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Endogenous money and inflation: an introductory post-Keynesian/Kaleckian conflict inflation model

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Endogenous money and inflation: an introductory post-Keynesian/Kaleckian conflict inflation model

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Abstract
Based on the notion of endogenous money, which precludes inflation from being a monetary phenomenon, this contribution develops an introductory macroeconomic model of conflict inflation aimed at undergraduate teaching. Our demand-driven model includes Kaleckian mark-up pricing determining firms' target profit shares, while workers' target wage shares are determined by institutional features of the labour market and the social benefit system and the employment rate. Conflict inflation emerges if these targets are inconsistent with each other. This basic version of our teachable Kaleckian macroeconomic model incorporates the main components of aggregate demand and their determinants for a closed (private) economy, as well as conflicting income claims between workers and capitalists. The model is then applied in a stylised way to the recent inflationary shocks taking off in 2021. It aims to provide a basic heterodox approach, which is both straightforward and effective in facilitating students' understanding of inflationary dynamics.

Keywords: conflict inflation, post-Keynesian/Kaleckian model, teaching economics
JEL code: A22, E12, E25, E31

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1. Introduction

In an endogenous money framework, it is impossible for the monetarist claim that '(i)nflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output', as Milton Friedman's (1970, p. 24) famously put it, to hold. In opposition to the monetarist view, the post-Keynesian approach to be explained here can be summarised by arguing that 'inflation is always and everywhere a conflict phenomenon in the sense that it can only be generated if the claims on real income by different groups persistently exceed real output' (Hein 2024, p. 203).

As explained in detail in Hein (2024) from different post-Keynesian perspectives, inflation as a persistent process requires inconsistent claims of the main groups of actors on real output, which may then be modified by inflation expectations. These claims can be broadly distinguished as follows: (1) capitalists' claims, including firms, rentiers and landowners, on unit profits or the profit share, including retained profits, interest, dividends, and rents; (2) workers' claims on the real wage or the wage share; (3) government's claims in terms of net tax revenues; and (4) the external sector's claim via the value of imports of the domestic economy. Inflation may thus be triggered by an increase in claims of one or more of these groups of actors, which is not matched by a decline of the claims of any other group of actors.

From this it follows that inflation may be generated (1) by an increase in capitalists' real profits or profit share claims, triggered by excess demand, changes in the degree of price competition, or higher interest or dividend claims, which will each generate profit-driven conflict inflation. It may be generated (2) by an increase in workers' real wage or wage share claims, triggered by changing bargaining conditions in the labour market (employment, wage bargaining and labour market institutions), which will give rise to wage-driven conflict inflation. It may be generated (3) by an increase in government claims, that is by a change in taxes, social transfers and subsidies, which will generate tax-driven conflict inflation. Finally, it may be generated (4) by a change in the claims of the external sector, hence rising import prices or a nominal depreciation of the domestic currency, which will generate external cost/import price-driven conflict inflation. If the claims of any actor rise, first, this will only lead to a rise in relative price/wage levels. If other actors accept the related change in income distribution, no persistent inflation will emerge, but just an increase in relative price/wage levels. Only if other actors do not accept the distribution effects of the change in claims and will start raising their prices/wags in turn, inflation will arise as a persistent process. In this sense, 'inflation is always and everywhere a conflict phenomenon', and the distinction between different types of inflation (demand-pull, cost-push, imported, etc.), unfortunately also quite widespread in the post-Keynesian literature, can only relate to the trigger but not to the essence of inflation.

This contribution develops an introductory macroeconomic model of conflict inflation and employment aimed at undergraduate teaching. It is composed of an income- and employment-generating process, an inflation- and distribution-generating process, and then of the interaction of these two processes.

With regard to the determination of income and employment, our basic closed economy model is similar to Blecker's (2025) recent presentation of a teachable Kaleckian model of distribution, income and employment for undergraduates. Functional income distribution is determined by mark-up pricing of firms, distribution affects consumption in a Kaleckian and Kaldorian way, and investment is determined by Keynesian animal spirits, or autonomous investment, and an accelerator term. Our model here is thus a simplified version of the models by Hein and Stockhammer (2009, 2010, 2011) and Hein (2023a, chap. 5), where also creditor-debtor relationships, interest costs of firms and interest incomes of rentiers' households, as well as real debt effects, are considered, either in a growth model as in Hein and Stockhammer (2009, 2010, 2011), or in an income and employment model, as in Hein (2023a, chap. 5). The income- and employment-generating process in our present model is also different from the interactive internet based undergraduate textbook by Prante et al. (2025), where functional distribution has no effect in the Keynesian consumption function and the rate of interest together with animal spirits or autonomous investment determine the aggregate level of investment.

Regarding the inflation- and distribution-generating process, our model includes a variation of what we find in Hein and Stockhammer (2009, 2010, 2011), Hein (2023a, chap. 5), and Prante et al. (2025). Only an employment rate, which is associated with consistent claims of firms and workers, generates a constant rate of inflation and constant functional income distribution. Any deviation from a 'stable inflation rate of employment' (SIRE) triggers rising or falling inflation rates. The Philips curve, i.e. the relationship between inflation and (un-)employment is thus unstable and shifting, similar to the 'non accelerating inflation rate of unemployment' (NAIRU) model in orthodox new consensus macroeconomics (NCM) (Carlin and Soskice 2005, 2015). However, different from this orthodox approach, our SIRE/NAIRU is not a unique rate but is conceived as rather a range or a corridor, it is 'not a strong attractor' (Sawyer 2002) in the short run, and it turns endogenous with regard to demand-determined employment in the long run through various channels (Hein and Stockhammer 2009, 2010, Hein 2023a, chap. 5). Our approach here is also different from other post-Keynesian conflict inflation models, as in the (graduate) textbooks by Blecker and Setterfield (2019, chap. 5) and Lavoie (1992, chap. 7, 2022, chap. 8), where stable Philips curves are derived, mainly because of incomplete effects of past inflation on current inflation ('incomplete indexation').[1]

This contribution is structured as follows. Section 2 contains a simple Kaleckian closed economy model of conflict inflation, income and employment. We start with the income- and employment-generating process, turn to the inflation- and distribution-generating process, and then look at the interaction of these processes. This section will provide an explicit

[1] See Hein (2023a, chap. 5, 2024) for a discussion of the Hein/Stockhammer as compared to the Blecker/Settefield-Lavoie approaches and Hein and Häusler (2024) for the elaboration and comparison of different variants of these approaches regarding the role of indexation and inflation expectations etc. For a recent attempt at reconciling these modelling approaches see Woodgate (2025).

presentation of the equations of income/employment- and inflation/distribution-generating processes and it will discuss the interaction using figures. Based on this simple model, in Section 3, we will then graphically discuss the recent inflation hikes in the context of the recovery from the Covid 19 recession and the energy price shock triggered by the Russian war on Ukraine. Section 4 will briefly summarise and conclude.

