Impacts of tax incidence on distribution and effective demand in a sraffian framework

Gabriel Aidar[*]
Franklin Serrano

Abstract

This paper integrates taxation in a framework of distributive conflict using the sraffian approach to conflict inflation (Pivetti, 1991; Serrano, 1993, 2010; Stirati, 2001). Using the sraffian supermultiplier, we connect the effects of real tax incidence on distribution with the levels of effective demand, and then we are able to show in what circumstances Haavelmo's (1945) results hold with endogenous tax incidence. In doing so, this paper presents two main contributions. First, we show that the real incidence of goods taxation falls entirely on wages only under the particular assumption of given real profit markups. Second, we argue that the evaluation of the expansionary nature of balanced budgets depends on the assumptions regarding the form of taxation and the parameters of the distributive conflict. In the particular case of a sales tax, we show that Haavelmo's results can be valid, independently of the direction in which taxation causes a redistribution of income.

Keywords: Sraffian; Fiscal Policy; Taxation

JEL Classification: B24; E62; H20

---

[*] PhD Candidate and Associate Professor at the Universidade Federal do Rio de Janeiro. Email: gabriel.aidar@gmail.com

We thank Matías Vernengo for comments on an early version of this draft. All errors and shortcomings are our own.
This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

1. Introduction

In Haavemo's (1945) balanced-budget multiplier, tax incidence is assumed fixed and has no effect on distribution. Haavelmo argued that he wanted to show that his conclusions on the possibility of expansionary effects of balanced budgets did not depend on the size of the propensity to consume assuming no income redistribution through taxation. In this paper, we will develop Haavelmo's balanced budget multiplier in a situation in which we endogenize the real tax incidence. In order to do so, we need to integrate taxation in a framework of distributive conflict. To fulfill this objective, we will utilize the sraffian approach to value and distribution, particularly its modeling of conflict inflation (Pivetti, 1991; Serrano, 1993, 2010; Stirati, 2001). Also, we will connect the effects of real tax incidence on the levels of effective demand and output using the sraffian supermultiplier (Serrano et al., 2019). Although the role of government spending in economic growth has been incorporated in some recent supermultipler demand-led models (Allain, 2015; Dutt, 2013, 2019; Freitas and Christianes, 2020; Serrano and Pimentel, 2019), real tax incidence and its effects on effective demand and output are far less studied in this literature.

The introduction of taxation in the sraffian literature was first presented in Metcalfe and Steedman (1971). Eatwell (1980) connected the effect of taxes in the price equations with effective demand assuming balanced budgets. Serrano and Pimentel (2019), in their turn, showed the validity of Haalvemo's results on the expansarionary effects of taxation under the balanced budget assumption in the context of the sraffian supermultiplier. Our work builds on this previous sraffian literature and provides two main contributions. First, we show that the real incidence of goods taxation relies on wages only under the particular assumption of given real profit markups, which makes the view from Kalecki (1937) and part of the kaleckian literature (Laramie, 1991; Mott and Slatiery, 1994) as one particular case of a more general approach. Second, we argue that the assessment of the expansionist nature of balanced budgets depends on the assumptions regarding the form of taxation and the parameters of distributive conflict. In the particular case of a sales tax, we show that an increase in government spending entirely financed by the rise in the sales tax rate, under a balanced budget, is always expansionary as long as the real profit markup is not exogenous, even if workers do not save. In other words, we show that Haavelmo's results can be valid even when taxation provides a redistribution of income.

The paper is organized into seven sections. After this introduction, the second section outlines the general framework, based on a very simple version of the sraffian corn model, to study the interaction between indirect taxation and distribution for a given level of output. The third section of the paper shows the classical closures to distribution and the implications for the real tax incidence. The fourth section explores the situations in which the rate of profit and wage may react to changes in prices due to taxation in a sraffian conflict inflation model. The fifth section integrates effective demand, using the Supermultiplier and balanced budgets, with real tax incidence. The final section presents our final remarks.

2. A simple sraffian framework for taxation

2.1 The basic model

In any kind of model, the real tax incidence depends on relative prices and distribution. In the neoclassical approach, relative prices, distribution (factors prices) and output are simultaneously determined. Based on given preferences, technology and factor endowments, the elasticities of substitution of demand and supply determine the real burden of taxation over consumers and suppliers (Fullerton and Metcalf, 2002). Neoclassical welfare theorems, in their turn, provide the Pareto-efficiency benchmark to assess the social outcome of taxation (Petri, 2021, chap. 14). Taxation may lead to the dilemma between efficiency and equity: in addition to changes in distribution, taxes distort the costs of factors of production. For instance, indirect payroll taxes may lead to the reduction of employment and output. Alternatively, taxes on wages may reduce the labor supply reducing employment and output[1].

Once we consider the limitations of the neoclassical demand and supply apparatus to determine relative prices, output and distribution, as shown by Sraffa (1960), Garegnani (1970) and others, a different framework for the study of tax incidence is needed. These limitations from the neoclassical approach break down the tendency to full employment and the Paretian notion of efficiency (Garegnani, 2007)[2]. In the alternative sraffian framework, there is a separation between the determination of output and the theory of value and distribution, and the analysis of tax incidence for a given level of output depends on the technical coefficients of productions and the assumptions regarding the distributive variables, which ultimately reflects the bargaining power of workers and capitalists.

In order to provide a simple framework to assess tax incidence, we will consider that the economy produces only one good ('corn'), and it uses homogenous labor for its production, besides corn itself. This simplification will not allow us to consider the different impacts of taxation on the different baskets of goods consumed by the different social classes. Also, we will not deal with the consequences of heterogenous tax rates levied on different economic sectors nor check the effects of changes in the composition of gross output over tax incidence. Note that one of the crucial changes in a multi-sector sraffian model is that relative prices vary in complex ways when distribution changes, and these changes, especially when there are alternative production methods, undermine the idea of a generally neoclassical idea an inverse relation between factor intensity and factor prices. Metcalfe and Steedman (1971) study the choice of technique in the context of different forms of taxation. One of the main results shown by the authors is that the choice of technique is not straightforward: the heaviest taxed good does not necessarily present the highest relative price. Therefore, new 'reswitching' points are possible[3].

The corn model provides a simple and insightful framework for the study of the real tax incidence and the distribution between wages and profits that is easily connected to analysis of aggregate output as we will do further below. Note also that the use of multiple sectors and basic goods does not change the main results we are interested on[4].

Our formal model consists of one good X, and output and capital consist of the same commodity. There is only circulating capital, which is fully consumed in each period of production. Moreover, labor productivity is fixed, which leads to constant technical coefficients. Also, we assume post-factum wages, so they are not considered advanced capital. The price level equation assuming a uniform (between producers) real rate of profits on replacement costs for this economy is given by:

(1) $$PX = PaX(1 + r) + PblX$$

[1] For a survey on this literature, see Martinez-Vazquez et al. (2011).

[2] The meaning of separation here does not mean that distribution (and taxation) has no effect whatsoever on output. It only means that there are multiple possible functional relations between those variables, depending on more specific assumptions.

[3] One little-noticed consequence of that is the critique of one important neoclassical welfare tenet: the pigouvian tax. Suppose the State, for instance, wants to tax one given input because it harms the environment. In that case, there is no guarantee that the resultant dominant technique chosen in the process of competition will be less intensive in the usage of the given input. There is no guarantee that other techniques will become more profitable with the introduction of a pigouvian tax, which in the end should prove to be useless (Gehrke and Lager, 1995).

[4] Metcalfe and Steedman (1971, pp. 178–79) show that the effects on the wage-frontier and the choice of techniques are independent of the number of basic commodities entering in the net output.

