- WORK IN PROGRESS -

This version of the manuscript has been submitted to the Review of Political Economy in May 2024 and is currently under review. This is a pre-print version. Wealth distribution with and without real estate assets and mortgage debt in ten European countries – a post-Kaleckian approach

Eckhard Hein*, Moritz Marpe[§], Karolina Schütt[§] *Institute for International Political Economy (IPE), Berlin School of Economics and Law ORCID: <u>https://orcid.org/0000-0002-6542-6630</u>

[§]Berlin School of Economics and Law

Abstract

Post-Keynesian demand-led distribution and growth models, including Ederer/Rehm (2020a, 2020b), have challenged Piketty's (2014) prediction that wealth distribution will become ever more unequal, if the rate of profit (r) exceeds the growth rate (g), and have proposed that long-run wealth distribution may stabilize with constant shares of capitalists and workers in a two class model, even if r > g. Ederer/Rehm (2020b) have empirically calibrated long-run equilibrium wealth distribution for ten European countries, mainly using 2010 Household Finance and Consumption Survey (HFCS) data. Measuring wealth inequality through the capitalists' share of wealth, they find that seven out of ten countries deviate from Piketty's prediction. With the actual capitalists' share in 2010 below the calibrated equilibrium, they forecast increasing wealth inequality. Our research extends this analysis in two ways. Firstly, using the 2010, 2014, 2017, and 2021 HFCS data, we recalibrate the equilibrium based on 2010 data and track changes over the decade. We observe convergence tendencies towards the long-run equilibrium in some but not in all countries. Parameters influencing equilibrium wealth distribution seem to change over time, indicating potential endogeneity. Secondly, we expand the Ederer/Rehm (2020b) model to include real estate assets and mortgage debt. Recalibrating the long-run equilibrium for this extended model using 2010 values produces results similar to the long-run equilibrium wealth distribution in the basic model. For three countries, Piketty's prediction holds, while for the remaining seven the equilibrium capitalists' wealth share is significantly lower than 100 per cent. The extended model shows a much lower actual capitalists' share in wealth, supporting the idea that real estate assets, adjusted for mortgage debt, are more equally distributed than other types of wealth. Wealth inequality for the extended model is also predicted to rise, which is indeed found for several countries, making use of 2014, 2017 and 2021 HFCS data, but nor for all countries. Again, parameters determining long-run equilibrium wealth distribution are not constant, which raises the issue of endogeneity of this long-run equilibrium to be explored in future research.

JEL code: D31, E12, E21

Key words: Wealth distribution, post-Kaleckian model, model calibration **Acknowledgements:** For editing assistance, we thank Samuel Küppers. Remaining errors are exclusively ours, of course.

Contact

Prof. Dr. Eckhard Hein Berlin School of Economics and Law Badensche Str. 52 10825 Berlin Germany e-mail: <u>eckhard.hein@hwr-berlin.de</u>

1. Introduction

Thomas Piketty's (2014) Capital in the 21st Century has put income and wealth inequality back on the research agenda, also in orthodox economics. The theoretical foundations of his core claim that a rate of profit exceeding the rate of growth (r > g) will lead to ever rising wealth inequality, however, have been scrutinised, both from orthodox and heterodox perspectives, and have been found to be seriously lacking (King 2017, Lopez-Bernado et al. 2016, Rowthorn 2014, Sawyer 2015, Taylor 2014, van Treeck 2015, Zamparelli 2017). Ederer/Rehm (2020a, 2020b, 2021) tried to overcome these deficiencies, re-examining the dynamics of wealth distribution in a post-Kaleckian distribution and growth model with two classes, capitalists and workers, who each hold wealth and earn both capital and labour incomes. They have thus continued a long-standing research tradition in post-Keynesian economics starting with Pasinetti (1962) and Kaldor (1966), with more recent contributions by Dutt (1990), Lavoie (1996) and Palley (2012, 2017a, 2017b). Ederer/Rehm (2020b) have calibrated their model for ten European countries, mainly based on data from the 2010 Household Finance and Consumption Survey (HFCS) by the European Central Bank (ECB) (ECB, 2010). The calibrated long-run equilibria of their model are not in line with Piketty's prediction of ever rising wealth shares of the capitalists for all the countries in their dataset. However, the calibrated long-run equilibrium values are well above the measured 2010 values for several countries, from which Ederer/Rehm (2020b) predict a further increase in wealth inequality for the investigated countries.

Our paper builds on the research by Ederer/Rehm (2020b). First, we make use of later HFCS vintages – 2014, 2017, 2021 – in order to check whether there is a tendency towards the longrun equilibrium wealth distribution calibrated with the respective 2010 values. For this purpose, we also have to recalibrate the equilibrium based on 2010 data because of data revisions etc.. Second, we extend the Ederer/Rehm (2020b) theoretical and empirical analysis by including the distribution of real estate ownership and the related household mortgage debt. The focus of Ederer/Rehm (2020b) has been on the distribution of what they call 'productive wealth', defined as business ownership plus net financial wealth, excluding real estate ownership and household mortgage debt. However, this disregards an important component of the debt and wealth dynamics, in finance-dominated capitalism in particular (Hein 2012, Moore/Stockhammer 2018, Stockhammer/Wildauer 2016, 2018), which has also had important implications for the dynamics of the demand and growth regimes, as well as their respective changes after the Global Financial Crisis and the Great Recession 2007-09 (Kohler/Stockhammer 2022, Kohler et al 2023). This broader notion of wealth distribution and its dynamics, including real estate assets and mortgage debt, are thus highly relevant for macroeconomic analysis in general. We attempt to provide some basis for such a research agenda.

In what follows, we proceed as follows. In Section 2, we present the Ederer/Rehm (2020b) model, which will be the starting point for our extensions. In Section 3, we follow Ederer/Rehm (2020b) and calibrate the long-run equilibrium wealth distribution, measured by the capitalists' share in total wealth, based on 2010 HFCS data, and, going beyond

Ederer/Rehm (2020b), we check whether the actual shares from the 2014, 2017 and 2021 HFCS vintages converge towards these equilibria. In Section 4, we extend the Ederer/Rehm (2020b) model by including real estate assets and mortgage debt, we calculate the modified long-run equilibrium values for the capitalists' share in total wealth based on the 2010 HFCS data, and we check whether the actual shares from the 2014, 2017 and 2021 HFCS vintages converge towards these equilibria. Here, we also compare the results for wealth distribution without and with real estate assets and mortgage debt. Section 5 summarises and concludes.

2. The Basic Theoretical Model

The Ederer/Rehm (2020b) post-Kaleckian one-good distribution and growth model is for a closed private economy with four sectors: workers' households, capitalists' households, firms and banks, and with four types of assets: deposits, loans from banks, external capital from households (equity, corporate bonds, self-owned business) and the real capital stock, as can be seen in Table 1.

