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Effects of Wealth Inequality and Segregation on Economic Growth: An Interpretation via Luxury Asset Holdings

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Effects of Wealth Inequality and Segregation on Economic Growth: An Interpretation via Luxury Asset Holdings

Laura Policardo* Edgar J. Sanchez Carrera†

Abstract

The lack of data has challenged the study of the effect of wealth inequality on economic growth despite it being at the core of the international debate. Scholars have not found a unanimous effect of wealth inequality on economic growth for the last few years. In this paper, we provide a possible explanation of why wealth inequality might have a different effect on growth in different countries. So, we claim that a possible reason for such different effects could be the different socio-economic structure of the population and, more precisely, the level of economic segregation. We prove this effect with numerical simulations calibrated on accurate data.

Keywords: Economic Growth; Wealth Inequality; Luxury Non-productive Assets; United States; France; Residential Segregation.

JEL Codes: D31; O47; O51; O52

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1 Introduction

In recent years economists have paid increasing attention to growing socioeconomic inequality (Stiglitz, 2012; Atkinson, 2015). Scholars mainly focused on the analysis of the effects of income inequality on economic growth, finding preponderantly a negative relationship between income inequality and growth (Persson and Tabellini, 1994; Aghion et al., 1999; Banerjee and Duflo, 2003; Ravallion, 2018). Recently, however, due to the release of new datasets on the distribution of wealth, wealth inequality has began catching the attention of scholars. Empirical analysis showed that in regressions where both wealth inequality and income inequality were included as explanatory variables for economic growth, the coefficient attached to income inequality falls away as statistically insignificant, meaning that it is wealth inequality that matters more for economic growth, and not income inequality, either in an inverse linear form or in the form of an inverse u-shape *À la* Kuznets (Bagchi and Svejnar, 2015, 2016; Islam and McGillivray, 2020; Dávila-Fernández and Punzo, 2021). This paper contributes to the burgeoning literature examining the impact of wealth inequality on economic growth, with a special emphasis on two key variables: the types of capital held by different wealth groups of population and their level of economic and residential segregation. Our idea is based on Policardo and Sanchez Carrera (2024) work, and on Piketty's argument (Piketty and Saez, 2014) according to which capital may take several forms and might not be always productive as in the classical macroeeconomic sense (Stiglitz, 2016b, p. 143). Capital, indeed, may be represented by firms, productive machinery, and generically by all physical properties that can provide a flow of income because of their ability to produce goods or services. But capital may also be represented by vacational real estate properties which are vacant most of the year, reinassance paintings, jewellery, precious metals, rare whiskies, supercars etc., which are not productive in the neoclassical sense, but that can preserve (and sometimes even increase) their value through time and function as a store of value. We will call this kind of capital "luxury non-productive capital". Luxury capital may be held disproportionally across wealth groups. Piketty and Saez (2014) classify billionaires as either rentiers or entrepreneurs. Rentiers may act in a way that is detrimental to economic growth, with greater power the more concentrated their wealth holding (Morck et al., 2000; Lazonick, 2017). If the rentier proposition wins out, as a nation's wealth becomes concentrated in the hands of a few the greater the drag on economic growth. Savings rates can also be affected by wealth inequality. When the wealth-income ratio rises indefinitely (or definitely but at very high levels), the rich may stop saving as additional wealth units become almost of no utility (see Poterba, 2000; Piketty and Saez, 2014; Stiglitz, 2016a). Poor households may also be implicated in this vicious cycle. Competition for conspicuous (i.e., visible) consumption is not only a prerogative of the rich. When the poor are exposed to the wealthy (that is to say, in countries where segregation among rich and poor is low), they have a tendency to hold proportionally more luxury non-productive assets in their asset portfolios than do the rich (Bertrand and

Morse, 2016; Quillian and Lagrange, 2016; Moav and Neeman, 2012). This implies that as the middle class gets hollowed out by increasing wealth inequality the aggregate stock of productive capital is drawn down in favor of luxury non-productive capital increasingly held by the now richer and now poorer households, which slows economic growth. Income inequality is increasing worldwide (Stiglitz 2016b). Wealth inequality has grown even more (Davies et al. 2011; Piketty, 2014; Piketty and Saez, 2014; Stiglitz, 2016a, 2016b). In both Europe and the US from the 1870 through 2010 the top decile share of income ranged from 30% to 50%, whereas the top decile share of wealth ranged from 60% to 90%. If negative influences of wealth concentration on economic growth exist, rising wealth inequality can be problematic. Since wealth inequality is affected not only by income inequality, but also by initial conditions and stock effects, the redistribution of income via taxation or other measures may not solve a wealth inequality problem. Wealth inequality will need to be directly addressed.[1]

In this paper we present a theoretical model showing the effects of wealth inequality on economic growth if the proportion of luxury non-productive assets is held disproportionally across wealth cohorts, investigating also the effect of segregation on this proportion. We will focus our attention first of all on the distribution of wealth and its effect on the amount of luxury assets in an economy (with obvious effects on economic growth) given the level of segregation, then we will consider the effect of a change in the level of segregation given the distribution of wealth. We collected evidence on luxury non-productive asset holdings for two different countries, US and France, and we conjectured a function of luxury asset holding with respect to the level of wealth in an opportunistic way, so to better fit the obseerved data of luxury assets holdings for these two countries. We then simulated the model to estimate the amount of luxury non-productive assets in the economy as a result of a variation of wealth distribution and segregation. The choice of these two countries lies on the fact that they have been identified as having similar levels of wealth inequality[2] but very different level of residential segregation[3].

So our aim is to tackle an important question: why do previous studies found sometimes a positive and sometimes a negative impact of inequality on GDP growth? We answer to

[1]From a theoretical point of view, (e.g., see Banerjee and Newman, 1993; Galor and Zeira, 1993; Aghion and Bolton, 1997; Piketty, 1997) the evolution of wealth distribution and the existence of poverty traps can also be considered. They employ a (non-convex) investment technology (a production function) and show how wealth initial conditions determine long-run outcomes in a closed economy with multiple steady states, and generate inequality that can be high or low. However, inequality remains persistent. Another view in the development literature is that economic inequality is the inevitable outcome of the market mechanism, even with all identical agents and no non-convexity (Ljungqvist, 1993; Freeman, 1996; Mookherjee and Ray, 2002, 2003).