Where X is the economy's gross output, P corresponds to the price level of gross output, a is the technical coefficient, r is the real rate of profit, b the real wage[5] and l is the labor coefficient[6]. The economy's surplus is $1 - a$ and it is divided between wages and profits according to equation (2). Also, from equation (2), It is easy to derive the wage frontier for this economy simply by solving for the real wage in equation (3):

(2) $$1 - a = ar + bl$$

(3) $$b = \frac{1 - a(1 + r)}{l}$$

Next, we will include taxation in this economy. According to the OECD classification (OECD, 2020), taxes are differentiated according to their tax base. The 6 groups are: (i) taxes on income, profits and gains; (ii) social contributions; (iii) taxes on payroll and workforce; (iv) taxes on propriety; (v) taxes on goods and services; and (vi) other taxes. Taxes from (i) to (iv) are generally understood as direct taxes on individual and corporate income, propriety or wealth, whereas (v) and (vi) are understood as indirect taxes that are levied on expenditures, in particular through value-added, sales and payroll taxes.

In the neoclassical theory, the discussion on tax incidence tends to focus on direct versus indirect taxes and their effects on relative prices and distribution (Fullerton and Metcalf, 2002; Martinez-Vazquez et al., 2011). According to this approach, direct taxation corresponds to taxes levied on income or wealth of taxpayers. On the other hand, indirect taxation consists of taxs levied on market transactions irrespective of the economic conditions of the buyer or seller of the good or service. Therefore the legal incidence will differ from the real incidence in the unique case of indirect taxation.

From a sraffian standpoint, we can approach the same difference between the nominal (or legal) and real incidence with a different perspective. What is central to determine if the legal incidence differs from the real incidence is how much the tax is passed on to prices and that, in turn, depends on whether or not the tax is part of normal costs of production of the dominant technique used by firms[7]. If a given tax is part of normal costs of production, it must be included in the price level equation above and, hence, it will impact distribution depending on how the rate of profit and wages react to the increase in costs and prices. For instance, income tax could be considered part of the price equations if we assume that workers succeed in maintaining the value of their after-tax real wage[8]. In this case, the nominal incidence could be different from the real incidence, because workers would be able to pass on to capitalists the burden of income taxation. In the same sense, if we assume that competition equalizes the after-tax rate of profit, corporate income tax could also be subject to different real tax incidences.

In the simple model proposed in this paper, we assume that there is no difference between nominal and real incidence once taxes are levied on personal income, corporate profits and private wealth. Also, social security contributions levied on workers will not enter our price equation. Although Eatwell (1980) includes those taxes in the price equations, we do not follow his choice: it seems more realistic to consider that workers bargain for gross wages (before taxes). For instance, minimum wage policies usually determine the gross wage value. Hence, the study of real tax incidence in this paper focuses on one sort of tax that directly impact the price level equation above: sales taxes t_s, value-added taxes t_{va} and payroll taxes t_{pr}[9]. The general framework

[5] In a multi-sectoral model, b should be considered as the basket of goods consumed by workers. Notice that in this formulation, an increase in real wage means that new (and probably more expensive) itens are included in workers' consumption. The opposite occurs when the real wage decreases.

[6] In a multi-sectoral model, the scalar a is equivalent to an input-output matrix and l is equivalent to the labor input vector. Also, in a multi-sectoral model, r is uniform assuming that competition brings this equality and w is uniform under the hypothesis of homogenous labor.

[7] Or, from a kaleckian approach, if taxes are part of firms' prime costs (Laramie, 1991).

[8] See Eatwell (1980). For a discussion on capital/wealth tax and its impacts see Laramie and Mair (2001).

[9] For an analysis of other indirect taxes, such as value-added and payroll taxes, see Aidar (2022).

presented below draws on Metcalfe and Steedman (1971) and Eatwell (1980). Following these authors, we use a uniform tax rate. Since this paper deals with a one-sector economy, heterogenous tax rates are unnecessary.

2.2 Sales Tax

In the case of sales tax, the sale price for corporations is $\frac{P}{1+t_s}$. An example of this tax is sales taxes in the US, which are levied on sales from the retail sector[10]. So, the price equation becomes:

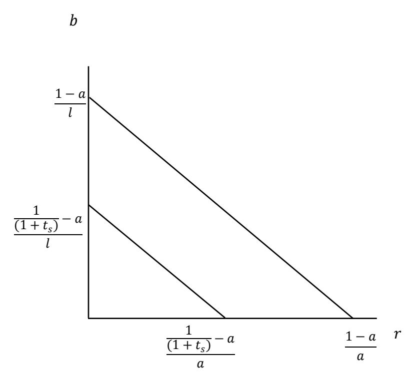
$$(4) \qquad P = Pa(1+r)(1+t_s) + Pbl(1+t_s)$$

Taxation reduces the social surplus available for capitalists and workers for a given level of output. The new division of the surplus, including taxation by the State, is given by equation (5) below. Also, the wage frontier makes a parallel shift toward the origin, as shown in Figure 1 below. This is shown by the new wage frontier in equation (6). Both the maximum real wage and the rate of profit are reduced, but the slope of the wage frontier does not change.

$$(5) \qquad 1 - a = ar + bl + t_s[a(1+r) + bl]$$

$$(6) \qquad b = \frac{\left(\frac{1}{(1+t_s)}\right) - a(1+r)}{l}$$

Figure 1: The wage frontier with a sale tax



3. Taxation and distribution I: the classical closures to the distribution theory

3.1 Taxation with a given real wage

So far, we only saw the reduction in total surplus expressed by a shift in the wage frontier. In order to examine how taxation is actually shared between wages and profits, we need to consider the different closures to distribution theory. In the Classical Political Economy, real wages are exogenously given and equal to a socially-determined subsistence level that enables workers to reproduce themselves (Levrero, 2018; Stirati, 1994). Hence, the real wage $\bar{b}$ becomes exogenous to our model, and it is determined outside the price equation. If we introduce a sales tax under the condition of a given real wage, we have:

$$(7) \qquad P = Pa(1+r)(1+t_s) + P\bar{b}l(1+t_s)$$

In this context, it is clear that the real incidence entirely relies on profits. If we replace $\bar{b}$ in the wage frontier, we have:

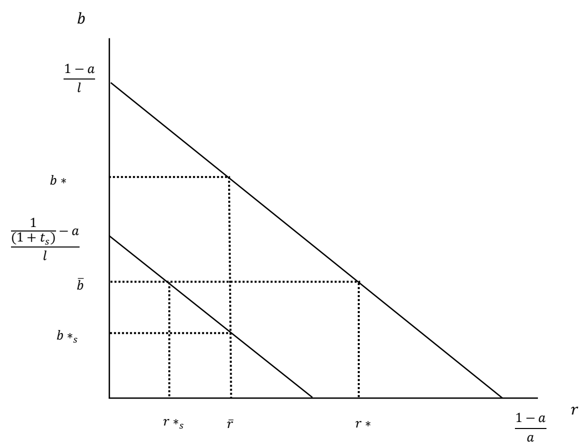
[10] Sales taxes in the US respond for 5.0% of GDP (or 17,6% of total public revenue) according to OECD (2020).

(8) $$r^* = \frac{\left(\frac{1}{(1+t_s)}\right) - \bar{b}l}{a} - 1$$

(9) $$\frac{dr^*}{dt_s} = -\frac{1}{a}\left\{\frac{1}{(1+t_s)^2}\right\} < 0$$

The profit rate after-tax r^* becomes the endogenous variable that adjusts according to the size of the tax rate t_s and the exogenous real wage (equation (8)). Also, it is straightforward that the derivative of the rate of profit in relation to the nominal tax rate t_s is negative (equation (9)). Notice that the size of the reduction of the rate of profit also depends on each form of taxation. Figure 2 below illustrates the fixed-wage closure in the wage frontier.