				· · ·	
	Workers'	Capitalists'	Firms	Banks	Σ
	nousenotus	nousenotus			
Deposits	+D _w	+D _R		-(D _R + D _W)	0
Loans			-L _F	+L _F	0
Equity,					
corporate					
bonds, self-	+Ew	+E _R	-(E _w + E _R)		0
owned					
business					
Capital			K		K
Net worth	-V _w	-V _R	0	0	-V
Σ	0	0	0	0	0

Table 1: Balance sheet matrix of the Ederer/Rehm (2020b) model

Notes: D_W : deposits held by workers, D_R : deposits held by capitalists, L_F : loans to firms, E_W : equity and corporate bonds held by workers, E_R : equity, corporate bonds and own business held by rentiers, K: firms' capital stock, V: net worth, V_W : workers' net worth, V_R : capitalists' net worth.

Source: Based on Ederer/Rehm (2020b), own elaboration.

For the economy as a whole, net wealth (V) consists of the capital stock of the firms (K):

(1)
$$V = K = V_R + V_W$$
.

Net wealth in the model economy is held by households only, while net wealth of the firms is zero, as is net wealth of the banking sector. Workers' households' net wealth (V_W) is composed of equity and corporate bonds (E_W) plus non-interest bearing deposits (D_W):

(2)
$$V_{W} = D_{W} + E_{W}$$
.

Similarly, capitalists' households' net wealth (V_R) contains equity and corporate bonds (E_R) plus non-interest bearing deposits (D_R):

(3)
$$V_{R} = D_{R} + E_{R}$$
.

The capitalists' share (z) and workers (1-z) shares in net wealth are defined as:

$$(4) z = \frac{V_R}{V},$$

(5)
$$1-z = \frac{V_W}{V}$$
.

The ratio z is the indicator of wealth inequality. It is treated as exogenous in the short run and is then endogenously determined in the long run of the model.

It is assumed that capitalists have better access to high capital income generating assets, which in the model means that they hold a higher share of capital income generating assets in their net wealth. The respective shares for workers (γ_W) and capitalists (γ_R) are defined as:

(6)
$$\gamma_{W} = \frac{E_{W}}{V_{W}} = \frac{V_{W} - D_{W}}{V_{W}}$$
,

(7)
$$\gamma_{\rm R} = \frac{E_{\rm R}}{V_{\rm R}} = \frac{V_{\rm R} - D_{\rm R}}{V_{\rm R}}.$$

and it is assumed that $\gamma_R > \gamma_W$. Each share is treated as exogenously given and constant in the short and in the long run of the model.

In their empirical analysis, Ederer/Rehm (2020b) include interest on loans (Z) into the capital income, and it should thus be part of profits in the transaction flow matrix in Table 2. Firms pay interest to banks, and the banks then pay their profits based on the interest differential between loans and deposits out to capitalists and workers. Profits in Table 2 thus do not only include dividends on equity, interest on corporate bonds and profits of self-employed, but also interest payments on loans from firms to banks, assuming that the interest rate on deposits is zero.

	Workers'	Capitalists'	Firms'	Firms'	Bonko	2
	households	households	current	capital	Dariks	Ζ
Consumption	-Cw	-C _R	$+C_{W}+C_{R}$			0
Investment			+ _F	-1 _F		0
Wages	+Ww	+W _R	-(W _W +W _R)			0
Profits						
(dividends,						
interest,	+0 +0	+D +D			-(П _{вw}	0
profits of	TI IFW TI IBW		-(I IFW +I IFR)		+П _{вк})	0
self-						
employed)						
Interest on			7-		±7-	0
loans			-ZF		τZF	0
Change in						
equity,						
corporate	-dE	-dE-		+dE+dE-		0
bonds, self-						U
owned						
business						
Change in	-dDw	-dD ₂			+dD _w	0
deposits					+dD _R	U
Change in				+dl -	-dl -	0
loans				· u L _F		0
Σ	0	0	0	0	0	0

Table 2: Transaction flow matrix of the Ederer/Rehm (2020b) model

Notes: C_W : consumption of workers, C_R : consumption of capitalists, I_F : firms' investment in the capital stock, W_W : wages received by workers, W_R : wages received by capitalists, Π_{FW} : profits from firms to workers, Π_{FR} : profits from firms to capitalists, Π_{BW} : profits from banks to workers, Π_{BR} : profits from banks to capitalists, Z_F : interest payments to banks by firms, dE_W : change in equity and corporate bonds held by workers, dE_R : change in equity, corporate bonds and own business held by rentiers, dD_W : change in deposits held by workers, dD_R : change in deposits held by capitalists, dL_F : change in loans to firms. Source: Based on Ederer/Rehm (2020b), own elaboration.

Different from other post-Keynesian distribution and growth models with financial variables (Hein 2014, Chapters 9-10), Ederer/Rehm (2020b, p. 62) do not consider retained profits, assuming that 'wealth surveys ... do include (at least ideally), the full value of wealth, since the retained profits of firms should be reflected in the valuation of firms and should thus lead to higher net wealth'. Although there are some doubts regarding perfect capital asset valuation, we keep this assumption for simplicity and comparability.

As can be seen in Table 2, Ederer/Rehm (2020b) assume that firms pay wages (W) not only to workers' households (W_W), but also to capitalists' households (W_R), which are more broadly defined, as will be explained in the next section. The shares of capitalists' wages (α) and workers' wages (1- α) in total wages are exogenously given:

$$(8) \qquad W_{\rm R} = \alpha W,$$

(9) $W_{W} = (1-\alpha)W$.

As usual in Kaleckian distribution and growth models, the profit and wage shares (h, 1-h) in the income generated in production are exogenous as well, mainly determined by mark-up pricing of firms in incompletely competitive goods markets, such that profits (Π) and wages (W) are given as:

$$(10) \quad \Pi = hY,$$

(11)
$$W = (1-h)Y$$
.

Since all the profits are distributed to households and workers' households save and accumulate financial wealth, too, they also receive a part of profits. Workers' profits (Π_w) are determined by their share of wealth held as capital income generating asset:

(12)
$$\Pi_{W} = \frac{\gamma_{W}(1-z)}{\gamma_{W}(1-z) + \gamma_{R}z} \Pi = \frac{\gamma_{W}(1-z)h}{\gamma_{W}(1-z) + \gamma_{R}z} Y.$$

Similarly, capitalists' profits (Π_W) are determined as:

(13)
$$\Pi_{\rm R} = \frac{\gamma_{\rm R} z}{\gamma_{\rm W} (1-z) + \gamma_{\rm R} z} \Pi = \frac{\gamma_{\rm R} z h}{\gamma_{\rm W} (1-z) + \gamma_{\rm R} z} Y$$

With these assumptions, workers' income (Y_W) and capitalists' incomes (Y_R) are given as:

