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RESEARCH ARTICLE

DUAL DYNAMICS OF SAVINGS IN GLOBAL CONSUMPTION DISPARITIES

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Abstract

This paper examines global consumption inequality through empirical and theoretical approaches. To provide a clear perspective on the magnitude of consumption inequality globally, the study utilizes the Penn World Tables 10.01 dataset covering the period from 1960 to 2019. The categorization of countries into five consumption groups reveals a remarkably stable distribution, with the majority of the global population persistently concentrated in the lowest and highest consumption groups. Over the past six decades, the proportion of the worldwide population of the lowest consumption group has remained strikingly high, highlighting global inequality's entrenched and severe nature. This paper refines the theoretical framework by examining how savings rates influence economic disparities among countries, drawing on Solow's (1956) and Pasinetti's (1962) perspectives. While the Solow-Swan model highlights the role of higher savings in fostering economic growth and decreasing economic inequalities, this study incorporates Pasinetti's (1962) perspective, which argues that increased savings among lower-income groups may disproportionately benefit wealthier groups, potentially intensifying inequality. Using Gillman's (2011) general equilibrium model, the paper bridges these theoretical insights to examine how class-based economic differences shape the outcomes of savings behavior. Empirical results derived from the theoretical model show that the impact of savings rates on global consumption patterns varies significantly depending on the economic structures of different countries. This analysis underscores the importance of designing economic policies sensitive to each country's unique characteristics and structural realities rather than applying uniform, one-size-fits-all solutions.
Keywords: Consumption-Saving, Solow Growth Model, Demand-led Growth Models, Dynamic Panel Data Models.
JEL codes: E21, O47, C21

Introduction

Understanding and explaining the mechanism behind the distribution of economic inequality – both within and across countries – has a solemn place in economics. Within countries, the primary concern about inequality is how wealth, income, and consumption are distributed among individuals or social groups. In contrast, inequality across countries focuses on the disparities in economic performance and living standards across sovereign nations. Inequality within and across countries intersects

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through common economic behaviors, such as savings habits, which influence long-term economic trajectories at both the individual and national levels. Besides, national and individual savings rates also play a critical role in shaping long-term macroeconomic outcomes and economic growth paths.

There are different approaches in the economic literature to explain the relationship between savings behavior and economic inequality, with various schools of thought offering distinct perspectives on how savings influence growth trajectories and distributional outcomes. Neo-classical and demand-led or neo-Keynesian models recognize the critical role of savings in shaping economic development and inequality (Solow, 1956; Kaldor, 1957; Lewis, 1954; Pasinetti, 1962). The Solow (1956) model, a cornerstone of the neo-classical approach, highlights the importance of savings rates in driving long-term economic growth and convergence across countries. However, demand-led growth models suggest that increasing savings without considering the social structure can exacerbate income inequality within a country. Pasinetti (1962) argues that higher savings rates among the poor may disproportionately benefit the wealthy, worsening income inequality. Therefore, while increased savings are essential for economic growth, it is equally important to consider their impact on income distribution to ensure equitable growth (Pasinetti, 1962). The comparison of Solow's (1956) neo-classical model and Pasinetti's (1962) demand-led model provides valuable insights into the complex dynamics of savings behavior and economic inequality.

The theoretical motivation of this study stems from an integration of the class-based savings theory of Pasinetti (1962) with the long-run growth dynamics presented by Solow (1956). Pasinetti (1962) emphasizes the heterogeneity in savings behavior across different social classes, arguing that capital owners tend to save more while wage earners exhibit higher consumption tendencies. This class-based perspective suggests that differences in savings behaviors across social groups are critical in shaping economic inequality. On the other hand, Solow's (1956) model assumes a homogeneous savings impact across all countries, disregarding the differences in savings behaviors and their implications for inequality. While Pasinetti's (1962) analysis focuses on within-country inequality, this study extends his class-based approach to the global context by categorizing countries into distinct economic classes based on their consumption levels. In this adaptation, high-income countries function as capital owners, accumulating and reinvesting savings, while low-income countries function as wage earners, relying more on consumption. By applying Pasinetti's (1962) insights to the international level, this study provides a framework for understanding how differences in national savings behaviors contribute to global consumption inequality.