2. A basic macroeconomic model with conflict inflation

In the following we will develop step-by-step a simple macroeconomic model with conflict inflation. First, the income/employment-generating process in the model economy will be displayed, generating the goods market equilibrium levels of income and employment. For this purpose, we assume prices and functional income distribution to be exogenously given. For the sake of simplicity, the price level is set equal to unity, such that nominal and real values coincide. Second, we will introduce the inflation/distribution generating process, based on conflicting claims of different social groups, here only workers and capitalists. This will determine inflation and functional income distribution between wages and profits. For this, we will take the levels of output and employment to be exogenously given. Third, we will then look at the interaction between the income- and employment-generating process, i.e. the goods market equilibrium, and the inflation- and distribution-generating process, i.e. the distribution equilibrium.

2.1. The income- and employment-generating process

To understand the dynamics in our model economy, we will first focus on the aggregate demand side of the economy, put differently on the process which generates income and employment. In the post-Keynesian tradition, following Kalecki (1933, 1954) and Keynes (1936) it is assumed that effective demand determines aggregate economic activity in the short and the long run (Hein 2023a, chap. 3).

Aggregate demand (AD) is composed of private consumption (C), investment (I), government consumption (G) and net exports of goods and services, the difference between exports (X) and imports (M):

$$AD = C + I + G + (X - M) \tag{1}$$

For simplicity, we assume here a ‘private closed economy’, which means there is no government and no international trade, i.e. no exports nor imports. With $G = X = M = 0$, we have:

$$AD = C + I \tag{2}$$

For a goods market equilibrium, firms’ aggregate supply adjusts to aggregate demand, such that equilibrium output (Y) is determined by aggregate demand, and we get:

$$Y = AD = C + I \tag{3}$$

The produced output in our economy equals the national income received by the different social classes, labour and capital. Labour income (W) consists of wages and salaries paid to workers. Capital income (Π) refers to profits in a broad sense, such as retained profits of firms, as well as distributed profits, dividends and interest payment to capitalists and rentiers:

$$Y = W + \Pi \tag{4}$$

In what follows, the functional distribution of income, in our case between wages and profits, is important. The profit share (h) is given as

$$h = 1 - \Omega = \frac{\Pi}{Y} = \frac{\Pi}{W + \Pi} \tag{5}$$

and the wage share (Ω) is:

$$\Omega = 1 - h = \frac{W}{Y} = \frac{W}{W + \Pi} \tag{6}$$

In our Kaleckian model, wage and profit shares are determined simultaneously with the rate of inflation, as we will show in the next section on the inflation- and distribution-generating process. For the behavioural equations in this income- and employment-generating process of the model, we take those shares as exogenously given.

For the consumption function of the model, following Kalecki (1954, chap. 3), we assume different propensities to consume out of wages and out of profits, with the propensity to consume out of wages (c_W) to be higher than the propensity to consume out of profits (c_Π). There are two major reasons for this. First, Keynes (1936, chap. 8) already argued that the marginal propensity to consume would fall with the income level of households. Since workers' households on average receive lower incomes than capitalists' households, this implies that their propensity to consume is higher than the capitalists' households'. Second, Kaldor (1955) has pointed out that a major part of profits is retained by corporations and hence not available for consumption at all, which reduces the average propensity to consume out of profits. For aggregate consumption (C), we also assume that there is an autonomous part (C_a), mainly by the capitalists, which independent of current income, i.e. profits and wages. This autonomous part can be financed out of wealth and/or by obtaining credit. For our consumption function, we thus have:

$$C = C_a + c_W W + c_\Pi \Pi\,, \qquad C_a \geq 0, 1 \geq c_W > c_\Pi \geq 0 \tag{7}$$

We assume that workers as a social group spend all their income ($c_W = 1$) and therefore do not save:

$$W = c_W W \tag{8}$$

and make use of the definition of profit and wage shares in equations (5) and (6), in order to obtain:

$$C = C_a + \Omega Y + c_\Pi(1-\Omega)\mathrm{Y} = C_a + [\Omega + c_\Pi(1-\Omega)]Y \tag{9}$$

Consumption is thus determined by autonomous consumption, the level of income, the wage share and the propensity to consume out of profits.

For investment, we assume that firms in a capitalist monetary production economy have access to credit, which is endogenously generated by the monetary and financial system (Lavoie 2022, chap. 4, Hein 2023a, chap. 4). Therefore, neither the individual firm nor the economy as a whole has to save in order for firms to obtain the necessary amount of finance for investment. Of course, for the individual firm, own means of finance, i.e. (accumulated) retained earnings, may have an impact on its creditworthiness in the credit market, as Kalecki's (1937) famous 'principle of increasing risk' has claimed. Here, however, we will not explicitly consider these financial aspects, but apply a simplified investment function. We assume that investment (I) is determined by so-called 'animal spirits' (I_a), which refer to the general climate in the economy and creditors' and firms' perceptions of the future. This term goes back to Keynes (1936, p. 261), who argued that this behaviour is especially prominent in a fundamentally 'uncertain' environment. However, I_a can also be taken to represent investment, which is autonomous from the level of current income. The latter influence is captured by a second term, which says that firms' investment decisions are also affected by aggregate demand through an accelerator term (βY). If companies face high demand for their products and high capacity utilisation, they will expect demand to rise in the future and are willing to increase their future capacity to produce by means of investment in the capital stock. The resulting behavioural equation of investment decisions of firms is thus given by:

$$I = I_a + \beta Y, \qquad I_a, \beta \geq 0 \tag{10}$$

In order to derive equilibrium output, we plug in equations (9) and (10) into the goods market equilibrium condition in equation (3):

$$Y = C_a + [\Omega + c_\Pi(1-\Omega)]Y + I_a + \beta Y \tag{11}$$

and we solve for equilibrium output/income:

$$Y^* = \frac{C_a + I_a}{(1-\Omega)\,(1-c_\Pi) - \beta} \tag{12}$$

Equilibrium income is thus determined by autonomous expenditures ($C_a + I_a$) and by the multiplier ($\frac{1}{(1-\Omega)\,(1-c_\Pi)-\beta}$). A positive equilibrium requires $(1-\Omega)\,(1-c_\Pi)-\beta > 0$. This is also the Keynesian stability condition for the goods market equilibrium, i.e. saving has to respond more elastically to changes in income than does investment, which for positive equilibrium values is thus given in our model.

Based on equation (12) we can derive the effects of changes in the model parameters. It can be easily seen that an increase in the expectations of firms and animal spirits, as well as in autonomous investment, will have expansionary effects on equilibrium income in our model. The same holds true for autonomous consumption. Considering the multiplier in our model, we can immediately see that an increase in the wage share will have expansionary effects on equilibrium income. Our economy is thus wage-led. Furthermore, also the 'paradox of costs' (Rowthorn 1981) holds, i.e. lowering the real wage of workers and the wage share (and thus increasing the profit share), is detrimental to the aggregate level of profits.[2] Furthermore, we can see that a fall in the propensity to consume out of profits reduces equilibrium income. Therefore, the 'paradox of saving' holds, too, which means that if capitalists save more and hence consume less from their profits, overall income and thus also aggregate profits will fall. Finally, an increase in the accelerator term in the investment function will have expansionary effects in the model and increases equilibrium income.