[2]Of high-income countries with wealth inequality data, the US has the highest wealth inequality Gini, at 0.801. France is next, at 0.730. Japan, Germany, UK, Italy, Spain, Canada, Australia, and Netherlands all have less wealth inequality than France (Davies et al. 2011)

[3]Racial residential segregation as represented by the Dissimilarity index is 0.59 in USA and 0.27 in France. See section 2.2 for technical notes on sources and methods of computations.

this important question by extending the model of Bertola et al's (2006) as in Policardo and Sanchez Carrera (2024), and investigating the interrelation between different propensities of luxury non-productive capital holdings across different wealth groups and different levels of segregation in a country. We will see that if both rich and poor compete for conspicuous luxury consumption, an increase of wealth inequality may have mixed effects on economic growth, being segregation responsible, at least in part, for this evidence. In order to prove our statement, we gathered real data on luxury asset holdings for two different countries, US and France, which have been chosen because they have similar wealth inequality levels but very different segregation levels. We then approximated the real distribution of luxury asset holdings among different wealth cohort by a function chosen opportunistically and calibrated so as to fit the data as better as possible. We then used this function to estimate the quantity of luxury non productive assets in an economy if the level of wealth inequality and segregation vary, and we showed that when segregation is low, a reduction of wealth inequality may or may not be detrimental for growth, depending on the different propensities of converting productive capital into luxury non-productive assets by the poorest and richest strata of population. When, instead, segregation is high, a decrease in wealth inequality made by transferring wealth from the richest to the poorest strata, will increase economic growth by reducing the amount of luxury non-productive assets in the economy.

The remainder of the paper is structured as follows. Section 2 presents a series of stylized facts on the wealth-income inequality ratio, its impact on economic growth, the growth in luxury non-productive asset holdings in general. In subsection 2.1 we present data on the place of luxury non-productive assets in the specific asset portfolios of American and French households of varying wealth. Section 2.2 shows data according to which residential segregation and luxury non-productive asset holdings of the poorest are negatively correlated. Section 3 develops a macroeconomic model to explain the effects of wealth inequality on economic growth, emphasizing the role of luxury non-productive assets as a class of capital. Such modeling has not been a feature of the previous growth literature. Section 4 concludes offering important policy recommendations.

2 Stylized Facts

In growth theory, capital is instrumental for current production. The definition of capital provided by Piketty (2014) is different, and is based on the idea that "capital," that is to say, the sum of non-human assets that can be exchanged on some markets, may not necessarily be uniformly "productive," as neoclassical economic theory assumes. Instead, it may have a binary role in an economy; it may function mainly as a store of value, or as a factor of production. In Piketty's (2014) view, capital may assume all forms of real property (including residential estate) as well as financial capital and functional capital like plant, infrastructure, machinery, patents and so on, used by firms and governmental agencies.

One could argue, then, that capital intended as a means of production is only a subset of this broader definition of capital. Hence, we may propose that certain real property asset holdings like real estate, art, boats, wine collections, and fancy cars are particularly attractive as indicators of status, but are not productive capital. The distinction between productive capital, K, and wealth, W, the latter inclusive of these luxury non-productive assets, will be crucial to explain how wealth inequality can affect economic growth.

Piketty (2014) has brought this distinction between types of capital to the attention of the scientific community. This has prompted Stiglitz (2015), whose attention is on the global rise in wealth inequality, to note that:

> "Standard data on savings cannot be reconciled with the increase in the wealth-income inequality ratio: there is a wealth residual. An important component of this is associated with rents: land rents, exploitation rents, and rents on intellectual property."

Qualitative data affirms that the demand for luxury non-productive assets is increasing with the rise of the rich and super-rich (Featherstone 2014, Hay and Beaverstock 2016). The volume of luxury real estate transactions in Europe steadily increased from 2011 to 2018, the main reasons for purchasing such a home reportedly being use as a second home and finding a safe haven for investment, rather than using the home as a productive asset generating rental income.[4]

There is plenty of literature supporting the idea that households systematically seek out and hold increasing amounts of luxury non-productive assets as their wealth increases. The evidence of peer-effect purchasing of visible goods for conspicuous consumption by all wealth classes is overwhelming (Agarwal et al. 2020, Kuhn et al. 2011, Bertrand and Morse 2016). Eaton and Eswaran (2009) and Eaton and Matheson (2013) model that the rich seek out and hold Veblen goods to such an extent that the Easterlin paradox may be because Veblen goods crowd out consumption of non-Veblen goods in wealthy societies: "Veblen competition characterizes affluent people" (Eaton and Eswaran 2009, p. 1101, emphasis in the original). Empirically, Heffetz (2011) and Bricker et al. (2021) find that in he US increasing income increases household desire to purchase signalling goods like high status cars: "A 1-standard deviation increase in income rank implies a 3.6-percentage point rise in the probability of owning a status car, a 14.5% rise in the average value of all cars, and a 15.8% drop in the age of the households' youngest car."[5] Charles et al. (2009) empirically confirm that in the US visible goods like cars and jewelry are luxury goods (a 1% increase

[4] `https://tranio.com/articles/luxury-real-estate-in-europe-a-market-trend-analysis/`

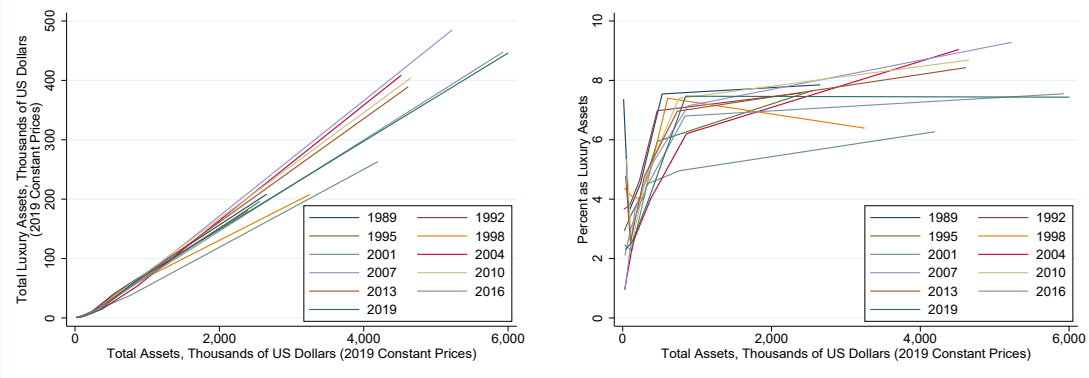
[5] Bricker et al. (2021, fn. 16) define a high status car as an Acura, Aston Martin, Audi, Bentley, BMW, Cadillac, Infiniti, Lamborghini, Land Rover, Lexus, Lincoln, Lotus, Maserati, Maybach, Mercedes-Benz, Porsche, Rolls Royce, Tesla and Volvo.

in total household income results in a 1.5% increase in household expenditures on these visible items), and that spending on visible goods increases with income.

There is another literature, however, that suggests that the poor are also interested in visible consumption, especially when confronted with wealthy neighbors (Bertrand and Morse 2016; Moav and Neeman 2012). Bertrand and Morse (2016) find indeed that in the US, poor households' budger shares devoted to the consumption of visible goods increases when they are exposed to households in top income and consumption levels, whereas the effect is muted when the rich and poor are segregated.