(14)
$$Y_{W} = W_{W} + \Pi_{W} = (1-\alpha)W + \frac{\gamma_{W}(1-z)}{\gamma_{W}(1-z) + \gamma_{R}z}\Pi = \left[(1-\alpha)(1-h) + \frac{\gamma_{W}(1-z)h}{\gamma_{W}(1-z) + \gamma_{R}z}\right]Y,$$

(15)
$$Y_{R} = W_{R} + \Pi_{R} = \alpha W + \frac{\gamma_{R} z}{\gamma_{W} (1-z) + \gamma_{R} z} \Pi = \left[\alpha (1-h) + \frac{\gamma_{R} zh}{\gamma_{W} (1-z) + \gamma_{R} z} \right] Y.$$

As can be seen in Table 2, workers' and capitalists' households spend their income on consumption and on wealth accumulation, determined by their respective propensities to consume and to save (s_W, s_{II}), which are treated as exogenous parameters for which the usual condition is assumed: $s_W < s_{II}$. The wealth portfolio compositions are given by the exogenous parameters γ_R , γ_W , which then also apply to wealth accumulation. Firms do not retain any profits and finance their net investment by issuing further equity or debt, and by loans granted by banks. Banks also offer deposits to households. Bank profits determined by the interest differential for loans and deposits are distributed as profit to households.

For the saving rate (σ), relating saving (S) to the capital stock (K) and making use of equations (14) and (15), we get:

$$\sigma = \frac{S}{K} = \frac{s_{W}Y_{W} + s_{R}Y_{R}}{K}$$

$$= \left\{ s_{W} \left[(1-\alpha)(1-h) + \frac{\gamma_{W}(1-z)h}{\gamma_{W}(1-z) + \gamma_{R}z} \right] + s_{R} \left[\alpha(1-h) + \frac{\gamma_{R}zh}{\gamma_{W}(1-z) + \gamma_{R}z} \right] \right\} u$$

$$= \left\{ (1-h) \left[s_{W}(1-\alpha) + s_{R}\alpha \right] + \frac{h \left[s_{W}\gamma_{W}(1-z) + s_{R}\gamma_{R}z \right]}{\gamma_{W}(1-z) + \gamma_{R}z} \right\} u$$

$$= (A+B)u, \quad 0 \le s_{W} < s_{R} \le 1$$

with the rate of capacity utilisation as $u = \frac{Y}{K}$, and with $A = (1-h) \left[s_w (1-\alpha) + s_R \alpha \right]$ and $B = \frac{h \left[s_w \gamma_w (1-z) + s_R \gamma_R z \right]}{\gamma_w (1-z) + \gamma_R z}$.

For firms' accumulation rate (g), relating net investment (I) to the capital stock (K), Ederer/Rehm (2020b) follow the post-Kaleckian investment function from Bhaduri/Marglin (1990) and Kurz (1990), such that:

(17)
$$\mathbf{g} = \frac{\mathbf{I}}{\mathbf{K}} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 \mathbf{u} + \boldsymbol{\beta}_2 \mathbf{h}, \qquad \boldsymbol{\beta}_1, \boldsymbol{\beta}_2 \ge 0$$

The goods market equilibrium and stability conditions are:

$$(18) \qquad g = \sigma,$$

(19)
$$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} > 0 \implies A + B - \beta_1 > 0.$$

From equations (16), (17) and (18), the short-run equilibrium values for the rate of capacity utilisation and the accumulation rate are:

(20)
$$u^* = \frac{\beta_0 + \beta_2 h}{A + B - \beta_1}$$
,

(21)
$$g^* = \sigma^* = (A+B)u^* = \frac{(A+B)(\beta_0 + \beta_2 h)}{A+B-\beta_1}$$

In the long run, the capitalists' and the workers' shares in wealth, and hence wealth distribution, turn endogenous. From equation (4), we get for the time rates of change, indicated by a dot on the variables:

(22)
$$\dot{z} = \frac{\dot{V}_R V - V_R \dot{V}}{V^2} = \frac{\dot{V}_R - z\dot{V}}{V} = \frac{\dot{V}_R - zgK}{K} = \frac{S_R - zgK}{K}$$

Making use of equations (15), (20) and (21), this turns to:

$$\dot{z} = s_{R} \left[\alpha (1-h) + \frac{\gamma_{R} zh}{\gamma_{W} (1-z) + \gamma_{R} z} \right] u - zg$$

$$(23) \qquad = \left\langle \frac{s_{R} \left\{ \alpha (1-h) \left[\gamma_{W} (1-z) + \gamma_{R} z \right] + \gamma_{R} zh \right\}}{\gamma_{W} (1-z) + \gamma_{R} z} - (A+B) z \right\rangle u$$

$$= \left\langle \frac{s_{R} \left\{ \alpha (1-h) \left[\gamma_{W} (1-z) + \gamma_{R} z \right] + \gamma_{R} zh \right\}}{\gamma_{W} (1-z) + \gamma_{R} z} - (A+B) z \right\rangle \frac{\beta_{0} + \beta_{2} h}{A+B-\beta_{1}}$$

For the long-run equilibrium, we need $\dot{z} = 0$. This yields the quadratic equation:

(24)
$$Cz^2 + Dz + E = 0$$

with the following two solutions:

(25)
$$z^{**} = \frac{-D \pm \sqrt{D^2 - 4CE}}{2C}$$

with:

$$\begin{split} C &= - \Big[s_w (1 - \alpha) + s_R \alpha \Big] (1 - h) (\gamma_R - \gamma_W) - (s_R \gamma_R - s_W \gamma_W) h , \\ D &= s_R \alpha (1 - h) (\gamma_R - \gamma_W) + s_R \gamma_R h - \Big[s_W (1 - \alpha) + s_R \alpha \Big] (1 - h) \gamma_W - s_W \gamma_W h \\ E &= s_R \alpha (1 - h) \gamma_W . \end{split}$$

Equation (25) is used by Ederer/Rehm (2020b) in their empirical analysis to calibrate the longrun equilibrium values for the capitalists' and the workers' wealth shares, and hence for wealth distribution in that long-run equilibrium. For this, they have taken the following model parameters from the statistics: h, α , s_W, s_R, γ_W , γ_R . They argue that applying the empirical values in their analysis for ten European countries, only the upper equilibrium value for z is stable, i.e. we have that $\frac{\partial \dot{z}}{\partial z} < 0$ in equation (23). This is then the value reported in their empirical calibration of the long-run equilibrium values.