Having so far derived equilibrium income/output and its properties, we can define the employment rate (e) as the relationship between the number of employed workers (E) to the labour force (LF) as the sum of employed and unemployed workers (UE):

$$e = \frac{E}{E+UE} = \frac{E}{LF} = 1 - ue \tag{13}$$

Of course, the unemployment rate (ue) is then given as:

$$ue = \frac{UE}{E+UE} = \frac{UE}{LF} = 1 - e \tag{14}$$

With a constant labour force and constant labour productivity, the employment rate is positively related to the level of output/income, we assume by a constant factor (q). Therefore, we have for the goods market equilibrium rate of employment (GERE):

$$e^* = \frac{q(C_a + I_a)}{(1-\Omega)\,(1-c_\Pi)-\beta} \tag{15}$$

[2] See Hein (2023a, chap. 4) for a proof.

The GERE is thus positively affected by autonomous consumption and investment, by the propensity to consume out of profits and by the accelerator in the investment function, while the profit share has a negative effect – and thus the wage share a positive effect. In what follows, we will call this a 'wage-led employment curve', which is shown in a linearised way in Figure 1.[3] For this, we treat autonomous expenditures ($C_a + I_a$) as shift parameters and the propensity to consume out of profits (c_Π) and the accelerator in the investment function (β) as affecting the slope. An increase in any of these parameters will thus mean that the GERE for every wage share will increase (either through a shift or a rotation of the curve).

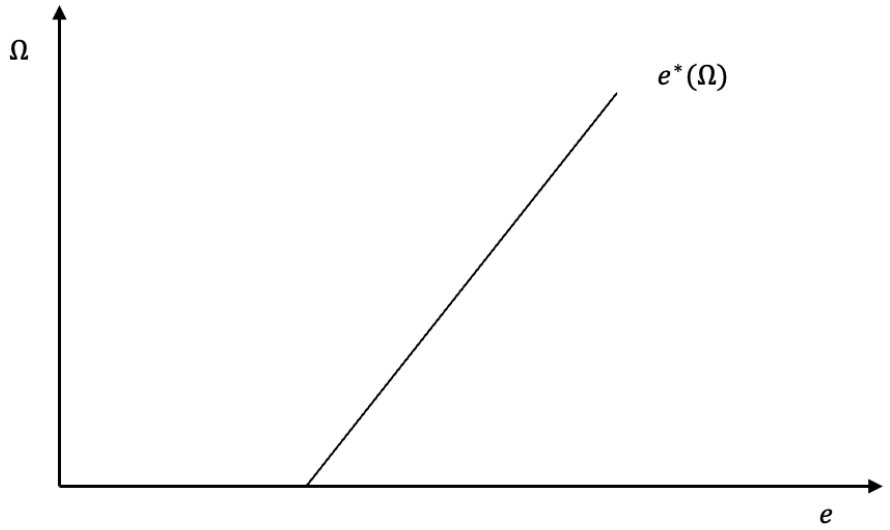

Figure 1: The income- and employment-generating process: the employment curve

2.2. The inflation- and distribution-generating process

In the inflation/distribution-generating process of our model, inflation and functional income distribution are determined as joint outcomes of the conflict between different social actors—workers and capitalists/firms in our case. For this we take the level of economic activity and hence the employment rate as exogenously given, determined by the income/employment-generating process as explained above. We assume that capitalist firms actively set prices by means of which they target a certain profit share and hence a certain wage share, while workers actively set nominal wages in order to achieve a certain real wage rate and a certain wage share target. Of course, neither firms nor workers have absolute power and can thus not raise prices or wages as they please, but their respective powers are constrained by competition of other firms, in the case of price setting, and by competitions of other workers,

[3] Of course, equation (15) for the GERE shows a non-linear relationship between the employment rate and the profit share (or wage share), which for the sake of simplicity we linearise in our figures. As shown in Hein (2023b, pp. 193-194), with a non-linear employment curve, we have two joint equilibria for the income/employment and the inflation/distribution process, the lower one stable, the upper one unstable. In order to avoid this complication in what follows, we are linearising the employment curve here, such that we will only have one equilibrium further below, which is stable.

in the case of nominal wage setting. Our presentation is inspired by Hein and Stockhammer (2009, 2010, 2011) and Hein (2023a, chap. 5).

Let us start with firms' price setting. For the sake of simplicity, we assume that our model economy produces a homogenous good, which can be used for consumption and investment purposes. Labour is the only variable input – we are thus ignoring raw materials and semi-finished products. We abstract from technical progress, and the production technology and hence labour productivity up to full capacity output are constant, but may vary between firms. Following Kalecki (1954, chaps 1–2), we assume that firms are operating in an oligopolistic environment and they set prices (p) as a mark-up (m) over constant unit direct labour costs (up to full capacity output). The latter are given as the ratio between nominal wages and real output (Y_r), or between the nominal wage rate ($w = \frac{W}{E}$), as the sum of wages divided by employment, and labour productivity, as real output divided by employment ($y = \frac{Y_r}{E}$):

$$p = (1+m)\frac{W}{Y_r} = (1+m)\frac{w}{y}, \qquad m > 0 \tag{16}$$

As argued by Kalecki (1954, chaps 1–2), the mark-up is determined by the degree of price competition of firms, by the relevance of price competition as compared to other parameters of competition (product differentiation, marketing), and by overhead costs, which have to be covered by the mark-up, too. Furthermore, the bargaining power of trade unions may constrain the mark-up, because firms may be aware that high mark-ups may induce workers to raise wages in order to benefit from firms' high profitability. (Some) firms may then not be able to fully pass this increase in wages on to prices, because of competition in the goods market, and may thus constrain the mark-up in the first place, if they are facing strong trade unions.

Setting prices according to equation (16) implies that firms are targeting a certain real wage rate ($w_r = \frac{w}{p}$) and, with constant labour productivity, a certain wage share. This can be shown by rearranging equation (16):

$$\frac{1}{1+m} = \frac{w}{py} = \frac{w_r}{y} = \frac{W}{Y} = \Omega_F^T = 1 - h_F^T = 1 - h_A, \qquad h_A > 0 \tag{17}$$

Since the mark-up remains constant whenever output varies (below full capacity output), the target profit share given by firms' pricing can be denoted by a constant h_A and the firms' target wage share by $1 - h_A$.

