledness

(Nikiforos 2016) of the specific regime and on the reaction of the economy to a change in wage inequality.

Again, this can be demonstrated by taking the second order partial (cross) derivatives. However, to simplify the analysis, I will abstract from effects of the profit share on the real exchange rate. The second order (cross) partial derivatives of the open economy post-Kaleckian model with wage dispersion are then given by the following equations:

$$(29) \quad \frac{\partial^2 u^*}{\partial h^2} = \frac{-2 \left[\tau \left([s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \right) - (\alpha + \tau h + \psi e^r + \zeta u_f) \frac{s_{\pi} - s_w}{v} \right] \frac{s_{\pi} - s_w}{v}}{\left([s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \right)^3}$$

$$(30) \quad \frac{\partial^2 g^*}{\partial h^2} = \beta \frac{\partial^2 u^*}{\partial h^2}$$

$$(31) \quad \frac{\partial^2 b^*}{\partial h^2} = -\phi \frac{\partial^2 u^*}{\partial h^2}$$

As I am abstracting from effects of the functional income distribution on the real exchange rate the signs of the second order partial derivatives of utilization, investment and net exports with respect to the profit share solely depend on the nature of the utilization regime: If capacity utilization is wage led, the expression $\left[\tau \left([s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \right) - (\alpha + \tau h + \psi e^r + \zeta u_f) \frac{s_{\pi} - s_w}{v} \right]$ will be negative, which implies that the second order derivatives of utilization and investment with respect to the profit share are positive, while the second order derivative of net exports is negative. This means that the utilization regime will become less wage-led, the investment regime will become less wage-led or more profit-led and the net export regime will become less profit-led as the profit share is increasing.

$$(32) \quad \frac{\partial^2 u^*}{\partial h^2}, \frac{\partial^2 g^*}{\partial h^2} > 0 \text{ and } \frac{\partial^2 b^*}{\partial h^2} < 0, \text{ if } \frac{\partial u^*}{\partial h} < 0$$

If capacity utilization is in a profit-led regime instead, the expression $\left[\tau \left([s_{W0} + \eta\Gamma + (s_{\pi} - s_{W0} - \eta\Gamma)h]^{\frac{1}{v}} - \beta + \phi \right) - (\alpha + \tau h + \psi e^r + \zeta u_f) \frac{s_{\pi} - s_w}{v} \right]$ will be positive, so that the second order derivatives of utilization and investment are negative and the second order derivative

of net exports is positive, meaning that capacity utilization is becoming less profit-led, investment becomes more wage-led or less profit-led and net exports become less wage-led.

$$(33) \quad \frac{\partial^2 u^*}{\partial h^2}, \frac{\partial^2 g^*}{\partial h^2} < 0 \text{ and } \frac{\partial^2 b^*}{\partial h^2} > 0, \text{ if } \frac{\partial u^*}{\partial h} > 0$$

This shows that the strength of macroeconomic effects due to changes in the profit share are also endogenous in more complex Kaleckian models since they depend on the specific value of the profit share. The reason for this is, as in the simple neo-Kaleckian model discussed above, that the multiplier is decreasing whenever the profit share rises (*ceteris paribus*).

Turning to the second order derivatives of the rate of capacity utilization and investment with respect to wage dispersion, it is revealed that they are always positive:

$$(34) \quad \frac{\partial^2 u^*}{\partial \Gamma^2} = \frac{2(\alpha + \tau h + \psi e^r + \zeta u_f) \left((1-h) \frac{\eta}{v} \right)^2}{([s_{W0} + \eta \Gamma + (s_{\pi} - s_{W0} - \eta \Gamma) h] \frac{1}{v} - \beta + \phi)^3} > 0$$

$$(35) \quad \frac{\partial^2 g^*}{\partial \Gamma^2} = \frac{2\beta(\alpha + \tau h + \psi e^r + \zeta u_f) \left((1-h) \frac{\eta}{v} \right)^2}{([s_{W0} + \eta \Gamma + (s_{\pi} - s_{W0} - \eta \Gamma) h] \frac{1}{v} - \beta + \phi)^3} > 0$$

In turn, the the second order derivatives of the rate of net exports is always negative:

$$(36) \quad \frac{\partial^2 b^*}{\partial \Gamma^2} = \frac{-2\phi(\alpha + \tau h + \psi e^r + \zeta u_f) \left((1-h) \frac{\eta}{v} \right)^2}{([s_{W0} + \eta \Gamma + (s_{\pi} - s_{W0} - \eta \Gamma) h] \frac{1}{v} - \beta + \phi)^3} < 0$$

To see the consequences for the macroeconomic effects of changes in wage inequality the cases of a positive and a negative social norms parameter need to be distinguished.