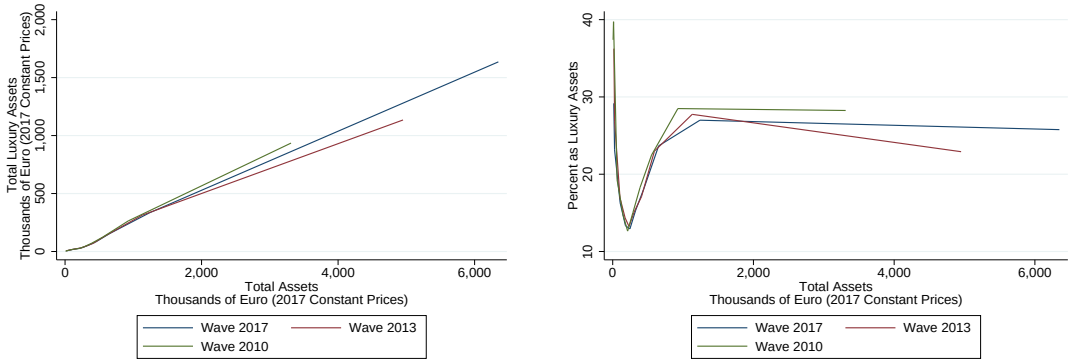
Policardo and Sanchez Carrera (2024) collected data on luxury asset holdings for two countries, namely, US and France, to investigate the propensity to hold such assets by different wealth cohorts. We borrow their analysis and report here the final result of their investigation with a total reference to their original publication for the methods used. They found, for US and France, such distribution of luxury assets among different wealth groups (see figure 1 for US, and figure 2 for France).

Figure 1: US Household Luxury Non-productive Asset Holdings (in levels, on the left, and as a percent of total assets, on the right as in Policardo and Sanchez Carrera (2024))



Source: US Federal Reserve Board surveys (`https://www.federalreserve.gov/econres/scfindex.htm`, `https://www.federalreserve.gov/scf/scf.htm`).

Figure 2: French Household Luxury Non-productive Asset Holdings (in levels, on the left, and as a percent of total assets, on the right, as in Policardo and Sanchez Carrera (2024))



Source: Eurosystem Household Finance and Consumption Survey. Household Finance and Consumption Network (`https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html`, `https://www.ecb.europa.eu/pub/economic-research/research-networks/html/researcher_hfcn.en.html`).

Figure 1 and 2 show two important figures: the fact that the stock of luxury assets in the portfolios of the different wealth groups is increasing with increasing wealth, and, the poorest households in France tend to hold proportionally more luxury assets in their portfolios than do their US counterparts.

One possible reason for such different tastes between french and american households could be due to their level of segregation. We indeed estimated the level of segregation of different European countries and gathered such information for the US, finding that US and France are at the antipodes of segregation levels in the sample considered.

Segregation, and in particular wealth residential segregation may be an important factor influencing the share, the amount and the distribution of luxury non-productive assets among different wealth cohorts in an economy.
According to the economic literature, however, racial segregation is positively correlated with income and wealth segregation (Galster, 1987). Oltmans Ananat (2011) finds that segregation increases black poverty and overall black-white income disparities, while decreasing white poverty and inequality within the white population. Reardon and Bischoff (2011) find a strong correlation between income and race, and racial segregation alone can produce income segregation.

We are aware that racial segregation and wealth segregation are two different concepts. But as long as those two variables are positively correlated, as the literature suggests, racial segregation can be used as "proxy" for income and wealth segregation to support our argument and shed light on the possible motivations underlying the dramatically different

effects of wealth inequality in the United States and France when data are extremely scarce or non-existent.

For the racial segregation index, we have been able to find 7 cross-sectional observations (six European countries and the United States) for which also the luxury asset holdings of the poorest 50% population index was present in year 2010. We are aware that 7 observations are far from remotely sufficient to be used for any statistical analysis, but we hope with this little evidence to contribute to the debate and to the sensitivity of the statistical institutes in the collection of such data, because we believe that they could profitably used to investigate some economic insights as we are trying to do here. To the best of our knowledge, this is one of the very few papers (if not the only) which tries to make an association between segregation and luxury non-productive assets holdings using aggregated macroeconomic data. Almost all the economic literature on segregation and visible consumption are micro-based studies.

Figure 3 plots luxury asset holdings (as percent of total assets) for the poorest 50% population versus the Dissimilarity index of racial residential segregation for year 2010. For the computation of the Dissimilarity index of segregation, we used the D4I dataset[6] with data for migrants aggregated by continents,[7,8] by selecting, for all the countries, only cities with no less than 200.000 inhabitants.[9] We then plotted the Dissimilarity index against the percent as luxury asset holdings over total assets for the poorest half of the population.

For the United States, we gathered the Dissimilarity index for year 2010 from Menendian S. and Gambhir S. (2019). We cannot guarantee that the methods of computation are exactly the same as for the other European countries above, but in any case we believe that the inclusion of this data in the figure may help shedding light on some stylized facts in a situation characterized by deep scarcity of data.

Data for the luxury asset holdings of the different wealth deciles of population were gathered instead from two different sources, as Policardo and Sanchez Carrera (2024) explained in their paper. Data for the European countries were gathered by the European Central Bank (Eurosystem Household Finance and Consumption Survey), while data for

[6]The Data for Integration (D4I) dataset has been obtained through a spatial disaggregation of statistics of the 2011 Census, collected from national statistical institutes (Alessandrini et al., 2017) of seven European countries. The results of the spatial processing of the original data is a uniform grid showing the concentration of migrants in cells of 100 by 100 metres in all cities of these countries. The migrants are grouped at three different levels of aggregation: by specific country, continent, and EU versus third country of origin.

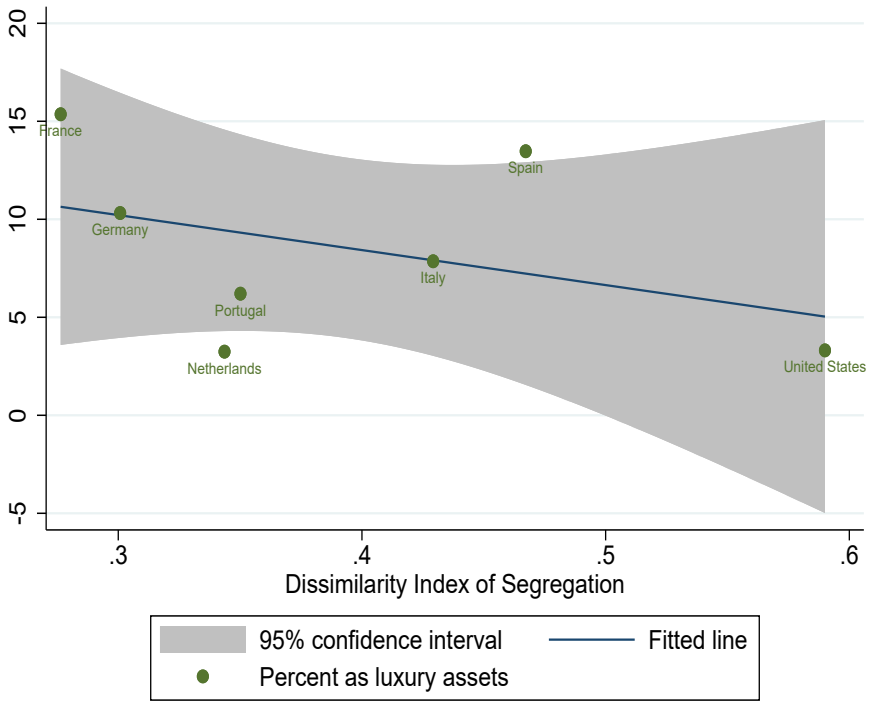
[7]Countries for which D4I data were available with migrants aggregated at continent-level are: France (FRA), Germany (DEU), Italy (ITA), Netherlands (NLD), Portugal (PRT) and Spain (ESP).

