Conflicting-claims and labour market concerns in a Supermultiplier model

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Abstract

We propose to introduce inflation via conflicting-claims between workers and firms, an endogenous labour productivity regime à la Kaldor-Verdoorn and an explicit account for the labour market into a Supermultiplier Stock-Flow Consistent (SFC) model that combines an endogenous autonomous expenditure component with the induced investment behaviour of firms. The aim of the paper is to analyse the dynamics of real wage and productivity growth and the impacts on the long run growth trend, income shares and the employment rate, following: (i) changes in the propensity to consume (paradox of thrift) for different initial workers' and firms' income target sensitivities to changes in economic activity; (ii) changes in the bargaining power of workers and firms under different initial institutional conditions: namely, a more unionised economy and a more competitive one. As a secondary goal, we also compare these results with those obtained for an endogenous autonomous expenditure supermultiplier model with exogenous income distribution and only demand side concerns. The results suggest that the higher growth rate that follows the increase in the propensity to consume will be accompanied by higher inflation and employment rates in the long run. In addition to this, the higher the sensitivity of workers' income target to changes in the employment rate in comparison to firms' income target sensitivity to changes in economic activity and the more unionised the economy, the more likely a higher growth rate will be associated with a higher wage share in the long run.

Keywords: Super-multiplier; autonomous expenditures; conflicting-claims; labour market; growth theories.
JEL classification codes: B59, E11, E12, E25, O41.

Resumo

Esse artigo introduz a abordagem da inflação via conflito distributivo entre trabalhadores e firmas, um regime de produtividade do trabalho à la Kaldor-Verdoorn e o mercado de trabalho num modelo *stock-flow consistent* (SFC) que combina um componente de gasto autônomo endógeno com o investimento induzido das firmas. O objetivo do artigo é analisar a dinâmica do crescimento dos salários reais e da produtividade e os impactos sobre a trajetória de crescimento de longo prazo, sobre a distribuição funcional da renda e sobre o emprego, a partir de: (i) mudanças na propensão a consumir (paradoxo da poupança) para sensibilidades diferentes das metas de renda de trabalhadores e firmas a mudanças na atividade econômica; (ii) mudanças no poder de barganha de trabalhadores e firmas a partir de condições institucionais distintas: isto é, uma economia mais sindicalizada e uma economia mais competitiva. Como objetivo secundário, os resultados obtidos são comparados com aqueles obtidos para um modelo super-multiplicador com gastos autônomos endógenos, distribuição de renda exógena e que considera apenas o lado da demanda. Os resultados sugerem que uma taxa de crescimento mais elevada que se segue a um aumento na propensão a consumir será acompanhada por taxas de inflação e de emprego mais elevadas no longo prazo. Além disso, quanto maior a sensibilidade da meta de renda dos trabalhadores a mudanças na taxa de emprego em relação à sensibilidade da meta de renda das firmas a mudanças na atividade econômica e quanto mais sindicalizada for a economia, maior a probabilidade de que uma taxa de crescimento mais elevada estará associada a parcelas mais elevadas dos salários na renda no longo prazo.

Palavras-chave: Supermultiplicador; gastos autônomos; conflito distributivo; mercado de trabalho; teorias de crescimento.

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1 Introduction

Since the 1970s, US and continental Europe have experienced a lower GDP growth followed by a lower trend of labour productivity growth. This tendency is more accentuated in European countries, while the US had some periods of recovery (Hein and Tarassow, 2009) – yet interrupted by the financial crisis of 2007-08. Further exploring this relation, some studies attribute the weakness of labour productivity growth to the lower pace of investment, indicating that the fall in labour productivity is an endogenous response to the contraction in economic activity brought about by the shortfall of aggregate demand (Hein and Tarassow, 2009; Reifschneider et al., 2015; Bivens, 2017).

At the same time, real wage growth has lagged behind labour productivity growth in these economies (Naastepad, 2006; Storm and Naastepad, 2012; Lazonick, 2014; Bivens, 2017; Ciarli et al., 2018), certainly adding to the observed decline of the labour share over GDP during this period (Hein and Tarassow, 2009; Karabarbounis and Neiman, 2013). According to Naastepad (2006), that might indicate that wage moderation policies have been successful in increasing profit rates, but not in improving the macroeconomic performance of OECD countries, that fell short of Golden Age standards from the 1980s onwards.

In what concerns the relation between wages and unemployment, there is some empirical evidence suggesting an inverse relation (Blanchflower and Oswald, 1994; Flaschel et al., 2007; Stirati, 2016; Stirati and Meloni, 2018). This evidence seems to be more marked for the *wage curve*, which establishes an inverse relation between unemployment and real wages (instead of nominal wages as in the original Phillips curve) (Dosi et al., 2017).

These stylized facts provide enough motivation to further explore the relations of output, real wages, productivity and employment. Certainly the heterodox literature has shown some concern in discussing these issues both on empirical and theoretical grounds. Yet more often than not, a productivity regime is absent of theoretical growth models and an explicit account of the labour market is also missing (Ryoo and Skott, 2008, 2013a; Skott, 2017).

Aware of this, some authors concentrated efforts in analysing the conflicting-claims approach to inflation (Nah and Lavoie, 2017; Cassetti, 2017) and the effects of growth on labour productivity and on unemployment under the Supemultiplier approach (Nah and Lavoie, 2016; Fazzari et al., 2017; Caminati and Sordi, 2017; Allain, 2018; Palley, 2018). In the latter, exogenous non-capacity creating autonomous expenditures lead growth while capacity utilization converges towards the normal rate due to firms' induced investment behaviour in the long run (Allain, 2015; Freitas and Serrano, 2015; Lavoie, 2016).

For the most part, these very interesting papers do not tackle these issues simultaneously and it is fair to say they do not aim at doing so. However, for the purpose of analysing the endogenous interactions among growth, income distribution and employment, it seems appropriate to address them altogether. Based on this, we propose to introduce inflation via conflicting-claims between workers and firms, an endogenous labour productivity regime à la Kaldor-Verdoorn and an explicit account for the labour market into a Supermultiplier Stock-Flow Consistent (SFC) model that combines an endogenous autonomous expenditure component with the induced investment behaviour of firms.

We adopt the supermultiplier closure to deal with these interactions relying on its capacity of reproducing well-know stylized facts. According to empirical studies departing from different theoretical strands, aggregate demand is found to have persistent effects on employment and capital accumulation (Rowthorn, 1995; Haltmaier, 2012; Ball, 2014; Martin et al., 2015; Fatas and Summers, 2016; Blanchard and Leigh, 2013; Girardi et al., 2017). Some recent papers also find that an increase in autonomous expenditures – consumption, exports, government expenditures or residential investment – induces a permanent increase in the GDP and in the investment-output ratio not only for the US case, but also for some European and OECD countries (Wen, 2007; Girardi and Pariboni, 2016; Stirati and Meloni, 2018). Besides that, the accelerator effect on business investment can be considered as a robust finding (Girardi and Pariboni, 2016; Girardi et al., 2017; Bivens, 2017). The induced nature of business investment, the leading role of autonomous expenditures in explaining growth (or changes in GDP levels) and the positive correlation between GDP levels and investment-to-GDP ratios are all essential features of supermultiplier models.

In turn, the SFC methodology allows us to take into account the role finance can play in a growing economy, since the channels through which the financial stocks, mainly financial wealth in this case, impact the capital accumulation and vice-versa can be parsimoniously introduced. For this very same reason, it serves the purpose of making autonomous expenditures partially endogenous (and, thus, the growth rate) without losing track of its financial

determinants.

That said, the aim of the paper is to analyse the dynamics of real wage and productivity growth and the impacts on the long run growth trend, income shares and employment rate, following: (i) changes in the propensity to consume (paradox of thrift) for different initial workers' and firms' income target sensitivities to changes in economic activity; (ii) changes in the bargaining power of workers and firms under different initial institutional conditions: namely, a more unionised economy and a more competitive one. As a secondary goal, we also compare these results with those obtained for an endogenous autonomous expenditure supermultiplier model with exogenous income distribution and only demand side concerns.