3. Capitalists' Share in Wealth in the Ederer/Rehm (2020b) Approach: Convergence Towards Calibrated Equilibrium?

In this section, we follow the Ederer/Rehm (2020b) calibration of the long-run equilibrium wealth distribution indicated by the capitalists' share of wealth, based on the HFCS survey data of 2010 for ten European countries. Furthermore, going beyond Ederer/Rehm (2020b), we compare the calibrated equilibrium values not only with the actual values for 2010 but also with the actual values from the 2014, 2017 and 2021 vintages of the HFCS, in order to check whether there is a tendency of actual values moving towards the calibrated equilibrium values over time. The HFCS encompasses data on household wealth and socio-economic characteristics for fifteen European countries. It is a survey-based data collection on the

household level, provided by the ECB, which started in 2010 and has been repeated in 2014, 2017 and 2021.¹

Ederer/Rehm (2020b, p. 61) have defined wealth as 'businesses (in which the owner may or may not be self-employed) plus financial wealth (including shares and bonds), and deduct financial liabilities (i.e. non-mortgage debt)'. Following Rehm et al. (2016), they have divided households into capitalists and workers. The capitalist class contains households which either own a business (with more than five employees), are rentiers (receiving more capital income than average work income), or are part of the wealthiest 1%. Workers are defined as those households who earn most of their income from wages. All other households (i.e., pensioners and unemployed) are not included in the analysis. With this classification, the survey data allow for the calculation of the capitalists' share in wages (α), as well as the shares of capital income generating assets in respective total assets of capitalists (γ_R) and workers (γ_W). Capital income generating assets are defined as total financial assets plus self-employed business assets minus deposits. The class specific propensities to save (s_R, s_W) are derived by Ederer/Rehm (2020b) from the 2010 European Household Budget Survey (HBS) (Eurostat, 2010), because this contains more detailed information on households' expenditures and thus saving. With Austria, Belgium, Cyprus, Spain, Finland, France, Greece, Malta, Portugal, and Slovakia, they have ten countries covered by the HBS, which are also included in HFCS. These are thus the ten countries included in their analysis. Finally, Ederer/Rehm (2020b) use the profit share (h) as the share of operating surplus in gross domestic product (GDP) at factor cost from the European Commission's AMECO database (European Commission, 2024). With these data, Ederer/Rehm (2020b) could directly calculate the capitalists' share in wealth (z) for 2010 and calibrate its long-run equilibrium values (z^{**}) based on the parameters for 2010.

For our calibration of the long-run equilibrium values of the capitalists' share in wealth for the ten countries (z^{**}), we have made use of the propensities to save (s_R , s_W), which Ederer/Rehm (2020b) have calculated from the 2010 HBS. Furthermore, we have used the values derived from the updated and revised HFCS and AMECO data bases for 2010 for the capitalists' share of wages (α), the share of capital income generating assets in total assets for each group (γ_R , γ_W), and the profit share (h). The long-run equilibrium capitalists' shares in wealth together with the parameters generating these equilibria can be seen in Table 3.

¹ The HFCS is conducted at a national level and provides household-level data. It contains households' information on (the financing of) assets, liabilities, consumption, and saving, as well as demographics, employment, future pension entitlements, and income (ECB, 2024).

weattintor 2010 values based on Edeler/Menin (2020b)							
Country	S _R	SW	h	α	γr	γw	z**
Austria	0.23	0.05	0.38	0.06	0.64	0.33	0.71
Belgium	0.29	0.10	0.33	0.02	0.86	0.37	0.47
Cyprus	0.10	0.00	0.37	0.22	0.83	0.54	1.00
Spain	0.07	0.00	0.38	0.29	0.89	0.62	1.00
Finland	0.39	0.12	0.38	0.02	0.80	0.40	0.56
France	0.29	0.01	0.34	0.06	0.88	0.53	0.94
Greece	0.13	0.05	0.39	0.05	0.75	0.36	0.54
Malta	0.26	0.00	0.45	0.03	0.87	0.37	1.00
Portugal	0.33	0.13	0.36	0.04	0.86	0.36	0.50
Slovakia	0.30	0.18	0.52	0.06	0.60	0.14	0.61

Table 3: Parameters for the calibration of the long-run equilibrium capitalists' share of wealth for 2010 values based on Ederer/Rehm (2020b)

Notes: Parameters are calculated for the year 2010, h: profit share, α : capitalists' share in wages, s_W : workers' propensity to save, s_R : capitalists' propensity to save, γ_W : share of capital income generating assets in workers' net wealth: γ_R : share of capital income generating assets in capitalists' net wealth, z^{**} : long-run equilibrium values of capitalists' wealth share. Source: ECB (2010), European Commission (2024), Eurostat (2010), own calculations.

As can be seen in the Figure 1(a) in the appendix, our results slightly deviate from those of Ederer/Rehm (2020b) due to data revisions and updates,² but the general pattern remains the same. As also visible in Figure 1 below, only a few countries, Malta, Spain and Cyprus, show a long-run equilibrium capitalists' share in total wealth of 100 per cent, and hence a workers' share of zero per cent, which Piketty's (2014) model would imply. For the other seven countries, however, we obtain calibrated long-run equilibria based on 2010 data, in which the capitalists' share in wealth is between 47 and 94 per cent, and the workers' share hence between 53 and 6 per cent. This is in line with the theoretical predictions of the post-Keynesian distribution and growth models including wealth distribution, as briefly reviewed in the introduction. Furthermore, the actual values for the capitalists' share in wealth for 2010 are usually below the calibrated long-run equilibrium values, with Portugal as only exception in our calculations, while in Ederer/Rehm (2020b) the value for Portugal was close to the equilibrium value. From this general pattern, Ederer/Rehm (2020b, p.64) conclude that this 'would lead to an even higher wealth concentration in the long-run than is currently empirically observed'.

² Another reason for the deviation of our results from Ederer/Rehm (2020b) may be slight deviations in the application of the Ederer/Rehm (2020b) methodology, as certain technical details had not been provided. For example, our class categorisation might be slightly different due to the ambiguity in the criteria of business ownership (5+ employees) for capitalists.



Figure 1: Calibrated equilibrium values for the capitalists' share in wealth for 2010 and actual values for 2010, 2014, 2017 and 2020 for the Ederer/Rehm (2020b) model

Notes: From left to right: Belgium (BE), Slovakia (SK), Finland (FI), Portugal (PT), Greece (GR), Austria (AT), France (FR), Malta (MT), Spain (ES) and Cyprus (CY). Source: ECB (2010, 2014, 2017, 2021), European Commission (2024), Ederer/Rehm (2020b) and Eurostat (2010) for saving propensities, own calculations.

In order to check whether such an increasing trend towards calibrated long-run equilibrium values for the capitalists' share in wealth based on 2010 data has indeed materialised in the following decade, we have calculated the actual data for the capitalists' share in wealth based on the 2014, 2017 and 2021 HFCS vintages, as can be seen in Figure 1. For three countries, Belgium, France and Spain, we indeed see such a trend throughout, while Greece shows such a trend since 2014, Cyprus since 2017 and Austria until 2017. For the other four countries, Slovakia, Finland, Portugal and Malta, however, no converging trends are visible. One of the reasons may be that the calibrated long-run equilibrium itself is not constant over time, but may vary due to changes in the underlying parameters. Based on the respective HFCS vintages and annual AMECO data in order to calculate the parameters h, α , γ_W and γ_R , but keeping the propensities to save s_W and s_R , derived by Ederer/Rehm (2020b) from the 2010 HBS, for simplicity, we have explored this. Indeed, we find that z^{**} is varying over time for some countries, as shown in Figure 2(a) in the appendix. While for some countries we see a parallel development of z^{**} and the actual share of wealth owned by capitalists, for others the relationship remains rather unclear, which, in more detail, can be subject to future research. We will come back to these time variations and endogeneities of the equilibrium capitalists'

share in wealth when discussing the empirics of an extended model with real estate assets and mortgage debt, to which we turn next.

