Inequality, consumption emulation, and growth

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Abstract

We develop a short-run neo-Kaleckian model to investigate the interplay of the functional and personal distribution of income, and their impact on growth. Personal distribution becomes relevant in light of the institutionalist hypothesis of consumption emulation, which makes aggregate saving dependent on the concentration of wages and of profits.
A more equal distribution of wages and/or profits increases aggregate demand and the rate of capacity utilisation. But the wage- or profit-led growth regime crucially depends on the difference in the propensities to save out of profits and out of wages, as well as on the impact of changes in the profit and wage shares on the concentration of personal incomes.
Preliminary evidence on Italy over the period 1980s-2010s highlights that growth regimes might be a relatively short-term and cyclical characteristic of that economy, with changes in the growth regime partly explained by changes in income distribution.

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1. Motivation

The shares of income that accrue, on the one hand, to wages, and on the other hand, to profits and rents, are often interpreted as a measure of (class-based) inequality. This view, however, is increasingly limited in capturing the full extent of income inequality given the growing relevance of within-class inequality. In the USA, a large debate among both mainstream and heterodox economists has concerned high and increasing wage polarization. In the European Union (EU), the variety of welfare regimes and growth models adds to the more global trend, of increasing worker participation in the financial markets (especially in countries with privatized pension systems) resulting in high heterogeneity among profit-earners too (Cirillo, Corsi and D'Ippoliti 2017). On a global level, Ranaldi and Milanović (2022) stress the importance of

distinguishing two issues: (i) inequality of personal incomes; and (ii) how the shares of capital and labor incomes vary along the income distribution, which they call "compositional inequality". In a cross-country analysis they find a (weak) positive correlation between the two—implying that where inequality is higher it tends to be more class-based—but most of all, they highlight the large variety of national experiences.

This work tries to consider the possible impact of both sorts of inequality, personal and functional, on economic growth. We develop a neo-Kaleckian model, characteristically looking at functional inequality, in which the inequality of personal incomes affects the aggregate saving rate due to consumption emulation among households.

Our model predicts that ceteris paribus a more equal distribution of wages and/or profits increases aggregate demand and the rate of capacity utilization. We derive the conditions for an economy to be wage-led, finding that the more the propensity to save out of profits is higher than that to save out of wages, and/or the more an increase in the profit share leads to a less equal distribution of profits, the more the economy is wage-led. Empirical tests of our model are especially challenging due to the need for long time series of micro data on the individual distribution of both labor and capital incomes. However, preliminary evidence on Italy for the period 1980s-2010s suggests that growth regimes might be a relatively short-term characteristic of an economy, liable to endogenously change.

2. Personal and functional income inequality, and growth

Dating back to the debate between Kaldor and Pasinetti in the 1950s-1960s, there is a long tradition of post-Keynesian models that try to consider the impact of different and/or variable

saving rates. Keynes made it clear already in the *General Theory* that an increase in inequality, to the extent that it entails a transfer of resources from households with a lower to those with a higher propensity to save, will depress consumption and therefore aggregate income.

In a dynamic context, neo-Kaleckian growth models have typically highlighted the role of functional income inequality, considering the role of the wage share of income or conversely of the profit share, in a two-class society. A first generation of such models that tried to incorporate personal income inequality relied on the introduction of a third social class: the high skilled or supervision workers, or the middle or managerial class (e.g. Palley 2014, 2017).[1] In these models, as happens in those that allow for workers' saving, the growth regime depends on the saving gap between social classes. The higher the gap, the more redistributing resources to those who consume relatively less will depress growth. If workers are those who typically earn a lower income and consume a higher share of it, the growth regime will tend to be wage-led.

This conclusion is in a sense automatic, because it is based on the obvious fact that the aggregate saving rate is a weighted average of the individual propensities to save (s), and transferring a higher share of the aggregate income to those with a lower s will correspondingly reduce this average. However, the net result is less clear-cut if beside this automatic effect one allows for a behavioral reaction on the side of households. Inspired by Veblen, Galbraith, and a long list of authors, institutionalists hold that, when inequality increases, the relatively poorer households might decide to increase their propensity to consume in order to "keep up with the Joneses". The growth in household debt in the runup to the US subprime crisis has often been explained in this way (e.g. by Starr 2008). Crucially, if poorer workers are able to borrow and

[1] This approach has been used in other Post-Keynesian models too, e.g. by Dutt (1984), Lavoie (1996), or Tavani and Vasudevan (2014).

therefore consume more than would be expected on the basis of their monetary income, this could feed a process of debt-led growth—albeit an unsustainable one.

Kapeller and Schütz (2015) and Setterfield and Kim (2017) develop neo-Kaleckian models to describe this dynamic. They assume that lower-income workers borrow from the capitalists when their income is insufficient to meet a certain socially-determined consumption target. Their models can exhibit profit-led growth regimes where demand is not driven by investment expenditure (as in the seminal Bhaduri and Marglin 1990), but rather by the increase in debt-fueled consumption. Ultimately, this consumption (and the associated debt) is originated from an increase in personal income inequality, which increases the gap between households' consumption target and what they can afford to consume given their income.