Turning to workers' target wage share and their nominal wage setting, we assume that workers' target wage share ($\Omega_W^T = 1 - h_W^T$) is first determined by the institutional setting of the labour market and the social benefit system, including union density, wage bargaining

coverage and coordination, employment protection legislation, minimum wages, or unemployment benefits. This institutional setting affects the competition among workers for jobs and more generally their bargaining power at any rate of employment, or at any rate of unemployment. Furthermore, the employment rate (and thus the unemployment rate) should have an impact on the workers' target wage share, since high employment rates limit the competition among workers seeking jobs and therefore improve their bargaining power in the labour market, while low employment rates have the opposite effects. We assume that the institutional setting, represented by Ω_B, Ω_C further below, is only slowly changing, while the employment rate varies in the short run with the change in aggregate demand. Different from the basic models in Hein and Stockhammer (2009, 2010, 2011) and Hein (2023a, chap. 5), we assume here that variations in the employment rate only affect workers' target wage share if employment rates turn particularly high or low.[4] However, if employment rates vary within a 'normal' range or corridor, between e_1^N and e_2^N, workers' distribution target (Ω_A) does not change and is given by what has been feasible and realised in the past. Only if the employment rate exceeds e_2^N, workers will raise their target wage share and try to redistribute income in their favour. If the employment falls below e_1^N, workers' power is too weak to maintain their normal target.

$$\begin{gathered} \Omega_W^T = 1 - h_W^T = \Omega_A, \qquad if\ e_1^N < e < e_2^N \\ \Omega_W^T = 1 - h_W^T = \Omega_B + \Omega_C e, \qquad if\ e < e_1^N\ or\ e > e_2^N, \\ 1 > \Omega_A > \Omega_B > 0,\ \ \Omega_C \geq 0 \end{gathered} \tag{18}$$

The 'normal' corridor for workers' target wage shares between e_1^N and e_2^N is itself determined by labour market institutions, in particular by the degree of wage bargaining coverage and coordination (Hein 2002). The higher the degree of coverage and coordination, the better are the conditions for workers/trade unions to account for negative macroeconomic externalities of their nominal wage setting, like rising inflation which may trigger central bank intervention and/or loss of international price competitiveness in an international framework or falling inflation and finally deflation which may trigger a debt-deflation crisis (Fisher 1933). Therefore, the higher the degree of coordination of wage bargaining, the larger will be the corridor of employment rates with a constant workers' target. If the employment rate exceeds the corridor, coordinated wage bargaining will not be effective, because firms are competing for scarce workers and workers can gain higher wages above the collectively agreed levels (positive wage drift), which means they are targeting a higher wage share. If the employment rate is below the corridor, workers are willing to compromise and to accept a wage rate below the collectively agreed level (negative wage drift), which means they are targeting a lower wage share.

[4] This is another way of introducing Rowthorn's (1977) and others' distinction between a stable low and an unstable high inflation regime, where in the former inflation is not anticipated by workers but in the latter it is and feeds workers' nominal wage setting.

If there is no coordination of wage bargaining, the workers' target wage share curve will rise linearly in the employment rate. This is assumed in the basic models in Hein and Stockhammer (2009, 2010, 2011) and Hein (2023a, chap. 5), where wage bargaining coordination is then introduced as a part of a post-Keynesian macroeconomic policy mix to generate high non-inflationary employment rates.

If the targets of the two classes, workers and capitalists, coincide, target wage shares of both groups are the same ($\Omega_W^T = \Omega_F^T$), or the target wage share of workers and the target profit share of firms sum up to unity ($\Omega_W^T + h_F^T = 1$). In this case, the claims of the two groups exactly match real output. We can call this case a competitive claims equilibrium or a distribution claims equilibrium:

$$\Omega_W^T = \Omega_F^T \quad <=> \quad \Omega_W^T + h_F^T = 1 \tag{19}$$

If the workers' target wage share exceeds the firms' target wage share ($\Omega_W^T > \Omega_F^T$) and the groups' targets regarding their own shares exceeds unity ($\Omega_W^T + h_F^T > 1$), the total claims exceed real output, and the economy will face inflationary pressure, as we will show further below. If the workers' target wage share falls short of the firms' target wage share ($\Omega_W^T < \Omega_F^T$) and the groups' targets regarding their own shares falls short of unity ($\Omega_W^T + h_F^T < 1$), the total claims fall short of real output, and the economy will face dis-inflationary pressure, as also shown below.

As shown in Figure 2, we assume that for an employment rate between e_1^N and e_2^N workers' target wage share (Ω_A) is equal to firms' target wage share ($1 - h_A$) – bargaining coordination has made workers/trade unions accept what is feasible given firms' pricing. The corridor between e_1^N and e_2^N contains thus a range of 'consistent claims rates of employment', or as we will see below, a range of 'stable inflation rates of employment' (SIRE = e^N). If there were no corridor of workers' target wage shares but the latter were a continuously positive function of the employment rate, the 'consistent claims rates of employment' or the SIRE would be a single value at the intersection of firms' and workers' target wage share curves, as derived in Hein and Stockhammer (2009, 2010, 2011) and Hein (2023a, chap. 5). The SIRE can be understood as the counterpart to the 'non-accelerating inflation rate of unemployment' (NAIRU) in orthodox economics, which is defined as $u^N = 1 - e^N$. The wage share which is consistent with the targets of firms and of workers is denoted as Ω^N:

$$\Omega^N = \Omega_W^T = \Omega_F^T \tag{20}$$

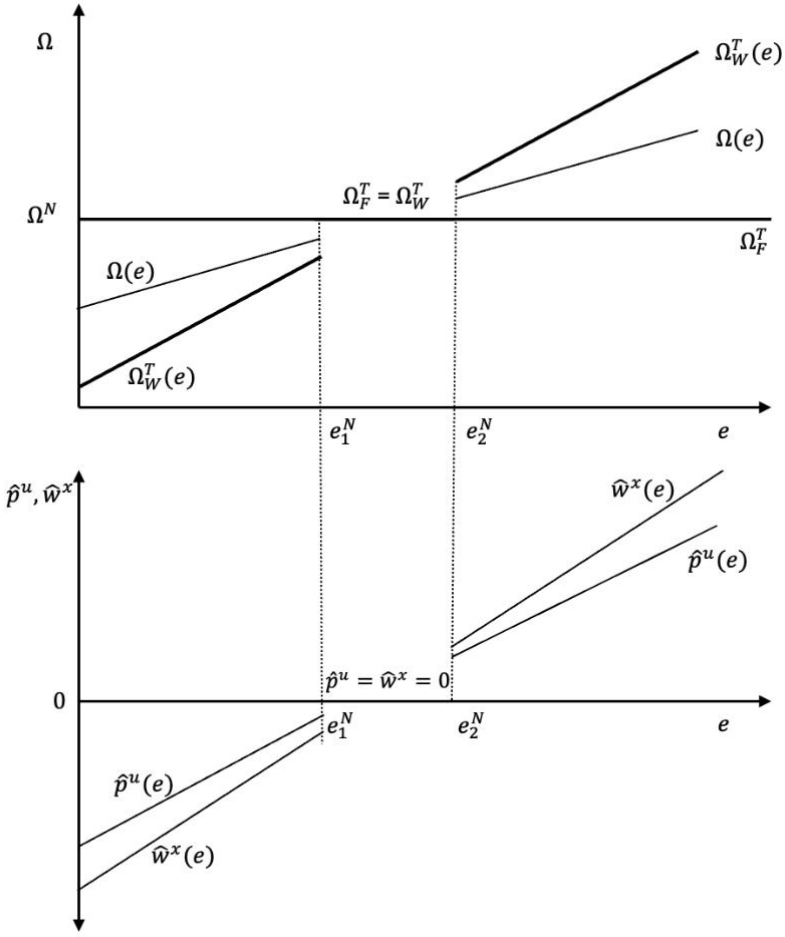

Figure 2: The distribution- and inflation-generating process: target wage shares, the distribution curve, excess wage inflation and unexpected price inflation

Any deviation of the actual rate of employment from the SIRE corridor will lead to inconsistent income claims. In the case of $e > e_2^N$, workers' target wage share exceeds firms' target wage share ($\Omega_W^T > \Omega_F^T$), we have $\Omega_W^T + h_F^T > 1$, income claims will exceed the distributable output and generate inflationary pressure. If $e < e_1^N$, workers' target wage share falls short of firms' target wage share ($\Omega_W^T < \Omega_F^T$), we have $\Omega_W^T + h_F^T < 1$, income claims fall short of output, and we will observe disinflationary pressure.

