Wage-Led vs. Profit-Led Demand:

A Comprehensive Empirical Analysis

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ABSTRACT

This study investigates various economic factors' impact in determining the relationship between functional income distribution and aggregate demand from both a theoretical and an empirical viewpoint. Inspired by Bhaduri and Marglin (1990), we base our analysis on a demand-driven growth model for an open economy that allows for either profit-led or wage-led regimes. Our results strongly indicate that a higher level of trade openness is associated with a lower probability of being wage-led. We find evidence that lower wage inequality makes an economy more wage-led and that countries with a greater private credit-to-GDP ratio are more likely to be profit-led.

Keywords: Distribution, demand, economic growth, trade openness, Keynesian economics

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1. Introduction

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This paper investigates structural factors that determine the relationships between aggregate demand and income inequality. We follow a neo-Kaleckian framework as presented by Bhaduri and Marglin (1990) in which economic growth is demand-driven. In this framework, the overall impact of changes in wage share on growth determines whether regimes are profit-led or wage-led. Rising wage shares can stimulate economic growth because workers have a greater marginal propensity to consume than capitalists (e.g. Keynes, 1936; Hein & Vogel, 2007; Alarco, 2016). However, larger wage shares (which also means squeezing profit share) can also create disincentives for private investment. Moreover, higher wage shares driven by higher wages can reduce domestic firms' international competitiveness. Whichever effect is more substantial is a widely investigated empirical question (e.g. Naastepad, 2006; Onaran, Stockhammer, & Grafl, 2011; Onaran & Galanis, 2014; Alarco, 2016; Obst, Onaran, & Nikolaidi, 2017).

Despite recent increased emphasis on empirical analysis of the relationship between wage share and economic growth, there has been minimal empirical discussion regarding the factors that determine this relationship. Several theoretical papers (e.g. von Arnim, Tavani & Carvalho, 2014; Palley, 2015, 2017; Kapeller & Schütz, 2015) have discussed the factors that determine wage share's impact on economic growth. Carvalho and Rezai (2016) empirically show that rising wage inequalities make the US economy more profit-led while Stockhammer and Ederer (2008) for Austria and Stockhammer, Hein, and Grafl (2011) for Germany have investigated globalisation's impact by estimating wage share's impact on economic growth. Our study aims to fill the gap in the literature through a comprehensive empirical analysis of the structural factors behind the demand regime using a broad cross-section of economies.

In our analysis, we first estimate the impact of the wage share on GDP using a Vector Error Correction Model (VECM) and Autoregressive Distributed Lag (ARDL) for 41 countries for which there is a long-run relationship between these two variables. Next, we

examine the impact of different characteristics on the probability of each regime being wage-led or profit-led using probit analysis. Finally, we identify the factors that affect the level of the wage share's coefficient in our first stage analysis using meta-regression.

The paper focuses explicitly on the impact of trade openness, wage inequality and the private credit-to-GDP ratio in determining whether a regime is profit-led or wage-led. We prefer these three factors since they have rapidly evolved, particularly during the neoliberal era since the 1980s, and are widely associated with neoliberalism (e.g. Harvey, 2005; Duménil & Lévy, 2011).[2] The type of globalisation experienced by national economies has led to a "race to the bottom" in which wage competition between countries stimulated a simultaneous decline in wage shares (Rodrik, 1997; Kiefer & Nada, 2015). Indeed, Onaran and Galanis (2014) noted that globalisation with wage policy coordination between countries could have improved growth and employment in all coordinating countries. However, due to insufficient international wage policy coordination, our results show that countries that are more open to trade are significantly more likely to be profit-led.

[2] Although the neoliberal era is associated with a series of privatizations, the decline of the welfare state and a reduction of taxes on top incomes (Harvey, 2005), neoliberalism's influence is not consistently reflected in declining government expenditure as a share of GDP. We therefore do not examine the impact of government expenditure as a share of GDP on the wage-ledness of an economy in this paper. Between 1980 and 2011, the latest year covered in this study, general government final consumption expenditure as a share of GDP increased in Austria, Australia, Belgium, Chile, Colombia, Denmark, Finland, Greece, Hong Kong, Iceland, Italy, Japan, Malta, Mexico, Netherlands, Norway, South Africa, Spain, Turkey, the United States and Uruguay (World Bank, 2018). This increase might be because state intervention has been transformed rather than simply reduced under neoliberalism, as highlighted by Fine and Saad-Filho (2017). Moreover, many developing economies could still have increased their education, healthcare, and social welfare expenditure since 1980 due to rising demand generated by urbanisation.

Since the 1980s, wage inequality in both OECD and non-OECD countries has also been rising (Galbraith, 2011). According to our estimates, this situation may also lead to a growth model in which it is harder for workers and capitalists to coordinate. Our meta-regression analyses reveal that countries with higher wage inequality are more profit-led[3]. Finally, many studies show that both developing and developed countries have experienced a rise in financialisation during the neoliberal era, in which financial incomes have increased significantly more than non-financial incomes, the financial activities of non-financial firms, and non-financial sector and household debt (Epstein & Jayadev, 2005; Demir, 2009; Jayadev, Mason, & Schröder, 2018). We examine the impact of financialisation on the demand regime using domestic credit to the private sector as a percentage of GDP. Our results show that countries with higher private credit-to-GDP ratios are more likely to be profit-led. Using an alternative meta-regression analysis for a more limited number of countries, we also show that countries with greater household debt/GDP ratios are more profit-led.

These results hint that lower wage inequality and globalisation strategies that considers wage policy coordination between countries creates an economic environment in which domestic labour-friendly policies stimulate higher economic growth. Moreover, financialisation impedes achieving higher growth with labour-friendly policies.

The rest of the paper is organized as follows. In the next section, we discuss the structural factors that make an economy wage-led or profit-led. In section three, we present our empirical analysis while section four provides our conclusions.

[3] 'Being more likely to be profit-led (wage-led)' and 'being more profit-led (wage-led)' or 'profit-ledness (wage-ledness)' have slightly different meanings. 'Being more likely to be profit-led (wage-led)' refers to having higher probability of being profit-led (wage-led). We test this using a probit analysis in our empirical section. On the other hand, 'being more profit-led (wage-led)' mean profit share has a larger positive (negative) impact on aggregate demand. We test this using a meta-regression in our empirical section.

2. Theoretical Background

In this section, after providing background from the existing literature, we develop a full-fledged model and investigate which factors affect the wage-ledness/profit-ledness of an economy. We define wage-ledness (profit-ledness) as the magnitude of wage share's positive (negative) impact on aggregate output.[4]

2.1 Wage-led or Profit-led?

The earlier works of Rowthorn (1981) and Bowles and Boyer (1988) examined the impact of changing real wages on economic growth to show that higher real wages can either increase or reduce economic growth depending on the type of regime. Bhaduri and Marglin (1990) had a significant influence in forming the neo-Kaleckian approach on the relationship between wage shares and growth. According to their model, capital accumulation is determined by profit share and the capacity utilisation rate determines capital accumulation. Assuming that capitalists have a greater propensity to save than workers, then increasing the workers' income share should stimulate consumption, which might also raise capacity utilisation. However, higher wage shares have a negative direct impact on investment since a squeeze in profit share might discourage capitalists from investing and also reduce capacity utilisation. If the direct negative effect of higher wage shares on capacity utilisation is greater than the positive effect of wage shares through increased consumption, then higher wage shares will reduce capacity utilisation and total demand. In this case, growth regime will be exhilarationist (profit-led). If, however, a larger wage share has a positive effect on the balance due to rising consumption, then growth regime will be stagnationist (wage-led) in that

[4] The terms 'wage-ledness' and 'profit-ledness' were previously used in Carvalho and Rezai (2016) and Nikiforos (2016). Carvalho and Rezai (2016) and Nikiforos (2016) respectively use 'profit-ledness' (wage-ledness) as the magnitude of the wage share's positive (negative) effect on capacity utilisation and growth.

higher wage share stimulates aggregate demand. Moreover, Bhaduri and Marglin model shows that higher wage share reduces net exports; therefore, growth regime is more likely to be exhilarationist in an open economy.

The type of growth or demand regime in each country has been examined empirically using various methodologies. One group of studies tests the relationship between capacity utilisation and profit share by considering these two variables within a two-way relationship. In their SVAR analysis, Stockhammer and Onaran (2004) estimated that profit share does not Granger cause capacity utilisation in the US, the UK or France. On the other hand, Barbosa-Filho and Taylor (2006) using VAR, Basu and Gautham (2019), using SVAR, and Carvalho and Rezai (2016) using TVAR, found that the US economy is profit-led. Moreover, Nikiforos and Foley (2012) showed that the US economy has multiple equilibrium points: one equilibrium with a higher wage share and capacity utilisation and another equilibrium with a lower wage share and capacity utilisation. In contrast, Nikiforos and Foley rejected the conventional wage-led growth understanding to conclude that the US economy is wage-led because distributive or technological changes that favour the wage share lead the US economy to the equilibrium with higher capacity utilisation, although the initial impact of this change on capacity utilisation is negative.