Most of these models share a Pasinettian approach, whereby two or more social classes are assumed, and saving rates depend on one's class belonging. More recently, a second generation of neo-Kaleckian growth models has tried to consider the role of personal income distribution within a single class. In their empirical contribution, Behringer and van Treeck (2019) consider the cases of Germany and the USA, and discuss how income distribution and institutions interact to generate different growth models (export-led for Germany, debt-led for the United States). They consider an "expenditure cascades" model in which the relationship between personal income inequality and consumption depends on upward-looking status comparisons: each household sets their desired level of consumption based on their personal income and on the observed consumption of those immediately above them in the personal income distribution. Such keeping-up-with-the-Joneses behavior could lead to such a strong change of consumption patterns in response to changes in inequality, that Keynes' automatic effect is superseded and in the aggregate a negative correlation might emerge between inequality and the saving rate (Frank,

Levine and Dijk 2014). The intuition behind this "expenditure cascades" effect is that if the increase in inequality leads to an increase in the gap between a household's income and that of those who are immediately above them in the personal income distribution, the household will start consuming a larger share of their income in order to keep roughly the same standard of living as those above them. If this loss of relative standing is experienced by a large enough share of the population (e.g. if the increase in incomes is concentrated in the top percentiles of the income distribution), overall most households could end up increasing their propensity to consume and therefore the aggregate saving rate might decrease.

As the seminal contributions of Brady and Friedman (1947) and Duesenberry (1949) showed, such keeping-up-with-the-Joneses behavior can be formalized by simply assuming that the marginal propensity to consume (and that to save) is a positive function of an individual's relative position in the income distribution—e.g., their percentile of income, and not, or not only, the monetary value of their income. However, keeping-up-with-the-Joneses is not enough to produce a negative correlation between inequality and aggregate saving, as this behavioral effect has to be large enough to compensate for Keynes' automatic effect. Possibly for this reason, the only two studies that fully developed a formal neo-Kaleckian model integrating both functional and personal income distribution rely on a different assumption concerning household's consumption target.

The first, by Carvalho and Rezai (2016), derive the conditions for profit-led and wage-led growth when the saving rate positively depends on personal income inequality. They assume that only the saving rate out of wages depends on inequality; that personal incomes (wages) follow a Pareto distribution; and that personal consumption depends both on the individual monetary wage and on the difference between one's wage and the median wage in the overall distribution.

This model is still based on the idea of consumption emulation, but reference to the median of the distribution is more suggestive of a notion of a socially necessary bundle of consumption than of a keeping-up-with-the-Joneses effect. Since the Pareto distribution has a well defined formula for the median, Carvalho and Rezai (2016) are able to formally derive the aggregate saving rate as the sum of individuals' propensities to save—the same procedure that we use here.

Using the same assumptions (Pareto distribution, and median income as a consumption target), Tonni (2022) extends the model to allow for personal inequality in profits too. He considers both the case in which inequality is positively correlated with the aggregate saving rate, and that in which they are negatively correlated (the expenditure cascades model). Although with opposite implications, the two cases imply that the growth regime is not a fixed characteristic of an economy but rather it changes endogenously, due to changes in personal income inequality. Through some simulations Tonni shows that, for feasible values of the main parameters, there is a threshold value for the wage share above/below which the growth regime switches from profit-led to wage-led (or vice versa).

In the next section we present a model further generalizing Carvalho and Rezai's and Tonni's approach by removing the assumption that individual incomes necessarily follow a Pareto distribution, and we explicitly investigate the interplay between personal and functional income distribution. Our work can thus be interpreted as contributing to this second generation of micro-founded neo-Kaleckian models, adopting a Kaldorian approach whereby the marginal propensities to save and consume depend on the kind of income that a household receives rather than on their belonging to a specific class. Indeed, as shown below we do not assume anything concerning compositional inequality, that is, we allow that each household could earn a labor and/or a capital income comprised between zero and the maximum observed in the distribution,

and our results do not depend on the assumption that some households only earn one kind of income, or that capital incomes are necessarily larger than labor incomes for any single household. Such level of abstraction allows our model to encompass both a heavily class-based society, and one in which compositional inequality could theoretically be zero (so that all households would receive both kinds of income in exactly the same proportion of their household income). For this reason, along Kaldorian lines we refer to the propensities to save out of profits and out of wages, rather than to the capitalists' or the workers' propensities.

3. The model

We assume that households might receive labor and/or capital incomes that they may consume or save, but we do not explicitly model the financial side of the economy. We further assume that the functional and personal distribution of income could impact on aggregate growth, but distribution does not depend on growth (as typically assumed in neo-Kaleckian models). Finally, for simplicity we assume a closed economy without public sector and in which all profits are distributed, and we ignore capital depreciation.[2]

Denoting total income by Y, capital income by Π, and labor income by W; and the associated income shares: of profits, π, and wages, w; we define:

$$Y = \Pi + W \tag{1}$$

$$\frac{\Pi}{Y} + \frac{W}{Y} = \pi + w = 1 \tag{2}$$

[2] These assumptions allow a more elegant and compact treatment, but do not qualitatively affect our main results. A demonstration and further results with a more general model are available from the authors upon request.

Assume a population of *N* individuals, with each individual i receiving an income Y_i. Evidently, it will be: $\sum_{i=1}^{N} Y_i = Y$. Without loss of generality, let us sort the individuals in non-decreasing order by individual income, i.e. such that $Y_i \leq Y_{i+1}\ \forall\ i$. Let us further denote Π_i and W_i respectively the individual profits and wages. Given the order just established, it is not necessary that $W_i \leq W_{i+1}$ or that $\Pi_i \leq \Pi_{i+1}$.