Let us now look at the (dis-)inflationary processes in detail. For the process of nominal wage setting and price setting we assume that wages are set at the beginning of the period, and that firms set prices as soon as wages have been set. Wages may then respond at the beginning of the next period, and so on.

Therefore, we start with workers' wage setting, and we assume that workers' inflation expectation in each period is given by past inflation ($\widehat{p_t^e} = \widehat{p_{t-1}}$). We thus assume that workers have adaptive expectations. With given labour productivity, we will have the following equation for wage inflation:

$$\widehat{w_t} = \omega(e_t - e^N) + \widehat{p_t^e} = \omega(e_t - e^N) + \widehat{p_{t-1}}, \qquad \omega \geq 0 \qquad (21)$$

From this equation, we can also define excess wage inflation ($\widehat{w^x}$) as the difference between wage inflation and expected price inflation, triggered by the difference of the employment rate from the SIRE:

$$\widehat{w_t^x} = \widehat{w_t} - \widehat{p_{t-1}} = \omega(e_t - e^N) \qquad (22)$$

This curve is shown in the lower part of Figure 2. If $e > e_2^N$, workers' target wage share is higher than Ω^N, workers will raise nominal wages above expected inflation, excess wage inflation will be positive, in order to raise real wages and the wage share towards their target wage share. If $e < e_1^N$, workers' target wage share is lower than Ω^N. Workers are too weak to even keep wage inflation in line with expected price inflation and excess wage inflation will be negative. If $e_1^N < e < e_2^N$, workers' target wage share is at Ω^N and hence equal to firms' target wage share. Workers will raise nominal wages in line with expected inflation, and excess wage inflation will be zero.

While the coefficient Ω_C in equation (18) for the target wage share of workers tells us by how much the workers' target wage share will respond toward the employment rate outside the corridor of workers' constant wage share targets, the coefficient ω in equation (21) denotes the speed of adjustment of the nominal wage rate in order change the wage share towards the workers' target.

For firms' price setting and the rate of price inflation, we can start with the mark-up pricing equation (16). With a constant mark-up and given labour productivity, price inflation would be equal to wage inflation in each period. Workers would not be able to raise the real wage rate or the wage share at all, and the target wage share of firms would always be realised. This is what is assumed in the NCM model by Carlin and Soskice (2005, 2015, chaps 2–3), but also in the post-Keynesian model by Hein (2006, 2008, chaps 16–17). However, in our current model, we have assumed that, although producing the same single good, firms are different and may operate at different levels of productivity and efficiency, and may also face different nominal wage rates, depending on their regional location, for example. Mark-ups will therefore also be different among firms, because they all set the same price – or at least cannot deviate too much from the prices set by their competitors. Therefore, in order to remain price competitive and to stay in the market, less productive firms with higher unit labour costs have to accept lower mark-ups than the more productive firms with lower unit labour costs.[5] From this it follows that a change in nominal wage inflation cannot be completely passed through to price inflation by the firm sector as a whole. Only the most productive firms will be able to fully pass

[5] See Sylos Labini (1979) for more extensive elaborations supporting incomplete pass-through of wage inflation to price inflation.

through an increase in wage inflation, while less productive firms will not be able to do so and will have to accept lower mark-ups. The average mark-up and the average profit share will thus fall. In the case of falling wage inflation, the less productive firms will be forced to pass this on to price inflation while the most productive firms can afford not to do so completely and hence raise their mark-ups. Therefore, the average mark-up and the average profit share will rise.

Based on these considerations, for the price inflation equation of our model, we assume that the firm sector passes through the part of wage inflation, which follows previous price inflation, but that excess wage inflation is only partly passed through by the firm sector as a whole:[6]

$$\widehat{p_t} = \vartheta\omega(e_t - e^N) + \widehat{p_{t-1}}\,, \qquad 1 > \vartheta \geq 0 \tag{23}$$

The coefficient ϑ denotes the pass-through factor for excess wage inflation to price inflation, which we assume here to be lower than one.[7] For unexpected inflation ($\widehat{p_t^u}$), the difference between actual and expected inflation, we obtain:

$$\widehat{p_t^u} = \widehat{p_t} - \widehat{p_{t-1}} = \vartheta\omega(e_t - e^N) \tag{24}$$

Unexpected inflation as a function of the employment rate is also shown in the lower part of Figure 2. Since the pass through from excess wage inflation to price inflation is lower than one, unexpected price inflation will fall short of excess wage inflation if $e > e_2^N$, and the wage share will hence rise. If $e < e_1^N$, unexpected price dis-inflation will be lower than excess wage dis-inflation, and the wage share will hence fall. This incomplete pass-through of wage inflation to price inflation means that whenever the employment rate is outside the SIRE corridor, there will be an effect on functional income distribution. However, if $e_1^N < e < e_2^N$, excess wage inflation and unexpected price inflation will be zero, and the wage share will remain constant at Ω^N. The relationship between the employment rate und the realised wage share, the distribution curve, is shown in the upper part of Figure 2:

$$\begin{gathered} \Omega = \Omega^N = \Omega_W^T = \Omega_F^T \qquad if\ e_1^N < e < e_2^N \\ \Omega = \Omega(e), with\ \frac{\partial \Omega}{\partial e} > 0, \qquad if e <\ e_1^N\ or\ e > e_2^N > 0 \end{gathered} \tag{25}$$

Outside the SIRE corridor, we thus have a profit squeeze distribution curve, according to which the wage share is a positive function of the employment rate. Here, the distribution curve is not only upwards sloping, it will also rotate towards the workers' target wage share curve, because of the incomplete pass-through of excess wage inflation to price inflation period by period. As shown in Table 1, we can hence distinguish three cases, also visible in Figure 2.

[6] For alternative formulations of the price inflation equation, see Hein and Häusler (2024).

[7] In Carlin and Soskice (2005, 2015, chaps 2–3) and Hein (2006, 2008, chaps 16–17) the assumption is $\vartheta = 1$.