Another group of studies estimates wage (or profit) shares' impact on GDP by decomposing GDP into its components (consumption, investment, exports and imports). These studies first estimate wage share's impact on each component and then predict the overall impact of wage share on GDP using the estimated coefficients. In an earlier version of this approach, Bowles and Boyer (1995) tested the impact of wages on each component of GDP for five developed economies. Later, many studies (Alarco, 2016; Álvarez, Uxó & Febrero, 2019; Hein & Vogel, 2007; Onaran & Galanis, 2014; Onaran & Obst, 2016; Onaran, Stockhammer & Grafl, 2011; Stockhammer & Ederer, 2007; Stockhammer, Onaran, &

Ederer, 2009) examined wage share's effects on each component of private aggregate demand to predict its overall impact on the percentage change in aggregate private demand for various country cases. These studies mainly implemented time-series analysis techniques. Equally important, Naastepad and Storm (2006), for 8 OECD countries, and Hartwig (2014), for all OECD countries, estimated real wage growth's impact on the growth of each component of GDP to predict the effect on overall output growth. Appendix 1 lists the results of the studies for the countries examined in this paper. In addition, Stockhammer, Onaran, and Ederer (2009) found that the Euro area as a whole is wage-led while Hartwig (2014), using panel data analysis, estimated that OECD countries are on average wage-led.

2.2 A simple model on wage-led/profit-led growth

We use a simple model to demonstrate the relationship between profit share (π) and total output (Y). Using this model, we also aim to discuss the structural conditions that make a country more likely to be wage-led or profit-led. Following previous theoretical and empirical work, we define total output (Y) as the sum of consumption (C), investment (I), government expenditure (G), exports (X) and imports (M):

$$Y = C(W, R) + I(Y, \pi, b) + X(Y_W, \pi, e) - M(Y, \pi, e) \quad (1)$$

where W is total wage payments, R total profits, b business confidence, Y_W world demand and e real exchange rate. An increase in e indicates real depreciation. We omitted government expenditure for simplicity. Workers earn wages and capitalists earn profits. Workers and capitalists share total income (Y) based on profit share. Therefore, total wage payments (W) and total profits (R) are

$$W = Y(1 - \pi), \qquad R = Y\pi \quad (2)$$

Following this, the consumption function can be defined as

$$C = c_0 + c_W Y(1 - \pi) + c_R Y\pi, \qquad c_0 > 0, c_W > 0, c_R > 0 \quad (3)$$

where c_W and c_R are the marginal propensities to consume by workers and capitalists, respectively. In *The General Theory of Employment, Interest and Money,* Keynes (1936) noted that the marginal propensity to consume is larger for the poorer population members, which in our model is represented by workers. Keynes's argument is strongly consistent with the empirical findings on profit share's impact on consumption (e.g. Hein & Vogel, 2007; Onaran & Obst, 2016; Alarco, 2016; Obst, Onaran, & Nikolaidi, 2017).[5] Accordingly, we assume that workers have a greater propensity to consume ($c_W > c_R$). Hence, income redistribution of income from capitalists to workers increases consumption.

We define the investment function similarly to Naastepad's (2006) investment function:

$$I = \phi_0 (Y)^{\phi_1} (\pi)^{\phi_2} (b)^{\phi_3} \tag{4}$$

where $\phi_1$and ϕ_2 represent elasticities of investment with respect to total output and profit share, respectively. Greater total demand increases capacity utilisation and stimulates investment ($\phi_1 > 0$). Larger profit shares have a direct positive effect on investment ($\phi_2 > 0$) while improving business confidence (b) also raises investment ($\phi_3 > 0$).

Next, we define exports (X) as a function of world demand (Y_W), profit share (π) and real exchange rate (e):

$$X = \alpha_0 (Y_W)^{\alpha_1} (\pi)^{\alpha_2} (e)^{\alpha_3} \tag{5}$$

where

$$\alpha_0 > 0, \quad \alpha_1 > 0, \ \ \alpha_2 > 0, \quad \alpha_3 > 0 \tag{6}$$

[5] Hein and Vogel (2007) for 6 OECD economies, Alarco (2016) for 16 Latin American economies, and Obst, Onaran, and Nikolaidi (2017) for 15 EU countries, estimated wage share's impact on consumption. They all found that a higher wage share also increases consumption in all estimated countries. This outcome supports the argument that workers have a greater propensity to consume than capitalists.

An increase in e represents a real currency depreciation. We assume that $\alpha_2 > 0$ since increasing unit labour costs relative to unit labour costs in the trading partner reduces international competitiveness, since the unit labour cost is inversely related to profit share; hence profit share declines are likely to reduce exports (Naastepad, 2006; Hein & Tarassow, 2010; Onaran & Obst, 2016; Obst, Onaran, & Nikolaidi 2017). We define the import function (M) similarly except for assuming that imports are dependent on domestic income (Y) rather than world income (Y_W)[6]:

$$M = \gamma_0 (Y)^{\gamma_1} (\pi)^{\gamma_2} (e)^{\gamma_3} \tag{7}$$

where

$$\gamma_0 > 0, \quad \gamma_1 > 0, \quad \gamma_2 < 0, \quad \gamma_3 < 0 \tag{8}$$

Following equations (1), (3), (4), (5) and (7), we find the impact of profit share on the percentage change in output (θ_1) as

$$\theta_1 = \frac{1}{Y}\frac{dY}{d\pi} = \frac{1}{Y}\left(\frac{\left|\frac{\partial C}{\partial \pi}\right|_Y + \left|\frac{\partial I}{\partial \pi}\right|_Y + \left|\frac{\partial X}{\partial \pi}\right|_Y - \left|\frac{\partial M}{\partial \pi}\right|_Y}{\left|\frac{\partial Y}{\partial Y}\right|_\pi - \left|\frac{\partial C}{\partial Y}\right|_\pi - \left|\frac{\partial I}{\partial Y}\right|_\pi - \left|\frac{\partial X}{\partial Y}\right|_\pi + \left|\frac{\partial M}{\partial Y}\right|_\pi} \right) \tag{9}$$

which can be simplified as

$$\theta_1 = \frac{\left(\frac{dY}{d\pi}\right)}{Y} = \frac{-(c_W - c_R) + \phi_2 \frac{I}{R} + \alpha_2 \frac{X}{R} - \gamma_2 \frac{M}{R}}{\psi_1} \tag{10}$$

where

$$\psi_1 = 1 - c_W(1-\pi) - c_R\pi - \phi_1 \frac{I}{Y} + \gamma_1 \frac{M}{Y} \tag{11}$$

[6] In contrast to our work, Naastepad (2006) assumes that imports are solely dependent on domestic output. Similarly, in Hein and Tarassow's (2010) model, only capacity utilisation has a negative impact on net exports. However, changes in profit share and real appreciation also affect imports since these changes also alter the relative competitiveness of domestic goods in the home markets.

We assume that the Keynesian stability condition holds: $(\psi_1 > 0)$.[7] The demand regime in an economy will be wage-led if the negative impact of rising profit share due to the gap in marginal propensities to consume $(c_W - c_R)$ is greater than its positive effect on investment, exports and imports. The regime is profit-led in the reverse case.[8]

2.3. Factors affecting wage-ledness and profit-ledness

The demand regime in an economy depends on country-specific structural factors. In this section, we discuss theoretically the structural factors that determine whether an economy's

[7] Keynesian stability condition holds when the equilibrium in equation (9) is stable. Equation (1) is stable when $\frac{d(\Delta Y)}{dY} < 0$, which holds when at goods market equilibrium, higher total output eliminates excess demand relative to total output (or when at goods market equilibrium, the impact of aggregate output on leakages is greater than its impact on injections). That is, the Keynesian stability condition holds when $\frac{d(S+M)}{dY} - \frac{d(I+X)}{dY} = \frac{d(Y-C-I-X+M)}{dY} = 1 - c_W(1-\pi) - c_R\pi - \phi_1\frac{I}{Y} + \gamma_1\frac{M}{Y} > 0$, where *S* is savings ($S = Y - C$).

[8] One limitation of this study is that our model does not consider technical change and its influence on the relationship between distribution and output. However, examining its impact would require a different theoretical framework, which separately considers the longer-run effects of changes in average wage (*w*) and employment (*L*), as in Naastepad and Storm (2017), Hein and Tarassow (2010), von Armin (2011) and Onaran, Oyvat, and Fotopoulou (2019). At constant wages, an increase in labour productivity (*T*) through exogenous technical change is directly reflected in the profit share since $T = \frac{Y}{L} = w(Y/(wL)) = w(1/(1-\pi))$ and $\mathrm{d}\pi/\mathrm{d}T = w/T^2$. However, an increase in wages increases labour productivity in the medium run through pushing labour-saving technologies. It also has secondary effects by changing the effects of wages on scale of the production (known as the Kaldor-Verdoorn effect). Moreover, increasing wages can also affect labour productivity in the medium term through households' increased social expenditure (e.g. educational, healthcare, and caring) (Onaran, Oyvat, and Fotopoulou, 2019). For space considerations and as our empirical analysis is based on wage share rather than average wages, we do not expand our model to examine the dynamic relationship between average wage, productivity and output.

demand is profit-led or wage-led. We will focus on the influence of three factors: trade openness, wage inequality and credit availability.

