Synthesizing Feminist and Post-Keynesian/Kaleckian Economics for a Purple Green Red Transition

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Abstract

The aim of this article is to discuss why we should synthesize feminist and post-Keynesian/Kaleckian economics. We answer three related questions: why do post-Keynesian economics need feminist economics? Why do feminist economics need post-Keynesian macroeconomics? Finally, what is the relevance of synthesizing feminist and post-Keynesian economics for policy analysis in the 21st century? We then present a theoretical synthesis model bringing together and extending existing macroeconomic models in feminist post-Keynesian economics. Finally empirical findings based on this synthesis model are discussed in a policy context.

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1. Introduction

The aim of this article is to discuss why and how we should synthesize feminist economics and post-Keynesian/Kaleckian economics (PKE).

We discuss three reasons why such a synthesis enriches post-Keynesian macroeconomic theory in order to adequately address the challenges of the 21st century: firstly, post-Keynesian economic analysis benefits from integrating feminist theory of both paid and unpaid care work, and their effects on wellbeing, productivity, labour supply and fertility (Braunstein et al.,2011; Onaran et al., 2023, 2022a,b). Secondly, feminist theory of gendered social norms and inequalities has significant implications for the behavioural analysis of household consumption and private investments in post-Keynesian demand-led models (Onaran et al., 2022a; Seguino/Floro, 2003; Morrison, et al., 2007). Thirdly, different types of government expenditures and fiscal policy influence gender inequalities due to the occupational segregation in economies, and have different multiplier effects (İlkkaracan et al., 2015, 2021; İlkkaracan/Kim, 2018; Onaran/Oyvat, 2023; Onaran et al. 2023).

Coming to the other side of the question, does feminist economics need post-Keynesian economics? A question related to that has been "do feminist economics need a macroeconomic model?" questioning the usefulness of aggregate macroeconomic analysis from a heterodox feminist point of view, which we have come across during the last decade of gendering macroeconomics projects. Feminist economics has a large microeconomic research strand and while gendering macroeconomics has been a project of 30 years since the landmark 1995 paper by Ertürk/Çağatay (1995), the balance is still skewed towards the micro side, apart from the notable exceptions cited above.

In our research on gendering macroeconomics, we build on the post-Kaleckian strand within post-Keynesian economics, synthesizing Marxist and Keynesian concepts with feminist economics for four reasons: firstly, demand-side constraints and involuntary unemployment are important to analyse economic inactivity, underemployment or unemployment of women. Secondly, the modelling of the effects of class distribution of income on demand and supply offers a basis to integrate the effects of gender pay and employment gaps. Thirdly, the presence of multiplier effects of fiscal policy facilitates the analysis of the effects of different types of government spending on gender distribution of income and employment and productivity. Fourthly, the structural features of the model in terms of sectoral composition, oligopolistic markets, import dependency, balance of payments constraints, international currency hierarchies, bargaining power allow integrating gender inequalities.

Last, but not least, from a policy perspective, synthesizing feminist and post-Keynesian economics enhances our ability to address the multiple crises of ecology, care, inequalities and technological change by offering an analytical framework to integrate both the care economy and the green economy (Dafermos/Nikolaidi, 2019, 2022; Onaran/Oyvat, 2022, 2023).

In the rest of this article, Section two discusses this question from the perspectives of post-Keynesian economics, feminist economics and policy analysis. After establishing that a synthesis of feminist and post-Keynesian economics enhances the analytical strengths of macroeconomic analysis, section three presents a theoretical synthesis model bringing together and extending existing macroeconomic models in feminist post-Keynesian economics. Section four presents the main policy lessons based on the empirical findings of this feminist structuralist/post-Keynesian analysis. Section five concludes with policy implications.

2. Why and how we should synthesize feminist and post-Keynesian economics?

The question has three sides to it: on one side of the medallion, why do post-Keynesian economics need feminist economics? And, on the other side of the medallion, why do feminist economics need post-Keynesian macroeconomics? Finally, what is the relevance of synthesizing feminist and post-Keynesian economics for policy analysis in the 21st century, beyond being a theoretical improvement in macroeconomic modelling?

2.1 Why do post-Keynesian economics need feminist economics?

The question of why post-Keynesian economics need feminist economics involves a sub-question on why we need to enrich the supply side analysis in post-Keynesian demand-led growth models. There are three reasons why post-Keynesian economics needs to incorporate feminist economics for a macroeconomic theory adequate to analyse the challenges of the 21st century: firstly, the feminist theory of labour as a means of production that needs to be reproduced recognizes the care economy as a key sector in terms of both unpaid domestic work and paid work in the private market sector and public sector. Integrating both the unpaid and paid work in the care economy facilitates an accurate analysis of the demand and supply side interactions by crystallizing the effects on wellbeing, productivity, labour supply and fertility. E.g. in the post-pandemic phase of the “Great Resignation” central banks such as the Bank of England puts an excessive emphasis on the tightness of the labour markets based on a rather narrow mainstream New Keynesian NAIRU thinking, missing the broader

range of policy tools beyond interest rates to address the root cause of the economic inactivity and labour shortages related to lack of infrastructure in the care economy in health care, social care and childcare and reliance on unpaid domestic care work of women which leads to supply bottlenecks in the economy. The recognition of the supply side effects of the care economy on productivity, labour supply and social fabric by feminist economists implies that it has to be defined as social infrastructure rather than current spending, which in turn has crucial implications for fiscal or industrial policy priorities and fiscal credibility rules which are adopted by governments defining the limits of borrowing for investing in public infrastructure (Elson, 2016;2017).