The remainder of the paper is organized as follows. Section 2 reviews the Supermultiplier growth literature on conflicting-claims, labour productivity and employment in order to better place the discussion proposed by the paper and to make it clear how it can further contribute to this literature. In section 3 we present the model, focusing on the extensions needed to address inflation via conflicting-claims, labour productivity and employment. In what follows, the experiments based on numerical simulations are carried out (section 4). At last, the final remarks (section 5) sum up the main findings of the experiments and the contributions of the paper.

2 Conflicting-claims, labour productivity and employment in Supermultiplier models

There have been some efforts in the Supermultiplier literature to include conflicting-claims inflation and to tackle endogenous technical progress, although not simultaneously for most of the cases. Addressing one of the main criticisms usually directed towards neo-Kaleckian models (Ryoo and Skott, 2008; Skott, 2010; Ryoo and Skott, 2013b; Skott, 2017), that is, the absence of the labour market[1], some of these models also discuss the determinants of the employment rate and allow for an endogenous adjustment of the natural rate of growth to the exogenous growth rate of autonomous expenditures.

Regarding the conflicting-claims approach to inflation in this framework, it has been discussed (as far as we are aware) by Nah and Lavoie (2017) and Cassetti (2017). Nah and Lavoie (2017) integrate a conflicting-theory of inflation into the supermultiplier model developed in Lavoie (2016), in which workers' real wage target is a positive function of the employment growth rate and firms' profit target is exogenously determined. As productivity growth is ruled out of the model, an stable wage share in the long run requires that nominal wages and price inflation grow at the same rate.

In turn, Cassetti (2017) analyses the process of cost-induced inflation in a Supermultiplier SFC model, in which government expenditures lead growth. In this case, both workers and firms income claims are a positive function of the higher level of activity as represented by the gap between actual and normal capacity utilization rates. The extent to which a higher level of activity translates into a higher rate of price inflation and nominal wages growth represents respectively firms and workers bargaining power positions. The author emphasizes just the case called Radical, in which workers' bargaining power is higher than firms' bargaining power, so that real wages increase with the higher level of capacity utilization. It is worth to highlight that wage and profit shares are path dependent in Cassetti (2017)'s model, so that different levels of wage share and inflation are consistent with the equilibrium position in which capacity utilization is at the normal rate.

An increase in the growth rate of autonomous expenditures will have a positive effect on the employment rate but no permanent effect on income distribution in Nah and Lavoie (2017). The initial boost to demand is followed by an increasing growth rate of employment, that increases workers' bargaining power and, temporarily, raises the wage share. However, the rise in the active population growth (that endogenously reacts to an increasing employment rate) reduces the employment rate, weakening workers' bargaining power and compensating for the initial effect on wages.

As for Cassetti (2017), in the Radical regime, a higher pace of increase in government spending will be asso-

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[1]Usually neo-Kaleckian models assume that labour supply is infinitely elastic so that increases in demand can always be accommodated by supply through higher employment levels (Ryoo and Skott, 2008) – both for developing and developed countries, as the latter can count on a larger inflow of immigrants for instance.

ciated with a redistribution of income towards wage earners due to the higher increase in wage inflation in comparison to price inflation following the expansion of government expenditures. Since autonomous expenditures are exogenous in both models, changes in the bargaining power of workers or firms will only have temporary effects on the accumulation rate. Besides that, we notice that in both cases the interactions with labour productivity are not analysed, as income distribution has no effect on labour productivity (nor indirectly through output) – since it is either absent (Nah and Lavoie, 2017) or exogenous(Cassetti, 2017).

Symmetrically those Supermultiplier models that extend the framework to deal with an endogenous labour productivity regime take income distribution as exogenously given – real wages are implicitly assumed to grow in line with labour productivity. Labour productivity growth in these models, in addition to an exogenous component, will depend positively on the capital accumulation rate or on the output growth rate (Nah and Lavoie, 2016; Fazzari et al., 2017; Palley, 2018), following the Kaldor-Verdoorn law, and in some instances also on the labour market conditions as proxied by the unemployment rate (Fazzari et al., 2017; Palley, 2018). Since the capital accumulation rate will converge towards the autonomous expenditure growth rate in the long run, labour productivity growth will also depend on this exogenous growth rate (Nah and Lavoie, 2016; Fazzari et al., 2017; Palley, 2018). Accordingly, changes in income distribution or in the propensity to save will have only a temporary positive effect on labour productivity through the Kaldor-Verdoorn component; and changes in the exogenous component of productivity growth will have only a transitory effect on the capital accumulation rate.[2] This last result is also in line with Cesaratto et al. (2003), where technical progress also temporarily affects the capital accumulation rate through the propensity to invest and the depreciation rate.

However, the effect of a shock to the exogenous component of labour productivity growth will be permanent on the employment rate. Considering a Leontief production function with fixed technology coefficients (the case of the considered papers), for a given autonomous expenditure growth rate, a higher labour productivity growth means a lower labour demand to produce the same amount of output and thus the employment rate falls. As for the effect of an increase in the autonomous expenditures growth rate on the employment rate, it will be positive for all the models, provided the elasticity of labour productivity (and labour supply) to output is lower than the unity.

When dealing with the long run dynamics, it is also important to take into account the growth rate of labour supply (or active population), since for a given labour supply (active population) a divergence between the autonomous component and labour productivity growth rates would mean an ever growing or decreasing employment rate. Nah and Lavoie (2016) leave this issue for future work while Nah and Lavoie (2017) and Fazzari et al. (2017) make active population (or labour supply) growth a function of the (un) employment rate, which allows for the convergence of the natural rate of growth towards the autonomous expenditure trend and, consequently, for the stabilization of the employment rate.[3] In Palley (2018), labour productivity growth itself is the adjustment variable that makes the natural growth rate converge towards the autonomous expenditure growth in the long run, as labour supply also grows at an exogenously given rate.

At last, in Allain (2018), the autonomous expenditure component – subsistence consumption arising from the redistribution of wages in a kind of unemployed benefits system – grows at the population rate. This means that the natural rate of growth and the autonomous growth rate are the same in the long run, as labour productivity is absent. Differently from previous papers, in Allain (2018)'s model, a temporary increases in the output growth rate due to a lower profit share or propensity to save will have a permanent effect on the employment rate. This happens since labour demand will grow temporarily at a faster pace (with output) while the population growth rate remains constant, increasing the employment rate.

In a somewhat different light, the work by Caminati and Sordi (2017) is also noteworthy since it builds a Supermultiplier model in which autonomous expenditures – investment in R&D and consumption which grows in line with productivity – grow endogenously. In their model, a redistribution of income towards wages has a permanent effect on the long run growth rate – in line with the results of Brochier and Macedo e Silva (2018) – and, thus, also on

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[2]In Nah and Lavoie (2016) an increase in the exogenous component of labour productivity has a temporary positive effect on the capital accumulation, since productivity enters the investment function as a shift parameter, while this effect is absent in Fazzari et al. (2017) and Palley (2018).

[3]In Fazzari et al. (2017), the natural rate of growth is composed by the rate of growth of labour productivity and labour supply while in Nah and Lavoie (2017) since labour productivity is absent, it its composed only by the rate of growth of active population.

the employment rate.

We notice that the Supermultiplier models that deal with the conflicting-claims approach to inflation and, thus, make income distribution endogenous usually take labour productivity as exogenous. This eliminates the channels through which income distribution could impact labour productivity. On the other hand, the papers that add an endogenous labour productivity regime take income distribution as exogenous. The latter assumption, in turn, blocks the feedbacks that labour productivity could have on income distribution, as real wage growth could temporarily diverge from labour productivity growth.