2.3.1 Trade openness

The impact of international trade on the relationship between wage share and economic growth was examined in the earlier neo-Kaleckian work. Blecker (1989), and Bhaduri and Marglin (1990) showed that greater wage shares reduce international economies' competitiveness through increased real production costs. Therefore, a growth regime becomes less likely to be wage-led when we consider net exports. Using a neo-Kaleckian two-country model, von Arnim, Tavani, and Carvalho (2014) showed that an increase in home country wage share decreases its global demand share and lowers its growth unless foreign country's wage share also rises. Casetti (2012)'s model reflected that international trade may make a wage-led economy profit-led under certain conditions; however, in the case that wages simultaneously increase throughout the world in international coordination, international trade would not reduce wage-ledness of economies. In another neo-Kaleckian two-country model, Rezai (2015) showed that trade openness makes the home economy more profit-led if currency depreciation in the home country increases its output.

Empirical studies following the neo-Kaleckian framework have strongly supported the argument that the net exports component of aggregate demand in most economies is profit-led (e.g. Naastepad & Storm, 2006; Onaran & Galanis, 2014, Onaran & Obst, 2016).[9] Similarly,

[9] To our knowledge, none of the empirical work examining the growth regime of net exports has reported that the net exports component of GDP is wage-led. For all 15 countries and the EU-15 area estimated, Onaran and Galanis (2014) found that net exports are profit-led. Similarly, Onaran and Obst (2016) found that net exports in 14 of 15 EU countries are profit led while the impact of net exports on aggregate demand in Luxembourg is

using panel data analysis for a sample of 20 countries, Behringer and van Treeck (2013) estimated that a greater wage share damages the current account balance. These results hint that trade openness would make countries more profit-led through expanding the share of profit-led components of aggregate demand.

Several studies have estimated the possible impact of trade openness on the link between the wage share and aggregate demand. Stockhammer and Ederer (2008), for Austria, and Stockhammer, Hein, and Grafl (2011), for Germany, concluded that globalisation has weakened the positive impact of the wage share on aggregate demand in Germany through expanding net exports' influence on aggregate demand. Moreover, Onaran and Galanis (2014) showed that Australia, Canada, Mexico, Argentina, India, China and South Africa have wage-led domestic demand but are profit-led economies when net exports are also considered.

In today's globalized world, the pressure of international competitiveness and wage share's negative effect on net exports weakens labour movements and leads to policies that change distribution in favour of the owners of capital (Rodrik, 1997, Onaran, 2009, Oyvat, 2011). This situation leads to a race to the bottom in which many countries simultaneously reduce wage shares. However, these countries cannot stimulate economic growth through lower wage shares since net exports in every country, by definition, cannot simultaneously increase.

Kiefer and Rada (2015) tested the race to the bottom arguments in a panel of 13 OECD countries and concluded that the wage shares are on average declining due to international competition between countries for high profits. Moreover, they found that both capacity utilisation rates and wage shares have fallen simultaneously in these 13 OECD countries due to the race to the bottom. Similarly, Onaran and Galanis (2014) estimated the

insignificant. Similarly, Naastepad and Storm (2006) found that the impact of wage growth on export growth is negative in six OECD countries and negligible in the Netherlands and the US.

effect of a simultaneous wage shares increase in the Euro-area 12 and in 12 other economies. They reported that all these economies would be more wage-led if they jointly expanded their wage shares by international coordination. They also concluded that the G-20 as a whole is wage-led.

However, in isolation, greater trade openness increases the contribution of GDP's profit-led component, thereby increasing the likelihood of a country being profit-led. Our model demonstrates rising trade openness's influence on growth regimes. If the exports/output and imports/output ratios are higher due to exogenous factors (e.g. greater concentration of production in specific sectors, trade agreements), α_0 and γ_0 are higher. For any given Y and π, an economy with higher α_0, and hence a greater share of exports in GDP, is more likely to be profit-led.

$$\frac{d\theta_1}{d\alpha_0} = \frac{\alpha_2 X}{\alpha_0 \psi_1 R} > 0 \tag{12}$$

The impact of γ_0, and hence the greater share of imports in GDP, is conditional on the profit-ledness of an economy, as shown in equation (13). The sign of equation (13) depends on γ_0's effect on θ_1 through, γ_0's direct effect on the sign of change in the GDP-profit share relationship ($\frac{M}{\gamma_0}\frac{\gamma_2}{R\psi_1}$) and its effect by changing the GDP multiplier ($\frac{M}{\gamma_0}\frac{\gamma_1\theta_1}{Y\psi_1}$).

$$\frac{d\theta_1}{d\gamma_0} = -\frac{\frac{M}{\gamma_0}\left(\frac{\gamma_2}{R} + \frac{\gamma_1\theta_1}{Y}\right)}{\psi_1} \tag{13}$$

If the demand regime is wage-led ($\theta_1 < 0$), greater γ_0 values push the economy towards a more profit-led regime ($\frac{\partial\theta_1}{\partial\gamma_0} > 0$). In a weakly profit-led demand regime such that γ_0's impact on θ_1's numerator is stronger than its effect through the multiplier ($\frac{\gamma_2}{R} < \frac{\gamma_1\theta_1}{Y}$), then greater γ_0 values still make the demand regime more profit-led. However, if γ_0's effect

through the multiplier is stronger, then the larger γ_0 values push the regime toward being less profit-led. Therefore, the ambiguity of the sign of $\frac{\partial \theta_1}{\partial \gamma_0}$ affects only the magnitude of profit-ledness while greater openness to imports (γ_0) still increases the likelihood of being profit-led. In short, economies that are more open to trade are more likely to be profit-led.

2.3.2 Wage inequality

Income distribution among workers is another factor affecting the wage-ledness of an economy. Income distribution affects workers' average propensity to consume. Workers with lower wages are expected to have a higher consumption propensity following the Keynesian view that consumption propensity is higher for more impoverished populations. The lower propensity to consume (and a higher savings rate) in higher-income quartiles was demonstrated by Carvalho and Rezai (2016) for the US. Based on this finding, Carvalho and Rezai assumed that an increase in wage inequality increases workers' savings rate and makes the demand regime more profit led. Carvalho and Rezai also supported their argument empirically by demonstrating that the US economic regime is less profit-led when US wage inequality is lower. Similarly, using three class analyses (capitalists/top management, managers/middle managers, workers), Palley (2015, 2017) showed that reducing managers' (or middle managers') share in the wage bill shifts an economic regime from profit-led to wage-led.[10]

[10] Palley used different terminology in his theoretical models in Palley (2015) and Palley (2017). In Palley (2015), he assumed that capitalists and the top management class receive the profits and that the middle management class receives higher wages than the worker class. In Palley (2017), however, these three classes listed are named capitalists, managers, and workers. In our paper, we also assume that capitalists again receive a larger share of profits while managers receive higher wages than workers.

We can observe the impact of wage inequality on wage-ledness by using a consumption equation that includes two types of agents receiving higher and lower wages. The agents receiving higher wages may be managers and/or highly-skilled workers, whom we consider to constitute the smaller part of the population receiving wages.

$$C = c_0 + \big(c_H\sigma + c_L(1-\sigma)\big)Y(1-\pi) + \ c_R Y\pi\ , \tag{14}$$

$$c_0 > 0, c_H > 0, c_L > 0, c_R > 0 \tag{15}$$

where c_H and c_L are the propensity to consume values for those receiving higher and lower wages, respectively, and σ is the share that workers with higher wages receive of total wage payments. Following this, we can show the impact of rising profit share on the percentage change in total output (θ_2) as

$$\theta_2 = \frac{\left(\frac{dY}{d\pi}\right)}{Y} = \frac{-(c_H\sigma + c_L(1-\sigma) - c_R) + \phi_2\frac{I}{R} + \alpha_2\frac{X}{R} - \gamma_2\frac{M}{R}}{\psi_2} \tag{16}$$

where

$$\psi_2 = 1 - (c_H\sigma + c_L(1-\sigma))(1-\pi) - c_R\pi - \phi_1\frac{I}{Y} + \gamma_1\frac{M}{Y} \tag{17}$$

We assume that the Keynesian stability condition holds and that $\psi_2 > 0$. Overall, the effect of a rising share of higher wages on profit-ledness is

$$\frac{d\theta_2}{d\sigma} = \frac{(c_L - c_H)(1-(1-\pi)\theta_2)}{\psi_2} \tag{18}$$

which will be positive when

$$1 > (1-\pi)\theta_2 \tag{19}$$

According to estimates by Alarco (2016), Hein and Vogel (2008), and Obst, Onaran, and Nikolaidi (2017), which consider groups of countries, all of the examined countries satisfy the condition above.[11] Similarly, according to our estimates in Section 3.3, the condition (19) is satisfied for all countries in our sample, except Italy and Norway.

In summary, rising wage inequality pushes wage-led countries ($\theta_2 < 0$) towards being more profit-led. Higher wage inequality also increases the profit-ledness of profit-led economies ($\theta_2 > 0$) unless the negative impact of a higher wage share on total output is exceptionally high. The ambiguity that we highlight for profit-led economies is similar to the outcome noted in Carvalho and Rezai (2016).

2.3.3 Household borrowing and debt

Several studies have examined the impact of household borrowing and debt. Using a Steindlian model of consumer debt, Dutt (2006) showed that consumer borrowing simulates short-run growth through rising consumer demand. However, in the long run, its effect is ambiguous due to increasing consumer debt and redistribution of income in favour of higher income groups. Moreover, financial innovations and securitisation often support consumer loans growth (Stockhammer, 2012). Bertay, Gong, and Wagner (2017) claim that securitisation can decrease economic activity if it leads to excessive debt burdens and defaults because securitisation reduces banks' incentives for screening and monitoring, which leads to low-quality loans.