Using the terminology by Ranaldi (2021), we define $\alpha_i = \frac{\Pi_i}{\Pi}$ the share of individual *i*'s profits in total (aggregate) profits, and $\beta_i = \frac{W_i}{W}$ the share of *i*'s wages in total wages. Evidently, the following relation will hold: $\sum_{i=1}^{N} \alpha_i = \sum_{i=1}^{N} \beta_i = 1$.

Individual income can thus be written as:

$$Y_i = \Pi_i + W_i = \frac{\Pi_i}{\Pi}\Pi + \frac{W_i}{W}W = \alpha_i \Pi + \beta_i W \tag{3}$$

The individual's marginal propensity to save out of profits, $s_{\pi,i}$, and her marginal propensity to save out of wages, $s_{w,i}$, could be, but in general they need not be, equal. Allowing for the possibility of an exogenous component of consumption, denoted by $\bar{c} \geq 0$, we can write the value of individual saving:

$$\begin{aligned} S_i &= s_i\, Y_i - \bar{c} \;=\; s_{\pi,i}\, \Pi_i + s_{w,i}\, W_i - \bar{c} \;=\; s_{\pi,i}\, \alpha_i\, \Pi \;+ s_{w,i}\, \beta_i\, W - \bar{c} \;= \\ &= (s_{\pi,i}\, \alpha_i\, \pi \;+ s_{w,i}\, \beta_i\, w)\, Y \;- \bar{c} \end{aligned} \tag{4}$$

To introduce consumption emulation, we assume that the propensities to save are a function of the individual's position in the distribution of personal incomes that, given the individual ordering we defined above, is denoted by $\frac{i}{N} \in [0,1]$. For simplicity, we assume a linear function:

$$s_{\pi,i} = \sigma_\pi \frac{i}{N} \tag{5}$$

$$s_{w,i} = \sigma_w \frac{i}{N} \tag{6}$$

with $\sigma_\pi \in [0,1]$ and $\sigma_w \in [0,1]$ exogenous parameters. Individual saving thus becomes:

$$S_i = \frac{1}{N}(\sigma_\pi \; i \; \alpha_i \; \pi + \sigma_w \; i \; \beta_i \; w) \; Y - \bar{c} \tag{7}$$

Aggregate saving is the sum of all individuals' saving:

$$S = \sum_{i=1}^{N} S_i = \left(\sigma_\pi \; \pi \; \sum_{i=1}^{N} \frac{i\alpha_i}{N} + \sigma_w \; w \; \sum_{i=1}^{N} \frac{i\beta_i}{N}\right) Y - \bar{c}N \tag{8}$$

Following Ranaldi (2021) we introduce two measures of equality: $\mu_\pi \in [0,1]$, and $\mu_w \in [0,1]$. These represent the normalized areas of the concentration curves respectively of the capital and labor incomes. Therefore, μ_π increases when the equality of individual profits increases, that is, when profits are transferred towards the lower part of the distribution. The same occurs for

wages, with μ_w a measure of equality of labor incomes. Following Ranaldi (2021: 150) we observe that:[3]

$$\mu_\pi = \frac{2N+1}{2N} - \sum_{i=1}^{N} \frac{i\alpha_i}{N} \tag{9}$$

$$\mu_w = \frac{2N+1}{2N} - \sum_{i=1}^{N} \frac{i\beta_i}{N} \tag{10}$$

Noting that for a non-negligible population size we can approximate $\frac{2N+1}{2N} \approx 1$, we obtain the aggregate marginal propensities to save:

$$s_\pi = \sigma_\pi(1 - \mu_\pi) \tag{11}$$

$$s_w = \sigma_w(1 - \mu_w) \tag{12}$$

Substituting equations (11) and (12) into (8):

$$S = \underbrace{[\sigma_\pi\,(1-\mu_\pi)\,\pi + \sigma_w\,(1-\mu_w)\,w]}_{s\text{ = aggregate saving rate}}\,Y - \bar{c}N \;=\; (s_\pi\,\pi + s_w\,w)\,Y - \bar{c}N \tag{13}$$

Equation (13) highlights that due to the importance of both personal and functional income inequality, the aggregate marginal propensity to save, s (the term within brackets), is an endogenous variable. As in Carvalho and Rezai (2016), consumption emulation implies that

[3] From the definition of Lorenz curve: $\mu_\pi = \frac{1}{2N}\sum_{i=0}^{N}\left(\sum_{j=0}^{i}\alpha_j + \sum_{j=0}^{i+1}\alpha_j\right)$, therefore, $\mu_\pi = \frac{1}{2N}\sum_{i=1}^{N}\left(2\sum_{j=1}^{i}\alpha_j + \alpha_i\right) = \frac{1}{N}\sum_{i=0}^{N}\sum_{j=0}^{i}\alpha_j + \frac{1}{2N}\sum_{i=0}^{N}\alpha_i = \sum_{i=1}^{N}\alpha_i\left(\frac{2N-2i+1}{2N}\right) = \frac{2N+1}{2N} - \frac{1}{N}\sum_{i=0}^{N} i\alpha_i$, as shown in equation (9). For μ_w, the same applies (except with β in place of α).

personal income inequality increases *s* (μ_π and μ_w exhibit a negative sign) and therefore compresses aggregate demand.

