

# The effects of income distribution and fiscal policy on aggregate demand, investment and the budget balance: the case of Europe<sup>1</sup>

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This paper develops a multi-country post-Kaleckian model that incorporates the role of the government. One key novelty of the model is that it integrates cross-country effects of changes in both income distribution and fiscal policy. The model is used to estimate econometrically the effects of income distribution and fiscal policy on the components of aggregate demand and the budget balance in EU15 countries. The results show that a simultaneous increase in the wage share in all EU15 countries would increase demand and the primary budget balance in all countries. A simultaneous increase in government spending turns out to boost economic activity in all the EU15 countries, indicating the positive economic effects of expansionary fiscal policy. Moreover, a progressive tax policy that would be implemented simultaneously at the EU level would lead to an increase in output in all countries.

*Key words:* Wage share, Fiscal multiplier, Demand regime, Fiscal policy

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## 1. Introduction

The outbreak of the Great Recession and the sluggish growth in the aftermath in most European countries has rekindled interest in the effect of fiscal policy on economic activity,

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as evidenced in the vast literature on fiscal multiplier effects (Blanchard and Leigh, 2013; Gechert, 2015). Although it has been shown that austerity policies have negative effects on output and private investment, contributing to the prolonged stagnation in Europe, fiscal contraction continues to be the dominant European strategy in the post-crisis era.

At the same time, inequality has increased significantly since the 1980s in all the major developed and developing countries with a simultaneous fall in the share of labour income in national income and a rise in top income shares (Stockhammer, 2017). The negative impact of inequality on growth has been well evidenced in empirical research based on both supply-side growth models (Barro, 2000; Daudey and Garcia-Penalosa, 2007; Berg *et al.*, 2012) and post-Keynesian demand-led growth models (Naastepad and Storm, 2006; Hein and Vogel, 2008; Stockhammer *et al.*, 2009; Onaran and Galanis, 2014; Onaran and Obst, 2016).

However, the combined effects of fiscal policy and income distribution on economic activity and fiscal performance have not yet been empirically investigated in the context of models with demand-led output. So far, these models, most of which place particular emphasis on functional income distribution, have been used to explore various effects of fiscal policy at a theoretical level. In particular, within a closed economy framework, Blecker (2002:129–141), Mott and Slattery (1994) and Palley (2014) have focused on the interactions between tax policies, output and income distribution. Mott and Slattery (1994) have studied the effects of taxes on income distribution and output, paying particular attention to the role of tax shifting, while Blecker (2002, pp. 129–141) and Palley (2014) have analysed how different tax rates on labour and capital income affect whether the growth regime of an economy is wage-led or profit-led. You and Dutt (1996), Zezza and Dos Santos (2004), Palley (2013), Ryoo and Skott (2013), Allain (2015), Hein (2018), Kapeller *et al.* (2017), Ko (2019) and Ribeiro and Lima (2019) have studied the effects of aggregate government expenditure on various macroeconomic variables, such as output, capital accumulation and public debt. In similar lines, Commendatore *et al.* (2011), Seguino (2012), Dutt (2013) and Tavani and Zamparelli (2017) have focused on the effects of different types of government expenditure. Yoshida and Asada (2007), Charpe *et al.* (2011) and Nikolaidi (2014) have analysed the role of counter-cyclical fiscal policy, focusing on its positive stabilising effects.

Within an open economy framework, Blecker (1999, 2002, pp. 141–145) and Greenwood-Nimmo (2014) have analysed the various interactions between government spending, taxation and income distribution. However, these models do not consider the cross-country spillover effects of the joint effects of income distribution and fiscal policy. Thus, they do not permit a more integrated approach to the way that government spending, taxation and income distribution interact when trade relationships are incorporated in the analysis.

The novelty of this paper is twofold. First, we develop a post-Kaleckian theoretical model that incorporates the role of the government within an open economy context. The model moves beyond the above-mentioned literature because it is a multi-country model that allows the analysis of the interactions between countries. Second, we use this model in order to estimate econometrically the effects of income distribution and fiscal policy on the components of aggregate demand (AD) for each of the EU15 countries.<sup>2</sup> We calculate

<sup>2</sup> EU15 refers to the 15 West European old member states of the EU, which includes the UK despite the Brexit decision. We keep the UK as part of our analysis for Europe, as policy coordination issues discussed in the paper can be implemented even when countries are not part of a political union, although we recognise the importance of a political union to facilitate such policy coordination.

a Europe-wide multiplier based on the responses of each country to changes in not only domestic but also other European countries' income distribution, taxation and government spending. Hence, we move beyond [Onaran and Galanis \(2014\)](#) and [Onaran and Obst \(2016\)](#) who presented the impact of simultaneous changes in income distribution in the G20 and the EU15, but did not incorporate the impact of public spending and taxes. From a policy perspective, the analysis of the paper can guide the implementation of fiscal and wage policies conducive to higher economic activity in the short run.

The rest of the paper is organised as follows. Section 2 outlines the theoretical model. Section 3 presents the data and describes the estimation methodology. Section 4 presents the estimation results. Section 5 examines the effects of wage and fiscal policies on output, private investment and the primary budget balance. Moreover, it compares the effects when policies are implemented in one country in isolation versus the case in which policies are implemented simultaneously in all countries. Finally, Section 6 summarises and concludes.

## 2. A post-Keynesian/post-Kaleckian macro model with government

### 2.1 Structure of the model

Our multi-country model for the EU15 countries is based on the post-Kaleckian framework (see [Bhaduri and Marglin, 1990](#)). We integrate fiscal policy (tax rates and government expenditure) into the private sector open economy model presented in [Onaran and Galanis \(2014\)](#) and [Onaran and Obst \(2016\)](#) and formalise the effects of a change in the profit share and fiscal policy by means of analysing the country-level effects on private aggregated demand: consumption, investment, exports and imports. We then simulate European interactions through integrating the effects of a change in income distribution as well as fiscal policy of other EU15 countries.

Our model is designed to capture short-run effects. This implies that we abstract from endogenous changes in income shares, labour productivity and capital stock as well as from the dynamic stock-flow interaction between public debt, private financial assets/liabilities and economic activity. The incorporation of these issues would require the development of a much more complicated model, which moves beyond the scope of the current paper. Compared to a more complicated long-run model, the main advantage of our relatively simple short-run model is that, as will be shown below, it permits us to identify the exact channels through which wage and fiscal policy affect aggregate demand.

