

# Equitable Income Distribution and Public Spending: A synergy for decent work?

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**Abstract:** In this paper we develop a post-Kaleckian feminist demand-led growth model, which includes gender-specific variables, and analyse the effects of a change in female and male wage rate on: i) employment of men and women, and ii) distribution of wage income between men and women. Furthermore, we explore the impact of public investment on easing these tensions and bringing about more equal income distribution, while generating employment. Insights from a large body of work contribute to the understanding of how constraints could be relaxed to promote broadly shared growth. Building on this work from a feminist perspective, we highlight the relationship between income equality, including gender equality, and economic growth, by exploring how inequality between men and women in employment can influence the rate of economic growth, investment and employment. The model aims to provide a theoretical basis to test stylised facts from the literature which point out that public investment in social infrastructure reduces women's care burden, while enabling them to spend more time in paid work. On the one hand resources spent on children increase (with positive spill-over effects on human capital investment), and on the other hand aggregate demand is stimulated. Likewise, targeted public investment can leverage private investment towards the same end. Each of these effects produces a set of scenarios illustrating the conditions under which an economy can lead to gender-equal growth, with inclusive, gender-responsive budgeting. This theoretical model can form the basis for the empirical analysis of gender equality and fiscal policy on growth and employment of men and women and serve a powerful tool for policy analysis to overcome structural constraints that perpetuate gender inequality, and transform gender norms, through a more equitable distribution of income with long run effects.

**Keywords:** gender, inequality, macroeconomics, aggregate demand

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## **1. Introduction**

Understanding the effect of gender equality on growth requires assessing observed gendered inequalities in opportunities and earnings which affect both men and women. We explore the themes that emerge by highlighting the significance of divisions between men and women in the sphere of employment, both at home and the workplace. The struggle within the household is exemplified by different consumption patterns, and ultimately by the power the members command over resource allocation, which is effected by their income level outside the household. In the workplace the effects are manifested by the persistence of the gender pay gap.

The questions that arise from these observations underscore the need for a more a gender-aware distribution of income between men and women, and highlight the importance of the state. In this paper we analyse the effects of a change in female and male wage rate on: i) employment of men and women, and ii) distribution of wage income between men and women. Furthermore, we explore the impact of public investment in easing these tensions and bringing about more equal income distribution, generate employment.

We present a post-Keynesian/ post-Kaleckian feminist demand-led growth model, constructed as a set of behavioural functions that determine aggregate demand. Our model, an extension of the post-Kaleckian model, incorporates gendered parameters, employment, the public sector and productivity. While keeping the class structure of the model (worker and capitalist, who exhibit different saving behaviours), we include female and male workers, departing from the classical representation of agency, making the model both class- and gender-relevant. Our major contribution lies in the inclusion of the female and male waged workers, employment and public spending in a two sector open economy with endogenous productivity. While several authors have analysed the impact of public spending and taxation on the demand regime from a post-Kaleckian perspective (Obst, Onaran, Nikolaidi, 2017; Blecker, 2002; Palley, 2013, 2014; Mott and Slattery, 1994; Commendatore, Panico, Pinto, 2011; Dutt, 2013; Hein, 2016), they have not analysed gender specific behavioural differences and effects of public spending and changes in distribution with the notable exception of Seguino (2012). A further novelty of this paper is modelling productivity endogenously, which in turn influences changes in employment levels and growth.

The paper is structured as follows. After this introductory section, the second section of this paper reviews the existing literature. The third part presents the theoretical model and analyses i) the impact of changes in female and male wages on growth and employment of men and women, i.e. the conditions under which the economy would have a gender equality-led growth and employment regime, and ii) the effects of government spending on the employment of men and women.

## **2. Literature**

We frame our argument by bringing together two traditions, namely post-Kaleckian economics and feminist economics. The result is a palimpsest that reveals the way gender relations and power struggle become institutionalised and evident in the division of rewards between men and women in the market economy. This, in turn, is used to put the building blocks of the model together: wage income differences and how they are exploited by the existing economic structure, the role of public spending in sectors that generate employment for women and growth, as well as the role of private investment. In particular, public spending is key not only to growth and reduction of income inequality, but the creation of opportunities for women with spill-over effects for the entire economy.

The bulk of the gender-aware analysis in the economic literature focuses on issues that emerge in developing countries, particularly during the 1980s and 1990s, such as the impact of structural

adjustment programmes on labour market outcomes, poverty, inequality and well-being within the household. Towards this end we relate income distribution to well-being, by taking into account human development, which can be extended on the one hand by higher wages, and on the other hand by targeted public spending (Seguino, 2016). The existing literature concurs that women's bargaining power within the household is enhanced when they command resources (Duflo, 2003; Duflo and Udry, 2004; Himmelweit et al., 2013; Phipps and Burton, 1998; Quisumbing & Maluccio, 2003; Thomas, 1990; Hashemi et al., 1996; Kabeer, 2001; Littlefield, 2003; Morrison et al., 2007; Pitt et al., 2006). Hoddinott and Haddad (1995) and Thomas (1997) showed that a rise in women's share of cash income in Ivory Coast and Brazil leads to an increase in spending on nutritional, health, and education expenditures as well, whereas the share of spending on private goods for men is decreasing. Similar results are found by Doss (2005), Duflo and Udry (2004), Morrison et al. (2007), Phipps and Burton (1998) Rubalcava et al. (2004), Lundberg et al. (1997). An increase in assets controlled by women is positively associated with children's educational attainment and with their nutritional status—especially of girls (Doepke and Tertilt, 2011; Duflo, 2003; Engle, 1993; Gitter and Barham, 2008; Thomas, 1990).

Braunstein (2013) argues that the impact of income on human capacities depends not only on how much is earned and spent, but on what is purchased, and whether these commodities provide good substitutes or complements for unpaid care time. At first glance, women need to spend more of their income on social services to replace their unpaid reproductive labour, assuming these services are not freely provided by the public sector. More income in the hands of women or the presence of an employed mother in the household increases household spending on children (Lundberg et al, 1997; Pahl, 2000; Cappellini et al, 2014). Microeconomic studies across the board to a great extent attest that a larger share of women's income compared to that of men's, is spend to satisfy the needs of household (Blumberg, 1991; Antonopoulos et al, 2010; Pahl, 2000) and a possible increase in their income leads to increased spending on children's education and wellbeing (see previous section on developing countries' literature, and Vogler and Pahl, 1994; Lundeberg et al. 1997; Cappellini et al 2014), with further implications for the distribution of power within the household too (Vogler and Pahl, 1994). Men's income on the other hand, tends to be spent on capital intensive and luxury goods. Seguino (2012a) and Kabeer (1997) suggested that in developing countries women are more likely to consume domestically produced goods, while men are more likely to consume a higher proportion of luxury and/or imported goods (such as cell phones, automobiles and televisions). These studies highlight the positive effect that higher incomes for women can have for an economy, by shifting the consumption towards goods that have long-term impacts in the quality of life and workforce.