[8]In the D4I dataset, they are indicated as level "L3".

[9]For the computation of the Dissimilarity (Dseg) index, we used the Stata® user-written package `seg` developed by Reardon and Townsend (1999).

the United states were gathered by the US Federal Reserve Board surveys. Figures 1 and 2 show the amount of luxury assets in levels and as percent of total assets as a function of total asset for each decile of population ordered by their wealth level (as indicated by total assets). In figure 3, we summed up the amount of luxury assets and total assets for the first five deciles, getting therefore the percentage of luxury assets over total assets for the poorest 50% population. This data was then plotted against the Dissimilarity index of segregation at the national level.

Figure 3: Percent as luxury assets on total assets for the poorest 50% population vs the Dissimilarity index of racial residential segregation. Year 2010.



Source: Data for Segregation have been gathered form D4I Dataset for the six European countries and from Menendian S. and Gambhir S. (2019) for US. Data for Luxury asset holdings from the European Central Bank and the US Federal Reserve Survey. Own Calculations.

Despite the fact - as we already said - that these data are obviously not sufficient for any statistical inference, they suggest a plausible reason that might have a significant role in determining the pattern of assets type holdings for different groups of population. Looking at figure 3, we can observe that the slope of the line that best approximates the data, that is, that minimizes the sum of squared residuals, shows a negative relationship between segregation and luxury non productive assets holdings for the poor. This indicates that

according to this little evidence, the higher the residential segregation in a country, the lower is the amount of luxury non productive assets that the poorest 50% population owns in his portfolio.

3 Model and numerical simulations

Policardo and Sanchez Carrera (2024), developed a theoretical model by extending Bertola et al.'s (2006) model published in the book entitled "Income Distribution in Macroeconomic Models" edited by Princeton University Press, in which they suggested that, depending on the shape of the function representing the share of luxury assets in the portfolios held by different wealth cohorts (stressing that this function needed to be convex), an increase in wealth inequality could imply a decrease of economic growth due to a larger conversion of productive capital into non-productive luxury assets both by the rich and the poor strata of population.

Here we base our reasoning starting from their model, but using as function for the conversion of productive capital into luxury non-productive assets, an opportunistic function that best fits the real data. As a further innovation with respect to the previous model, we assume that this function, which originally depends on the level of total wealth, here depends also on the level of segregation. The release of the assumption $b(k) = \alpha k^2 + \beta k$ (as in equation 14 in their original paper) imply that our results hold not only if a hypothetical function (which does not necessarily represent the "real" behavior observed in the economy, especially for the rich and the super-rich) is used, but our function, when correctly parameterized to best adapt to the real observational data and to take into account for different propensities to convert productive capital into luxury assets as the level of segregation varies, shows how effectively the level of wealth inequality and segregation could affect economic development via the conversion of productive capital into luxury non-productive assets.

For completeness of treatment, we will report here the basics of the model by Policardo and Sanchez Carrera (2024), whose insights are the following:

1. There is a type of luxury asset that is counted in measures of wealth and in wealth inequality, but that has no direct productive use;

2. These luxury non-productive assets have the potential to be held disproportionately across households;

3. Wealth can become more unequally distributed over time;

4. Wealth inequality affects the propensities of households to hold luxury non-productive assets in their portfolios as they wealth varies.

In addition to these basic assumptions, in this paper we introduce the possibility that also segregation contributes to affect the propensity to hold luxury assets the different wealth cohorts of population.

Here the basic equations that represent the functioning of the model:[10] Let us assume that w represents the endowment of total wealth at households-unit level, that is the sum of k (productive capital) and u (luxury non-productive assets).

$$w = k + u, \tag{1}$$

Household's income is instead given by y, and obeys the rule

$$y = Wl + Rk, \tag{2}$$

with l and k representing, respectively, non-accumulated factors (like labor) and productive capital, while W and R are the returns on non-accumulated and accumulated productive factors. The equations governing the returns of non-accumulated and accumulated factors are $W = F_2(K, L)$, $R = F_1(K, L) + \delta^K$, where δ^K represents the net rate of appreciation of capital.[11] As in Bertola et al. (2006) capital letters represent economy-wide prices that are identical across households. Consumption is the linear function (Bertola et al. 2006, equation 2.1)

$$c = \bar{c} + ay + bk, \tag{3}$$

where $\bar{c} \geq 0$ is a subsistence level of consumption and $a \in [0, 1]$ and $b \in [0, 1]$ are exogenously determined marginal propensities to consume from current income and accumulated productive capital. They are constant across all households, allowing consumption to exceed income y.

In the Bertola (2006) model consumption is a drag on the steady state level of capital k because it directly depletes the capital stock via bk. The consumption of the capital stock is not, however, explicitly treated other than via its vaporization during the consumption process. In our model consumption converts productive capital into a luxury non-productive asset that is a component of wealth that is durable and provides utility via its conspicuousness and promotion of status.

The dynamics of household accumulation of productive capital follow

$$\dot{k} = y - c = Wl + Rk - c. \tag{4}$$

[10] Notice that in the remainder of the model we use the same notation as in Bertola et al. (2006), according to which capital letters indicate variables or parameters at the aggregate level or that are constant through units, while with lowercase letters we indicate variables or parameter at the individual household level.

[11] In our model, we do not make explicitly any *à priori* assumption on the sign of δ^k. This means that δ^k could be positive (if capital appreciates) or negative (if capital depreciates). In order to be as more generic as possible, we left the sign of δ^k unspecified, allowing the possibility that if productive capital appreciates, this will add to the productivity of k (i.e. the rewards R); if instead capital depreciates (implying that $\delta^k < 0$), this will detract from total capital rewards.