Table 1: Inflation and distribution effects of deviations of the employment rate from the SIRE			
	Ω_W^T, Ω_F^T	$\widehat{p_t^u}, \widehat{w_t^x}$	Ω
$e > e_2^N$	$\Omega_W^T > \Omega_F^T$	$\widehat{w_t^x} > \widehat{p_t^u} > 0$	$\Omega > \Omega^N$, rising
$e_2^N > e > e_1^N$	$\Omega_W^T = \Omega_F^T$	$\widehat{w_t^x} = \widehat{p_t^u} = 0$	$\Omega = \Omega^N$, constant
$e_1^N > e$	$\Omega_W^T < \Omega_F^T$	$\widehat{w_t^x} < \widehat{p_t^u} < 0$	$\Omega < \Omega^N$, falling

If $e > e_2^N$, workers' target wage share exceeds firms' target wage share, positive excess wage inflation exceeds positive unexpected price inflation, the wage share is higher than in the distribution equilibrium and rising towards the workers' target wage share. If $e_2^N > e > e_1^N$, workers' and firms' target wage shares coincide, excess wage inflation and unexpected price inflation will each be zero, wage and price inflation will be equal and remain constant, and the wage share is at the distribution equilibrium and will remain constant, too. If $e < e_1^N$, workers' target wage share is lower than the firms' target wage share, excess wage inflation is negative and smaller than negative unexpected price inflation, the wage share is lower than in the distribution equilibrium and falling towards the workers' target wage share.

2.3. Overall equilibrium and stability

In the final step of building our model, we can now link the income- and employment-generating process from Figure 1 and the inflation- and distribution-generating-process from Figure 2 and examine the overall equilibrium and its stability. As shown above, the income- and employment-generating process takes distribution as exogenous and determines the goods market equilibrium level of output and employment. The inflation- and distribution-generating process takes the employment rate as exogenous and determines income distribution and unexpected inflation. Now we will link these two processes. Figure 3 includes the target and actual wage share curves, as well as excess wage inflation and unexpected price inflation curves from Figure 2 and includes the linearised employment function from Figure 1.

The intersection of the distribution curve with the employment curve generates a distribution-employment equilibrium. At this point of intersection, the associated employment rate generates a wage share (via the distribution curve), which generates an employment rate (via the employment curve), which generates the same wage share, and so on. As shown by Blecker and Setterfield (2019, chap. 5.3) the stability of this distribution-employment equilibrium requires the employment curve to be steeper than the distribution curve, as can easily be checked graphically. However, an overall equilibrium with constant inflation and constant functional income distribution will only be attained, if the distribution and employment curve intersect within the SIRE corridor. This is shown in Figure 3.

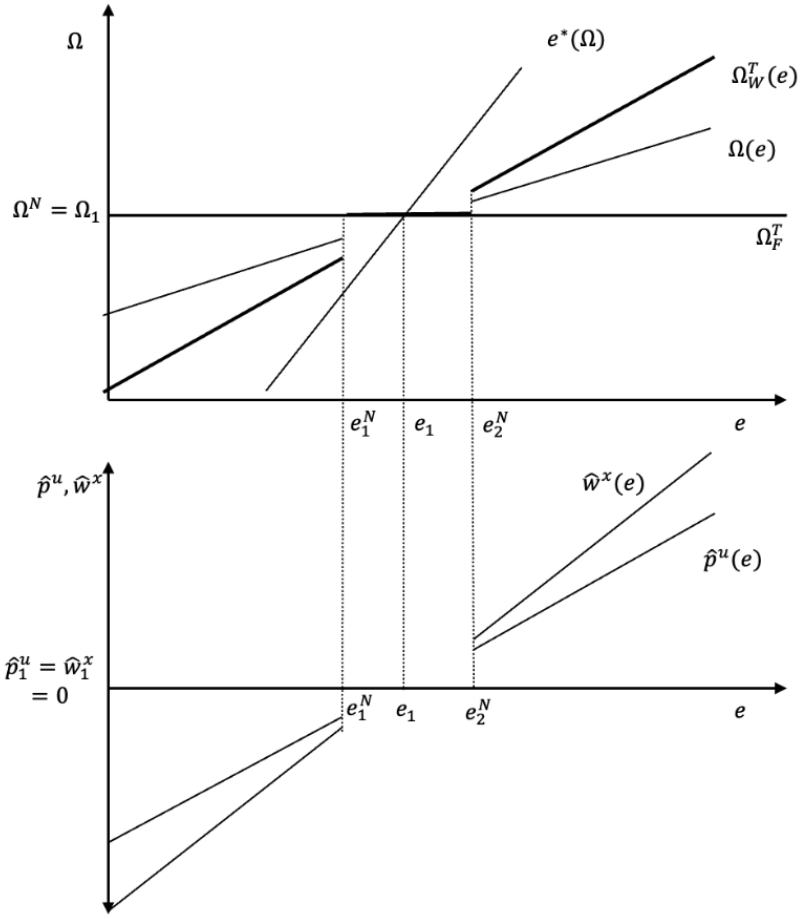

Figure 3: Joint equilibrium of income/employment and inflation/distribution generating processes

But it cannot be taken for granted that the distribution-employment equilibrium coincides with the distribution claims equilibrium within the SIRE corridor. Such a case is shown in Figure 4, were the wage-led employment curve and the profit-squeeze distribution curve intersect at $e_1 > e_2^N$. Although the wage share Ω_1 at e_1 exceeds Ω^N, this generates excess wage inflation – workers want to come closer to their even higher target wage share at e_1 – and somewhat lower unexpected price inflation – the pass-through to price inflation is incomplete. This makes the distribution curve rotate towards the workers' target wage share, and the distribution-employment equilibrium will not stay at e_1 but shift to the right – even further away from e_2^N. The wage share will rise towards the workers target, and excess wage inflation and unexpected price inflation will also increase. Therefore, the distributional claims equilibrium outside the SIRE corridor is 'not a strong attractor' (Sawyer 2002). Any deviation from e_2^N will lead to a cumulatively unstable process, with rising employment rates, rising excess wage inflation exceeding rising unexpected price inflation, as well as rising wage shares. If $e < e_1^N$, the cumulatively diverging process away from the SIRE corridor will be in the other direction.