An area where this becomes more pronounced is unpaid caring labour where women carry unevenly more burden than men, with implications for growth (Seguino, 2012; Antonopoulos et al. 2010, Braunstein, van Stavaren, Tavani 2011). Similarly, the increase and intensification of unpaid household labour compensate for the continuous shrinking of public services provision in health, education, due to budget cuts, leading to higher intergenerational costs. Folbre (1995), Himmelweit et al. (2014), Pahl (1997), and Nelson (1996) stress the importance of including the unpaid care work largely done by women for the smooth running of society and the economy. The term "reproductive labour" used to describe this includes all the activities that in general ensure that the workforce is fed, healthy, and able to work. However, it will be wrong to claim that all of this caring activity takes part in the unpaid economy; the state is responsible by to a large extend for the provision of services such as healthcare, childcare and education, in most countries of the world. While recognising the importance of unpaid

work in the debate, due to data limitations and the subjective nature of measurement, this will not be included in our research.

Dissecting the household is fundamental in understanding how the inclusion of gender in a demand-led growth model would bring new insights. Households are understood as sources both of consumption and labour supply. By adding gender specific variables and assumptions to the model we acknowledge the variety of roles for each member of the household, which have different economic impact, reflected by power dynamics on households. The relations of power within a household as an outcome of the participation of women in paid employment have been well documented (Agarwal, 1997; and for a more extensive review see Himmelweit et al. 2013; De Henau and Himmelweit, 2013). More importantly, households are institutions of production and savings, through unpaid work and the reproduction of the labour force (van Stavaren 2010; DeHenau and Himmelweit 2013b; Hamner and Akram-Lodhi 1998; Nelson 1996). The household, apart from being an arena of cooperation or conflict in terms of power relations, is also a key source of demand for the economy. Consequently, another important empirical question to explore is how a higher degree of gender equality in wages or employment could change the composition of consumption. There is limited empirical research on the differences in propensities to consume by men and women, as well as the composition of consumption with respect to types of goods and services and their import content. Empirical evidence points out that the marginal propensity to consume out of wages is higher than that out of profits (eg. Onaran and Galanis, 2014), and since female wage income in aggregate is lower than male wage income, the marginal propensity to consume out of female wage income is likely to be higher than that out of male wage income. Van Stavaren (2010) mentions a study by Bunting (1998) for the USA which found that the highest propensity to consume is found in the lowest income households, which have the highest share of women (62%), compared to richer households. Subsequently, an increase in female wage rates or female employment, other things being equal, is expected to lead to higher consumption (Onaran, 2016).

The provision of social welfare is usually undertaken by the state, by means of public investment in the social care sector, which not only has the potential to reduce women's care burden, but is also a sector where employment creation tends to be predominantly female (Antonopoulos et al., 2010; Braunstein et al. 2011; Seguino, 2012; Onaran, 2016). The degree by which these needs of the population are covered determines the types of welfare regime of a country, and would influence how growth can improve gender equality. Furthermore, the state is the main employer in the education and healthcare industries. The manner a state can nurture or obstruct equality is explored in Braunstein et al.'s (2011) categorisation of social welfare networks, formal or informal. An informal social welfare support can be formed by means of kinship or solidarity networks. These networks however have evolved not only as an outcome of cultural norms, but to replace the scarcity of formal social welfare provision. In the exactly opposite side, we find countries which have an efficient formal social welfare provision system, provided by the state that nurtures equality (Braunstein et al, 2011).

Women do the majority of unpaid reproductive labour, therefore the development of the social sector in the market economy with services provided by paid labour in the public sector, as well as the private sector, will have profound effects on women as well as on aggregate macroeconomic outcomes (Onaran, 2016; Folbre, 1995). First, on the supply side, this will reduce the need for unpaid labour to provide care, education and health, and improve the chances of women to participate in the paid economy. Secondly, on the demand side, given the current rates of occupational segregation the new jobs generated in the social sector will be traditionally female jobs, and thereby increase the employment chances of women (Tzannatos, 1995). Thirdly, both the public supply of social services

and increased paid employment opportunities could transform gender norms concerning divisions of labour both within the household and paid versus unpaid work (Folbre and Nelson, 2000).

Furthermore, public investment in times of underemployment/ unemployment addresses the lack of effective demand in the economy, which can deter private investment (DeHenau et al, 2016). A large body of research differentiates between two types of public spending, as productive (government capital spending), and unproductive expenditure (government current spending). Palley (2013) and Seguino (2012) for example consider public investment in technology and infrastructure productive expenditure and argue that it is leading to positive crowding in effects on private investment. Seguino (2012) however further distinguishes between public investment in physical and social infrastructure pointing out that both enhance the business environment and hence private investment. Most of the Post-Keynesian literature does not model the public sector, with the notable exceptions of Blecker (2002) and Seguino (2012b), and most recently Obst, Onaran and Nikolaidi (2017).

Recent research highlights the beneficial effect of public spending on employment generation and economic growth. DeHenau et al (2016) using input-output analysis find for seven OECD countries that investment in the social sector would create roughly double the amount of new jobs as investment in physical infrastructure (directly and through a strong multiplier effect). Their findings also note a decrease in the gender gap in employment with more investment in social infrastructure, reflecting in part the concentration of women in the social sector. In a similar vein, Bargawi and Cozzi (2014) using the Cambridge alphametrics model (CAM), compare and contrast three scenarios for Europe: continued austerity, gender-neutral expansionary scenario and gendered expansionary scenario. Projections for their gendered expansionary scenario suggest that an additional 7.3 million jobs for women could be created in the Eurozone and the United Kingdom by gendering government expenditure (as opposed to reduction of public spending). Additionally, they find that higher growth rates under the gendered scenario can lead to significant reductions of debt-to-GDP ratios and lower budget deficits. Antonopoulos et al (2010) for the USA using microsimulation find that for the same amount of investment in the social sector and physical infrastructure investment the number of jobs created from investment in social care is more than double (1.2 million vs 550,000 jobs) than in the alternative scenario of physical infrastructure investment, reducing significantly the gender employment gap. Antonopoulos and Kim (2008) examining South Africa make similar observations to the study for the USA for an increase in public spending in social infrastructure. Finally, Ilkcaracan et al (2015) investigating the impact of public investment in social care services on employment, gender equality and poverty in Turkey, find that fiscal prioritization of early childhood care and preschool education as a subsector of social infrastructure compared to investment in physical infrastructure and cash transfers “presents an enormous potential for decent job creation, particularly in the female-dominated occupations and sectors” (p. 7).

The literature in the nexus of gender equality- public spending- human development in developing countries underlines the fact that greater public spending in services that reduce the care burden of women empower them in many levels: increased financial independence, higher literacy and better health outcomes for them and their children, thus ensuring not only short term effects (higher labour force participation), but significant long run effects (higher productivity, better quality of workforce and shifting gender stereotypes).