Figure 2: The Wage Frontier with a given distributive variable



From this very simple model, it becomes clear why any tax levied on the consumption of 'necessaires' necessarily reduces profits for classical economists, such as Smith and Ricardo. Dome (1992) shows that in Ricardo's *Principles of Political Economy and Taxation* any increase in this type of tax will reduce the uniform rate of profit, since the other distributive variable (rent) is also given. The strong assumption behind this result relies on the fact that workers are considered to be able to increase their nominal wage according to inflation in each period, so the real wage is not reduced by the increase in prices after the introduction of the new tax. In this same context, this exercise shows that payroll taxes (or social security contributions paid by employers) may not reduce real wages, which opposes the neoclassical interpretation of labor market taxation reducing real wages.

3.2 Taxation with a given real rate of profit

If the classical economists took the real wage as given in order to determine prices and distribution, Sraffa (Sraffa, 1960, p. 33) argues that the rate of profit could be taken as given in the price system and potentially determined by the monetary rate of interest. Pivetti (1991) suggests then that the exogenous distributive variable in the price system is the real rate of profit $\bar{r}$, which is determined by the targeted real rate of interest pursued by the Central Bank (Pivetti, 2007; Stirati, 2001). The price equation with a sales tax becomes:

(10) $$P = Pa(1+\bar{r})(1+t_s) + Pbl(1+t_s)$$

Under a fixed real rate of profit, the real incidence of taxation is on wages, since capitalists pass on to prices the proportional increase in costs of production. The real wage becomes endogenous to the exogenous rate of profit and nominal tax rate. We can therefore rewrite the wage frontier from equation (6) as:

(11) $$b^* = \frac{\left(\frac{1}{(1+t_s)}\right) - a(1+\bar{r})}{l}$$

The real wage b^* becomes endogenous to the exogenous rate of profit $\bar{r}$ and the sales tax rate. The result of an increase in the tax rate is analogous to the previous case (see equation (12) and figure 2).

(12) $$\frac{db^*_s}{dt_s} = -\frac{1}{a}\left\{\frac{1}{(1+t_s)^2}\right\} < 0$$

From a different perspective, but with similar results for our analysis of real tax incidence, Kalecki and some kaleckians economists adopted a fixed real gross profit margin determined by the degree of monopoly of each sector (Kalecki, 1954; Lavoie, 2014, p. 172)[11]. The price equation based on the costs of production can be transformed in order to show that the gross profit margin depends positively on the real rate of profit and the technical coefficient a (Dutt, 1999, p. 103; Lavoie, 2014, p. 177). Therefore, a fixed real profit margin is equivalent to a fixed real rate of profit. In this context, Kalecki (1937) argues that taxes on wage goods are fully passed on to prices and cause a proportional decrease in real wages. The same results are obtained in some kaleckian works on tax incidence (Laramie, 1991; Mott and Slatiery, 1994). As we saw in this case, the rate of profit remains constant, and the introduction of a tax on wage goods provokes a decrease in real wages.

Both classical economists and Kalecki were critical of imposing taxes on the consumption of wage goods for different reasons. Whereas the criticism in the classical economists was associated with the negative impact on the rate of profit (due to fixed real wages), in the case of Kalecki and kaleckians, there is a negative impact on real wages (due to a fixed gross profit margin or real rate of profit). In Ricardo, the reduction in the rate of profit, because of the assumption of Say's Law, causes a decrease in the rate of accumulation. In Kalecki, the reduction in the real wage decreases the size of the multiplier and the level of output.

4. Taxation and distribution II: introducing the conflict inflation model

4.1 The sraffian conflict inflation framework and the aspiration gap

We saw that in the Classical authors, workers obtained their desired real wage even after taxes. This is due to the fact that the real wage is a socially-determined variable. Hence, the distributive conflict is limited to the social/institutional factors behind the so-called subsistence wage. In the case in which capitalists obtained a fixed real rate of profit even after taxes, being this rate determined by the real interest rates (Pivetti, 1991) or by the degree of monopoly (Kalecki, 1954; Lavoie, 2014, p. 172), the distributive conflict is focused on the monetary policy or the degree of competition in each industry.

However, a third situation may occur when neither capitalists nor workers obtain the same pre-tax income level once a new tax is introduced. Capitalists can pass on to prices the increase in costs due to taxation, but workers can also be able to bargain for nominal wage increases. If the claims over the surplus after taxes are incompatible, conflict inflation occurs. The resulting real wage and real rate of profit after taxes become endogenous to the conflict dynamics. To deal with conflict inflation, and specify the possibilities of tax incidence, we will draw on original conflict inflation models (Okishio, 1977; Rowthorn, 1977) to derive a simple framework of conflict inflation drawing on the sraffian literature (Pivetti, 1991; Serrano, 1993, 2010; Stirati, 2001).

We first introduce two new price equations:

(13) $$P = Pa(1 + r_w)(1 + t_s) + Pb_w l(1 + t_s)$$

[11] It is worth noting that Kalecki (1971) and Rowthorn (1977) considered the possibility of wage rises depressing markups. For a more recent approach, see Blecker and Setterfield (2019).

(14) $P = Pa(1 + r_k)(1 + t_s) + Pb_k l(1 + t_s)$

Equation (13) represents the price equation related to the workers' desired level of the real wage b_w and the real rate of profit r_w compatible with it. b_w can be considered as the socially accepted basket of goods for workers' consumption. Equation (14), in its turn, represents the capitalists' desired real rate of profit r_k and the real wage b_k compatible with it. r_k could be related to the monetary interest rate as in the Monetary Theory of Distribution (Pivetti, 1991). Conflict inflation exists when r_k and b_w are incompatible with the available surplus. This is equivalent to:

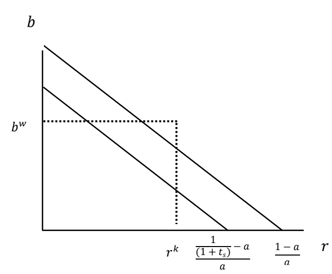
(15) $a(1 + r_k)(1 + t_s) + b_w l(1 + t_s) > 1$
(16) $ar_k + b_w l > 1 - a - t_s[a(1 + r_k) + b_w l]$
(17) $a(1 + r_k) + (1 - a(1 + r_w) > 1 - t_s[a(1 + r_k) + b_w l]$
(18) $b_w l + (1 - b_k l) > 1 - t_s[a(1 + r_k) + b_w l]$

Equation (15) is analogous to the condition presented in Okishio (1977, p. 21), providing the initial condition of conflict inflation. Equation (16) shows that the available surplus after tax is incompatible with income claims. Equations (17) and (18) express this incompatibility in terms of the two desired rates of profits and the two desired real wages, respectively. The conditions in equations (15) and (16) are illustrated in figure 3 below.

In the previous sections, the rate of profit was defined in terms of replacement costs, which correspond to the costs when the production is sold. In this case, distribution is assumed to have already been determined. However, once we consider conflicting claims in a monetary economy, we must discuss the relations between nominal wages, nominal rate of profits and prices[12]. In this context, competition implies that capitalists will have a uniform rate of profit based on their historical costs at the beginning of the production cycle $(t - 1)$, which may be not the same prices when production is sold (because of inflation). Since we are assuming that wages are only paid when the product is sold, the price equation becomes (from now on, the subscript -1 means one period lag):

(19) $P = P_{-1}a(1 + r_k)(1 + t_s) + Wl(1 + t_s)$

Figure 3: The Wage Frontier with conflicting claims



The nominal wage in equation (19) is W. It is clear that in this equation r_k is equivalent to the nominal rate of profit, which corresponds to capitalists' targeted rate of profit at the beginning of the production cycle. Competition implies that any sum of capital invested in production must generate the same nominal rate of profit at the beginning of the production cycle. In this sense, the nominal rate of profits is based on historical costs and that is why the input price in equation (29) is P_{-1}. The real rate of profit will only be determined when the product is sold, and it will be determined by the nominal rate of profit reduced by the changes in primary costs and in the nominal wage that took place between the beginning and the end of the production

[12] The implications of the differentiation between replacement and historical costs pricing was introduced in the heterodox literature by Harcourt (1959) and the Cambridge Economic Policy Group (Cripps and Godley, 1976; Meade, 1981; Tarling and Wilkinson, 1985). Later, this was taken up by some sraffian, such as Pivetti (1991), Serrano (1993) and Stirati (2001).

cycle. So the real interest rate is defined in terms of replacement costs and the end of the production cycle[13]. The real wage, in its turn, will be determined by confronting the bargained variation in nominal wages and the final variation of prices.