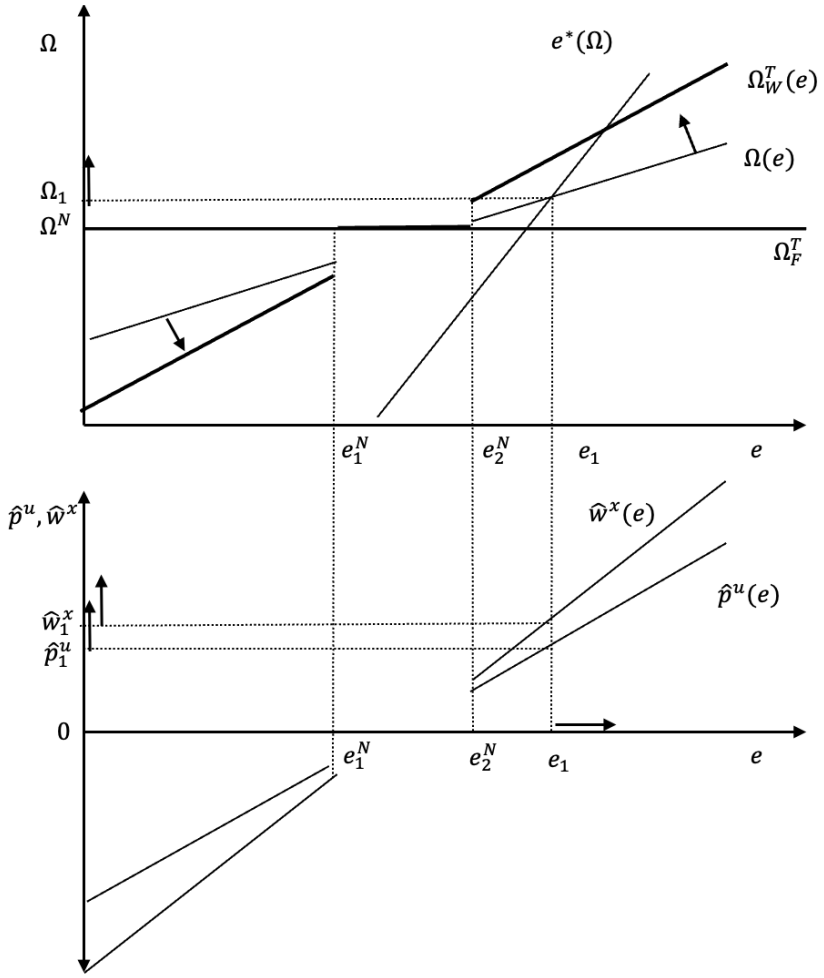

Figure 4: Unstable joint equilibrium

Here is not the place to investigate into medium- or long-run limits to cumulative instability around the SIRE corridor, as for example contained in Hein and Häusler (2024). On the one hand, one could argue that a limit is approached, as soon as the distribution curve has reached the workers' target curve and the employment rate has moved to the intersection of the employment curve with the workers' target wage share curve.[8] On the other hand, however, with rising unexpected inflation, also the employment curve may start to shift to the right. Capitalists' households' propensity to consume out of current income may rise, because of expected higher prices in the future. Most importantly, autonomous investment and autonomous consumption may rise, because unexpected inflation favours debtors – the real value of debt and the associated interest payments fall (Hein 2023a, chap. 5).

An in-depth discussion of macroeconomic policy responses to stabilise the economy within the SIRE corridor is beyond the scope of this contribution. Post-Keynesians have been highly critical of the NCM approach (Carlin and Soskice 2005, 2015, chaps 2–3), which advocates

[8] However, this would require to reformulate the workers' wage inflation equation (21), as argued by Hein and Häusler (2024)

inflation targeting interest rate policies by the central bank as main macroeconomic stabilisation policies, for two reasons (Hein 2023a, chap. 5). First, in the short run central bank interest rate policies have highly asymmetric effects. In a boom period with rising inflation rates, raising the short-term policy rate may increase the long-term interest rate relevant for private expenditures and may at some point reduce private demand, employment and hence inflationary pressure. But in a recession with falling inflation rates, and finally deflation, there is the zero lower bound for nominal interest rates, long-term rates may not follow short-term rates because of rising liquidity preference, default risks, etc., and even if long-term rates fall there is no good reason to believe that this will stimulate private credit-financed expenditure in a recession climate. Second, even if successful in bringing down inflationary pressure in the short run, rising interest rates will have detrimental effects on inflation in the long run. This is so, because higher interest costs force firms to raise their mark-ups, lower their target wage share and thus reduce the SIRE, which then means raising inflationary pressure for employment rates above that new SIRE.

For these reasons, post-Keynesians have endorsed a combination of incomes policies and fiscal policies to stabilise the economy around the SIRE (Hein 2023a, chap. 6). Income policies, including wage bargaining coordination, should be used to align workers' and firms' distribution targets and to establish (or widen) the SIRE corridor, in order to increase the level of employment which is consistent with constant inflation rates. Achieving this goal would require a state-supported coordination process between employer associations and workers' trade unions. Functional finance fiscal policies, i.e. varying government expenditures without deficit or debt targets or constraints, should then be applied in order to shift the employment curve towards the upper limit of that corridor, to the maximum SIRE, and stabilise it there. Government expenditure policies have symmetric effects in the short run, in particular, they are also effective in a recession, and they are not raising distributional claims and hence conflict inflation in the long run, and thus do not have detrimental effects. Central banks should support such policies by targeting low long-term interest rates, reducing distributional claims of firms and rentiers and thus inflationary pressures.

3. Bottlenecks and rising energy prices

We can now briefly apply our very simple model to the inflationary shock taking off in the second half of 2021 and lasting until 2024 in most advanced capitalist economies. Several empirical studies have argued that the inflationary shocks could be partly explained by recovery dynamics after the COVID-19 crisis facing bottlenecks due to the disruption of global value chains, and then by the energy price shock triggered by the Russian war on Ukraine (Bivens 2022, Ragnitz 2022, Dullien *et al.* 2023, Ferguson and Storm 2023, Stiglitz and Regmi 2023, Tölgyes and Picek 2023, Matamoros 2024). Rising inflation was hence caused by rising (imported) energy prices, on the one hand, and by firms' taking advantage of supply constraints by means of raising their mark-ups, on the other hand. In particular, Weber and Wasner (2023) argued that we were witnessing 'sellers' inflation', i.e. profit-driven inflation with a simultaneous increase in inflation and profit shares. In the following debates some

authors have pointed out that in a Kaleckian conflicting claims inflation framework the simultaneous increase in inflation and profit shares does not require that firms raise mark-ups, but can already be explained by the increase in (imported) energy prices and by the recovery from the crisis as such (Hein 2024, Lavoie 2024). Albeit empirically also rising mark-ups may have played a role (Storm 2023, Nikiforos *et al.* 2024).[9]

Our basic model does not allow us to elaborate on these debates. However, we can clarify the basic difference between a conflict inflation approach like ours and a mainstream explanation of the recent inflation as being driven by excess aggregate demand or excess money supply. Figure 5 presents such a conflict inflation explanation based on our simple model. Our starting point is the overall equilibrium within the SIRE corridor, where e_1 is between e_1^N and e_2^N, $\Omega_1 = \Omega_1^N = \Omega_{F1}^T = \Omega_{W1}^T$ and $\widehat{w}_1^x = \hat{p}_1^u = 0$. A rise in imported energy prices or bottlenecks in the global value chains will induce firms to increase their mark-up over unit variable labour costs to cover the additional costs and/or to increase profitability. Therefore, the firms' target profit share rises and their target wage share decreases, and the curve shifts downwards from Ω_{F1}^T to Ω_{F2}^T. This implies that the different parts of the distribution curve each shift down from $\Omega_1(e)$ to $\Omega_2(e)$. With an unchanged employment curve, the temporary distribution-employment equilibrium will move down to e_2, the employment rate will hence fall, and the unemployment rate will rise, the wage share will fall to Ω_2, and the profit share will increase accordingly. With workers' wage share target unchanged, the downward shift in the firms' target wage share causes a fall of the SIRE to e_3^N which is below the actual employment rate e_2, and an upwards shift of the different parts of both the excess wage inflation curve and the unexpected price inflation curve. Note that we are now in a situation, where the SIRE is not a corridor anymore but a single point (e_3^N). At e_2 we will thus have unexpected price inflation p_2^u and excess wage inflation w_2^x.