The impact of savings rates on inequality is not uniform; it varies depending on where these savings are concentrated and which economic class or country group is primarily responsible for the savings. In this context, the analysis presented here examines the differential effects of savings behaviors across distinct economic classes of countries. Specifically, this study investigates how the savings practices of high-income countries, which tend to have higher savings rates and more capital-intensive economies, contribute to consumption inequality compared to the savings behaviors of lower-income countries. By combining Pasinetti's (1962) insights on class-based savings with Solow's (1956) emphasis on long-term growth dynamics, this research offers a more nuanced

understanding of how global consumption inequality is influenced by country-specific savings patterns. This approach also addresses a critical gap in the existing literature by showing that global economic inequality cannot be fully understood through aggregate savings rates alone. Instead, it is essential to account for the heterogeneity in savings behaviors across different economic classes of countries, as these behaviors play a pivotal role in shaping global inequality dynamics.

The measure of inequality that best represents overall economic disparities remains a subject of academic debate, as studies suggest that differences between income inequality and consumption inequality may be driven by increasing savings gaps favoring high-income households. As Aguiar and Bils (2015) point out, if consumption inequality appears less severe than income inequality, this discrepancy is mainly due to higher savings rates among wealthier households, which can obscure the long-term effects of economic disparities if the gap between the two measures is overlooked. Therefore, it is essential to approach consumption-based inequality measures cautiously, as they may underestimate future disparities in living standards. However, noteworthy arguments in the literature highlight the importance of consumption inequality as a metric for understanding current living standards, particularly in cases where income and wealth data may fail to reflect everyday economic realities due to short-term fluctuations and the influence of policy changes. In contrast, consumption patterns are generally more stable over time, providing a more reliable indicator of household welfare (Johnson and Ship, 1991; Cutler and Katz, 1991; Krueger and Perri, 2006; Blundell and Preston, 1998; Slesnick, 1993). Furthermore, some scholars consider consumption inequality the final stage of economic inequality, capturing the combined effects of disparities in income, wealth, and resource access (Atkinson, 2015).

Before delving into the technical parts of the article, it is helpful to remind readers about the word inequality: This word is used throughout this article to express "economic inequality." However, this generalizing style should be approached cautiously because it is concerned in the literature that inequality is reduced to economic or even income inequality (Sen, 1999). This is why we work on the final stage, where inequality will manifest itself, namely consumption.

While poverty reduction has been a primary focus of global development policies, whether inequality or poverty should be the central concern remains a topic of debate in the literature. Feldstein (1999) argues that policies should focus on reducing poverty rather than addressing inequality, whereas Bourguignon (2004) emphasizes that reducing poverty requires tackling inequality, as the two issues are inherently linked. Similarly, Basu (2006) highlights that if there is a trade-off between reducing poverty and reducing inequality, absolute poverty should take precedence, even if it means tolerating a certain level of inequality. Despite these differences, these perspectives prioritize poverty reduction as the primary objective of development efforts.

Historical evidence shows that global poverty rates have declined significantly over the past two centuries. For instance, Angus Maddison's (1995) historical GDP estimates reveal that in 1820, approximately 84% of the global population lived in extreme poverty, which fell to 24% by 1992 (Bourguignon and Morrisson, 2002). Despite these gains in poverty reduction, consumption

disparities have proven far more resilient. As this study demonstrates, countries with low per capita consumption levels tend to remain in the same consumption class for decades, indicating the presence of a global caste system in consumption. This persistence of inequality raises critical questions about the underlying dynamics of economic development and the extent to which savings behavior can facilitate upward mobility in global consumption rankings.

Following Tümer (2019) and Kane (2016), Table 1 categorizes countries into five consumption groups based on their per capita consumption levels relative to the global average consumption ($\bar{c}_t$). These thresholds provide a framework for assessing global consumption inequality by illustrating which countries fall into high, middle, and low consumption categories over time:

Table 1: Consumption Group Classification by Threshold Levels

Consumption Group	Threshold Consumption Level
The Top Class	$2 * \bar{c}_t \leq X_{it}$
The Upper-Middle Class	$1.5 * \bar{c}_t \leq X_{it} < 2 * \bar{c}_t$
The Middle-Class	$\bar{c}_t \leq X_{it} < 1.5 * \bar{c}_t$
The Lower-Middle Class	$0.5 * \bar{c}_t \leq X_{it} < \bar{c}_t$
The Lowest Class	$X_{it} < 0.5 * \bar{c}_t$

Note: X_{it} represents the per capita real consumption level of the country *i* in year *t*, $\bar{c}_t$ denotes the average global consumption level for the same year.

To further explore the dynamics of global consumption inequality, this study analyzes annual shifts in population shares across different consumption groups between 1960 and 2019. Drawing on data from the Penn World Tables (PWT 10.01), the analysis tracks how countries have transitioned—or remained stagnant—within these consumption classes over time. The following figure illustrates these movement patterns, providing valuable insights into the persistence of global consumption disparities.