In sum, both the real rate of profit and the real wage become endogenous variables. The different assumptions regarding wage and profit targets and their resistance to inflation will determine the after-tax distribution. We will now explore our framework considering that nominal wages change according to the distance between the targeted real wage and the actual real wage (the so-called aspiration gap). Later, we will introduce profit and wage resistance and present the more general version of our sraffian conflict model.

4.2 The aspiration Gap

In Okishio (1977) and Rowthorn (1977), workers increase their nominal wage in proportion to the gap between the desired basket of goods $b^w$and the actual real wage and it is the basis of the models of inflation based on the so-called aspiration gap (Lavoie, 2014, chap. 8). In terms of our model, (one plus) the rate of increase of nominal wages is given by:

(20) $$\frac{W}{W_{-1}} = \frac{b_w}{b_{-1}}$$

Where W_{-1} and b_{-1} are, respectively, the nominal and real wages observed in the previous period. According to equation (20), workers demand higher nominal wages whenever the observed real wage is below their target . We can rewrite equation (20) in order to obtain the expression for the nominal wage:

(21) $$W = b_w P_{-1}$$

From equation (21) we grasp why Okishio considers that "labourers raise the money wage rate of the next period so as to procure their required real wage rate (…), using current prices as a basis of calculation (Okishio, 1977, p. 20)[14]". Replacing equation (21) in equation (19) leads us to:

(22) $$P = P_{-1}a\left(1 + r^k\right)(1 + t_s) + P_{-1}b^w l(1 + t_s)$$

Dividing both sides of the equation by the price level of the previous period P_{-1}, we have:

(23) $$1 + \hat{p} = a\left(1 + r^k\right)(1 + t_s) + b^w l(1 + t_s)$$

Because of the condition expressed in equation (15), equation (23) describes a constant rate of inflation caused by the incompatibility of claims over the after-tax surplus. Moreover, replacing equation (18) in (33) gives us:

(24) $$1 + \hat{p} = 1 + (b^w - b_k)l(1 + t_s)$$

Hence, the rate of inflation is constant, and it is a positive function of the divergence between the claims over the surplus and the tax rate. Note that equation (34) is analogous to Lavoie (2014, p. 551) and Rowthorn (1977), the major difference being the inclusion of taxation.

To check the real tax incidence in this context, let's look at the equilibrium real wage and rate of profit after tax:

(25) $$b^* = \frac{P_{-1}b^w}{P} = \frac{b^w}{1+\hat{p}} = \frac{b^w}{1+(b^w - b_k)l(1+t_s)}$$

---

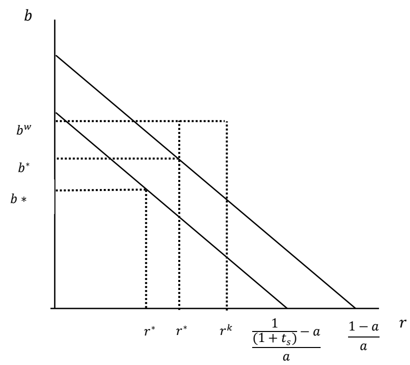
[13] See Bastos (Bastos, 2002, chap. 5) for a detailed discussion on nominal/real rate of profit and historical/replacement costs.

[14] Okishio makes a multi-sector model and assumes that wage are paid in advance, but these assumptions do not change the main results we derive in this paper.

(26) $$1 + r^* = \frac{1+r^k}{1+\hat{p}} = \frac{1+r^k}{1+(b^w-b_k)l(1+t_s)}$$

The resulting real wage after-tax b^* is below the desired workers' real wage b^w. Moreover, it is also a decreasing function of the tax rate t_s. The same occurs with the equilibrium real rate of profit r^*, which is below the targeted rate of profit r^k, and it is a decreasing function of the tax rate t_s. It is clear from the equations above that both capitalists and workers have a proportional reduction in their share of the surplus after-tax. Also, final distribution will be only compatible with the original claims over profits and wages in the absence of conflict and taxes. Figure 4 below illustrates our results for the aspiration gap in our model.

Figure 4: The Wage Frontier with conflicting claims



4.3 Wage and profit resistance

The closure of the previous section, based on the work of Okishio (1977) and Rowthorn (1977), did not consider that capitalists and workers may resist to actual or expected inflation. According to Okishio (1977, p.21), '(…) it is difficult to make the fairly reasonable assumptions concerning the expectations of the classes (…)'. We agree with Okishio's concern in using expectations in his model. However, not considering the past inflation seems contradictory to the idea of bargaining a desired real wage (or a real rate of profit). As Lavoie (2014, p. 549-550) put out, past inflation is one of the critical issues in labor bargaining. Rudd (2022), for instance, shows that past inflation (and not inflation expectations) are important to explain recent US inflation. Also, if the nominal interest rates are considered a floor to the nominal rate of profit[15] even if other factors may also affect it, a monetary policy pursuing a targeted real interest rate can also introduce inflation indexation in the nominal rate of profit (Stirati, 2001). Hence, introducing inflation resistance, the nominal rate of profit and the nominal wage rate of growth will be given by:

(27) $$1 + n = \left(1 + r^k\right)(1 + x_k \widehat{p_{-1}})$$

(28) $$\frac{W}{W_{-1}} = \frac{(1+x_w \widehat{p_{-1}})b^w}{b_{-1}}$$

(29) $$W = P_{-1}(1 + x_w \widehat{p_{-1}})b^w$$

For convenience, in equation (27) above, the nominal rate of profit is now n, being r^k the targeted nominal rate of profit and x_k the fraction of past inflation incorporated in the rate of profit. The variation of nominal wages, in equation (28), also incorporates a fraction x_w of past inflation[16]. Note that differently from the previous presentation of the aspiration gap without wage resistance, workers bargained variation in nominal wages now incorporates the observed change in prices. Rewriting equation (28) for the level of the current

---

[15] For the discussion of the interest rate determining the nominal rate of profit, see Lucas (2021), Serrano (2010) and Stirati (2001).

[16] In a more complex model, x_k and x_w could be related to the relative frequency of wage and price adjustments (see references in note 13).

nominal wage gives us equation (29). We are able now to incorporate wage and profit resistances in our price equation simply replacing the nominal rate of profit and nominal wage given by equations (27) and (29) in equation (19):

$$(30) \qquad P = P_{-1}a(1 + r^k)(1 + x_k\widehat{p_{-1}})(1 + t_s) + P_{-1}(1 + x_w\widehat{p_{-1}})b^w l(1 + t_s)$$

In order to obtain the rate of inflation, let's divide both sides of equation (30) by P_{-1}:

$$(31) \qquad 1 + \hat{p} = a(1 + r^k)(1 + x_k\widehat{p_{-1}})(1 + t_s) + (1 + x_w\widehat{p_{-1}})b^w l(1 + t_s)$$

The result is a first-order difference equation for the rate of inflation $\hat{p}$. The stability condition for the rate of inflation implies that:

$$(32) \qquad x_k a(1 + r^k) + x_w b^w l < \frac{1}{1+t_s}$$

If the condition presented in equation (32) does not hold, the conflict is too intense and there will be hyperinflation. Since the rate of inflation has a positive feedback through the rate of profit and wage resistance, equation (32), in economic terms, means that the condition for inflation not to be explosive is that the fraction of conflict inflation related to wage/profit resistance must be compatible with the available surplus net of taxes. We can illustrate this condition in the situation where the real rate of profit is fully indexed to past inflation ($x_k = 1$). In that case:

$$(33) \qquad x_w < \frac{\frac{1}{1+t_s} - a(1+r^k)}{b^w l} = \frac{b^k}{b^w}$$

Because capitalists succeed in restoring the value of their targeted rate of profit, the degree of wage resistance x_w needs to be lower than the ratio of conflict between the real wage compatible with the targeted rate of profit b^k and the workers' targeted real wage b^w.

