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Exchange rates and international prices are fundamental to explain inflation in open economies. Conflict inflation models account for these variables by including imported inputs and, in some cases, a distributive impact of exchange rates. A different viewpoint emerges from the Classical-Keynesian theory of distribution for a price-taker open economy. Thus, we explore this alternative by developing a conflict inflation model building on Classical-Keynesian approach. The paper contributes to the literature by combining the conflicting claims approach with the Classical-Keynesian open economy framework. Including tradable prices, the model considers their direct impact on distribution. Therefore, it addresses a cause of inflation overlooked in the literature. Finally, conflict inflation affects the real exchange rate, which becomes an important distributive variable.

1 INTRODUCTION

Growing international integration has inspired criticism of inflation theories focusing mainly on domestic variables (Borio and Filardo, 2007). Since international variables explain much of national inflation across countries, theoretical models should account for the high substitutability of tradable goods, international competition, labor mobility, and cross-border input-output linkages (Bobeica and Jarocinski, 2019). The evolution of prices and income distribution in open economies thus cannot be studied independently from international prices and exchange rates.

Post-Keynesian conflicting claims models have explained inflation as the outcome of the conflict of social groups over income distribution. Although most analyses have focused on a closed-economy perspective, many studies have extended conflict inflation to open economies. An immediate extension lies in the inclusion of non-competing imported inputs among production costs (Cassetti, 2002; Rowthorn, 1977; Stirati, 2001). This perspective highlights imported inputs' costs as an additional source of pressure on domestic incomes, affecting thus conflict and inflation. Other models have considered a direct distributive effect of real exchange rates, as it loosens or tightens foreign competition. Therefore, these contributions assume the real exchange rate affects firms' mark-up (Blecker, 1989; Vera, 2010) or firms' and workers' targeted income share (Bastian and Setterfield, 2020; Blecker, 2011; Lavoie, 2014). Despite their importance, these contributions seem to challenge the explanation of distribution in

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open economies, adding up to the shortcomings of relying on mark-ups determined by the degree of monopoly (Pivetti, 1991; Steedman, 1992; Stirati, 2001). An alternative angle emerges from the Classical-Keynesian price equations compatible with the open economy. This literature defined long period positions to prices, distribution, and trade specialization (Dvoskin and Feldman, 2020; Dvoskin et al., 2018; Steedman, 1999). However, its implications for inflation have not been fully appreciated yet.

This paper aims to model conflict inflation based on Classical-Keynesian price equations for a price-taker open economy. This approach allows us to account for tradable prices and their effect on distribution. We contribute to the literature by combining a model of conflict inflation with the Classical-Keynesian approach for the open economy. The model shows that the relation between inflation and exchange rate is crucial for distribution in an open economy. While nominal exchange rates and international prices affect distribution, workers can react to external shocks through wage bargaining. Increases in money wages can thus compensate for external shocks. We assume the monetary authority can also react with nominal devaluations. The equilibrium distribution depends on the result of wage bargaining, exchange rate devaluations, and inflation.

Section 2 outlines the conflicting claims model in the closed economy. Section 3 reviews the Post-Keynesian literature on inflation in the open economy. In Section 4, we present the nominal price equations for the open economy case, deriving the relations between the distributive variables. These equations are reappraised in a dynamic model of inflation and conflicting claims in Section 5, where the main findings are discussed. A final section summarizes the conclusions.

2 CONFLICT INFLATION

Conflicting claims models have shed light on the race between prices and money wages. The struggle among capitalists and workers is the main inflationary pressure in closed economy conflicting claims models. When workers obtain wage increases, capitalists protect their profits by passing higher unit labor costs into prices. A higher cost of living leads to further wage demands in a process that may be repeated many times. Along these lines, we can argue that inflation results from distributive conflict (as Okishio 1977, Rowthorn 1977, Lavoie, 2014, p. 541-573).[1] The *real* outcome for distributive variables is only known at the end of each period, as nominal changes affect the price level and relative prices (Pivetti, 1991; Stirati, 2001). Rowthorn (1977) explicitly introduced the unemployment rate among the determinants of workers' wage claims. The stylized fact

1 See also Dutt (1987) Dalziel (1990).

that lower unemployment correlates with money wage increases is consistent with the assumption that workers experience higher bargaining power in wage bargaining when unemployment is low. Meanwhile, when unemployment is high, workers fear losing their jobs and have weaker bargaining power. Apart from labor market conditions, institutional and political factors affect workers' bargaining position, such as labor laws, the strength of unions and employer's associations, social rights, and the political representation of class interests.

While, on the one side, fear of unemployment discourages wage claims, on the other, competition imposes boundaries to price increases. If capitalists could *immediately* and *completely* pass-through cost increases into prices, workers' efforts to raise real wages would be vain. In other words, if an increase in money wages causes an immediate and proportional rise in prices, then real wages remain constant (Tarling and Wilkinson, 1985). However, price adjustments are constrained by competition. That implies a delayed pass-through of cost increases into prices, allowing wage bargaining to affect income distribution.

Conflicting claims models build on the Kaleckian theory of distribution (Lavoie, 2014, p. 541-573). Prices follow a mark-up on average costs rule. In turn, the mark-up is determined by the degree of monopoly of the industry (Kalecki, 1954). Nevertheless, Kalecki (1971) also argued that strong unions may compress firms' mark-ups. Conflicting claims models explicitly allow for this possibility, since workers' bargaining power affects the equilibrium distribution.

Critics have pointed shortcomings in this approach to distribution. Kaleckian mark-up pricing does not consider that firms' costs depend on other firms' prices — and, hence, on the mark-ups found in other industries —, overlooking input-output relations (Steedman, 1992). The average mark-up of the economy cannot be properly defined as an 'average' since the weights (the output value of different industries) depend on relative prices and, thus, on the mark-ups themselves (Steedman, 1992). Moreover, the explanation of the mark-up based on the degree of monopoly does not set a lower limit for the profit rate (Pivetti, 1991, p. 105-119).

Alternatively, conflict inflation can build on the Classical-Keynesian approach to distribution (Stirati, 2001). This approach brings a different perspective into the study of inflation while avoiding the mentioned shortcomings. Hence, Stirati (2001) starts with nominal price equations and a monetary explanation of distribution. The interest rate is of particular importance for determining the profit rate. However, inflation and wage bargaining affect distribution, so that real variables (as the real interest rate) are the ones compatible with the outcome for distribution (Pivetti, 1991; Serrano, 1993; Stirati, 2001).

While this approach brings a useful contribution to the study of inflation and closed economy distributive closures, it is of limited interest for the open economy case. Addressing this gap, we model conflict inflation building on a Classical-Keynesian framework for the open economy. Before presenting our contribution, we review how inflation in open economies has been discussed by different authors.