Besides that, changes in income distribution, in the marginal propensity to save and in the labour productivity growth rate have only temporary effects on growth. The assumption of an exogenous autonomous expenditure growth rate also means, for most cases, that changes in the above mentioned variables will also have a transitory impact on the employment rate, which depends also on this autonomous expenditure growth rate. With the exceptions of Caminati and Sordi (2017), in which the growth of the autonomous component variable is endogenous; and of Allain (2018), in which the natural rate of growth is exogenous and, thus, a temporary increase in the growth rate has a permanent effect on the employment rate.

All these papers provide very useful and interesting insights. Yet for the purpose of analysing the interactions of growth, income distribution and employment, it would be best to consider the implications of having endogenous interactions among these variables. This is what we propose in the next sections.

3 Framework of the model

Motivated by the issues raised in sections 1 and 2, we extend the Supermultiplier Stock-Flow Consistent (SFC) model built in Brochier and Macedo e Silva (2018), in which autonomous expenditures are endogenous (namely consumption out of household wealth), to account for both inflation via conflicting-claims between workers and firms, a labour productivity growth regime and the employment determinants.

In this section we describe the general behaviour of the institutional sectors of the economy. Yet in order to be parsimonious, we present just the equations that make the model in Brochier and Macedo e Silva (2018) different from other recent Supermultiplier models – such as Freitas and Serrano (2015); Lavoie (2016); Allain (2015) – and the equations concerning the inclusion of the inflation dynamics and of the supply side (labour market and labour productivity regime equations).[4]

The model deals with a pure credit closed economy in which inflation is determined by the conflict between workers' and firms' income aspirations. *Banks* lend to firms and receive deposits from households. As banks do not profit, deposits earn the same interest rate of loans granted to firms. Firms sell equities to households and are not credit constrained, for banks grant all demand for loans.

Government issues bills to finances its expenditures which are not covered by household taxation. These bills will be held by households. We define government expenditures in real terms, so that they are a fraction of real output in the beginning of the period. Besides that, the monetary authority tries to keep a constant real interest rate on bills, setting a real interest rate target towards which the real interest rate adjusts, as in Godley and Lavoie (2007).

Households earn wages and financial income accruing from their held assets. The desired proportion of wealth allocated in equities will depend on the comparison of the expected rate of return of this asset with the real interest rate at the beginning of the period. This will impact equity prices, since equity supply is determined by firms. Real household consumption expenditure comprises a fraction (α_2) of real household wealth at the beginning of the period and a fraction of after-tax real wages (α_1) (equation 1). Similar consumption functions can be found in other post-Keynesian models, as in Dos Santos and Zezza (2008).

$$c = \alpha_1.(1-\tau).\frac{WB}{p} + \alpha_2.vh_{-1} \tag{1}$$

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[4]For the balance sheet and the transactions and flow of funds matrices see Appendix A and for the full set of equations see Appendix B.

Usually in the supermultiplier approach, autonomous expenditures – defined as those expenditures that cannot be directly deduced from the circular flow of income and that are not related to the current level of income coming from firms' production decisions (Freitas and Serrano, 2015) – grow at an exogenously given rate. This assumption rules out the paradox of thrift and the paradox of costs in terms of growth effects. Income distribution and the propensities to spend will have only transitory effects on growth rates (Lavoie, 2016).

In this model, since autonomous consumption is partially endogenous (and the other demand components are induced by income), the paradoxes of thrift and of costs are allowed to emerge in terms of growth effects. As a consequence, a change in income distribution or in the propensities to spend can affect the long run growth rate of the economy. This result is attained in a framework that keeps the supermultiplier approach essentials – a non-capacity creating autonomous expenditure and the induced business investment with the adjustment of the capacity utilization towards the normal rate (Brochier and Macedo e Silva, 2018).

That said, *Firms*' investment behaviour is based on the flexible accelerator principle. Aggregate investment of firms (id) is induced by output (equation 2) and the marginal propensity to invest (h) will endogenously react to the discrepancies between the actual (u) and the normal utilization rate (u_n), according to the sensitivity parameter γ (equation 3) (Freitas and Serrano, 2015; Lavoie, 2016; Allain, 2015). We further assume that if the utilization rate is inside a certain range (χ), firms will want to keep their investment strategy unchanged, not triggering changes in the propensity to invest, as in Pedrosa and Macedo e Silva (2014).[5]

$$id = h.y \tag{2}$$

$$\Delta h = \begin{cases} h_{-1}.\gamma.(u - u_n), & \text{if } |u - u_n| > \chi \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

Moving to firms financing decisions, we suppose they finance their investment through retained earnings, equity issuance and bank loans, which clear firms' demand for funds. Equities are issued as a fixed proportion of the real capital stock at beginning of the period. Besides that, firms retain a fraction of their profits net of interest on loans and distribute the rest of it to households in the form of dividends.

After presenting the basic framework of the model, we can specify the extensions needed in order to analyse the interactions of growth, employment and income distribution.

3.1 Labour market

Production decisions by firms also entail a demand for labour (n^d), which depends on both real output (y) and labour productivity (β). We assume that all labour demand is satisfied – as long as the economy is below full employment – and thus labour demand also defines the actual employment level (n) (equation 4). The employment rate is given by the employed population divided by the labour supply (n^s) (equation 5). Since we are dealing with a long run growth model, we suppose that labour supply growth will depend on a component θ_0, which captures exogenous demographic movements, and to some extent (θ_1) on the employment rate, since changes in economic activity can affect the rate of labour force participation (equation 6). This labour supply growth function is similar to that proposed by Fazzari et al. (2017).[6]

$$n = n^d = \frac{y}{\beta} \tag{4}$$

$$e = \frac{n_{-1}}{n^s_{-1}} \tag{5}$$

$$g_{n^s} = \theta_0 + \theta_1 e_{-1} \tag{6}$$

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[5]For a justification for such a band see Hein et al. (2012) and Dutt (2011).

[6]If we were not to include a rule for labour supply growth in the model, the employment rate would only be constant if we assumed that output and labour productivity would grow at the same rate in the long run, which does not seem to be a realistic assumption looking at the data for these historical series.

3.2 Labour productivity growth regime

We add to the model an endogenous labour productivity regime, which takes into account the Kaldor-Verdoorn law, broadly researched in the post-Keynesian empirical literature.[7] According to the Kaldor-Verdoorn law (Kaldor, 1966), labour productivity growth is positively affected by output or capital accumulation growth rate. This relation could be explained by the increasing returns to scale that can originate from a demand expansion (new markets), leading to a more intense process of mechanization and rationalization and, thus, positively contributing to technical progress and labour productivity growth (Kaldor, 1966; Boyer and Petit, 1991; McCombie et al., 2002; Storm and Naastepad, 2012). Besides that, it is also more likely that improvements and innovations will be introduced in the production process when new investments are made (Kaldor, 1957; Lavoie, 2014).

Along these lines, labour productivity growth ($\hat{\beta}$) depends on an exogenous component (η_0) and on a component which measures the output growth effect on labour productivity, being η_1 the Kaldor-Verdoorn (K-V) coefficient (equations 7 and 8).[8]

$$\beta = \beta_{-1}.(1 + \hat{\beta}_{-1}) \tag{7}$$

$$\hat{\beta} = \eta_0 + \eta_1.g_{y_{-1}} \tag{8}$$

It is worth noting that we are assuming a Leontief-type production function with fixed coefficients technology:

$$y = \min\left(\frac{k}{v}, \beta.n\right) \tag{9}$$

Consequently, if demand exceeds supply, output will be restrained by supply. In our model, since we are assuming that firms attain their planned capacity utilization rate in the long run and that they keep spare capacity to meet unexpected demand changes, capital supply will not impose a restraint to production. It is more likely that labour supply will restrain production first.[9]

Once we included the employment rate determinants and the labour productivity regime, we have completed the representation of the supply side in the model. There still remains to specify how conflict inflation unfolds.