4. Extending the Ederer/Rehm (2020b) Analysis with Real Estate Assets and Mortgage Debt

4.1 The Theoretical Model with Real Estate Assets and Mortgage Debt

With the introduction of real estate assets and mortgage debt, the balance sheet matrix for our model economy from Table 1 turns to the one in Table 4.

	Workers'	Capitalists'	Firms	Banks	Σ
	nousenolas	nousenolas			
Deposits	+Dw	+D _R		-(D _R +D _W)	0
Loans	-Lw	-L _R	-L _F	$+L_W +L_R +L_F$	0
Equity,					
corporate					
bonds, self-	+Ew	+E _R	-(E _W +E _R)		0
owned					
business					
Capital	+K _{HW}	+K _{HR}	+K		+К _н +К
Net worth	-V _w	-V _R	0	0	-V
Σ	0	0	0	0	0

Table 4: Balance sheet matrix including real estate assets and mortgage debt

Notes: D_W : deposits held by workers, D_R : deposits held by capitalists, L_W : loans to workers, L_R : loans to capitalists, L_F : loans to firms, E_W : equity and corporate bonds held by workers, E_R : equity, corporate bonds and own business held by rentiers, K_{HW} : stock of real estate held by workers, K_{HR} : stock of real estate held by capitalists, K: firms' capital stock, V: net worth, V_W : workers' net worth, V_R : capitalists' net worth. Source: own elaboration.

For the economy as a whole, net wealth (V) now consists of the capital stock of the firms (K) plus the stock of housing/real estate (K_H) directly owned by capitalists' (K_{HR}) and by workers' (K_{HW}) households – real estate owned by firms is part of their capital stock:

(26)
$$V = K + K_{H} = K + K_{HR} + K_{HW} = V_{R} + V_{W}$$

Net wealth is again held by households only. Workers' households' net wealth (V_w) is composed of equity and bonds (E_w) , plus non-interest bearing deposits (D_w) , plus the value of their real estate (K_{HW}) , minus their total loans (L_w) :

(27)
$$V_w = D_w + E_w + K_{HW} - L_w$$
.

For capitalists' households, we have accordingly that their net wealth (V_R) is composed of equity, bonds and self-owned business (E_R), plus non-interest bearing deposits (D_R), plus the value of their real estate (K_{HR}), minus their total loans (L_R):

(28)
$$V_R = D_R + E_R + K_{HR} - L_R$$
.

The capitalists' share in net wealth (z) and the workers' share (1-z), as in equations (4) and (5), now includes real estate assets and mortgage debt.

The share of capital income generating assets in total net wealth of workers' households (γ_W) is defined as:

(29)
$$\gamma_{W} = \frac{E_{W} + K_{HW} - K_{HWMR} - L_{W}}{V_{W}} = \frac{V_{W} - K_{HWMR} - D_{W}}{V_{W}}$$

Capital income generating assets thus include equity and bonds held by workers plus their real estate assets minus the value of their home main residence (K_{HWMR}), which does not generate rent revenues, minus their total debt. The capital income generated by real estate is thus not containing imputed rents on self-used housing.³ For the capitalists, the share of their capital income generating assets in total net wealth (γ_R) is hence:

(30)
$$\gamma_{\rm R} = \frac{E_{\rm R} + K_{\rm HR} - K_{\rm HRMR} - L_{\rm R}}{V_{\rm R}} = \frac{V_{\rm R} - K_{\rm HRMR} - D_{\rm R}}{V_{\rm R}}$$

For our model extension, the transaction flow matrix from Table 2 turns into the one in Table 5. In our extended model, investment also includes workers' and capitalists' households' real estate investment (I_{HW} , I_{HR}). Profits include dividends, interest, rents, and profits of self-employed. Profits are completely distributed by firms and by banks to workers' households (Π_{FW} , Π_{BW}) and to capitalists' households (Π_{FR} , Π_{BR}). We also make explicit the interest on loans, which are paid by workers' households, capitalists' households and firms to banks, which add to banks' profits, then paid out to both types of households.⁴

³ Rents in the transaction flow matrix in Table 5 are gross rents. Rents paid are part of households' consumption expenditures. This means that we are treating non-corporate rental housing as self-owned business in our theoretical model.

⁴ Interest payments of households were absent in the basic Ederer/Rehm (2020b) model and its empirical application. When extending the model by incorporating real estate assets and mortgage debt, we include total interest payments of households, affecting their net financial income, because they may not only pay interest on their mortgage debt.

	Workers'	Capitalists'	Firms'	Firms'	Banks	Σ
	nousenoius	nousenoius	current	Capitat		
Consumption,	-Cw	-C.,	+C ₁₄ +C ₂			0
including rent	Οw	U R	• O W • O R			Ŭ
Investment,						
including real		1	+ _F + _{HW}			0
estate	-IHM	-I _{HR}	+ _{HR}	-IF		0
investment						
Wages	+Ww	+W _R	-(W _W +W _R)			0
Profits						
(dividends,						
interest on	+0 +0	+∏ _{FR} +∏ _{BR}	-(П _{FW} +П _{FR})		-(П _{вw} +П _{вw})	0
corporate bonds,	'I IFW 'I IBW					
profits of self-						
employed, rents)						
Interest on loans	-Zw	-Z _R	-Z _F		$+Z_W +Z_R +Z_F$	0
Change in equity,						
corporate bonds,	٩E	al		+dEw		
self-owned	-dew	-OE _R		+dE _R		
business						
Change in	-10	JD				_
deposits	-aD _w	-aD _R			$+aD_W +aD_R$	0
Change in loans	+dl	+dl -		+dl -	-(dL _w +dL _R	0
	' ULW	'ULR		' U LF	+dL⊧)	0
Σ	0	0	0	0	0	0

Table 5: Transaction flow matrix for an economy with real estate assets and mortgage debt

Notes: C_W : consumption of workers, C_R : consumption of capitalists, I_{HW} : real estate investment of workers, I_{HR} : real estate investment of capitalists, I_F : firms' investment in the capital stock, W_W : wages received by workers, W_R : wages received by capitalists, Π_{FW} : profits from firms to workers, Π_{FR} : profits from firms to capitalists, Π_{BW} : profits from banks to workers., Π_{BR} : profits from banks to capitalists, Z_W : interest payments to banks by workers, Z_R : interest payments to banks by capitalists, Z_F : interest payments to banks by firms, dE_W : change in equity and corporate bonds held by workers, dE_R : change in equity, corporate bonds and own business held by rentiers, dD_W : change in deposits held by workers, dD_R : change in deposits held by capitalists, dL_W : change in loans to workers, dL_R : change in loans to capitalists, dL_F : change in loans to firms. Source: own elaboration.