3 INFLATION IN THE OPEN ECONOMY

Distributive conflict has long been present in open economy discussions of inflation. When reviewing the work of Bresciani-Turroni on the German hyperinflation in the inter-war period, Joan Robinson (1938) explicitly assigns a central role to money wage increases in the explanation of hyperinflation. Wage increases were a response to the rise in the cost of living due to sharp exchange rate devaluations. Money wages increases further rose production costs, worsening the trade account balance, and leading to additional devaluations. This process generated an inflationary spiral of money wages and the nominal exchange rate. The origin of the external crisis lied in the war reparations imposed in the Treaty of Versailles (Câmara and Vernengo, 2001).

Latin American Structuralist School discussed conflict inflation triggered by external disequilibria since the 1950s (Furtado, 1954; Noyola Vázquez, 1956; Sunkel, 1958). The distributive conflict, among other propagation mechanisms, would explain the persistence of inflationary shocks.[2] However, the ultimate cause of inflation were the structural shocks related to chronic deficits in the Balance of Payments, productivity bottlenecks, and the inelasticity of supply of food products (due to land concentration and low productivity of agriculture) (Furtado, 1954; Noyola Vázquez, 1956; Sunkel, 1958). Structural deficits in Balance of Payments due to the need for industrial imported goods and the secular decline of terms of trade[3] led to repeated exchange rate devaluations, directly causing inflation. Domestic factors propagated these shocks, eventually leading to further devaluations.

Nevertheless, a sharp improvement of the terms of trade could also be inflationary. Analyzing the effect of the price of coffe on Brazilian inflation,[4] Celso Furtado (1963, 246-258) describes two different transmission mechanisms through which the increase in the international price of an exported commodity can cause inflation. First, there is an increase in the domestic price of the same commodity. The second effect con-

2 Notably, Furtado (1954, 1963) and Noyola Vázquez (1956) placed conflicting claims among the main propagation mechanisms.
3 Following the Prebisch-Singer hypothesis.
4 Coffee was the main commodity exported by Brazil in the period.

cerns a distributive channel. A higher price of the exported commodity increases the compensation of productive resources allocated in the exporting sector — as land rent. Consequently, a larger portion of land would be dedicated to the exported commodity, reducing the domestic supply of food products. Given the effective demand for food, a smaller supply tends to raise prices. Competition among different uses of land leads the economy towards a position in which these prices are enough to cover the rent earned in the exporting sector. In sum, a persistent increase in the price of coffee raises the land rent, thus increasing the price of agricultural commodities sold in the domestic market. (Furtado, 1963, p. 257).

Tradable prices are explicitly included in the Scandinavian model of inflation[5] (Aukrust, 1977; Edgren et al., 1973). This model departs from a distinction between two economic sectors: one tradable and the other non-tradable. Prices of the tradable sector are determined in the international market, thereby being insensitive to changes in domestic costs. In turn, prices of the non-tradable sector depend directly on costs once they are not constraint by foreign competition. The two sectors also differ with respect to productivity growth. The tradable sector contains industries leading productivity growth (as manufacturing) in contrast with the non-tradable sector (mainly composed of services). The model assumes a constant nominal exchange rate based on the rules of the Bretton Woods agreement, then in force. Moreover, the model assumes that money wages completely absorb productivity gains in the tradable sector, also absorbing the increase in international prices. Wage increases in the tradable sector then spread to the non-tradable sector, either because of competition in the labor market or unions' activity. Since non-tradable prices follow unit labor costs, the inflation rate is completely determined by the international inflation and the domestic differential of productivity across sectors (Aukrust, 1977; Edgren et al., 1973).

The Scandinavian model stresses that firms cannot freely pass through cost increases into the prices of tradable commodities in price-taker open economies. Therefore, mark-ups of the tradable sector are compressed when wages exceed the rise in international prices and productivity.[6]

Open economy inflation models also consider the role of the exchange rate. A target for the real exchange rate may result from a policy orientation to avoid — or reduce — the trade deficit, as in some models (Vera, 2010; Blecker, 2011; Vernengo and Perry, 2018). However, the success of this policy depends on the Marshall-Lerner condition. Let us assume a nominal exchange rate devaluation, pursued by a monetary authority targeting a certain value for the real exchange rate. Even if the targeted real

5 Canavese (1982) compares Latin American and European structuralist theories of inflation.

6 That, in turn, would affect investment, growth, and Balance of Payments equilibrium (Edgren et al., 1973). See also Morlin and Bastos (2019a) and Morlin and Bastos (2019b).

exchange rate is achieved at the moment of the devaluation, the propagation of inflation through wage and price increases partially offsets the previous real devaluation. This propagation, in turn, can lead to additional nominal devaluations, imposing a pattern of chronic devaluations and a race between money wages and the exchange rate (Blecker, 2011; Vernengo and Perry, 2018).

Vera (2010) introduces the Balance of Payments to approach a small economy running deficits. The author assumes imported goods are part of the workers' bundle. In a second step, he also includes imported inputs to domestic production. Finally, Vera considers mark-ups to be flexible and positively affected by the real exchange rate. This framework generates persistent inflation and repeated exchange rate devaluations. However, this model does not explicitly account for the distributive conflict.

Vernengo and Perry (2018) also discuss the inflationary impact of a deterioration in the Balance of Payments. The analysis assumes monetary authorities target a value for the real exchange rate, aiming to stimulate exports (and reduce imports) to pay for the external debt service. This policy is pursued by adopting a nominal depreciation rule – namely, crawling pegs. Hence, an increase in the international interest rate (as the Volcker shock in the 1970s) rises the targeted real exchange rate due to the increase in the debt service, leading to an exchange rate devaluation. After that, incomplete wage indexation temporarily propagates the exchange rate shock. Successive rounds of adjustment from both sides generate an exchange rate-wage-price spiral.

Charles and Marie (2016) propose an alternative model to account for inflation in open economies. The authors assume firms are indebted to the international capital market and must the pay debt service in international currency. Firms' pricing decision thus includes the cost of debt service. Therefore, if these costs increase either because of exchange rate devaluations or increases in the international interest rate, firms raise prices. Monitoring trade account balance allows firms to form expectations about the future exchange rate. In this way, firms anticipate the impact of a devaluation on the debt service and imported inputs costs, raising final prices in advance of the shocks. In this framework, an external shock can provoke an inflationary spiral. Under extreme conditions, it can lead to hyperinflation. Charles and Marie (2016) assume the indexation of wages to inflation is complete. The authors do not explicitly address wage claims and distributive conflict.

In different ways, these models advance in the inclusion of Balance of Payments concerns in the analysis of inflation, revealing the distributive impact of the exchange rate and international prices. After external shocks, inflation persists due to distributive conflict. Thus, we can move forward to discuss how conflicting claims are modeled in the open economy case.