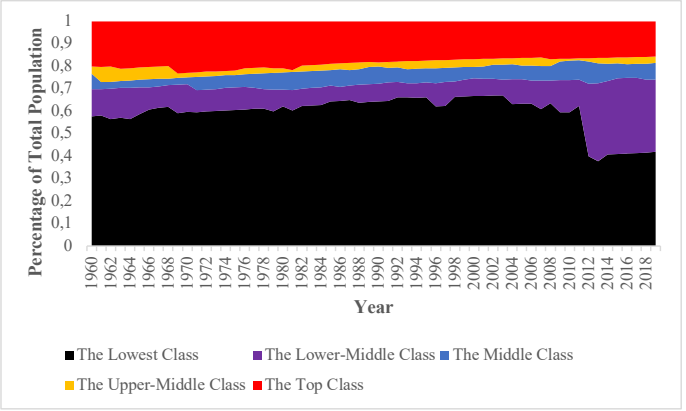

Figure 1: Global Population Distribution by Consumption Class (1960-2018)

Source: Penn World Table 10.01.

The construction of Figure 1 follows the approach outlined by Mankiw et al. (1992). Countries with a population of less than 1 million in 2019 were excluded from the Penn World Table (PWT) dataset, as were major oil-exporting countries. After these exclusions, countries with complete data across all variables were included in the analysis, resulting in a sample of 100 countries. [1]

Figure 1 illustrates the annual distribution of the global population across five consumption classes from 1960 to 2019, highlighting the persistence of global consumption inequality over time. The classes are categorized as the lowest, lower-middle, middle, upper-middle, and top class based on their per capita consumption relative to the global average. Throughout the period, much of the global population was concentrated in the lowest class (black area), indicating persistent consumption inequality. This group represents countries with less than half the global average per capita consumption. The size of this class remains relatively stable until the early 2000s, reflecting limited upward mobility for countries in this category. A notable decline in the size of the lowest class is observed starting from the early 2000s, particularly after 2012, when China transitioned into the lower-middle class category. This shift underscores the significant impact of China's economic growth on global consumption patterns. As one of the most populous countries in the world, China's upward movement reduced the global share of the lowest consumption class and expanded the lower-middle class (purple area). The lower-middle class (purple area) has gradually grown over time, especially after 2012, when China's economic advancement accelerated its transition from the lowest to the lower-middle class. The top class (red area), representing countries with per capita consumption at least double the global average, remains relatively stable throughout the period. This stability suggests that high-consumption countries consistently maintain their privileged position. The upper-middle class (yellow area) and middle class (blue area) show minimal fluctuations over time, indicating that countries in these classes tend to maintain their consumption levels without significant movement between classes. However, as noted in a previous study by the author, while these groups – the upper-middle and middle class – appear stable in the aggregate, they exhibit considerable internal mobility, with countries frequently shifting positions within their bands (Elcin, 2024). When China is excluded, a similar pattern can be observed in the lower-middle class (purple area), indicating that upward or downward mobility across broader consumption categories is rare, but internal mobility within these three classes is more common. As a result, Figure 1 reveals that global consumption inequality is persistent, with low-income countries struggling to ascend into higher consumption classes. The "global caste system" in consumption is evident, as high-consumption countries consistently retain their top position, while lower-consumption countries face significant barriers to upward mobility.

1 Countries with a population of less than 1 million that were excluded from the analysis are as follows: Anguilla, Antigua and Barbuda, Aruba, The Bahamas, Barbados, Belize, Bermuda, Bhutan, British Virgin Islands, Brunei Darussalam, Cabo Verde, Cayman Islands, Macau, Comoros, Curaçao, Cyprus, Djibouti, Dominica, Fiji, Grenada, Guyana, Iceland, Luxembourg, Maldives, Malta, Montenegro, Montserrat, Saint Kitts and Nevis, Saint Lucia, São Tomé and Príncipe, Seychelles, Sint Maarten, Saint Vincent and the Grenadines, Suriname, and Turks and Caicos Islands. *The excluded oil-exporting countries* are Bahrain, Gabon, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

As previously mentioned, this study builds on the theoretical insights of Solow (1956) and Pasinetti (1962) to explore how national savings behaviors influence global consumption inequality. While Solow's (1956) growth model highlights the importance of savings rates for long-term economic growth, Pasinetti's (1962) class-based perspective emphasizes that the distribution of savings across social groups matters for income distribution. Extending this framework to the country level, this study investigates how differences in national savings rates across high-income and lower-income (or developed and developing) countries shape persistent global consumption disparities.