## 2.1 Gendering macroeconomic models

The discussion above shows that there is a multilevel positive correlation with macroeconomic growth, albeit most Kaleckian models have not fully integrated these linkages. Ertürk and Çagatay's landmark 1995 paper was the first attempt to stylise empirically the relationship between women's share of the workforce and long-term economic growth and short-term macroeconomic changes, with reference to structural adjustment policies. Using cross-country data for 1985 and 1990, they conclude that structural adjustment policies lead to the feminization of the labour force, through changes in income distribution, reflected in decreasing wage shares in manufacturing, and through shifts in the outward orientation of the economy as measured by the increase in the ratio of exports to GNP. Blecker and Seguino (2002) debunk the myth that if women's wages relative to men's increase, a decline in export competitiveness and a slowdown in the country's growth rate ensues. However under certain parameters, gender equity may not be compatible with growth in export-oriented semi-industrialised economies. Their analysis is informed by the fact that in the labour markets of many developing countries where female workers in the export sector face employment constraints that result in their segregation in export sector jobs at lower wages than male workers receive in the non-export industries. Braunstein et al. (2011), incorporate Keynesian insights to provide an alternative to the typical aggregate demand-aggregate supply model. Income distribution plays a significant role in determining investment, consumption and the level of output. Their findings are related to the unpaid and care sectors, in essence putting reproduction in their macroeconomic model. Braunstein et al.'s (2011) structuralist model departs from the strictly economic paradigm and introduces notions from the behavioural science explaining attitudes according to "altruist" or "selfish" types of economies, linking care with the gender-wage gap and gendered job segregation. Finally, Seguino (2012), sketches a two-sector model (human development sector vs. the rest). Seguino's (2012) finding is that greater equality can either be a drag on or a stimulus to growth, depending on the type of inequality and macro-level policies regulating trade and investment. Under the right conditions, a more equitable distribution of income and opportunities (in the form of human development) can be a self-sustaining stimulus to growth, with significant trans-generational effects.

Our work is largely informed by these contributions and by adding the role of government spending we contribute in the creation of a gender and policy-aware macroeconomic model. In order to do so, we use a post-Keynesian/ Kaleckian model. Post-Keynesian macroeconomic models integrate the dual role of wages as cost and as source of demand. These models accept the direct positive effects of higher profits on private investment and net exports as emphasised in mainstream models, contrasting these positive effects with the negative effects on consumption. Demand plays a central role in determining growth and employment, and the distribution of income between workers and capitalists (wages and profits) have a crucial effect on demand. These models allow for involuntary unemployment, underemployment, and excess capacity (Onaran, 2016). This approach is different from the neoclassical macroeconomic models based on microeconomic decisions of optimizing agents. Components of aggregate demand are determined by behavioural equations. Wages are an outcome of a bargaining process between employers and workers as opposed to the neoclassical theory, where they are determined by the marginal product of labour. Neoclassical labour supply is based on the choice between leisure and consumption. The difference of the demand-led models of growth and employment is that unemployment is involuntary. Labour supply is inelastic and employment is demand-constrained not supply-determined. In this respect, the upwards convergence of wages, coupled with public social and physical investment can lead to higher human development and growth (Seguino, 2012). Public investment can partially be self-financing in the sense that it creates the conditions for crowding in of private investment, stimulating labour productivity, and growth thus generating tax revenue (Seguino, 2016).

The observed gender pay gap is included in such a model. This concept translates social prejudice into economic behaviour, assuming a preference by employers to a particular type of workers (black/white, or by extension, male/female). From a feminist political economy approach gender wage gap is determined by the relative bargaining power of men and women vis-a-vis capital, which for the purpose of this paper is considered a historical constraint.

### 3. The theoretical model

Drawing from the literature, the economy is split into two sectors: the social sector (H), consisting of education, child care, health and social care,<sup>4</sup> and the rest of the economy (N), in a model that considers the differences between male and female workers and the consequences these have in an open economy. A novel addition to the standard post- Kaleckian models, is that the economy consists of two workers (wage earners), male and female (denoted by the script M and F respectively), and one capitalist (profit earner). The demand side of the economy is defined by the consumption behaviour of the female and male workers and the capitalists and the investment behaviour of the firms and net exports. The total income of the economy is distributed between female and male wage income and profits, as in the post-Kaleckian tradition. For the sake of simplicity, the behaviour of the capitalist class is assumed to be gender neutral.<sup>5</sup> In the following we first present the behavioural equations that comprise the model.

The total income,  $Y$ , in the economy consists of the total profits of the capitalist,  $R$ , the total wage income of the male workers,  $W_M$ , and the total wage income of the female workers,  $W_F$ :

$$Y = W_M + W_F + R \quad (1)$$

Average hourly wage rate for men and women are  $w_M$  and  $w_F$  respectively. Due to the gender wage gap:

$$w_M = \alpha w_F \quad (1b)$$

where historically  $\alpha > 1$ , and greater gender equality would mean a convergence of  $\alpha$  to one.

In equilibrium,  $Y$  equals to aggregate demand:

$$Y = C + I^N + G^H + G^C + I^G + NX \quad (1.c)$$

where  $I^N$  refers to private investment in the economy.<sup>6</sup>

Government expenditure,  $G$ , is disaggregated for the purposes of our model in three types of expenditure:  $G^H, G^C, I^G$ .  $G^C$  refers to the consumption expenditure of the government (current

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<sup>4</sup> Some manufacturing sectors, such as food, could also be considered as part of the social sector. However, we opt for a sectoral classification that mirrors the functions of government spending for analytical simplification and relevance for policy analysis.

<sup>5</sup> Recently there is a growing body of literature examining the decision making behaviour of female capitalists and the impact of the presence of women in the board of directors on the firm performance (Burke 2000; Terjensen, Sealy and Singh 2009; Konrad et al 2008; van der Walt and Ingley 2003; Burke and Mattis 2013; Perrault 2015). There is some evidence that the risk taking behaviour of women entrepreneurs is different to men, which may provide room for extending the model. However, as there are only very few female capitalists, their behaviour is unlikely to change the overall results from an empirical point of view.

<sup>6</sup> For simplicity, we assume that there is no private investment in the social sector; thus all private investment is in the rest of the economy (sector N).

account spending), where  $\kappa_c Y = G^C$ , and  $I^G$  refers to public investment in fixed capital, where  $\kappa_G Y = I^G$ .  $G^H$  refers to the social expenditure of the government, where  $\kappa_H Y = G^H$ .  $\kappa_c, \kappa_G, \kappa_H$  are exogenous fiscal policy targets.

Consumption  $C$  can be disaggregated into  $C^H$ , consumption in the social sector, and  $C^N$ , consumption in the rest of the economy. Historical data confirms that on average consumption in goods and services produced in the social sector by households as a ratio to GDP has been stable at a rate below 4% in the UK (ONS, 2016). Given the very small share of household expenditure on social sector goods and services, for simplicity we assume that consumption in the social sector is entirely done by the government, thus:  $G^H = C^H$ .

Finally,  $NX$  denotes net exports, generated only in the rest of the economy, as for simplicity we assume that the services produced in the social sector are not tradable.

Thus the total expenditure in the social sector,  $Y^H$ , is:

$$Y^H = G^H = \kappa_H Y \quad (2. a)$$

Likewise the total expenditure in the rest of the economy,  $Y^N$ , is:

$$Y^N = Y(1 - \kappa_H) \quad (2. b)$$

In the initial exposition of the model we assume that wages in the two sectors are same for male workers; similarly, we assume that they are the same for female workers in the two sectors. This assumption will help us to simplify the model, but at a later stage we will follow the factual indications, where there are significant differences between the wages of both male and female workers in the two sectors.