3.1 *Conflicting claims in the open economy*

Conflicting claims in the open economy can be modeled by extending closed economy models with the inclusion of (non-competing) imported inputs to production (Hein and Vogel, 2008; Rowthorn, 1977; Stirati, 2001). Conflict also emerges in models including imported consumption goods as part of workers' bundles (Cassetti, 2002). However, the former approach appears more frequently in the literature. We discuss this approach following Hein and Vogel (2008) and Lavoie (2014). Equation 1 shows an economy in which a unit of output is produced with a combination of labor and an imported input, employed in quantity a_m. The input's price is given by the international price (p^*_μ) times the nominal exchange rate (e). Mark-up depends on the degree of monopoly, as in closed economy models.

$$P_t = (1 + \mu_t)(w_t l_t + a_m e_t p^*_{m,t}) \tag{1}$$

Equation 2 describes the profit share. For a given wage rate, the profit share increases with the mark-up, the international price, the exchange rate, and the coefficient a_m.

$$\Pi_t = \frac{1}{1 + \frac{1}{\mu_t(1+z_t)}} \tag{2}$$

where

$$z_t = \frac{a_m e_t p^*_{m,t}}{l_t w_t}$$

In these models, both a uniform rise in international prices and an exchange rate devaluation present the same effect on prices and distribution. Either of these shocks proportionally increases the value of imported inputs as measured in domestic currency, thus raising production costs. The adjustment of prices to costs is assumed to happen instantaneously. Therefore, the real value of the mark-up – *i.e.*, the ratio between prices and current reproduction costs — is constant.[7] The profit share increases after such shocks since a greater cost of imported inputs (given the greater p^* or e) implies a greater z_t and, thus, a larger profit share (Π_t) (see equation 2). As a counterpart, both the wage share and real wages fall due to the increase in the price level. Putting it differently, the increase in the price of imported inputs (as measured in the domestic

7 Assume, for the sake of exposition, that prices do not adjust instantaneously after an external shock. In that case, an increase in international prices (or an exchange rate devaluation) immediately reduces the mark-up due to the higher replacement costs of capital. As higher costs are passed through into prices, the mark-up is restored to its initial value, while real wages absorb the external shock. The final profit-share is larger than the initial one.

currency), *ceteris paribus* reduces the National Income available to be distributed among workers and capitalists. If the mark-up is constant, the higher costs are completely pass through into prices leaving all the burden to workers in the form of a lower real wage and a lower wage share.

A lower real wage may trigger reactions in the form of wage claims, leading to an inflationary process. The outcome of this process depends on capitalists' ability to pass on wage increases to prices. In Rowthorn (1977), above a threshold, complete and instantaneous pass-through ensures that the burden falls on workers, whose reaction only accelerates inflation. Other models assume an incomplete pass-through, allowing the bargaining process to affect the equilibrium mark-up (Bastian and Setterfield, 2020; Blecker, 2011; Lavoie, 2014). In sum, an increase in the costs of imported inputs implies either lower mark-ups or lower real wages – or an intermediate situation in which losses are shared between capitalists and workers.

3.2 *Mark-ups and the real exchange rate*

Closed economy conflicting claims models assume firms' mark-up (or targeted mark-up) depend exclusively on the degree of monopoly. However, foreign competition can affect domestic mark-ups in open economies. Blecker (1989) accounts for this effect by introducing flexible mark-ups. Fixed mark-ups are not compatible with foreign competition. Introducing flexible mark-ups " creates the possibility that profit margins may be 'squeezed' between high domestic costs and low foreign prices" (Blecker, 1989, p. 396). Hence, mark-ups are assumed to be a positive function of the real exchange rate. A real depreciation makes foreign competing commodities relatively more expensive, allowing domestic firms to raise mark-ups. Hence, the flexible mark-up introduces a profit-claim of capitalists related to a real depreciation. [8] This approach is also adopted by Vera (2010).

An alternative way to model the distributive effect of the real exchange rate and its interaction with inflation is found in Blecker (2011). The author includes the real exchange rate among the determinants of firms' targeted real wage in a conflicting claims approach. The pressure of foreign competition explains the negative effect of the real exchange on firms' targeted real wage (or a positive effect on the targeted mark-up). Such effect follows a similar reasoning as the flexible mark-ups, implying thus a profit-claim related to external competitiveness. Due to the presence of imported consumption goods, the real exchange rate would also affect the rate of change of

8 Blecker (1989, p. 406) stresses the distributive effect of a real depreciation: "a depreciation is equivalent to a money wage cut, since it redistributes income to profits."

money wages (Blecker, 2011, p. 224).[9] In a similar model, Bastian and Setterfield (2020) also include the positive effect of the real exchange rate on workers' targeted real wage. In both models, the net effect of the real exchange rate on equilibrium distribution depends on the relative bargaining power of workers and firms, represented by the parameters of the real exchange rate effects.

We argued above that fixed mark-up pricing presents weakenesses in closed economy models. A mark-up simultaneously determined by the degree of monopoly and real exchange rate brings additional challenges. If the real exchange rate is allowed to affect a flexible mark-up[10] or firms' target, it is no longer clear to which extent the degree of monopoly still determines the mark-up.

4 A FORMAL MODEL OF INFLATION IN AN OPEN ECONOMY

Developments in trade theory within the Classical-Keynesian approach extended the price equations to the open economy case, focusing on the determination of trade and specialization as a problem of choice of technique (Steedman, 1999). The exchange rate and international prices are relevant determinants of prices and distribution in open economies (Metcalfe and Steedman, 1981). We extend this approach into a conflicting claims model.

Let us consider the case of a price-taker open economy[11] producing two commodities: one tradable machine (commodity 1) and one non-tradable consumption good (commodity 2) — as in Steedman (1999). Production in both industries requires non-competing imports as inputs (denoted by the subscripts m and μ) and an amount of the tradable machine and labor. Labor is assumed homogeneous, thereby equalizing the wage rate in the two sectors. Capitalist competition implies that the profit rate is uniform across sectors in the long period position. We assume production takes one period of time. Wages are set at the beginning of this period and paid at the end.

$$p_1 = (a_1 p_1 + a_m p_m)(1 + r) + w l_1 \tag{3}$$

9 Bastian and Setterfield (2020) correctly argue that the adjustment of money wages should follow the rate of change of the real exchange rate rather than the level of the real exchange rate as in Blecker (2011).

10 In the case of flexible mark-ups, an additional problem arises when considering sectorial mark-ups. A sector with a high degree of monopoly could have a lower mark-up than another sector in which domestic competition is more intense, although being more protected from international competition. In that case, the notion that mark-up depends on the degree of monopoly would be perverted.

11 An economy is price-taker in a particular commodity when it cannot satisfy the world demand for this commodity with lower costs than the other countries.

$$p_2 = (a_2 p_1 + a_\mu p_\mu)(1 + r) + w l_2 \tag{4}$$

$$p_1 = e p_1^* \tag{5}$$

The price of commodity 2 follows a customary price equation as in 4, summing unit labor costs and unit costs of circulating capital added of a profit rate. In contrast, the price of the tradable machine is constrained by international competition. Thus, the domestic price for 1 follows the international price (p_1^*) as measured in domestic currency (given the nominal exchange rate e) – as in equation 5.