Analogously, if wages are fully indexed ($x_w = 1$), the condition of stability implies:

$$(34) \qquad x_k < \frac{\frac{1}{1+t_s} - b^w l}{a(1+r^k)} = \frac{1+r^w}{1+r^k}$$

Now workers succeed in obtaining their targeted real wage, so the degree of the rate of profit resistance has to be lower than the ratio of conflict between the rate of profit compatible with this target and the capitalists' desired rate of profit. Note that, in line with Stirati (2001; 2018), if wages and profits are fully indexed ($x_w, x_k = 1$), the inflation rate will be explosive. Any divergence between distributive claims will cause accelerating inflation over time. Also, according to the condition expressed in equation (32), if x_k and x_w are high enough, explosive/accelerating inflation is possible even with no full indexation.

If the stability condition in equation (32) holds, from equation (31), we derive the equilibrium rate of inflation:

$$(35) \qquad \hat{p}^* = \frac{(1+t_s)[a(1+r^k)+b^w l]-1}{1-(1+t_s)[x_k a(1+r^k)+x_w b^w l]}$$

The equilibrium rate of inflation is a positive function of the targeted distributive variables and the degree of wage/rate of profit resistance as in the tradition of conflict inflation models (Lavoie, 2014, chap. 8). Also, inflation is positively related to taxation. However, differently from the previous section, because we assumed that past inflation is passed on to prices, the increase of inflation is more than proportional to the tax rate t_s.

Both after-tax real wage and the real rate of profit are endogenous and depend on the distributive parameters of the conflict inflation model. The equilibrium after-tax real wage is given by:

(36) $$b^* = \frac{P_{-1}(1+x_w\hat{p}^*)b^w}{P} = \frac{(1+x_w\hat{p}^*)b^w}{1+\hat{p}^*} = \frac{[(1-x_w)-(1+t_s)a(1+r^k)(x_k-x_w)]b^w}{(1+t_s)[a(1+r^k)(1-x_k)+b^w l(1-x_w)]}$$

One first observation b^* is lower than workers' desired real wage b^w because capitalists react to the increase in wages. As expected, $b^*$is an increasing function of the degree of wage resistance x_w and the targeted real wage b^w. However, the equilibrium real wage is a negative function of capitalists' desired rate of profit r^k and their degree of profit resistance x_k. Finally, the real wage is a decreasing function of the tax rate t_s. The derivative of b^* in relation to the tax rate is:

(37) $$\frac{db^*}{dt_s} = \frac{b^w(x_w-1)}{(1+t_s)^2[a(1+r^k)(1-x_k)+b^w l(1-x_w)]} \leq 0$$

The derivative is always negative because the degree of wage resistance is equal or lower than unity. However, a higher degree of wage resistance dampens the negative impact of an increase in the tax rate on the real wage – the other result will be a higher equilibrium rate of inflation according to equation (35). It is interesting to explore what happens when $x_w = 1$. It is easy to check in equation (36) that the real wage is not affected by changes in the tax rate and it equals b^w. In this case, the result is the same of section 3.1, which is consistent with the Classical Political Economy approach for distribution. Through full incorporation of past inflation, workers succeed in obtaining their target b^w. Hence, the tax burden is fully shifted to capitalists. After an increase in the tax rate, for instance, although during a transitory period the real wage may be below b^w because of the initial increase in inflation, as inflation converges to its equilibrium level, the real wage converges to b^w. This means that no matter the partial degree of the rate of profit resistance, workers are able to obtain their desired real wage and taxation does not reduce their income.

Let us now check the real rate of profit:

(38) $$1 + r^* = \frac{(1+r^k)(1+x_k\hat{p}^*)}{1+\hat{p}^*} = \frac{[(1-x_k)-(1+t_s)b^w(x_w-x_k)](1+r^k)}{(1+t_s)[a(1+r^k)(1-x_k)+b^w l(1-x_w)]}$$

As expected, the impacts of the exogenous variables on the equilibrium rate of profit r^* are exactly the opposite of equation (36) for the real wage. The equilibrium rate of profit is an increasing function of its degree of resistance x_k and the desired rate of profit r^k, whereas it is a negative function of workers' wage resistance x_w and their targeted real wage b^w. Note that if wages are perfectly indexed to past inflation ($x_w = 1$), equation (38) becomes:

(39) $$1 + r^* = \frac{[1-(1+t_s)b^w]}{a(1+t_s)}$$

The result obtained in equation (39) is compatible with equation (8), which gave us the rate of profit consistent with workers' claims. Hence, in this case, $r^* = r^w$. However, if the rate of profit, instead of wage, is perfectly indexed to past inflation, $x_k = 1$, equations (36) and (39) tell us that $b^* = b^k$ and $r^* = r^k$. In this case, capitalists are able to keep their real rate of profit at their target no matter the tax rate or workers' wage resistance. Hence, we are back to an exogenous rate of profit as seen in section 3.2 of this paper.

When neither distributive variables are fully indexed to inflation, the derivative of r^* in relation to t_s is negative:

(40) $$\frac{dr^*}{dt_s} = \frac{(1+r^k)(x_k-1)}{(1+t_s)^2[a(1+r^k)(1-x_k)+b^w l(1-x_w)]} \leq 0$$

As in the case of wages, a higher degree of profit resistance softens the negative impact of an increase in the tax rate on the rate of profit.

In sum, our conflict inflation model allowed us to explore the alternative closures to the after-tax distribution. We saw that the extreme situations of full wage or profit resistance bring us back to the pure exogenous real wage or rate of profit, respectively, where the endogenous distributive variable completely absorbs taxation. Also, when wage and profit resistances to inflation are absent but incompatible claims over income are present, we arrive at Okishio (1977) and Rowthorn (1977) original model, which leads to a shared real taxation. Finally, when partial inflation resistance is present, both the real wage and the rate of profit become endogenous to the conflict model's exogenous parameters, that is, the degree of indexation and the targeted/bargained distributive variable. The size of each of these parameters determines who gets a higher after-tax income.

One important aspect not mentioned so far is the determination of these exogenous variables of this model, notably the distributive parameters such as r^k, b^w, x_w and x_k. We briefly mentioned the social subsistence wage (Levrero, 2018), the kaleckian degree of monopoly (Kalecki, 1954[2003]) and the Monetary Theory of Distribution (Pivetti, 1991). However, other effects such as unemployment and other institutional aspects shall play a role in determining those variables[17]. Also, the form of taxation and the political context can also impact those variables. As argued by Rowthorn (1977, p. 220):

'In the case of higher taxes, however, the situation is less straightforward, as these are often accompanied by higher government expenditure, the benefits of which may partially compensate for the loss of disposable income caused by higher taxes. But this does not mean that these taxes will be passively accepted by workers or capitalists in the private sector. Government expenditure may be used for a variety of purposes, such as the armed forces, the social services and welfare payment to the aged, the sick and the poor; the willingness of capitalists and workers to support this kind of expenditure depends upon their evaluation of its social usefulness'.

In that context, the State can intervene in the after-tax distribution (and inflation) as in Cesaratto (2008), who argues that through the provision of 'social wage goods', such as free education/health, public infrastructure, or transport subsidies for workers, the State reduces the costs of workers' subsistence. In terms of our model, this translates into a smaller targeted real wage b^w. According to equation (48), this, in turn, tends to mitigate pressures on conflict inflation. Alternatively, those public investments can raise the economy's productivity, reducing the technical coefficients in equation (48), which increases the social surplus and reduces conflict inflation.

