No. 05

Distributional Aspects of Economic Systems

Marco Ranaldi

February 2020

Distributional Aspects of Economic Systems*

Marco Ranaldi[†]

January 10, 2020

Abstract

This paper proposes a methodology to jointly analyze the distributions of capital and labor and of saving and consumption across the population. Hinging on the novel concept of *income composition inequality* and on its technical assessment through a specific indicator, this paper classifies economic systems by bringing together these two distributions in a two-dimensional box. Economic systems can be classified as *Kaldorian Systems* or as *Representative Agent Systems* depending on their position in the box. In a Kaldorian Systems the rich individuals save capital income and the poor individuals consume labor income. In a Representative Agent Systems all individuals are identical in terms of ownerships and behaviors. The paper illustrates this methodology via an empirical application to the European context, in which two major clusters of economic systems - *Mediterranean* and *Northern European* - emerge. Furthermore, this paper illustrates how the classification proposed can be useful in understanding a country's long-run performance in terms of capital accumulation, inequality and growth.

JEL-Classification: D31, P10, O43

Keywords: Distributional Dynamics, Income Inequality, Income Composition Inequality, Economic Systems.

1 Introduction

Distributional aspects of economic systems are fundamental to understand long-term trajectories of countries' macroeconomic performances. In his pioneering work, [Kuznetz](#)

*I would like to thank B. Amable, F. Coricelli, M. Franks, D. Klenert, L. Mattauch, A. Roventini, F. Saraceno, E. Stockhammer as well as all participants at the EPCI seminar (PSE) for helpful comments and suggestions. The usual disclaimer applies.

[†]The Stone Center on Socio-Economic Inequality and The Graduate Center, CUNY. E-mail: mrnanaldi@gc.cuny.edu

(1955) advanced the hypothesis of the inverted-U shaped relationship between economic growth and income inequality. More recently, Piketty (2014) has formulated a fundamental inequality law, whereby the growth rate of the economy is generally lower than the rate of capital accumulation. These important studies reflect upon two key elements of modern economic systems: The distribution of income across individuals, and individuals' ability to accumulate wealth over time. This brings our attention to the distribution of capital and labor, and to the distribution of saving and consumption across the income distribution.

Indeed, the distribution of capital and labor across the population provides precious information not only on the gap between the rich and the poor, but also on the *type* of gap that is present. A capital-rich person is (economically) different from a labor-rich person in a number of ways. Capital-rich and labor-rich people have a different command over resources, and occupy different roles in society.¹ The distribution of saving and consumption, instead, makes us understand which people manage to save an important share of their income, and which people do not.

From a more technical perspective, the distribution of capital and labor among individuals can be considered ranging between two extreme distributions, structured in the following way: The capital is owned by the top (or bottom) and the labor is owned by the bottom (or top),² and both factors are evenly distributed across the population.³ Likewise, the distribution of saving and consumption ranges between two extreme distributions which are similar in nature. The interaction between these two distributions or, in other words, between *endowment* and *choice* represents the core of this paper.⁴ Specifically, we propose a methodology that summarizes information regarding heterogeneity in individuals' income composition as well as in their saving and consumption

¹For instance, we can consider an aerospace engineer, who approximately earns a gross salary of 100.000\$ per year in the US, as labor-rich and the owner of a factory, who has the power to hire and fire other workers, as capital-rich.

²This distribution reflects the condition of maximum-concentration of income sources as shown in Ranaldi (2018), and corresponds to the *classical capitalism*, as defined by Milanovic (2017).

³The second extreme distribution, in which both factors are evenly distributed across the population, is defined given (i) the way total income is distributed, and (ii) the total amount of capital and labor in the economy. This distribution corresponds to the condition of zero-concentration of income sources as proposed in Ranaldi (2018), as well as to the *new capitalism 2* described by Milanovic (2017).

⁴The term *choice* is here referred to the decision of saving and consuming of an individual.

decisions within an economic environment. Then, by taking this method to data, we show that heterogeneity *matters* and is *country specific*.

The method we propose hinges on the concept of *income composition inequality*, and on its technical assessment via the *income-factor concentration index* $\mathcal{I}_f$ (IFC), developed in [Ranaldi \(2018\)](#).⁵ Specifically, we first introduce the concept of *saving and consumption composition inequality*, which, similarly to that of income composition inequality, studies how unequally saving and consumption composition is distributed across the income distribution. We then define the *saving and consumption concentration index* $\mathcal{I}_{s/c}$ (SCC), which is constructed as the IFC index, by means of specific concentration curves. Secondly, we combine these two dimensions of concentration, thus the IFC index and SCC index, to construct a 1×1 box. Every point in the box corresponds to a specific pair of the two indices. In particular, when $(\mathcal{I}_f, \mathcal{I}_{s/c}) = (1, 1)$, the economic system is composed by a group of rich people that own the capital and save, and by a group of poor people that earn the labor and consume. On the contrary, when $(\mathcal{I}_f, \mathcal{I}_{s/c}) = (0, 0)$, every individual has the same population shares of capital, labor, consumption and savings. We label these two extremes as *Kaldorian System* and as *Representative Agent System*.

This method allows us to synthesize, in a simple and straightforward manner, information on households' heterogeneity in terms of income composition and of consumption and saving decisions. From an empirical perspective, we show that the Representative Agent System is well suited to describe the country of *Sweden*, whereas the Kaldorian System to describe the countries of *Italy*, *Portugal* and *Greece* within the European context.

Understanding the relative position of a country in the box can be useful to foresee the same country's macroeconomic dynamics, as well as the way the benefits from macroeconomic outcomes are distributed across the population. For instance, it can be shown

⁵The IFC index measures the extent to which two income sources are separately earned by the top and the bottom of the income distribution, or rather they are jointly earned by each individual, as described by the two extreme distributions previously discussed. The higher the IFC, the stronger the link between the functional and the personal distribution of income. Furthermore, when the IFC is high, changes in the factor shares have a strong impact on personal income inequality.

that savings out of capital income are greater in Kaldorian Systems than in Representative Agent Systems. Furthermore, information on the relative position of a country in the box, if embedded in macroeconomic models, allows for a higher degree of realism in terms of households' heterogeneity. In this regard, it is shown in the paper that the two indices emerge from a simple Kaldorian model of distribution and growth.

For all these reasons, we believe our method can provide us with a direct link between *institutional setting* and *macroeconomic performances* of economic systems; a link that is dynamic by nature. The institutional aspect of economic systems emerges from our empirical investigation (Section 5.6), which highlights the presence of two major clusters of countries: the *Mediterranean* cluster and the *Northern European* cluster. The countries' macroeconomic performances, instead, depend on their relative position in the box (as discussed in Section 3), which can potentially change over time, underlying the dynamic nature of this link.

This paper is structured as follows. Section 2 discusses the related literature. Section 3 introduces the methodology. Section 4 illustrates the notions of *behavior-* and *distribution-led inequality regimes*. Section 5 provides the first estimation of the European countries' position in the box using EU-SCIL and HBS data. Section 6 concludes.

2 Related Literature

The present paper builds on two different strands of research. The *first* strand is the macroeconomics of income distribution. Classical economists such as Kaldor and Kalecki used to pay a great deal of attention to the way capital and labor were distributed among the various classes in society. Moreover, they used to make precise assumptions according to the way individuals from each social class save and consume their income. For instance, in his pioneering work, [Kaldor \(1955\)](#) assumes the marginal propensity to save of the capitalists, who draw their income from capital, to be higher than the marginal propensity to save of the workers, who draw their income from labor. This assumption influences the long-run trajectories of both the capital share of income and the rate

of profit in the economy. Hinging on Kaldor 1955's piece, [Pasinetti \(1962\)](#) wrote an article in which, by allowing also the workers to earn some profits, he proves that the steady-state capital output ratio, the capital labor ratio and the share of income going to capital are independent of the propensity to save of the workers (Pasinetti Theorem). Pasinetti 1962's article has been subsequently subject to the critique by [Samuelson and Modigliani \(1967\)](#), who show the conditions under which an Anti-Pasinetti outcome can occur in a neoclassical framework.⁶

The interest on distributional issues have subsequently decreased after the neoclassical theoretical development. Indeed, as stated by [Bertola et al. \(2006\)](#), "crucial progress in microfounding behavioral relationships in terms of optimal choices and expectations accompanied heavy reliance on "representative agent" modeling strategies. The distribution of income and wealth across consumers was viewed as a passive outcome of aggregate dynamics and market interactions, and little attention was paid to feedback effects from distribution into growth and other macroeconomic phenomena".

However, an important revival of interest on distributional issues has then taken hold also within the neoclassical tradition. The early works of [Stiglitz \(1967; 1969\)](#) and [Atkinson \(1975\)](#) studied the dynamics of income and wealth distribution in neoclassical models of capital accumulation.⁷ Particularly, [Stiglitz \(1969\)](#) developed a theory of distribution of wealth and income among individuals, to study the forces for equality under alternative assumptions about the shape of the consumption function, heterogeneity of labor skills and endowments, inheritance policies and the rate of reproduction.

While the pioneering work by [Stiglitz \(1969\)](#) was based on a model of accumulation, [Aiyagari \(1994\)](#) presented a version of the neoclassical growth model with idiosyncratic but no aggregate risk. Aiyagari's model, which was a further development of the model proposed by [Bewley \(1986\)](#), has then become a leading model for modern dynamic

⁶The Anti-Pasinetti outcome refers to the result whereby the average product of capital completely depends on the propensity to save of the workers, and not on that of capitalists. Samuelson and Modigliani illustrate in their article that the Pasinettian conditions whereby the propensity to save of the workers must be lower than that of the capitalists, and that the capital stocks of both the capitalists and the workers must be non-negative, tend to be extremely unrealistic within a neoclassical framework. Moreover, the Anti-Pasinetti case can also occur as a result of financing a public good with capital taxes (see [Mattauch et al., 2018](#)).