Since the non-tradable commodity (commodity 2) is the only consumption good, the real wage rate is the ratio of money wages to the price of the non-tradable commodity. The real wage is the meaningful target for workers in wage bargaining.

$$w_R = \frac{w}{p_2} \tag{6}$$

The profit rate is determined in the tradable sector, being endogenous to the system formed by equations 3 and 5.[12] This distributive closure implies taking the real wage as exogenous to the system of price equations (Metcalfe and Steedman, 1981).

Given the technical coefficients, distribution is completely determinate once we know money wages, the nominal exchange rate and the international prices of 1, m and μ. We build on two realistic assumptions. First, wage bargaining determines money wages. Second, the nominal exchange rate is affected by monetary policy. While the former is widely acknowledged, the latter deserves some lines.

Lavoie (2000, 2002) and Smithin (2002) argue that open economies with a sovereign currency can carry on monetary policy with substantial degrees of freedom. Central Banks autonomously peg interest rates in open economies. Naturally, monetary policy takes into account the international interest rate, the Balance of Payments, the stock of foreign currency reserves, and domestic variables as inflation and employment. As in uncovered interest parity, movements in the nominal exchange rate depend on the monetary policy, which regulates the difference between domestic and foreign interest rates. Hence, Smithin (2002) argues that the real exchange rate is a monetary variable influenced by economic policy.[13] That has important implications in the framework proposed in this paper because the real exchange rate turns out to be a key determinant of distribution.

12 We avoid here the problem of overdetermination in the price-taker economy by introducing only one tradable commodity. In contrast, if this economy operated with more than one tradable commodity, the price of these commodities, given internationally, would allow for uniformization of the profit rate only by a fluke (Baldone, 2001; Steedman, 1999).

13 Moreover, the case against the conventional determination of the exchange rate by (absolute) Purchasing Power Parity is a well-established empirical result (see, for instance, Engel, 2014).

The price equation of commodity 1 determines the equilibrium profit rate given the money wage rate, the nominal exchange rate, international prices, and technical coefficients. We can derive the expression for the equilibrium profit rate (r^*) from equation 3. By substituting p_1 per ep_1^*, and rearranging, we obtain equation 7. Note that p_m^* stands for the international price of the input m.

$$(1 + r^*) = \frac{p_1^* - \frac{w}{e} l_1}{a_1 p_1^* + a_m p_m^*} \tag{7}$$

Capitalist competition brings about the convergence of profit rates between the two industries.[14] Hence, the profit rate in the non-tradable sector follows the rate established in the tradable sector.

As an illustration, consider that a nominal exchange rate devaluation rises prices in the tradable sector, leading to a persistently higher profit rate. In that case, capital would move from the non-tradable sector towards the tradable one. Consequently, production in the non-tradable sector does not follow the pace of demand increases, which makes the market price for this good larger than its former normal price (*i.e.*, the normal price observed *before* the change in the equilibrium profit rate due to the devaluation). This discrepancy persists until the profit rate obtained in production of commodity 2 approaches the new equilibrium profit rate determined in the production of commodity 1.[15]

Equation 7 reveals an inverse relationship between the profit rate and the ratio between money wages and the nominal exchange rate.[16] Moreover, as the international price of commodity 1 rises, the equilibrium profit rate increases. In the absence of other changes, the higher profit rate also implies an increase in the price of commodity 2, as convergence takes place.

To study inflation in this economy, we must check how prices change in time, outside of long-period positions. Let us assume that technical coefficients remain constant, but prices and distributive variables can change. Then, we can rewrite the expressions for prices with a time index, as follows below.

$$p_1^t = (a_1 p_1^{t-1} + a_m p_m^{t-1})(1 + r^t) + w^{t-1} l_1 \tag{8}$$

$$p_2^t = (a_2 p_1^{t-1} + a_\mu p_\mu^{t-1})(1 + r^{t-1}) + w^{t-1} l_2 \tag{9}$$

14 See, for instance, Garegnani (1990), Shaikh (2016, p. 259-326), and Bellino and Serrano (2018).

15 The competition of potential entrants (and thus exits) across sectors may be sufficient for the convergence of prices and profit rates to the new equilibrium.

16 Dvoskin and Feldman (2020) and Machado (2017) present similar results.

$$p_1^t = e^t p_1^{*,t} \tag{10}$$

Input costs follow their prices at the beginning of the period of production. Likewise, the wage rate is fixed at the beginning of the production period despite being paid in the end. In contrast, the selling price of the commodities is set at the end of the production period.

The profit rate of the tradable sector adjusts to the current price (given by equation 10) and the production costs defined in the previous period. It is important to distinguish here the movement in the *normal profit rate* (which concerns equilibrium positions) from the transitory movements in the profit rate, which define the *nominal profit rate*.[17]

As argued above, competition leads to the convergence of the profit rate in the non-tradable sector towards the profit rate in the tradable sector. However, this process is not instantaneous. For this reason, the profit rate in the price formation of the non-tradable sector is lagged in one period, differently from what happens in the tradable sector. In other words, the profit rate that affects prices of commodity 2 in t is the one obtained in the tradable sector in period $t-1$. As a simplification, we assume the convergence across sectors takes only one period. We further assume that the profit rate in the non-tradable sector follows the *normal* profit rate determine in the tradable sector in the previous period. This assumption avoids that the transitory overshooting in the tradable sector's *nominal* profit rate affects the other sector's profit rate.

Equations 8-10 describe how shocks in international prices and the exchange rate affect domestic prices. We can define three different channels. First, the domestic price of the tradable commodity increases when its price abroad increases or the exchange rate devaluates. This direct channel is associated with competition and contestability since domestic goods present some degree of substitutability with goods produced abroad. Second, the increase in production costs due to higher prices of the tradable machine and imported inputs leads to higher prices in the non-tradable sector. Finally, a persistent increase in the profit rate (caused by an increase in p_1^* or e) leads to an increase in prices in the non-tradable sector.[18] Income distribution varies according to international prices, the exchange rate, and money wages.[19] Given international prices, a nominal devaluation of the exchange rate leads to a higher equilibrium profit rate.

17 Here, the normal profit rate corresponds to the relevant value for income distribution since it takes the replacement costs of capital into account. What we call the nominal profit rate is measured according to the historical costs of capital.

18 However, in the case of an exchange rate devaluation, this effect is different from the case of a pure increase in the international price of 1. In the case of a nominal devaluation, the domestic price of imported inputs (m, μ) also raises proportionally so that the impact on the profit rate is smaller than in the case of an increase in the international price of 1.

19 See, for instance, Metcalfe and Steedman (1981); Steedman (1999)

This distributive channel relies on capitalist competition and the role of the tradable sector in the determination of distribution.

An exchange rate devaluation triggers all three channels.