Consumption ( $C$ ) is given by:

$$\log C = c_0 + c_r \log(1 - t_r) R + c_w (\log(1 - t_w) W + \log S) \quad (1)$$

where  $R$  denotes profits,  $W$  stands for wages,  $t_r$  denotes the tax rate on capital income,  $t_w$  stands for the tax rate on labour income and  $S$  denotes the social transfers in cash. Note that after-tax profits are equal to  $R' = (1 - t_r) R$  and after-tax wages are given by  $W' = (1 - t_w) W$ . Compared to [Onaran and Obst \(2016\)](#), consumption function (1) has two new features: first, it includes tax rates on capital income and tax rates on labour income; second, it incorporates social transfers, which augment the disposable income of households. Previous demand-led growth models have used consumption functions with different tax rates on wage income and capital income (see, e.g. [Mott and Slattery, 1994](#); [You and Dutt, 1996](#); [Blecker, 2002](#); [Palley, 2014](#); [Ko, 2019](#); [Ribeiro](#)

and Lima, 2019). However, the consumption functions in these models do not include social transfers. We hypothesise that a more progressive tax system (which in this paper is captured by an increase in taxes on capital and a decrease in taxes on labour) supports a wage-led economic regime, whereas a more regressive tax system would boost economic activity in a profit-led regime.

Private investment ( $I$ ) is modelled based on the following specification:

$$\log I = i_a + i_y \log Y_p + i_\pi \log(1 - t_r)\pi + i_g \log G + i_r r \quad (2)$$

where,  $i_a$  is autonomous investment and captures the effects of ‘animal spirits’,  $Y_p = Y - G$  denotes private demand, defined as GDP ( $Y$ ) minus the government expenditure that is part of GDP ( $G$ ),  $\pi$  denotes the profit share and  $r$  is the interest rate. Note that the after-tax profit share is equal to  $\pi' = (1 - t_r)\pi$ . This specification implies that private investment is affected by four factors. First, a higher level of aggregate demand is assumed to increase private investment. This is a standard assumption in the related empirical literature (e.g. Hein and Vogel, 2008; Stockhammer *et al.*, 2009; Onaran and Galanis, 2014). Second, in line with the post-Kaleckian literature that draws on Bhaduri and Marglin (1990), investment depends on the profit share (e.g. You and Dutt, 1996; Hein, 2007; Hein and Vogel, 2008; Stockhammer *et al.*, 2009; Seguino, 2012; Onaran and Galanis, 2014; Onaran and Obst, 2016). We assume that firms consider after-tax profits in making investment decisions as widely assumed in the literature (e.g. You and Dutt, 1996; Blecker, 2002; Seguino, 2012).

Third, following Kapeller *et al.* (2017), private investment is assumed to be positively affected by government spending. As explained below, this allows us to examine potential crowding-in effects that might stem from the fact that government expenditure can improve business environment.<sup>3</sup> Fourth, we include the impact of interest rate on investment in order to take into account the negative impact that the cost of borrowing might have on investment (see also Taylor, 1985; Onaran and Galanis, 2014; Onaran and Obst, 2016). Based on the above, in the empirical estimations, we overall expect  $i_y > 0$ ,  $i_\pi > 0$ ,  $i_g > 0$  and  $i_r < 0$ .

Our investment function assumes that investment spending depends on the profit share. An alternative assumption would be to postulate that investment relies on the profit rate (e.g. Rowthorn, 1981; Dutt, 1984; Taylor, 1985; van Treeck, 2009; Carvalho and Rezai, 2016; Tavani and Zamparelli, 2017). However, this would increase the sensitivity of investment to changes in capacity utilisation, relative to changes in profitability: Bhaduri and Marglin (1990) have argued that since the profit rate can be decomposed into capacity utilisation and the profit share, the inclusion of both variables in the investment function would account for the impact of capacity utilisation on investment twice. Moreover, as shown by Blecker (2002), the inclusion of the profit rate instead of the profit share in the investment function would increase the possibility of obtaining a wage-led demand regime. In our case, we prefer to use a specification that does not reduce the possibility of obtaining a profit-led demand regime. However, this does not mean that the post-Kaleckian investment function is necessarily superior

<sup>3</sup> For the potential positive effects of public investment on private investment, see Seguino (2012) and Dutt (2013). For the potential positive effects of government spending on labour productivity, see Commendatore *et al.* (2011) and Tavani and Zamparelli (2017). In our model, we abstract from distinguishing between the long-run and short-run impact of government spending and from different types of government expenditure on private investment.

to an investment function that would use the profit rate as an independent variable. For example, it could be argued that in practice firms make their investment decisions based on the profit rate.<sup>4</sup>

In order to integrate the effects of expansionary fiscal policy on demand in the EU15, we define government expenditure as a fraction of GDP<sup>5</sup>:

$$G = \kappa_g Y \quad (3)$$

The total primary government expenditure ( $G_{tot}$ ) is equal to:

$$G_{tot} = G + S \quad (4)$$

Taxes ( $T$ ) are given by:

$$T = t_w W + t_r R + t_c C \quad (5)$$

where,  $t_c$  is the tax rate on consumption.

The primary budget balance of the government sector ( $PB$ ) is:

$$PB = T - G_{tot} \quad (6)$$

GDP is given by:

$$Y = C + I + G + NX \quad (7)$$

where, net exports ( $NX$ ) are equal to exports ( $X$ ) minus imports ( $M$ ).

We model the effects of distribution on net exports using a stepwise approach that follows [Stockhammer et al. \(2009\)](#), [Onaran et al. \(2011\)](#) and [Onaran and Galanis \(2014\)](#). We extend the specification of domestic and export prices by including tax rate on consumption at home and abroad. Domestic prices ( $P$ ) and export prices ( $P_x$ ) are determined as follows:

$$\log P = p_0 + p_{ulc} \log(ulc) + p_{tc} \log(1 + t_c) + p_m \log P_m \quad (8)$$

$$\log P_x = p_{x0} + p_{xulc} \log(ulc) + p_{xcf} \log(1 + t_{cf}) + p_{xm} \log P_m \quad (9)$$

where,  $ulc$  denotes nominal unit labour costs,  $P_m$  stands for import prices and  $t_{cf}$  denotes tax rate on consumption abroad. Compared to [Onaran and Obst \(2016\)](#), we have taken into account that the tax rate on consumption might increase domestic and export prices.

Exports are given by:

$$\log X = x_0 + x_{pxm} \log(P_x/P_m) + x_{yrw} \log Y_{rw} + x_e \log E \quad (10)$$

where,  $Y_{rw}$  is the GDP of the rest of the world and  $E$  is the exchange rate. Exports are a function of relative prices of exports to imports, the GDP of the rest of the world and exchange rate.

<sup>4</sup> The use of the profit rate instead of the profit share would not change the conclusions of our analysis. First, we have econometrically estimated equation (2) using the profit rate and we have found that the results are similar to the specification in which investment depends on the profit share. Second, although the profit rate and the profit share do not always move in the same direction, in our sample, their correlation is high in the vast majority of the countries. The results are available upon request.

<sup>5</sup> We assume that the government decides about government spending by taking into account the share of government expenditure in output rather than the absolute value of government spending. [Dutt \(2013\)](#) has made a similar assumption about the expenditure on public investment.