3.3 Conflicting-claims inflation

The conflicting-claims approach to inflation is based on the idea that income shares demanded by workers and firms tend to be inconsistent with each other and, as a result of the "aspirational gap" (or real wage resistance), inflation arises. Income claims are neither fully nor automatically satisfied. On the one hand, labour unions negotiate increases in the nominal wage based on the gap between the real wage target and the actual real wage and on the previous period inflation rate (indexation). On the other hand, firms try to compensate for higher labour costs by increasing prices based on the discrepancy between their desired profit margin and the actual profit margin, giving rise to a wage-price spiral. Wage and profit targets can be exogenous or endogenous. In the latter, they take into account the effect of real economic variables (Lavoie, 2014).

In the post-Keynesian literature, regarding the determinants of real wage (or wage share) target, there is a broad consensus that it should be a positive function of the employment rate or the growth rate of the employment rate (Dutt, 2002; Lima, 2005; Cassetti, 2003, 2012; Lavoie, 2014; Nah and Lavoie, 2017). Following Cassetti (2003),

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[7]See, for instance, Dixon and Thirlwall (1975); McCombie et al. (2002); Angeriz et al. (2008); Hein and Tarassow (2009); Hartwig (2013); McCombie and Spreafico (2016); Magacho and McCombie (2017); Tridico and Pariboni (2018); Deleidi et al. (2018).

[8]Whether we write labour productivity growth as a function of output or the capital stock does not affect qualitatively the results, since business investment is fully induced by output in the model.

[9]Even if labour supply is partially endogenous and adjusts to the employment rate, if the boost to demand is too strong, nothing guarantees that the economy will not reach full employment of labour. In that case, there could operate a mechanism of the Cambridge type, in which excess demand would cause accelerating inflation. Yet, before that, a restrictive fiscal or monetary policy would probably be triggered.

we define real wage aspirations in terms of the wage share, so that whenever the employment rate is increasing (decreasing) (g_e) workers' wage share target (ω_w^T) is also increasing (decreasing). ξ represents the wage share target sensitivity to changes in the employment rate. Wage share aspirations will remain still when the employment rate stabilizes (equation 10). Notice that changes in the economic environment will permanently affect workers' income share aspirations.

$$\omega_w^T = \omega_{w-1}^T + \xi.g_e \tag{10}$$

The aspirational gap between workers' wage share target and the actual wage share (ω) will be the main determinant of the nominal wage growth function and the higher workers' bargaining power (ϵ_1), the larger will be the effect of wage aspirations on the nominal wage growth rate ($\hat{w}$). Besides that, past inflation will also impact nominal wage negotiations through an indexation component ($\epsilon_2 \hat{p}_{-1}$) (equations 11 and 12).

$$W^* = W_{-1}.(1 + \hat{w}_{-1}) \tag{11}$$

$$\hat{w} = \epsilon_1.(\omega_w^T - \omega) + \epsilon_2.\hat{p}_{-1} \tag{12}$$

Following Rowthorn (1977), Dutt (1992) and Lima (2005), we assume that firms' desired mark-up increases and thus their wage (profit) share (ω_f^T) target decreases (increases) as they attempt to take advantage of a booming economy, as represented by an increase of capacity utilization over the normal level. Contrariwise, when sales are low, firms will reduce their desired margins (increasing their wage share target) in order to avoid market losses (equation 13). ψ measures the sensitivity of firms' income target to changes in economic activity.

$$\omega_f^T = \omega_{f-1}^T - \psi.(u - u_n) \tag{13}$$

The rate of inflation ($\hat{p}$) will thus react to the gap between the actual wage share and the wage share targeted by firms. Inflation will accelerate as the gap between actual unit costs and desired unit costs increases. The higher firms bargaining power (ϕ_1), the larger the pass through of increased unit costs to the inflation rate. Past nominal wage inflation will also have an impact on price inflation ($\phi_2 \hat{w}_{-1}$) (equations 14 and 15).

$$p = p_{-1}.(1 + \hat{p}_{-1}) \tag{14}$$

$$\hat{p} = \phi_1(\omega - \omega_f^T) + \phi_2.\hat{w}_{-1} \tag{15}$$

With a complete structure of the model we can introduce the long run equilibrium conditions.

3.4   Equilibrium conditions

For the economy to be in a steady growth configuration in the long run – that is, a long run equilibrium position – all stock and stock-flow ratios have to be constant. This will happen, as was the case for the growth model in Brochier and Macedo e Silva (2018), when all stocks and the output grow at the same rate and capacity utilization converges towards the normal utilization rate – or an inertia zone (which implies that the propensity to invest stabilizes):

$$g^* = g_k = g_{v_h} = g_b = g_l = g_y \tag{16}$$

$$u^* = u_n \rightarrow \Delta h = 0 \tag{17}$$

Besides these conditions, since income distribution is now partially endogenous and given our assumptions concerning the production function and the conflicting-claims inflation dynamics, for the wage (and profit) share to attain a constant equilibrium value, real wage must grow ($\hat{w}p$) at the same rate as labour productivity (equation 18). This condition can be stated as follows (since we are dealing with a discrete time framework):

$$\frac{(1 + \hat{w})}{(1 + \hat{p})} = (1 + \hat{w}p) = (1 + \hat{\beta})$$

$$\hat{w}p = \hat{\beta} \tag{18}$$

On the labour market, for the employment rate to attain its equilibrium long run value, labour demand (since we suppose that all labour demand is met as long as the economy is bellow full employment) and labour supply must grow at the same rate:

$$g_{n_d} = g_{n_s} \tag{19}$$

In other words, the economy will be growing at its natural rate, as can be seen by calculating g_{n_d} from equation 4 and substituting the result into equation 19:

$$g_y = \hat{\beta} + g_{n_s} \tag{20}$$

4   Simulation experiments

Given the complex nature of the model, we rely on numerical simulation experiments to evaluate some of its main features. We run three main simulation experiments (for a summary of the experiments and their results see table **??**) starting from a steady growth state configuration (baseline) built based on the equilibrium conditions stated in subsection 3.4. The first experiment is an aggregate demand expansion – namely, a positive shock to the propensity to consume out of after-tax wages (α_1) –, which we test under different initial conditions regarding workers' and firms' aspirational targets sensitivity to changes in the economic environment. The second experiment is a positive shock to workers' bargaining power under two different baseline scenarios: (i) a first baseline scenario, which is the same one for the first and the third experiments, that we call a more competitive regime; (ii) a second baseline scenario in which the initial gap between workers and firms bargaining power is amplified, illustrating a more unionised economy.

4.1   The paradox of thrift

A higher propensity to consume out of after-tax wages (α_1) will raise consumption and, therefore, stimulate activity, raising output and capacity utilization over the normal capacity rate (figure 1b). In turn, this will trigger firms reaction, through a higher propensity to invest and, consequently, capital accumulation rate speeds up (figures 1a and 1c). The rise in output growth rate also feedbacks into a faster labour productivity growth rate. Yet, as the spur in output growth is larger than that in labour productivity growth, firms' labour demand will grow temporarily at a faster pace than labour supply, which culminates into a spike in the employment rate (figure 1d).

On the one hand, workers see themselves in a favourable position – as the employment rate accelerates – and target a higher wage share, which raises their aspirational gap. This larger aspirational gap will quickly translate into a faster growth rate of nominal wages. On the other hand, firms will increase (reduce) their profit (wage) share target as capacity utilization increases and they try to take advantage of the booming economy. As a consequence, firms' aspirational gap also increases and leads to a higher inflation rate. Since workers aspirational gap has a stronger impact on nominal wages than firms' aspirational gap on inflation, real wages will grow at a faster pace. In the short run, real wages grow faster than labour productivity expanding the wage share and reinforcing the initial demand shock (figures 1e and 1f).