[11] According to Alarco (2016), Hein and Vogel (2008), and Obst, Onaran, and Nikolaidi (2017)'s estimates, a percentage point increase in profit share does not increase the total output by more than 1% in any of the countries.

In their empirical analysis, Stockhammer and Wildauer (2015) showed that the OECD economies were debt-driven before the 2007 crisis. Similarly, Kim, Setterfield, and Mei (2015) showed that household borrowing had a significant positive effect on consumption in the post-1980 US economy. However, Kim (2016) reported a negative long-run relationship between household debt and GDP in the US from his examination of data from 1951Q4 to 2009Q1, a span that included the 2007 crisis. Moreover, Onaran, Stockhammer, and Grafl (2011) estimated that an increase in rentier income share at the expense of wage income had net negative effects on consumption and investment in the US. In addition, using a panel of 104 countries for 1995-2012, Bertay, Gong, and Wagner (2017) showed that securitisation of household loans raised the share of nonperforming loans in total loans while reducing investment growth.

The impact of borrowing and debt on the wage-ledness of a country was first examined by Kapeller and Schütz (2015). They noted that if lower income workers borrow sufficient consumer credit to keep their consumption up with higher income workers, growth regimes may shift from a wage-led to a "consumption-driven profit-led demand regime". However, rising debt makes consumer borrowing's influence on the type of regime ambiguous since a lower wage share can also increase indebtedness and reduce workers' consumption due to interest payments and instalments. Vasudevan (2017) also noted the ambiguity of the finance sector's influence on the type of growth regime. According to Vasudevan's model, finance-led regimes tend to be profit-led whereas finance-burdened regimes tend to be wage-led.

Setterfield and Kim (2016) and Setterfield, Kim and Rees (2016) showed that economies are more profit-led in the short-term when workers' savings and net borrowing are considered. This is because rising profit shares increase workers' borrowing and rentier income, and consequently rentiers' consumption, which both lead to conditions in which

higher profit shares raise consumption. However, debt-led growth regimes may not be sustainable in the long run because a higher profit share can also cause an economic crisis if it pushes household debt to an unsustainable level.

We can also examine the effect of household borrowing and debt using our simple model in Section 2.2. For simplicity, we assume that an economy is closed ($X = 0, M = 0$). Following Kapeller and Schütz (2015), Setterfield and Kim (2016) and Setterfield, Kim, and Rees (2016), we assume that instead of saving, workers tend to borrow to keep up with higher income agents' consumption, which in our case are the capitalists. By saving and lending to workers, these capitalists receive an interest income on top of their profits. Therefore, capitalists' consumption (C_R) is a function of their profit and interest revenues,

$$C_R = c_R(\pi Y + iD) \tag{20}$$

where *i* is the rate of interest and *D* is the debt stock

A consumption function similar to Kapeller and Schütz (2015) represents the workers' consumption

$$C'_W = \beta(C_R/N_R)N_W + (1-\beta)C_W \tag{21}$$

where N_W is the number of workers, N_R the number of capitalists and β is a term that reflects households' desire and capability to borrow. In Kapeller and Schütz (2015), lower income workers borrow to keep up with higher income workers' consumption. Unlike their model, however, our simple model includes two agents, namely capitalists and workers. Workers borrow to keep up with capitalists' consumption. C_W is the consumption of workers when workers do not borrow ($\beta = 0$) yet still face a debt burden:

$$C_W = c_W((1-\pi)Y - iD) \tag{22}$$

C_R/N_R is the average consumption of a capitalist. An average worker consumes as much as a capitalist by borrowing if $\beta = 1$.

Considering that λ is the ratio between the number of capitalists (N_R) and number of workers (N_W),

$$\lambda = N_R/N_W \tag{23}$$

This makes the consumption of workers

$$C'_W = \frac{\beta}{\lambda}(c_R(\pi Y + iD)) + (1-\beta)C_W \tag{24}$$

Following this, the total consumption function is

$$C = c_R\left(1+\frac{\beta}{\lambda}\right)(\pi Y + iD) + (1-\beta)c_W\big((1-\pi)Y - iD\big) \tag{25}$$

From (1), (4) and (25), we can conclude that rising profit shares' short-run impact on the percentage change in total output (θ_3) is

$$\theta_3 = \frac{\frac{dY}{d\pi}}{Y} = \frac{c_R\left(1+\frac{\beta}{\lambda}\right) - (1-\beta)c_W + \phi_2\frac{I}{R}}{\psi_3} \tag{26}$$

where

$$\psi_3 = 1 - c_R\pi\left(1+\frac{\beta}{\lambda}\right) - (1-\beta)c_W(1-\pi) - \phi_1\frac{I}{Y} \tag{27}$$

Given the Keynesian stability condition holds ($\psi_3 > 0$), we can show the impact of workers' changing borrowing behaviour on short-run profit-ledness as

$$\frac{d\theta_3}{d\beta} = \frac{\left(\frac{c_R}{\lambda} + c_W\right) - \theta_3\left(c_W(1-\pi) - \frac{c_R\pi}{\lambda}\right)}{\psi_3} \tag{28}$$

A positive sign for $\frac{d\theta_3}{d\beta}$ is probable as $c_W > c_W(1-\pi)\theta_3$ is likely to be observed based on previously estimated coefficients for θ_3 (Alarco, 2016; Hein & Vogel, 2008; Obst, Onaran, & Nikolaidi, 2017; Onaran & Galanis, 2014) and the coefficients that we estimated in Tables 2 and 3 in this paper. Hence, when increases in overall indebtedness are not considered, worker households' desire and capability to borrow can make an economy more profit-led in the short run. This condition arises because household credit keeps workers' consumption at higher levels, even when their wage share declines.

However, household debt also increases in each period by the sum of the gap between workers' consumption and workers' net income after their interest payments:

$$\begin{aligned} \frac{dD}{dt} = \dot{D} &= C'_W - \big((1-\pi)Y - iD\big) \\ &= c_R\left(\frac{\beta}{\lambda}\right)(\pi Y + iD) - (1-c_W)\big((1-\pi)Y + iD\big) \end{aligned} \tag{29}$$

Higher profit shares lead to faster accumulation of consumer debt with the given constant parameters:

$$\frac{d\dot{D}}{d\pi} = \left(c_R\frac{\beta}{\lambda} + (1-c_W)\right)Y > 0 \tag{30}$$

Moreover, workers' higher capacity and willingness to borrow (β) increases the magnitude of profit share's effect on the rise in debt:

$$\frac{\partial^2\dot{D}}{\partial\pi\partial\beta} = c_R\frac{Y}{\lambda} > 0 \tag{31}$$

The effect of debt on output is ambiguous:

$$\frac{dY}{dD} = c_R\left(1+\frac{\beta}{\lambda}\right)i - (1-\beta)c_W i \tag{32}$$

This shows that higher borrowing can also increase profit shares' negative impact on output since an increase in the profit share at higher levels of borrowing can also restrict workers' consumption by causing high levels of debt. Hence, similar to Kapeller and Schütz (2015) and Setterfield, Kim, and Rees (2016), we show that the impact of worker households' desire and capability to borrow on wage-ledness is ambiguous when we consider household debt.

3. Empirical Analysis

Based on the simple model developed in the previous section, we constructed three empirically testable hypotheses. Specifically, we will test whether

1. a higher level of trade openness

2. a higher level of wage inequality

3. a higher level of private credit to GDP ratio make a growth regime more wage-led or profit-led.

After describing the empirical methodology and the dataset employed in the analysis, the following section presents the estimation results.

3.1 Methodology

Our empirical methodology uses a two-step estimation approach: First, we conduct a time-series analysis for each country in our sample to establish whether its demand regime type is wage-led or profit-led. Second, using the first step's findings, we run cross-country regressions to identify which factors explain why countries are classified as wage-led or profit-led.

3.1.1. Time-Series Analysis

In each country's time-series analysis, we aim to establish a robust relationship between the wage share (ratio of total wage bill to GDP) and aggregate real GDP's natural logarithm. Unlike previous work following the GDP decomposition approach (e.g. Obst & Onaran, 2016; Hein & Vogel, 2008) in which the researchers estimated each GDP component's relationship separately, we estimate a single regression for each country. We choose this approach because meta-regression analyses require the use of one coefficient and one standard deviation for each country. Moreover, for greater consistency in our estimations, we only use coefficients from long-run equations of cointegrating vectors[12]. This requirement would be harder to satisfy using the GDP decomposition approach.

We include government expenditure as a percentage of GDP in the time-series regressions and real exchange rates, whenever we find cointegrating vectors with these variables. The literature following the GDP decomposition approach (e.g. Álvarez, Uxó & Febrero, 2019; Hein & Vogel, 2007) mainly examines the impact of wage share only on aggregate private demand as discussed in Section 2.1. For presenting a more accurate estimation on the impact of wage share on GDP, we also control for government spending share in GDP in our analysis. Moreover, consistent with our exports and imports functions in our theoretical model, we include the real exchange rates in our time-series regressions.