⁷See [Bertola et al., 2006](#), for a survey of the related literature.

macroeconomics. The underlying intuition of the model is that, in an economy populated with heterogeneous infinitely lived agents, adverse income shocks caused by borrowing constraints and fluctuations in consumption can be mitigated only by precautionary savings. As a result of individuals' heterogeneity in both income levels and income shocks, the Aiyagari's model generates different equilibrium cross-section distributions of wealth, saving and consumption. Furthermore, the novelty of [Aiyagari \(1994\)](#)'s article was also related to the development of numerical techniques to solve the dynamic model proposed. After Aiyagari's article, several computational models of the income and wealth distributions in general equilibrium have been formulated,⁸ until the more recent HANK models.⁹

More recently, [Stiglitz \(2015\)](#) has published a series of four articles with novel theoretical perspectives on the distribution of income and wealth among individuals. Following the Kaldor's fact,¹⁰ these four papers aim at explaining a new set of stylized facts. According to Stiglitz, five empirical observations feature prominently in our contemporary societies, namely: (i) the growing inequality in both wages and capital income (wealth), and growing inequality overall; (ii) the fact that wealth is more unequally distributed than wages; (iii) the stagnation of average wages, even as productivity has increased, so the share of capital has increased; (iv) the significant increases in the wealth income ratio; (v) the fact that the return to capital has not declined, even as wealth-income ratio has increased. Stiglitz argues that these stylized facts can be described by slightly modifying the old models of distribution and growth.

Outside of the neoclassical approach to macroeconomics, a large number of macroeco-

⁸See [Heathcote et al., 2009](#), for a review of the literature.

⁹The HANK models, or Heterogeneous Agent New Keynesian models, combine New Keynesian models with Bewley models. They are based on three building blocks: uninsurable idiosyncratic income risk, nominal price rigidities and assets with different degrees of liquidity.

¹⁰In an influential paper written in 1957, Kaldor described the properties of long-term economic growth by means of empirical findings of that time. Specifically, Kaldor pointed out six statements about economic growth, namely: (i) the shares of national income received by labor and capital are roughly constant over long periods of time; (ii) the rate of growth of the capital stock per worker is roughly constant over long periods of time; (iii) the rate of growth of output per worker is roughly constant over long periods of time; (iv) the capital/output ratio is roughly constant over long periods of time; (v) the rate of return on investment is roughly constant over long periods of time; (vi) there are appreciable variations (2 to 5 percent) in the rate of growth of labor productivity and of total output among countries.

nomic models of distribution have been proposed thus far. [Bhaduri and Marglin \(1990\)](#) is an important example in this respect.¹¹ This is a post-Kaleckian model capable of generating different regimes of demand and growth, as well as to establish relationship between the functional distribution of income and macroeconomic variables such as the capacity utilization, the capital accumulation, growth and the rate of profit.

Along similar lines, [Carvalho and Rezai \(2016\)](#) have studied the effect of changes in the size distribution of income on both aggregate demand and demand regime of an economy, whereas [Jump \(2017\)](#) has extended the textbook IS-LM and IS-MP models to allow them for a short-run effect of an increase in household income inequality, as measured by the coefficient of variation. Furthermore, the emerging literature on agent-based modeling is putting at the forefront the issue of income distribution, as we can see from the works of [Cardaci and Saraceno \(2015\)](#) and [Roventini et al. \(2017\)](#).¹²

Our work differs from those previously discussed in two ways. Firstly, we adopt a *measurement-based* approach to deal with the issue of households' heterogeneity in terms of income composition (i.e., the joint distribution of labor and capital income across the population) and propensities to save and consume. In fact, instead of assuming specific saving functions (as illustrated by [Stiglitz, 1969](#)), or specific joint distributions of labor and capital income across the income ranking, we rely on appositely created indicators capable of capturing these two types of heterogeneity in a straightforward manner. Then, by estimating these indicators for a group of European countries,¹³ we can classify these countries as Kaldorian Systems (high level of both indicators) or as Representative Agent System (low level of both indicators). Secondly, we show that these metrics formally emerge from a Kaldorian model of distribution and growth. The latter result shows that the type of economic system (Kaldorian *vs* Representative Agent) in place is relevant in determining the same country's long-run macroeconomic performances. We believe that the choice of a specific model of growth and accumulation should therefore

¹¹For a complete analysis of the post-Keynesian approaches to distribution and growth, see [Hein \(2014\)](#).

¹²The agent based models are classes of computational models that simulate the interactions of different agents in a complex environment.

¹³The countries we analyze are: Germany (DE), Greece (EL), Finland (FI), France (FR), Ireland (IE), Italy (IT), Portugal (PT), Sweden (SE) and United Kingdom (UK).

be made with an eye on the type of economic system analyzed. For instance, it directly follows from our result that Italy can be better described by a Kaldorian model of accumulation and growth, whereas Sweden by a representative agent model.

The *second* strand is the distribution of saving and consumption across the population from an empirical perspective. Many scholars have already explored this issue, such as Lawrance (1991), Attanasio (1994), Dynan et al. (2004), Carvalho and Rezai (2015), Piketty and Zucman (2015), Saez and Zucman (2016), Spath and Schmid (2016). The previous works show that, although in different contexts, the households' propensity to save is an increasing function of households' total income.

In line with this result, we find that the SCC index is positive for all European countries considered in 2010, meaning that a large share of total savings in the economy is concentrated in the hands of those at the top of the income ranking, whilst the people at the bottom consume more than those at the top relatively to their income.

In addition to that, we find a strong and negative correlation between the SCC and the saving rate. Hence, countries with a low saving rate are also characterized by a high level of saving and consumption composition inequality.

3 Methodology

3.1 Income Composition Inequality

In this section we do two things. First, we recall the notion of income composition inequality developed by Ranaldi (2018) and illustrate the income-factor concentration (IFC) index, which serves for its measurement. Second, we define the concept of *saving and consumption composition inequality*, which directly hinges on that of income composition inequality. Then, we derive the *saving and consumption concentration* (SCC) index, designed similarly to the IFC index.

Definition 3.1. *If we decompose total income into two factors, such as capital and labor income, then income composition inequality is the extent to which the income composition is distributed unevenly across the income distribution.*

Inequality in income composition is, hence, *maximal* when individuals at the top and at the bottom of the income distribution separately earn the two different types of income. On the contrary, it is *minimal* when each individual earns the same composition of the two factors. A high level of income composition inequality is associated with a strong relationship between the functional and personal distribution of income. The underlying intuition is straightforward: if the rich earn all the capital income in the economy, then an increase in the capital income share rises the income of the rich. From a political economy perspective, the level of income composition inequality provides us with insights on the “type of capitalism” of a given social system, as we will discuss later in this section.

In order to measure income composition inequality, we use the *income-factor concentration* (IFC) index. The IFC index is constructed by means of specific concentration curves for income source. The concentration curve for income source describes the cumulative distribution of a specific income source (such as capital income) across the population with individuals indexed by their income ranking. The curve is then multiplied by the overall level of the related income share. Figure 1 shows a graphical representation of the concentration curves for labor (orange line) and capital (red line) income. The sum of the areas of the concentration curves for capital and labor income is equal to the area of the Lorenz curve (blue line). When the concentration curve is “convex”, then the related income source is mainly concentrated at the top of the total income distribution, whereas when the concentration curve is “concave” the opposite situation holds true, and the income source is mainly concentrated at the bottom of the total income distribution.

In order to measure the degree of concentration of a given income source across the total income distribution, two more concentration curves are needed: the *zero-* and the *maximum-concentration curves*. These two curves correspond to the minimal, and maximal level of income composition inequality in the population.¹⁴ If we denote by $\mathcal{A}$ the area between the zero-concentration curve and the concentration curve for capital

¹⁴For a detailed discussion on the construction of the zero- and maximum-concentration curve, the reader can refer to the technical work by Ranaldi (2018).

Concentration Curves for Income Source

Figure 1: A graphical representation of the concentration curve for capital $\mathcal{L}(\pi, p)$, the concentration curve for labor $\mathcal{L}(w, p)$ and the Lorenz curve for income $\mathcal{L}(y, p)$ with 10 individuals (or groups) and equal sources of income in the economy ($\pi = w = \frac{1}{2}$). As it can be noticed, for each population decile p the Lorenz curve for income $\mathcal{L}(y, p)$ equals the sum of the concentration curve for capital $\mathcal{L}(\pi, p)$ and the concentration curve for labor $\mathcal{L}(w, p)$.

income and by $\mathcal{B}$ the area between the zero-concentration curve and the maximum-concentration curve, then the income-factor concentration index, IFC, is defined as the ratio between these two areas. Formally:

$$\mathcal{I}_f(\pi) = \frac{\mathcal{A}}{\mathcal{B}}. \quad (1)$$

The IFC index can also be written in the following way:

$$\mathcal{I}_f(\pi) = \frac{\pi w (\tilde{\mu}_w - \tilde{\mu}_\pi)}{\mathcal{B}(\pi)}, \quad (2)$$

where π is the capital share of income, w is the labor share of income, $\mathcal{B}(\pi)$ is the normalization coefficient and $\tilde{\mu}_\pi$ and $\tilde{\mu}_w$ are the areas of the concentration curves for

capital and labor income respectively.

The indicator ranges between -1 and 1 . It is equal to 1 when the capital income is concentrated at the top of the income distribution and the labor income at the bottom. It is equal to -1 when the capital income is concentrated at the bottom and the capital income at the top. Finally, it is equal to 0 when all individuals have the same composition of capital and labor income.

As we have previously anticipated, the degree of income composition inequality has a clear political economy interpretation. Following the classification of social systems proposed by Milanovic (2017), under a high level of income composition inequality the economy bears resemblance to a *Classical Capitalism*, where rich individuals earn capital income and poor individuals labor income. On the contrary, under a low level of income composition inequality the economy bears resemblance to a *New Capitalism*, or to a multiple sources of income society.¹⁵

At this point of the analysis, let us define saving and consumption composition inequality.

Definition 3.2. *Saving and consumption composition inequality is the extent to which the composition of income in saving and consumption is distributed unevenly across the income distribution.*

Similarly for income composition inequality, saving and consumption composition inequality is maximal when the top and the bottom of the income distribution separately save and consume, and minimal when all people in the population save and consume in the same way.