The aspirational gap of workers soon starts to fall – as the increment in the wage share becomes effective – leading to a slower pace of growth of nominal wages. On the contrary, firms' aspirational gap keeps on increasing while capacity utilization is building up, so that the inflation rate pace will surpass that of nominal wages growth rate. The fall in real wage growth in comparison to labour productivity growth reverses the initial increase in the wage share. Once the lower wage share reduces the pace of consumption the level of activity slows down. The decline in output growth will drag labour productivity growth down as well but to a shorter extent than output itself, decreasing employment growth and, therefore, the employment rate.

The worsening in labour market conditions will make workers accept a lower wage share target, for they fear to be unemployed. In turn, this will reduce their aspirational gap – despite the lower wage share – further reducing the nominal wage growth rate. The slowdown in activity will translate into a lower capacity utilization, which will be below the desired level, increasing firms' wage share target – they will be willing to reduce their margins – and, hence, tightening their aspirational gap as well. The smaller gap will reduce the inflation rate, contributing to the upswing in real wage growth, which again will precede the increase in labour productivity growth. The wage share will increase

until productivity catches up with real wages. Due to the inflation dynamics and productivity response to demand, on average real wages will grow at a lower pace than productivity, explaining the stabilization of the wage share at a lower level in comparison to the baseline scenario.

Nevertheless, these are not the only effects operating on aggregate demand. The increase in the propensity to consume out of after-tax wages will initially have a negative impact on real household wealth growth, since it temporarily reduces households' savings. This effect will be reinforced by short run capital losses. The latter happens due to the fall in equity prices brought about by the larger equity supply by firms (as capital accumulation accelerates) whereas demand falls (as household wealth growth slows down). As the boost in consumption fosters the utilization rate and firms are able to appropriate a larger profit share, distributed dividends will make household wealth grow at a faster pace – compensating for the low wage share through a relative increase in consumption out of wealth and anticipating the second ascending phase of capital accumulation rate. Besides that, as household wealth grows temporarily faster than the capital stock, the higher equity prices will translate into larger capital gains, which also contribute to the recovery of household wealth growth (figure 1a). Household wealth to capital ratio decreases as the capital stock grows faster than household wealth on average.

Focusing on the other financial assets ratios for a moment, we see that government bills to capital ratio decreases in relation to the baseline (figure 1i). The government pure deficit to GDP will be reduced in relation to the baseline, since taxation revenues will expand more than government expenditures due to the faster pace of capital accumulation that contributes to increase household income in relation to total income.[10] As there is an increase in the interest payment on bills in relation to GDP, the nominal deficit slightly increases in relation to the baseline (figure 1j).

Firms' loans to capital ratio will decrease in relation to the baseline as retained profits build up faster than investment needs (that also expand with the larger propensity to invest of firms). It is worth noting that, in the short run, the rise in equities as a source of finance (the market value of newly issued equities increases) will add to the retained earnings negative effect on the loans to capital ratio (figure 1i). Regarding the profit rates, the total profit rate increases after the initial shock due to both the higher profit share and the temporarily higher capacity utilization rate. As the utilization rate converges back to the normal utilization rate, the remaining effect will be that of the profit share, which amounts to a larger profit rate in relation to the baseline. The profit rate net of interests on loans will increase only temporarily given that the higher profit share will not compensate for the larger normalized interest payments ratio (figure 1h).

From this experiment we observe that an expansion of aggregate demand accruing from the propensity to consume leads to higher capital accumulation rate in the long run. Now income distribution changes due to the dynamics of real wages and labour productivity growth. For this scenario, a higher capital accumulation rate will be associated with a higher profit rate in the long run, for the profit share permanently rises. As a result of the exacerbation of the conflict between workers and firms in the aftermath of the expansion (expressed in larger aspirational gaps for both groups), the inflation rate will also be higher (and stable) in relation to the baseline.

Since the long run growth rate depends on the size of the supermultiplier and on the autonomous consumption ratio (Brochier and Macedo e Silva, 2018) and that the supermultiplier increases (the combined effects of the propensity to consume and to invest predominate over the lower wage share) enough to compensate for the lower autonomous consumption share, it will be permanently higher in relation to the baseline – so that the paradox of thrift can be said to hold in growth terms.

Differently from other supermultiplier models (Fazzari et al., 2017; Nah and Lavoie, 2017; Palley, 2018) – in which a reduction in the propensity to save would have only a temporary effect on the employment rate, for it depends on the exogenous growth rate of autonomous expenditures in the long run – here the increase in the propensity to consume will also translate into a higher employment rate in the long run, since it has a permanent effect on the economy's growth rate.[11] For given labour supply conditions and for a K-V coefficient lower than the unity, a positive shock to demand will make output growth accelerates more than productivity growth – raising firms' labour demand

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[10]The sharp reduction in pure government deficit, which temporarily becomes a surplus, happens due to the lagged nature of government expenditures. The effects of the demand expansion are felt first on the revenue side.

[11]To be fair, in Allain (2018) a reduction in the propensities to save and in the profit share has a permanent effect on the employment rate as already mentioned, since the natural rate of growth is exogenous and output grows temporarily at a faster pace than the natural rate.

temporarily at a faster rate than labour supply –, permanently raising the employment rate.

At last, it its worth to highlight that the effects of an increase in the propensity to consume out of household wealth (α_2) – in the autonomous expenditure component – will be similar to the ones presented here for an increase in the propensity to consume out of after tax wages. It will permanently increase the employment rate, the capital accumulation rate and it will have an ambiguous effect on income distribution. The difference between both experiments lies on the short run dynamics of household wealth and autonomous consumption: consumption out of household wealth increases in the short run and household wealth growth decreases due to the lower savings brought about by the higher consumption.

One could ask what would change in terms of employment, income distribution and growth if the initial conditions were different in what concerns agents reaction to changes in economic activity. In what follows we compare the results of the same demand expansion under different initial conditions for the sensitivity of workers' and firms' income targets.

4.1.1 Same aggregate demand shock for different income share targets' sensitivity parameters

In this subsection we shock the propensity to consume out of after-tax wages (scenario 1) under four different initial configurations: (i) with a higher workers' income target revision parameter (ξ) in relation to the baseline (scenario 1a); (ii) with a higher firms' income target revision parameter (ψ) in relation to the baseline (scenario 1b); (iii) with lower income target revision parameters for both groups (scenario 1c); and (iv) with higher income target revision parameters for both groups (scenario 1d);

If workers' wage share target has a larger sensitivity to employment growth (scenario 1a), each increment in the employment rate brought about by the higher aggregate demand will have a larger impact on nominal wage growth in relation to scenario 1 (and vice-versa). As firms behaviour regarding its aspirational target does not change, initially the inflation rate grows at the same pace of the former scenario. Accordingly, real wage growth accelerates more in response to the initial demand shock whereas labour productivity growth response is still the same, which leads to a higher wage share (figure 2a). The higher wage share in relation to scenario 1 provides an extra stimulus to demand which explains the higher capacity utilization and, consequently, capital accumulation and output growth rates in the short run (figure 2c). The higher output growth rate will feedback into labour productivity growth and on the inflation rate.

The inflation rate will be higher in relation to scenario 1 due to: (i) the higher wage share and the higher capacity utilization, since both contribute to increase firms' aspirational gap; (ii) the faster pace of nominal wages increments, which feedbacks into inflation through the indexation component (figure 2d). As the inflation rate accelerates and nominal wages growth slows down (after the higher wage share is realized), real wages growth falls below labour productivity growth, reducing the wage share and, consequently, output growth and the employment rate. As the fall in the employment rate exacerbates the unemployment fear and reduces workers' income aspirations, it reinforces nominal wages deceleration and explains the sharp fall of real wages (figures 2a, 2b and 2c).

In the upswing phases, real wage growth will increase enough and for a sufficient long period above labour productivity growth, accounting for the higher wage share in the long run in comparison to scenario 1. The higher wage share in the long run will add up to the positive effects of the higher propensities to invest and to consume on the growth rate. We notice that the same initial shock to demand, through its larger feedback on income distribution, exemplifies a different growth regime: now, according to the different institutional settings, a higher capital accumulation rate in the long run is associated with a lower profit rate (figures 2a and 2c). The slight increase in output growth rate in comparison to the previous scenario is also enough to increase the long run employment rate (figure 2d).