[12] In the time-series analysis (as well as in the cross-sectional analysis, even though this is a much bigger issue for the time-series analysis) we conduct for each particular country, adding more variables reduces the degree of freedom of the time-series regression significantly as the number of observations is quite limited. This is because some of our VECM and ARDL regressions include one, two and three year lags of the differences of all our variables and also variable(s) that control for the time trend. For this reason, we only included wage share, government spending share in GDP and real exchange rate in our time-series analysis.

Finally, we also test for trends using various trend specifications.

More specifically, for each country, we use three different models. In the first and most general one (Model Type 1), we estimate the relationship between the wage share, natural logarithm of GDP, government spending share in GDP, and the real exchange rate. For this, we first test the order of integration of all the four variables using the Augmented Dickey-Fuller (ADF) test. If the order of integration for all the variables is 1, and the Johansen cointegration test at 5% significance level indicates the presence of integration between the variables, then we estimate a vector error correction model (VECM), where we use the Akaike Information Criterion (AIC) to determine the number of lags. We estimate VECMs in the following form:

$$\begin{aligned}\Delta \log(GDP)_t = {} & a_1(b_1 \log(GDP)_{t-1} - b_2 ws_{t-1} - b_3 G_{t-1} - b_4 RER_{t-1} - \mu_1 \\ & - \rho_1 t) \\ & + a_2(c_1 G_{t-1} - c_2 ws_{t-1} \\ & - c_3 \log(GDP)_{t-1} - c_4 RER_{t-1} - \mu_2 - \rho_2 t) \\ & + a_3(d_1 RER_{t-1} - d_2 ws_{t-1} \\ & - d_3 \log(GDP)_{t-1} - d_4 G_{t-1} - \mu_3 - \rho_3 t) \\ & + \sum_{i=1}^{n} \Gamma_i \Delta \log(GDP)_{t-i} + \sum_{i=1}^{n} \Lambda_i \Delta G_{t-i} + \sum_{i=1}^{n} \Upsilon_i \Delta RER_{t-i} + v + rt \\ & + \varepsilon_t\end{aligned} \tag{33}$$

where

$$\log(GDP)_t = \left(\frac{b_2}{b_1}\right) ws_t + \left(\frac{b_3}{b_1}\right) G_t + \left(\frac{b_4}{b_1}\right) RER_t + \frac{\mu_1}{b_1} + \left(\frac{\rho_1}{b_1}\right) t \tag{34}$$

is our long-run relationship for the logarithm of GDP ($\log(GDP)$), *ws* is the wage share, *G* is the share of government expenditure in GDP, *RER* is the real exchange rate, and *t* is the time trend. $a_3 = 0$ if the Johansen cointegration test suggests two cointegrating vectors whereas a_2, $a_3 = 0$ if the Johansen cointegration test suggests only one cointegrating vector. For each country, we tested for VECMs with unrestricted and restricted trends, and unrestricted constant and restricted constant in order. We preferred the models with cointegrating vectors.

If at least one of the variables has an order of integration other than 1 (such as 0 or 2) or if the four variables are not cointegrated according to the Johansen cointegration test results, we test cointegration using an autoregressive-distributed lag (ARDL) bounds approach. If the variables are cointegrated, we estimate an autoregressive-distributed lag (ARDL) model in the error correction form, where we used an AIC to determine the number of lags. ARDL analysis also allows us to test for structural breaks using the Gregory-Hansen test with different trend or regime shifts. Hence, we express our ARDL models as

$$\begin{aligned}\Delta \log(GDP)_t = a(b_1 \log(GDP)_{t-1} - b_2 ws_{t-1} - b_3 G_{t-1} - b_4 RER_{t-1} - \mu \\ - \rho t) + \sum_{i=1}^{n_1} \Gamma_i \Delta \log(GDP)_{t-i} + \sum_{i=1}^{n_2} \Lambda_i \Delta G_{t-i} + \sum_{i=1}^{n_3} \Upsilon_i \Delta RER_{t-i} \\ + v + r_1 t + r_2 s + \varepsilon_t\end{aligned} \tag{35}$$

where *s* is the dummy variable for the years after the structural change and

$$\log(GDP)_t = \left(\frac{b_2}{b_1}\right) ws_t + \left(\frac{b_3}{b_1}\right) G_t + \left(\frac{b_4}{b_1}\right) RER_t + \frac{\mu}{b_1} + \left(\frac{\rho}{b_1}\right) t \tag{36}$$

is our long-run relationship for the logarithm of GDP ($\log(GDP)$)[13].

[13] The use of natural logarithm of GDP in our VECM and ARDL models is consistent with our equations in (10), (16) and (26). This is because $d(\log(GDP))/d\,(ws) = \frac{d(GDP)}{d(ws)} * \left(\frac{1}{GDP}\right) = \frac{b_2}{b_1}$ in equations (34) and (36).

If using both procedures does not yield significant estimates in the first model, then we use the second model (Model Type 2), which excludes the real exchange rate and repeat this procedure with the VECM and ARDL approaches. Finally, if the second model yields non-significant estimates, we use the third model (Model Type 3), which includes only wage share and the natural logarithm of real GDP. We eliminate the countries in which a long-run relationship,[14] a cointegration between wage share and logarithm of real GDP, or a significant long-run coefficient of wage share (at 10% level) are not detected from our sample.[15]

3.1.2. Cross-Sectional Analysis

Once the time-series analysis indicates the presence of wage or profit-led growth, we next create a cross-sectional dummy variable, which takes the value of 1 for a given country if its growth regime is wage-led and 0 if profit-led. That is,

[14] We only include long-run relations in our analysis to conduct a consistent analysis in our second stage regressions rather than a mixture of short-run and long-run coefficients. Moreover, a single coefficient and a single standard deviation for wage share, as opposed to the sum of short-run coefficients, is also required for conducting a meta-regression analysis. For countries in which the variables in their estimations are not cointegrated or their long-run coefficients are insignificant, we also estimate the impact of wage share on the logarithm of GDP using separate VAR estimations. However, because the sums of the short-run coefficients were not significant at the 10% level in any of our VAR estimations, we drop the VAR estimations from our empirical analysis.

[15] We drop 12 countries (Bangladesh, Barbados, Bolivia, Costa Rica, France, Germany, Israel, Malawi, Mauritius, Philippines, Portugal and Tanzania) from our sample because we could not detect cointegration between wage share and the logarithm of real GDP or any significant effect of wage share. Moreover, we exclude those countries for which our VECM or ARDL regressions did not allow estimations with at least 25 data observations, considering that these countries have insufficient data.

$$\Pr(Y = 1|X) = \varphi(X^T\beta) \quad (37)$$

Here, *Pr* denotes the probability, φ is the cumulative distribution function, and X represents the control variables. Then, we perform a maximum likelihood estimation where the estimated coefficients indicate the effects of changes in the independent variables on the relative place in the standard normal distribution; therefore, they cannot be interpreted as marginal effects.

Considering the binary nature of our dependent variable, constructed as explained above in the cross-sectional analysis, we then run a probit regression where we regress this dummy variable on various independent variables. We control for each country's structural characteristics by using the average values of our independent variables through the period in which the time-series analysis is conducted. The impact of trade openness is controlled by the ratio of the sum of exports and imports to GDP. We use UTIP Research Group's (2018) industrial pay inequality data, UTIP-UNIDO, for testing wage inequality influence on a country's wage-ledness. UTIP-UNIDO data measure industrial pay inequality according to the Theil index.

The datasets on household debt and credit do not cover the whole period in our time-series analysis (1961-2011) for 41 developed and developing economies. We, therefore, preferred to use the ratio of domestic credit to private sector as a percentage of GDP to measure financialisation.[16] We compare the average domestic credit to private sector as a

[16] Among the alternative datasets, OECD's (2018) household debt percentage of net disposable income data starts from 1995 and mainly covers OECD countries. Similarly, Büyükkarabacak and Valev (2010)'s dataset on household credit to GDP is for 1990-2016. BIS's (2018) data for total debt of households as a percentage of GDP covers the pre-1980s for only 11 countries and the pre-1990s for only 16 countries in our dataset. Nevertheless, despite this restriction, we use the BIS averages for our robustness analysis.

percentage of GDP values with post-1989 average household debt as a percentage of GDP from BIS (2018) for 25 countries available with data. Although the periods covered by the two variables are different, they are strongly correlated (r = 0.803).

The other independent variables are impacts of GDP per capita, population growth rate, government spending as a percentage of GDP, average years of schooling and time trend. We also control for model structure through dummy variables, such as using the ARDL model, model type used for each country (Model Types 1, 2, or 3), our wage share data type (industrial labour share from UNIDO's (2014) INDSTAT2, Industrial Statistics Database or the adjusted wage share[17] for entire economies from the European Commission's (2018) AMECO Database, and Onaran and Galanis's (2014) work). Probit regression allows us to estimate the nature of the effects of several factors on the probability of an economy being wage-led.

Moreover, we also run a random-effects meta-regression that includes for each

[17] Counting self-employed income as part of capital income creates a bias in wage share calculations, especially for developing countries (Stockhammer, 2017) in which the share of the self-employed changes rapidly due to structural change from agriculture to non-agricultural sectors, from subsistence to the capitalist sector, and from the informal to formal economy (Oyvat, 2015). The adjustments on wage share aim to remove the bias that self-employed income could cause wage share calculations (Gollin, 2002).