Secondly, gendered social norms, intra-household power relations alongside the structure of the social welfare state lead to a gendered division of labour in both the unpaid domestic work and occupational segregation in paid work, which in turn leads to behavioural differences between men and women and affect household consumption or private investment on the demand side and labour supply and productivity on the supply side. The feminist recognition of gender inequality in intra-household decision making as opposed to modelling the household as a harmonious aggregate unit is another essential dimension of the analysis of power relations which post-Keynesian economics can benefit from. These have crucial implications for macroeconomic behaviour. E.g., both macro and microeconomic research shows that the marginal propensity to consume in the care economy is larger for women than men and the marginal propensity to consume in the rest of the goods and services is larger for men than women (Onaran, et al., 2022a, b; Seguino/Floro, 2003; Morrison, et al., 2007; Lee/Pocock, 2007). The micro-evidence for developing counties suggest that the overall propensity to save is higher for women due to the higher uncertainty they face (Seguino/Floro, 2003). Seguino (2012) suggests that in developing countries, women are more likely to consume domestic goods, while men are more likely to consume a higher proportion of luxury and/or imported goods (such as cell phones, automobiles and televisions). Taking on board the interaction of the demand and supply sides, more income in the hands of women is expected to have positive effects on labour productivity in the medium run by increasing the private household spending in the care economy.

Thirdly, women's concentration in the care economy in terms of both unpaid and paid work and gendered and racial profiling of jobs and labour market segregation affects the bargaining power of women and racial minorities in wage negotiations as well as intra household bargaining power of women, and thereby lead to a rise or persistence in gender, race and

class inequalities. Following this occupational segregation patterns, feminist macroeconomics also provide a gendered framework for analysing the effects of different types of government spending and allows for gender mainstreaming of macroeconomic policies. Post-Keynesian macroeconomic analysis of the dynamics of inequality and distribution would be incomplete without integrating the macroeconomic interactions between gender and class inequalities and demand and employment.

Integrating these aspects, Braunstein et al. (2011), Seguino (2010, 2012), Onaran et al. (2023, 2022a,b), Onaran/Oyvat (2022), Oyvat/Onaran (2022), Hein (2020) incorporate both demand and supply side analysis within feminist structuralist/post-Kaleckian theoretical models, allowing for both positive and negative effects of gender equality on the demand side and positive effects on the supply side. Braunstein et al. (2020) analyse how care models, globalization and macroeconomic policy stance shape the development trajectories using a principal component analysis. Another body of feminist structuralist macroeconomic research use input-output tables to analyse the impact of public spending in social care and education on women's and men's employment (Antonopoulos et al., 2010; İlkkaracan et al., 2015, 2021; İlkkaracan/Kim, 2018; De Henau et al., 2016). Antonopoulos et al. (2010) and İlkkaracan et al. (2015, 2021) extend this macro analysis using micro household data to match the macro labor demand with personal characteristics of individuals. These studies do not take the medium-run productivity effects and the supply side into account.

2.2 Why do feminist economics need post-Keynesian macroeconomics?

Before answering this question above, a look at the developments in mainstream economics is in place here. Mainstream neoclassical macroeconomic models have essentially ignored feminist economics as can be illustrated most acutely by the lack of citations to the main field journal- Feminist Economics; and/or abstained from referring to "gender" as a socially constructed category; but elaborated on the intra household bargaining, developing the "economics of the household" further focusing on the supply-side effects of wage gaps on labour supply, fertility, savings and the accumulation of human capital (Becker et al., 1990; Benhabib et al., 1991; Doepke/Tertilt, 2016; Agenor/Agenor, 2014; Cavalcanti/Tavares, 2016; Fukui, et al., 2019). These models do not analyse the gendered demand side effects and constraints in demand matching the increases in women's education and labour force participation (Seguino, 2017; Onaran, 2016a). Empirical mainstream growth models using panel data estimate the supply-side effects of equality in education and labour supply, the direct and indirect/intergenerational effects on productivity (Phipps/Burton, 1998; Morrison

et al., 2007; Klasen/ Lamanna 2009; Cuberes/Teignier, 2014). Reductions in labour market imperfections such as wage discrimination and occupational segregation are expected to stimulate growth via supply side effects (Seguino, 2017).

What does post-Keynesian economics have to offer to heterodox feminist economics different from mainstream economics? Extending the post-Kaleckian strand within post-Keynesian economics, synthesizing Marxist and Keynesian concepts with feminist economics, we give four reasons as an asnwer[1]: firstly, the recognition of demand-side constraints, and consequently presence of excess capacity and involuntary unemployment in the economy, which is ignored by the mainstream neoclassical models of full employment, where "non-employment" is a voluntary labour supply choice for "leisure" by the utility maximising working women or men, is important to understand the demand side reasons behind economic inactivity, underemployment or unemployment of women.

Secondly, the explicit modelling of the effects of class distribution of income on demand and output in Kaleckian models with the dual effects of wages on not just production costs but also aggregate demand and supply lends itself to integrating the effects of other dimensions of within working class inequality stemming from both gender pay and employment gaps. Post-Keynesian/post-Kaleckian demand-led macroeconomic models allow for both positive and negative effects of a fall in the labour share in income on aggregate demand (Bhaduri/Marglin, 1990; Naastepad/Storm, 2006/7; Hein/Vogel, 2008; Stockhammer et al., 2009; Onaran/Galanis, 2014; Onaran/Obst, 2016). Onaran et al. (2023) introduces both gender pay gaps and a further distributional dimension along class lines in terms of wealth distribution.

Thirdly, the post-Keynesian demand-led growth models allow for multiplier effects of fiscal policy on demand (Mott/Slattery, 1994; You/Dutt, 1996, Blecker, 2002; Seguino, 2010, 2012; Palley, 2013; Commendatore et al., 2011; Allain, 2015; Tavani/Zamparelli, 2017a; Ko, 2018; Hein, 2018; Obst et al., 2019; Onaran et al., 2023, 2022a,b), which can be extended to analyse the effects of different types of government spending on not just demand but also gender distribution of income and employment as well as on the supply side on productivity.[2]

[1] See Onaran (2016a) for a more detailed description of the features of the post-Kaleckian models relevant to feminist economic analysis.

[2] Going beyond the short-run demand effects, a series of post-Keynesian models integrate the changes in productivity (Palley, 1996, 2013, 2014; Stockhammer/Onaran, 2004; Dutt, 2010; Naastepad, 2006; Setterfield, 2006; Seguino, 2010, 2012; Hein/Tarassow, 2010; Tavani/Zamparelli, 2017b; Onaran et al., 2023, 2022a,b).

Fourthly, the structural features of the economy in terms of sectoral composition, oligopolistic price setting, import dependency, balance of payments constraints, international currency hierarchies, unequal bargaining power between labour and capital present a realistic model of the economy and allow integrating gender inequality in the distribution of unpaid and paid work, occupational segregation and power relations. Wages and gender gaps 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 different types of labour. All these structural features of the economy have real effects on the demand and supply side.