If absolute income effects dominate the reaction of the propensity to save out of wages to a rise in wage dispersion the positive second order derivatives with respect to wage dispersion imply that the negative effect of wage dispersion on capacity utilization $\left(\frac{\partial u^*}{\partial \Gamma} < 0 \right)$ and investment $\left(\frac{\partial g^*}{\partial \Gamma} < 0 \right)$ will fall as wage dispersion is increasing. At the same time the positive effect of increasing wage inequality on net exports $\left(\frac{\partial b^*}{\partial \Gamma} > 0 \right)$ is falling. Meaning that an increase of wage inequality has less contractionary effects on the on utilization and investment and less expansionary effects on net exports when wage inequality is already high,

compared to a situation in which wage inequality is low. The reason for this is again that the multiplier effect of the model is endogenous to wage inequality. Under dominant absolute income effects a rise in wage dispersion leads to a fall of the multiplier.

$$(37) \quad \frac{\partial k}{\partial \Gamma} < 0, \text{ if } \frac{\partial s_w}{\partial \Gamma} > 0$$

In the opposite scenario, i.e. under dominant relative income effects, the increase in wage inequality will increase the multiplier, implying that the positive effects of rising wage dispersion on capacity utilization $\left(\frac{\partial u^*}{\partial \Gamma} > 0\right)$ and investment $\left(\frac{\partial g^*}{\partial \Gamma} > 0\right)$ will become even stronger and the negative effect on net exports $\left(\frac{\partial b^*}{\partial \Gamma} < 0\right)$ will become weaker as wage dispersion is rising.

$$(38) \quad \frac{\partial k}{\partial \Gamma} > 0, \text{ if } \frac{\partial s_w}{\partial \Gamma} < 0$$

The second order mixed partial derivatives show the effects of a change in one distributional variable on the potential effects of a change in the other distributional variable. Due to Schwarz's theorem, the order of taking the partial derivatives doesn't matter, i.e. the effects of a change in wage dispersion on the wage- or profit-ledness will be the same as the effects of a change in the profit share on the potential effects of rising or falling wage dispersion. The second order mixed partial derivatives are given by:

$$(39) \quad \frac{\partial^2 u^*}{\partial \Gamma \partial h} = \frac{\partial^2 u^*}{\partial h \partial \Gamma} = \frac{(\alpha + \tau h + \psi e^r + \zeta u_f) \left([s_{W0} + \eta \Gamma + (s_\pi - s_{W0} - \eta \Gamma) h]^{\frac{1}{v} - \beta + \phi} \right)^2 - 2 \left(\tau \left([s_{W0} + \eta \Gamma + (s_\pi - s_{W0} - \eta \Gamma) h]^{\frac{1}{v} - \beta + \phi} \right) - (\alpha + \tau h + \psi e^r + \zeta u_f) \frac{(s_\pi - s_{W0} - \eta \Gamma)}{v} \right) (1-h)^{\frac{2}{v}}}{\left([s_{W0} + \eta \Gamma + (s_\pi - s_{W0} - \eta \Gamma) h]^{\frac{1}{v} - \beta + \phi} \right)^3}$$

$$(40) \quad \frac{\partial^2 g^*}{\partial \Gamma \partial h} = \frac{\partial^2 g^*}{\partial h \partial \Gamma} = \beta \frac{\partial^2 u^*}{\partial \Gamma \partial h}$$

If capacity utilization is wage-led and absolute income effects are the dominant driver of the propensity to save out of wages, the mixed partial derivatives of capacity utilization and the mixed partial derivatives of investment will be positive. This means that an increase of wage dispersion will make capacity utilization less wage-led and investment less wage-led or more profit-led. At first sight, this result seems to contradict the results summarized Table 1 where

I have argued that a rise in inequality with dominant absolute income effects accelerates a wage-led regime, however, we are asking a different question here. The question in Table 1 was: What is the resulting macroeconomic effect if there is a simultaneous increase in wage dispersion and the profit share. Here I am asking: what happens to the potential effect of a change in the profit share, if wage dispersion is increasing? The answer to this second question in the case that utilization and investment are wage-led and η is positive is that an increase in wage dispersion will reduce the wage-ledness of utilization and investment with respect to functional income distribution; at the same time, this increase in wage dispersion will have a contractionary effect on utilization and investment, even without a change of the profit share. The reduction in wage-ledness (or the increase in profit-ledness for a profit-led investment regime) happens because the rise in wage dispersion increases the propensity to save out of wage income due to the dominance of absolute income effects. This in turn is lowering the differential between the propensity to save out of profits and the propensity to save out of wages, which lowers the multiplier and the contractionary effect of an increase in the profit share on aggregate consumption. Analogously, an increasing profit share will make the potential negative reaction of utilization and investment on a rise in wage dispersion less strong, since the higher profit share results in a lower multiplier due to a rising aggregate propensity to save.