To further investigate this effect, we derive the goods market equilibrium. First, as common in the neo-Kaleckian literature, we introduce the rate of capacity utilization, z, given by the ratio of aggregate income to potential income, Y^*. For the sake of simplicity, we normalize the latter to 1. Aggregate saving can thus be rewritten as:

$$S = (s_\pi\, \pi + s_w\, w)\, \frac{Y}{Y^*}\, Y^* - \bar{c}N = (s_\pi\, \pi + s_w\, w)\, z - \bar{c}N \tag{14}$$

Following Bhaduri and Marglin (1990) we assume that the investment function depends on the aggregate profit share, π, as well as on z. We again adopt a linear function, with partial derivatives I_z and I_π:[4]

$$I = I_0 + I_z\, z + I_\pi\, \pi \tag{15}$$

Setting the equality between aggregate saving equal and aggregate investment:

$$I_0 + I_z\, z + I_\pi \pi = z[\sigma_\pi(1-\mu_\pi)\pi + \sigma_w(1-\mu_w)w] - \bar{c}N = z(s_\pi\, \pi + s_w\, w) - \bar{c}N \tag{16}$$

Therefore, the capacity utilization rate guaranteeing the real market equilibrium, z^*, is:

[4] In equation (15) the constant term, I_0, can be thought of as the capitalists' animal spirits, or, in a more general model, as government spending and/or exports.

$$z^* = \frac{I_0 + I_\pi\,\pi + \bar{c}N}{[\sigma_\pi\,(1-\mu_\pi)\pi + \sigma_w(1-\mu_w)w] - I_z} = \frac{I_0 + I_\pi\,\pi + \bar{c}N}{s - I_z} \tag{17}$$

This result is similar to that of Bhaduri and Marglin (1990), except that the aggregate saving rate (and the aggregate propensities to save out of profits and wages) is endogenous, and depends on the personal income distribution. To identify growth regimes, we compute the variation in z^* associated with a change in the profit share. Using logarithmic differentiation we write:

$$I_z \frac{dz}{d\pi} + I_\pi = \frac{dz}{d\pi}(s_\pi\,\pi + s_w\,w) + z(s_\pi - s_w) + z\left(\pi\frac{ds_\pi}{d\pi} + w\frac{ds_w}{d\pi}\right)$$

$$\Rightarrow \quad \frac{dz}{d\pi} = \frac{I_\pi - z\left[(s_\pi - s_w) + \left(\pi\frac{ds_\pi}{d\pi} + w\frac{ds_w}{d\pi}\right)\right]}{(s_\pi\,\pi + s_w\,w) - I_z} \tag{18}$$

If the derivative is positive, that is, if capacity utilization increases when the profit share increases, the growth regime is said to be profit-led; if it is negative, wage-led. As can be seen from equation (18), in our model the growth regime itself is endogenous and possibly variable. Thus the model is apt to capture short or medium-run dynamics and not long-run steady states. However, it is still possible to define the conditions for stability by expressing the excess demand for goods, $EDG = I - S$, as a function of the capacity utilization rate. Indeed, it will be: $EDG = I_0 + I_\pi\,\pi + \bar{c}N + z[I_z - s_\pi\,\pi - s_w w]$. For stability, it is necessary that an increase in z reduces excess demand, that is, $\frac{\partial EDG}{\partial z} < 0$. In our case, this implies that: $\frac{\partial EDG}{\partial z} = I_z - s_\pi\,\pi - s_w\,w = I_z - s < 0$. As usual, this condition implies that the denominator of equation (18) be strictly positive. Accordingly, the sign of the derivative, and thus the growth regime, only depends on the sign of the numerator.

Recalling that by construction $w = 1 - \pi$, we can rewrite equation (18) as follows:

$$\frac{dz}{d\pi} = \frac{I_\pi - z\left[(s_\pi - s_w) + \left(\pi \frac{ds_\pi}{d\pi} - w \frac{ds_w}{dw}\right)\right]}{(s_\pi \pi + s_w w) - I_z} = \frac{I_\pi - z\left[(s_\pi - s_w) + \left(\pi \sigma_\pi \frac{d(1-\mu_\pi)}{d\pi} - w \sigma_w \frac{d(1-\mu_w)}{dw}\right)\right]}{s - I_z} \tag{19}$$

and substituting σ_π and σ_w in this equation with their definition in equations (11) and (12) we obtain:

$$\frac{dz}{d\pi} = \frac{I_\pi - z\left[(s_\pi - s_w) + \left(s_\pi \frac{\pi}{1-\mu_\pi} \frac{d(1-\mu_\pi)}{d\pi} - s_w \frac{w}{1-\mu_w} \frac{d(1-\mu_w)}{dw}\right)\right]}{s - I_z} =$$

$$\frac{dz}{d\pi} = \frac{I_\pi - z\left[\overbrace{(s_\pi - s_w)}^{\text{saving gap}} + \overbrace{\left(s_\pi \varepsilon_{\mu_\pi} - s_w \varepsilon_{\mu_w}\right)}^{\text{inequality-adjusted saving gap}}\right]}{s - I_z} \tag{20}$$

where ε_{μ_π} is the elasticity of the inequality among individual profits to changes in the profit share, and ε_{μ_w} is the elasticity of the inequality among wages to changes in the wage share. Although we assume that income distribution does not depend on growth, we allow for the personal distribution to potentially be affected by changes in the functional distribution. If the two elasticities were both zero, the functional income distribution would have no impact on the personal distribution, and the model would return the well-known result that when saving out of wages is allowed, the growth regime of the economy depends on the difference between the aggregate propensities to save out of profits and that out of wages (the "saving gap").[5] The larger

[5] Implicitly, Ranaldi and Milanović (2022) assume that inequality among profits and among wages does not change if the aggregate profit share changes (p. 24, eq. 6). This assumption, however, rests more on the lack of substantial empirical evidence of a correlation in either direction (and possibly a requirement of simplicity of the model) than on an explicit argument.

this difference, the more the second term at the numerator of equation (20) is likely to be larger than I_π , and therefore the more growth will be wage-led.