Formally, we define the *saving and consumption concentration index*, $\mathcal{I}_{s/c}(s)$, as follows:

$$\mathcal{I}_{s/c}(s) = \frac{sc(\tilde{\mu}_c - \tilde{\mu}_s)}{\mathcal{B}(s)}, \quad (3)$$

where s is the saving rate, c is the consumption rate, $\mathcal{B}(s)$ is a normalization coefficient and $\tilde{\mu}_c$ and $\tilde{\mu}_s$ are the areas of the concentration curves for consumption and saving respectively. The construction of the saving and consumption concentration index hinges

¹⁵To be more precise, the condition of zero-concentration of income source reflects the *New Capitalism* 2, in which each individual's income can be written as $y_i = \epsilon_i(\pi + w)$, where ϵ_i increases in i .

on the following individual i 's income decomposition:

$$y_i = \delta_i s + \gamma_i c, \quad (4)$$

where $\delta_i = \frac{S_i}{S}$ and $\gamma_i = \frac{C_i}{C}$ are the relative shares of individual i 's income consumed and saved respectively.

We can further observe there is a mathematical relationship between the $\mathcal{J}_{s/c}(s)$ and individuals' propensities to save and consume for specific values of the $\mathcal{J}_{s/c}(s)$. When $\mathcal{J}(s)_{s/c} = 0$, then the propensity to save of each individual in the population is equal to the total saving rate s , thus $\mathcal{P}_s(i) = \frac{S_i}{Y_i} = s \forall i$.¹⁶ Conversely, when $\mathcal{J}(s)_{s/c} = \{1, -1\}$, then $\mathcal{P}_s(i)$ takes specific functional forms. In particular, when $\mathcal{J}(s)_{s/c} = 1$, then we have:

$$\mathcal{P}_s(i) = \begin{cases} 0 & \text{for } p \leq p' \\ 1 & \text{for } p > p' \end{cases}$$

with p' s.t. $\mathcal{L}(\mathbf{y}, p') = c$, and when $\mathcal{J}(s)_{s/c} = -1$:

$$\mathcal{P}_s(i) = \begin{cases} 1 & \text{for } p \leq p'' \\ 0 & \text{for } p > p'' \end{cases}$$

with p'' s.t. $\mathcal{L}(\mathbf{y}, p'') = s$, where $\mathcal{L}(\mathbf{y}, p)$ is the Lorenz curve for income.

3.2 The Box

In this Section, we illustrate a novel tool that summarizes information regarding heterogeneity in individuals' income composition as well as in their saving and consumption decisions within an economic environment.

This tool is a 1×1 box (see Figure 2) that displays all possible combinations of the two previously discussed indicators, namely the IFC and SSC indices. It is worth mentioning that, although the value of the two indicators may hypothetically range between -1 and 1 , it is unlikely they take negative values. These two indicators act as measures

¹⁶When $\mathcal{J}(s)_{s/c} = 0$ then $\frac{S_i}{C_i} = \frac{S}{C} \forall i$, therefore we can write that $y_i = \delta_i s + \gamma_i c = \epsilon_i(s + c) = \epsilon_i \forall i$, given that $s + c = y = 1$. We can thus conclude that $\frac{Y_i}{Y} = \frac{S_i}{S} \forall i$, which implies that $\mathcal{P}_s(i) = \frac{S_i}{Y_i} = \frac{S}{Y} = s \forall i$.

Figure 2: This box displays all combinations of the two indices IFC and SSC for a given society at a point in time. Note that the analysis is restrained to the positive values of the two metrics only. Point **K** represents the *Kaldorian System*, in which both income composition inequality and saving and consumption composition inequality are maximized. On the contrary side, point **R** displays the *Representative Agent System*, in which both dimensions are equal to zero. Under point **K** we expect a high level of saving out of capital income at the top of the distribution and under point **R** a low level. In point **K** the link between income inequality and both the saving rate and the factor shares is strong, while it is weak in point **R**.

of individuals' heterogeneity in income composition and consumption and saving decisions, respectively. Note that, to be more precise, we should refer to heterogeneity in the distribution of capital and labor and in the distribution of saving and consumption across the population.

To start understand the functioning of this box, let us focus on few representative points. For the seek of simplicity, let us assume in what follows to be in an artificial economic system composed of two individuals, each endowed with the same level of income (i.e., $y_1 = y_2$). In addition, let us further assume that the capital share of income is equal to

the saving rate, both equal to $\frac{1}{2}$ (i.e., $\pi = s = \frac{1}{2}$). These assumptions allow us to keep the analysis as simple as possible, and do not undermine the generality of the argument.

3.2.1 The Kaldorian System

Point $\mathbf{K} = (1, 1)$ represents the *Kaldorian System*. In point $\mathbf{K}$ both indices are equal to one, meaning that one person saves capital income, whilst the other person consumes labor income. In a system as such, an increase in the capital share of income, or in the saving rate, directly rises income inequality, as the total amounts of capital or saving in the economy are concentrated in the hands of a single person only.

Formally, we can write that $y_1 = c = w$ and $y_2 = s = \pi$, and thus an increase in the capital share of income π boosts the income of individual 2, by in turns hampering income inequality in the economy. In addition, note that *total saving out of capital income*, π_s , is equal to $\frac{1}{2}$, suggesting that all capital in the economy is saved.¹⁷

We can therefore argue that the Kaldorian System is characterized by the highest level of capital accumulation at the *top* of the income distribution. Additionally, in point $\mathbf{K}$ the relationship between income inequality and both the functional income distribution and the saving and consumption rates is very strong.

An economic system with similar characteristics is the one originally proposed by Kaldor in his article on alternative theories of income distribution (Kaldor, 1955), this is why we label is Kaldorian System.¹⁸ Having said that, it is undoubtedly very difficult to find an economic system with similar characteristics. For this reason, we should consider it for its figurative power only.

3.2.2 The Representative Agent System

Let us now move to the center of the Box. Point $\mathbf{R} = (0, 0)$ identifies what we call the *Representative Agent System*. In $\mathbf{R}$ each individual has the same population shares

¹⁷This result follows from the fact that $y_2 = \pi = s = \frac{1}{2}$.

¹⁸The main difference between our Kaldorian System and the one defined by Kaldor in his 1955's article relies on the fact that Kaldor allows the workers to save out of their labor income.

of capital and labor, consumption and saving.¹⁹

An increase in the capital share of income, or rather in the saving rate does not affect personal income inequality. The saving out of capital income π_s is therefore lower or equal than $\frac{1}{4}$ (i.e., $\pi_s \leq \frac{1}{4}$) and, hence, lower than in the Kaldorian System.²⁰ We expect this system to be characterized by a low rate of capital accumulation at the top of the income distribution. To note that the level of income inequality in this society is not determined by changes in the functional income distribution or in the saving and consumption rates.

When we move from point K to point R we go from a *class-based* to a *representative-agent-based* system. This consideration sheds new light on the possibility to design country-specific macroeconomic models depending on the countries' relative position in the box. For instance, if country A is in point R , then we can further assume that a representative agent model is well suited to describe country A 's macroeconomic performances. On the contrary, if country B is in point K , then a *two-classes* model would be better suited to describe country B 's macroeconomic dynamics.

3.2.3 The Pasinettian System

In his 1962's article *Rate of Profits and Income Distribution in Relation to the Rate of Economic Growth*, Pasinetti introduced in a two-class Kaldorian model of distribution and growth the hypothesis whereby also the workers may be in possession of some capital income. In fact, Pasinetti argues that "when any individual saves a part of his income, he must also be allowed to own it, otherwise he would not save at all [...] And since ownership of capital entitles the owner to a rate of interest, if workers have saved [...] then they will also receive a share of the total profits" (pp. 270). The Pasinetti's novel formulation of the Kaldorian model shows that, in the end, capitalists determine

¹⁹Formally, we can notice that the Representative Agent System respects the following two conditions: $\frac{\pi}{w} = \frac{\Pi_i}{W_i}$ and $\frac{s}{c} = \frac{S_i}{C_i} \forall i$.

²⁰Each individual saves only half of her income, which is composed by capital and labor in the same proportion. Therefore, the total amount of savings from capital income can be at maximum $\frac{1}{4}$.

the size of the capital stock, whereas the workers only its distribution.²¹

Therefore, we refer to the *Pasinettian System* to describe economic systems characterized by mild levels of both indicators. This makes the Pasinettian System as an intermediate system lying between the two extremes previously discussed, which remain our benchmark systems. We can easily show that in the Pasinettian System the saving out of capital income varies between $\frac{1}{4}$ and $\frac{1}{2}$ (i.e., $\frac{1}{4} \leq \pi_s < \frac{1}{2}$).

3.3 The Macroeconomics of the Box

In this Section, we derive simple macroeconomic relations that explain some macroeconomic characteristics of the economic systems previously presented. For simplicity, we keep the assumption whereby the economy is composed only by two groups, whose mean incomes are denoted by Y_1 and Y_2 .

To begin with, let us consider the following accounting identity:

$$Y = \Pi + W, \quad (5)$$

where Π and W represent the total capital and labor incomes in the economy respectively. Further, we can express total income of each group as follows:

$$Y_i = \alpha_i \Pi + \beta_i W \quad \forall i = 1, 2, \quad (6)$$

where $\alpha_i = \frac{\Pi_i}{\Pi}$ and $\beta_i = \frac{W_i}{W}$ are the relative shares of capital and labor of group i respectively. We define total saving of group i as S_i , hence $s_i = \frac{S_i}{Y_i}$ is the saving rate of group i . As total saving is the sum of S_1 and S_2 , i.e., $S = S_1 + S_2$, then, after some rearrangements, we can write:

$$S = s_1 Y_1 + s_2 Y_2 = \Pi (\alpha_1 - \beta_1) (s_1 - s_2) + Y (s_1 \beta_1 + s_2 \beta_2). \quad (7)$$

Now, let us consider the condition in which the system is in a (long-run) dynamic equilibrium, that is $S = I$, where I is the amount of investment necessary to withstand

²¹See [Mattauch et al. \(2017\)](#) for a discussion on the Pasinetti's theorem, also in relation to the critique by [Samuelson and Modigliani \(1966\)](#).

either population growth and technological progress. Furthermore, if we supposed to be in a closed economy without government spending, from equation 7 we can define both the capital share of income $\frac{\Pi}{Y}$ and the rate of profit $\frac{\Pi}{K}$ in the economy as:²²

$$\frac{\Pi}{Y} = \pi = \frac{1}{\alpha_1 - \beta_1} \frac{1}{s_1 - s_2} \frac{I}{Y} + \frac{s_1\beta_1 + s_2\beta_2}{(\alpha_1 - \beta_1)(s_1 - s_2)}, \quad (8)$$

and:

$$\frac{\Pi}{K} = \frac{1}{\alpha_1 - \beta_1} \frac{1}{s_1 - s_2} \frac{I}{K} + \frac{s_1\beta_1 + s_2\beta_2}{(\alpha_1 - \beta_1)(s_1 - s_2)} \frac{Y}{K}. \quad (9)$$