**Fig. 1.** First-round effects of an increase in the profit share

Imports are equal to:

$$\log M = m_0 + m_{ppm} \log(P/P_m) + x_y \log Y_p + m_g \log G + m_e \log E \quad (11)$$

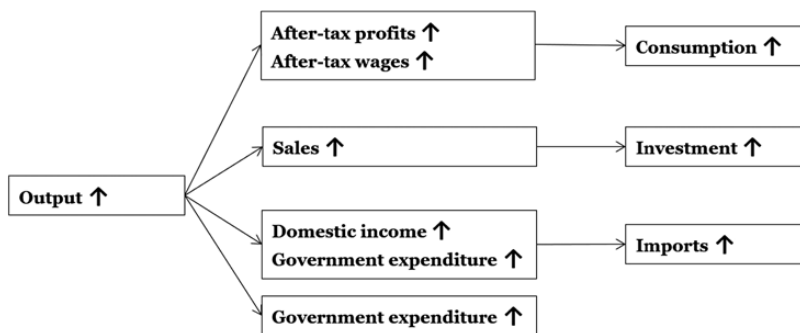
Imports depend on domestic prices relative to import prices, the exchange rate and aggregate demand in which we include separately  $Y_p$  and  $G$  (Palley, 2009).

## 2.2 Effects of a change in the profit share and fiscal policy on aggregate demand, private investment and primary budget balance

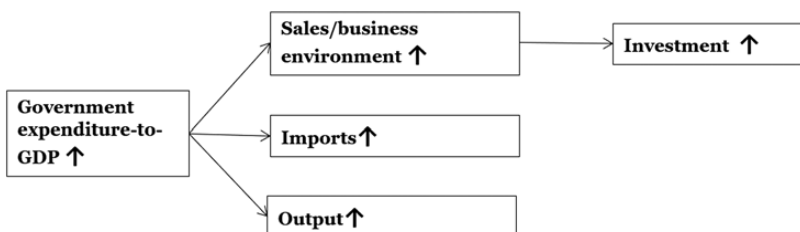
The model presented above can be deployed to study the short-run effects of a change in profit share ( $\pi$ ) and fiscal policy on aggregate demand, private investment and primary budget balance as a ratio to output (the algebraic details are reported in [Supplementary Appendix A](#)). An increase in  $\pi$  has both first-round and second-round (post-multiplier) effects on aggregate demand as illustrated in [Figures 1 and 2](#). An increase in  $\pi$  tends to reduce consumption since the propensity to consume out of wages is expected to be higher than the propensity to consume out of profits. Investment is positively affected since an increase in  $\pi$  raises the expected profitability and the availability of internal finance for given capacity utilisation. Net exports tend to increase since the export and domestic prices decline because of the reduction in the unit labour cost caused by the increase in  $\pi$ . These are the first-round effects (see [Figure 1](#)). If the positive effects on demand prevail over the negative ones, we have a profit-led demand regime. In the opposite case, the demand regime is wage-led.

At a second stage, the change in output, that stems from the rise in  $\pi$ , influences the components of demand through the multiplier effects. In [Figure 2](#), we illustrate these multiplier effects when an exogenous shock leads to a rise in output (these channels work in the opposite direction if the shock leads to a decline in output, that is, in a wage-led demand regime). When we have a profit-led demand regime, an increase in  $\pi$  increases output which in turn (i) increases consumption since households' disposable income goes up, (ii) increases private investment since the sales of firms go up, (iii) decreases net exports since higher output might induce firms and the government to buy more goods and services from foreign countries and (iv) increases government expenditure since government spending is proportional to output.

Regarding the effects of  $\pi$  on the primary budget balance-to-GDP ratio, we also have both first-round and second-round effects. In the first-round, an increase in  $\pi$  leads to an increase in the revenues collected from taxes on capital income and a decrease in revenues collected from taxes on consumption and wage income. At a second stage



**Fig. 2.** Second-round (multiplier) effects of an increase in output caused by an exogenous shock



**Fig. 3.** First-round effects of an increase in government expenditure-to-GDP ratio

(and in a profit-led demand regime), the rise in  $\pi$  causes an increase in output that increases both government spending and tax revenues since both of them are a positive function of output. Hence, the overall effects on the primary balance are ambiguous.

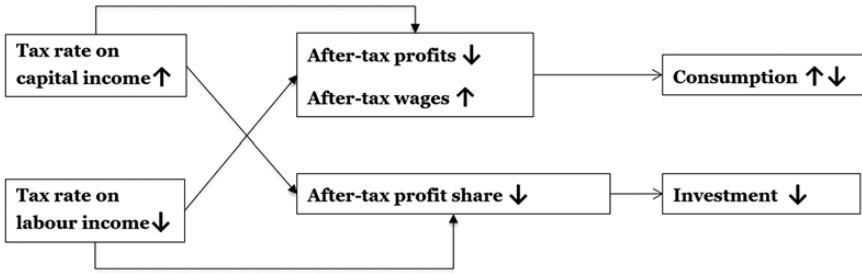
Furthermore, we focus on the effects of the following changes in fiscal policy: (i) an increase in government expenditure-to-GDP ratio ( $\kappa_g$ ), (ii) an increase in the tax rate on capital income ( $t_r$ ), (iii) a decrease in tax rate on labour income ( $t_w$ ) and (iv) a combination of a progressive tax policy based on a fall in the tax rate on wages and an increase in the tax rate on profits.

The increase in government spending is captured by a rise in  $\kappa_g$ . The related channels are shown in [Figure 3](#). At a first stage, the increase in  $\kappa_g$  leads to lower net exports since the government may buy goods and services from abroad.<sup>6</sup> A rise in  $\kappa_g$  has a positive effect on private investment since it increases the sales of firms and might improve the business environment. However, since the rise in  $\kappa_g$  stimulates output, we also have second-round effects on aggregate demand as already shown in [Figure 2](#).

We now turn to the effects of tax policies as shown in [Figure 4](#). An increase in  $t_r$  affects consumption and investment directly. Consumption decreases since after-tax profits decline. Investment is adversely affected by lower after-tax profits. Overall, the increase in  $t_r$  negatively affects aggregate demand. The effect of a higher in  $t_r$  on primary budget balance is ambiguous since there is a decrease in the revenues collected from taxes and a simultaneous decrease in government expenditure. Similar channels

<sup>6</sup> In reality, an increase in public spending produces an increase in the wages of the public sector employees, affecting the wage share. For simplicity, we assume away this effect. If this effect was taken into account, an increase in public spending would provide a further boost to economic activity via consumption.





**Fig. 4.** First-round effects of a combined increase in the tax rate on capital income and a decrease in the tax rate on labour income

apply when  $t_w$  decreases. When an increase in  $t_r$  is combined with a decrease in  $t_w$ , the overall effects on consumption and investment are ambiguous.

All the effects mentioned above refer only to changes that are implemented in countries individually. However, drawing on [Onaran and Obst \(2016\)](#), our model can be applied to analyse the effects associated with changes that take place simultaneously in the EU countries. This is particularly important because of the high integration of the European economies. The related calculations are reported in [Supplementary Appendix B](#).