Both the European Commission (2018) in its AMECO Database, and Onaran and Galanis (2014) for Argentina and South Africa calculated the adjusted wage share using the following formula: (Compensation per employee in total economy)/(Gross domestic product/Number employed in all industries). The OECD (2018) calculated the adjusted wage share as (Compensation of employees/GDP)*(hours worked for total employment/hours worked for employees) when hourly employed data is available and as (Compensation per employee in total economy)/(Gross domestic product/Number of employed in all industries) when hourly data is not available.

country the estimated coefficient of wage share in the time-series analysis and its standard deviation. We use the method of moments estimator in the random-effects setting to also allow for between-country variance, specifically to estimate the additive (between-countries) component of variance. This non-iterative method is basically a generalization of the method developed by DerSimonian and Lair (1986), which is commonly used for random-effects meta-analysis.

Table 1 is here

3.2 Data

Table 1 presents the descriptive summary statistics of the entire dataset. In total, there is data for 41 developing and developed countries. Although the largest span is from 1961 to 2011, the time-series dimension of each country varies due to the wage share series' limited availability. Our data source for GDP and GDP per-capita was Penn World Tables 8.1. Government spending as a share of GDP (%), real effective exchange rate index (2010=100), population growth (%), and trade as a share of GDP (%) are obtained from the World Development Indicators (World Bank, 2018). We define the real effective exchange rate index as the nominal effective exchange rate against a weighted average of several foreign currencies over a price deflator or index of costs. Average years of schooling was obtained from Barro and Lee (2013)[18] while the wage inequality series came from the UTIP Research Group's (2018) industrial pay inequality dataset, based on UNIDO Industrial Statistics. For the wage share series, we use AMECO's adjusted wage share and UNIDO's (2014)

[18] Barro and Lee's (2013) dataset shows five-yearly average years of schooling. The gaps between the five years were filled with linear interpolation.

INDSTAT2 databases. The AMECO database represents the adjusted wage share for an entire economy whereas the UNIDO database is only for manufacturing. For the adjusted wage share of some specific economies, we also utilise Onaran and Galanis (2014)[19] and OECD (2017) (Appendix 1).

3.3. Estimation Results

The results of our Vector Error Correction Model (VECM) and Autoregressive Distributed Lag (ARDL) model estimations are reported in Tables 2 and 3, respectively, for each country. Here, for each country, we report which model type we use (Model Types 1, 2 or 3 as explained in the first section), the trend type if included, and the estimated coefficient of the wage share in the time-series regression as well as its standard deviation. Note that a positive (negative) estimated coefficient here implies wage-led (profit-led) demand. We observe from Tables 2 and 3 that 21 of the 41 countries have wage-led demand regimes, whereas the remaining 20 have profit-led demand regimes. Appendix 1 compares our results with the existing literature.

Table 2 is here

Table 3 is here

[19] Wherever the wage share data had a one or two-year gap, we filled the gap by linear interpolation. For gaps longer than two years, we preferred to use the part of the dataset that provided longer data. In addition, we observed unrealistic breaks in the wage share data from UNIDO's (2014) INDSTAT2. We treated the wage share data that changed more than 5 percentage points between two observations as a change in methodology, unless an economic crisis, war, or catastrophe was observed during that period. In these cases, we preferred the longer part and dropped the rest of the dataset.

Figure 1 provides information on the structural characteristics of the wage-led and profit-led countries that we estimated. Box-plot diagrams show the average trade/GDP (%), industrial pay inequality (Theil), and domestic credit to private sector/GDP (%) for countries with wage-led or profit-led demand regimes for the periods of our estimations. Figure 1 shows that countries with higher average trade/GDP (%) are mainly profit-led. The third quartile for average trade/GDP is 92.8% for profit-led economies, which is larger than 72.6%, the third quartile for wage-led economies. Moreover, profit-led countries include those with higher outlier values of trade openness (Singapore, Luxembourg and Malta).

Figure 1 is here

Figure 1 also shows that profit-led economies are on average countries with more substantial industrial pay inequalities. The median, first quartile, and third quartile values of industrial pay inequalities are higher in profit-led economies. The exception for wage-led countries is Jordan, which has an average Theil value of 0.093 for wage inequality. Finally, Figure 1 shows higher values of average domestic credit to private sector/GDP (%) for wage-led economies.

The cross-sectional estimation results for the factors making an economy profit-led or wage-led are reported in Tables 4 and 5. Table 4 reports probit regression results using the wage-led dummy as the dependent variable. These results indicate that countries with greater trade openness are more likely to be profit-led, which is consistent with our argument in section 2.3.1. Table 4 also shows that countries with higher domestic private credit ratios tend to be profit-led, whereas countries with higher GDP per-capita and government spending to GDP ratios are more likely to be wage-led. We fail to find a significant effect of industrial pay

inequality in our probit regression. Lastly, Table 4 also shows that countries with higher domestic private credit ratios tend to be profit-led, which contradicts the descriptive data in Figure 1. Countries with higher domestic private credit ratios are also mainly higher-income countries.[20] Table 4 shows that countries with higher GDP per capita are more likely to be wage-led, which may have biased Figure 1. We, therefore, prefer to rely on our probit regression in Table 4, in which we can control other variables, over Figure 1 in interpreting the causal relationship between average domestic credit to private sector /GDP (%) and the probability of being a wage-led economy.

Table 4 is here

Our meta-regression analyses in Table 5 reveal that the level of the estimated coefficient in the time-series analysis also depends on several variables. As indicated by the I-square and Chi-square tests, there is significant heterogeneity across different country-based time-series regressions. Moreover, consistent with Table 4, our baseline regression (1), which includes all 41 countries in our analysis, indicates that countries with greater trade openness are significantly more profit-led at the 5% significance level. Moreover, countries with greater wage inequality are also more profit-led. However, our baseline regression (1) fails to reflect the significant impact of domestic credit to private sector/GDP (%) on wage-ledness at the 10% significance level. This result might be due to the ambiguities discussed in section 2.3.3.

To test the robustness of our analysis, we performed four extra meta-regression

[20] The correlation coefficient between the logarithm of average domestic private credit/GDP (%) and the logarithm of average GDP per capita is 0.733.

analyses. The long-run coefficients of wage share for Italy and Norway in Table 2 are over 1.00, which is significantly higher than for other countries, which might bias our analysis. Therefore, in regression (2), we excluded Italy and Norway. However, the magnitude and significance of the coefficients for trade/GDP (%), wage inequality and credit/GDP (%) are very similar to those in regression (1). In regression (3) in Table 5, we included only countries with coefficients coming from Model 1 in which all wage shares, government expenditure/GDP (%) and real exchange rates are controlled. However, our meta-regression includes only 25 countries, and the coefficients for trade/GDP (%) and wage inequality are still significant at 5%, with both being more negative while the coefficient of GDP per-capita is significantly positive at the 10% significance level.

Table 5 is here

For regression (4) in Table 5, we use personal income inequality as a proxy for wage inequality, following Carvalho and Rezai (2016). For measuring income inequality, we use average standardised market income Gini coefficient measures from Solt (2018). However, the coefficient for income Gini was close to zero and insignificant at the 10% level. This result may be because personal income inequality might not be a good proxy for wage inequality in emerging economies with widespread self-employment and a subsistence sector. Finally, in regression (5), we control for the impact of household debt/GDP. We test this measure's impact for greater consistency with the model in section 2.3.3, which focuses explicitly on the impact of household credit and debt. We use BIS's (2018) household debt/GDP (%); however, these data are very limited for pre-1990 and include post-1989 data for only 25 of the countries in our sample. Therefore, household debt/GDP (%) measures are averages from post-1989. Consistent with Table 4, regression (5) shows that higher household

debt significantly decreases the wage-ledness of an economy at the 5% significance level. Moreover, the impact of higher wage inequality on wage-ledness is also significantly negative while the effect of trade openness on wage-ledness becomes insignificant at the 10% level. However, the coefficient for trade openness was similar to our baseline regression and may be insignificant due to the very small number of observations.

4. Conclusions

This study analyses structural factors that can make an economy profit-led or wage-led. Our results show that economies with greater trade openness are more likely to be profit-led. Moreover, we demonstrate that lower wage inequality makes an economy more wage-led. We also find that countries with higher private credit-to-GDP ratios are more likely to be profit-led and countries with higher household debt/GDP are more profit-led.

If policymakers wish to achieve an egalitarian growth path, they should reconsider altering the structural factors that determine the relationship between inequality and growth. Globalisation with greater wage policy coordination between countries along with lower wage inequality would create a setting in which a simultaneous rise in wage shares along with higher growth rates would be more possible. Moreover, taming financialisation should also be considered by policymakers to achieve labour-friendly economic growth.