Equations 8 and 9 generalize the equations of the capital share and of the profit rate introduced by Kaldor (1955).²³ The choice of $\frac{\Pi}{Y}$ and $\frac{\Pi}{K}$ as dependent variables follows directly from the works of Kaldor (1955), Pasinetti (1962), Samuelson and Modigliani (1966). Particularly, to use Kaldor's words: "The interpretative value of the model [...] depends on the "Keynesian" hypothesis that investment, or rather, the ratio of investment to output, can be treated as an independent variable, invariant with respect to changes in the two savings propensities" (Kaldor (1955), p. 95). However, our major objective simply remains to show that an economic system's position in the box features prominently in shaping its long-run macroeconomic outcomes. At this point of the analysis, if we further assume that $Y_1 > Y_2$, we can observe that the term $\alpha_1 - \beta_1$ is one of the three main components of the income-factor concentration index for $n = 2$ (see Ranaldi (2018)). In other words, this term is equivalent to the difference between the areas of the two concentration curves for labor and capital ($\tilde{\mu}_w - \tilde{\mu}_\pi$) in the framework with a population of size n . Therefore, we can consider the term $\alpha_1 - \beta_1$ as a proxy for income composition inequality: $\alpha_1 - \beta_1 \approx \mathcal{J}_f(\boldsymbol{\pi})$.²⁴ Additionally, in order for the equations 8 and 9 to be economically meaningful, we shall assume that $\alpha_1 - \beta_1 > 0$.

²²Note that the term $\frac{s_1\beta_1 + s_2\beta_2}{(\alpha_1 - \beta_1)(s_1 - s_2)}$ can also be written as $\frac{\beta_1}{\alpha_1 - \beta_1} + \frac{s_2}{(\alpha_1 - \beta_1)(s_1 - s_2)}$.

²³In his pioneering work, Kaldor develops what we can define as the Post-Keynesian theory of income distribution and of the rate of profit. In his article, the author assumes *maximum concentration of income sources* among the two groups, as $Y_1 = \Pi$ and $Y_2 = W$. This assumption is equivalent to say that $\alpha_1 = 1$ and $\beta_2 = 1$ (and, therefore, that $\alpha_2 = 0$ and $\beta_1 = 0$). Chiang (1973) proposed a threefold saving ratio model, where workers have two different propensities to save depending on the income type. In such way, Chiang shows that Kaldor's equation is a special case of his own generalization.

²⁴Recall that $\alpha_1 - \beta_1$ is the determinant of $\mathbf{A} = \begin{pmatrix} \alpha_1 & \beta_1 \\ \alpha_2 & \beta_2 \end{pmatrix}$ with $\mathbf{A}$ such that $\mathbf{Y} = \mathbf{A}\mathbf{X}$, where $\bar{y} = \begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix}$ and $\bar{x} = \begin{pmatrix} \pi \\ w \end{pmatrix}$. Interestingly, when $\mathbf{A}$ is an identity, then the two equations for $\frac{\Pi}{Y}$ and $\frac{\Pi}{K}$ are

Such an assumption is reasonable as the sign of the IFC index, which solely depends on $\tilde{\mu}_w - \tilde{\mu}_\pi$, is positive for all European countries (see Section 5).

Likewise, the term $s_1 - s_2$ can be regarded as an increasing function of saving and consumption composition inequality: When the rich save relatively more than the poor with respect to their total income, then savings are relatively more concentrated at top rather than at the bottom of the income ranking. Therefore, we can write: $s_1 - s_2 = f(\mathcal{J}_{s/c}(\mathbf{s}))$, with $\frac{\partial f}{\partial \mathcal{J}_{s/c}(\mathbf{s})} > 0$.

In light of the previous considerations, and noticing that $\frac{Y}{K} = \frac{1}{\beta}$ and $\frac{I}{K} = \dot{K}$, where β is the capital-output ratio as in Piketty (2014) and $\dot{K}$ is the rate of capital accumulation, equations 8 and 9 can be further expressed as:

$$\frac{\Pi}{Y} = \pi = \frac{1}{\mathcal{J}_f(\boldsymbol{\pi})} \frac{1}{f(\mathcal{J}_{s/c}(\mathbf{s}))} \frac{I}{Y} - \frac{s_1\beta_1 + s_2\beta_2}{\mathcal{J}_f(\boldsymbol{\pi})f(\mathcal{J}_{s/c}(\mathbf{s}))}, \quad (10)$$

and:

$$\frac{\Pi}{K} = \frac{1}{\mathcal{J}_f(\boldsymbol{\pi})} \frac{1}{f(\mathcal{J}_{s/c}(\mathbf{s}))} \dot{K} - \frac{s_1\beta_1 + s_2\beta_2}{\mathcal{J}_f(\boldsymbol{\pi})f(\mathcal{J}_{s/c}(\mathbf{s}))} \frac{1}{\beta}. \quad (11)$$

Equations 10 and 11 suggest that the levels of income composition inequality and of saving and consumption composition inequality are central to understand the long-run dynamics of the capital share of income and of the rate of profits. Particularly, if we define $\mathcal{S}$ as follows: $\mathcal{S} = \frac{1}{\mathcal{J}_f(\boldsymbol{\pi})} \frac{1}{f(\mathcal{J}_{s/c}(\mathbf{s}))}$, then we can say that a country's position in the box, which is a function of $\mathcal{S}$, determines the “sensitivity of distribution”, since it indicates the change in the share of profits in income which follows upon a change in the share of investment in output” (Kaldor, (1955), p. 95). Considering that $\mathcal{S}$ is high in a Kaldorian System, and low in a Representative Agent System, four observations can be put forward:

1. A rise in the investment-to-income ratio $\frac{I}{Y}$ increases the capital share of income π more in the Representative Agent System than in the Kaldorian System,
2. In the absence of investment in the economy, the total level of capital income share π is higher in a Representative Agent System than in a Kaldorian System,

as in Kaldor (1955), whilst when $\mathbf{A}$ is of the form $\begin{pmatrix} a & 0 \\ b & c \end{pmatrix}$ with $a, b, c \neq 0$, then the two equations for $\frac{\Pi}{Y}$ and $\frac{\Pi}{K}$ are as in Pasinetti (1962).

3. A rise in the capital accumulation $\dot{K}$ increases the rate of profits $\frac{\Pi}{K}$ more in the Representative Agent System than in the Kaldorian System,
4. A rise in the capital-to-income ratio β increases the rate of profits $\frac{\Pi}{K}$ more in the Representative Agent System than in the Kaldorian System.

Let us now further analyze the observations above. The first tells us that in a Representative Agent System a sudden boost in the investment rate increases the capital income share relatively more than in a Kaldorian System. While such rise in the investment rate does not hamper income inequality in a Representative Agent System (as the composition of the two factors is equally distributed across the population), it does boost income inequality in a Kaldorian System, in which the capital income is mainly concentrated at the top end of the income ranking. It is of utmost importance now to understand how does the rise in the investment rate differently affect economic growth in the two systems. To answer this question, we recall the literature on *wage* and *profit-led growth* (Lavoi and Stockhammer, 2012).²⁵ In a wage-led growth regime an increase in the labor share will lead to an increase in GDP, whereas in a profit-led growth regime an increase in the capital share will lead to an increase in GDP. According to the underlying theoretical framework, in a wage-led growth regime the rise in the GDP via the increase in the labor share of income is possible thanks to the fact that total consumption is an increasing function of the labor share. On the other hand, in a profit-led growth regime the rise in the GDP via the increase in the capital share is due to the fact that total investment and net exports are positive functions of the capital share. Coming back to our own framework, we can conclude that if we are in a profit-led demand regime, then an increase in the investment rate leads to a higher demand (and, hence, to a higher growth) in a Representative Agent System than in a Kaldorian System. Conversely, if we are in a wage-led demand regime the situation is the reverse.

Let us now focus on the third and the fourth observations and leave aside the second one, which does refer to a rather improbable scenario in which the investment rate is

²⁵The origin of the wage-led (and, hence, of the profit-led) aggregate demand hypothesis can be found in the works of Michael Kalecki and Josef Steindl through the contributions of Rowthorn (1981), Dutt (1984), and Bhaduri and Marglin (1990) (see also Jump and Mendieta-Munoz (2018) for a survey).

equal to zero.

The third observation states that when we increase the stock of capital in the economy, then the capital tends to be more profitable in a Representative Agent System than in a Kaldorian System. In other words, under an increase in the stock of capital, the capital tends to be more profitable when better distributed across the population. Instead, the fourth observation states that under a rise in the capital-to-income ratio, or the Piketty's β , the capital tends to be more profitable when it is better distributed across the population.

These results simply mean to illustrate that the two concepts of income composition inequality and saving and consumption composition inequality feature prominently in shaping the long-term relations between key macroeconomics variables, such as the capital-to-output ratio, the rate of profits, the capital share of income and the investment rate. Although the construction of a sound macroeconomic model of the box goes well beyond the scope of our work, we believe equations 10 and 11 bring interesting insights for future research on the matter.²⁶

4 Inequality Regimes

In this Section, we discuss how fluctuations in the saving rate and in the capital income share jointly affect income inequality. Specifically, we examine the extent to

²⁶ A first way to forward on the macroeconomics of the box, is to build on [Stiglitz \(2015\)](#). In the third part of his collection of four NBER's articles with title "Theoretical Perspectives on the Distribution of Income and Wealth among individuals", Stiglitz extends the standard life cycle model to a world composed by workers and, also, capitalists. Similarly to a two-class model á la [Pasinetti \(1962\)](#), Stiglitz designs a model in which, in its more general formulation, workers engage in life cycle savings, and capitalists pass on wealth from one generation to another. By assuming savings of each individual i as a function of her end of period wealth $\mathbf{W}_t$, hence $S_{i,t} = s(\mathbf{W}_t)\mathbf{W}_t$, with $s(\mathbf{W}_t)$ be S-shaped, and the wealth dynamic to be $\mathbf{W}_t = w_t + (1 + r_t)k_t$, it is possible to extend Stiglitz's model in light of different compositions of each individual's incomes (here determined by w_t and $r_t k_t$) and of different compositions of her savings and consumption expenditures (here depending on $s(\mathbf{W}_t)$). On a similar level, [Franks et al. \(2018\)](#) also extend a Pasinetti-type model to several different types of saving behavior and different asset classes. A second way, is to build on [Carvalho and Rezai \(2014\)](#) that, building on [Taylor et al. \(2004\)](#), incorporate personal income inequality in a neo-Kaleckian model. The most interesting feature of their model for our scopes is the assumption according to which the propensity to save out of wages depends on the size distribution of income among workers.

which income inequality in a given economic system is most seriously threatened by an increase in the saving rate or by an increase in the capital share. Normally, these two elasticities cannot be directly observed: They can be estimated econometrically, or through specific decomposition techniques. In what follows, we show that, by means of the methodology we adopt, it is straightforward to establish a simple relationship between these two elasticities. Precisely, they are linearly related, and their link depends on four parameters, namely: the area of the concentration curve for capital $\tilde{\mu}_\pi$, the area of the concentration curve for saving $\tilde{\mu}_s$, the capital share of income π and the saving rate s .