### 3. Data and estimation methodology

The data used in the econometric estimation refer to EU15 countries and mostly come from the annual macro-economic database of the European Commission (AMECO) and the OECD national accounts, in most cases for the period between 1960 and 2013. The tax rates are based on Eurostat data for most countries for the period of 1965–2012. For the estimation of our investment function, we use the real long-term interest rate that captures the cost of borrowing for the government. Although the proper interest rate is the lending interest rate of firms (which refers to firms' access to credit), there is a lack of sufficiently long time series data for this variable. Therefore, we have used instead the real long-term interest rate, which is a good proxy of the firm lending interest rate (we have found that the correlation between the lending interest rate of the firms and the real long-term interest rate is high in the vast majority of the countries).<sup>7</sup> The definitions of all variables and sources can be found in [Supplementary Appendix C](#).<sup>8</sup>

In our econometric estimations, we focus only on the components of government expenditure that are part of GDP. These are the gross capital formation ( $I_g$ ), the individual consumption expenditure ( $G_i$ ) and the collective consumption expenditure ( $G_c$ ).

<sup>7</sup> Results are available upon request.

<sup>8</sup> In our econometric estimations, we use the adjusted wage share and the adjusted profit share as provided by AMECO. Compared to the unadjusted wage share, the adjusted wage share takes explicitly into account the role of self-employment. This is done by assigning a certain proportion of the average self-employment income to the average compensation of dependent employees, following the methodology outlined by [Gollin \(2002\)](#). Moreover, the tax rates on labour, capital and consumption are captured by the corresponding implicit tax rates also provided by AMECO. The implicit tax rates of each tax base category are calculated as the ratio of the total tax revenues of the category to the potential tax base of this category. See [Supplementary Appendix C](#) for more details and sources.



of the general government. On average,  $G_b$ ,  $G_c$  and  $I_g$  constitute roughly 50% of total government expenditure in our sample. An important part of the remaining government expenditures are social transfers in cash. These have been included in our theoretical model (see Section 2) but not in our empirical estimations due to limited data availability (e.g. social benefits in cash start only in 1995 for most EU15 countries). Moreover, in our econometric estimations, we include only the tax revenues, which are the biggest part of government revenues, leaving aside other revenue streams such as property income or national insurance payments.

Despite the fact that our model is a short-run one, we need to rely on long time-series in order to estimate our parameters in a statistically credible way. However, it is important to point out that these estimates capture the average behaviour of the economies in the period under investigation. For example, if an economy appears to be wage-led based on the parameter estimations for the whole period, this does not necessarily mean that this has been the case for all the sub-periods. As pointed out by [Nikiforos \(2016\)](#), there might have been sub-periods in which the economies have been profit-led and other sub-periods whereby the economies have been wage-led. However, if our estimated coefficients suggest that an economy is wage-led for the whole period, this implies that this economy has been on average wage-led in the period under investigation, and this is the best estimation that we can use for our short-run parameters.

We estimate separate single equations for consumption, investment, exports, imports, domestic prices and export prices. We choose the single equation approach (SEA) because it allows a clearer interpretation of the results and permits us to deal with the fact that the time period of our sample is quite short. However, the main limitation of the SEA approach is that it might introduce some bias resulting from endogeneity issues, which might arise from the fact that the wage share and the government expenditure-to-GDP ratio are arguably a function of output. These could be tackled by using a VAR or an instrumental variable method. However, as discussed in [Onaran and Obst \(2016\)](#), these methods have their own limitations. Most importantly, it is necessary to have a large number of observations, which is not the case in our sample. Hence, we have chosen to use a SEA approach, which is also in line with the fact that our model is a short-run one, and we have reasonably assumed that the time lag of the impact of output on distribution and government expenditure is longer than one year.

Unit root tests suggest that most of our variables are integrated of order one.<sup>9</sup> The profit share is stationary in Greece, Spain, Sweden and the UK. Hence, we use this variable to its level in these countries. We first estimate error-correction models (ECM). If no cointegration is found, the equations are estimated in differences. We start with general specifications and only keep those variables, which are statistically significant. In order to test for autocorrelation, we use the Breusch–Godfrey test. In the case of autocorrelation, either we keep the lagged dependent variable or add an AR(1) term. As outlined in [Onaran and Obst \(2016\)](#), we derive the long-term coefficients (elasticities) using two different methods depending on whether there is a short-run (differenced form) or a long-run relationship (ECM) among the variables.

<sup>9</sup> Results are available upon request.

#### 4. Estimation results

The estimation results for our consumption function (equation 1) are given in [Table 1](#). The hypothesis that the marginal propensity to consume (MPC) out of profit income is larger than the propensity to consume out of wage income is confirmed in all countries.

[Supplementary Table 1](#) presents the effects on private investment based on equation (2). We find strong and significant accelerator effects of private demand on private investment in all countries. Regarding the after-tax profit share, the effects are more varied. The profit share has no statistically significant effect in 10 countries: Austria, Belgium, Denmark, Finland, Germany, Greece, Luxembourg, Portugal, Spain and the UK.<sup>10</sup> In these cases, the effects are treated as zero when we calculate the total effects on excess demand. There is a positive statistically significant effect of government expenditure in seven EU countries: Denmark, Finland, Germany, Greece, Ireland, the Netherlands and Portugal. There are only two countries (Belgium and France) where the effects of government expenditure on private investment are negative.<sup>11</sup> We find significant negative effects of an increase in long-term interest rate on private investment in only two countries: Denmark and Sweden.

The estimation results for domestic prices, export prices, exports and imports are reported in [Tables 2–3](#) and [Supplementary Tables 2 and 3](#). The results are broadly in line with our expectations; however, there are no significant effects of export prices relative to import prices on exports in Belgium, Ireland, Luxembourg, the Netherlands and Portugal. We also find no statistically significant effects of domestic prices relative to import prices on imports in Denmark, Finland, Germany, Greece, Luxembourg and the UK. An increase in government expenditure leads to an increase in imports in six countries: Belgium, Germany, Ireland, Portugal, Sweden and the UK. Regarding the tax rate on consumption, we find statistically significant effects on domestic prices in seven countries: Finland, Ireland, Italy, Portugal, Spain, Sweden and the UK. Concerning export prices, we find statistically significant effects in only three countries: Denmark, Germany and Italy.

We have run a series of robustness checks for consumption and investment estimations.<sup>12</sup> For consumption, we have checked the robustness of our results using different sample sizes: 1960–2007; 1980–2007; 1980–2012. Our results are robust except for Spain. Here, we find either insignificant or perverse effects of profit income on consumption for the full sample, which is at odds with our previous estimations and the empirical literature ([Onaran and Obst, 2016](#)).<sup>13</sup> Hence, we have kept the full sample for all EU15 countries, but Spain, where estimation is based on the pre-crisis period.

<sup>10</sup> When we compare our results to previous findings in the empirical literature ([Onaran and Obst, 2016](#)), we find a general breakdown of the profit-investment nexus since the start of the Great Recession in 2007. Taking after-tax profits, this issue becomes even more apparent. Only five EU countries have a statistically significant profitability effect.