For the case that capacity utilization is wage-led, but relative income effects dominate the behaviour of the propensity to save out of wage income such that η is negative, I obtain the opposite results since the mixed partial derivatives of capacity utilization and investment are negative: A rise in wage inequality will increase the wage-ledness of the utilization and investment regime (or decrease the profit-ledness of a profit-led investment regime). The underlying mechanism is the same: rising wage dispersion lowers the propensity to save out of wage income due to dominant relative income effects. This in turn increases the differential between the propensity to save out of profits and the propensity to save out of wages and raises the multiplier, which strengthens the contractionary effect of a potential redistribution towards profit income on aggregate consumption. And again, I obtain the symmetric result for the effect of a rising profit share when utilization is wage-led and relative income effects

on the propensity to save out of wages are dominant: A rising profit share makes the positive reaction of utilization and investment to an increase in wage inequality weaker, as the multiplier is falling.

When utilization is profit-led, it is not clear a priori in which direction the first order partial effects will change when wage inequality or the profit share rise. For the net export regime, the direction of regime endogeneity is ambiguous for both, the wage-led and the profit-led regime.

$$(41) \quad \frac{\partial^2 b^*}{\partial \Gamma \partial h} = \frac{\partial^2 b^*}{\partial h \partial \Gamma} = \frac{\frac{\eta}{v} \left\{ (1-h) \psi \frac{\partial e^r(h)}{\partial h} \cdot \phi u^* \right\} (SC) - \left(\psi \frac{\partial e^r(h)}{\partial h} \left\{ [s_0 + \eta \Gamma + (s_r - s_0 - \eta \Gamma) h] \frac{1}{v} - \beta \right\} + \phi [s_\pi - s_0 - \eta \Gamma] \frac{u^*}{v} - \tau \right) (1-h) \frac{\eta}{v}}{\left\{ [s_{W0} + \eta \Gamma + (s_\pi - s_{W0} - \eta \Gamma) h] \frac{1}{v} - \beta + \phi \right\}^2}$$

5 Conclusion

This paper presented a simple post-Kaleckian open-economy model of distribution and growth that incorporates wage inequality and functional income distribution. I have shown in a simple way how the macroeconomic effects of simultaneous changes in factor shares and income inequality can either reinforce or dampen each other, depending especially on implicitly assumed consumption and financing behaviour. Furthermore, I have discussed an endogeneity effect that is usually ignored by the literature even though it is present in basic, as well as in more complex Kaleckian models: the wage-ledness or profit-ledness of Kaleckian models is endogenous to changes in the profit share due to a profit share dependent multiplier. This endogeneity channel is extended if wage inequality is introduced to Kaleckian models.

References

- Barba, A. and M. Pivetti (2009). 'Rising Household Debt: Its Causes and Macroeconomic Implications—A Long-period Analysis'. In: Cambridge Journal of Economics 33.1, pp. 113–137.
- Belabed, C., T. Theobald and T. van Treeck (2013). 'Income Distribution and Current Account Imbalances'. IMK Working Paper No. 126, Macroeconomic Policy Institute (IMK) at the Hans Böckler Foundation, Düsseldorf.