Formally, let us consider the following relationship, previously derived by [Ranaldi \(2018\)](#):

$$\frac{\partial \mathcal{G}}{\partial \pi} = 2(\tilde{\mu}_w - \tilde{\mu}_\pi), \quad (12)$$

as well as its analogous but in the context of saving and consumption composition inequality:

$$\frac{\partial \mathcal{G}}{\partial s} = 2(\tilde{\mu}_c - \tilde{\mu}_s). \quad (13)$$

Equations 12 and 13 show that the elasticities of income inequality, as measured by the Gini coefficient ($\mathcal{G}$), to changes in the capital share and the saving rate are function of $\tilde{\mu}_w - \tilde{\mu}_\pi$ and $\tilde{\mu}_c - \tilde{\mu}_s$ respectively. These two terms determine the sign of the IFC index. Therefore, equations 12 and 13 prove that the sign of the IFC index determine whether changes in the capital share and the saving rate have an impact on inequality dynamics.

After manipulating equations 12 and 13 we can write:²⁷

$$\frac{\partial \mathcal{G}}{\partial \pi} = \frac{2}{w} (\tilde{\mu}_s - \tilde{\mu}_\pi) + \frac{c}{w} \frac{\partial \mathcal{G}}{\partial s}, \quad (14)$$

which can also be written as:

$$\frac{\partial \mathcal{G}}{\partial \pi} = A + B \frac{\partial \mathcal{G}}{\partial s},$$

where $A = \frac{2}{w} (\tilde{\mu}_s - \tilde{\mu}_\pi)$ and $B = \frac{c}{w}$. We label equation 14 as *Double-Elasticity Equation (DEE)*, which establishes a linear relationship between the two elasticities.²⁸ When

²⁷Note that $\tilde{\mu}_y = \pi \tilde{\mu}_\pi + w \tilde{\mu}_w$ and thus we can easily find $\frac{\partial \mathcal{G}}{\partial \pi} = \frac{2}{w} (\tilde{\mu}_y - \tilde{\mu}_\pi)$. By expressing $\frac{\partial \mathcal{G}}{\partial s}$ in the same way (i.e. $\frac{\partial \mathcal{G}}{\partial s} = \frac{2}{c} (\tilde{\mu}_y - \tilde{\mu}_s)$), and by solving the system of two equations (which both share the variable $\tilde{\mu}_y$), we find equation 14.

²⁸Another interesting way to read equation 14 is the following. If we rewrite equation 14 as follows: $w \frac{\partial \mathcal{G}}{\partial \pi} - c \frac{\partial \mathcal{G}}{\partial s} = 2 (\tilde{\mu}_s - \tilde{\mu}_\pi)$, we can notice that the term in the right-hand side of the equation resembles

$B > 1$ (thus $\pi > s$), then we can say that $\forall \frac{\partial \mathcal{G}}{\partial s} > \frac{2(\tilde{\mu}_s - \tilde{\mu}_\pi)}{(s - \pi)} \equiv \mathcal{X}$ the elasticity of income inequality to changes in the capital share is greater than the elasticity of income inequality to changes in the saving rate ($\frac{\partial \mathcal{G}}{\partial \pi} > \frac{\partial \mathcal{G}}{\partial s}$). Conversely, when $B < 1$ then $\forall \frac{\partial \mathcal{G}}{\partial s} < \mathcal{X}$ and the contrary situation holds true. Note that when $B = 1$, to compare the two elasticities we only need to check whether the term $\tilde{\mu}_s - \tilde{\mu}_\pi$ is greater or lower than zero.

Figure 3 provides an illustration of the **DDE** when $A > 0$ and $B < 1$. The latter two conditions describe an economic system in which the capital distribution is worse than the saving distribution across the population ($\tilde{\mu}_s > \tilde{\mu}_\pi$), and the capital share of income is greater than the saving rate ($\pi > s$).

Now, we can define the *behavior-led* and *distribution-led* inequality regimes as follows.

Definition 4.1. *We are in a behavior-led inequality regime (**BLI**) when $\frac{\partial \mathcal{G}}{\partial s} > \mathcal{X}$, whilst we are in a distribution-led inequality regime (**DLI**) when $\frac{\partial \mathcal{G}}{\partial s} < \mathcal{X}$.*

In a **BLI** regime income inequality is more sensitive to fluctuations in the saving rate (and, thus, in the investment rate, in case we were in a Keynesian framework) rather than to fluctuations in the functional income distribution. The contrary situation holds true when we are in a **DLI** regime.

It is worth mentioning that the causal relation going from income inequality to both the functional income distribution and the saving rate, the latter of which has already received much attention (see [Schmidt-Hebbel and Servén, 2000](#) for a survey of the literature), is not discussed in this paper.

the derivative of the Gini coefficient of total incomes with respect to π . However, instead of the variable $\tilde{\mu}_w$, we have $\tilde{\mu}_s$. Such expression can, therefore, be interpreted as the derivative of the Gini coefficient of the variable $\tilde{y}$ with respect to π , where $\tilde{y}$ is, for each individual, the sum of its savings and profits. Precisely, if we define the variable $\tilde{y}_i = s_i + \pi_i \ \forall i$ and then take the derivative of the Gini coefficient of this variable with respect to $\pi = \frac{\Pi}{S + \Pi}$, then we obtain $2(\tilde{\mu}_s - \tilde{\mu}_\pi)$.

Double-Elasticity Diagram

Figure 3: The elasticity of income inequality as measured by the Gini coefficient ($\mathcal{G}$) to changes in the capital share of income ($\frac{\partial \mathcal{G}}{\partial \pi}$) is put against the elasticity of income inequality to changes in the saving rate ($\frac{\partial \mathcal{G}}{\partial s}$). The blue line is the *double-elasticity equation*, which links these two elasticities, whilst the red line is the bisector. These two curves together allow us to categorize countries according to their inequality regime, which can be either *behavior-*, or *distribution-led*.

5 Empirical Application

In this Section we take the Kaldorian/Representative Agent distinction of economic systems to data. To this end, Subsections 5.1 and 5.2 introduce the data that we use as well as the definitions of capital, labor, consumption and saving that we adopt. Subsections 5.3 presents useful descriptive statistics for our analysis. Subsections 5.4 and 5.5 separately discuss the results concerning the first and the second dimension of the box respectively. Finally, Subsection 5.6 illustrates the first estimate of the European

countries' relative position in the box in 2010.

5.1 Data

In this Section, the framework illustrated is applied to the EU-SILC and Household Budget Survey (HBS) data. The EU-SILC provides harmonized data on households' income and living conditions, while the HBS contains detailed information on their consumption expenditures.

The European countries analyzed are 9 in total.²⁹ The EU-SILC are available from 2007 to 2016, whilst the HBS for 2010 only. Therefore, the estimation of the box is limited to 2010, although several hypothesis on the countries' relative position in 2007 and 2016 will also be formulated.

Despite the many limitations these data carry with them, they are, to the best of our knowledge, the most comprehensive and reliable sources to jointly study income composition inequality and saving and consumption composition inequality. Indeed, they provide a harmonized set of variables on households' income sources and saving and consumption decisions at the European level.

5.2 Definitions

To construct the IFC index, we consider households' *gross* income. If we considered net income we would require information concerning taxes on capital and on labor at the household level, which is not provided by the EU-SILC.

In what follows, we define capital income as the sum of (1) household's income from rental of a property or land, (2) interests, dividends, capital from capital investments in unincorporated business, (3) the capital component of gross cash benefits or losses from self-employment (including royalties) and (4) pensions from individual private plans. The capital component of self-employment income, which is not directly furnished by

²⁹The countries considered are: *Germany* (DE), *Greece* (EL), *Finland* (FI), *France* (FR), *Ireland* (IE), *Italy* (IT), *Portugal* (PT), *Sweden* (SE) and *United Kingdom* (UK).

EU-SILC, is imputed by means of the procedure by [Glyn \(2011\)](#).³⁰ We define labor income as the difference between total household gross income minus capital income.³¹ Let us now turn to the definitions of households' consumption and saving. Note that the definition of income we consider now is households' *net* income, as the HBS data do not provide information on gross income. In what follows, we consider three different definitions of consumption, which are precisely:

- C_1 = total consumption expenditure - housing, water, electricity, gas and other fuels - transport,
- C_2 = total consumption expenditure - actual rentals for housing - imputed rentals for housing - transport for housing - transport,
- C_3 = total consumption expenditure - actual rentals for housing - imputed rentals for housing.

Three definitions of saving follow accordingly:

- S_1 = net monetary income (in-kinds income excluded) $- C_1$,
- S_2 = net monetary income (in-kinds income excluded) $- C_2$,
- S_3 = net monetary income (in-kinds income excluded) $- C_3$.

These three definitions of consumption can be regarded as alternative estimates of *consumption of non-durable goods*. The choice of considering non-durable goods to estimate households' consumption is motivated by the fact that in 2010 all European countries were heavily hit by the financial crisis, which especially affected housing prices (see [Stockhammer and Moore, 2018](#)).

At this point of the analysis, before to illustrate the first picture of the countries' relative

³⁰See [Ranaldi \(2018\)](#) for a formalization of this imputation strategy.