However, this would not imply that the personal distribution of income was irrelevant, because the aggregate propensities to save out of profits and out of wages are endogenous variables, correlated with personal income inequality. Therefore, given everything else, growth will be more wage-led if wages are more equally distributed than profits, and it will be more profit-led in the opposite case.

In the more general case, where the elasticities are not zero, the relevance of personal income distribution is even more evident (the "personal inequality-adjusted saving gap" in equation (20) is different from zero). Everything else given, a positive elasticity of the inequality of individual profits to the profit share—that is, if profits tend to be more unequally distributed when they constitute a larger share of the aggregate product—makes the growth regime relatively more wage-led. In contrast, a positive elasticity of the inequality of wages to the wage share—that is, if wages tend to be more unequally distributed when they constitute a larger share of the aggregate product—makes the growth regime relatively more profit-led. In other words, ε_{μ_π} pushes in the same direction of the saving gap, and ε_{μ_w} in the opposite direction.

4. The Italian economy over three decades

A priori, we have no theoretical reason to expect a specific value for ε_{μ_π} or ε_{μ_w}. An in-depth empirical analysis is especially challenging due to the data requirements of our model: whereas the neo-Kaleckian models are usually estimated with aggregate data (national accounts), the computation of the inequality of individual wages and profits, as well as of the behavioral rule

determining consumption emulation, requires access to micro-level information. For capital incomes in particular, such data is often unavailable or it does not span over long time series. In some countries, population surveys administered from the central bank provide reliable data for the recent past. According to Brandolini et al. (2018), the Bank of Italy's *Survey on Household Income and Wealth* (SHIW) has information on capital incomes at the household level on a representative sample of Italy's population, that can be considered as reliable for the waves since the end of the 1980s. Since then, the survey has been conducted biannually (except in 1998 and 2018) up to 2020, for a total of 14 usable yearly waves.[6] Having just 14 observations prevents us from applying standard econometric methods. However, such data can nonetheless provide some preliminary descriptive evidence.[7]

As shown in figure 1, we find that individual profits are always more unequally distributed than wages. For wages, a trend towards increasing concentration is clearly visible, whereas for profits it is not. Ceteris paribus, this implies a tendency for the growth regime to be wage-led, but increasingly less over the period, due to a positive but decreasing saving gap.

Concerning consumption and saving behavior, the SHIW data allows us to estimate the two propensities to save (s_w and s_π) by means of cross-section regressions on the single waves of the survey. Tables A1 and A2, in appendix, report the results of such regressions of the saving rate as a function of: the household's relative labor income ($\frac{i}{N} W_i$, using the symbols defined in the previous section); their relative capital income ($\frac{i}{N} \Pi_i$); and a number of control variables

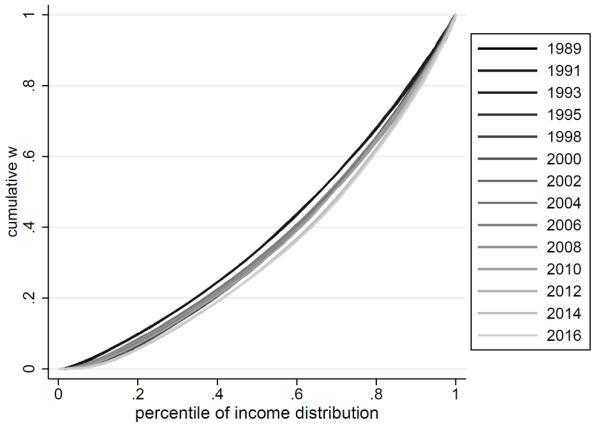
[6] Data for year 2020 is severely biased by the COVID-19 crisis and therefore it is not fully comparable with the previous ones and will not be used in this work.

[7] Since in the model we sharply distinguish between labor and capital incomes, we decompose the "mixed incomes" of the self-employed and the entrepreneurs into the two components, according to the procedure suggested by Glyn (2012). However, the allocation of mixed incomes entirely to either the labor or the capital incomes does not significantly change our results. Further results are available from the authors upon request.

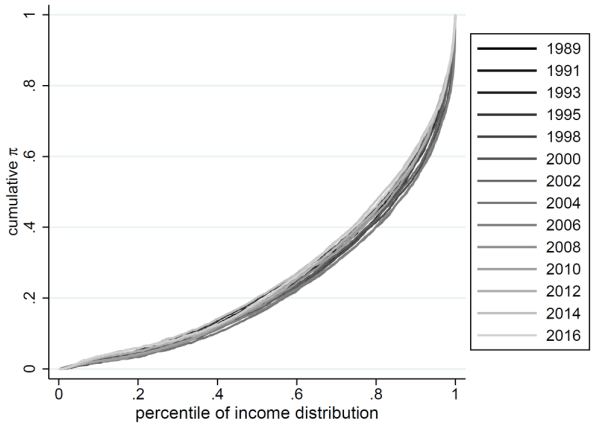
(among which other relative incomes not explicitly considered in our model, such as pensions and social transfers, as well as their gender, age, highest educational attainment, etc.). It emerges that the coefficient relating the propensity to save out of wages to the household's income percentile, σ_w (the behavioral component of s_w) is relatively constant over time, and ranges between 0.4 and 0.5. Instead, the behavioral coefficient related to the propensity to save out of profits, σ_π, is more variable, but it is usually larger than σ_w. Multiplying each year's values by the relevant measure of concentration of household incomes (as per equations 11 and 12), we confirm the previous finding, of a variable but positive saving gap, as shown in figure 2.