In order to focus on wealth and its inequality, let l be the same for all households, as indicated by L. Substituting equation (3) into (4),

$$\dot{k} = (1-a)(WL + Rk) - \bar{c} - bk. \tag{5}$$

An important point of the paper by Policardo and Sanchez Carrera (2024) is that the contribution of each household unit to measured aggregate GDP is its income y. After substituting for $\dot{k}$ as given in equation (5), and assuming L is constant, growth in income is:

$$\frac{\dot{y}}{y} = \frac{R\dot{k}}{Rk + WL} = R(1-a) - \frac{R(\bar{c} + bk)}{Rk + WL}. \tag{6}$$

As reflected in the last term on the right-hand side of equation (6), growth is reduced with increasing levels of subsistence consumption $\bar{c}$ and with higher conversion of productive capital into luxury non-productive capital b, as these lower the steady state level of income. But this is not related to wealth inequality as an unequal distribution of k across households has no effect on aggregate growth when b is constant across households.

The household survey data in the previous section reveals that b may not be constant across all households. In France, the poorest and richest households were found to convert wealth into luxury non-productive assets at a far higher rate than middle class households. In the US, net of a scale factors representing personal tastes, b is found strictly increasing with wealth. In the following of this paper, we will assume that this difference could be due to different level of segregation in the country.

Policardo and Sanchez Carrera (2024) consider, as a final component of their model, the nonlinear consumption function,

$$c = \bar{c} + ay + b(k)k, \tag{7}$$

with $b'(k) \neq 0$ reflecting differing marginal propensities to convert productive capital into luxury non-productive assets across household wealth levels.

They estimated a reasonable specification for $b(k)$ as:

$$b(k) = \alpha/k^2 + \beta k, \tag{8}$$

so as to indicate that the poorest and the richest strata of the population have an higher tendency to convert productive capital into luxury non productive assets, as in France. In the US, however, the poorest strata of the population seem not to have such desire to hold luxury assets, probably due to different levels of segregation between rich and poor in these two different countries.

In this paper, we used an opportunistic function which - net of a scale factor which does not change our qualitative implications - represents a better approximation of the data observed in figures 1 and 2.
Let us consider the following function for $b(k)$ (with $b(k)$ assumed to be strictly greater or equal to zero):

$$b(k) = \alpha \cdot \frac{(k - \beta + S)^2 - \omega}{(\lambda k - \gamma + S)^2 + \delta} + \mu, \tag{9}$$

with α, β, γ, ω, λ, μ and δ positive parameters. S represents the level of segregation, which moves the function on the left hand side as the segregation increases. It is important to point out that this function has not the goal to be "reasonable" from an economic point of view and easily interpretable, but has the only aim to fit the data as better as possible.

As it can be seen from the following figures, a good parametrization of this function could be: $\alpha = 0.40$, $\beta = 20$, $\gamma = 0.08$, $\omega = 0.5$, $\lambda = 0.15$ $\mu = 13$, $\delta = 2.3$. For France, S could be assumed to be equal to 0, while for US, S could be equal to 9, denoting a higher segregation level. What distinguishes the functions of US and France, in addition to the level of segregation S, is also the scale factor μ, representing a different taste for luxury holdings between those two countries, but, as it will be clearer with our simulations, it does not change our qualitative results, since the effect of the scale factor on the variation of the amount of unproductive assets in the economy as function of a change on the level of inequality and/or segregation is nil.

Figure 4: Percent as luxury assets as function of total assets, real vs estimated (year 2017 for France, year 2019 for US).

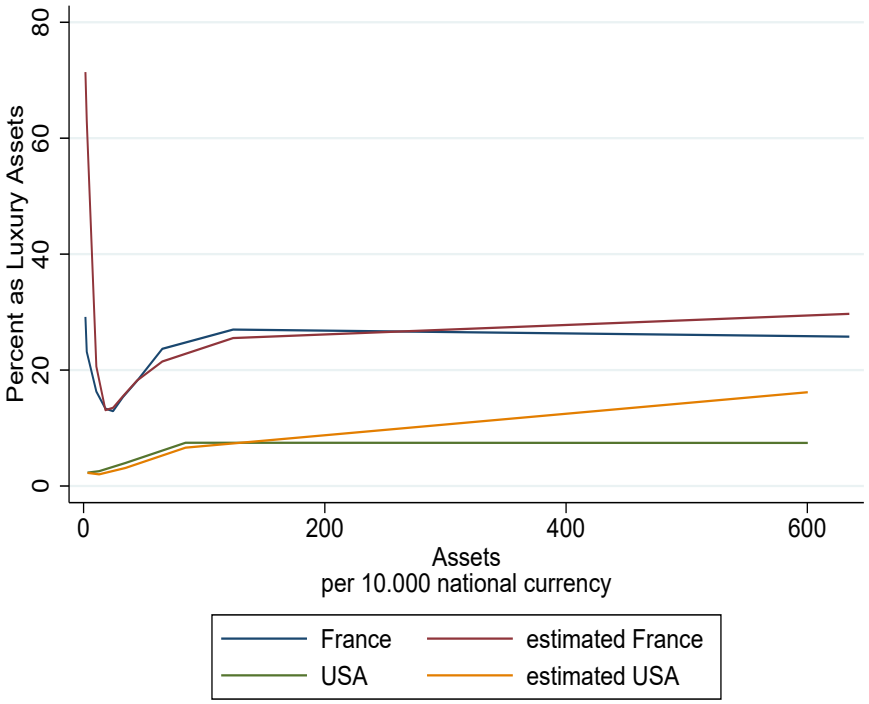


Figure 4 reports the real distribution of luxury assets (as percent of total assets) as a function of total wealth.[12] In the same graph, we also plotted the estimated luxury asset holdings given by equation 9. As written before, the common parameters for both estimated functions are $\alpha = 0.40$, $\beta = 20$, $\gamma = 0.08$, $\omega = 0.5$, $\lambda = 0.15$ $\mu = 13$, $\delta = 2.3$. For France, S could be assumed to be equal to 0, while for US, S could be equal to 9. A different scale factor has been considered between the estimated functions of France and US, just to make the reader better aware of the ability of this function to fit the US data, being $\mu = 13$ for France and $\mu = 2$ for USA. The scale factor will be considered the same for both countries for the simulation purposes, being irrelevant in the determination of the qualitative implications of the model.

So, the purpose of our analysis is twofold: on the one hand, we want to investigate the impact of a variation of wealth inequality on the stock of luxury non-productive assets in the economy (and therefore its implication on economic development), and, on the other, we aim to measure the effect of wealth segregation, taking constant wealth inequality.

[12]In order to be able to plot both functions in the same grid with the same axis scale, we normalized total wealth for each wealth group as percent of total wealth in the economy.

In order to do that, we will assume a common scale factor for equation 9, and for hypothesis, will will take as benchmark that of France. We will then investigate first what would be the effect on the stock of non-productive assets in the economy as a result of a variation of the level of segregation, taking constant the the distribution of wealth, and then, assuming a constant level of segregation, we measure the impact of wealth inequality on the stock of luxury assets by decreasing wealth for the rich and increasing wealth for the poor, taking constant the level of segregation.