5. Taxation, distribution and effective demand under balanced budgets

5.1 Tax incidence and effective demand

In the previous sections, we assumed a given level of output in order to explore the real tax incidence on wages and profits. Now, in order to discuss Haavelmo's (1945) results, we expand our model to explore the impact of taxation on the level of effective demand and output assuming a government's balanced budget. Our model builds on Eatwell's (1980) pioneering examination of taxation, distribution and effective demand. However, our model distinguishes itself from Eatwell's analysis in two important aspects. First, it explicitly considers two different forms of taxation, that is, income and goods taxation. Secondly, we consider that private capacity-generating investment (from now on only investment) is induced by demand, using the sraffian supermultiplier model (Serrano et al., 2019), which is consistent with the approach to inflation and distribution explored in this paper. According to this model, investment is induced by demand, so any increase in public spending positively

[17] See Lucas (2021) and Serrano (2019) for a more in-depth discussion.

impacts productive investment through a flexible accelerator mechanism[18]. We try to add to the previous effort of Serrano and Pimentel (2019), who already expanded Haalvemo's results in the context of the sraffian supermultiplier, and show the validity of both Haavelmo and Serrano and Pimentel results when we endogenize real tax incidence following our conflicting claims model.

Since we are assuming a balanced budget, we do not need to explore the dynamics of public debt nor the effects of public debt on distribution and effective demand. Note that the different forms of government financing, be it through taxation or debt issue, would have heterogeneous effects on distribution (Lerner, 1944, chap. 24). However, differently from Eatwell (1980), who was interested in finding the combinations of taxation depending on the full-employment target and distribution, in our model there is no such a target, and the tax rate is considered exogenous.

5.2 Tax incidence and effective demand: the case of a sales tax

In order to analyze aggregate demand, we need rewrite equation (3) in terms of quantities:

(41) $$X = [Xa(1 + r^*) + Xb^*l](1 + t_s)$$

In equation (41), X corresponds to gross output/income, whereas b^* and r^* depict the equilibrium real wage and rate of profit (after sales tax) given by equations (36) and (38), respectively. Reorganizing equation (41):

(42) $$X = aX + Xar^* + Xb^*l + t_s[Xa(1 + r) + Xbl]$$

So we can write the sales tax revenue in terms of output and the tax rate:

(43) $$T_{sales} = \frac{t_s}{1+t_s}X$$

Once we write the tax revenue in terms of gross output/income, it is easy to check that the tax revenue is a positive function of the tax rate but at a decreasing rate. The increase in tax revenues is counterbalanced by the reduction in the after-tax output. Gross output will be given then by:

(44) $$X = aX + Xar^* + Xb^*l + \frac{t_s}{1+t_s}X$$

Since we are incorporating income taxes in our model, wages and profits in equation (44) include income taxes. Hence, considering a closed economy, from the demand-side, gross output/income will be equal to:

(45) $$X = C + I + G$$

Where C corresponds to final consumption, I is equal to investment and G depicts government expenditures.

Consumption is determined by an autonomous component Z, by the propensities to consume out of wages c_w and profits c_π. However, the disposable income is defined in terms of net wages and profits, so the consumption function becomes:

(46) $$C = Z + [c_w b^* l(1 - t_w)X + c_\pi r^* a(1 - t_\pi)X]$$

[18] Note the investment is not affected by the rate of profit in opposition to the kaleckian literature (Serrano and Freitas, 2017). One important consequence of this choice is that real taxation on profits will not impact investment differently from the case of Kalecki (1937)

Where t_w and t_π are income tax rates on wages and profits, respectively. Investment is induced by demand according to a flexible accelerator in which the capital stock adjusts to the expected growth of effective demand for a given capital-output ratio a (Serrano et al. (2017)). So the investment rate can be expressed as:

(47) $$I = a(1 + g^e)X$$

Where g^e corresponds to the expected growth of effective demand. Finally, as we are interested in assessing Haavelmo's insights on balanced-budget multipliers, government expenditures are equal to public revenue. Total taxation, in its turn, is the sum of income and sales taxes. So we have:

(48) $$G = T_{income} + T_{sales}$$

(49) $$G = \left[t_w b^* l + t_\pi r^* a + \frac{t_s}{1+t_s}\right] X$$

Replacing equations (46), (47) and (49) in equation (45), allows us to solve the system of equations for X:

(50) $$X = Z + \left\{[c_w + t_w(1 - c_w)]b^* l + [c_\pi + t_\pi(1 - c_\pi)]r^* a + a(1 + g^e) + \frac{t_s}{1+t_s}\right\} X$$

(51) $$X = \frac{Z}{1 - \left\{b^* l[c_w + t_w(1 - c_w)] + r^* a[c_\pi + t_\pi(1 - c_\pi)] + \left(\frac{t_s}{1+t_s}\right)\right\} - a(1 + g^e)}$$

The present model is made in order to show the effect of changes in taxation on the level of effective demand and output. We also assume that the economy is in its long-period position, and we assume that g^e is fixed, so only changes in distribution and taxation may cause variations in the supermultiplier[19]. Note also that since we assumed balanced budgets, government expenditures are induced, and the only autonomous expenditure in equation (51) is the component of private consumption Z. Hence, changes in taxation and, consequently, on government spending do not impact the long-run rate of growth of output, but it will impact the (super)multiplier and have level effects: it will change the size of output and the productive capacity[20].

In equations (50) and (51), we followed Serrano and Pimentel (2019) and rearranged the consumption function considering the impact of direct taxation on wages and profits and the impact of government spending induced by taxation. So, it becomes clear that Haavelmo's results are independent of the size of the different propensities to consume, assuming a fixed tax incidence on distribution, because:

(52) $$t_w(1 - c_w) > 0$$

(53) $$t_\pi(1 - c_\pi) > 0$$

Equations (52) and (53) explicit that Haavelmo's results do not depend on the different sizes of the propensity to consume, but his results are determined by the fact that the propensity to consume of the government, which equals one, is always greater than the propensity to consume of workers and capitalists (Serrano and Pimentel, 2019). Also, it is clear that if workers have a higher propensity to consume, $c_w > c_\pi$, taxing profits will always be more expansionary under balanced budgets[21]. However, we need now to explore if these results still hold if we relax the assumption of exogenous real tax incidence. As we already argued, changes in 'indirect' taxation, which interfere with the normal costs of production, may have different results for distribution, according to the relative bargaining power of the two classes[22]. To explore the effect of expanding government expenditures with a balanced budget and endogenous real tax incidence, we must consider the impact of changes in t_s in the

[19] For the dynamic proprieties of the sraffian supermultiplier, see Freitas and Serrano (2015).

[20] See Freitas and Serrano (2015) for the relation between changes in the supermultiplier and the level and rate of growth of output.

[21] Note that in a more general setting the indirect taxation of non-basic (luxury) goods would have a similar effect as a higher income tax rate on profits.

[22] Haavelmo (1945) considers a specific distribution function in order to assume that taxation will not interfere in distribution.

equilibrium real wage b^* and real rate of profit r^*. So, we replace equations (36) and (38) in (51), which gives us:

$$(54) \qquad X = \frac{Z}{1-\left\{\frac{[(1-x_w)-(1+t_s)a(1+r^k)(x_k-x_w)]b^w}{(1+t_s)[a(1+r^k)(1-x_k)+b^w l(1-x_w)]} l[c_w+t_w(1-c_w)]+\left\{\frac{[(1-x_k)-(1+t_s)b^w(x_w-x_k)](1+r^k)}{(1+t_s)[a(1+r^k)(1-x_k)+b^w l(1-x_w)]}-1\right\}a[c_\pi+t_\pi(1-c_\pi)]+\left(\frac{t_s}{1+t_s}\right)\right\}-a(1+g^e)}$$