Figure 1 – Concentration of individual incomes: Italy, 1989-2016

1.a) Wages



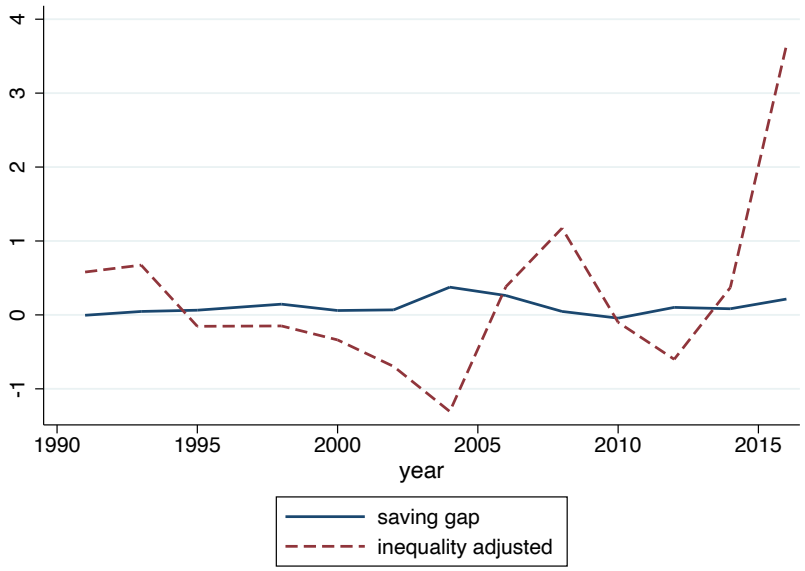
1.b) Profits



However, as shown in the same figure, the personal inequality-adjusted saving gap is significantly larger and more volatile than the saving gap, even taking on a substantially negative value in a number of years. Therefore, the two elasticities measuring the reaction of personal

income inequality to changes in the functional income inequality do seem to matter, and not consistently in the same direction over time.

Figure 2 – Saving gap, and elasticity-adjusted saving gap



To understand if the values of the inequality-adjusted saving gap are large enough to determine (changes in) the growth regime—in our case: if they are large enough to result in a profit-led regime at least in some years—we reconstruct what might have been the growth regime of the Italian economy over the period considered, based on national accounts (GDP data and the profit share) from the European Commission's AMECO database. We first compute the *apparent* growth regime, by which we mean the sign of the simple ratio between the observed GDP growth and the observed change in the profit share between each two waves of the SHIW survey data. We refer to this computation as the 'apparent' growth regime because the variations

of both quantities are likely to be determined by a number of other factors besides those considered in our model but that, due to the limited number of observations, we cannot explicitly control for. Therefore, we cannot claim that the observed changes in GDP are caused by the observed changes in the profit share, and we limit our interpretation to that of mere correlations.

We then compute the growth regime predicted by the model, on the basis of our estimated saving gaps, and the distributive shares obtained from the same AMECO database. To obtain the predicted growth regime, two further variables in equation (20) are necessary: the rate of capacity utilization, and the response of investments to changes in the profit share. Following Barbosa-Filho and Taylor (2006), we estimate z as the ratio of GDP to the value obtained by applying a Hodrick-Prescott (HP) filter. Concerning I_π, we use the estimate for the Italian economy in the period 1970-2007 by Onaran and Giorgos (2012: 19). They report relatively low values: 0.24 for the (lagged) coefficient of investment on the profit share, and an elasticity of 0.13. Using these figures is a conservative approach to our aims, because relatively low values are more likely to result in predictions of a wage-led growth regime, that is, they skew in the same direction of the saving gap and make it less likely that we can predict a profit-led regime. Nonetheless, as shown in table 1, the apparent elasticities of the personal to the functional income distribution are so large and volatile that for roughly half of the times in the period considered here, our simple model-based calculation predicts that the growth regime is profit-led. With reference to equation (20), this implies that in those periods the inequality-adjected saving gap is the preponderant force.

Aggregate data suggests that over these decades the Italian economy has been characterized by an *apparent* profit-led growth regime. This, however, would be the result of a first period of wage-led growth in the first half of the 1990s, then a span of profit-led growth in the second half

of the 1990s, then again (limited) wage-led growth in the 2000s, and a mixed regime during the euro-crisis years (2010s). We do not wish to draw too much from a such simple descriptive analysis, but these findings are broadly consistent with Blecker's (2016) argument, that growth is more likely to be wage-led in the short run and profit-led in the long-run. Further, they echo the findings of Carrillo-Maldonado and Michalis (2022), who find that the USA too has undergone at least one growth regime switch in recent decades.

As the table shows, our model allows to explain some of these shifts: during the 1990s, during the 2000s (though with some delay), and partly in the 2010s. Overall, we correctly predict the apparent growth regime in 9 out of the 13 periods between two waves of the SHIW survey.