Regarding the financial assets ratios, government debt to capital ratio falls more intensively in comparison to scenario 1 due to the higher household income to total income brought about by the higher wage share, which means also a higher tax revenue in relation to government expenditures. Firms' loans to capital ratio will fall to a lesser extent due to the lower profit share that also means lower retained earnings as a share of capital in comparison to scenario 1. Household wealth to capital ratio will decrease to a larger extent due to the faster capital accumulation rate, even if the capital gains ratio increases.

The opposite will happen after an increase in the propensity to consume if firms' increase the sensitivity of

their income share target (scenario 1b): the initial positive effect on aggregate demand through consumption will be partially compensated by the lower wage share in the long run – generated by the lower growth of real wages in relation to labour productivity growth. Thus, the same shock to the propensity to consume will have a smaller total effect on output growth due to the worsening in income distribution in relation to scenario 1. Besides that, since output grows at a slower pace, it will reduce the increments of firms' demand for labour, reducing the long run employment rate in relation to scenario 1 (figure 2). In what concerns the financial assets ratios, the results will be the opposite of scenario 1a.

For the case in which both workers and firms incorporate changes in economic activity into their income targets to a lesser extent (scenario 1c), so that wage and price inflation dynamics is mitigated, the long run impact of an increase to the propensity to consume will be larger over growth and employment rates in comparison to scenario 1 (figures 3c and 3b). But how does this happen since there seems to be no increase in the wage share in the long run? The short run larger increase in the wage share will further boost consumption and, accordingly, capacity utilization to a larger extent in comparison to scenario 1. The increase in capacity utilization will trigger a stronger reaction of firms through a permanently higher propensity to invest and capital accumulation rate. Therefore the short run effect of a higher wage share is carried over to the long run through a higher propensity to invest, which raises the supermultiplier in addition to the increase in the propensity to consume and, as a result, the growth rate.

When both groups increase the sensitivity of their income targets to changes in the economy (scenario 1d), the conflict between workers and firms after the boost in consumption will escalate: workers' wage share target will increase to a larger extent to the changes in the employment rate, raising the aspirational gap and nominal wage growth; and firms will also react more intensively to the increase in capacity utilization over the normal rate and, as a consequence, the inflation rate will rise to a larger extent as well. In the short run, as real wage growth oscillates more intensively than labour productivity growth and the oscillations are asymmetric downwards, the wage share will be lower than in scenario 1.The lower wage share will lead to a weaker consumption stimulus, capacity utilization and, therefore, to a faint reaction of firms through the propensity to invest in comparison to scenarios 1 and 1c (figure 3d), which will carry over to the long run, mitigating the effect of a higher propensity to consume out of after tax wages in the growth path of the economy and in the employment rate, that stabilizes at a lower level as well.

In what concerns the financial assets ratios, it is worth to mention that firms' loans to capital ratio will fall more in comparison to scenario 1, even if the profit share does not change the share of retained earnings in relation to the capital stock, due to the slower pace of investment.

4.2   Changes in the bargaining power of workers and firms

So far we have looked at the secondary effects that the interaction of wage and price inflation dynamics and productivity growth may have on income distribution, employment and growth after an initial demand shock elsewhere. In this section we evaluate what can happen if there is an institutional change that allows for a higher bargaining power of workers (ϵ_1) or firms (ϕ_1), departing from (i) the same baseline of scenario 1 (ss_1); (ii) a second baseline scenario (ss_2), in which the initial gap between workers and firms bargaining power is larger.[12] This makes an allusion to a more unionised economy (ss_2) in contrast with a more competitive regime (ss_1).

Departing from the initial baseline scenario, an increase in the bargaining power of workers will initially raise the nominal wage growth rate at a faster pace than the inflation rate and as the spike in real wage growth is well above labour productivity reaction to output growth in the short run, the wage share increases (figure 4e). As the wage share increases it stimulates consumption out of after-tax wages and leads to an expansion of the level of activity, represented by the capacity utilization rate increase over the normal level. The higher capacity utilization will trigger firms' reaction, which revise their propensity to invest upwards and, therefore, the capital accumulation rate (figures 4b and 4f).

The initial expansion fostered by an income redistribution towards wages contains the elements that precipitate the downturn: (i) on the one hand, there is the conflict process already described by the previous experiments: the gap between actual and normal capacity utilization will decrease (increase) firms' wage (profit) share target and the higher effective wage share will contribute to raise firms aspirational gap and, thus, the inflation rate (besides the

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[12]$(\epsilon_1 - \phi_1)_{ss_2} > (\epsilon_1 - \phi_1)_{ss_1}$

lagged effect of a higher wage inflation); (ii) on the other hand, the initial fall of the profit share will have a larger negative impact on household wealth accumulation than the increase in the wage share (since we assume that households save a larger fraction of profits than wages). This will have, in turn, a negative effect on consumption out of household wealth and will lead the fall in capacity utilization and, accordingly, firms will reduce their propensity to invest and the capital accumulation rate.

In what follows, the slowdown in activity will have a negative impact on the employment rate, since firms mitigate the pace of labour demand as output growth is hit harder than productivity growth (figure 4a). Accordingly, this will reduce the pace of growth of nominal wages. Besides that, as capacity utilization declines, firms' will also reduce their aspirational gap and so the inflation rate falls. However, since nominal wages decelerate more than the inflation rate and that labour productivity growth is less impacted than real wages, the wage share declines in relation to the initial positive shock. In the long run, even as the wage share recovers, the demand expansion will not be enough to make firms react through a higher propensity to invest. Even though the supermultiplier is higher in comparison to the baseline (the wage share increases more than the propensity to invest falls), the predominant effect over the long run growth rate is that of the lower autonomous consumption ratio.

We observe that the redistribution of income towards workers, brought about by a higher bargaining power of this group, may unfold competing effects on aggregate demand and on growth in the long run. If the increase in consumption out of wages is not enough to compensate for the slowdown in consumption out of household wealth due to the lower ratio of distributed profits – and if there is no other source of demand stimuli –, the effect on growth in the long run will likely be negative.

In this scenario, an improvement in labour market conditions for workers is associated with a higher employment rate in the short run, but with a slightly lower employment rate in the long run. We notice that, on average, labour productivity growth will present a faster rhythm than output growth (and more regular), mostly due to the oscillation in output growth. If we reduced workers bargaining power, the results would be the opposite: as the positive effect on consumption out of wealth would be higher than the negative effect of a lower wage share on consumption out of wages, despite the short run negative effect, the long run growth trend would be higher. That is also to say, that a reduction in workers bargaining power might have a short run negative impact on the employment rate, but a (weak) positive effect in the long run.

This result is in line with the results found by Storm and Naastepad (2017), however the mechanism is different. In their case, the restraint in real wage growth might have a positive effect on the employment rate since it negatively impacts output growth, but it negatively impacts labour productivity twice – through the direct impact of a lower level of activity and through the rate of Marxian labour saving technical progress, namely, the direct negative impact of real wage growth on productivity. In our case, it is the income distribution impact on aggregate demand that might increase the growth of output at a faster pace than productivity growth in the long run, depending on the relative trade-off between consumption out of wages and consumption out of household wealth.