2.3 What is the relevance of synthesizing feminist and post-Keynesian economics for policy analysis

From a policy analysis perspective, it is a particularly timely task to synthesize feminist and post-Keynesian economics in order to address the multiple crises of ecology, care, inequalities and technological change in the age of robotization. This synthesis offers a unified macroeconomic modelling framework integrating both the care economy and the green economy[3]. Distribution of income along gender and class lines as well as distribution of public spending in physical vs. social infrastructure have not only important macroeconomic, and distributional effects but also environmental effects. This synthesis model can provide the basis for a needs-based approach to fiscal policy, comparing the impact of different tools to fund fiscal policy without an illusion that we have to choose between competing investment priorities in the green or care economy or social housing. Onaran et al. (2023) and Onaran/Oyvat (2022, 2023) present models moving in this direction, and Nikolaidi (2022) presents a conceptual framework, but for a full macroeconomic model, the next stage of vital extension is to integrate an ecological block with the impacts on emissions, waste and biodiversity and their macroeconomic feedback effects. Post-Keynesian ecological global macroeconomic models, such as Dafermos/Nikolaidi (2019, 2022) incorporate the limits to material resources, the damage on GDP due to emissions, waste and climate change, but they do not model the care economy or gender effects. Pollin et al. (2009, 2015, 2022) analyse the environmental and employment effects of investing in the green economy using input-output analysis and discuss the gender composition of new jobs created but does not explicitly model the care economy.

[3] See Dafermos/Nikolaidi (2019, 2022) for a review of macroeconomic models synthesizing post-Keynesian and ecological economics, and one of the most developed example of this synthesis.

3. A feminist structuralist post-Keynesian/Kaleckian theoretical model

In this section, we present a feminist structuralist post-Keynesian/Kaleckian synthesis model, bringing together concepts from feminist, Marxist and Keynesian economics, building on Onaran et al. (2023, 2022a,b), Onaran/Oyvat (2022, 2023) and Oyvat/Onaran (2022), which furthers the models by Braunstein et al. (2011) and Seguino (2010, 2012), incorporating explicit analysis of both the components of demand and supply side, class inequality in income and wealth and gender gaps in wages and employment, government spending in the care and green economy, and employment. This synthesis model is an application of the points discussed in Section two on the ways feminist and post-Keynesian macroeconomics can be integrated. The model in this paper extends Onaran et al. (2023, 2022a,b) in five ways[4]: 1) it introduces public spending in the green economy defined as current and capital spending in renewable energy, energy efficiency and public transport, organic agriculture, forestry, and circular economy as opposed to the simple sum of public sector gross fixed capital formation; 2) labour supply is endogenous; 3) wage bargaining of both men and women are endogenous; 4) occupational segregation changes endogenously; 5) price effects of wages is explicitly modelled.

The model presented here is feminist post-Keynesian synthesis model that encompasses several features, and different modelling choices could be made to expand the relation between care economy and unpaid household labour or endogeneity of wages or labour supply or social norms. We leave the analysis of the full implications of these extensions, e.g. the implications of endogenous wage bargaining process or occupational segregation on the dynamics of the economy for future research. On the green economy side, a caveat of the model for future development is the absence of modelling of carbon emissions or other environmental variables.

The model is geared towards applicability to empirical estimation for policy analysis and the results of various applications are discussed in Section 4.

The economy has three sectors: 1) the care economy, which consists of the current expenditure of the government in the care economy, i.e. in education, childcare, healthcare, and social care (producing human capabilities (Braunstein et al., 2011) using paid public

[4] The degree of endogeneity in this version of the model was handled in empirical analysis by using a systems estimation method based on Vector Autoregression (VAR) in Onaran/Oyvat (2023, 2022).

sector employees), 2) the rest of the market economy (denoted with script N), and 3) the unpaid care sector.

There are women and men workers. The profit earning capitalist class is genderless for simplicity.

The variables corresponding to women and men workers are denoted by scripts F and M, respectively. The public care economy and the rest of the market economy are denoted by scripts H and N.

Aggregate output and income (Y_t) are equivalent to the sum of the wage income of men, WB_t^M, and women, WB_t^F, and profits, R_t.

$$Y_t = WB_t^M + WB_t^F + R_t \tag{1}$$

The total wage income of women workers is a function of women's wage rate in the care economy (w_t^{HF}), women's employment in the care economy (E_t^{HF}), women's wage rate in the rest of the economy (w_t^{NF}), and women's employment in the rest of the economy (E_t^{NF}).

$$WB_t^F = w_t^{HF} E_t^{HF} + w_t^{NF} E_t^{NF} \tag{2}$$

Similarly, the total wage income of men workers is a function of men's wage rates in the care economy (w_t^{HM}), men's employment in the care economy (E_t^{HM}), men's wage rates in the rest of the economy (w_t^{NM}), and men's employment in the rest of the economy (E_t^{NM}).

$$WB_t^M = w_t^{HM} E_t^{HM} + w_t^{NM} E_t^{NM} \tag{3}$$

Gender wage gaps (α_t^N and α_t^H) are the ratio of men's wage rate to women's wage rate in each sector.

$$\alpha_t^N = \frac{w_t^{NM}}{w_t^{NF}}, \quad \alpha_t^H = \frac{w_t^{HM}}{w_t^{HF}} \tag{4}$$

There are four different types of government spending: i) current spending in renewable energy, energy efficiency and public transport[5] (G_t^G), ii) current spending in the care economy

[5] This includes public sector wages, subsidies and procurement.

including spending in education, childcare, healthcare and social care (G_t^H), iii) capital spending in infrastructure (public sector gross fixed capital formation (GFCF, I_t^G), and iv) other government spending (G_t^C). Public sector gross fixed capital formation includes capital spending in renewable energy, energy efficiency and public transport as well as buildings for the care economy, e.g., hospitals or schools.