With these qualifications, we can now make use of equations (14) and (15) from the Ederer/Rehm (2020b) model, with profits defined as sum of dividends, interest, profits of self-employed and rents received minus interest payments for each class. Based on this, we can then use the saving equation (16). For the accumulation rate (17), for the sake of simplicity, we assume that capital accumulation includes the accumulation of real estate/housing, such that in equilibrium, the capital stock of the firm sector and the stock of real estate grow at the same rate, as determined in equation (20). For the long-run endogenous share of wealth

owned by capitalists, Ederer/Rehm's (2020b) determination from equation (25) can hence be applied as well, and we can use the same set of parameters, h, α , s_w, s_R, γ _w, γ _R, but with γ _w, γ _R now defined as above and thus empirically calculated in a different way.

4.2 Long-run Equilibrium Distribution with Real Estate Assets and Mortgage Debt

For our calibration of the long-run equilibrium capitalists' share in wealth based on 2010 data, we use our interpretation of the Ederer/Rehm (2020b) classification of workers' and capitalists' households, already applied in Section 3. We make use of the updated 2010 HFCS data for calculating the capitalists' share in wages (α) and the shares of capital income generating assets in total assets for both workers and capitalists (γ_W , γ_R), as defined in the previous section. For the sake of clarity, Table 6 provides an overview over the respective empirical definitions of wealth, capital income, as well as capital income generating wealth, in the two versions of the model. Finally, we use the Ederer/Rehm (2020b) propensities to save (s_W , s_R) based on the 2010 HBS data, and updated AMECO data for the 2010 profit share (h). The respective values together with the calibrated equilibrium capitalists' shares in wealth (z^{**}) can be found in Table 7.

	Ederer/Rehm (2020b) model	Extended model
Net wealth	+ Total financial assets	+ Total financial assets (DA2100)
	(DA2100)	+ Value of self-employment businesses
	+ Value of self-employment	(DA1140)
	businesses (DA1140)	+ Real estate wealth (DA1400)
	 Outstanding balance of 	 Outstanding balance of total debt
	non-mortgage debt (DL1200)	(DL1100 + DL1200)
Capital income	+ Income from financial	+ Income from financial assets (DI1400)
	assets (DI1400)	+ Gross income from other sources
	+ Gross income from other	(HG0610)
	sources (HG06010)	+ Rental income from real estate
		property (DI1300)
		 Interest payments (DI1412)
Capital income	+ Total financial assets	+ Total financial assets (DA2100)
generating	(DA2100)	– Deposits (DA2101)
assets	– Deposits (DA2101)	+ Value of self-employment businesses
	+ Value of self-employment	(DA1140)
	businesses (DA1140)	+ Value of other real estate property
		(DA1120)
		 Outstanding balance of total debt
		(DL1100 + DL1200)

Table 6: Empirical definitions of net wealth, capital income and capital income generating wealth for the basic Ederer/Rehm (2020b) model and the extended version with real estate assets and mortgage debt

Notes: Classification in parenthesis is based on HFCS (2021). Source: Ederer/Rehm (2020b), ECB (2021), own elaboration.

weatth								
Country	S _R	SW	h	А	γ _R	γw	z**	
Austria	0.23	0.05	0.38	0.06	0.66	0.22	0.73	
Belgium	0.29	0.10	0.33	0.03	0.81	0.27	0.51	
Cyprus	0.10	0.00	0.37	0.22	0.81	0.44	1.00	
Spain	0.07	0.00	0.38	0.29	0.86	0.55	1.00	
Finland	0.39	0.12	0.38	0.02	0.75	0.17	0.63	
France	0.29	0.01	0.34	0.07	0.86	0.43	0.95	
Greece	0.13	0.05	0.39	0.06	0.71	0.25	0.59	
Malta	0.26	0.00	0.45	0.02	0.86	0.32	1.00	
Portugal	0.33	0.13	0.36	0.04	0.86	0.20	0.56	
Slovakia	0.30	0.18	0.52	0.06	0.53	0.06	0.64	

Table 7: Parameters for the calibration of the long-run equilibrium capitalists' share of wealth based on 2010 values – including real estate assets and mortgage debt

Notes: Parameters are calculated for the year 2010, h: profit share, α : capitalists' share in wages, s_W : workers' propensity to save, s_R : capitalists' propensity to save, γ_W : share of capital income generating assets in workers' net wealth: γ_R : share of capital income generating assets in capitalists' net wealth, z^{**} : long-run equilibrium values of capitalists' wealth share. Source: ECB (2010), European Commission (2024), Eurostat (2010), own calculations.

Comparing Table 7 for the extended model with real estate assets and mortgage debt with Table 3 for the model following the basic Ederer/Rehm (2020b) approach makes clear that some differences arise with respect to the shares of capital income generating assets in total assets for both workers and capitalists. The ratio γ_W increases in all countries for the extended model, while the ratio γ_R increases in all countries but Austria and Portugal. Also, the capitalists' share in wages (α) increases in four countries and decreases in one, but remains constant in five countries. The changes in the first two parameters arise due to the incorporation of additional asset classes in the extended model, which may ultimately result also in a reclassification of households and may thus cause a change in the capitalists' share in wages (α). Some differences hence also arise with respect to the long-run equilibrium capitalists' share in total wealth (z^{**}) from these changes in parameters. We see slight increases in all but three countries. However, the long-run equilibrium capitalists' shares in wealth based on 2010 data do not differ much between the two model variants. The inclusion of real estate assets and mortgage debt thus does not make much of a difference when it comes to the longrun trend of wealth inequality. For three countries, Malta, Spain and Cyprus, we find again that the long-run equilibrium capitalists' share of wealth is 100 per cent, the Piketty (2014) solution. However, for the other countries, the equilibrium capitalists' share of wealth is between 51 and 95 per cent.

Comparing the calibrated long-run equilibrium values based on 2010 values with the actual values for the same year in Figure 2, we find that the gap between actual and equilibrium values is much larger for the extended model with real estate assets and mortgage debt than

for the basic Ederer/Rehm (2020b) model in Section 3. Since calibrated equilibrium values for both model variants are rather similar, this implies that the inclusion of real estate assets and mortgage debt generates lower actual capitalists' shares in wealth. Real estate assets, corrected for the related mortgage debt, were thus more equally distributed in 2010 (and also in the following HFCS vintages) than the other types of wealth, for all countries except for Spain. We thus can confirm what Ederer/Rehm (2020b, p.65) had assumed:

'(R)eal estate wealth is distributed more equally than financial wealth. Workers' wealth would therefore rise compared to capitalists' wealth, and thus the empirical wealth inequality [...] would be lower. As a consequence, the gap between the theoretical and empirical wealth distribution would increase.'