³¹The sources of labor income that we consider are: gross employee cash or near cash income, gross non-cash employee income, employers' social insurance contributions, value of goods produced for own consumption, unemployment benefits, old-age benefits, survivor' benefits, sickness benefits, disability benefits, education-related allowances, family/children related allowances, social exclusion not elsewhere classified, housing allowances, regular inter-household cash transfers received and income received by people aged under 16.

position in the box, we separately analyze the two dimensions at stake, starting with some descriptive statistics.

5.3 Descriptive Statistics

Table 1 presents the income shares of four different income groups, defined as follows: 0-50%, 50-90%, 90-95% and 95-100%. The incomes here considered are from the EU-SILC. Overall, the nine countries are characterized by a bottom 50% of the whole population earning about the 20% of the total income in the survey, a middle class (50-90%) earning almost a half of the total income and a top 10% earning approximately the 25-30% of the total. However, fundamental differences can be observed among the countries. Sweden, Germany, France and Finland are the most equal countries in the sample, with the top 5% of the population earning less than 20% of the total income and the bottom 50% earning more than 20%. On the contrary, Ireland, Greece and the UK are the most unequal countries, with a Gini coefficient of about 0.47, the top 5% of the population earning more than 20% of the total income and the bottom 50% earning less than 20%. Finally, Italy and Portugal have a Gini coefficient of 0.44 and, for both countries, the bottom 50% and the top 5% of the population earn approximately the 20% of total income in the sample. Although the Italian middle class is relatively richer than the Portuguese's one.

Table 1: Income Shares

Income Group	FI	FR	DE	EL	IE	IT	PT	SE	UK
<i>0-50%</i>	22%	23%	23%	17%	17%	19%	20%	26%	18%
<i>50-90%</i>	48%	46%	48%	48%	48%	49%	46%	48%	48%
<i>90-95%</i>	10%	19%	10%	11%	12%	11%	11%	9%	11%
<i>95-100%</i>	17%	18%	17%	22%	22%	19%	20%	15%	21%
<i>Gini</i>	0.39	0.38	0.38	0.47	0.48	0.44	0.44	0.33	0.47

Let us now analyze the distribution of capital income across the *total* income ranking. Indeed, Table 2 shows the share of the capital income earned by the different total income

groups. For instance, in Finland in 2010 the poorest 50% of the total income distribution earned the 10% of the capital income in the economy, whereas the top 50% of the total income distribution earned the 90% of the capital income in the economy.

It is striking to notice that, on average, the richest 5% in terms of total income earned in 2010 more than the 40% of the total capital income captured by the survey in all countries considered. And in addition to that, considering that the surveys are generally unable to properly capture the capital income in the economy (see the levels of the capital share in the same Table), we should consider these numbers as lower bounds.

The capital income earned by the bottom 50% is the highest in Sweden and Greece, immediately followed by the UK. Recall that the capital component of self-employment income plays an important role in this analysis, and it may explain the reason for such a high level of capital income at the bottom in countries like Greece. Italy, Portugal and Ireland are, instead, associated by a low level of capital income concentrated at the bottom of the income distribution.³² The share of capital income earned by the middle class ranges between a low 24% in countries such as the UK and Ireland, and a high 34% in Greece. It is also worth noticing that the distribution of the capital income within the top 10% can be very different across the countries. Particularly, in Sweden and Germany the capital income is mainly concentrated in the hands of the top 50% of the top 10%, whereas in countries such as Portugal and Italy the capital income is better distributed across the whole top 10% income group.

³²Note that according to the definition of capital income that we adopt and to the source of data that we use the results can differ, at least in their absolute numbers. For instance, in [Iacono and Ranaldi \(2018\)](#) the capital income owned by the bottom 50% of the total income distribution in Italy in 2010 was approximately the 20% of the total. Such difference with the result shown in this paper is likely to be determined by differences in the way we treat the imputed rent. Indeed, imputed rent is excluded by the definition of total income adopted in this paper, whereas is likely to be present in the total income variable provided by the data from the Bank of Italy. Having said that, the decreasing trend in income composition inequality in Italy seems to be confirmed by both sources.

Table 2: Capital Shares (Income Ranking)

Income Group	FI	FR	DE	EL	IE	IT	PT	SE	UK
<i>0-50%</i>	10%	13%	12%	17%	9%	6%	7%	21%	14%
<i>50-90%</i>	31%	29%	27%	34%	24%	32%	32%	29%	24%
<i>90-95%</i>	10%	12%	9%	10%	11%	13%	18%	7%	10%
<i>95-100%</i>	47%	45%	51%	47%	54%	47%	42%	41%	50%
<i>Capital Share</i>	11%	15%	7%	18%	8%	18%	6%	6%	10%
<i>IFC</i>	0.46	0.42	0.45	0.51	0.43	0.52	0.47	0.26	0.30

Let us now take a closer look at the labor income distribution (Table 3). The countries seem to share a very similar distribution of labor income across the total income ranking, with a middle class earning approximately the 50% of the total labor income in the economy, the top 10% earning less than the 20% of the total labor income and the bottom 50% earning around the 20%. Ireland, Portugal and the UK, however, appear to have the labor income which is more concentrated at the top rather than at the bottom of the income distribution relatively to the other countries in the sample. Such difference is likely to reflect a different skill composition across the population.

Table 3: Labor Shares (Income Ranking)

Income Group	FI	FR	DE	EL	IE	IT	PT	SE	UK
<i>0-50%</i>	22%	25%	24%	20%	17%	22%	21%	26%	18%
<i>50-90%</i>	51%	50%	50%	51%	50%	52%	47%	50%	50%
<i>90-95%</i>	10%	9%	10%	11%	12%	10%	11%	9%	11%
<i>95-100%</i>	13%	13%	14%	15%	19%	13%	19%	13%	18%
<i>Labor Share</i>	89%	85%	93%	82%	92%	82%	94%	94%	90%
<i>IFC</i>	0.46	0.42	0.45	0.51	0.43	0.52	0.47	0.26	0.30

At this point, let us move to the distribution of saving and consumption across the income ranking (Tables 4 and 5). The definition of consumption, and hence of saving here adopted is the second one (C_2). For this reason, the overall saving rates are relatively higher than those that can found from macroeconomic data. As we previously said, we need to reduce the risk that our estimates on the propensities to save and consume are strongly affected by the financial crisis. To this end, we have removed some durable

goods from the households' consumption basket, which have automatically reduced the saving rate in the sample.

Overall, we can notice that the shares of income saved by the top 5% in all countries are higher than the shares of income consumed by the same income group. At the same time, the shares of income saved by the bottom 50% are lower than the shares of income consumed by the same income group. This result already emphasizes that the propensity to consume of the poor are higher than that of the rich.

Table 4: Saving Shares (Income Ranking)

Income Group	FI	FR	DE	EL	IE	IT	PT	SE	UK
<i>0-50%</i>	22%	0%	18%	-7%	11%	6%	-10%	21%	8%
<i>50-90%</i>	44%	49%	48%	55%	52%	51%	47%	46%	48%
<i>90-95%</i>	10%	15%	11%	15%	12%	14%	18%	9%	12%
<i>95-100%</i>	22%	35%	21%	36%	23%	27%	45%	22%	31%
<i>Saving Rate</i>	49%	45%	48%	33%	51%	23%	41%	54%	51%
<i>SCC</i>	0.15	0.43	0.18	0.49	0.32	0.45	0.54	0.19	0.35

If we focus on Table 4 we can notice that in Greece and Portugal the share of income saved by the bottom 50% is negative. This means that the bottom 50% of the income distribution in these two countries consumed more than they actually earned in 2010.

While the consumption distribution is relatively similar in all countries, the saving distributions change considerably from the countries. For instance, countries like Finland, Germany and Sweden have a low share of income saved at the top and a high share of income saved at the bottom relatively to the other countries. On the contrary, Portugal and Greece have a saving distribution which is very skewed against the poor.

Table 5: Consumption Shares (Income Ranking)

Income Group	FI	FR	DE	EL	IE	IT	PT	SE	UK
<i>0-50%</i>	30%	31%	30%	28%	32%	32%	30%	33%	30%
<i>50-90%</i>	50%	49%	49%	47%	48%	46%	47%	48%	47%
<i>90-95%</i>	8%	8%	9%	10%	8%	8%	9%	7%	9%
<i>95-100%</i>	10%	11%	11%	14%	10%	12%	12%	9%	12%
<i>Consumption Rate</i>	51%	55%	52%	67%	49%	77%	59%	46%	49%
<i>SCC</i>	0.15	0.43	0.18	0.49	0.32	0.45	0.54	0.19	0.35

Income Composition Inequality

Figure 4: The levels of income composition inequality, as measured by IFC index, for 9 European countries in 2010. **Source:** Author's calculations on basis of EU-SILC.

From these descriptive statistics we can already infer that the two indicators are likely to be both positives. However, in order to precisely grasp all differences in the concentrations of capital, labor, saving and consumption across the nine countries, we need to estimate them. This is the purpose of the next Sections.

5.4 First Dimension

Let us start by analyzing the income composition inequality dimension. Figure 4 shows the level of the IFC index for the nine European countries in 2010.

The countries can be divided into three groups according to their level of the IFC index, which can be *low*, *average* and *high*. The countries with low IFC index (below 0.4) are Sweden and the UK. The countries with average IFC index (between 0.4 and 0.5) are France, Ireland, Germany, Finland and Portugal. Finally, the countries with high IFC index (above 0.5) are Greece and Italy.

Income Composition Inequality - Trend

Figure 5: The series of income composition inequality, as measured by the IFC index, for the richest 9 European countries 2007-2016. **Source:** Author's calculations on basis of EU-SILC.

Figure 5 portrays the income composition inequality trend of the nine countries between 2007 and 2016.³³ The fact that IFC index is positive for all countries means that a rise in the capital income share can positively affect inter-personal income inequality.

If we plot the IFC index against the Gini coefficient (Figure 12) we notice that a slightly positive relationship seems to emerge among the countries. Countries with a high levels of income composition inequality, like Greece, Italy and Portugal share a high level of

³³Note that, although the bottom 50% in Greece owns the 17% of capital income whereas in Italy only the 6%, the reason for not finding such difference in the two estimates of the IFC index is mainly explained by the presence of negative values at the bottom of the distribution. Negative values at the bottom disappear in the estimates of the indicator from the moment in which the concentrations curves coincide with the x-axe when they goes below zero.