Government's expenditure in the care economy constitutes the public care economy output Y_t^H. The rest of the GDP (Y_t^N) is the market output in the rest of economy, which provides the goods and services to meet both the private demand (household consumption, private investment and exports) and government demand for spending in the green economy, other public infrastructure investment (gross fixed capital formation) and other expenditures. Economic activity in the rest of the economy provides output for both spending in the green economy and the rest of economic activities.

The aggregate output in the market economy (GDP, excluding unpaid activities) is the is the sum of households' expenditure in the care economy (C_t^H), household consumption in the rest of the economy (C_t^N), private investment expenditure (I_t), government's expenditure in the care economy, government's current spending in renewable energy, energy efficiency and public transport, public investment (gross fixed capital formation), government's other expenditures, and net exports of goods and services ($X_t - M_t$).

The share of government's current expenditure in the care economy, in the green economy, other public infrastructure investment and other spending are all determined as a fiscal policy decision as a share of aggregate output.

$$Y_t = C_t^N + C_t^H + I_t + G_t^H + G_t^G + G_t^C + I_t^G + X_t - M_t \quad (5)$$

$$Y_t^H = G_t^H = \kappa_t^H Y_t \quad (6)$$

$$Y_t^N = Y_t - G_t^H = Y_t(1 - \kappa_t^H) \quad (7)$$

$$G_t^G = \kappa_t^G Y_t \quad (8)$$

$$G_t^C = \kappa_t^C Y_t \quad (9)$$

$$I_t^G = \kappa_t^I Y_t \quad (10)$$

Employment in the rest of the economy (E_t^N) is determined by output and labour productivity in the rest of the economy (and is equal to output divided by productivity, T_t^N).

The share of women in employment in each sector (β_t^N, β_t^H) is socially determined by occupational segregation.

$$E_t^N = \frac{Y_t^N}{T_t^N} \tag{11}$$

$$E_t^{NF} = E_t^N \beta_t^N \tag{12}$$

$$E_t^{NM} = \ E_t^N (1 - \beta_t^N) \tag{13}$$

The wage paid to men and women workers in the care economy constitutes the public social expenditure and the care economy is not making profits. Any non-labour inputs used constitute part of other government expenditure. Thus, the public social expenditure is a function of women and men's wage rate and employment in the care economy (E_t^H).

$$G_t^H = \kappa_t^H Y_t = \ \beta_t^H E_t^H w_t^{FH} + (1 - \beta_t^H) E_t^H w_t^{MH} \tag{14}$$

$$E_t^H = \frac{\kappa_t^H Y_t}{w_t^{FH}(\beta_t^H + \alpha_t^H - \beta_t^H \alpha_t^H)} \tag{15}$$

Next, the model introduces the unpaid domestic care labour within the households (U_t). For a given demographic structure defining the care needs of a society, higher paid employment by men and women is expected to have some negative impact on the supply of unpaid labour. An increase in government expenditure in the care economy (in education, childcare, health, and social care) is also expected to reduce the need in the households for care; therefore, it leads to lower unpaid labour. The impact of employment and public social expenditure on the time spent on unpaid domestic care might be non-linear, and this negative impact might be decreasing in absolute values as it gets increasingly more difficult to decrease unpaid care at lower levels of unpaid care. Unpaid domestic care labour is shared between women and men and is exogenous and institutionally and socially determined.

$$\log U_t = q_0 + q_G \log G_t^H + q_F \log E_t^{NF} + q_M \log E_t^{NM} \tag{16}$$

Profits, i.e., the operating surplus in the rest of the economy is income minus wage payments.

$$R_t = Y_t^N - \ w_t^{NF}E_t^{NF} \ - w_t^{NM}\ E_t^{NM} = Y_t^N - \ E_t^N(\beta_t^N + \alpha_t^N - \beta_t^N\alpha_t^N)w_t^{NF} \qquad (17)$$
$$= \left((1-\kappa_t^H)Y_t - E_t^N(\beta_t^N + \alpha_t^N - \beta_t^N\alpha_t^N)w_t^{NF}\right)$$

The profit share (π_t) is the share of profits in output in the rest of the economy and is a negative function of men's and women's wages and employment and a positive function of labour productivity in in the rest of the economy.

$$\pi_t = \frac{Y_t^N - \ w_t^{NF}E_t^{NF} \ - w_t^{NM}\ E_t^{NM}}{Y_t^N} = 1 - \frac{(\beta_t^N + \alpha_t^N - \beta_t^N\alpha_t^N)w_t^{NF}}{T_t^N} \qquad (18)$$

On the demand side of the model, components of aggregate demand are defined by behavioural equations.

Consumption of households in goods and services other than care economy expenditure (C_t^N) is a function of after-tax wage income of men and women workers in both sectors and profit income of capitalists and after tax net private wealth of the top 1% ($PW1_t$) and bottom 99% ($PW99_t$).

$$\begin{aligned}\log C_t^N = {} & c_0 + c_R \log[R_t(1 - \ t_t^R)] \\ & + c_F \log[(w_t^{NF}E_t^{NF} + w_t^{HF}E_t^{HF})(1 - \ t_t^W)] \\ & + c_M \log[(w_t^{NM}E_t^{NM} + w_t^{HM}E_t^{HM})(1 - \ t_t^W)] \\ & + c_{PW1} \log\left(PW1_t(1 - t_t^{PW})\right) \\ & + c_{PW99} \log\left(PW99_t(1 - t_t^{PW})\right) + c_G \log G_t^G + c_I \log I_t^G\end{aligned} \qquad (19)$$

where t_t^R is the implicit tax rate (ITR) on capital income, t_t^W is the ITR on labour income, and t_t^{PW} is the ITR on wealth.

The households' expenditure in the care economy (C_t^H) is also a function of after-tax profit and wage income of women and men workers in the two sectors and after tax net private wealth of the top 1% and bottom 99%, albeit with different parameters and governments' care expenditure (reflected in wage income in H).

$$\begin{aligned}\log C_t^H = {} & z_0 + z_R \log[R_t(1 - t_t^R)] \\ & + z_F \log[(w_t^{NF} E_t^{NF} + w_t^{HF} E_t^{HF})(1 - t_t^W)] \\ & + z_M \log[(w_t^{NM} E_t^{NM} + w_t^{HM} E_t^{HM})(1 - t_t^W)] \\ & + z_{PW1} \log (PW1_t(1 - t_t^{PW})) + z_{PW99} \log (PW99_t(1 - t_t^{PW}))\end{aligned} \quad (20)$$

The marginal propensity to consume in goods and services produced in the care economy and the rest of the economy are assumed to be different for men and women workers, who make separate decisions albeit interdependent and within the same household, reflecting the gender pay gaps as well as gendered differences in behaviour.