But are these results obtained in another institutional setting? Suppose that the same increase in the bargaining power of workers now happens in an economy that has a larger initial gap between workers and firms bargaining power (ss_2). In that case, firms' reaction to higher unit labour costs will have a smaller magnitude in comparison with workers' reaction to changes in the employment rate, leading to a higher growth rate of nominal wages and lower inflation rate in the short run. Consequently, the rise in the wage share will be larger, leading to a higher capacity utilization and to a stronger reaction of firms through the propensity to invest. The slowdown in household wealth is mitigated due to the faster pace of capital accumulation and output growth in comparison to the previous scenario. Now as consumption out of wages increases at a larger extent in relation to the previous scenario and more than compensates the short run deceleration of consumption out of household wealth, the long run growth rate (weakly) expands. This happens since both the wage share and the propensity to invest (as a result of the higher level of activity in comparison to the previous scenario) stabilize at higher level in the long run, increasing the economy's multiplier enough to change the growth trend upwards. Besides that, since output growth accelerates more than productivity growth during the transition, firms' pace of labour demand will build up until labour supply growth catches up, permanently increasing the employment rate.

For both baseline scenarios, an increase in firms' bargaining power will have a negative effect on capital accumulation and employment rates. In the short run, the higher bargaining power will raise firms aspirational gap and thus inflation rate at a faster pace than nominal wages growth. As a result real wages growth falls below labour

productivity growth, reducing the wage share and consumption. The lower consumption path will feedback into capacity utilization which will plunge below the normal rate. Accordingly, firms react, diminishing the propensity to invest, and the capital accumulation decelerates. As output growth shifts down, firms also reduce the pace of labour demand, which translates into a lower employment rate. In the long run, the negative effects of a lower wage share and propensity to invest on the supermultiplier explain the lower growth path in both scenarios. The autonomous consumption ratio works as a floor to demand, household wealth will also growth at a slower pace, but since output falls to a larger extent, the ratio increases – as would be expected in supermultiplier models.

5 Final Remarks

From the existing literature on Supermultiplier models, we have that an increase in the exogenous growth rate of autonomous expenditures will positively impact the employment rate and the labour productivity growth rate (Nah and Lavoie, 2016; Fazzari et al., 2017; Palley, 2018). We also have that an increase in the bargaining power of workers will translate into a temporary positive effect on the capital accumulation rate (Nah and Lavoie, 2017). We also know that in most of these models changes in income distribution and aggregate demand stimuli arising from the propensities to spend will have only transitory effects on the trajectory of the economy. However, we do not know what the outcomes would be in terms of growth, income distribution and employment in a supermultiplier model that allows for the interactions of wage and inflation dynamics, labour productivity and autonomous demand. The model built in this paper is a very first step in that direction. The main results obtained through the simulation experiments are summarized in the next paragraphs.

An increase in the propensity to consume out of after-tax wages (or in the propensity to consume out of household wealth) leads to an increase in the capital accumulation rate in the long run, so that we can say the paradox of thrift holds in terms of growth effects. A higher capital accumulation rate can be associated with either higher or lower profit rates since the effect on income distribution is ambiguous – depending on how the conflict between workers and firms unfolds following the initial shock. It is interesting to note that when income distribution is partially endogenous even if we are departing from a wage-led growth regime, a higher long run growth rate can be connected to higher profit rates.

The higher growth rate that follows the increase in the propensity to consume will be accompanied by higher inflation and employment rates for all scenarios. Since the aggregate demand shock does not generate an ever increasing inflation rate (for the initial parameter values), there is a trade-off between unemployment and inflation in the long run. In what concerns the impact on the employment rate, the result is different from other Supermultiplier models, in which a reduction in the propensity to save would have only a temporary effect on the employment rate, for it depends on the exogenous growth rate of autonomous expenditures in the long run.

The experiments also indicate that the higher workers' wage share target sensitivity to changes in the employment rate in comparison to firms' profit share target sensitivity to the level of activity, the higher the likelihood of an aggregate demand expansion originated from a rise of the propensities to spend will be associated with a higher wage share, due to the higher growth rate of real wages in relation to labour productivity in the short run. In that case, the secondary effect of income distribution on aggregate demand also contributes to raise the long run growth of the economy and, as a result, the employment rate. The downside of a higher sensitivity of workers' wage share target is the larger inflation rate in the long run that emerges from the exacerbation of the conflict between workers and firms, as they try to appropriate a larger income share following the expansion.

If an increase in the propensity to consume happens in a framework where the wage and price dynamics is mitigated – through lower sensitivity parameters for both workers and firms income targets –, the short run impact of the demand shock will be stronger and will be carried over to the long run. The boost to consumption due to the higher propensity to spend will be amplified by a larger wage share – since the gap between real wage and labour productivity is larger in the short run – and this will translate into a higher capacity utilization rate, triggering a stronger response of firms, that permanently increase their propensity to invest and, therefore, the growth path of the economy shifts upwards in the long run. We notice that the intensity of conflicting-claims between workers and firms will affect the supermultiplier not only through the wage share but through the propensity to invest. This makes it clearer that the same initial expansion of the propensity to consume might have a larger impact in the long run growth rate, even

if the wage share stabilizes at a lower path in the long run, if the short run expansion has a larger impact on firms' expectation of demand as represented by the propensity to invest. This result also illustrates how the long run can be seen as sequence of short-period equilibria in a dynamic model (Macedo e Silva and Dos Santos, 2011).

An increase in the bargaining power of workers raises the wage share and has a positive effect on capital accumulation and employment rates in the short run. Yet in the long run it might have a positive or negative effect on capital accumulation and employment rates depending on the "regime" of the economy. If the economy at stake is a more unionised one (the gap between workers and firms bargaining power is larger), the more likely the demand effects will be predominantly positive also in the long run; if the economy is more competitive (the gap between workers and firms bargaining power is smaller), the more likely the effects of an increase in the bargaining power of workers will be (even if slightly) negative in the long run.

This happens since the redistribution of income towards wages might have conflicting impacts on aggregate demand. In a more competitive economy, the stimulus arising from the acceleration of consumption out of wages may not be enough to compensate the following deceleration of consumption out of accumulated wealth – due to the lower amount of distributed profits (given that the households save a smaller share of wages than distributed profits). If that is the case, both the growth trend and the employment rate will be lower, even as the wage share slightly increases. On the other hand, the odds are that in a more unionised economy, the wage share will increase to a higher extent in the short run, expanding consumption out of wages enough to trigger firms' reaction, increasing the supermultiplier of the economy and compensating for the initial slowdown of consumption out of household wealth.

The experiments concerning workers' bargaining power illustrate how a wage moderation policy could have a positive effect on the employment rate through demand channels: by means of a small positive effect on the autonomous consumption component that work as a floor when demand arising elsewhere is fragile. Regarding the bargaining power of firms, it is worth to mention that it has no ambiguous effect on demand and growth for both the competitive and the unionised economy regimes: an increase in firms' bargaining power will have a negative effect on capital accumulation and employment rates.

As a general assessment, we can say that what matters the most for raising the growth rate of the economy in the long run is whether the short run effects of the aggregate demand shocks are carried over to the long run through the supermultiplier. In a framework of conflicting-claims between workers and firms, a stimulus to demand that comes from a higher bargaining power of workers can be very limited and the more competitive the economy lower is the inducement it generates. Yet this does not means a higher path of sustained growth can not be achieved in a more egalitarian economy. The latter will depend on whether the institutional setting of the economy allows for a higher sensitivity of workers to changes in the employment rate and for a higher bargaining power of workers or not.

At last, the results presented here should be seen for what they are: they provide some insights on how stimuli to demand could be fostered or mitigated due the conflicting nature of income distribution and the institutional setting for income groups bargaining power. Besides that, the model can be further explored in several directions, one of which is a more thorough research of the supply-side constraints and the channels through which these constraints could affect demand as the economy approaches full employment. We leave that as a matter for future research.