As equation (54) shows, the supermultiplier is endogenous to changes in distribution caused by changes in t_s or in the parameters of the distributive conflict x_w, x_k, b^w and r^k. Note, first, that according to equation (54), the supermultiplier with balanced budgets is always positive. Second, in order to obtain the net effect on the level of output of raising government spending by means of a raise in the sales tax rate, we take the derivative of X in relation to t_s:

$$(55) \qquad \frac{dX}{dt_s} = \frac{\mu^2 Z\{a(1+r^k)(1-x_k)[1-c_\pi-t_\pi(1-c_\pi)]+b^w l(1-x_w)[1-c_w-t_w(1-c_w)]\}}{[a(1+r^k)(1-x_k)+b^w l(1-x_w)]} \geq 0$$

For convenience, we wrote the supermultiplier as μ. The derivative in equation (55) is always greater or equal to zero because the keynesian stability condition with income tax implies that $c_\pi + t_\pi(1-c_\pi) < 1$ and $c_w + t_w(1-c_w) < 1$[23]. In economic terms, the result above indicates that although the increase in the sales tax rate reduces both the after-tax real wage and rate of profit, it is expansionary because the propensity to consume of the government, which is equal to one, is greater than the average propensity of consume of workers and capitalists. This result, as we saw in the case of direct taxation, is independent of the size of the different propensities to consume and the real tax incidence – given that the distributive conflict is not explosive: $x_k \leq 1$ and $x_w \leq 1$. Therefore, independently of the income distribution after the raise in indirect taxation, the level of gross output (and income) is higher than before.

If, however, we adopt the kaleckian assumption of a fixed real rate of profit based on a fixed markup ($x_k = 1$), the derivative above becomes:

$$(56) \qquad \frac{dX}{dt_s} = \frac{\mu^2 Z\{b^w l(1-x_w)[1-c_w-t_w(1-c_w)]\}}{[b^w l(1-x_w)]} \geq 0$$

In that case, an increase in the tax rate is totally absorbed by a reduction in the wage share net of taxes because capitalists succeed in passing on to prices the increase in the tax rate. Therefore, the increase in the tax rate causes an increase in output as long as workers' propensity to consume is below unity. If, as in Kalecki (1937), workers consume their entire income ($c_w = 1$), the derivative above equals zero, and Haalvemo's results are not valid anymore for an increase in the sales tax – which is the original result obtained by Kalecki (1937) a few years before Haavelmo (1945).

Now, if the wage resistance restores the purchasing power desired by workers, as in the Classical authors, the real wage becomes fixed ($x_w = 1$) and the derivative of equation (55) becomes:

$$(57) \qquad \frac{dX}{dt_s} = \frac{\mu^2 Z\{a(1+r^k)(1-x_k)[1-C_\pi-t_\pi(1-C_\pi)]\}}{[a(1+r^k)(1-x_k)]} \geq 0$$

Since it is implausible to assume a propensity to consume out of profits equal to one, it is clear that Haalvemo's results, in this case, are unequivocal. The fact that wage resistance transfers the fiscal burden to profits, which allows an increase in government spending, mitigates the negative impact on total consumption and increases output. Note that the introduction of effective demand changes the Classical skepticism, under Say's law, concerning consumption tax and its allegedly negative effect on accumulation.

[23] Also, we have from the previous section that $x_k < 1$ and $x_w < 1$ otherwise inflation would be explosive.

Finally, we can explore what happens to the effect of taxation on gross output when the wage x_w and profit resistances vary x_k. In order to do that, we take a look at the second derivative of $\frac{dY}{dt_s}$ in relation to x_w and x_k:

$$(58) \qquad \frac{d^2X}{dt_s dx_w} = \frac{\mu^2 Za(1+r^k)(1-x_k)b^w l\{[1-c_\pi-t_\pi(1-c_\pi)]-[1-c_w-t_w(1-c_w)]\}}{\left[a(1+r^k)(1-x_k)+b^w l(1-x_w)\right]^2}$$

$$(59) \qquad \frac{d^2X}{dt_s dx_k} = \frac{\mu^2 Za(1+r^k)b^w l(1-x_w)\{[1-c_w-t_w(1-c_w)]-[1-c_\pi-t_\pi(1-c_\pi)]\}}{\left[a(1+r^k)(1-x_k)+b^w l(1-x_w)\right]^2}$$

The difference between $c_w - t_w(1-c_w)$ and $c_\pi - t_\pi(1-c_\pi)$ defines which equation above is positive or negative. In the extreme case where $c_w = 1$, it is clear that equation (58) is always positive, whereas equation (59) is always negative. In economic terms, it means that because the propensity to consume out of wages is maximum, whenever the wage share is more 'resistant' to increases in the sales tax rate, protecting the wage share against the increase in taxation, the (positive) impact of t_s on output rises. When $c_w > c_\pi$, which tends to be a more realistic situation, equation (58) will be negative, and equation (59) positive, only when direct taxation over profits t_π is substantially higher than direct taxation on wages t_w. In other words, if direct taxation is sufficiently progressive ($t_\pi > t_w$) to offset the difference in the propensities to consume (so equation (59) becomes negative), more resistant wages against inflation make the raise in t_s less expansionary because it reduces more than proportionally the revenues out of direct taxation – and consequently government spending increases less than previously.

In sum, the difference in the propensities to consume and the real tax incidence do not overturn Haavelmo's results. However, the intensity of the expansion in gross output caused by an increase in the 'indirect' tax rate depends on the real tax incidence, which in our model is given by the parameters of the distributive conflict, the size of the propensities to consume and the size of the direct tax rates.

Final remarks

Our paper tried to deal with Theorems I and III of Haavelmo (1945) relaxing the condition that taxation does not interfere in distribution. From a sraffian standpoint, real tax incidence depends ultimately on the conditions of distributive conflict, in particular the degree profit and wage resistance. On the one hand, the Classical Political Economy view on taxation, as we argued, was represented in our model by a full wage resistance. Hence, any increase in goods taxation would be ultimately paid capitalists. On the other hand, Kalecki (1937), Pivetti (1991) and some kaleckians can be united in assuming a full profit resistance. In this case, the taxation of wage goods would be ultimately paid by a decrease in real wages.

Moreover, we argued that the Classical framework of real tax incidence can be compatible with either Say's Law or effective demand. We adopted the Supermultiplier approach to the level of effective demand and gross output in order to examine the expansionary nature of balanced budgets. In particular, we showed that, in this situation, Haavelmo's conclusion holds even when we endogeneize the real tax incidence in the case of sales tax (independently of the distribution of the real taxation).

This paper is a contribution to a different perspective on the assessment of taxation. From a sraffian standpoint, first, real tax incidence should be studied through the analysis of the distributive conflict between wages and profits. Secondly, the implications of real tax incidence to output reflect the chosen theory of output and accumulation, which in our case is the sraffian supermultiplier. Finally, both tax and fiscal regimes are also important to understand the consequences of real tax incidence to effective demand. In addition to the distributive conflict between wages and profits, the conflicts in the heart of the State that affects the forms of taxation and fiscal policy is crucial to the understanding of the interaction of taxation and output. These two conflicts should be seen as the real constraint to the goals of public finance.