Governments' social expenditure can on the one hand increase households' social expenditure by providing wage income in the care economy, and on the other hand decrease households' social expenditure by reducing the need for these expenditures. Government's current or capital spending in the green economy also effect consumption of the households in two opposite directions, e.g., on the one hand the provision of public transport may reduce demand for private cars, and on the other hand government spending leads to indirect rebound effects by increasing household income available for other consumption goods (See Dafermos et al. 2022a).

Private investment is expected to increase as a result of higher aggregate output and after-tax profit share in the rest of the economy. Government's infrastructure investment may have further positive direct effects on private investment by improving infrastructure and business expectations or substitute private investment in infrastructure. The model also introduces the effect of public debt to GDP $\left(\frac{D}{Y}\right)$ on investment to consider the possible negative crowding out effects of rising public debt on the interest rate and thereby, private investment. Finally, we also incorporate wealth effects on investment.

$$\begin{aligned}logI_t = {} & i_0 + i_1 \log Y_t + i_2 log\,[\pi_t(1 - t_t^R)] + i_3 \log\left(\frac{D}{Y}\right)_t + i_4 \log (PW1_t(1 - \\ & t_t^{PW})) + i_5 \log (PW99_t(1 - t_t^{PW})) + i_G logI_t^G\end{aligned} \quad (21)$$

In terms of aggregate wealth effects on investment, Stockhammer et al. (2021) suggests two opposing effects: i) higher wealth may lower the cost of finance, improve access to credit and business expectations, thereby increase investment; ii) if a higher net wealth implies

higher business liabilities, or if firms react more strongly to liabilities than assets, wealth could have a negative effect. Onaran et al. (2023) further discusses the effects of wealth inequality based on different effects of $PW99$ and $PW1$. $PW99$ can have positive effects, in particular on residential investment. $PW99$ includes ownership of small and medium enterprises (SMEs) and may be expected to have a positive effect for reasons suggested by Stockhammer et al. (2021). Increasing $PW1$ might reflect market concentration, barriers to entry, and financialization, which may lead to negative effects dominating (see Onaran et al., 2023 for further references). A further extension to the investment function could include business debt to include Minskyan features.

Public debt (D) at a point in time is the public debt accumulated in the previous period plus interest (r_{t-1}) on this debt, plus the total government expenditure in the current period, minus the taxes collected in the current period.

$$D_t = (1 + r_{t-1})\, D_{t-1} + G_t^H + G_t^C + I_t^G - t_t^W (WB_t^F + WB_t^M) - t_t^R R_t - t_t^{PW} PW_t - t_t^C (C_t^N + C_t^H) \tag{22}$$

where t_t^C is the ITR on consumption, and r_t is the interest rate on public debt.

Exports (X_t) are expected to increase with the income of the trading partners (Y_t^{World}) and the depreciation in currency (ε_t) and decrease with an increase in relative prices of exports to imports ($\frac{P_x}{P_m}$).

$$logX_t = x_0 + x_1 logY_t^{World} + x_2 \log \left(\frac{P_x}{P_m}\right)_t + x_3 log\varepsilon_t \tag{23}$$

Imports (M_t) increase when domestic demand in N or domestic prices relative to import prices increase $\left(\frac{P}{P_m}\right)_t$ and decrease with the deprecation in currency. For simplicity we assume that the marginal propensity to import in the care economy is negligible.

$$logM_t = n_0 + n_1 logY_t^N + n_2 log \left(\frac{P}{P_m}\right)_t + n_3 log\varepsilon_t \tag{24}$$

Domestic prices (P) and export prices (P_x) are set as a mark-up on nominal unit labour costs (ulc) and other imported input costs (proxied by P_m) depending on the oligopolistic market

power of firms in an imperfectly competitive market. As nominal unit labour costs are real unit labour costs multiplied by domestic prices, and the wage share is identical to real unit labour costs (corrected for the ratio of GDP at factor cost to GDP,

at market prices), a fall in the wage share, i.e. a rise in the profit share, leads to a fall in relative prices and improves net exports, depending on the labour intensity of exports, the pass through from labour costs to export prices and domestic prices and the price elasticity of exports and imports.

$$logP = p_0 + p_{ulc}\, log(ulc)_t + p_m logP_{mt} \tag{25}$$

$$\log P_x = p_{x0} + p_{xulc}\, log(ulc)_t + p_{xm} \log P_{mt} \tag{26}$$

On the supply side of the model, labour productivity is constant in the short run and changes endogenously in the medium run in the rest of the economy, as we assume technological change take time.[6] The medium run is a sufficiently long period for these effects on productivity to be realised, e.g., five years or more. Labour productivity is expected to increase with an increase in government's spending in the care economy, green economy, public investment, households' consumption in care, domestic unpaid care, output, wages, and its own lag.[7]

$$\begin{aligned} \log T_t^N = {} & h_0 + h_1 \log G_{t-1}^H + h_2 \log I_{t-1}^G + h_3 \log G_{t-1}^G + h_4 \log G_{t-1}^C \\ & + h_5 \log Y_{t-1} + h_6 \log w_{t-1}^{NF} + h_7 \log(\alpha_{t-1}^N\, w_{t-1}^{NF}) \\ & + h_8 \log C_{t-1}^H + h_9 \log U_{t-1} + h_{10} \log T_{t-1}^N \end{aligned} \tag{27}$$

The integration of technological change and productivity on the supply side builds on previous post-Keynesian models (e.g. Naastepad, 2006; Hein and Tarassow, 2010) and furthers these by explicitly integrating effects of both different types of government spending

[6] Increasing productivity in the care economy is less related to the availability of technology. Productivity in the care economy is determined by definition by output per employee.