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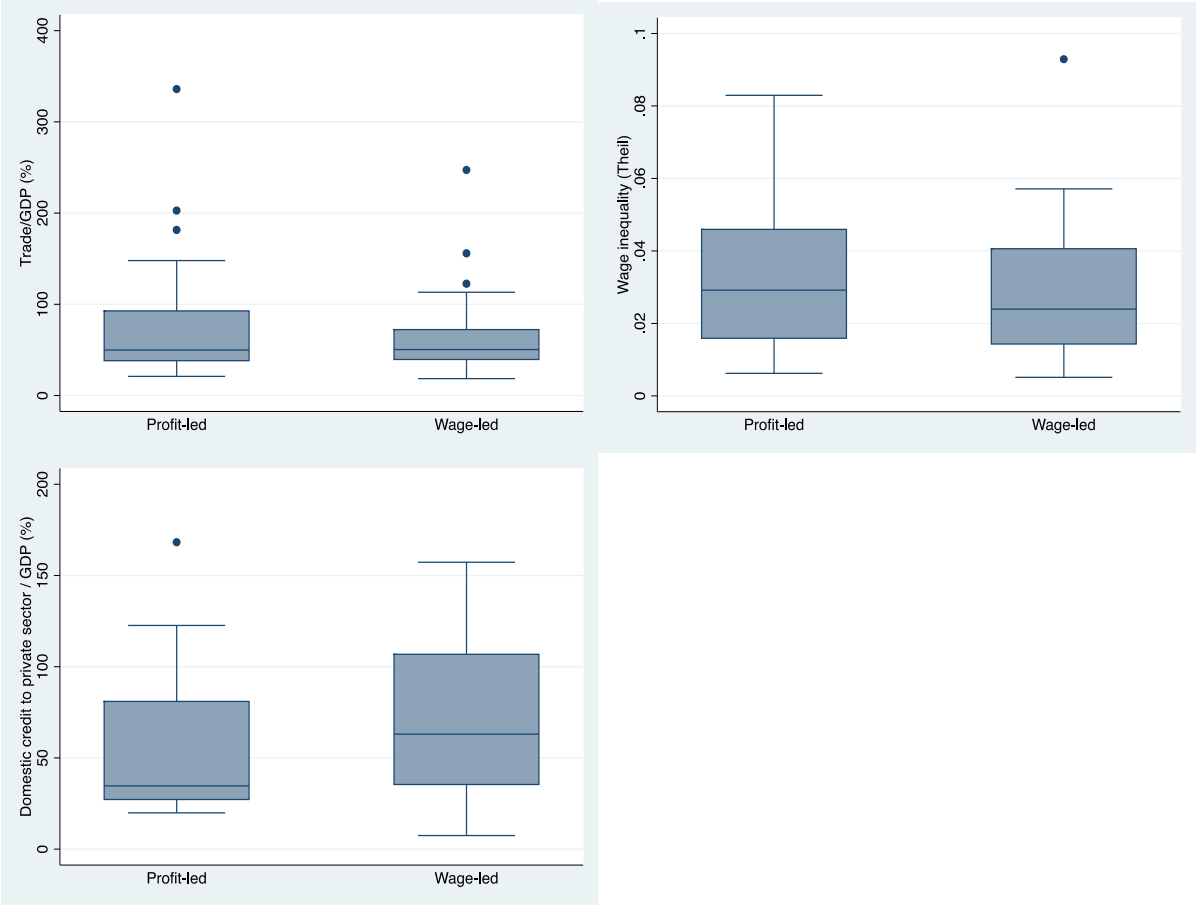
Figure 1. Average Trade/GDP (%), Wage Inequality (Theil) and Domestic Credit to Private Sector/GDP (%) for Profit-led and Wage-led Countries for the Years of Estimation



Notes: The distributions of the averages for each country are shown in the box plot diagrams generated by the Stata 13.1 software package. The upper and lower lines of the box show respectively the third quartile and first quartile values. The length of the box represents the interquartile range. The middle vertical line inside the box is the median. The upper and lower horizontal lines called whiskers include all points within a 1.5 interquartile range of the nearer quartile. Any points beyond the whiskers are outliers and are shown individually.

Table 1. Descriptive Summary Statistics

	Mean	Std. Dev.	Minimum	Maximum
Wage Share (%)	47.01	18.01	3.33	87.68
GDP (USD millions)	582.3	147.5	1.1	13379.3
Government Expenditure(% GDP)	18.2	8.9	6.1	79.8
Real Exchange Rate (national currency/USD)	139.56	769.58	0.00	10616.30
Average Years of Schooling	7.49	2.60	1.09	13.18
Domestic Credit to Private Sector (% GDP)	58.65	47.43	4.18	221.29
GDP per capita (USD)	14944	11922	700	72528
Household Debt (% GDP)	51.53	28.47	0.10	139.40
Income Inequality (Gini)	35.34	10.01	17.76	71.18
Population Growth (%)	1.40	1.03	-0.38	5.74
Trade to GDP (%)	77.21	70.83	7.53	447.06
Wage Inequality (Theil)	0.0312	0.0270	0.0009	0.2720

Table 2. Estimated Results in Vector Error Correction Models (VECM) – *Dependent variable – Log(GDP)*

Country	Model Type	Trend	LR coefficient for wage share	LR std. dev. for wage share	Estimation Period
Argentina	3	Restricted Constant	0.066*	0.011	1972-2007
Austria	1	Unrestricted Trend	0.143*	0.037	1965-2011
Belgium	2	Unrestricted Trend	0.020*	0.008	1961-2011
Canada	1	Restricted Trend	-0.071*	0.023	1961-2011
Chile	1	Unrestricted Trend	-0.025*	0.010	1967-1994
China-Macao	1	Unrestricted Trend	0.146*	0.030	1980-2011
Ecuador	1	Unrestricted Trend	0.018*	0.003	1964-2008
Egypt	1	Unrestricted Trend	-0.012*	0.002	1966-1998
Greece	2	Unrestricted Trend	-0.060*	0.016	1962-2011
Hong Kong	2	Unrestricted Constant	0.209*	0.065	1975-2011
Iceland	1	Unrestricted Trend	0.077*	0.012	1972-1996
India	1	Unrestricted Trend	-0.092*	0.015	1964-2011
Indonesia	1	Unrestricted Trend	-0.122*	0.023	1971-2011
Iran	1	Unrestricted Trend	0.223*	0.066	1981-2011
Ireland	3	Unrestricted Trend	-0.049*	0.010	1962-2011
Italy	1	Unrestricted Trend	296.101*	50.656	1962-2011
Jordan	1	Restricted Constant	0.056*	0.019	1975-2011
Kenya	1	Unrestricted Trend	-0.086*	0.015	1964-2011
Luxembourg	2	Unrestricted Trend	-0.162*	0.032	1961-2011
Malta	1	Unrestricted Trend	-0.019*	0.004	1965-2008
Mexico	1	Restricted Constant	-0.077*	0.016	1972-2009
Netherlands	1	Unrestricted Trend	0.036*	0.004	1962-2011
Norway	1	Unrestricted Trend	2.724*	0.515	1962-2011
Pakistan	1	Unrestricted Trend	-0.008**	0.004	1965-1991
South Africa	2	Unrestricted Trend	0.138*	0.024	1972-2007
South Korea	2	Restricted Trend	0.695*	0.140	1964-2011
Spain	2	Unrestricted Trend	0.011*	0.003	1965-2011
Sweden	1	Unrestricted Trend	0.052*	0.008	1962-2011
Syria	2	Unrestricted Trend	0.032*	0.012	1967-1995
Turkey	1	Unrestricted Constant	0.066**	0.030	1964-2009
UK	1	Unrestricted Trend	0.051*	0.009	1962-2011
US	2	Unrestricted Trend	0.072*	0.016	1962-2011
Venezuela	1	Unrestricted Constant	-0.042***	0.022	1964-1998

Notes: *, **, *** denote 1, 5 and 10% significance levels. Model 1 includes wage share, share of government expenditure in GDP (%) and real exchange rate. Model 2 includes wage share, share of government expenditure in GDP (%) while Model 3 includes wage share only. The trend column reflects different uses of trend in different models. When the unrestricted trend is preferred, there are no restrictions on the trend parameters. In models with unrestricted constants, $\rho_1 = 0$ and $r = 0$; in models with unrestricted constants, $\rho_1 = 0$, $r = 0$ and, $\mu_1 = 0$; and in models with unrestricted constants, $\rho_1 = 0$, $r = 0$, $\mu_1 = 0$ and $\nu = 0$ in equations (33) and (34).

Table 3. Estimated Results in Autoregressive Distributed Lag (ARDL) Models –

Dependent variable – Log(GDP)

Country	Model Type	Trend	Structural change dummy	LR coefficient for wage share	LR std. dev. for wage share	Estimation Period
Australia	1	Yes	Yes	-0.005**	0.002	1967-1991
Colombia	3	Yes	N/A	-0.056**	0.027	1967-2011
Denmark	2	N/A	N/A	-0.097**	0.039	1964-2011
Finland	1	Yes	Yes	-0.019*	0.006	1967-2011
Japan	2	N/A	N/A	0.084***	0.047	1967-2010
Malaysia	1	Yes	N/A	-0.061**	0.026	1972-2011
Singapore	3	Yes	Yes	-0.040**	0.016	1967-2011
Uruguay	3	N/A	N/A	-0.034*	0.005	1967-2008

Notes: *, **, *** denote 1, 5 and 10% significance levels.