A nominal devaluation affects the price of the non-tradable sector through an immediate increase in input costs and a delayed increase in the normal profit rate. A devaluation increases production costs in the non-tradable sector due to the rise in the domestic prices of the tradable machine and the non-competing imports. Finally, the price of commodity 2 also rises as the economy approaches a higher equilibrium profit rate after the exchange rate devaluation.

In the absence of further shocks, the economy stabilizes with a higher price level, higher profit rate, and lower real wages. The relative price of commodity 2 with respect to commodity 1 is lower after the adjustment process. A lower relative price of 2 is thus associated with a lower ratio between the money wage rate and the price of commodity 1. If workers react to the rise in prices by asking for money wages increases, there is a further step to be discussed. Workers may react to the fall in real wage. The capacity of workers to obtain the desired wage rate depends on their bargaining power, determined by political and institutional features and by the current conditions in the labor market (as the unemployment rate). If the money wage rate increase less than the price of 2, its purchasing partially recovers from the initial shock. However, in the following period, the money wage increase is passed through into the price of commodity 2. This process can repeat for several rounds of adjustment of prices and money wages. In the absence of further exchange rate shocks, the money wage rate and the price level will converge to a stable equilibrium as long as the reaction of money wages to the increase in the price of 2 is incomplete. Real wage is smaller than before the shock, but higher than if workers had not responded.

Suppose that workers are able to completely recover their initial real wage rate. That happens when, after many rounds of adjustment, the accumulated rate of increase in money wages equal the rate of exchange rate devaluation. In that case, relative prices return to their initial values under a higher price level, nominal exchange rate, and money wages.

4.1 *Price of the non-tradable commodity*

Although temporary shocks in prices and costs may deviate profit rates across sectors, competition leads to convergence. Henceforth, we assume the profit rate obtained in the production of commodity 2 follows the equilibrium profit rate of 1 (that is, the normal profit rate). Then, we can derive the dynamics of prices of commodity 2 by substituting

the normal profit rate (assumed to hold in period $t-1$), in the price equation of 2. Since prices of commodity 1 and inputs m and μ are determined in the international market, we can substitute each of these terms by its correspondent international price multiplied by the exchange rate. Rearranging and canceling e when possible gives us equation 11. Following this procedure, we obtain the expression that follows below.

$$p_2^t = \left(\frac{a_2 p_1^{*,t-1} + a_\mu p_\mu^{*,t-1}}{a_1 p_1^{*,t-1} + a_m p_m^{*,t-1}} \right) e^{t-1} p_1^{*,t-1} + \left(l_2 - l_1 \frac{a_2 p_1^{*,t-1} + a_\mu p_\mu^{*,t-1}}{a_1 p_1^{*,t-1} + a_m p_m^{*,t-1}} \right) w^{t-1} \tag{11}$$

For simplicity, we can rewrite 11 as in equation 12, collapsing the two terms within parenthesis in Φ_1 and Φ_2. Let us assume that international prices are constant. Then, Φ_1 and Φ_2 must also be constant in time. The same holds for the international price of commodity 1. Hence, we can withdraw the time index of these variables.

$$p_2^t = \Phi_1 e^{t-1} p_1^* + \Phi_2 w^{t-1} \tag{12}$$

Since we assume constant technical coefficients and international prices, changes in the price of 2 are explained by changes in the exchange rate and money wages.

Note that Φ_1 corresponds to the ratio between circulating capital inputs to the production of commodity 2 to the same variable for commodity 1. This ratio can be expressed in terms of international prices, thereby being exogenous to the domestic economy. If the production of 2 requires a larger value of capital input than the production of 1, $\Phi_1 > 1$. In that case, the price of commodity 2 responds more than proportionally to an increase (or fall) in the exchange rate.

The sign of Φ_2 depends on the relative proportions of labor to circulating capital of each industry. Φ_2 is positive if the production of commodity two has a higher ratio between labor input and circulating capital, *given* p_1^*, p_m^*, p_μ^*.[20] We assume this term is positive because, in general, non-tradable industries have a smaller capital-labor ratio than tradable industries.[21] While tradable industries include manufacturing and dynamic industries, non-tradable industries include services, among other sectors.[22] In

20 It is easy to check this, since $\Phi_2 > 0$ if and only if $\frac{l_2}{a_2 p_1^* + a_\mu p_\mu^*} > \frac{l_1}{a_1 p_1^* + a_m p_m^*}$.

21 These capital-labor ratios depend on the prices of 1, m and μ. Mathematically, Φ_2 may be negative depending on these prices. However, if this is the case, an increase in money wages would reduce the price of commodity 2. The positive impact of additional labor costs would be more than offset by the decrease in the profit rate. We abstract from this possibility, assuming that Φ_2 is positive. Although a negative Φ_2 is theoretically possible, it seems less plausible once we acknowledge the stylized facts mentioned in the text. Finally, since foreign prices are exogenous, we can also abstract from changes in the value or sign of Φ_2.

22 Baumol (1967) stressed the increasing trend of the relative prices of services with respect to manufacturing goods due to the difficulty to reduce the labor content in the former. Aukrust (1977); Edgren et al. (1973)

addition, it is expected that an increase in wages tends to increase prices in non-tradable industries (which can only happen if Φ_2 is positive).

Φ_2 combines two effects of wages in the price of commodity 2. The first one is direct. The labor input in the production of commodity 2 implies a wage increase affects its production costs. The second effect relates to the negative impact of a wage increase on the profit rate in the production of commodity 1. The smaller profit rate pushes down the price of 2. The net outcome of these two effects depends on which channel is the strongest.

What happens when Φ_2 is equal to zero? In that case, the two effects completely offset each other. Their combined effect is therefore null. That occurs because both industries present the same capital-labor ratio. Hence, changes in distributive variables (either real wage rate or normal profit rate) do not affect relative prices.[23] In sum, if $\Phi_2 = 0$, the prices of 1 and 2 move proportionally after changes in w or e, keeping the relative price of commodities 1 and 2 constant.

Let us further assume that international relative prices remain stable as well as the international price level. Consequently, the price of commodity 2 varies with changes in the exchange rate and money wages. In this case, we can describe in equation 13 the rate of change in the price of commodity two. This expression comes from the rate of change in the price of commodity 2, as described in equation 12.

$$\pi_2^t = \phi_1^t \hat{e}^{t-1} + \phi_2^t \hat{w}^{t-1} \tag{13}$$

where

$$\phi_1^t = \frac{\Phi_1 e^{t-2} p_1^*}{\Phi_1 e^{t-2} p_1^* + \Phi_2 w^{t-2}}$$

and $\phi_2^t = 1 - \phi_1^t$.

Note that the weights denoted by ϕ_1 and ϕ_2 vary in time. These weights are always positive and smaller than one.[24] Since international prices are assumed constant, Φ_1 and Φ_2 remain constant. Thus, changes in ϕ_1 and ϕ_2 follow changes in the exchange rate and money wages. Finally, equation 13 reveals that the impact of cost shocks on

analyzed inflation using the stylized fact that tradable industries present a higher productivity growth than non-tradable industries.