[7] Two notes are in place here. While green government spending can increase productivity by reducing uncertainty and climate risks and improving energy infrastructure, several green jobs are considered to have higher labour intensity which is good for the creation of more jobs but may be associated with growth in sectors with lower labour productivity. Government spending on public sector wages and capital formation is part of output, to avoid the problem of double counting by having both output and public spending as the determinants of productivity, in the empirical analysis we rely on sectoral panel data estimations for the rest of the economy.

and the effects of paid and unpaid care work building on feminist structuralist models (Onaran et al., 2022, b, 2023, Braunstein et al. 2011, Seguino 2010; 2012).

On the labour supply side, women's and men's labour force participation rates (labour force as a ratio to population) increase with an increase in wages and social infrastructure and decrease with increased needs for unpaid domestic care labour (Equation 28-29 below). We assume that population are exogenously determined with only long-run changes in fertility, mortality and migration, however this can be relaxed by making population also a function of care spending and unpaid care. If employment grows faster than the labour force for a particular type of worker, unemployment rate decreases, and vice versa. An exogenous increase in labour supply due to migration or changing gender norms would help relieving constraints on labour supply if demand for employment for a particular type of worker is not met. A rise in wages in a particular sector is likely to lead to higher labour supply of both men and women, leading to also changes in the sectoral segregation ratios in the care economy and the rest of the economy, as well as a change in social gender norms and the distribution of unpaid domestic labour between men and women (U_t^F and U_t^M in equations 30-31) is also determined by gendered social norms about the share of women in unpaid care (β_d).

$$L_t^F = (l_{1F}(w_t^{FH} + w_t^{FN}) + l_{2F}G_t^H + l_{3F}U_t^F)N_t^F \quad (28)$$

$$L_t^M = (l_{1M}(w_t^{MH} + w_t^{MN}) + l_{2M}G_t^H + l_{3M}U_t^M)N_t^M \quad (29)$$

$$U_t^F = \beta_d U_t \quad (30)$$

$$U_t^M = (1 - \beta_d)U_t \quad (31)$$

While the wage rates in the care economy are exogenously determined by the government as a policy decision, we allow the wage rates for men and women in the rest of the economy to be determined endogenously as an outcome of a bargaining process between employers and workers. The bargaining power of women and men workers depend on the changes in labour demand in each sector and labour supply of men and women as well as exogenous factors determined by labour market institutions and legislation, social wage (determined by public social expenditure or parts of public infrastructure such as public transport or social housing), social norms, and occupational segregation effected by these norms, as well as personal

characteristics such as education which in turn are affected by social norms. For simplicity, we assume expected prices are equal to actual prices. Hence, the real wage rates in the rest of the economy are functions of employment (or unemployment rate) for men and women, spill-over effects from wages in the care economy and across genders, productivity, and a set of exogenous factors effecting the bargaining relations. The spillover effects of wage setting in the care economy are two folds: Wage setting in the public sector affects the wage norm and negotiations in the rest of the economy too. Moreover, public spending in the care economy provides the social wage and improves the bargaining power of the workers in the rest of the economy.

$$\log w_t^{NF} = p_{0F} + p_{1F}\log\left((E_t^{NF} + E_t^{HF})/L_t^F\right) + p_{2F}\log w_t^{HF} + p_{3F}\log T_t^N \tag{32}$$

$$\log w_t^{NM} = p_{0M} + p_{1M}\log\left((E_{t-1}^{NM} + E_t^{HM})/L_t^M\right) + p_{2M}\log w_t^{HM} + p_{3M}\log T_t^N \tag{33}$$

Gendered distribution of labour, i.e., women's share in labour in both the paid care economy and the rest of the economy, and in the unpaid economy change endogenously with changes in wages and employment of men and women in and unpaid labour requirement with a lag in the medium run.

$$\beta_H = b_{h1}G_{t-1}^H \tag{34}$$

$$\beta_N = b_{n1}G_{t-1}^H \tag{35}$$

$$\beta_d = b_{d1}G_{t-1}^H \tag{36}$$

Finally, After-tax net wealth, $PW_t(1 - t_t^{PW})$ accumulates as

$$\log(PW_t(1 - t_t^{PW})) = a_0 + a_F\log(WB_t^F(1 - t_t^W)) + a_M\log(WB_t^M(1 - t_t^W)) + a_R\log(R_t(1 - t_t^R)) + a_c\log(PW_{t-1}(1 - t_{t-1}^{PW})) \tag{37}$$

where after-tax wage income of women and men, after tax profit income have different effects on wealth accumulation reflecting differences in savings rates and wealth accumulation is path dependent.

Wealth concentration is PW1/PW (λ_t) which changes endogenously as

$$log\lambda_t = s_0 + s_1 \log[\pi_t(1 - t_t^R)] + s_2 log\ t_t^{PW} + s_3 log\alpha_t^N + s_4 log\alpha_t^H + s_5 log\lambda_{t-1} \quad (38)$$

The effect of the profit share captures the effect of the different marginal propensity to save from profits vs. wages, as well as the scale and type effects due to differences in the assets and liabilities of households earning capital vs. labour income (Onaran et al., 2023). The effects of gender pay gaps capture such differences between male and female workers. Tax on wealth is expected to affect wealth concentration if it has a progressive nature. Finally, wealth concentration is expected to exhibit strong path dependency and be significantly correlated to its past values.[8]

The wealth of the top 1% and bottom 99% (in logarithms) are by definition:

$$\log(PW1_t(1 - t_t^{PW})) = \log(PW_t(1 - t_t^{PW})) + log\lambda_t \quad (39)$$

$$\log(PW99_t(1 - t_t^{PW})) = \log(PW_t(1 - t_t^{PW})) + log(1 - \lambda_t) \quad (40)$$

Based on this model, Onaran et al (2019, 2022a) define two demand regimes expanding the post-Kaleckian literature. Firstly, a female wage-led or gender equality-led regime in the short run is when a decreasing gender pay gap (due to a rise in women's wages in the private sector) leads to a higher aggregate output in the short run. Alternatively, if this leads to lower output in the short run, the demand regime is defined as gender inequality-led in the short run.