Data for France have been downloaded at micro-level, and has been ordered according to net wealth so as to be able to compute our variables of interest for each decile of the sample representing this population.
Data for US are expressed for a different groupings at the origin, when downloaded. The US Surveys reported data for 5 wealth groups ordered according to their net wealth represented by: the first, which includes the poorest 25 centiles of population, the second, representing centiles from 26 to 50, the third, including centiles from 51 to 75, the fourth, representing centiles from 76 to 90, and the last one, the fifth, representing the richer 10% population.

Table 1 shows, for France and USA, the effect of a change in the level of segregation on the mean level of luxury non-productive assets per capita. Column 1, 2 and 3 show, respectively, the real level of assets per capita (expressed as x10.000 thousands of national currency), the real level of luxury assets owned by each decile/wealth group (as derived by the surveys), again expressed as x10.000 national currency, and the observed fraction of luxury assets computed as the ratio of column 2 over 1 (%). As we already said, in our simulations France has a segregation level of 0, while USA has 9. Column 5 reports, for each wealth group, the estimated quantity of luxury assets owned by the population, which is equal to a mean of 25.796, computed by the application of function 9 on column 1 with the assumption of segregation equal to 0. Once computed the estimated per capita stock of luxury assets, we computed also the fraction of estimated luxury assets per capita (expressed as % of total assets) for each wealth group and for the whole economy (column 4). After doing that, we re-applied function 9 with the assumption of segregation equal to 9, and we estimated first the stock of luxury non-productive assets per capita that the function would have predicted in case of high segregation (column 7) and also, the fraction of such assets on total assets (column 6).

We observe that for France, raising segregation from 0 to 9 (that is, to the level registered for USA), the estimated fraction of luxury non-productive assets per capita (in its mean level) decreases from 26.91% (column 4) to 23.74% (column 6), and this stimulates economic growth. Similarly, for USA, decreasing segregation from 9 to 0, as those of France, raises the fraction of mean per capita luxury non-productive assets holdings in the economy from 23.77% to 27.09%, draining productive resources towards unproductive uses.

Table 1: Variation of the stock of luxury assets as a result of a variation of the level of segregation

FRANCE

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Decile	Weight	Assets percapita (x 10.000 euro)	Luxury percapita (x 10.000 euro)	% as luxury (2)/(1)*100	Est. % as luxury (segr=0)	Est. percapita luxury (x10.000 euro), segr=0	Est. % as luxury (segr=9)	Est. percapita luxury (x10.000 euro), segr=9
1	1	1.547882	.4515513	29.1722	71.4085	1.105319	13.42105	.2077421
2	1	2.638476	.6109828	23.15666	63.03476	1.663157	13.31954	.3514329
3	1	10.59507	1.726631	16.29655	20.61949	2.184651	13.00502	1.377891
4	1	18.15149	2.423111	13.34938	13.09336	2.376641	13.15203	2.387289
5	1	24.44468	3.158426	12.92071	13.48812	3.297128	13.45297	3.288536
6	1	32.65213	5.010262	15.34436	15.49028	5.057908	13.97306	4.562501
7	1	44.27998	8.026782	18.12734	18.18756	8.05345	14.81418	6.559715
8	1	65.30959	15.45977	23.67151	21.4861	14.03248	16.34741	10.67642
9	1	123.9935	33.46595	26.99009	25.52804	31.6531	19.72398	24.45644
10	1	634.8206	163.585	25.7687	29.699	188.5354	27.3492	173.6184
TOTAL		95.84334	23.39185	24.40633	26.91467	25.79592	23.73522	22.74863

USA

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wealth group	Weight	Assets percapita (x 10.000 US$)	Luxury percapita (x 10.000 US$)	% as luxury (2)/(1)*100	Est. % as luxury (segr=0)	Est. percapita luxury (x10.000 US$), segr=0	Est. % as luxury (segr=9)	Est. percapita luxury (x10.000 US$), segr=9
1	2.5	3.273841	.0754975	2.306082	58.12211	1.902826	13.26827	.4343821
2	2.5	12.90627	.3306586	2.562	16.4169	2.118809	13.01626	1.679913
3	2.5	34.68378	1.378124	3.973396	16.00432	5.550904	14.11461	4.89548
4	1.5	84.55563	6.314102	7.467393	23.34149	19.73654	17.61546	14.89487
5	1	600.3798	44.6366	7.434728	29.63784	177.9396	27.18018	163.1843
TOTAL		85.43730	5.85685	6.855144	27.09301	23.147576	23.7661	20.305104

Table 2: Variation of the stock of luxury assets as a result of a variation of the level of wealth inequality (segregation = 0)

FRANCE							
		(1)	(2)	(3)	(4)	(5)	(6)
Decile	Weight	Assets percapita (x10.000 euro)	Est. % as luxury	Est. percapita luxury (x10.000 euro)	New Assets percapita (x10.000 euro)	New Est. % as luxury	0New Est. percapita luxury (x10.000 euro)
1	1	1.547882	71.4085	1.105319	2.547882	63.73803	1.62397
2	1	2.638476	63.03476	1.663157	2.638476	63.03476	1.663157
3	1	10.59507	20.61949	2.184651	10.59507	20.61949	2.184651
4	1	18.15149	13.09336	2.376641	18.15149	13.09336	2.376641
5	1	24.44468	13.48812	3.297128	24.44468	13.48812	3.297128
6	1	32.65213	15.49028	5.057908	32.65213	15.49028	5.057908
7	1	44.27998	18.18756	8.05345	44.27998	18.18756	8.05345
8	1	65.30959	21.4861	14.03248	65.30959	21.4861	14.03248
9	1	123.9935	25.52804	31.6531	123.9935	25.52804	31.6531
10	1	634.8206	29.699	188.5354	633.8206	29.69732	188.2277
TOTAL		95.84334	26.91467	25.79592	95.84334	26.93669	25.81702

USA							
		(1)	(2)	(3)	(4)	(5)	(6)
Wealth group	Weight	Assets percapita (x10.000 US$)	Est. % as luxury	Est. percapita luxury (x10.000 US$)	New Assets percapita (x10.000 US$)	New Est. % as luxury	New Est. percapita luxury (x10.000 US$)
1	2.5	3.273841	58.12211	1.902826	4.273841	50.64135	2.16433
2	2.5	12.90627	16.4169	2.118809	12.90627	16.4169	2.118809
3	2.5	34.68378	16.00432	5.550904	34.68378	16.00432	5.550904
4	1.5	84.55563	23.34149	19.73654	84.55563	23.34149	19.73654
5	1	600.3798	29.63784	177.9396	597.8798	29.63313	177.1705
TOTAL		85,437295	27.093055	23.147574	85.437295	27.079554	23.136038