As a result of the shock, we thus see a lower employment rate, a lower wage share and a higher profit share, rising price inflation (positive unexpected inflation) and also rising wage inflation (positive excess wage inflation), which exceeds price inflation – as long as workers' target wage share curve does not change. Following our arguments in the previous section, there is no endogenous adjustment to the lower SIRE e_3^N. On the contrary, since excess wage inflation at e_2 exceeds unexpected price inflation, and the distribution curve will move towards the workers' target wage share, the employment rate will rise, moving it further away from e_3^N, associated with rising unexpected inflation. There is thus no endogenous process towards a new stable inflation equilibrium, and the economy needs stabilisation policy.

[9] For further models, debates, country studies etc. on the 2021-24 inflation episode, see the contributions to the respective special issues of the *European Journal of Economics and Economic Policies: Intervention* (2024, 21 (2)), *International Journal of Political Economy* (2020, 49 (4), 2022, 51 (1)), *Review of Keynesian Economics* (2023, 11 (2)), and *Review of Political Economy* (2024, 36 (4)).

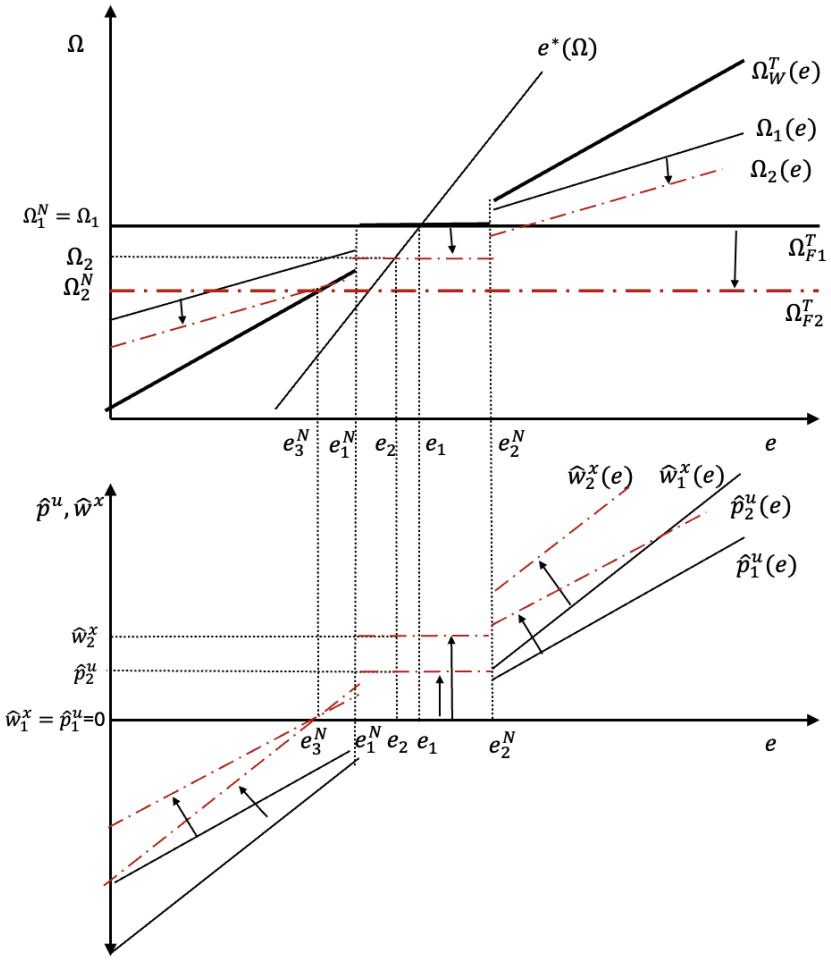

Figure 5: Bottlenecks and energy price shocks raising firms' target profit share and generating an increase in inflation and the profit share (and a fall in the wage share)

As we have pointed out above, applying inflation targeting interest rate policies by the monetary authorities, as recommended by the NCM, may temporarily reduce inflation rates, but at the expense of increasing inflationary pressure in the medium run, because higher real interest costs feed firms' target profit share, reduce their target wage share and thus lower the SIRE even further. Therefore, post-Keynesians have rather opted for an alternative policy package in order to mitigate inflationary pressure and preserve a high rate of employment (Hein 2024). This is based on a 'sharing the burden' incomes policy approach of aligning distribution targets in the face of energy price shocks and supply constraints. This would include measures to prevent firms from raising the mark-up on unit labour costs, like selective price controls, competition policies, public investments to overcome supply constraints, as well as tax reliefs. Central banks targeting low long-term interest rates would contribute to this. Workers'/trade unions' wage demands should be coordinated and accept the feasible wage share and aim at a medium-run increase of nominal wages in line with the target rate of inflation plus the labour productivity growth trend. Effective coordination requires strong trade unions and employer associations, and also government involvement (minimum wage policies, legal extension clauses, etc.). These measures should prevent a fall in the SIRE. Fiscal

policies should support low-income households through transfers and should manage aggregate demand such that a high non-inflationary employment rate is reached.

4. Conclusions

Based on the notion of endogenous money, which precludes inflation to be a monetary phenomenon, this contribution develops an introductory macroeconomic model of conflict inflation aimed at undergraduate teaching. We have developed a simple post-Keynesian/Kaleckian two-class model for the closed economy in three steps. In the first step, we have outlined the income- and employment-generating process based on the principle of effective demand. For this we have taken prices and distribution as exogenously given, and we have derived a distribution dependent employment curve, which is wage led in our model. In the second step, we have introduced the inflation- and distribution-generating process, taking demand and employment as exogenously given variables. Based on competitive claims, we have derived the stable inflation rate of employment (SIRE) as distributional claims equilibrium, which is conceived as a range as long as there is some coordination of wage bargaining. Outside this range of distribution claims equilibria, we have derived a profit-squeeze distribution curve, which is rotating to the workers' target wage share curve because of incomplete pass through of wage inflation to price inflation. In the third step, we have linked income/employment- and inflation/distribution-generating processes and derived the overall equilibrium. We have shown that the SIRE equilibrium is not stable (or an attractor) and that it requires macroeconomic stabilisation policies. We have argued that inflation-targeting policies by the central bank, as advocated by the NCM, face severe problems, and have briefly sketched a post-Keynesian alternative macroeconomic policy approach. This contains stabilising incomes policies that establish or broaden the SIRE corridor, demand management fiscal policies and central banks targeting low interest rates. Finally, we have applied our basic model to explain the conflict nature of the recent inflation period, associated with the recovery from the Covid 19 crisis and the Russian war on Ukraine. With this contribution we have laid the foundations for extending the conflict inflation approach, by means of explicitly including further groups of actors (rentiers, the state, the foreign sector) both in the income/employment- and inflation/distribution-generating processes of the model.

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