<sup>11</sup> We also found negative significant effects for the UK in the full sample 1960–2012 in some specifications. However, when running a robustness check with a reduced sample prior to the crisis (1960–2007), the significant negative effects in the UK do not hold true. Hence, we report the specification where government expenditure is insignificant and dropped from the equation. For Belgium and France, the negative effects of government expenditure hold true also in the reduced sample, hence we keep the original estimation.

<sup>12</sup> Results are available upon request.

<sup>13</sup> Estimating a reduced sample size (1960–2007) shows that the perverse effects are driven by the significant reduction of the tax rate on capital from 42% to 26% during the crisis period.

Table 1. Consumption: dependent variable  $dlog C$  (equation 1)

	$c$	$dlog(1-t_c)R$	$dlog(1-t_w)W$	$dlog(C_{-1})$	$AR1$	$DW$	$R^2$	Sample
A	0.010 (3.760)***	0.113 (3.792)***	0.588 (5.950)***			2.073	0.544	1971–2012
B	0.015 (5.795)***	0.094 (2.152)**	0.289 (4.071)***			1.638	0.339	1971–2012
DK	0.007 (1.434)	0.087 (1.987)**	0.519 (3.089)***			1.668	0.211	1971–2011
FIN	0.017 (5.386)***	0.106 (4.455)***	0.439 (6.445)***			1.814	0.553	1966–2012
F	0.014 (6.307)***	0.086 (3.100)***	0.515 (5.802)***			1.608	0.535	1971–2012
D	0.005 (1.576)	0.067 (1.731)*	0.381 (3.711)***	0.419 (3.726)***		1.810	0.634	1966–2012
GR	0.018 (3.396)***	0.190 (3.902)***	0.399 (5.619)***		0.375 (2.102)**	1.957	0.735	1972–2013
IRL	0.011 (2.036)**	0.129 (3.110)***	0.457 (5.058)***			1.989	0.472	1971–2012
I	0.014 (2.867)**	0.112 (4.810)***	0.311 (3.596)***		0.568 (3.855)***	1.890	0.657	1972–2012
L	0.016 (4.087)***	0.103 (3.451)***	0.350 (4.920)***			1.741	0.350	1961–2013
NL	0.000 (−0.040)	0.095 (3.340)***	0.338 (3.673)***	0.519 (4.878)***		1.921	0.668	1971–2012
P	0.018 (4.495)***	0.089 (5.287)***	0.574 (6.867)***			1.821	0.591	1971–2012
E	0.009 (3.510)***	0.072 (2.136)**	0.753 (15.132)***			2.449	0.847	1961–2007
S	0.010 (2.640)**	0.019 (0.666)	0.236 (2.701)***	0.258 (1.924)*		1.865	0.282	1962–2012
UK	0.011 (3.268)***	0.072 (4.288)***	0.626 (6.761)***		0.310 (2.051)**	2.038	0.682	1967–2012

Note:  $t$ -statistics are reported in the parentheses; \*, \*\* and \*\*\* stand for 10%, 5% and 1% significance levels, respectively. Since there are no data for tax rate on capital income in Luxembourg, the regression for this country is estimated based on the pre-tax income.

A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

Table 2. Price deflator: dependent variable  $dlogP$  (equation 8)

c	$dlogP_m$	$dlogP_{m-1}$	$dlogP_{-1}$	$dlog(ulc)$	$dlog(ulc_{-1})$	$dlog(1+t_c)$	ARI	DW	R <sup>2</sup>	Sample
A	0.005 (2.433)**	0.146 (3.715)***	0.453 (5.320)***	0.286 (4.952)	***			1.920	0.851	1962–2013
B	0.019 (3.985)***	0.158 (6.721)***	0.129 (4.197)***			0.214 (2.456)***	0.573 (3.662)***	2.139	0.813	1962–2013
DK	0.008 (2.423)**	0.183 (5.266)***	0.465 (4.037)***			0.249 (2.698)***		2.029	0.865	1962–2013
FIN	0.009 (2.299)**	0.236 (5.712)***	0.198 (2.128)**	0.416 (5.399)	***	0.742 (2.336)**		1.966	0.860	1966–2012
F	0.004 (1.718)*	0.094 (3.580)***	0.633 (4.635)***			0.194 (1.624)*		1.795	0.907	1962–2013
D	0.017 (4.498)***	0.032 (1.635)*		0.366 (7.781)	***		0.697 (8.452)***	2.105	0.841	1962–2013
GR	0.019 (2.870)***	0.462 (6.435)***		0.423 (5.932)	0.000 ***			1.758	0.810	1962–2013
IRL	0.030 (2.418)**	0.235 (2.872)***				0.334 (2.512)**	0.404 (2.727)***	2.120	0.753	1971–2012
I	0.028 (1.333)	0.084 (4.292)***		0.445 8.934	***			2.404	0.958	1971–2012
L	0.024 (4.180)***	0.523 (5.076)***	–0.482 (–3.605)***	0.345 (3.284)	***			1.651	0.479	1962–2013
NL	0.007 (2.492)**	0.152 (4.599)***	0.448 (3.656)***			0.255 (2.687)***		1.997	0.801	1962–2013
P	0.005 (0.982)	0.206 (3.418)***				0.668 (9.214)***		1.645	0.921	1981–2012
E	0.025 (1.971)**	0.078 (2.700)***		0.430 (5.281)	***	0.640 (2.335)**	0.857 (7.580)***	2.257	0.944	1981–2012
S	0.011 (3.032)***	0.156 (3.915)***	0.225 (5.372)***			0.407 (6.697)***		1.590	0.846	1971–2012
UK	0.002 (0.769)	0.036 (1.206)	0.380 (7.491)***	0.558 (12.119)	***	0.565 (1.708)*		2.136	0.945	1966–2012

Note:  $t$ -statistics are reported in the parentheses, \*, \*\* and \*\*\* stand for 10%, 5% and 1% significance levels, respectively.  
A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