Table 1 – Italy, 1989-2016: apparent and predicted growth regime

	Apparent growth regime	**Implied by the model**
1991	wage-led	**wage-led**
1993	wage-led	**wage-led**
1995	profit-led	**profit-led**
1998	profit-led	**profit-led**
2000	profit-led	**profit-led**
2002	wage-led	profit-led
2004	wage-led	profit-led
2006	wage-led	**wage-led**
2008	wage-led	**wage-led**
2010	profit-led	**profit-led**
2012	wage-led	profit-led
2014	wage-led	**wage-led**
2016	profit-led	wage-led
Whole period	***profit-led***	***profit-led***

Note: bold characters denote a correct prediction.

5. Conclusions

In this work we provide a compact way to summarize the joint impact of functional and personal income distribution on growth. Assuming that income distribution affects the aggregate saving rate, it emerges that an economy's growth regime is liable to endogenous changes, especially when changes in the wage or profit shares are not neutral in the distribution of individual wages or profits.

Following a long institutionalist tradition, we explain the impact of income distribution on the saving rate by means of an assumption of consumption emulation. However, distribution itself is exogenous in our model, and in particular our model cannot explain why or how shifts in the profit or wage share impact on the distribution of individual incomes.

A preliminary empirical investigation of the Italian economy between the late 1980s and the 2010s provides some encouraging evidence on the real-world relevance of our model. Therefore, it appears that the *kind* or nature of economic growth—in particular, the degree to which a certain change in the profit or the wage share is "pro-poor"—has a decisive influence on the growth regime of the Italian economy. This, measured by our two elasticities of income inequality, ε_{μ_π} and ε_{μ_w}, is determined by factors not explicitly considered in our model (possibly such as technology or political and institutional developments).

We leave for future research the question of whether the Italian economy is a special one, possibly on the edge between the two growth regimes (especially given the persistent stagnation of GDP in the period considered), or whether such variability of the growth regime is a general feature of mature economies.

References

Behringer Jan, Till van Treeck. 2019. Income distribution and growth models: A sectoral balances approach. *Politics & Society* 47 (3): 303–332.

Bhaduri, Amit, Stephen Marglin. 1990. Unemployment and the real wage: the economic basis for contesting political ideologies. *Cambridge Journal of Economics* 14 (4): 375–393.

Blecker, Robert A. 2016. Wage-led versus profit-led demand regimes: The long and the short of it. *Review of Keynesian Economics* 4 (4): 373–90.

Brady, Dorothy S., Rose D. Friedman. 1947. Savings and the Income Distribution. In Conference on Research in Income and Wealth, eds. Edward F. Denison, Selma Goldsmith, Simon Kuznets & Martha Anderson: 247–265. Cambridge (MA): National Bureau of Economic Research.

Brandolini, Andrea, Romina Gambacorta, Alfonso Rosolia. 2018. Inequality amid income stagnation: Italy over the last quarter of a century. Questioni di economia e finanza (occasional papers), Rome: Bank of Italy.

Carrillo-Maldonado, Paul, Michalis Nikiforos. 2022. Estimating a Time-Varying Distribution-Led Regime. Levy Economics Institute Working Paper 1001, Annandale-on-Hudson, NY: Bard College.

Carvalho, Laura, Armon Rezai. 2016. Personal income inequality and aggregate demand. *Cambridge Journal of Economics* 40 (2): 491–505.

Cirillo Valeria, Marcella Corsi, Carlo D'Ippoliti. 2017. European households' incomes since the crisis. *Investigación Económica* 76 (301): 57-85.

Duesenberry. James S. 1949. *Income, saving, and the theory of consumer behavior*. Cambridge, MA: Harvard University Press.

Dutt, Amitava K. 1984. Stagnation, income distribution and monopoly power. *Cambridge Journal of Economics* 8 (1): 25–40.

Frank, Robert H., Adam Seth Levine, Oege Dijk. 2014. Expenditure Cascades. Review of Behavioral Economics 1 (12): 55–73.

Glyn, A. 2012. Functional distribution and inequality. In The Oxford Handbook of Economic Inequality, ed. Brian Nolan. Oxford: Oxford University Press.

Kapeller, Jakob, Bernhard Schütz. 2015. Conspicuous consumption, inequality and debt: The nature of consumption-driven profit-led regimes. *Metroeconomica* 66 (1): 51-70.

Onaran, Ozlem, Giorgos Galanis. 2012. Is aggregate demand wage-led or profit-led? National and global effects. ILO Working Papers, Geneva: International Labour Organization.

Palley, Thomas I. 2014. The middle class in macroeconomics and growth theory: a three-class neo-Kaleckian–Goodwin model. *Cambridge Journal of Economics* 39 (1): 221–243.

Ranaldi, Marco, Branko Milanović. 2022. Capitalist systems and income inequality. Journal of Comparative Economics 50 (1): 20-32.

Ranaldi, Marco. 2022. Income composition inequality. *Review of Income and Wealth* 68 (1): 139-160.

Setterfield, Mark, Yk Kim. 2017. Household borrowing and the possibility of 'consumption-driven, profit-led growth'. *Review of Keynesian Economics* 5 (1): 43-60.