Employment is measured in hours of work,  $E$ , in each sector,  $H$  and  $N$ , can be rewritten as

$$E^H = \frac{Y^H}{T^H} = \frac{\kappa_H Y}{T^H} \quad (3. a)^7$$

$$E^N = \frac{Y^N}{T^N} = \frac{(1 - \kappa_H) Y}{T^N} \quad (3. b)$$

Due to occupational segregation, we assume there are more women employed (higher number of hours worked by women) in the social sector than men, whereas we observe the opposite in the rest of the economy. The number of hours of work by women and men are denoted by  $E^F$  and  $E^M$  in each sector,  $H$  and  $N$ . To reflect the occupational segregation in the two sectors, we introduce  $\beta_H$  and  $\beta_N$  which denote the share of female workers in each sector:

$$E^{HF} = \beta_H E^H \quad (4. a)$$

$$E^{NF} = \beta_N E^N \quad (4. b)$$

$$E^{HM} = (1 - \beta_H) E^H \quad (4. c)$$

$$E^{NM} = (1 - \beta_N) E^N \quad (4. d)$$

We assume that the social expenditure of the government,  $G^H$ , consists exclusively of the wage payments in the social sector; hence there is no profit (operating surplus) in this sector. Thus substituting (4.a) and (4.c) in (2.a), by definition  $G^H$  is:

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<sup>7</sup> In the social sector, we assume that the public sector is the sole employer.



$$G^H = \kappa_H Y = \beta_H E^H w_F + (1 - \beta_H) E^H w_M \quad (2. c)$$

Productivity is denoted  $T^H$  is productivity in the social sector and  $T^N$  in the rest of the economy, and it used in the definition of employment above. By definition,  $T^H$ , productivity in the social sector, which is output per hour in the social sector, is given as:

$$T^H = \beta_H w_F + (1 - \beta_H) w_M \quad (5)$$

Substituting (1b), (2c), (3.a-b) in (4.a-d), we can re-define employment as:

$$E^{HF} = \frac{\beta_H \kappa_H Y}{\beta_H w_F + (1 - \beta_H) w_M} = \frac{\beta_H \kappa_H Y}{w_F (\beta_H + \alpha - \beta_H \alpha)} \quad (4. e)$$

$$E^{NF} = \frac{(1 - \kappa_H) Y}{T^N} \beta_N \quad (4. f)$$

$$E^{HM} = \frac{(1 - \beta_H) \kappa_H Y}{w_F (\beta_H + \alpha - \beta_H \alpha)} \quad (4. g)$$

$$E^{NM} = \frac{(1 - \kappa_H) Y}{T^N} (1 - \beta_N) \quad (4. h)$$

The total wage payments on female workers are:

$$W_F = w_F [E^{HF} + E^{NF}] \quad (6. a)$$

The total wage payments on male workers are:

$$W_M = w_M [E^{HM} + E^{NM}] \quad (6. b)$$

The capitalist's profits in the rest of the economy,  $R$ , are:

$$\begin{aligned} R &= Y^N - w_F E^{NF} - w_M E^{NM} = Y^N - E^N (\beta_N + \alpha - \beta_N \alpha) w_F \\ &= ((1 - \kappa_H) Y - E^N (\beta_N + \alpha - \beta_N \alpha) w_F) \end{aligned} \quad (7)$$

Since we have assumed that the government is the sole investor and employer in the social sector, profit is generated only in the rest of the economy. Hence, the profit share in the rest of the economy ( $\pi$ ) becomes:

$$\pi = \frac{Y^N - w_F E^{NF} - w_M E^{NM}}{Y^N} = 1 - \frac{(\beta_N + \alpha - \beta_N \alpha) w_F}{T^N} \quad (8)$$

The government collects taxes on income and consumption. We take into account the existence of two different tax rates on income consistent with the class division of the model:  $t_R$ , which is the tax rate on capital income, and  $t_W$  which is the tax rate on the wage income of the workers. Taxation on consumption,  $t_C$ , is excluded for simplicity.

Next we define the behavioural equations of our model. Consumption in logarithm<sup>8</sup>,  $\log C$ , is a function of after-tax profit income, and after-tax wage income, both expressed in logarithms. Consumption is defined as:

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<sup>8</sup> Behavioural equations are all expressed in logarithms to provide a basis for future econometric modelling. Taking logarithm helps to decrease volatility and improve estimation diagnostics. The prefix "log" in front of the variables indicate that they are in logarithms.

$$\begin{aligned}
\log C &= c_0 + c_R (\log[R(1 - t_R)]) \\
&\quad + c_F (\log [w_F E^{HF} (1 - t_W) + w_F E^{NF} (1 - t_W)]) \\
&\quad + c_M (\log [w_M E^{HM} (1 - t_W) + w_M E^{NM} (1 - t_W)]) \\
&= c_0 + c_R \log ((1 - t_R)(Y(1 - \kappa_H) - w_F(E^{NF} + aE^{NM})) \\
&\quad + c_F \log((1 - t_W)w_F(E^{NF} + E^{HF})) + c_M \log((1 - t_W)aw_F(E^{NM} \\
&\quad + E^{HM}))
\end{aligned} \tag{9}$$

Private investment in logarithm,  $\log I$ , is defined as:

$$\begin{aligned}
\log I &= i_0 + i_1 \log Y^N + i_2 \log [\pi(1 - t_R)] - i_3 \log \frac{D}{Y} \\
&= i_0 + i_1 \log(Y(1 - \kappa_H)) + i_2 \log [\pi(1 - t_R)] + i_3 \log \frac{D}{Y}
\end{aligned} \tag{10}$$

where  $i_0$  is autonomous investment and captures the effects of ‘animal spirits’,  $Y^N$  is output in N,  $(1 - t_r)\pi$  is after-tax adjusted profit share, and  $D/Y$  is the ratio of domestic government debt to GDP, all in logarithmic form. The profit share is an indicator for expected profitability as well as the availability of internal finance.  $Y^N$  is a proxy for capacity utilisation in N with positive accelerator effects on private investment. Public debt as a ratio to GDP allows us to take into account possible financial crowding out effects of public spending, and captures the impact of interest rate. Potential crowding-in effects of public spending are captured by the demand effect of  $G^C$  and  $I^G$ , which are part of  $Y^N$ . Further crowding-in effects of public spending are incorporated as we model below the impact of public spending on productivity, which in turn affects the profit share.

Domestic government debt,  $D$ , is

$$\begin{aligned}
D &= r_{t-1}D_{t-1} + G^H + G^C + I^H - t_W(W_F + W_M) - t_R R \\
D &= (r_{t-1}D_{t-1} + Y(\kappa_H + \kappa_C + \kappa_G) - w_F(a(E^{HM} + E^{NM}) + (E^{NF} + E^{HF}))t_W \\
&\quad - t_R((1 - \kappa_H)Y - w_F(E^{NF} + aE^{NM})))
\end{aligned} \tag{11}$$

where  $D_{t-1}$  denotes debt of the previous period and  $r_{t-1}D_{t-1}$  is the interest payments on government debt of the previous period.