Table 4. Cross-Sectional Probit Regression Results (Profit-led = 0, Wage-led = 1)

	Coefficient	**Marginal effects**
Log (Trade openness)	-1.966*	-0.781*
	(0.686)	(0.271)
Wage inequality	49.811	19.794
	(45.027)	(17.841)
Log (Credit-to-GDP)	-1.101***	-0.438***
	(0.630)	(0.248)
Log (GDP per-capita)	4.291**	1.705**
	(1.861)	(0.736)
Population Growth	0.323	0.128
	(0.607)	(0.241)
Government Sp. (% GDP)	0.042*	0.167*
	(0.163)	(0.065)
Average years of schooling	0.414	0.164
	(0.392)	(0.155)
Time	0.731*	0.291*
	(0.229)	(0.091)
Observations	41	
Pseudo R-square	0.65	
Wald Test	36.76	

Notes: Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% significance levels. Dummy variables for the type of models (Model 1, 2 or 3), a dummy variable for estimates with ARDL models, a dummy variable for the use of the adjusted wage share in the estimates (as opposed to the industrial wage share from UNIDO (2014)) are also controlled for. The marginal effect of an independent variable is the effect of a unit change of this variable on the probability of being wage-led, given that all other independent variables are constant at their means.

Table 5. Meta-Regression Estimation Results – *Dependent variable: Long-run coefficient for wage share*

	All countries	***Norway and Italy excluded***	***Estimates from Model 1 only***	***With income inequality***	***With household debt***
	(1)	(2)	(3)	(4)	(5)
Log (Trade openness)	-0.034**	-0.033**	-0.090**	-0.036**	-0.035
	(0.016)	(0.015)	(0.039)	(0.016)	(0.038)
Wage inequality	-1.369**	-1.333**	-2.315**		-5.701**
	(0.661)	(0.624)	(0.897)		(2.891)
Log (Credit-to-GDP)	-0.008	-0.008	0.059	-0.001	
	(0.019)	(0.018)	(0.039)	(0.022)	
Log (GDP per-capita)	0.044	0.043	0.060***	0.058**	-0.048
	(0.029)	(0.028)	(0.033)	(0.028)	(0.086)
Population Growth	0.032**	0.032**	0.051**	0.026***	0.056
	(0.015)	(0.014)	(0.021)	(0.015)	(0.052)
Government Sp. (% GDP)	0.001	0.001	0.001	0.002	0.009
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)
Average years of schooling	0.017**	0.017**	0.017	0.016***	0.067*
	(0.008)	(0.008)	(0.012)	(0.008)	(0.023)
Time	0.009*	0.009*	0.011*	0.006**	0.013
	(0.003)	(0.003)	(0.004)	(0.003)	(0.008)
Income inequality, personal				-0.000	
				(0.001)	
Log (Household debt-to-GDP)					-0.093**
					(0.046)
Observations	41	39	25	39	25
I-sq	94.01%	93.61%	92.55%	93.65%	94.02%
Chi-sq Test (p-value)	0.000	0.000	0.001	0.001	0.006

Notes: Standard errors are reported in parentheses *, **, *** denote 1, 5 and 10% significance levels. Dummy variables for the type of models (Model 1, 2 or 3), a dummy variable for estimates with ARDL models, and a dummy variable on the use of the adjusted wage share in the estimates (as opposed to the industrial wage share from UNIDO (2014) are also controlled for. I-sq and Chi-sq tests look for heterogeneity across estimates from each country.

Appendix 1. Comparison of our Estimates with the Previous Work on Wage-led and Profit-led Demand

Table A1. Demand Regimes According to Our Estimations and Previous Work

Our Estimations				*Previous work*	
Country	**Demand Regime**	**Estimation Period**	**Data Source**	**Demand Regime**	**Source**
Argentina	Wage-led	1972-2007	Onaran and Galanis (2014)	Profit-led Wage-led	Onaran and Galanis (2014) Alarco (2016)
Australia	Profit-led	1967-1991	UNIDO	Profit-led	Onaran and Galanis (2014)
Austria	Wage-led	1965-2011	UNIDO	Profit-led Profit-led Profit-led Wage-led	Hein and Vogel (2007) Stockhammer and Ederer (2008) Onaran and Obst (2016) Obst, Onaran and Nikolaidi (2017)
Belgium	Wage-led	1961-2011	AMECO	Profit-led Profit-led	Onaran and Obst (2016) Obst, Onaran and Nikolaidi (2017)
Canada	Profit-led	1961-2011	AMECO	Profit-led	Onaran and Galanis (2014)
Chile	Profit-led	1967-1994	UNIDO	Profit-led	Alarco (2016)
China-Macao	Wage-led	1980-2011	UNIDO		
Colombia	Profit-led	1967-2011	UNIDO	Wage-led Wage-led Wage-led	Charpe ,Lee, Arias and Bridji (2014) Alarco (2016) Loaiza, Tobon and Hincapie (2017)
Denmark	Profit-led	1964-2011	AMECO	Profit-led Wage-led	Onaran and Obst (2016) Obst, Onaran and Nikolaidi (2017)
Ecuador	Wage-led	1964-2008	UNIDO	Wage-led	Alarco (2016)

Our Estimations				*Previous work*	
Country	**Demand Regime**	**Estimation Period**	**Data Source**	**Demand Regime**	**Source**
Egypt	Profit-led	1966-1998	UNIDO		
Finland	Profit-led	1967-2011	UNIDO	Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
Greece	Profit-led	1962-2011	AMECO	Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
Hong Kong	Wage-led	1975-2011	UNIDO		
Iceland	Wage-led	1972-1996	UNIDO		
India	Profit-led	1964-2011	UNIDO	Profit-led	Onaran and Galanis (2014)
Indonesia	Profit-led	1971-2011	UNIDO		
Iran	Wage-led	1981-2011	UNIDO		
Ireland	Profit-led	1962-2011	AMECO	Profit-led	Kinsella (2013)
Italy	Wage-led	1962-2011	AMECO	Wage-led	Naastepad and Storm (2006)
				Wage-led	Onaran and Galanis (2014)
				Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
Japan	Wage-led	1967-2010	UNIDO	Profit-led	Bowles and Boyer (1995)
				Profit-led	Naastepad and Storm (2006)
				Wage-led	Onaran and Galanis (2014)
Jordan	Wage-led	1975-2011	UNIDO		
Kenya	Profit-led	1964-2011	UNIDO		
Luxembourg	Profit-led	1961-2011	AMECO	Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
Malaysia	Profit-led	1972-2011	UNIDO		
Malta	Profit-led	1965-2008	UNIDO		

Our Estimations				*Previous Work*	
Country	**Demand Regime**	**Country**	**Data Source**	**Country**	**Demand Regime**
Mexico	Profit-led	1972-2009	OECD	Profit-led	Onaran and Galanis (2014)
				Profit-led	Charpe ,Lee, Arias and Bridji (2014)
				Wage-led	Alarco (2016)
Netherlands	Wage-led	1962-2011	AMECO	Wage-led	Naastepad (2006)
				Wage-led	Naastepad and Storm (2006)
				Profit-led	Hein and Vogel (2007)
				Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
Norway	Wage-led	1962-2011	AMECO		
Pakistan	Profit-led	1965-1991	UNIDO		
Singapore	Profit-led	1967-2011	UNIDO		
South Africa	Wage-led	1972-2007	Onaran and Galanis (2014)	Profit-led	Onaran and Galanis (2014)
				Wage-led	Strauss and Isaacs (2016)
South Korea	Wage-led	1964-2011	UNIDO	Wage-led	Onaran and Stockhammer (2005)
				Wage-led	Onaran and Galanis (2014)
Spain	Wage-led	1965-2011	UNIDO	Wage-led	Naastepad and Storm (2006)
				Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
				Wage-led	Álvarez, Uxó and Febrero (2019)
Sweden	Wage-led	1962-2011	AMECO	Wage-led	Onaran and Obst (2016)
Syria	Wage-led	1967-1995	UNIDO		

Our Estimations				*Previous work*	
Country	**Demand Regime**	**Country**	**Data Source**	**Country**	**Demand Regime**
Turkey	Wage-led	1964-2009	UNIDO	Wage-led	Onaran and Stockhammer (2005)
				Wage-led	Onaran and Galanis (2014)
				Profit-led	Yılmaz (2015)
UK	Wage-led	1962-2011	AMECO	Wage-led	Bowles and Boyer (1995)
				Wage-led	Naastepad and Storm (2006)
				Wage-led	Hein and Vogel (2007)
				Wage-led	Onaran and Obst (2016)
				Wage-led	Obst, Onaran and Nikolaidi (2017)
				Wage-led	Jump and Mendieta-Muñoz (2017)
				Wage-led	Onaran, Oyvat and Fotopoulou, (2019)
US	Wage-led	1962-2011	AMECO	Wage-led	Bowles and Boyer (1995)
				Profit-led	Barbosa-Filho and Taylor (2006)
				Profit-led	Naastepad and Storm (2006)
				Wage-led	Hein and Vogel (2007)
				Wage-led	Nikiforos and Foley (2012)
				Wage-led	Onaran, Stockhammer and Grafl (2011)
				Profit-led	Carvalho and Rezai (2016)
Uruguay	Profit-led	1967-2008	UNIDO	Wage-led	Alarco (2016)

Our Estimations				*Previous work*	
Country	**Demand Regime**	**Country**	**Data Source**	**Country**	**Demand Regime**
Venezuela	Profit-led	1964-1998	UNIDO	Profit-led Wage-led	Charpe ,Lee, Arias and Bridji (2014) Alarco (2016)