**Table 3.** Exports: dependent variable  $\text{dlog}X$  (equation 10)

	$c$	$\text{dlog}(P_x/P_m)_{-1}$	$\text{dlog}(P_x/P_m)$	$\text{dlog}Y_{rw}$	$\text{dlog}E$	$AR1$	$DW$	$R^2$	Sample
<b>A</b>	-0.028 (-2.813)***		-1.728 (-5.717)***	2.314 (9.008)***			1.778	0.676	1961–2013
<b>B</b>	-0.029 (-3.264)***		-0.185 (-0.728)	2.315 (10.045)***			1.876	0.669	1961–2013
<b>DK</b>	-0.004 (-0.483)		-0.627 (-3.581)***	1.540 (6.445)***			1.718	0.472	1961–2013
<b>FIN</b>	-0.068 (-3.074)***		-0.576 (-2.003)**	3.428 (6.415)***		0.430 (3.077)***	2.121	0.486	1962–2013
<b>F</b>	-0.020 (-1.718)*		-0.439 (-3.075)***	2.155 (7.689)***	0.158 (1.665)*	0.371 (2.684)***	2.194	0.725	1962–2013
<b>D</b>	-0.017 (-1.145)	-0.379 (-1.876)*		2.136 (5.376)***			2.022	0.372	1962–2013
<b>GR</b>	-0.037 (-1.342)	-0.729 (-1.805)*		2.917 (3.968)***			1.664	0.305	1962–2013
<b>IRL</b>	0.043 (2.223)**		-0.178 (-0.903)	1.041 (2.155)**		0.351 (2.608)***	1.896	0.189	1962–2013
<b>I</b>	-0.053 (-3.811)***	-0.307 (-1.994)**		3.006 (8.285)***			1.966	0.586	1962–2013
<b>L</b>	-0.033 (-1.621)	0.187 (0.789)		2.688 (4.893)***		0.317 (2.064)**	2.102	0.388	1963–2013
<b>NL</b>	-0.027 (-2.681)***		-0.290 (-1.318)	2.445 (10.955)***		0.559 (4.761)***	2.194	0.725	1962–2013
<b>P</b>	-0.017 (-0.799)	0.316 (1.354)		2.409 (4.401)***		0.330 (2.383)**	1.816	0.420	1963–2013
<b>E</b>	-0.012 (-0.815)		-0.277 (-2.214)**	2.448 (6.029)***			1.664	0.426	1961–2013
<b>S</b>	-0.045 (-3.009)***		-0.508 (-2.915)***	2.715 (7.877)***		0.497 (3.832)***	2.037	0.575	1962–2013
<b>UK</b>	0.001 (0.152)		-0.518 (-3.708)***	1.174 (4.696)***			1.562	0.453	1961–2013

Note:  $t$ -statistics are reported in the parentheses, \*, \*\* and \*\*\* stand for 10%, 5% and 1% significance levels, respectively.

A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

In the case of investment, the results are robust if we estimate specification 2 for the pre-crisis period of 1960–2007.

## 5. Effects of wage and fiscal policies

Using our econometric estimations, we simulate the effects of a 1% point decrease in the profit share ( $\pi$ ) on aggregate demand, private investment and primary budget balance (policy 1; see [Appendices A and B](#) for details). We consider both the case in which this decrease takes place only in one country individually and the case in which the profit share decreases in all countries in the EU15 simultaneously.

[Supplementary Table 4](#) presents the results. Column A reports how excess demand changes as a response to an individual decline in the profit share of a country, which is the sum of the partial effects of the profit share on consumption, investment, government expenditure and net exports as a ratio to GDP. These partial effects are presented in [Supplementary Appendix D](#) (note that the government expenditure/GDP does not change when  $\pi$  declines). Three points are worth mentioning. First, in the majority of countries, the positive partial effects of a decrease in  $\pi$  on consumption are higher in comparison with the results presented in [Onaran and Obst \(2016\)](#). This is explained by the incorporation of tax rates in the model, which tends to increase the differences in the propensities to consume out of wages and profits. Second, the partial effect on investment of an increase in  $\pi$  is either positive or statistically insignificant. Third, all countries exhibit a wage-led demand regime. Interestingly, incorporating the effects of  $\pi$  on net exports does not change the nature of the demand regime compared to the domestic demand regime.

Column B reports the multipliers, which capture the second-round effects of the change in demand induced by the decline in  $\pi$ . With the exception of Belgium and Luxemburg, the multipliers are above one and range between 1.13 (Ireland) and 4.84 (the Netherlands).<sup>14</sup> In comparison to the multipliers estimated in [Onaran and Obst \(2016\)](#), where fiscal policy was not taken into account, the multipliers reported in [Supplementary Table 4](#) are higher for all countries. Note that the incorporation of fiscal policy tends to increase the multiplier because a rise in output increases  $G$  (since  $\kappa_g$  is fixed) and private investment. However, it also tends to decrease the multiplier because a rise in  $G$  increases imports.

Column C shows the effects of a 1% point fall in  $\pi$  on demand and output after the multiplier effects. The countries in which the positive demand effects of a decline in  $\pi$  are strongest are Greece, Spain and Germany.

Most importantly, when the decline in  $\pi$  takes place in all countries simultaneously (Column G), the growth effects are reinforced. Overall, a simultaneous decline in the profit share in all countries leads to an increase in the EU15 GDP by 1.41%.<sup>15</sup>

Column D refers to private investment. A 1% fall in  $\pi$  improves private investment in the majority of EU15 countries (with the exception of Ireland and Italy). When this fall takes place in all countries simultaneously (Column H), private investment increases in all countries apart from Ireland. On average, private investment in the EU15 increases by 0.36% points as a ratio to GDP.

<sup>14</sup> [Stockhammer et al. \(2009\)](#) find multipliers ranging between 1.38 and 2.69 for the Euro area.

<sup>15</sup> [Onaran and Obst \(2016\)](#) found a decline in EU15 GDP by 0.30% following a 1% fall in the wage share in Europe.

A fall in  $\pi$  leads to an improvement in the primary budget balance (as a proportion of output) in all countries (Column E) except the UK. Since the EU15 countries exhibit a wage-led regime, a fall in  $\pi$  leads to a collection of more tax revenues (both directly and indirectly) that is quantitatively more significant than the increase in government expenditure. This holds because the government is able to collect more taxes from higher consumption expenditure and higher wage income. In the UK, there is a deterioration in the primary budget balance because there is a large drop in tax revenues from capital income that is not counterbalanced by the increase in tax revenues from wage income and consumption.

The positive effects of  $\pi$  on the primary budget balance are reinforced when  $\pi$  declines simultaneously in all countries (Column I). A 1% point simultaneous fall in  $\pi$  leads to an improvement in the primary budget balance of all countries (including the UK) due to the fact that an increase in the wage share has positive effects on GDP. The effects range from 0.02% points (UK) to 0.6% points (Spain).

Finally, we analyse the extent to which a wage stimulus in the EU15 countries would exert price effects. Prices increase by roughly 1.3% following an isolated decline in  $\pi$  by 1% point (Column F) and by 1.5% if  $\pi$  declines simultaneously in all countries (Column J). Hence, the rise in prices because of a wage stimulus is quite moderate.

We now turn to the effects of fiscal policy. Policy 2 captures the increase in the government expenditure-to-GDP ratio ( $\kappa_g$ ) by 1% point. The effects of this policy are presented in Table 4. An increase in  $\kappa_g$  in each country individually increases GDP significantly. As shown in Column C, the effect ranges from roughly 0.01% (Belgium) to 8.83% (the Netherlands). The effects become much more positive when all countries increase government expenditures simultaneously (Column F). This is due to high cross-country spillover effects.<sup>16</sup> Overall, the EU15 GDP increases by 3.29%.