Table 1 summarizes the demand regimes in the short run. If an economy is both wage-led and gender equality-led, the regime is defined as equality-led demand regime in the short run. Alternatively, the economy could be profit-led and gender inequality-led. However, an economy could also be wage-led and gender inequality-led or profit-led and gender equality-led in the short run at the same time depending on the marginal propensity to consume out of

[8] Onaran et al. (2023) argues that public debt/GDP could have an effect on wealth and its concentration but as the empirical estimations for the UK did not indicate significant effects, we do not include it in the theoretical model here for simplicity. Similarly, asset prices are not included as exogenous variables. The model also abstracts from social transfers which can play a significant role in affecting wealth concentration.

women's and men's wages and profits and the sensitivity of investment and net exports to unit labour costs.

If the economy is gender equality-led in the short run, closing the gender wage gap in the private sector increases women's and men's employment in the short run. The impact of closing the gender wage gap in the private sector in the next period affects the women's and men's employment via changes in labour productivity on the supply side and aggregate output in the medium-run and could lead to a fall in women's and/or men's employment in the medium-run even if the economy is wage-led in the medium run.[9] Again on the supply side in a gender inequality-led demand regime the closing of the gender gap has a positive direct impact on productivity, but it also decreases (indirectly) productivity through the reduction in output due to the closing of the gender gap.

An economy that is both wage-led and gender equality-led in the medium run is defined as an equality-led demand regime in the medium run (Onaran et al., 2023, 2022a).

<Table 1>

Fiscal policy on the spending side can include increasing employment in the care or green economy and/or increasing wages in the public sector or buying services from the private sector or giving them subsidies. On the tax side, the model includes taxes on wages, profits, wealth, and consumption.

4. Lessons from the empirical findings of feminist structuralist/post-Keynesian analysis

This section summarizes the key findings of the empirical analysis based on feminist structuralist/post-Keynesian models.

Onaran et al. (2023, 2022a) analyse how a change in hourly wage rates of men and women, gender pay gap, public spending in the care economy vs. green/public infrastructure or taxes on wages, profits and wealth have different short and medium-run impacts on output, productivity, employment of women and men, class distribution of income and wealth and gender gaps using an Instrumental Variable (IV) approach and single equation estimations for

[9] We do not analyse here further effects from endogeneity of wages, e.g. in a wage-led regime, an increase in employment can lead to further increases in wages which can lead to an additional increase in output that can then lead to instability.

behavioural equations. Onaran et al. (2022a) estimate that a 1%-point increase in public spending in the care economy as a ratio to GDP in the UK leads in the medium-run to a 2.7% increase in GDP, a 3.2% increase in women's employment, a 0.4% increase in men's employment, and a 1%-point increase in public gross fixed capital formation as a ratio to GDP leads to a 2.0% increase in GDP, a 1.8% increase in women's employment, and a 1.6% increase in men's employment. The effects of the spending in the care economy on total employment as well women's employment is higher due to the care economy being more labour intensive with a higher share of women. The use of gendered wage and employment data offer a rich set of IV to tackle endogeneity issues.

The results in Onaran et al. (2023, 2022a) show that positive impact of public social infrastructure investment in the care economy on both output and employment are very high, and despite a strong positive effect on productivity, employment of both men and women increases in the medium run as well. The high effect of public spending in the care economy on productivity in the rest of the economy provide supporting evidence that this spending serves the purpose of infrastructure investment.

Empirical research using input-output tables also find that public spending in social care and education have stronger effect on women's as well as men's employment (after accounting for the indirect effects) compared to investment in physical infrastructure (Antonopoulos et al., 2010; İlkkaracan et al., 2015, 2021; İlkkaracan/Kim, 2019; De Henau et al., 2016).

Onaran/Oyvat (2022, 2023) estimate a reduced form of the model in section two using VAR for eight emerging economies to analyse the impact of public spending in the care economy, the green economy and infrastructure on employment of men and women and GDP. The multiplier effects on GDP are always positive and in most countries substantial in all spending categories and reach in the medium run above one. Amongst the multipliers above 1, for public physical infrastructure (after a one-off increase), the multipliers at the end of five years range between 1.9 in Colombia to 4.6 in South Korea; the multiplier effects of the care spending on GDP in five years range between 1.6 in Turkey and South Africa and 4.5 in South Korea; the multiplier effects of the public spending in the green economy are between 1.1 in South Korea and 4.5 in Turkey. The differences across countries indicate that not only the amount but composition and targeted nature of spending matters in addition to differences in the import dependency or informality. Onaran/Oyvat (2022) also present the effects of a policy mix combining a repeated increase in public spending in the care and green economy, and other physical infrastructure (e.g., housing, buildings for schools, hospitals), each by 1%-

point as a ratio to GDP every year for five years Onaran et al. (2023, 2022a) analyse the effects of wage increases separately too. find that the UK is both wage-led and gender equality-led, and hence equality-led; i.e. an upward convergence in wages -increasing wages with closing gender pay gap in both the care economy and the rest of the economy- leads to higher output in both the short and the medium run. However, the positive impact on productivity is stronger in the medium run than on output, which leads to a fall in employment of both men and women.

A policy mix of upward convergence in wages and public investment in both the care economy and green/public infrastructure leads to a much higher increase in output, and the employment of both men and women as well as private investment increase both in the short and the medium run (Onaran et al., 2023). Hence, achieving both higher wages, gender equality and employment for both men and women requires a stimulus to demand in the form of higher public spending in both the care economy, the green economy and public infrastructure along with an upward convergence in wages. However, public debt/GDP increases marginally in the medium run in this policy mix and an increase in tax rates is required to improve public debt/GDP.

On taxation, an increase in the progressivity of income taxation in the form of increasing the tax rate on capital income and decreasing the tax rate on labour income increases output, men's and women's employment, and decreases public debt/GDP in both the short and the medium run (Onaran et al., 2023). An increase in the tax rate on wealth decreases wealth concentration and has a positive and the strongest impact on output, employment and the budget (Onaran et al., 2023). There are two reasons why taxes on profit income and wealth are more effective. Firstly, UK is a wage-led economy, The negative impact of taxes on profits and wealth on household consumption are significantly smaller than the negative impact of tax on labour. Secondly, a higher tax rate on wealth leads to a decline in wealth inequality which leads to higher private investment, reflecting the positive effects of lower market concentration, reduced barriers to entry and lower degree of financialization of non-financial companies. This inclusion of wealth inequality and wealth taxes in Onaran et al. (2023) are crucial to show the size of the fiscal space to simultaneously address the need for public care infrastructure investment and green physical infrastructure investment and to overcome false dichotomies.