Net exports in the rest of the economy, are a function of national income, unit labour costs, which are inversely related to the profit share, rest of the world income,  $Y_{World}$ , and the exchange rate,  $\varepsilon$ :

$$\log NX = n_0 - n_1 \log Y + n_2 \log \pi + n_3 \log Y_{World} + n_4 \log \varepsilon \tag{12}$$

Each sector in our model has a different productivity rate. The social sector is a more labour intensive sector, whereas the rest of the economy is primarily more capital intensive. We assume productivity in the social sector to be given and simply defined and output per hour. However in the rest of the economy, productivity is a behavioural function of demand, technological progress as an outcome of private and public spending as well as changes in labour costs. We assume that different type of government spending has a different effects on productivity in the rest of the economy. When modelling productivity in the rest of the economy, we take into account the fact that labour productivity is partly dependent on the growth of output itself (Verdoorn effect). Thus, for the rest of the economy productivity is modelled as:

$$\begin{aligned}
\log T_N &= h_0 + \sum_{i=0}^n h_{1i} (\log G_{t-i}^H) + \sum_{i=0}^n h_{2i} (\log I_{t-i}^G) + \sum_{i=0}^n h_{3i} (\log G_{t-i}^C) + h_4 (\log(Y_N - I_0^G - G_0^C)) \\
&\quad + h_5 (\log w_F) + h_6 (\log w_M)
\end{aligned}$$

$$\log T^N = h_0 + \sum_{i=0}^n h_{1i}(\log G_{t-i}^H) + \sum_{i=0}^n h_{2i}(\log I_{t-i}^G) + \sum_{i=0}^n h_{3i}(\log G_{t-i}^C) + h_4(\log(Y(1 - \kappa_H - \kappa_C - \kappa_G))) + h_5(\log w_F) + h_6(\log a w_F) \quad (13)$$

Equation (13) takes into account that productivity can be path-dependent, as it is influenced by previous public and private investment. Another determinant is wages, which can have a negative effect on employment.<sup>9</sup> When labour becomes dearer, employers can be tempted to switch to labour-saving technologies or innovate to avoid a reduction in the profit share (Dutt, 2006; Hein and Tarassow, 2010). However, an increase in wages can also have a positive impact on productivity as put forward in the efficiency wage hypothesis (Stiglitz, 1976). It is likely that higher wages increase workers' productivity via higher levels of effort and motivation.

Having presented the fundamental components of the model, we proceed to analyse the impact of a change in wages on demand and employment. We first present the partial effects of changes in wages, gender wage gap ( $\alpha$ ) and output on employment of men and women in different sectors in each sector:

$$\frac{\partial E^{HF}}{\partial Y} = e_Y^{HF} = \frac{\beta_H \kappa_H}{w_F(\beta_H + \alpha - \beta_H \alpha)} > 0 \quad (14)$$

$$\frac{\partial E^{HF}}{\partial w_F} = e_F^{HF} = -\frac{Y \beta_H \kappa_H}{w_F^2(\beta_H + \alpha - \beta_H \alpha)} < 0 \quad (15)$$

$$\frac{\partial E^{HF}}{\partial \alpha} = e_\alpha^{HF} = -\frac{(1 - \beta_H) Y \beta_H \kappa_H}{w_F(\beta_H + \alpha - \beta_H \alpha)^2} < 0 \quad (16)$$

$$\frac{\partial E^{HM}}{\partial Y} = e_Y^{HM} = \frac{(1 - \beta_H) \kappa_H}{w_F(\beta_H + \alpha - \beta_H \alpha)} > 0 \quad (17)$$

$$\frac{\partial E^{HM}}{\partial w_F} = e_F^{HM} = -\frac{Y(1 - \beta_H) \kappa_H}{w_F^2(\beta_H + \alpha - \beta_H \alpha)} < 0 \quad (18)$$

$$\frac{\partial E^{HM}}{\partial \alpha} = e_\alpha^{HM} = -\frac{(1 - \beta_H)^2 Y \kappa_H}{w_F(\beta_H + \alpha - \beta_H \alpha)^2} < 0 \quad (19)$$

$$\begin{aligned} \frac{\partial E^{NF}}{\partial Y} = e_Y^{NF} &= \beta_N \frac{(1 - \kappa_H)(T^N - T^N \left( \frac{h_{10} \kappa_H}{G^H_0} + \frac{h_{20} \kappa_G}{I^G_0} + \frac{h_{30} \kappa_C}{G^C_0} + h_4 \frac{(1 - \kappa_H - \kappa_C - \kappa_G)}{Y(1 - \kappa_H - \kappa_C - \kappa_G)} \right) Y)}{T^{N^2}} \\ &= \beta_N \left( 1 - \kappa_H \right) \frac{1 - (h_{10} + h_{20} + h_{30} + h_4)}{T^N} \end{aligned} \quad (20)^{10}$$

The sign of (20) is ambiguous, as it depends on the relative magnitude of two effects; namely the direct effect of rising output, 1, and the component  $h_{10} + h_{20} + h_{30} + h_4$  which shows the effect through rising productivity. However, under plausible parameters, it is safe to assume that the impact of output on Y will be positive.

<sup>9</sup> The logarithm of the labour cost is equivalent to  $\log w_F - \log w_M - \log T$ ; hence solving for T,  $\log w_F$  and  $\log w_M$  are left alone on the right hand side.

<sup>10</sup> Note that  $d \log T^N / d \log Y = (dT^N / dY)(Y/T)$  and similar transformations are required when converting all elasticities to marginal effects.

In the following we examine the effect of an increase in women's wages, when the wage gap remains constant. In the rest of the economy, the effect of female wages and wage gap on the employment of women are:

$$\frac{\partial E^{NF}}{\partial w_F} = e_Y^{NF} = -\beta_N \frac{Y(1-\kappa_H)}{(T^N)^2} \left( \frac{h_5}{w_F} + \frac{h_6}{w_F} \right) T^N w_F = -\beta_N \frac{Y(1-\kappa_H)}{T^N} (h_5 + h_6) < 0 \quad (21)$$

$$\frac{\partial E^{NF}}{\partial \alpha} = e_\alpha^{NF} = -\beta_N \frac{Y(1-\kappa_H)h_6}{\alpha T^N} < 0 \quad (22)$$

The effect of output on the employment of men in the rest of the economy is:

$$\begin{aligned} \frac{\partial E^{NM}}{\partial Y} = e_Y^{NM} &= (1-\beta_N) \frac{(1-\kappa_H)(T^N - T^N Y \left( \frac{h_{10}}{Y} + \frac{h_{20}}{Y} + \frac{h_{30}}{Y} + h_4 \frac{(1-\kappa_H - \kappa_C - \kappa_G)}{Y(1-\kappa_H - \kappa_C - \kappa_G)} \right))}{T^{N^2}} \\ &= (1 - \beta_N) \frac{(1-\kappa_H)(1 - (h_{10} + h_{20} + h_{30} + h_4))}{T^N} \end{aligned} \quad (23)$$

The sign of e (23) is again ambiguous.

$$\begin{aligned} \frac{\partial E^{NM}}{\partial w_F} = e_Y^{NM} &= -\frac{(1-\beta_N)(1-\kappa_H)Y(h_6 + h_5)T^N w_F}{T^{N^2} w_F} = -\frac{(1-\beta_N)(1-\kappa_H)Y(h_6 + h_5)}{T^N} \\ &< 0 \end{aligned} \quad (24)$$

$$\frac{\partial E^{NM}}{\partial \alpha} = e_\alpha^{NM} = -\frac{(1-\beta_N)Y(1-\kappa_H)h_6}{\alpha T^N} < 0 \quad (25)$$