23 This property arises from the analysis of price equations with uniform profit rate, as pointed by Sraffa (1960, p. 12). This property is preserved in a small open economy with a tradable capital good (Steedman, 1999).

24 Note that if, in contrast with our assumptions, we had that $\left(l_2 - l_1 \frac{a_2 p_1^* + a_\mu p_\mu^*}{a_1 p_1^* + a_m p_m^*}\right) = 0$, then we would obtain $\phi_1 = 1$ and $\phi_2 = 0$, which is compatible with the description of this particular case (see footnote 23). Hence, by assuming that $\left(l_2 - l_1 \frac{a_2 p_1^* + a_\mu p_\mu^*}{a_1 p_1^* + a_m p_m^*}\right) > 0$ we also set that the weights ϕ_1, ϕ_2 must remain between zero and one.

the price of commodity 2 is delayed in one period. This property emerges from the definition of production prices according to historical costs.

4.2 *Real exchange rate*

Analyzing the interactions between inflation and the real exchange rate is important because monetary authorities possibly target a value for the real exchange rate. Such a policy choice can be associated with different objectives. In some cases, it aims to stimulate exports in order to keep an equilibrium in the balance of payments (as in Vera 2010, Blecker 2011, Vernengo and Perry 2018). Alternatively, a targeted real exchange rate may derive from distributive objectives once a devaluation of the real exchange rate implies a higher profit rate and a lower real wage rate (Dvoskin et al., 2018), as in the model discussed here.

The real exchange rate is usually defined as the nominal exchange rate adjusted by domestic and foreign price levels. A nominal devaluation only succeeds in devaluating the real exchange rate if it is not completely offset by increases in domestic prices. Both foreign and domestic price levels include prices of tradable and non-tradable commodities. Thus, the rate of change in real exchange rate depends on the change in the nominal exchange rate and the rate of change of tradable and non-tradable prices in both domestic and foreign economies.

Assuming competition equalizes tradable prices across countries, the performance of the non-tradable prices becomes crucial for the real exchange rate. The price of the non-tradable commodity depends on the costs of the tradable commodity and the wage rate. As the former is given, the latter becomes more relevant in determining the real exchange rate. Workers' reaction to nominal exchange rate devaluations, asking wage increases to protect real wages, may offset the impact of the nominal devaluation on the real exchange rate. If monetary authorities have a target for the real exchange rate, the wage increase triggers additional nominal devaluations. The economy can experience repeated nominal exchange rate devaluations followed by money wage increases. An inflationary process takes place with a money wages-exchange rate spiral. Nevertheless, as both sides are unsuccessful in achieving their goals, they tend to moderate their claims (i.e., workers moderate money wage demands, while monetary authorities accept a partially smaller real exchange rate devaluation to avoid inflation). If that happens, the price level converges to a stable position.

Given technical coefficients, the domestic level of prices is determined by international prices, the nominal exchange rate, and the wage rate. Therefore, the real exchange rate will be proportional to the ratio of international prices as measured in the domestic

currency to money wages. That is the meaningful variable to the distributive conflict analysis (especially because we are assuming international prices are constant).[25] Hence, we concentrate on the ratio of the nominal exchange rate to money wages (q as defined in equation 14). This ratio is affected by the same variables and moves in the same direction of the real exchange rate.

$$q_t = \frac{e_t}{w_t} \tag{14}$$

We examine the relation between q and distribution in a few steps. By substituting equation 12 in equation 6, we get that the real wage in t can be written as follows:

$$w_R^t = \frac{w_t}{\Phi_1 e_{t-1} p_1^* + \Phi_2 w_{t-1}} \tag{15}$$

By dividing both the numerator and denominator of the fraction in the right-hand side by w_{t-1}, we obtain equation 16.

$$w_R^t = \frac{1 + \hat{w}_t}{\Phi_1 q_{t-1} p_1^* + \Phi_2} \tag{16}$$

q is therefore inversely related to the real wage, given technical coefficients and international prices. Note also that a higher rate of growth of money wages implies a larger value for real wages. This outcome is consistent with historical cost pricing and the notion of conflict inflation itself (Pivetti, 1991; Stirati, 2001; Tarling and Wilkinson, 1985).

5 INFLATION, WAGES, AND EXCHANGE RATE

The framework exposed in the last section sets the foundation for a conflict inflation model in an open economy. We follow a modified conflicting claims setup. Workers target a real wage rate.[26] The monetary authority targets a real exchange rate, which can be expressed as a target for the real wage (due to the inverse relation shown above). The conflict between the two sides causes inflation and affects income distribution.

25 Indeed, other works using similar price equations in the open economy discuss the changes in specialization, relative prices, distribution provoked by changes in the ratio between exchange rate and money wages (Dvoskin and Feldman, 2020; Dvoskin et al., 2018; Machado, 2017).

26 In most conflicting claim models, workers target an income share expressed either in terms of the wage share or profit share. For constant labor productivity and composition of output, there is a direct correspondence between the wage share and the real wage rate. Since we are considering simultaneously two different sectors, we choose to introduce a target for the real wage. In this way, we avoid that nominal changes in the composition of output, related to changes in relative prices, affect the distributive conflict. In contrast to the wage share, the real wage is directly connected with workers' interest, not being affected by changes in output composition.

Workers push for wage increases according to the difference between the actual real wage and the target for the real wage (w^T). Their ability to achieve this target depends on their bargaining power.

The rate of growth of money wages ($\hat{w}$) depends on the evolution of the price of commodity 2 (π_2). Changes in the cost of living affect wage negotiations, and often indexation rules are included in labor agreements. We assume wage indexation is incomplete so that α_1 is positive but less than one. A second determinant of the growth of money wage is related to the difference between workers' target real wage and the actual real wage. α_2 stands for the sensibility of the rate of change in money wages to this effect. Later on, we will allow for changes in workers' target, according to changes in the employment rate.

$$\hat{w}^t = \alpha_1 \pi_2^{t-1} + \alpha_2 (w_R^T - w_R^{t-1}) \tag{17}$$

We assume the monetary authority follows a rule for changing the nominal exchange rate to achieve a targeted real exchange rate. A rule of this type was introduced by Blecker (1989), although it was related to foreign competitiveness. Since there is a direct association between the real exchange rate and income distribution, we assume this target is associated with distributive purposes. We can express this policy rule in terms of a target for the real wage rate since q and real wage rate are inversely related. The target for the real wage corresponding to the monetary authority's target for the real exchange rate is denoted as w_R^q.

$$\hat{e}^t = \lambda (w_R^{t-1} - w_R^q) \tag{18}$$

Collecting the equations for inflation, money wages, and the exchange rate, we obtain a system composed of equations 13, 17, and 18. We can rewrite the system for real variables, restricting it to the two equations describing real wages and the real exchange rate.