Starr, Martha A. 2008. Lifestyle conformity and lifecycle saving: a Veblenian perspective. *Cambridge Journal of Economics* 33 (1): 25–49.
Tavani, Daniele, Ramaa Vasudevan. 2014. Capitalists, workers, and managers: wage inequality and effective demand. Structural Change and Economic Dynamics 30: 120–31.
Tonni, Lorenzo. 2022. Personal income distribution and the endogeneity of the demand regime. *Cambridge Journal of Economics*. Forthcoming.

Appendix: estimation results for the marginal propensity to save

	1989	1991	1993	1995	1998	2000	2002
$\frac{i}{N}\Pi_i$	0.381***	0.346***	0.499***	0.514***	0.626***	0.535***	0.528***
	(0.031)	(0.059)	(0.056)	(0.071)	(0.070)	(0.052)	(0.060)
$\frac{i}{N}W_i$	0.406***	0.429***	0.514***	0.494***	0.519***	0.550***	0.525***
	(0.019)	(0.049)	(0.030)	(0.029)	(0.030)	(0.034)	(0.036)
$\frac{i}{N}(Y-W-\Pi)_i$	0.351**	0.321	0.404	1.350***	1.135***	1.139***	1.469***
	(0.139)	(0.585)	(0.460)	(0.218)	(0.240)	(0.068)	(0.231)
male	-549.065**	-363.159	9.075	633.050	11.520	-446.905	-912.101*
	(246.671)	(437.646)	(466.227)	(491.721)	(545.035)	(435.010)	(474.270)
age	7.424	-12.886	-27.057	9.963	-21.839	-38.577	-55.809**
	(10.721)	(16.655)	(19.740)	(17.954)	(24.664)	(24.351)	(24.300)
south	458.070**	1315.488***	2236.078***	2332.516***	2758.740***	2601.521***	2402.167***
	(209.072)	(414.914)	(437.514)	(470.870)	(625.274)	(523.302)	(704.277)
tertiary education	-977.421**	-1255.462**	-1756.284**	-1884.211***	-2575.640***	-2829.240***	-2755.918***
	(388.770)	(574.566)	(799.712)	(651.006)	(950.816)	(897.369)	(994.530)
north	216.548	336.391	649.992	808.585*	306.425	-480.801	-88.241
	(242.819)	(349.962)	(472.132)	(434.085)	(610.285)	(471.119)	(818.953)
household size	-452.103***	-275.760**	-684.298***	-536.878***	-966.909***	-1088.245***	-519.201***
	(75.467)	(131.340)	(149.554)	(133.371)	(242.331)	(182.934)	(198.503)
constant	931.665**	40.310	-280.206	-3317.232***	-2.416	1364.856	111.288
	(401.737)	(516.949)	(877.866)	(796.139)	(950.888)	(911.106)	(1064.338)
N Obs.	4660.000	4262.000	3709.000	3667.000	3535.000	3775.000	3586.000
R^2	0.575	0.447	0.547	0.612	0.616	0.643	0.595
adjusted R^2	0.574	0.446	0.546	0.611	0.616	0.642	0.594

	2004	2006	2008	2010	2012	2014	2016
$\frac{i}{N}\Pi_i$	0.816***	0.761***	0.530***	0.357***	0.510***	0.527***	0.663***
	(0.046)	(0.076)	(0.032)	(0.043)	(0.048)	(0.046)	(0.086)
$\frac{i}{N}W_i$	0.406***	0.515***	0.552***	0.492***	0.424***	0.459***	0.416***
	(0.032)	(0.054)	(0.053)	(0.024)	(0.026)	(0.019)	(0.049)
$\frac{i}{N}(Y-W-\Pi)_i$	0.607**	1.639***	0.944***	0.864***	0.795***	1.576***	1.322***
	(0.269)	(0.373)	(0.175)	(0.187)	(0.186)	(0.407)	(0.191)
male	-382.138	-873.691*	-632.662	-868.859**	-571.236	374.777	-722.924
	(436.834)	(481.829)	(397.937)	(443.086)	(348.973)	(344.992)	(494.380)
age	-76.578***	-83.465**	8.545	-44.313*	-33.868*	-51.145***	-52.094*
	(26.076)	(34.652)	(25.917)	(24.591)	(19.022)	(17.536)	(27.201)
south	3357.450***	4552.585***	3181.422***	1003.645	2140.482***	1761.440***	2890.672***
	(728.616)	(783.185)	(691.728)	(659.676)	(491.012)	(458.632)	(823.005)
tertiary education	-3255.719***	-3241.211***	-1298.669*	-2597.540***	-1749.716***	-2427.822***	-2437.161***
	(995.983)	(1054.822)	(753.667)	(841.051)	(616.483)	(609.736)	(892.783)
north	975.757	473.150	685.463	-408.187	589.344	958.145**	1456.406*
	(659.060)	(796.474)	(529.714)	(674.390)	(482.405)	(462.629)	(798.065)
household size	-719.558***	-1288.126***	-1260.779***	-833.508***	-1016.674***	-845.674***	-734.952***
	(193.800)	(352.806)	(227.474)	(167.331)	(151.313)	(128.312)	(206.127)
constant	-567.011	319.890	-1563.297**	1253.285	-603.020	999.963	-442.568
	(1007.678)	(1336.594)	(794.445)	(952.899)	(706.036)	(765.116)	(933.291)
N Obs.	3592.000	3440.000	3445.000	3508.000	3542.000	3332.000	2999.000
R^2	0.803	0.805	0.703	0.534	0.614	0.634	0.626
adjusted R^2	0.802	0.805	0.702	0.533	0.613	0.633	0.625

***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.10$.