Table 2 shows the effect of a decrease in wealth inequality over the fraction of luxury assets in the economy, given the level of segregation, which, in this case, is assumed to be 0. Column 1 in table 2 reports the observed average per capita assets as derived by the surveys through each wealth group. Column 2 and 3 instead shows the corresponding estimated fraction and stock of per capita luxury non productive assets computed by the application of equation 9 over column 1. Column 4 represents a new distribution of wealth. As it is possible to observe, for France we detracted 10.000 euro from the 10th decile and we added 10.000 euro to the first decile, thus decreasing wealth inequality. In doing so, the average wealth of the 10th decile goes from 634.82 to 633.82, with a variation of -0.15% of wealth for the rich (keeping unchanged the average per capita stock of assets in the economy), while the wealth of the first decile (the poorest) raises from 1.55 to 2.55 (+64.5%). We applied function 9 over this new distribution of assets and interestingly, we observed that the stock of luxury assets in the economy increased. This effect is caused mainly by the higher propensity of the poor to hold luxury assets in their portfolios than the rich, so a transfer of money from the rich to the poor increases necessarily the stock of unproductive assets in the economy, since it is moved to a wealth group with a higher propensity to convert productive capital into unproductive luxury assets.

An opposite story can be told for USA. For this country, we decided to move 25.000 US$ from the richest group of population, allowing the first wealth group (corresponding to the first poorer 25 centiles of population) having 10.000 US$ more as assets per capita. Simulations performed on the distribution of US wealth (assuming segregation equal to zero) suggest that in this case the poorest wealth group decreased his fraction of luxury assets over total assets from 58.12% to 50.64%, and also the richest decreased their fraction of luxury assets in the portfolios from 27.09% to 27.08%. This effect is due to the nonlinearity of the function representing the conversion of productive capital into luxury non-productive assets as a function of total assets.

It is important to notice that, on average, the poorest decile of population in France had an initial value of assets percapita equal to 1.5, versus 3.3 of the first wealth group in USA. The marginal propensity to convert productive capital into luxury non productive assets is the higher, the lower is the absolute value of assets owned, and decreases as long as total assets increases up to a minimum value of about 200.000 national currency . This suggests that due to the nonlinearity of this function, what matters for economic growth is not only relative inequality, but also the absolute level of wealth. We will clarify this concept better with new simulations.

Now, let us suppose to reduce the wealth of the rich in France by an amount of €50.000, that is, by less than 1%, and let us suppose to increase by an equal amount the wealth of the poorest decile of population. Similarly, we decrease by 50.000 US$ the wealth of the richer 10% population and we increase by 20.000 US$ the wealth of the poorest 25% population. Results are exposed in table 3.

Table 3 shows how a substantial redistribution of wealth from the rich to the poor

Table 3: Variation of the stock of luxury assets as a result of a variation of the level of wealth inequality (segregation = 0)

FRANCE

Decile	Weight	(1) Assets percapita (x10.000 euro)	(2) Est. % as luxury	(3) Est. percapita luxury (x10.000 euro)	(4) New Assets percapita (x10.000 euro)	(5) New Est. % as luxury	(6) 0New Est. percapita luxury (x10.000 euro)
1	1	1.547882	71.4085	1.105319	6.547882	36.08457	2.362775
2	1	2.638476	63.03476	1.663157	2.638476	63.03476	1.663157
3	1	10.59507	20.61949	2.184651	10.59507	20.61949	2.184651
4	1	18.15149	13.09336	2.376641	18.15149	13.09336	2.376641
5	1	24.44468	13.48812	3.297128	24.44468	13.48812	3.297128
6	1	32.65213	15.49028	5.057908	32.65213	15.49028	5.057908
7	1	44.27998	18.18756	8.05345	44.27998	18.18756	8.05345
8	1	65.30959	21.4861	14.03248	65.30959	21.4861	14.03248
9	1	123.9935	25.52804	31.6531	123.9935	25.52804	31.6531
10	1	634.8206	29.699	188.5354	629.8206	29.69053	186.9971
TOTAL		95.84334	26.91467	25.79592	95.84334	26.88537	25.76784

USA

Wealth group	Weight	(1) Assets percapita (x10.000 US$)	(2) Est. % as luxury	(3) Est. percapita luxury (x10.000 US$)	(4) New Assets percapita (x10.000 US$)	(5) New Est. % as luxury	(6) New Est. percapita luxury (x10.000 US$)
1	2.5	3.273841	58.12211	1.902826	5.273841	43.73959	2.306756
2	2.5	12.90627	16.4169	2.118809	12.90627	16.4169	2.118809
3	2.5	34.68378	16.00432	5.550904	34.68378	16.00432	5.550904
4	1.5	84.55563	23.34149	19.73654	84.55563	23.34149	19.73654
5	1	600.3798	29.63784	177.9396	595.3798	29.62838	176.4014
TOTAL		85,437295	27.09306	23.14758	85.437295	27.03121	23.09474

can contribute to decrease the amount of unproductive luxury assets in the economy and therefore to increase economic growth. A decrease fof €50.000 for the richer 10% population and an equal increase for the poorest 10% population in France would imply a decrease of 0.03% of total assets employed in non-productive uses. The effect for USA is even greater, since the poorest wealth group owned an average of US$ 32.000 against €15.000 in France. In USA, indeed, an increase of 20.000 percapita wealth for the poorest group (and a decrease of US$ 50.000 for the richer group) would imply an increase of productive capital of 0.06% of total wealth.

One important lesson that we can draw from these simulations is that due to the non-linearity of the function representing the luxury asset holding with respect to total wealth, standard measures of inequality, like for example the ratio of wealth owned by the richer 10% population over the wealth owned by the poorest 10 or 50% population might not informative on their effect of economic growth, since different wealth groups have different propensities to hold non-productive assets and their propensities depend also by their absolute value of wealth.

So, in countries where segregation is low and possibly the poorest strata of population own little amounts of capital, a small increase of wealth for these individuals at the expense of the richer strata would imply an increase of non-productive capital in the economy and therefore a decrease in economic growth. This effect is due to the fact that the very poor have an higher propensity to hold luxury non-productive assets than the rich. In order a reduction of wealth inequality be positive for economic growth, wealth of the poorest strata of the population must be increased substantially, so to let the propensity to hold luxury assets for the poor decrease at a level lower than the rich.

Table 4 shows instead how a decrease in wealth inequality, in particular a decrease of €10.000 for the richest 10% population and a corresponding increase of wealth for the poorest 10% population for France, and a decrease of US$ 25.000 for the richest 10% population and a corresponding increase of US$10.000 for the poorest 25% population for USA, affects the stock of luxury non-productive assets in the economy when segregation is high, in particular at the level assumed for the United States.