An increase in government expenditure also leads to a rise in private investment in all countries apart from Belgium and France where the direct effects of government spending on investment are negative (Column D). Again, the effect is stronger when fiscal policy is implemented in coordination as opposed to the case in which it is implemented in isolation. This is the reason why a simultaneous fiscal expansion increases investment in France despite the fact that the direct effect of government spending on investment is negative (Column G). However, as shown in Column E, a 1% point increase in  $\kappa_g$  leads to a deterioration of the primary budget in almost all countries (the only exception is the Netherlands in which the multiplier is high). The reduction ranges from 0.38% points (Finland) to 0.99% points (Belgium). This reduction is, however, lower when government spending increases in all countries simultaneously (see Column H). In the Netherlands, the budget balance improves by 0.63% points.

Policy 3 refers to a 1% point increase in the tax rate on capital income ( $t_r$ ). Its effects are reported in Table 5. As a result of an isolated rise in  $t_r$ , output decreases in all countries (Column C). This reduction is slightly stronger when  $t_r$  increases simultaneously in all countries. Overall, EU15 GDP would decrease by 0.31% (Column F). As expected, a higher  $t_r$  reduces consumption and private investment and improves the primary budget balance (see Columns G and H).

<sup>16</sup> The empirical significance of spillover effects as well as the importance of coordination of fiscal policies is also confirmed in Auerbach and Gorodnichenko (2013).



**Table 4.** *The effects of an isolated and a simultaneous 1% point increase in government expenditure-to-GDP ( $\kappa_g$ )*

Policy 2: An isolated 1% point increase in $\kappa_g$					Policy 2: A simultaneous 1% point increase in $\kappa_g$				
Excess demand/Y (% points)	Multiplier	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)		
A	B	C=(A × B)	D	E	F	G	H		
A	1.000	1.758	0.532	-0.711	2.984	0.903	-0.510		
B	0.014	0.866	-0.582	-0.999	1.043	-0.412	-0.876		
DK	1.079	2.252	0.937	-0.611	3.522	1.323	-0.436		
FIN	2.104	3.028	3.933	-0.376	8.804	5.012	-0.138		
F	0.622	2.262	-0.070	-0.766	2.147	0.092	-0.643		
D	1.115	2.234	0.963	-0.530	3.293	1.153	-0.379		
GR	1.565	4.327	3.352	-0.986	8.366	4.009	-0.983		
IRL	0.973	1.129	0.774	-0.981	1.660	0.939	-0.972		
I	1.000	1.743	0.453	-0.786	2.554	0.664	-0.686		
L	1.000	0.560	0.968	-0.970	2.452	4.236	-0.867		
NL	1.824	4.842	5.421	0.092	13.151	7.671	0.626		
P	1.133	2.096	1.598	-0.702	3.221	1.930	-0.596		
E	1.000	2.933	0.866	-0.524	3.961	1.170	-0.357		
S	0.666	1.538	0.296	-0.933	2.204	0.637	-0.856		
UK	0.699	1.804	0.142	-0.880	1.667	0.188	-0.841		
EU15 <sup>a</sup>					3.286	1.111	-0.547		

*Note:* A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

<sup>a</sup>Change in each country is multiplied by its share in EU15 GDP.

**Table 5.** *The effects of an isolated and a simultaneous 1% point increase in tax rate on capital income ( $t_r$ )*

Policy 3: An isolated 1% point increase in $t_r$					Policy 3: A simultaneous 1% point increase in $t_r$				
	Excess demand/Y (% points)	Multiplier	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	
	A	B	C=(A × B)	D	E	F	G	H	
A	-0.087	1.758	-0.152	-0.046	0.230	-0.268	-0.081	0.211	
B	-0.069	0.866	-0.059	-0.010	0.273	-0.156	-0.026	0.261	
DK	-0.065	2.252	-0.146	-0.052	0.241	-0.250	-0.089	0.224	
FIN	-0.072	3.028	-0.218	-0.097	0.241	-0.453	-0.201	0.218	
F	-0.098	2.262	-0.221	-0.072	0.214	-0.288	-0.087	0.202	
D	-0.090	2.234	-0.200	-0.048	0.258	-0.279	-0.066	0.244	
GR	-0.131	4.327	-0.566	-0.233	0.340	-0.718	-0.296	0.340	
IRL	-0.153	1.129	-0.173	-0.084	0.283	-0.226	-0.100	0.282	
I	-0.129	1.743	-0.225	-0.076	0.284	-0.299	-0.096	0.275	
L	-0.042	0.560	-0.023	-0.040	0.401	-0.203	-0.350	0.391	
NL	-0.167	4.842	-0.808	-0.450	0.153	-1.219	-0.664	0.102	
P	-0.072	2.096	-0.151	-0.059	0.242	-0.232	-0.091	0.231	
E	-0.058	2.933	-0.170	-0.050	0.262	-0.270	-0.080	0.246	
S	-0.043	1.538	-0.067	-0.040	0.289	-0.179	-0.072	0.282	
UK	-0.075	1.804	-0.135	-0.015	0.251	-0.173	-0.020	0.247	
EU15 <sup>a</sup>						-0.311	-0.103	0.238	

*Note:* A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

<sup>a</sup>Change in each country is multiplied by its share in EU15 GDP.

Table 6 shows the effects of policy 4, which captures a 1% point decrease in tax rate on labour income ( $t_w$ ). This policy has a significant positive effect on consumption, which leads to both higher output and private investment. When it is implemented simultaneously in all countries, it causes, on average, an increase in the EU15 GDP by 1.53% (Column F) and an increase in the EU15 private investment by 0.44% points (Column G). Interestingly, the primary budget balance improves as a result of policy 4 (Columns E and H). The strong positive effects on consumption result in a significant increase in the revenues that come from the taxation of consumption. This counterbalances the decrease in the taxes on labour.

Table 7 presents the effects of a progressive tax policy (Policy 5) based on a combination of a 1% point increase in the tax rate on profits (Policy 3) and a 1% point fall in the tax rate on wages (Policy 4). The positive effects of a fall in the tax rate on labour income on consumption outweigh the negative effects of a rise in the tax rate on capital income on consumption as well as private investment. All countries experience positive effects with values ranging between 0.43% (Ireland) and 3.44% (the Netherlands). Overall, EU15 GDP increases by 1.22% (Column F).

## 6. Conclusion

This paper constructed a short-run empirical post-Kaleckian model for EU15 countries, and the results were used to examine the effects of wage and fiscal policies on aggregate demand, investment and budget balance. The empirical analysis has shown that a simultaneous decline in the wage share in a highly integrated European economy leads to a decline in economic activity. There is room to stimulate demand in an economic climate of sluggish demand: a 1% point simultaneous increase in the wage share at the European level could lead to an increase in EU15 GDP by 1.41%.