Saving and Consumption Composition Inequality

Figure 6: The levels of saving and consumption composition inequality, as measured by the saving and consumption concentration index, in 2010 for 9 countries. We consider three definitions of consumption (and, hence, savings), hence we have three different estimates of the SCC index. The first definition of consumption (SCC_1) includes non-durable goods only; the second definition of consumption (SCC_2) includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing); the third definition of consumption (SCC_3) includes non-durable goods plus some housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing) plus transports. **Source:** Author's calculations on basis of HBS.

income inequality. On the other hand, Sweden combines low levels of both dimensions. Finland, Germany and France, instead, occupy an intermediate position within the diagram. Finally, the UK combines a high inequality level with a low degree of income composition inequality.

Let us now plot the IFC index against the survey capital share of income (Figure 13). Interestingly, we can observe that Italy and Greece are, once again, in the upper right of the scatter. This is in line with the intuition that a high level of capital income at the top of the income distribution, coupled with a high capital share, implies high inequality in total income. The reverse situation holds true for Sweden, which is in fact situated in the bottom left of the diagram. Having said that, we should take into consideration the role that the capital share of income plays in the construction of the IFC index. Indeed, this index tends to be higher for values of the capital share which are closer to $\frac{1}{2}$. The intuition is simple: we have the highest level of income composition inequality when the top and the bottom of the income distribution separately own the same amount of the two sources. Such technical feature of the indicator, however, does not undermine the validity of our finding concerning its relationship with the capital share. Indeed, as we will see in the next section, the SCC index, which is constructed like the IFC index, negatively correlates with the saving rate.

5.5 Second Dimension

We estimate saving and consumption composition inequality for three different definitions of households' saving and consumption. Figure 6 shows, for all countries, the three levels of the saving and consumption concentration index in 2010. The first thing to notice from the graph is that the level of the SCC index, for all countries considered, increases once we move from the first, to the third definition of consumption (and, therefore, saving).³⁴ This is explained by the fact that, while the first definition of consumption excludes all possible durable goods, the second and the third exclude only a part of them. Specifically, the second definition only partially excludes housing expenses (actual rentals and imputed rentals), whilst the third definition does also include transport expenditures. As expected, the more durable goods we introduce in the households' consumption basket, the higher is saving and consumption composition inequality, i.e., the higher is the ability to save of the rich against that of the poor.

³⁴The exception of Italy is due to the fact that the Bank of Italy does not allow for such a finer decomposition of the consumption and saving dimensions.

SCC_2 Index vs Saving Rate

Figure 7: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and saving rate. We here consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of HBS.

By following the previous classification adopted to compare countries with respect to their IFC level, and by considering the SCC_2 as our reference estimate, we find that Italy, Portugal, France and Greece display *high* levels of the SCC_2 index, whilst Ireland and the UK have *average* levels of the SCC_2 index. Finally, Germany, Finland and Sweden register *low* levels of the SCC_2 index.

Interestingly, the SCC metric is negatively correlated with the saving rate, as illustrated by Figure 7 for the SCC_2 index. The same is also true for the SCC_1 and SCC_3 , as shown

SCC_2 Index vs Income Inequality

Figure 8: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and Gini coefficient. We here consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of HBS.

in Figures 14 and 15 respectively. This finding suggests that a more equal distribution of saving across the population is associated with a higher overall saving rate.

Let us explore the relationship between the SCC index and income inequality. When we plot the SCC index against income inequality, as measured by the Gini coefficient, we can observe that the two variables are positively correlated. Figures 16, 8 and 17 illustrate this relationship for the three different definitions of consumption and saving. This latter result goes in the direction of the fact that the distribution of savings across

The Box

Figure 9: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and income composition inequality, as measured by the income-factor concentration index. We consider all countries in the sample in 2010. According to the SCC, we consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of EU-SILC and HBS.

the income ranking can be seen as a proxy of income inequality in a population. The more the rich manage to save their income relatively to the poor, the higher the disparity between their income and that of the poor.

5.6 A Novel Taxonomy of Economic Systems

Figure 9 plots income composition inequality against saving and consumption composition inequality by providing a first empirical estimate of nine European countries' position in the box. We consider the second definition of consumption and saving previously defined (SCC_2).

The first thing to notice is that the nine European countries occupy different positions in the box, by hence validating the hypothesis whereby households' heterogeneity matters and is country specific.

In light of the classification of economic systems previously discussed, the Representative Agent System seems to be well suited to describe the country of *Sweden*, whereas the Kaldorian System the countries of *Portugal*, *Greece* and *Italy* (i.e. the Mediterranean countries).

Furthermore, Figure 9 shows the emergence of two counterposed clusters in the box: The first cluster is constituted by Greece, France, Italy and Portugal, and it is the closest cluster to the Kaldorian representation of economic systems, whereas the second cluster is constituted by Finland, Germany and Sweden, and it is better represented by the Representative Agent System. We label these two clusters as *Mediterranean* and *Northern European*, respectively. The two remaining countries in the sample, Ireland and the UK, are located in intermediate positions.³⁵ Mediterranean countries display, on average, a slightly higher level of the IFC index than Northern European countries. Furthermore, Mediterranean countries are characterized by a higher concentration of savings at the top and of consumption at the bottom of the income ranking than Northern European countries. In addition, Mediterranean countries have, on average, a higher level of income inequality than Northern European countries, considering that the SCC index is positively correlated to income inequality (see Figure 8).

If we now separate all the countries according to their inequality regime, which we recall can be either behavior-led or distribution-led, we can notice that the classification

³⁵A classification of societies as such bears resemblance to the one proposed by Schmidt (2002), which identifies three ideal-typical models: *market*, *managed* and *State-enhanced* capitalism, mirrored by the UK, Germany and France, respectively.

The Box - BLI Countries

Figure 10: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and income composition inequality, as measured by the income-factor concentration index. We consider only BLI countries in 2010. According to the SCC, we consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of EU-SILC and HBS.

between Mediterranean and Northern European countries only partially holds. Indeed, although all Northern European countries have a distribution-led inequality regime (fluctuations in the capital share have a stronger impact on changes in income inequality than fluctuations in the saving rate), the Mediterranean countries are split. Namely, Greece has a distribution-led inequality regime, whereas Portugal and France have a behavior-led inequality regime. At this point of the analysis, we wonder whether these two

The Box - DLI Countries

Figure 11: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and income composition inequality, as measured by the income-factor concentration index. We consider only DLI countries in 2010. According to the SCC, we consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of EU-SILC and HBS.

major clusters remain approximately the same across time. Therefore, we try to estimate the box for the years 2007 and 2016. To this end, we assume that the SCC index does not change over the time considered, namely that $SCC_{2007} = SCC_{2016} = SCC_{2010}$. Figures 18 and 19 show the estimates of the box in 2007 and 2016 respectively. Surprisingly, almost all relative countries' positions remained the same and, in particular, once we move from 2007 to 2016 we observe the two clusters becoming even more compact.

These findings illustrate that the two major clusters have remained approximately the same before, and after the recent financial crisis, under the core assumption that no major changes have occurred in term of the propensities to save and consume of European households.

In summary, our empirical investigation showed that Mediterranean countries such as Italy, Portugal and Greece bear more resemblance to Kaldorian Systems rather than to Representative Agent System, as it is the case for Northern European countries such as Sweden, Germany and Finland, whose positions in the box are the closest to point $(0, 0)$.

Furthermore, the very existence of these two clusters, whose configuration has already extensively been discussed within the comparative political economy literature (see [Amable, 2003](#)), shows that institutional setting and macroeconomic performances are profoundly interconnected. Additionally, such relationship has a dynamic nature, as the countries' relative position in the box can change over time. This box, hence, allows us for a simple dynamic macro-institutional framework, which brings the income distribution at the center of the political economy analysis.

Although this would go beyond the scope of this paper, we believe that an interesting extension of this work is to empirically test whether two countries occupying different and *stable* positions in the box (such as Italy and Sweden potentially) would also display different long-run macroeconomic trends, in accordance with the predictions of the model developed in section [3.3](#).

6 Conclusion

In this paper, we proposed a method to jointly study households' heterogeneity in income composition (i.e., the joint distribution of capital and labor across the population) and in propensities to save and to consume within an economic system. To this end, hinging on the concept of income composition inequality recently developed ([Ranaldi, 2018](#)) and on its technical assessment through the income-factor concentration index, we proposed a novel representation of economic systems through the construction a two

dimensional box.

The first dimension of this box is income composition inequality, whilst the second dimension is saving and consumption composition inequality. As for income composition inequality, saving and consumption composition inequality tells you how unequally saving and consumption composition is distributed across the population. We say that saving and consumption composition inequality is high when the top and the bottom of the income distribution separately save and consume, and low when all people in the population save and consume in the same way.

According to our framework, economic systems range between two extremes, namely the Kaldorian System and the Representative Agent System. The former system is characterized by a group of rich people that earn the capital income and save, and by a group of poor people that earn the labor income and consume, whereas the former system is characterized by individuals who have the same population shares of capital, labor, consumption and savings.

Understanding the relative position of a country in the box can be useful to foresee the same country's macroeconomic performances, such as the level of capital accumulation and the profit share of income. In this regard, we showed that the two dimensions of income composition inequality and saving and consumption composition inequality emerge from a simple Kaldorian model of distribution and growth.

Finally, we estimated the box for nine European countries in 2010 jointly using EU-SILC and HBS data. Two major clusters of economic systems - Mediterranean and Northern European - emerged from the analysis. The former cluster is characterized by higher levels of income composition inequality and saving and consumption composition inequality than the latter cluster.

The appearance of these two clusters illustrated, in a simple and straightforward manner, that countries' institutional setting and macroeconomic performances are profoundly interconnected, and that the same countries' distributional characteristics are at the heart of this connection.