- Bhaduri, A. and S. Marglin (1990). 'Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies'. In: *Cambridge Journal of Economics* 14.4, pp. 375–393.
- Carvalho, L. and A. Rezai (2016). 'Personal Income Inequality and Aggregate Demand'. In: *Cambridge Journal of Economics* 40.2, pp. 491–505.
- Cynamon, B. and S. Fazzari (2008). 'Household Debt in the Consumer Age: Source of Growth–Risk of Collapse'. In: *Capitalism and Society* 3.2.
- Detzer, D. (2016). 'Financialisation, Debt and Inequality – Scenarios Based on a Stock Flow Consistent Model'. IPE Working Paper, No. 64, Institute for International Political Economy Berlin.
- Duesenberry, J. S. (1949). *Income, Saving and the Theory of Consumer Behavior*. Cambridge, MA: Harvard University Press.
- Dutt, A.K. (1984). 'Stagnation, income distribution and monopoly power', *Cambridge Journal of Economics* 8, pp. 25–40.
- Dutt, A.K. (1987). 'Alternative closures again: a comment on "Growth, distribution and inflation"', *Cambridge Journal of Economics* 11, pp. 75–82.
- Dutt, A. (2005). 'Conspicuous Consumption, Consumer Debt and Economic Growth'. In: *Interactions in Analytical Political Economy: Theory, Policy and Applications*. Ed. by S. M. Armonk: M.E. Sharpe, pp. 155–178.
- Dutt, A. (2006). 'Maturity, Stagnation and Consumer Debt: A Steindlian Approach'. In: *Metroeconomica* 57, pp. 339–364.
- Frank, R. H., A. S. Levine and O. Dijk (2014). 'Expenditure Cascades'. In: *Review of Behavioral Economics* 1.1–2, pp. 55–73.
- Hein, E. (2014). *Distribution and Growth after Keynes: A Post-Keynesian Guide*. Edward Elgar Publishing.
- Hein, E., Detzer, D., Dodig, N. (2016). 'Financialisation and the Financial and Economic Crises: Country Studies', Edward Elgar Publishing.
- Hein, E. and L. Vogel (2008). 'Distribution and Growth Reconsidered: Empirical Results for six OECD Countries'. In: *Cambridge Journal of Economics* 32.3, pp. 479–511.

- Kapeller, J. and B. Schütz (2014). 'Debt, Boom, Bust: A Theory of Minsky-Veblen Cycles'. In: *Journal of Post Keynesian Economics* 36.4, pp. 781–814.
- Kapeller, J. and B. Schütz (2015). 'Conspicuous Consumption, Inequality and Debt: The Nature of Consumption-driven Profit-led Regimes'. In: *Metroeconomica* 66.1, pp. 51–70.
- Kapeller, J., Landesmann, M.A., Mohr, F.X., Schütz, B. (2017) Government policies and financial crises: mitigation, postponement or prevention?, In: *Cambridge Journal of Economics*, bew073.
- Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. London: Macmillan.
- Kurz, H.D. (1990). 'Technical change, growth and distribution: A steady state approach to unsteady growth', In: Kurz, H.D., *Capital, Distribution and Effective Demand: Studies in the Classical Approach to Economic Theory*, Cambridge: Polity Press, pp. 210-239.
- Lavoie, M. (2014). *Post-Keynesian Economics: New Foundations*. Edward Elgar Publishing Limited.
- Nikiforos, M. (2016). 'Distribution-led growth in the long run'. In: *Review of Keynesian Economics*, 4.4, pp. 391–408.
- Palley, T.I. (2015). 'The middle class in macroeconomics and growth theory: a three-class neo-Kaleckian–Goodwin model', In: *Cambridge Journal of Economics* 39.1, pp. 221–243.
- Palley, T.I. (2017). 'Wage- vs. profit-led growth: the role of the distribution of wages in determining regime character', *Cambridge Journal of Economics* 41.1, pp. 49–61.
- Rowthorn, B. (1981). 'Demand, real wages and economic growth', *Thames Papers in Political Economy*, Autumn, pp. 1-39.
- Setterfield, M. and Y. Kim (2016). 'Debt Servicing, Aggregate Consumption, and Growth'. In: *Structural Change and Economic Dynamics* 36, pp. 22–33.
- Stockhammer, E. (2015). 'Rising inequality as a cause of the present crisis', *Cambridge Journal of Economics* 39.3, pp. 935–958.
- Thaler, R. H. and H. M. Shefrin (1981). 'An Economic Theory of Self-control'. In: *The Journal of Political Economy*, pp. 392–406.

- Van Treeck, T. (2014). 'Did Inequality Cause the US Financial Crisis?' In: *Journal of Economic Surveys* 28.3, pp. 421–448.
- Van Treeck, T. and S. Sturn (2012). *Income Inequality as a Cause of the Great Recession? A Survey of Current Debates. Conditions of Work and Employment Series 39.* International Labour Organization.
- Veblen, T. (1899). *The Theory of the Leisure Class.* London: Allen and Unwin.
- Zeza, G. (2008). 'US Growth, the Housing Market, and the Distribution of Income'. In: *Journal of Post Keynesian Economics* 30.3, pp. 375–401.