The negative effects of a fall in the wage share on consumption overpower the positive effects on investment in 15 European countries. By considering after-tax income, we show that the differences in marginal propensity to consume out of wage versus profit income are significantly larger in the majority of the EU15 countries, compared to the previous empirical literature. Moreover, the general breakdown of the profit-investment nexus becomes even more apparent, when the investment is estimated as a function of after-tax profits. Hence, domestic demand is clearly wage-led in the EU15. Interestingly, integrating the foreign sector does not lead to a change in the impact of distribution on demand since domestic demand is strongly wage-led. Therefore, in isolation, without the international spillover effects, we find all countries to be wage-led.

The fiscal expansion has beneficial effects on aggregate demand in all EU15 countries and leads to higher private investment in almost all of them. In addition, the hypothesis that a more progressive tax system (e.g. a redistributive tax policy based on a 1% point fall in the tax rate on wages and a 1% point increase in the tax rate on capital) potentially stimulates demand is confirmed by our empirical estimations. The positive effects of a reduction of the tax rate on wages significantly induce consumption and thus outweigh the negative effects on investment spending (and consumption demand) due to an increase in the taxation of profit income.

As an outcome of a wage-led recovery scenario, the majority of the countries would experience increasing prices but by well below 2%. This implies that if the inflation rate were initially close to 0%, a wage stimulus in the EU15 would not lead to an inflation

**Table 6.** *The effects of an isolated and a simultaneous 1% point decrease in the tax rate on labour income ( $t_w$ )*

Policy 4: An isolated 1% point decrease in $t_w$					Policy 4: A simultaneous 1% point decrease in $t_w$				
	Excess demand/Y (% points)	Multiplier	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)		
<b>A</b>	0.512	<b>B</b>	<b>C=(A × B)</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	
<b>A</b>	0.512	1.758	0.900	0.272	0.635	1.472	0.446	0.729	
<b>B</b>	0.257	0.866	0.223	0.037	0.574	0.702	0.116	0.631	
<b>DK</b>	0.407	2.252	0.917	0.324	0.603	1.429	0.505	0.685	
<b>FIN</b>	0.364	3.028	1.102	0.489	0.621	2.257	1.002	0.734	
<b>F</b>	0.450	2.262	1.017	0.223	0.673	1.348	0.295	0.728	
<b>D</b>	0.581	2.234	1.298	0.308	0.739	1.663	0.394	0.808	
<b>GR</b>	0.337	4.327	1.458	0.600	0.503	2.218	0.913	0.504	
<b>IRL</b>	0.348	1.129	0.393	0.115	0.511	0.655	0.193	0.516	
<b>I</b>	0.279	1.743	0.486	0.126	0.602	0.877	0.228	0.650	
<b>L</b>	0.206	0.560	0.115	0.199	0.489	0.999	1.726	0.537	
<b>NL</b>	0.521	4.842	2.524	1.314	0.824	4.660	2.426	1.088	
<b>P</b>	0.461	2.096	0.965	0.379	0.679	1.362	0.535	0.728	
<b>E</b>	0.636	2.933	1.866	0.551	0.830	2.334	0.689	0.906	
<b>S</b>	0.280	1.538	0.430	0.124	0.468	0.982	0.284	0.504	
<b>UK</b>	0.491	1.804	0.886	0.100	0.608	1.068	0.120	0.625	
<b>EU15<sup>a</sup></b>						1.534	0.439	0.732	

*Note:* A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

<sup>a</sup>Change in each country is multiplied by its share in EU15 GDP.

**Table 7.** *The effects of an isolated and a simultaneous 1% point increase in tax rate on capital income ( $t_p$ ) and a 1% point decrease in the tax rate on labour income ( $t_w$ )*

Policy 5: An isolated 1% point increase in $t_r$ and a 1% point fall in $t_w$							Policy 5: A simultaneous 1% point increase in $t_r$ and a 1% point fall in $t_w$			
Excess demand/ $Y$ (% points)	Multiplier	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)	% point change in output (dY/Y)	% point change in private investment (dI/Y)	% point change in primary budget balance (dPB/Y)
<b>A</b>	<b>B</b>	<b>C=(A × B)</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>			
<b>A</b> 0.426	1.758	0.748	0.226	0.865	1.204	0.364	0.940			
<b>B</b> 0.189	0.866	0.163	0.027	0.847	0.545	0.090	0.893			
<b>DK</b> 0.342	2.252	0.771	0.272	0.844	1.179	0.417	0.909			
<b>FIN</b> 0.292	3.028	0.883	0.392	0.862	1.804	0.801	0.952			
<b>F</b> 0.352	2.262	0.796	0.150	0.886	1.060	0.208	0.930			
<b>D</b> 0.491	2.234	1.098	0.260	0.998	1.384	0.328	1.052			
<b>GR</b> 0.206	4.327	0.891	0.367	0.843	1.500	0.617	0.844			
<b>IRL</b> 0.195	1.129	0.220	0.031	0.794	0.430	0.093	0.798			
<b>I</b> 0.150	1.743	0.261	0.050	0.886	0.578	0.133	0.925			
<b>L</b> 0.164	0.560	0.092	0.159	0.890	0.796	1.376	0.928			
<b>NL</b> 0.354	4.842	1.716	0.864	0.977	3.440	1.762	1.190			
<b>P</b> 0.389	2.096	0.814	0.320	0.920	1.130	0.444	0.960			
<b>E</b> 0.579	2.933	1.697	0.501	1.091	2.064	0.610	1.151			
<b>S</b> 0.236	1.538	0.364	0.085	0.757	0.803	0.212	0.786			
<b>UK</b> 0.416	1.804	0.750	0.085	0.858	0.895	0.101	0.872			
<b>EU15<sup>a</sup></b>					1.223	0.336	0.969			

*Note:* A, Austria; B, Belgium; DK, Denmark; FIN, Finland; F, France; D, Germany; GR, Greece; IRL, Ireland; I, Italy; L, Luxembourg; NL, Netherlands; P, Portugal; E, Spain; S, Sweden; UK, United Kingdom.

<sup>a</sup>Change in each country is multiplied by its share in EU15 GDP.

rate higher than the ECB target inflation rate of 2%. In fact, it would help keep the European economy away from deflation.

Drawing on our results, it could be argued that a policy mix that would combine a pro-labour wage policy, an increase in government spending and a more progressive tax system would increase output in the EU15 countries significantly. Due to the positive spillover effects on demand, this effect would be even more significant if this policy mix would be implemented in a coordinated fashion across Europe. Furthermore, it is very likely that such a policy mix would improve the primary budget balance because of the positive effects of higher economic activity on tax revenues.

The econometrically estimated model in this paper has been kept quite simple to illuminate the key channels through which income distribution and fiscal policy interact in a demand-led economy. Future extensions of the model could move beyond the short-run nature of our analysis by incorporating the long-run dynamics of labour productivity, capital accumulation, private debt, employment and public debt. In addition, future empirical research could investigate how the combination of wage and fiscal policy could be used to achieve social and environmental targets, such as gender equality and low carbon emissions.

## Supplementary data

Supplementary data are available at *Cambridge Journal of Economics* online.

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