As part of the theoretical framework, this study employs the general equilibrium model proposed by Gillman (2011), which models the macroeconomic process of converting savings into investment. The consumption function derived from this model is used to explore the relationship between savings behaviors and global consumption disparities. Following the approach of Jones and Vollrath (2013), who manipulated the steady-state output in the Solow-Swan model using the ratio of $\frac{y_i}{y_{US}}$, where y_i and y_{US} represent output per worker in the country i and the United States, respectively, this study applies a similar method to Gillman's (2011) consumption function. Instead of output, the ratio $\frac{c_t}{c_t^*}$ is used, where c_t represents the higher per capita consumption level in a benchmark country and c_t^* represents the per capita consumption level in another country with a lower per capita consumption level. This ratio captures consumption inequality across countries as c_t exceeds c_t^*, indicating disparities in consumption levels.

To empirically examine the relationship between national savings behaviors and global consumption inequality, this study utilizes an unbalanced panel dataset covering multiple countries from 1960 to 2019, primarily sourced from the Penn World Tables (PWT 10.01). The analysis focuses on how differences in savings rates across high-income and lower-income countries affect per capita consumption disparities, using the United States as a benchmark due to its historically high consumption levels. The key regression model employs the $\frac{c_{US}}{c_i}$ ratio, where c_{US} represents per capita consumption in the United States and c_i represents per capita consumption in the country i, as the dependent variable. The primary explanatory variables include gross capital formation (as a proxy for savings) and an interaction term between savings rates and a high-income dummy variable, with real GDP per capita and GDP share of government consumption included as control variables. This empirical framework allows the study to test the hypothesis that higher savings in wealthier countries contribute to persistent global consumption disparities.

The empirical analysis uses a high-income dummy variable based on the World Bank's income classification. Countries classified as high-income by the World Bank are assigned a value of 1, and all others are assigned 0. The sample includes 139 countries, excluding small countries (population below 1 million) and oil-exporting countries. Unlike the Figure 1 analysis, which uses a balanced dataset, the empirical analysis employs an unbalanced dataset to maximize observations. [2]

2 The classification used in Figure 1 differs from the high-income and low-income discrimination applied in the empirical analysis. The approach in Figure 1 enables the study to observe annual changes in consumption inequality

The findings highlight the heterogeneous impact of savings rates on global consumption inequality. The interaction term with the high-income dummy shows that while general savings rates reduce inequality, savings in high-income countries have the opposite effect, suggesting that capital accumulation in wealthier countries reinforces long-term consumption disparities.

The structure of this paper is as follows: Section 2 presents the theoretical framework, which provides the foundation for defining consumption inequality using the general equilibrium model of Gillman (2011) and the approach proposed by Jones and Vollrath (2013). This section describes how these theoretical insights were applied to Pasinetti's (1962) class-based savings approach to cross-country consumption inequality. Section 3 discusses the data, methodology, and empirical analysis, detailing the construction of the dataset and the regression model used to test the relationship between savings rates and consumption inequality. Finally, Section 4 provides the conclusion, summarizing the key findings and their implications for global consumption inequality.

2. Theoretical Framework

This section outlines the theoretical framework underpinning this study, focusing on the interplay between savings behavior and consumption inequality in a cross-country context. The analysis draws on the Solow (1956) and Pasinetti (1962) models to highlight how different savings patterns can shape income distribution and economic growth. Building on this foundation, the study adopts Gillman's (2011) general equilibrium model, combined with the approach of Jones and Vollrath (2013), to define consumption inequality. This framework provides a basis for understanding how savings rates across different income groups influence global consumption disparities.

The general equilibrium model proposed by Gillman (2011) incorporates a recursive utility function, which reflects the consumer's decision-making process regarding consumption, leisure, and savings. The unique aspect of Gillman's (2011) model is that individual consumers cannot directly save their income; instead, they must use a financial intermediary, such as a bank, to convert their savings into investments. The efficiency of this financial intermediary is crucial — any imperfections in the financial market can cause savings to be lost or partially transformed into investment, leading to inefficiencies in capital accumulation.