We proceed by calculating the effect of female wages on output:

$$\frac{dY}{dw_F} = \frac{\left| \frac{\partial C}{\partial w_F} \right|_Y + \left| \frac{\partial I}{\partial w_F} \right|_Y + \left| \frac{\partial NX}{\partial w_F} \right|_Y}{1 - \left| \frac{\partial C}{\partial Y} \right|_{w_F} - \left| \frac{\partial I}{\partial Y} \right|_{w_F} - \left| \frac{\partial NX}{\partial Y} \right|_{w_F} - \kappa_H - \kappa_C - \kappa_G} \quad (26)$$

Where the effect of a change in women's wages on consumption is:<sup>11</sup>

$$\begin{aligned} \left| \frac{\partial C}{\partial w_F} \right|_Y \frac{1}{C} &= c_F \frac{(e_F^{HF} + e_F^{NF})w_F + E^{HF} + E^{NF}}{(E^{HF} + E^{NF})w_F} + c_M \frac{(e_F^{HM} + e_F^{NM})\alpha w_F + \alpha(E^{HM} + E^{NM})}{\alpha w_F(E^{HM} + E^{NM})} \\ &\quad - c_R \frac{E^{NF} + \alpha E^{NM} + (e_F^{NF} + \alpha e_F^{NM})w_F}{R} \\ &= C \left[ c_F \frac{(e_F^{HF} w_F + E^{HF}) + (e_F^{NF} w_F + E^{NF})}{W_F} + c_M \frac{\alpha \left( (e_F^{HM} w_F + E^{HM}) + (e_F^{NM} w_F + E^{NM}) \right)}{W_M} \right. \\ &\quad \left. - c_R \frac{E^{NF} + w_F e_F^{NF} + \alpha(E^{NM} + w_F e_F^{NM})}{R} \right] \end{aligned} \quad (27)$$

<sup>11</sup> See appendix for the details.

The sign of equation (27) is ambiguous, as it depends on the marginal propensities to consume out of the capitalist income, male wage income and female wage income. However, it is safe to expect the total effect to be positive, based on previous empirical research. Onaran and Galanis (2014) for instance, find that the marginal propensity to consume out of wages is higher than that out of profits, and since female wage income in aggregate is lower than male wage income, the marginal propensity to consume out of female wage income is likely to be higher than that out of male wage income.

We also expect the following components to be positive, as higher wages will lead to an increase in the wage bill overall:

$$e_F^{HF} w_F + E^{HF} > 0$$

$$e_F^{NF} w_F + E^{NF} > 0$$

$$e_F^{HM} w_F + E^{HM} > 0$$

$$e_F^{NM} w_F + E^{NM} > 0$$

The effect of a change in women's wages on private investment is given by:

$$\left| \frac{\partial I}{\partial w_F} \right|_Y = \left( i_2 \frac{\left| \frac{\partial \pi}{\partial w_F} \right|_Y}{\pi} + i_3 \frac{\left| \frac{\partial \frac{D}{Y}}{\partial w_F} \right|_Y}{\frac{D}{Y}} \right) I \quad (28)$$

The impact of the female wage rate on the profit share is:

$$\begin{aligned} \left| \frac{\partial \pi}{\partial w_F} \right|_Y &= - \frac{(\alpha - \alpha\beta_N + \beta_N) \left( T^N - \frac{w_F T^N (h_5 + h_6)}{w_F} \right)}{(T^N)^2} \\ &= \frac{(h_5 + h_6 - 1)(\alpha - \alpha\beta_N + \beta_N)}{T^N} \end{aligned} \quad (29)$$

Overall, equation (29) has an ambiguous sign, as increased productivity in response to higher wages might offset some of the impact of higher wage rate. However, it is plausible to assume that the direct effect of higher wages on the profit share will be dominant and the profit share will fall when wage rate increases.

$$\left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial w_F} \right|_Y = (t_R - t_W) \left( E^{NF} + w_F e_F^{NF} + (E^{NM} + w_F e_F^{NM}) \alpha \right) - t_W \left( \alpha (E^{HM} + w_F e_F^{HM}) + E^{HF} + w_F e_F^{HF} \right) \quad (30)$$

By substituting (29) and (30), in (28):

$$\begin{aligned}
& \left| \frac{\partial I}{\partial w_F} \right|_Y \\
&= I \left( i_2 \frac{(h_5 + h_6 - 1)(\alpha - \alpha\beta_N + \beta_N)}{\pi T^N} \right. \\
& \left. + i_3 \frac{(t_R - t_W)(E^{NF} + w_F e_F^{NF} + (E^{NM} + w_F e_F^{NM})\alpha) - t_W(\alpha(E^{HM} + w_F e_F^{HM}) + E^{HF} + w_F e_F^{HF})}{D/Y} \right) \quad (28.b)
\end{aligned}$$

The effect of an increase of women's wages on investment depends on the magnitude of the direct profitability and indirect productivity effects as well as the effect via debt/Y.

Similarly to the partial effect on net exports is and depends on the impact of wages on profit share:

$$\left| \frac{\partial NX}{\partial w_F} \right|_Y = NX n_2 \frac{\left| \frac{\partial \pi}{\partial w_F} \right|_Y}{\pi} = NX n_2 \frac{(h_5 + h_6 - 1)(\alpha - \alpha\beta_N + \beta_N)}{\pi T^N} \quad (31)$$

With regards to the multiplier terms of equation (26), the partial impact of output on consumption is:

$$\begin{aligned}
\left| \frac{\partial C}{\partial Y} \right|_{w_F} &= C \left( c_F \frac{w_F(e_Y^{HF} + e_Y^{NF})}{W_F} + c_M \frac{\alpha w_F(e_Y^{HM} + e_Y^{NM})}{W_M} + c_R \frac{(1 - \kappa_H) - \alpha w_F e_Y^{NM} - w_F e_Y^{NF}}{R} \right) \\
\left| \frac{\partial C}{\partial Y} \right|_{w_F} &= C \left( c_F \frac{e_Y^{HF} + e_Y^{NF}}{E^{NF} + E^{HF}} + c_M \frac{e_Y^{HM} + e_Y^{NM}}{E^{NM} + E^{HM}} + c_R \frac{(1 - \kappa_H) - \alpha w_F e_Y^{NM} - w_F e_Y^{NF}}{R} \right) \quad (32)
\end{aligned}$$

The partial impact of output on investment is:

$$\left| \frac{\partial I}{\partial Y} \right|_{w_F} = I \left( i_1 \frac{1 - \kappa_H}{(1 - \kappa_H)Y} + i_2 \frac{\left| \frac{\partial \pi}{\partial Y} \right|_{w_F}}{\pi} + i_3 \frac{\left| \frac{\partial (D/Y)}{\partial Y} \right|_{w_F}}{D/Y} \right) \quad (33)$$

To proceed with investment, we need first to define  $\left| \frac{\partial \pi}{\partial Y} \right|_{w_F}$ :

$$\left| \frac{\partial \pi}{\partial Y} \right|_{w_F} = \frac{(\alpha - \alpha\beta_N + \beta_N)w_F \left| \frac{\partial T^N}{\partial Y} \right|_{w_F}}{(T^N)^2} \quad (34)$$

Which in turn requires defining  $\left| \frac{\partial T^N}{\partial Y} \right|_{w_F}$ :

$$\left| \frac{\partial T^N}{\partial Y} \right|_{w_F} = \frac{T^N}{Y} (h_{10} + h_{20} + h_{30} + h_4) \quad (35)$$