References

Aidar, G. 2022. 'Essays on Economic Policies from a Sraffian Standpoint', Universidade Federal do Rio de Janeiro - non published PhD Dissertation

Allain, O. 2015. Tackling the instability of growth: a Kaleckian-Harrodian model with an autonomous expenditure component, *Cambridge Journal of Economics*, vol. 39, no. 5, 1351–71

Bastos, C. P. 2002. 'Price Stabilization in Brazil: a Classical Interpretation for an Indexed Nominal Interest Rate Economy', Unpublished PhD Dissertation - New School For Social Research

Blecker, R. A. and Setterfield, M. 2019. *Heterodox Macroeconomics: Models of Demand, Distribution and Growth*, Cheltenham, UK, Edward Elgar

Cesaratto, S. 2008. The Classical 'Surplus' Approach and the Theory of the Welfare State and Public Pensions, in Chiodi, G. and Ditta, L. (eds.), *Sraffa or An Alternative Economics*, London, Palgrave Macmillan

Cripps, F. and Godley, W. 1976. A Formal Analysis of the Cambridge Economic Policy Group Model, *Economica*, vol. 43, no. 172, 335–48

Dome, T. 1992. Ricardo's theory of tax incidence: a Sraffian re-interpretation, *Cambridge Journal of Economics*, vol. 16, no. 1, 43–53

Dutt, A. K. 1999. Kalecki and the kaleckians: the relevance of Kalecki today:, date last accessed July 3, 2022, at http://www.iea.usp.br/publicacoes/textos/dinamica-economica-do-capitalismo-contemporaneo-uma-homenagem-ao-centenario-de-michail-kalecki/view

Dutt, A. K. 2013. Government spending, aggregate demand, and economic growth, *Review of Keynesian Economics*, vol. 1, no. 1, 105–19

Dutt, A. K. 2019. Some observations on models of growth and distribution with autonomous demand growth, *Metroeconomica*, vol. 70, no. 2, 288–301

Eatwell, J. 1980. A simple framework for the analysis of taxation, distribution, and effective demand, in Nell, E. J. (ed.), *Growth, profits and property: essays in the revival of political economy*, Cambridge, UK, Cambridge University Press

Freitas, F. and Christianes, R. 2020. A baseline supermultiplier model for the analysis of fiscal policy and government debt, *Review of Keynesian Economics*, vol. 8, no. 3, 313–38

Freitas, F. and Serrano, F. 2015. Growth Rate and Level Effects, the Stability of the Adjustment of Capacity to Demand and the Sraffian Supermultiplier, *Review of Political Economy*, vol. 27, no. 3, 258–81

Fullerton, D. and Metcalf, G. E. 2002. Tax incidence, pp. 1787–1872, in Auerbach, A. J. and Feldstein, M. (eds.), *Handbook of Public Economics*, US, Elsevier

Garegnani, P. 1970. Heterogeneous Capital, the Production Function and the Theory of Distribution, *The Review of Economic Studies*, vol. 37, no. 3, 407–36

Garegnani, P. 2007. Professor Foley and Classical Policy Analysis, *Review of Political Economy*, vol. 19, no. 2, 221–42

Gehrke, C. and Lager, C. 1995. Environmental Taxes, Relative Prices and Choice of Technique in a Linear Model of Production, *Metroeconomica*, vol. 46, no. 2, 127–45

Haavelmo, T. 1945. Multiplier Effects of a Balanced Budget, *Econometrica*, vol. 13, no. 4, 311–18

Harcourt, G. C. 1959. Pricing Policies and Inflation, *Economic Record*, vol. 35, no. 70, 133–36

Kalecki, M. 1937. A Theory of Commodity, Income, and Capital Taxation, *The Economic Journal*, vol. 47, no. 187, 444–50

Kalecki, M. 1954[2003]. *Theory of Economic Dynamics: An Essay on Cyclical and Long-Run Changes in Capitalist Economy*, London, Routledge

Kalecki, M. 1971. Class Struggle and the Distribution of National Income, *Kyklos*, vol. 24, no. 1, 1–9

Laramie, A. J. 1991. Taxation and Kalecki's Distribution Factors, *Journal of Post Keynesian Economics*, vol. 13, no. 4, 583–94

Laramie, A. J. and Mair, D. 2001. Tax incidence, pp. 57–66, in Holt, R. P. F. and Pressman, S. (eds.), *A New Guide to Post Keynesian Economics*, London, Routledge

Lavoie, M. 2014. *Post-Keynesian economics: new foundations*, UK, Edward Elgar Publishing

Lerner, A. P. 1944. *The Economics of Control: Principles of Welfare Economics*, New York, The Macmillan Company

Levrero, E. S. 2018. Sraffa on taxable income and its implications for fiscal policy, *Cambridge Journal of Economics*, vol. 42, no. 4, 1087–1106

Lucas, G. D. 2021. The (dampened) wage-price spiral: Conflict, endogenous markup and inflation, *Structural Change and Economic Dynamics*, vol. 59, 558–66

Martinez-Vazquez, J., Vulovic, V., and Liu, Y. 2011. Direct versus Indirect Taxation: Trends, Theory, and Economic Significance, pp. 37–92, in Albi, E. and Martinez-Vazquez, J. (eds.), *The Elgar Guide to Tax Systems*, Edward Elgar Publishing

Meade, J. E. 1981. Note on the Inflationary Implications of the Wage-Fixing Assumption of the Cambridge Economic Policy Group, *Oxford Economic Papers*, vol. 33, no. 1, 28–41

Metcalfe, J. S. and Steedman, I. 1971. Some Effects of Taxation in a Linear Model of Production*, *The Manchester School*, vol. 39, no. 3, 171–85

Mott, T. and Slatiery, E. 1994. Tax Incidence and Macroeconomic Effects in a Kaleckian Model When Profits Finance Affects Investment and Prices May Respond to Taxes, *Journal of Post Keynesian Economics*, vol. 16, no. 3, 391–410

OECD. 2020. Revenue Statistics 2020: OECD, date last accessed July 3, 2022, at https://www.oecd-ilibrary.org/taxation/revenue-statistics-2020_8625f8e5-en

Okishio, N. 1977. Inflation as an expression of class antagonism, *Kobe University Economic Review*, vol. 23, no. 1, 17–29

Petri, F. 2021. *Microeconomics For The Critical Mind - Value, Distribution and Employment*, Springer Cham

Pivetti, M. 1991. *An Essay on Money and Distribution*, London, Macmillan

Pivetti, M. 2007. Distribution, Inflation and Policy Analysis, *Review of Political Economy*, vol. 19, no. 2, 243–47

Rowthorn, R. E. 1977. Conflict, inflation and money, *Cambridge Journal of Economics*, vol. 1, no. 3, 215–39

Rudd, J. B. 2022. Why do we think that inflation expectations matter for inflation? (And should we?), *Review of Keynesian Economics*, vol. 10, no. 1, 25–45

Serrano, F. 1993. Review of Pivetti's Essay on Money and Distribution, *Contributions to Political Economy*, vol. 12, 117–23

Serrano, F. 2010. O Conflito Distributivo e a Teoria da Inflação Inercial, *Revista de Economia Contemporanea*, Advance Access published 2010

Serrano, F. 2019. Mind the gaps: the conflict augmented Phillips curve and the Sraffian supermultiplier: TD IE-UFRJ, date last accessed July 3, 2022, at https://www.ie.ufrj.br/images/IE/TDS/2019/TD_IE_011_2019_SERRANO.pdf

Serrano, F. and Freitas, F. 2017. The Sraffian supermultiplier as an alternative closure for heterodox growth theory, *European Journal of Economics and Economic Policies: Intervention*, vol. 14, no. 1, 70–91

Serrano, F., Freitas, F., and Bhering, G. 2019. The Trouble with Harrod: The fundamental instability of the warranted rate in the light of the Sraffian Supermultiplier, *Metroeconomica*, vol. 70, no. 2, 263–87

Serrano, F. and Pimentel, K. 2019. Super Haavelmo: balanced and unbalanced budget theorems and the sraffian supermultiplier

Sraffa, P. 1960. *Production of Commodities by Means of Commodities : Prelude to a Critique of Economic Theory*, London, Cambridge University Press

Stirati, A. 1994. *The Theory of Wages in Classical Economics: A Study of Adam Smith, David Ricardo, and Their Contemporaries*, UK, Edward Elgar Publishing

Stirati, A. 2001. Inflation, Unemployment and Hysteresis: an Alternative View, *Review of Political Economy*, vol. 13, no. 4, 427–51

Stirati, A. and Meloni, W. P. 2018. A short story of the Phillips curve: from Phillips to Friedman… and back?, *Review of Keynesian Economics*, vol. 6, no. 4, 493–516

Tarling, R. and Wilkinson, F. 1985. Mark-up pricing, inflation and distributional shares: a note, *Cambridge Journal of Economics*, vol. 9, no. 2, 179–85