When segregation is high, as we see from figure 4, the estimated level of luxury assets as a function of total wealth is strictly increasing (or, at least, non-decreasing), with different propensities as the level of total wealth varies. This implies that at lower levels of wealth, the propensity to hold luxury assets decreases and therefore, a decrease of wealth inequality in favor of the poorest and at the expense of the richest can only generate a decrease in the stock of luxury assets in the economy and therefore stimulates economic growth. It is pretty clear from table 4 that after a redistribution of wealth in favor of the poorest wealth group (and at the expense of the richest) generates a decrease of the stock of non-productive assets in the economy. For France, a decrease of 0.15% of wealth for the richest 10% population in favor of the poorest wealth group generates an increase of 0.03% of total wealth devoted to

Table 4: Variation of the stock of luxury assets as a result of a variation of the level of wealth inequality (segregation =9)

FRANCE							
		(1)	(2)	(3)	(4)	(5)	(6)
Decile	Weight	Assets percapita (x10.000 euro)	Est. % as luxury	Est. percapita luxury (x10.000 euro)	New Assets percapita (x10.000 euro)	New Est. % as luxury	0New Est. percapita luxury (x10.000 euro)
1	1	1.547882	13.42105	.2077421	2.547882	13.32731	.3395642
2	1	2.638476	13.31954	.3514329	2.638476	13.31954	.3514329
3	1	10.59507	13.00502	1.377891	10.59507	13.00502	1.377891
4	1	18.15149	13.15203	2.387289	18.15149	13.15203	2.387289
5	1	24.44468	13.45297	3.288536	24.44468	13.45297	3.288536
6	1	32.65213	13.97306	4.562501	32.65213	13.97306	4.562501
7	1	44.27998	14.81418	6.559715	44.27998	14.81418	6.559715
8	1	65.30959	16.34741	10.67642	65.30959	16.34741	10.67642
9	1	123.9935	19.72398	24.45644	123.9935	19.72398	24.45644
10	1	634.8206	27.3492	173.6184	633.8206	27.34452	173.3152
TOTAL		95.84334	23.73523	22.748635	95.84334	23.71735	22.731501

USA							
		(1)	(2)	(3)	(4)	(5)	(6)
Wealth group	Weight	Assets percapita (x10.000 US$)	Est. % as luxury	Est. percapita luxury (x10.000 US$)	New Assets percapita (x10.000 US$)	New Est. % as luxury	New Est. percapita luxury (x10.000 US$)
1	2.5	3.273841	13.26827	.4343821	4.273841	13.19844	.5640803
2	2.5	12.90627	13.01626	1.679913	12.90627	13.01626	1.679913
3	2.5	34.68378	14.11461	4.89548	34.68378	14.11461	4.89548
4	1.5	84.55563	17.61546	14.89487	84.55563	17.61546	14.89487
5	1	600.3798	27.18018	163.1843	597.8798	27.16726	162.4276
TOTAL		85,437295	23.76609	20.305105	85.437295	23.71547	20.261855

productive uses. In USA, a decrease of 0.04% of wealth for the richest group generates an increase of 0.05% of total wealth devoted to production, and therefore to economic growth.

4 Policy Recommendations and Final Remarks

The simple theoretical model introduced in Policardo and Sanchez Carrera(2024) shows the mechanism according to which wealth inequality - through the different propensities to convert productive capital into luxury non-productive assets by different wealth cohorts - may have a detrimental impact for economic growth.

Their assumption lied on the fact that the function that converts productive capital into non-productive assets has a u-shape with respect to total wealth. The observation of survey data reveals however that this may not be the case, as figure 1 and 2 suggest. We hypothesized that the different shape of the functions representing the pattern of luxury assets holdings across different wealth cohorts could be due to different levels of segregation between rich and poor in the countries analyzed, as the data on racial segregation seem to suggest.

We therefore approximated with an opportunistic function the real observed pattern of luxury assets holdings as function of total assets, letting it depend on the level of segregation, so to fit as better as possible both observed patterns for France and US.

Once defined this function, we made two exercises: the first, where we estimated the stock of luxury non-productive assets in the economy assuming segregation equal to 0 and then to 9. For France, segregation equal to 0 imply that the estimated stock of luxury assets are the best approximation to their observed level, but increasing segregation to 9 decreases the level of productive capital devoted to unproductive uses by over 3% (from 25.8% of total wealth to 22.7%). For USA, a level of segregation equal to 9 is the one which approximates the real data, and the estimation of the stock of luxury assets that follows from this assumption is the closest to the real observed data. The estimation of the stock of luxury when segregation is assumed to be zero, therefore, increases the stock of wealth devoted to unproductive uses by over 3% (from 23.8% of total wealth to 27.1%).

Segregation, therefore, when brought close to zero, has the effect of making the function that approximates luxury assets holdings with respect to total assets highly non-linear. An increase of segregation, conversely, has the effect, once the threshold of the minimum is reached,[13] of making this function non-decreasing. This makes the implications of a variation in the level of wealth inequality different depending on the level of segregation.

When segregation is high, indeed, an increase in wealth inequality implies an increase

[13] As it is possible to observe, function 9, with $S = 0$, has a minimum at about 200.000 national currency. This means that below this threshold, luxury assets holdings is decreasing with respect to total wealth (for the poor), and over this threshold (for the rich), luxury assets holdings is increasing with wealth, but at a rate lower than for the poor. The middle class seems the least interested in owing luxury assets.

in the stock of luxury asset in the economy (and then a decrease of economic growth) due to the fact that the poor are those with the lower rate of conversion of productive capital into non-productive luxury assets.

When segregation is low, on the contrary, the effect is more ambiguous. In this case, it is relevant not only the ratio between wealth of the richest strata of the population and the poorest, but also the absolute level of wealth of the poorest strata. When the level of wealth of the poor are well far away from the threshold of about 200.000 national currency, a small increase in wealth of the poor at the expense of the richest strata will have an effect of increasing the stock of luxury assets in the economy since the poor have a much higher tendency to convert productive capital into non-productive wealth than the rich. For a decrease in wealth inequality be effective in increasing economic growth, wealth inequality must be addressed substantially, that is, the increase in wealth of the poor must be substantial.

This represents a possible explanation of why in the economic literature we find often contradicting theories about the effect of inequality on growth. If the effect of wealth inequality on growth can be due to the different propensities to convert productive capital into non-productive assets (at least in part), redistributing wealth from the rich to the poor might be growth-depressing in the short run, since it might be difficult to redistribute substantial wealth towards the poor in a single period. Redistribution may take time and in the short run it might be growth-reducing. On the other hand, increasing inequality letting more and more strata of population having a level of wealth lower and far away from the threshold of 200.000 national currency would imply an increase in the rate of conversion of productive capital into luxury assets which might be growth-depressing.

This may suggest to governments who want to increase economic growth while redistributing wealth to help the poorest strata of population to accumulate capital via social pension programs, who allowed the poor to accumulate productive capital without having the effect to increase luxury non-productive consumption. Other possible and collateral policies could be financial education programs, as well as good public school programs which may help in this purpose and let the poorest strata of population to earn a higher wages (and let them save more for productive purposes).

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