Substituting equation (35) in (34):

$$\left| \frac{\partial \pi}{\partial Y} \right|_{w_F} = \frac{(\alpha - \alpha\beta_N + \beta_N)w_F (h_{10} + h_{20} + h_{30} + h_4)}{T^N Y} \quad (34.b)$$

The partial impact of output on D/Y is:

$$\begin{aligned}
\left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial Y} \right|_{w_F} &= \frac{\frac{\partial D}{\partial Y} Y - \frac{\partial Y}{\partial Y} D}{Y^2} = \frac{\partial D}{\partial Y} \frac{1}{Y} - \frac{D}{Y^2} = \left( \frac{\partial D}{\partial Y} - \frac{D}{Y} \right) \frac{1}{Y} \\
&= \left( (\kappa_H + \kappa_C + \kappa_G) - w_F(\alpha(e_Y^{HM} + e_Y^{NM}) + e_Y^{HF} + e_Y^{NF})t_W - t_R((1 - \kappa_H) - w_F(e_Y^{NF} + \alpha e_Y^{NM})) - \frac{D}{Y} \right) \frac{1}{Y} \\
&= \left( (\kappa_H + \kappa_C + \kappa_G) - t_R(1 - \kappa_H) - (t_W - t_R)w_F(e_Y^{NF} + \alpha e_Y^{NM}) - t_W w_F(e_Y^{HF} + \alpha e_Y^{HM}) - \frac{D}{Y} \right) \frac{1}{Y}
\end{aligned} \tag{36}$$

Finally (33) becomes:

$$\begin{aligned}
&\left| \frac{\partial I}{\partial Y} \right|_{w_F} \\
&= I \left( \frac{i_1}{Y} + i_2 \frac{(\alpha - \alpha\beta_N + \beta_N)w_F(h_{10} + h_{20} + h_{30} + h_4)}{T^N Y \pi} \right. \\
&\left. + i_3 \frac{((\kappa_H + \kappa_C + \kappa_G) - t_R(1 - \kappa_H) - (t_W - t_R)w_F(e_Y^{NF} + \alpha e_Y^{NM}) - t_W w_F(e_Y^{HF} + \alpha e_Y^{HM}) - \frac{D}{Y})}{D} \right) \tag{33.b}
\end{aligned}$$

The effect of Y on net exports is defined as:

$$\left| \frac{\partial NX}{\partial Y} \right|_{w_F} = NX \left( -\frac{n_1}{Y} + n_2 \left( \frac{(\alpha - \alpha\beta_N + \beta_N)w_F(h_{10} + h_{20} + h_{30} + h_4)}{T^N Y} \right) \right) \tag{37}$$

This effect is also ambiguous, as it depends on two factors. On the hand it depends on the direct impact of output on net exports and on the other hand on the effect of output through a change in productivity.

The multiplier is  $\frac{1}{1 - \varphi_F}$  and is expected to be positive if the Keynesian stability condition holds, where:

$$\varphi_F = \left| \frac{\partial C}{\partial Y} \right|_{w_F} + \left| \frac{\partial I}{\partial Y} \right|_{w_F} + \left| \frac{\partial NX}{\partial Y} \right|_{w_F} + \kappa_H + \kappa_C + \kappa_G \tag{38}$$

Thus, the effect of a change (increase) in women's wages on growth is:

$$\begin{aligned}
\psi_F &= \frac{dY}{dw_F} \\
&= \frac{C \left[ c_F \frac{e_F^{HF} w_F + E^{HF} + e_F^{NF} w_F + E^{NF}}{W_F} + c_M \frac{\alpha((e_F^{HM} w_F + E^{HM}) + (e_F^{NM} w_F + E^{NM}))}{W_M} - c_R \frac{E^{NF} + w_F e_F^{NF} + \alpha(E^{NM} + w_F e_F^{NM})}{R} \right]}{1 - \varphi_F} \\
&+ \frac{I \left( i_2 \frac{(h_5 + h_6 - 1)(\alpha - \alpha\beta_N + \beta_N)}{\pi T^N} \right)}{1 - \varphi_F} \\
&+ \frac{I \left( i_3 \frac{(t_R - t_W)(E^{NF} + w_F e_F^{NF} + (E^{NM} + w_F e_F^{NM})\alpha) - t_W(\alpha(E^{HM} + w_F e_F^{HM}) + E^{HF} + w_F e_F^{HF})}{D/Y} \right)}{1 - \varphi_F} \\
&+ \frac{NX n_2 \frac{(h_5 + h_6 - 1)(\alpha - \alpha\beta_N + \beta_N)}{\pi T^N}}{1 - \varphi_F} \tag{39}
\end{aligned}$$

As a result of the ambiguous sign of each effect, we can identify a number of conditions under which an increase in the wages of women would bring about more equitable growth. Assuming that the impact of a change in wages on consumption is stronger than the impact on investment and net exports, an increase in women's wages will have a positive effect on growth, i.e. the demand in the economy is female wage-led.

With regards to the effects of a change in women's wages on employment, the channel of transmission will be through a change in aggregate demand (direct effect) and through a change in productivity (indirect effect). The impact of a change in women's wages on their employment levels in the social sector is given by:

$$\begin{aligned}\frac{dE^{HF}}{dw_F} &= \frac{\partial E^{HF}}{\partial w_F} + \frac{\partial E^{HF}}{\partial Y} \frac{\partial Y}{\partial w_F} \\ \frac{dE^{HF}}{dw_F} &= -\frac{\beta_H \kappa_H Y}{w_F^2 (\beta_H + \alpha - \beta_H \alpha)} + \frac{\beta_H \kappa_H}{w_F (\beta_H + \alpha - \beta_H \alpha)} \psi_F\end{aligned}\quad (40)$$

Equation (40) above illustrates in the first term the negative direct impact of an increase in women's wages (rising wage cost), and in the second term the impact through a change in output.

Likewise, an increase in women's wages will have a negative direct effect on women's employment in the rest of the economy as a consequence of higher wage costs, and through a change in output. The second impact can be negative, even if  $\varphi_F > 0$ , since higher wages can also lead to higher productivity:

$$\begin{aligned}\frac{dE^{NF}}{dw_F} &= \frac{\partial E^{NF}}{\partial w_F} + \frac{\partial E^{NF}}{\partial Y} \frac{\partial Y}{\partial w_F} \\ \frac{dE^{NF}}{dw_F} &= -\frac{Y(1 - \kappa_H)\beta_N(h_5 + h_6)}{T^N} + \beta_N \frac{(1 - \kappa_H) - (h_{1o} + h_{2o} + h_{3o} + h_4)}{T^N} \psi_F\end{aligned}\quad (41)$$

The effect of a change in women's wages on total employment of women is:

$$\begin{aligned}\frac{dE^F}{dw_F} &= -\frac{\beta_H \kappa_H Y}{w_F^2 (\beta_H + \alpha - \beta_H \alpha)} - \frac{Y(1 - \kappa_H)\beta_N(h_5 + h_6)}{T^N} \\ &+ \left( \frac{\beta_H \kappa_H}{w_F (\beta_H + \alpha - \beta_H \alpha)} + \beta_N \frac{(1 - \kappa_H) - (h_{1o} + h_{2o} + h_{3o} + h_4)}{T^N} \right) \psi_F\end{aligned}\quad (42)$$

There are two conflicting effects at work with respect to total employment of women, reflecting the conditions in sectoral employment for women (equations (41) and (40)): on the one hand an increase of wages means higher costs, hence it could reduce employment due to induced productivity effects, and on the other hand higher demand in the economy could expand employment for women. Under plausible parameters, it is likely that employment will increase, i.e. will be wage led if the demand regime is wage-led.