The rate of change of real wages ($\hat{w_R}$) is defined as the difference between the change in money wages and in the price of commodity two: $\hat{w_R}^t = \hat{w}^t - \pi_2^t$. Combining this definition with equation 17, we obtain equation 19.

$$\hat{w_R}^t = -\pi_2^t + \alpha_1 \pi_2^{t-1} + \alpha_2 (w_R^T - w_R^{t-1}) \tag{19}$$

The rate of change in q is given by the difference between the rate of change in the nominal exchange rate and in the rate of change of money wages, as in equation 14. By

substituting the expression for the rate of change in the exchange rate given in equation 18, we obtain equation 20. Equations 19 and 20 form the basis of the dynamic system.

$$\hat{q}^t = \lambda(w_R^{t-1} - w_R^q) - \hat{w}^t \tag{20}$$

5.1 *Equilibrium*

The economy achieves equilibrium when both real wages and the real exchange rate achieve a stable value. In other words, when both equations 19 and 20 are equal to zero. Equilibrium positions are denoted by the superscript **.

From equation 18, we obtain that $\hat{w} = \hat{e}$ in equilibrium. A constant real wage means that $\hat{w} = \pi_2$. By setting $\hat{w_R} = 0$ in equation 19, we can obtain the equilibrium rate of change in the price of commodity two.

The rates of change in the prices of commodities 1 and 2 are equal in equilibrium since the nominal exchange rate and money wages rise at the same rate in equilibrium. Hence, the inflation rate follows the same expression as the rate of change of money wages, the rate of change in the exchange rate, and the rate of change in prices in each industry (1,2). In other words, in the equilibrium, $\pi_2 = \pi = \hat{w}$. The equilibrium inflation rate is described by the equation below.

$$\pi^{**} = \frac{\alpha_2 \lambda (w_R^T - w_R^q)}{\alpha_2 + \lambda(1 - \alpha_1)} \tag{21}$$

We can rewrite it as follows.

$$\pi^{**} = \frac{w_R^T - w_R^q}{\frac{1}{\lambda} + \frac{(1-\alpha_1)}{\alpha_2}} \tag{22}$$

The inflation rate increases with α_1, α_2, and λ. It also increases with the difference $w_R^T - w_R^q$.

In turn, the equilibrium real wage rate is described by the equation below.

$$w_R^{**} = \frac{\alpha_2 w_R^T + \lambda(1 - \alpha_1) w_R^q}{\alpha_2 + \lambda(1 - \alpha_1)} \tag{23}$$

As in other conflicting claim models, equilibrium real wage is a weighted average of the two conflicting targets for the real wage. That equilibrium value is sensitive to changes in the parameters α_1, α_2, and λ. For instance, if wage indexation (α_1) increases, the equilibrium real wage gets closer to workers' target. The same happens if workers' bargaining power (α_2) increases. In turn, if monetary authorities accelerate the speed of

adjustment of the nominal exchange rate (i.e., λ increases), then the equilibrium real wage gets closer to w_R^q.

If inflation emerges from wage claims, a higher inflation rate is associated with a larger value for the equilibrium real wage rate. This outcome is often obtained in conflict inflation models. Finally, a larger real wage rate implies a loss in capitalists' share in distribution. It follows, thus, that a higher inflation rate and a lower equilibrium q are associated with a lower profit rate and a lower profit-share.

5.1.1 *Equilibrium with endogenous worker's claim*

Let us now consider the case in which workers' income claim is affected by the labor market. Previous conflicting claim models have set workers' wage target as dependent of changes in the rate of unemployment (Cassetti, 2002; Lavoie, 2014).[27] In this small open economy, persistent changes in unemployment rate depend on the difference between the growth rate of exports g_X and the growth rate of labor force g_L. Hence, we can define that workers' target for the real wage depends on an autonomous component, expressing institutional and political factors (θ_0), and a second term that expresses the effect of changes in the unemployment rate.

$$w_R^T = \theta_0 + \theta_1(g_X - g_L) \tag{24}$$

Now we can plug equation 24 in the equilibrium obtained above. The equilibrium real wage rate is now given by:

$$w_R^{**} = \frac{\alpha_2[\theta_0 + \theta_1(g_X - g_L)] + \lambda(1-\alpha_1)w_R^q}{\alpha_2 + \lambda(1-\alpha_1)} \tag{25}$$

The equilibrium inflation rate is:

$$\pi^{**} = \frac{[\theta_0 + \theta_1(g_X - g_L)] - w_R^q}{\frac{1}{\lambda} + \frac{(1-\alpha_1)}{\alpha_2}} \tag{26}$$

Therefore, increasing unemployment reduces both the equilibrium real wage and inflation. In contrast, falling unemployment implies an increase in both the equilibrium real wage and inflation. This result is compatible with the conflicting claims literature.

In turn, stronger bargaining power of workers, coming from unionization and employment protection legislation (*i.e.*, a higher θ_0), is associated with higher real wages and a higher inflation rate. It is also associated with a lower value of q and a lower real exchange rate. In this regard, Cherkasky and Abeles (2019) show that the weakening of

27 This is approached in a similar way as in Rowthorn's (1977), and later employed by many authors (Dalziel, 1990, Cassetti, 2002, Hein and Stockhammer, 2010, Lavoie et al., 2002).

worker's bargaining power due to weaker trade unions and the retreat of labor market institutions reduced the exchange rate pass-through in developing economies. That would explain the recent fall in the inflationary impact of exchange rate devaluations. In our model, weak workers' bargaining power means small θ_0 and α_2, which leads to a lower rate of inflation, lower real wage, and higher real exchange rate.

5.1.2 *Closure of the aspiration gap*

Rowthorn (1977, p. 217) defines the aspiration gap as the difference between the target and the actual income shares. In the equilibrium of the model presented here, the workers' aspiration gap corresponds to the difference between workers' targeted real wage (w_R^T) and the equilibrium real wage (w_R^{**}). Capitalists' aspiration gap can be described by the difference between the targeted real wage coming from the monetary authority's real exchange rate target (w_R^q) and the equilibrium real wage (w_R^{**}). A positive aspiration gap is the fundamental cause of conflicting claims inflation (Lavoie, 2014; Rowthorn, 1977). If both sides give up on claiming for a real wage different than the one resulting from the process of bargaining and inflation, the aspiration gap goes to zero. In that case, the inflation rate is also zero. This theoretical scenario allows us to describe the long period position associated with the distributive equilibrium.

We do not expect the aspiration gap to persist over time. Hence, conflict inflation is treated as a short period phenomenon, tending to dissipate in the absence of shocks in costs or employment (which affect the workers' target). The equilibrium associated with the closure of the aspiration gaps is described by the real wage expressed in equation 25 and a stable price level.