However, for given parameters, the wealth distribution including real estate wealth should converge towards an even somewhat higher degree of inequality as the one in the model without real estate assets and mortgage debt. Looking at the actual values for the capitalists' share of wealth from the further HFCS vintages, such a tendency is indeed visible for France for all the vintages, and for Belgium, Austria, Spain and Cyprus until 2017, as well as for Greece since 2014. For the other four countries, Slovakia, Finland, Portugal, and Malta, however, no such tendency seems to materialise, similar to our finding in Section 3 on the basic Ederer/Rehm (2020b) model.



Figure 2: Calibrated equilibrium values for the capitalists' share in wealth for 2010 and actual values for 2010, 2014, 2017 and 2020 for the extended model with real estate assets and mortgage debt

Again, we would argue that the parameters determining the long-run equilibrium and thus the long-run equilibrium wealth distribution itself are not necessarily constant over time. Based on the respective HFCS vintages and annual AMECO data in order to calculate the parameters h, α , γ_W and γ_R , but for simplicity keeping the propensities to save s_W and s_R , derived by Ederer/Rehm (2020b) from the 2010 HBS, we indeed find that z^{**} is varying over time for some countries also for the extended model, as shown in Figure 3(a) in the appendix. No such variations are observed for Malta, Cyprus and Spain with the calibrated long-run equilibrium capitalists' share in wealth being 100 per cent. But for the other countries, even with assumed constancy of the propensities to save, the equilibrium capitalists' share in wealth does vary over time. For Belgium, Slovakia, Portugal, Greece and France, these variations are in line with the actual capitalists' share in wealth, while for Finland and Austria no such correspondence is obvious. We leave the examination of potential endogeneities of the long-run equilibrium wealth distribution with regard to actual distribution for future research.

Notes: From left to right: Belgium (BE), Slovakia (SK), Finland (FI), Portugal (PT), Greece (GR), Austria (AT), France (FR), Malta (MT), Spain (ES) and Cyprus (CY). Source: ECB (2010, 2014, 2017, 2021), European Commission (2024), Ederer/Rehm (2020b) and Eurostat (2010) for saving propensities, own calculations.

5. Conclusions

While Piketty (2014) had argued that under the condition r > g modern capitalism should see an ever increasing inequality in wealth distribution, post-Keynesian demand-led distribution and growth models including wealth distribution have come up with more nuanced implications. Several models, including the one by Ederer/Rehm (2020b) used in this paper, have implied that long-run equilibrium wealth distribution may deviate from Piketty's (2014) corner solution. Wealth distribution may thus converge towards some stable shares of capitalists and workers in a two-class model and wealth inequality may hence not show ever increasing features, even if r > g. Ederer/Rehm (2020b) have been the first to empirically calibrate long-run equilibrium wealth distribution for ten European countries, mainly making use of 2010 HFCS data and using the capitalists' share in wealth as a measure of inequality. They have found that for seven out of ten countries, the long-run equilibrium solution deviates from Piketty's corner solution. Since the actual capitalists' share in wealth in 2010 has been below the calibrated long-run equilibrium, they have predicted further increases in wealth inequality.

We have extended this research in two directions. First, making use of the 2010, 2014, 2017 and 2021 vintages of the HFCS, we have re-calibrated the long-run equilibrium capitalists' share in wealth based on 2010 data and have checked whether in the following decade the actual share has moved towards this equilibrium. Indeed, for a few countries such a convergence is visible, while for others it is not. We have argued that this may be so, because the parameters determining the long-run equilibrium capitalists' share in wealth are not necessarily constant over time. The long-run equilibrium may hence be endogenous with respect to the actual wealth distribution.

Second, we have extended the Ederer/Rehm (2020b) model by including real estate assets and mortgage debt, since the dynamics of these have been found to be of major importance for recent macroeconomic regimes and their respective changes. Calibrating the long-run equilibrium capitalists' share in wealth for this extended model with 2010 values, we have found slightly higher values than the ones based on the Ederer/Rehm (2020b) model but no deviation from their pattern. For three countries, the Piketty (2014) solution seems to apply, while for the other seven a long-run equilibrium capitalists' wealth share partly well below 100 per cent is found. However, the actual capitalists' share in wealth in the extended model is much lower than in the application of the basic Ederer/Rehm (2020b) model, in 2010 and also according to the following HFCS vintages. This vindicates the Ederer/Rehm (2020b) suggestion that real estate assets, corrected for mortgage debt, are distributed more equally than the other types of wealth. However, the model predicts that inequality will converge towards a slightly higher level than in the basic Ederer/Rehm (2020b) model. We have found such a converging tendency applying the 2014, 2017 and 2021 vintages of the HFCS for some countries, but not for all. The reason for this may be that the parameters determining the longrun equilibrium are not constant over time, and that the long-run equilibrium may be endogenous with respect to the actual wealth distribution. Examining potential endogeneity channels is left for future research.

References

- Bhaduri, A., Marglin, S. 1990. 'Unemployment and the real wage: the economic basis for contesting political ideologies.' *Cambridge Journal of Economics* 14: 375-393.
- Dutt, A.K. 1990. 'Growth, distribution and capital ownership: Kalecki and Pasinetti revisited.' In *Economic Theory and Policy. Essays in honour of Dipak Banerjee*, edited by B. Dutta, S. Gangopadhyay, D. Mookherjee and D. Ray. Bombay: Oxford University Press.
- ECB. 2010. Household Finance and Consumption Survey (HFCS). Frankfurt am Main: ECB. <u>https://www.ecb.europa.eu/home/pdf/research/hfcn/HFCS</u> Statistical Tables Wave 2010.pdf?90d1e5ab4ace3e15e90ed59950d21ca1.
- ECB. 2014. Household Finance and Consumption Survey (HFCS). Frankfurt am Main: ECB. <u>https://www.ecb.europa.eu/home/pdf/research/hfcn/HFCS_Statistical_Tables_Wave_2014.pdf?bf06c66b9f89bd01e30e9ead7d836dad</u>.
- ECB. 2021. Household Finance and Consumption Survey (HFCS). Frankfurt am Main: ECB. https://www.ecb.europa.eu/home/pdf/research/hfcn/HFCS Statistical Tables Wave 2021 July2023.pdf?0515e108613e1e4d0e839e816e9f07b8.
- ECB. 2024. Household Finance and Consumption Survey (HFCS). Frankfurt am Main: ECB. https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html.
- EuropeanCommission.2024.AMECODatabase.https://ec.europa.eu/economy_finance/ameco_dashboard.
- Eurostat. 2010. Household Budget Survey (HBS). Luxembourg: European Commission. https://ec.europa.eu/eurostat/web/microdata/household-budget-survey.
- Ederer, S., Rehm, M. 2020a. 'Making sense of Piketty's 'fundamental laws' in a post-Keynesian framework.' *Review of Keynesian Economics* 8(2): 195-219.
- Ederer, S., Rehm, M. 2020b. 'Will wealth become more concentrated in Europe? Evidence from a calibrated post-Keynesian model.' *Cambridge Journal of Economics* 44(1): 55-72.
- Ederer, S., Rehm, M. 2021. 'Wealth inequality and aggregate demand.' *Metroeconomica* 72(2): 405-424.
- Hein, E. 2012. *The Macroeconomics of Finance-dominated Capitalism and its Crisis.* Cheltenham: Edward Elgar.
- Hein, E. 2014. *Distribution and Growth after Keynes: A Post-Keynesian Guide*. Cheltenham: Edward Elgar.
- Kaldor, N. 1966. 'Marginal productivity and the macroeconomic theories of distribution.' *Review of Economic Studies* 33: 309-319.