The change in employment of men as an outcome of a change in women's wages, in the social sector is:

$$\begin{aligned}\frac{dE^{HM}}{dw_F} &= \frac{\partial E^{HM}}{\partial w_F} + \frac{\partial E^{HM}}{\partial Y} \frac{\partial Y}{\partial w_F} \\ \frac{dE^{HM}}{dw_F} &= -\frac{Y(1 - \beta_H)\kappa_H}{w_F^2 (\beta_H + \alpha - \beta_H \alpha)} + \frac{\beta_H \kappa_H}{w_F (\beta_H + \alpha - \beta_H \alpha)} \psi_F\end{aligned}\quad (43)$$



Where a change in employment will be indirectly influenced by a change in output and productivity overall, and by the higher cost of employing women. If the increase in aggregate demand overcomes the impact of higher wage costs, then employment for men in the social sector could increase.

In the rest of the economy the employment of men is:

$$\begin{aligned} \frac{dE^{NM}}{dw_F} &= \frac{\partial E^{NM}}{\partial w_F} + \frac{\partial E^{NM}}{\partial Y} \frac{\partial Y}{\partial w_F} \\ \frac{dE^{NM}}{dw_F} &= - \frac{Y(1 - \kappa_H)(1 - \beta_N)(h_5 + h_6)}{T^N} \\ &\quad + (1 - \beta_N) \frac{(1 - \kappa_H) - (h_{1o} + h_{2o} + h_{3o} + h_4)}{T^N} \psi_F \end{aligned} \quad (44)$$

In this case, the change in men's employment in the rest of the economy depends on the change in output and productivity. If the effect of higher productivity outweighs this of an increase in aggregate demand, then it is likely that employment of men in the rest of the economy decreases.

Total employment of men is thus:

$$\begin{aligned} \frac{dE^M}{dw_F} &= - \frac{Y(1 - \beta_H)\kappa_H}{w_F^2(\beta_H + \alpha - \beta_H\alpha)} - \frac{Y(1 - \kappa_H)(1 - \beta_N)(h_5 + h_6)}{T^N} \\ &\quad + \left( \frac{(1 - \beta_H)\kappa_H}{w_F(\beta_H + \alpha - \beta_H\alpha)} + (1 - \beta_N) \frac{(1 - \kappa_H) - (h_{1o} + h_{2o} + h_{3o} + h_4)}{T^N} \right) \psi_F \end{aligned} \quad (45)$$

Where the sign is ambiguous, as the outcome depends on the relative magnitude of the wage effect as a higher cost vis-à-vis the effect of increased aggregate demand in the economy.

Finally, by adding the effects on men's and women's employment, we get:

$$\begin{aligned} \frac{dE^T}{dw_F} &= - \frac{\kappa_H Y}{w_F^2(\beta_H + \alpha - \beta_H\alpha)} - \frac{Y(1 - \kappa_H)\beta_N(h_5 + h_6)}{T^N} \\ &\quad + \left( \frac{\kappa_H}{w_F(\beta_H + \alpha - \beta_H\alpha)} + \frac{(1 - \kappa_H) - (h_{1o} + h_{2o} + h_{3o} + h_4)}{T^N} \right) \psi_F \end{aligned} \quad (50)$$

Equation (50) summarizes the conditions under which an increase in women's wages will have a positive impact on total employment. This is possible when the effect of increased aggregate demand in the economy overpowers the effect coming from labour-saving technology due to higher productivity.

#### 4.1. Further research

We have so far presented the first part of the analysis, namely exploring the circumstances under which an increase in women's wages would bring out growth and employment in an open economy, with taxation and government spending. The next step is to analyse the effects a change in government spending in the social sector ( $\kappa_H$ ) on growth and employment levels. A large body of research, as elaborated in section 2, points out that higher investment in the social sector of the economy has a stronger multiplier effect than investment in physical infrastructure in terms of generating employment for both male and female workers, and can be largely self-financing, when the tax regime is progressive. It is crucial to stress that social spending is not simply a cost; its equality-enhancing effects are economy-wide.

Furthermore, we will explore the effect of a change in employment segregation  $\beta$  and the gender pay gap  $\alpha$ , which will allow us to reconfigure in a much clearer manner the conditions under which an increase in gender equality can be a driver for equitable growth and employment. This is particularly interesting, as it could potentially create a movement of workers from one sector to another, directly challenging structural constraints and gender norms.

## 5. Conclusion

Feminist economics research into the causes and effects of gender inequality has produced a valuable analysis that sheds light on its impact on the economy and the society. Building on this work, we develop a theoretical model analysing the relationship between gender equality, public spending and economic growth.

While the impact of an increase in female wages on demand can be ambiguous, under the assumption of some plausible parameters consistent with the empirical estimations in the previous Post-Kaleckian research (e.g. Onaran and Galanis, 2014; Onaran and Obst, 2015), it is realistic to expect that an increase in female wages will have a positive effect on growth. These effects are amplified with a progressive tax regime and strong government spending strategy (Obst, Onaran, Nikolaidi, 2017). Public spending in the social sector or progressive tax and tax credit policies, which effect women more strongly are likely to have a larger stimulus impact for the economy (Onaran, 2016).

This theoretical model can form the basis for the empirical analysis of gender equality and fiscal policy on growth and employment of men and women and serve a powerful tool for policy analysis to overcome structural constraints that perpetuate gender inequality, and transform gender norms, through a more equitable distribution of income with long run effects.

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## APPENDIX

The partial effects of female wages for a given Y

$$\frac{\partial W_F}{\partial w_f} = (e_F^{HF} + e_F^{NF})w_F + E^{HF} + E^{NF} = (e_F^{HF}w_F + E^{HF}) + (e_F^{NF}w_F + E^{NF})$$

$$\frac{\partial W_M}{\partial w_f} = (e_F^{HM} + e_F^{NM})\alpha w_F + \alpha(E^{HM} + E^{NM}) = \alpha \left( (e_F^{HM}w_F + E^{HM}) + (e_F^{NM}w_F + E^{NM}) \right)$$

$$\frac{\partial R}{\partial w_f} = -(E^{NF} + \alpha E^{NM} + (e_F^{NF} + \alpha e_F^{NM})w_F) = -(E^{NF} + w_F e_F^{NF} + \alpha(E^{NM} + w_F e_F^{NM}))$$

$$\left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial w_F} \right|_Y = \left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial W_F} \right|_Y \left| \frac{\partial W_F}{\partial w_F} \right|_Y + \left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial W_M} \right|_Y \left| \frac{\partial W_M}{\partial w_F} \right|_Y + \left| \frac{\partial \left( \frac{D}{Y} \right)}{\partial R} \right|_Y \left| \frac{\partial R}{\partial w_F} \right|_Y$$

$$= (t_R - t_W) \left( E^{NF} + w_F e_F^{NF} + (E^{NM} + w_F e_F^{NM}) \alpha \right) - t_W \left( \alpha (E^{HM} + w_F e_F^{HM}) + E^{HF} + w_F e_F^{HF} \right)$$