We can also obtain the equilibrium ratio between the nominal exchange rate and money wages (q). Equilibrium q comes from the relation defined in equation 16. As argued before, q is inversely related to the real wage rate (see section 4.2).[28]

$$q^{**} = \frac{1}{\Phi_1 p_1^* w_R^{**}} - \frac{\Phi_2}{\Phi_1 p_1^*} \tag{27}$$

28 Note that q must be positive. We can show that in a few steps. The left-hand side of equation 27 is larger than zero as long as

$$\frac{1}{\Phi_1 p_1^*}\left(\frac{1}{w_R^{**}} - \Phi_2\right) > 0.$$

Since $\Phi_1 p_1^* > 0$, the inequality above implies that the term within parenthesis must be larger than zero. That, in turn, implies that

$$\frac{p_2 - \Phi_2 w}{w} > 0$$

which is trivially truth since production of 2 requires that its price is larger than the direct and indirect labor costs ($p_2 > \Phi_2 w$). The reader can refer to section 4.1, where we define Φ_2.

By substituting the equilibrium real wage in the former equation, we obtain:

$$q^{**} = \frac{\alpha_2 + \lambda(1-\alpha_1)}{\Phi_1 p_1^* \{\alpha_2[\theta_0 + \theta_1(g_X - g_L)] + \lambda(1-\alpha_1) w_R^q\}} - \frac{\Phi_2}{\Phi_1 p_1^*} \tag{28}$$

As expected, whatever increases the real wage rate reduces the equilibrium ratio between the exchange rate and money wages. An increase in workers' bargaining power (α_2) and in wage indexation (α_1) reduce equilibrium q by bringing the equilibrium real wage closer to workers' targeted value $[\theta_0 + \theta_1(g_X - g_L)]$. In turn, an increase in λ brings the equilibrium real wage closer to w_R^q, thereby increasing the equilibrium ratio between nominal exchange rate and money wages. Finally, an increasing rate of unemployment increases workers' target, reducing the equilibrium q.

5.2 *Discussion*

In general, open economy conflict inflation models either use a similar (targeted) mark-up as closed economy models or introduce an effect of the real exchange rate over mark-ups. In the first case, mark-up (or firm's targeted mark-up) is exogenous with respect to the exchange rate and international prices. It is thus solely determined by the degree of monopoly. This mark-up is not compatible with the presence of international competition. Implicitly, these models assume domestic and foreign goods are non-substitutable. International prices and the exchange rate only matter while they explain the cost of imported inputs — or the domestic price of imported consumption goods, as in Cassetti (2002) and Vera (2010). This framework is sufficient to generate a conflict between real wages and either the exchange rate or the international price of imported commodities. This conflict causes persistent inflation in open economy models (Cassetti, 2002; Rowthorn, 1977; Stirati, 2001).[29]

Another strand of the literature considers that the mark-up cannot be independent of the exchange rate and foreign prices. Two different perspectives are developed along these lines.

The first, labeled as flexible mark-up, considers the mark-up is affected by the real exchange rate (Blecker, 1989). This approach introduces a capitalists' distributive claim associated with a real exchange rate devaluation because it loosens foreign competition. In this case, the mark-up is contemporaneously determined by the degree of monopoly and by the real exchange rate.

29 Note that Stirati (2001) rejects the mark-up pricing framework. Still, the author assumes the profit rate is independent of international prices and the exchange rate.

The second view introduces the assumption that the real exchange rate affects firms' and workers' income claims by impacting their targeted income shares in a conflicting claims model. Hence, the real exchange rate increases firms' targeted mark-up (or reduces the firm's targeted wage share), and in some cases, it also reduces worker's targeted mark-up (or increases its targeted wage share) (Bastian and Setterfield, 2020; Blecker, 2011; Lavoie, 2014). Once again, the ultimate determinant of the mark-up becomes unclear. These difficulties add up to other shortcomings of mark-up pricing, especially concerning the role of the degree of monopoly as a determinant of the profit rate.

These shortcomings suggest that a conflict inflation theory should build on an alternative explanation of distribution. Such an alternative can be found in the Classical-Keynesian approach, extended to the open economy. The distributive closure presented in this paper also allows us to consider that international prices directly determine tradable prices in open economies. Moreover, the profit rate is positively affected by the exchange rate and the international price of the tradable commodity.

Within the Classical-Keynesian approach, the monetary theory of distribution stressed the role of nominal variables in determining income distribution. Following a hint of Sraffa (1960, p. 33), Pivetti (1991) takes the nominal interest rate as the exogenous variable in the system of price equations determining relative prices and distribution. However, the actual outcome (*i.e.*, real profit rate and real wages) of distribution can only be known after wage bargaining and inflation.[30] Since the price of labor and capital goods may change, the relevant profit rate must be evaluated with respect to the production costs at the end of each period. Even though the monetary authority can peg the nominal interest rate of the economy, it cannot fully determine distribution since workers can react to increases in the nominal interest rate preserving their income share. Thus, the real interest rate remains to be determined by the nominal interest rate and wage bargaining (in a closed economy) (Serrano, 1993, p. 123).[31]

Our results reveal an analogy with this theory. Rather than the nominal interest rate, distribution is regulated by the nominal exchange rate, international prices, and the money wage rate. In line with Post-Keynesian developments, we consider the nominal exchange rate to be strongly influenced by monetary policy within certain constraints. Hence, the nominal exchange rate, determined by the monetary authority, affects the ratio between prices and money wages. We show, however, that as wages can react to an exchange rate depreciation, distribution also depends on wage bargaining and the inflationary process. As a consequence, the real exchange rate known at the end of the

30 See Pivetti (1991, p. 52).
31 See also Garegnani (1979, p. 81).

period is the meaningful variable for distribution, rather than the nominal exchange rate.

6 FINAL REMARKS

We build on open economy price equations to develop a conflict inflation model following a Classical-Keynesian perspective. The extension of price equations to the open economy defined the relation among money wages, exchange rate, international prices, and the profit rate. Based on this setup, we further derived expressions for the inflation rate, the real wage rate, and its relation with the real exchange rate. An increase in international prices or an exchange rate devaluation raises production costs through more expensive inputs. That pushes prices up, possibly leading to a persistent inflation as workers respond to protect their purchasing power. Since the model includes tradable prices, these shocks also have a direct impact on prices and distribution. All else being equal, the tradable sector's profit rate increases after an exchange rate devaluation. Competition pushes prices of non-tradable commodities due to the tendency of convergence of profit rates. That describes an additional cause of inflation included in the model.

Finally, the paper brings new insights into the distributive closures within the Classical-Keynesian approach. Contributions in this approach highlighted the interest rate as an independent monetary variable that regulates income distribution. However, the real interest rate is the meaningful variable, being known after inflation occurs. Hence, the social conflict causing inflation also shapes distribution (Pivetti, 1991; Serrano, 1993; Stirati, 2001). Our model provides analogous results for the open economy setup. We conclude that the nominal exchange rate becomes a central variable for distribution in small open economies. However, its ultimate impact on distribution is conditional on the reactions of workers through bargaining and inflation.

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