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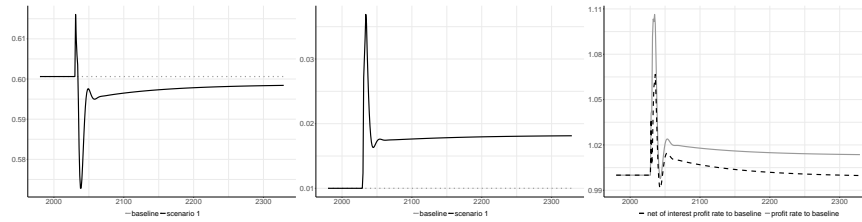**Figure 1:** Effects of an increase in the propensity to consume out of after-tax wages (α_1)

(a) Capital accumulation and household wealth growth rates **(b)** Capacity utilization rate **(c)** Firms' propensity to invest
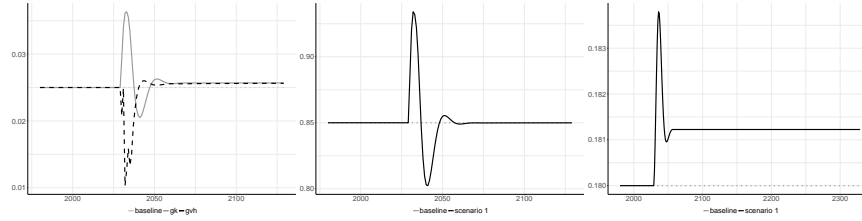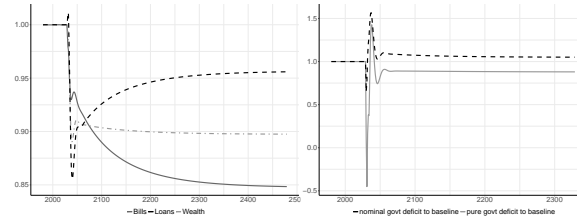

(d) Employment rate **(e)** Real wages and labour productivity growth rates
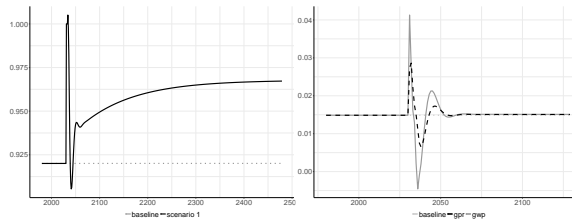
**(f)** Wage share **(g)** Inflation rate **(h)** Profit rates

**(i)** Financial assets to capital ratio **(j)** Public debt to GDP

Legend: g_k is for capital accumulation rate, g_{vh}, for household wealth growth rate, g_{pr} for labour productivity growth rate and $g_{w}p$ for real wage growth rate.

Figure 2: Effects of aggregate demand expansion: for a higher sensitivity of workers'(firms') wage (profit) share target to changes in economic activity

(a) Wage share

(b) Employment rate

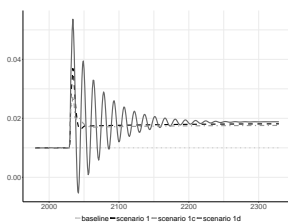**(c)** Capital accumulation rate
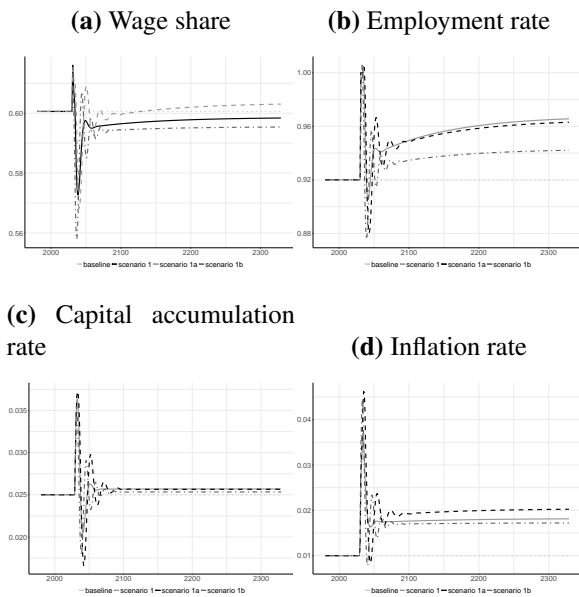
(d) Inflation rate

Scenario 1a: positive shock to α_1 and ξ; Scenario 1b: positive shock to α_1 and ψ

Figure 3: Effects of aggregate demand expansion: for a lower (higher) sensitivity of both income targets
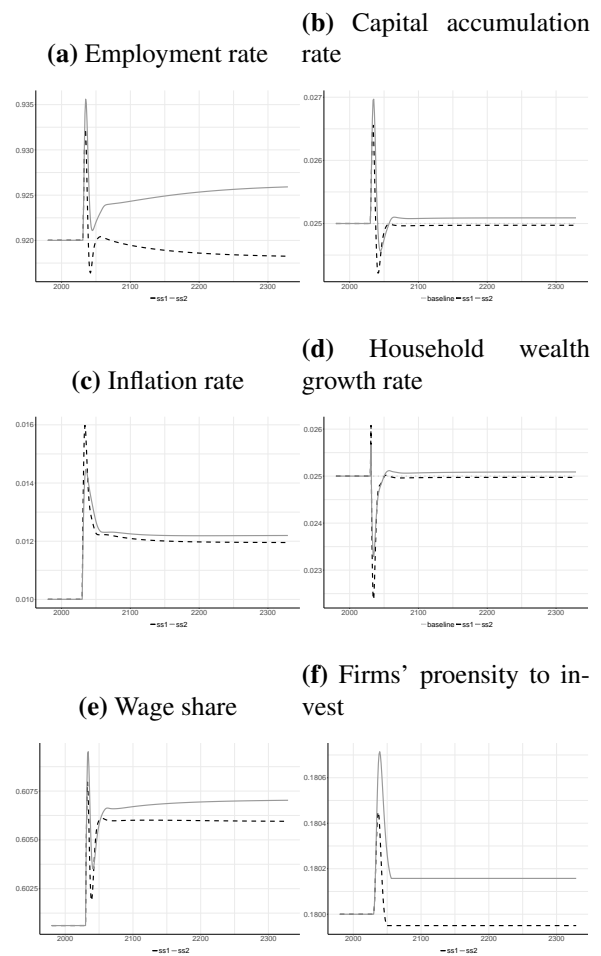
(a) Wage share

(b) Employment rate

(c) Capital accumulation rate

(d) Firms' propensity to invest
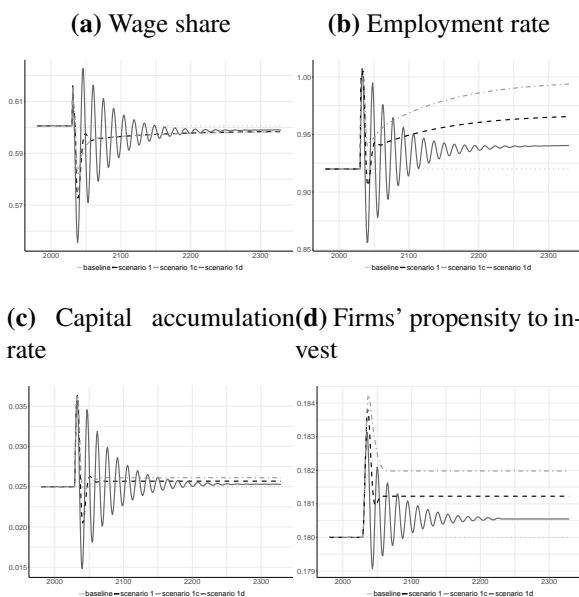
(e) Inflation rate

Scenario 1c: positive shock to α_1 and a negative shock to ξ and ψ; Scenario 1d: positive shock to α_1, ξ and ψ

Figure 4: Effects of a higher bargaining power of workers

(b) Capital accumulation rate

(a) Employment rate

(d) Household wealth growth rate

(c) Inflation rate

(f) Firms' proensity to invest

(e) Wage share

In baseline scenario 1 (ss1), we assume an initial gap between workers and firms bargaining power ($\epsilon_1 - \phi_1$) of 0.25; In baseline scenario 2 (ss2), we assume an initial gap of 0.45.

F=Y-WB