We believe that the choice of a specific model of growth and accumulation should therefore be made with an eye on the type of economic system analyzed. For instance, it

directly follows from our result that Italy can be better described by a Kaldorian model of accumulation and growth, whereas Sweden by a representative agent model. Furthermore, in this paper we argued that the combination of our approach with the literature on wage-led and profit-led growth regimes (see [Lavoi and Stockhammer, 2012](#)) can pave the way for interesting analysis. For instance, if we were in a profit-led demand regime (i.e., an increase in the capital share will lead to an increase in GDP), then an increase in the investment rate would lead to higher growth in a Representative Agent System than in a Kaldorian System. Conversely, if we were in a wage-led demand regime (i.e., an increase in the labor share will lead to an increase in GDP) the situation would be the reverse. At the same time, given that the elasticity of personal income inequality to changes in the capital income share is higher in a Representative Agent System than in a Kaldorian System, an increase in the capital share will boost income inequality in the latter system relatively more than in the former. For these reasons, in the context of a profit-led growth regime, a specific fiscal policy aiming at better distributing the composition of individuals' incomes would allow for more inclusive returns of both private and public investments. These examples are simply meant to illustrate how the framework proposed in this paper can be of potential interest for many future research, in the domain of theoretical, as well as applied political economy.

References

- [1] Aiyagari, S. R., 1994. *Uninsured Idiosyncratic Risk and Aggregate Saving*. The Quarterly Journal of Economics, Vol. 109, No. 3. (Aug., 1994), pp. 659-684.
- [2] Amable, B., 2003. *The Diversity of Modern Capitalism*. Oxford University Press.
- [3] Atkinson, A., 1975. *Economics of Inequality*. Oxford: Oxford University Press.
- [4] Attanasio, O. P., 1994. *Personal saving in the United States*. In Poterba, J. M., editor, International Comparisons of Household Saving, pages 57-124. The University of Chicago Press, Chicago.

- [5] Bhaduri, A. and Marglin, S. (1990). *Unemployment and the real wage: the economic basis for contesting political ideologies*. Cambridge Journal of Economics, 14, pp. 375-93
- [6] Bertola, G., Foellmi, R., Zweimuller, J., 2005. *Income Distribution in Macroeconomic Models*. Princeton University Press.
- [7] Cardaci, A., Saraceno, F., 2015. *Inequality, Financialisation and Economic Crisis : an Agent-Based Model*. Documents de Travail de l'OFCE.
- [8] Carvalho and Rezai, 2014. *Personal income inequality and aggregate demand*. Cambridge Journal of Economics, 40, pp. 491-505.
- [9] Chiang A. C., 1973. *A Simple Generalization of the Kaldor-Pasinetti Theory of the Profit Rate and Income Distribution*. Economica, 40(159), pp. 311-13.
- [10] Dynan, K. E., Skynner, J., Zeldes, S. P., 2004. *Do the Rich Save More?*. Journal of Political Economy, vol. 112, no. 2.
- [11] Dutt, A. 1984. *Stagnation, Income Distribution and Monopoly Power*. Cambridge Journal of Economics, 8, 25-40.
- [12] Frank, M., Klenert, D., Schultes, A., Lessmann, K., Edenhofer, O., 2018. *Is capital back? The role of land ownership and savings behavior*. International Tax and Public Finance, Volume 25, Issue 5, pp 1252-1276.
- [13] Glyn, A., 2011. *Functional Distribution and Inequality*. The Oxford Handbook of Economic Inequality. Edited by Nolan, B., Salverda, W., and Smeeding, T. M.
- [14] Heatcote, J., Storesletten, K., Violante, G. L., 2009. *Quantitative Macroeconomics with Heterogeneous Households*. Federal Reserve Bank of Minneapolis Research Department Staff Report 420.
- [15] Hein, E., 2014. *Distribution and Growth After Keynes: A Post-Keynesian Guide*. Edward Elgar Publishing.

- [16] Iacono, R., Ranaldi, M., 2018. *Sources of Inequality in Italy*. ECINEQ WP 2018 - 479.
- [17] Jump, R. C., 2017. *Inequality and Aggregate Demand in the IS-LM and IS-MP Models*. Bulletin of Economic Research.
- [18] Jump, R., C., Mendieta-Munoz, I., 2018. *wage-led aggregate demand in the United Kingdom*. International Review of Applied Economics, Volume 31, Issue 5.
- [19] Kaldor, N., 1955. *Alternative Theories of Distribution*. The Review of Economic Studies, Vol. 23, No. 2, pp. 83-100.
- [20] Kuznets, S., 1955. *Economic Growth and Income Inequality*. American Economic Review.
- [21] Lavoie, M., Stockhammer, E., 2012. *Wage-led growth: Concepts, theories and policies*. ILO Working Papers 41, International labor Organization.
- [22] Lawrance, E. C. 1991. *Poverty and the rate of time preference: evidence from panel data*. Journal of Political Economy, 99(1): 54-77.
- [23] Mattauch, L., Klenert, D., Stiglitz, J. E., Ottmar, E., 2018. *Overcoming wealth inequality by capital taxes that finance public investment*. NBER Working Paper, 25126.
- [24] Milanovic, B., 2017. *Increasing capital income share and its effect on personal income inequality*. In After Piketty, Harvard University Press.
- [25] Palagie, E., Napolitano, M., Roventini, A., Gaffard, J-L., 2017. *Inequality, Redistributive Policies and Multiplier dynamics in an Agent-Based Model with Credit Rationing*. OFCE Sciences Po Working paper, 2017-06, January 30.
- [26] Pasinetti, L., 1962. *Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth*. The Review of Economic Studies, Vol. 29, No. 4, pp. 267-279.
- [27] Piketty, T., 2014. *Capital in the Twenty-First Century*. Harvard University Press.

- [28] Ranaldi, M., 2018. *On the measurement of functional income distribution*. Documents de travail du Centre d'Economie de la Sorbonne 2016.51RR - ISSN : 1955-611X. Version or.. 2018.
- [29] Ricardo, D., 1911. *Principles of Political Economy*. First published 1817, London, Dent.
- [30] Rhodes, M. and B. van Apeldoorn, 1997. *Capitalism versus Capitalism in Western Europe*. in M. Rhodes, P. Heywood, and V. Wright (eds.), *Development in West European Politics*, London: St. Martins Press.
- [31] Rowthorn, R. 1981. *Demand, Real Wages and Economic Growth*. Thames Papers in Political Economy, Autumn 1-39, reprinted in *Studi Economici*, 1982, 18, 3-54.
- [32] Saez, E., Zucman, G., 2016. *Wealth Inequality in the United States Since 1913: Evidence from Capitalized Income Tax Data*. *Quarterly Journal of Economics*, 131(2):519-578.
- [33] Samuelson, P. A., Modigliani, F., 1966. *The Pasinetti Paradox in Neoclassical and More General Models*. *The Review of Economic Studies*, Vol. 33, No. 4, pp. 269-301.
- [34] Schmidt, A., 2002. *The Future of European Capitalisms*. Oxford: Oxford University Press.
- [35] Schmidt-Hebbel, K., Servén, L., 2000. *Does income inequality raise aggregate saving?*. *Journal of Development Economics*, Vol. 61, 417-446.
- [36] Hall, P. A., Soskice, D., 2001. *Varieties of Capitalism*. Oxford University Press.
- [37] Spath, Shmid, *The distribution of household savings in Germany*.
- [38] Stiglitz, J., 1967. *A Two-Sector Two Class Model of Economic Growth*. *Review of Economic Studies*, Oxford University Press, vol. 34(2), pages 227-238.
- [39] Stiglitz, J., 1969. *Distribution of Income and Wealth Among Individuals*. *Econometrica*.

- [40] Stiglitz, J., 2015. *Income and Wealth Among Individuals: Part III: Life Cycle Savings vs. Inherited Savings*. NBER.
- [41] Stockhammer, E., 2017. *Determinants of the wage share: A panel analysis of advanced and developing economies*. British Journal of Industrial Relations 55(1), 3-33.
- [42] Stockhammer, E., Moore, G. L., 2018. *The drivers of household indebtedness reconsidered: an empirical evaluation of competing arguments on the macroeconomic determinants of household indebtedness in OECD countries*. Post-Keynesian Economics Society. Working Paper 1803.
- [43] Taylor, L., Rezai, A., Kumar, R., Carvalho, L., Barbosa-Filho, N., 2014. *US Size Distribution and the Macroeconomy, 1986-2009*. In Macroeconomics and Development: Roberto Frenkel and the Economics of Latin America, ed. by M. Damill, M. Rapetti, and G. Rozenwurcel, p. ch. 15. Columbia University Press, New York, NY.

7 Appendix

IFC Index vs Income Inequality

Figure 12: The scatter plot of income composition inequality, as measured by the IFC index, and income inequality, as measured by the Gini coefficient. **Source:** Author's calculations on basis of EU-SILC.

IFC Index vs Capital Share

Figure 13: The scatter plot of income composition inequality, as measured by the IFC index, and the survey capital share of income. **Source:** Author's calculations on basis of EU-SILC.

SCC_1 Index *vs* Saving Rate

Figure 14: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and saving rate. We here consider the first definition of consumption (SCC_1), which includes non-durable goods only. **Source:** Author's calculations on basis of HBS.

SCC_3 Index *vs* Saving Rate

Figure 15: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and saving rate. We here consider the third definition of consumption (SCC_3), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing). **Source:** Author's calculations on basis of HBS.

SCC_1 Index *vs* Income Inequality

Figure 16: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and Gini coefficient. We here consider the first definition of consumption (SCC_1), which includes non-durable goods only. **Source:** Author's calculations on basis of HBS.

SCC_3 Index *vs* Income Inequality

Figure 17: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and Gini coefficient. We here consider the third definition of consumption (SCC_3), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing). **Source:** Author's calculations on basis of HBS.

The Box - 2007 Estimate

Figure 18: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and income composition inequality, as measured by the income-factor concentration index. We consider the ten richest countries in the sample. The SCC measure refers to 2010, whilst the IFC measure to 2007. According to the SCC, we consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of EU-SILC and HBS.

The Box - 2016 Estimate

Figure 19: The scatter plot of saving and consumption composition inequality, as measured by the saving and consumption consumption index, and income composition inequality, as measured by the income-factor concentration index. We consider the ten richest countries in the sample. The SCC measure refers to 2010, whilst the IFC measure to 2016. According to the SCC, we consider the second definition of consumption (SCC_2), which includes non-durable goods plus *some* housing expenses (without considering actual rentals for housing, imputed rentals for housing and transport for housing plus transports). **Source:** Author's calculations on basis of EU-SILC and HBS.