5. Conclusion

One policy lesson stands out among all the empirical findings based on the synthesis of feminist structuralist/post-Keynesian models discussed in this paper: public spending in the care economy, green economy and other infrastructure is the key to a green, purple[10] and red new deal for a caring just transition to a zero carbon economy. A paradigm shift to a needs-based approach to fiscal policy is required to tackle inequalities, social, economic and ecological crises.

A related important finding is that the multiplier effects of public spending are much larger than the effects through wage increases even if the economy is wage-led. Wage increases create a small positive stimulus to demand in a wage-led economy but the effects on productivity are much larger leading to negative employment in the medium run. Fiscal expansion should accompany wage-led development policies such as minimum wage policies in order to achieve full employment. During 2017-20 the progressive South Korean presidency faced this problem, trying to implement a paradigm shift towards an equality-led development policy while being restrained in fiscal expansion surrounded by a fiscally conservative environment. The bottom line is that full employment requires demand policies to accompany labour market and wage policies.

A needs-based policy departs from the social and environmental requirements in different spending areas rather than pre-determined budget constraints to ensure that both the ecological transition and care needs of the countries are adequately addressed and a green transition is gender-equitable.

The green economy, the care economy and other public infrastructure has the potential to create a high number of new jobs in socially much needed areas for redeployment from the fossil fuel-based sectors. The care economy is itself a low-carbon highly labour-intensive sector (Onaran/Oyvat, 2023). However, starting with high gender gaps in employment and the very high investment needs in the green economy, even a policy mix including investing in the care economy runs the danger of creating more jobs for men than for women if the current occupational segregation patterns do not evolve. This can be overcome by hiring and training policies for gender mainstreaming of the new green and physical infrastructure jobs.

There will be two important constraints to the implementation of this ***green, purple, red new deal***: the balance of payments constraint and the public debt constraint. On the former, the transition to renewable energy, food sovereignty and circular economy may in the medium

[10] The care economy also labelled as the "purple" economy by İlkkaracan (2013).

run relax the balance of payments constraints by substituting imported energy and food. In the short run, international policy coordination for green investment[11], technology transfer going beyond intellectual property rights, capital and current account controls, development aid and cancellation or restructuring of the debt of the developing countries are urgently required to tackle climate change in the context of global climate justice.

On the borrowing constraint, we need to be clear that while multiplier effects of the care and green investment are big, they are not big enough to fund all of the public spending. In September 2022 the very British right wing version of the deficit spending implementation by the Conservative Party cutting taxes on the rich while not cutting spending and increasing borrowing requirement, showed all too clearly that there are limits to public borrowing in the presence of global currency hierarchies even in a G7 economy with sovereign currency.

Public borrowing to invest in both the green and care economy can be justified given their medium-term effects on productivity and sustainability and is necessary in the short run given the time lags required for tax legislation.[12]

However, the scale and urgency of the social and ecological needs require a substantial rise in the tax rates. In particular, the wealth of the top 1% offers a so far untapped resource. Our synthesis model is particularly important in this respect showing that taxation of wealth is a very effective policy to fund purple and green public spending, while tackling income, gender, and wealth inequalities. Tippet et al. (2021) presents the tax revenue potential of a progressive scheme of wealth taxation, aiming at the top 1% of the wealthiest households in the UK with the potential to create new tax revenues equivalent to more than 15% of the current level of tax revenues. These policies should be implemented with further increase in the degree of progressivity of income tax and corporate tax.

Monetary policy should accommodate fiscal policies contributing to the funding of long-term public investment in the care and green economy. The central banks' mandate should include a dual target of full/high employment and an inflation target high enough to be consistent with the former, moving within a band, with a higher weight for employment. Furthermore, supporting the transition to net zero can be integrated to the secondary mandate

[11] The effects of public spending are stronger and negative effects on the current account balance are moderated, if policies are implemented simultaneously in all the countries (Onaran, 2016b; Obst et al., 2016).

[12] Day to day spending in these sectors, e.g., wages of teachers, nurses or social care workers, is considered as current spending, thus not as investment, in our national accounts; however public spending in the care economy has long term benefits to the society as a whole, with substantial productivity impact in all other sectors of the economy by increasing the skills, health and innovative capacity of people (Elson, 2016, 2017).

of central banks (see Dafermos et al., 2022b). National and regional investment banks working in cooperation with the government and central bank are also crucial for funding large scale public infrastructure projects.

The coordination of fiscal policies with pro-labour institutions makes the effects of fiscal spending stronger and eases the funding pressures as higher wages lead to higher tax revenues (Onaran, 2016b; Obst et al., 2016; Onaran et al., 2023).

Finally, a policy we have not discussed in this paper in terms of the policy implications of a synthesis model of feminist and post-Keynesian economics is the shortening of the working week. Feminist economists have shown that a scenario of upward convergence in hourly wage rates along with a downward convergence in weekly working hours between men and women is conducive to a more equal distribution of unpaid and paid work as well as green transition and high productivity (İlkkaracan, 2013; İlkkaracan/Memiş, 2021; Onaran/Calvert Jump, 2022).

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Table 1: The demand regimes in the short run

	Wage-led in the short run	**Profit-led in the short run**
Female wage-led/ gender equality-led in the short run	|Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on total consumption| > |Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on investment + net exports| & |Impact of w_t^{NF}on total consumption| > |Impact of w_t^{NF}on investment + net exports|	|Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on investment + net exports| > |Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on total consumption| > |Impact of w_t^{NF}on total consumption| > |Impact of w_t^{NF}on investment + net exports|
Gender inequality-led in the short run	|Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on total consumption| > |Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on investment + net exports| > |Impact of w_t^{NF}on investment + net exports > |Impact of w_t^{NF}on total consumption|	|Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on total consumption| < |Impact of w_t^{NF}& w_t^{NM}(constant α_t^N) on investment + net exports| & |Impact of w_t^{NF}on total consumption| < |Impact of w_t^{NF}on investment + net exports|

Source: Onaran et al. (2022a)