King, J.E. 2017. 'The literature on Piketty.' *Review of Political Economy* 29(1): 1-17.

- Kohler, K., Stockhammer, E. 2022. 'Growing differently? Financial cycles, austerity, and competitiveness in growth models since the Global Financial Crisis.' *Review of International Political Economy* 29(4): 1314-1341.
- Kohler, K., Tippet, B., Stockhammer, E. 2023. 'House price cycles, housing systems, and growth models.' *European Journal of Economics and Economic Policies: Intervention* 20(3): 461-490.
- Kurz, H.D. 1990. 'Technical change, growth and distribution: a steady-state approach to 'unsteady' growth.' In *Capital, Distribution and Effective Demand*, by H.D. Kurz. Cambridge, UK: Polity Press.
- Lavoie, M. 1996. 'The neo-Pasinetti theorem in Cambridge and Kaleckian models of growth and distribution.' *Eastern Economic Journal* 24: 417-434.
- Lopez-Bernado, J., Lopez-Martinez, F., Stockhammer, E. 2016. 'A post-Keynesian response to Piketty's 'Fundamental Contradiction of Capitalism'.' *Review of Political Economy* 28(2): 190-204.
- Moore, G.L., Stockhammer, E. 2018. 'The drivers of household indebtedness reconsidered: An empirical evaluation of competing arguments on the macroeconomic determinants of household indebtedness in OECD countries.' *Journal of Post Keynesian Economics* 41(4): 547-577.
- Palley, T.I. 2012. 'Wealth and wealth distribution in the neo-Kaleckian growth model.' *Journal* of Post Keynesian Economics 34(3): 453-474.
- Palley, T.I. 2017a. 'Wage- vs. profit-led growth: the role of the distribution of wages in determining regime character.' *Cambridge Journal of Economics* 41: 49-61.
- Palley, T.I. 2017b. 'Inequality and growth in neo-Kaleckian and Cambridge growth theory.' *Review of Keynesian Economics* 5(2): 146-169.
- Pasinetti, L.L. 1962. 'Rate of profit and income distribution in relation to the rate of economic growth.' *Review of Economic Studies* 29: 267-279.
- Piketty, T. 2014. *Capital in the Twenty-First Century.* Cambridge, MA, London: Cambridge University Press.
- Rehm, M., Naqvi, S.A., Hofmann, J. 2016. 'Different but equal? Classes, wealth, and perceptions in Europe.' *Kammer für Arbeiter und Angestellte für Wien* Working Paper 16.
- Rowthorn, R.E. 2014. 'A note on Piketty's Capital in the Twenty-First Century.' *Cambridge Journal of Economics* 38: 1275-1284.
- Sawyer, M. 2015. 'Confronting inequality: review article on Thomas Piketty on Capital in the 21st Century.' *International Review of Applied Economics* 29(6): 878-889.
- Stockhammer, E., Wildauer, R. 2016. 'Debt-driven growth? Wealth, distribution and demand in OECD countries.' *Cambridge Journal of Economics* 40(6): 1609-1634.

- Stockhammer, E., Wildauer, R. 2018. 'Expenditure cascades, low interest rates or property booms? Determinants of household debt in OECD countries.' *Review of Behavioural Economics* 5(2): 85-121.
- Taylor, L. 2014. 'The Triumph of the Rentier? Thomas Piketty vs. Luigi Pasinetti and John Maynard Keynes.' *International Journal of Political Economy* 43(3): 4-17. 10.1080/08911916.2014.1002296.
- Van Treeck, T. 2015. 'r>g: Why the 'Piketty Debate' Unsettles Germany's Economic Experts.' CESifo Forum ifo Institut Leibniz-Institut für Wirtschaftsforschung an der Universität München 16(1): 26-34.
- Zamparelli, L. 2017. 'Wealth Distribution, Elasticity of Substitution and Piketty: An 'Anti-Dual' Pasinetti Economy.' *Metroeconomica* 68(4): 927-946

Appendix



Figure 1(a): The Ederer/Rehm (2020b) actual and calibrated equilibrium values for the capitalists' share in wealth for 2010 data and our values

Share of wealth held by capitalists 🔶 calibrated value

Notes: Panel (a) shows the Ederer/Rehm (2020b) actual values (bars) and calibrated equilibrium values for the capitalists' share in wealth for 2010. Panel (b) shows our values based on revised and updated HFCS and AMECO data for (from left to right) Belgium (BE), Slovakia (SK), Finland (FI), Portugal (PT), Greece (GR), Austria (AT), France (FR), Malta (MT), Spain (ES) and Cyprus (CY) for 2010.

Source: ECB (2010), European Commission (2024), Ederer/Rehm (2020b) and Eurostat (2010) for saving propensities, own calculations.



Figure 2(a): Calibrated equilibrium values for the capitalists' share in wealth and actual values for 2010, 2014, 2017 and 2020 for the Ederer/Rehm (2020b) model

Notes: From left to right: Belgium (BE), Slovakia (SK), Finland (FI), Portugal (PT), Greece (GR), Austria (AT), France (FR), Malta (MT), Spain (ES) and Cyprus (CY). Source: ECB (2010, 2014, 2017, 2021), European Commission (2024), Ederer/Rehm (2020b) and Eurostat (2010) for saving propensities, own calculations.



Figure 3(a): Calibrated equilibrium values for the capitalists' share in wealth and actual values for 2010, 2014, 2017 and 2020 for the extended model with real estate assets and mortgage debt

Notes: From left to right: Belgium (BE), Slovakia (SK), Finland (FI), Portugal (PT), Greece (GR), Austria (AT), France (FR), Malta (MT), Spain (ES) and Cyprus (CY). Source: ECB (2010, 2014, 2017, 2021), European Commission (2024), Ederer/Rehm (2020b) and Eurostat (2010) for saving propensities, own calculations.