The recursive utility function is expressed as follows:

$$V(k_t^s) = \underset{c_t^d,\, x_t,\, l_t^s,\, k_{t+1}^s}{\text{Max}} \; u(c_t^d,\, x_t) + \beta V(k_{t+1}^s)$$

In above equation $V(k_t^s)$ describes the maximum utility that can be obtained given the state of capital investment at the time t. c_t^d represents the consumer's demand for consumption goods.

across income groups, which is not possible using the static World Bank classifications.

x_t denotes leisure, reflecting the consumer's choice between work and free time. l_t^s represents the labor supply to the financial intermediary and firm. β is the discount factor reflecting the weight given to future utility compared to current utility. It captures time preference, where higher values indicate greater importance for future utility. k_{t+1}^s describes the future state of capital investment.

The recursive utility function presented in its generic form captures the consumer's decision-making process regarding consumption, leisure, savings, and investment. In the logarithmic specification in equation (1), the utility function is transformed to account for the role of financial intermediaries and time allocation decisions. Unlike in traditional models, where consumers directly invest in capital, investment in this model takes the form of choosing d_{t+1}, which represents the new deposits made for the next period. Consumers receive a return on these deposits in the form of $d_t(1 + R_t^d)$, which includes both the principal and interest. The state variable, therefore, becomes d_t, representing the consumer's current deposits instead of k_t^s, the traditional capital stock. Additionally, consumers allocate time spent working in the bank l_{Ft}^s, reflecting the unique structure of this general equilibrium framework in which financial intermediaries play an active role in the economy.

$$V(d_t) = \underset{c_t^d,\, x_t,\, l_t^s,\, l_{Ft}^s,\, d_{t+1}}{\text{Max}} \ln c_t^d + \alpha \ln x_t + \beta V(d_{t+1}) \tag{1}$$

The utility function consists of three components, $\ln c_t^d$, $\alpha \ln x_t$ and $\beta V(d_{t+1})$ and representing the utility derived from consumption, leisure, and discounted future utility. The parameters and denote the relative weight of leisure in utility and – as stated earlier – the discount factor applied to future utility respectively.

To enhance the realism of the model, a government sector is introduced, imposing a tax on labor income, represented by $\tau_l (\tau_l \in [0,1])$. The government collects an amount of $\tau_l w_t (l_t^s + l_{Ft}^s)$ as revenue, where l_t^s represents the labor supplied to the firm and l_{Ft}^s denotes the labor supplied to the financial intermediary. The collected revenue is then used to provide public goods for the benefit of consumers, denoted by G_t. This can be expressed through the following equation:

$$G_t = \tau_l w_t (l_t^s + l_{Ft}^s)$$

The consumer's income consists of labor income and interest income from deposits, represented by $R_t^d d_t$. The amount reinvested in deposits, expressed as $d_{t+1} - d_t$, is subtracted from income to determine the net investment. The resulting budget constraint shows that consumption is equal to total income minus net investment and can be expressed as:

$$c_t = w_t(1 - \tau_l)(l_t^s + l_{Ft}^s) + R_t^d d_t + G_t - (d_{t+1} - d_t) \tag{2}$$

Consumers allocate their available time between working at the bank, working for the firm, and engaging in leisure activities.

$$l_t^s + l_{Ft}^s + x_t = 1$$

Based on these pieces of information, rearranging equation (2) yields the following equation.

$$c_t = w_t(1-\tau_l)(1- x_t) - d_{t+1} + G_t + d_t(1+R_t^d)$$

Using the above equation allows us to obtain the following recursive utility function:

$$V(d_t) = \underset{x_t}{\text{Max}} \ln[w_t(1-\tau_l)(1- x_t) - d_{t+1} + G_t + d_t(1+R_t^d)] + \alpha \ln x_t + \beta V(d_{t+1}) \quad (3)$$

The first-order conditions for leisure yields:

$$w_t = \frac{\alpha c_t}{x_t(1-\tau_l)} \quad (4)$$

The consumer earns wage income by maximizing utility with respect to leisure.

To further enhance the model's realism, the tax collection and redistribution assumption is relaxed by incorporating a voter-driven government policy framework, following the approach of Meltzer and Richard (1981) and Elgin et al. (2013). In this framework, the government collects taxes based on individuals' current wages and redistributes these funds based on the average wage level in the economy. Since the average income exceeds the median income in an unequal society, the decisive voter—whose preferences influence tax policy—seeks to maximize utility by supporting a tax rate that ensures redistributive benefits outweigh personal tax contributions. As a result, the consumption function for the decisive voter can be expressed as follows:

$$c_t^d = w_t^d(1-\tau_l)(1- x_t) - d_{t+1} + \tau_l \bar{w}_t(1- x_t) + d_t(1+R_t^d) \quad (5)$$

In an economy characterized by economic inequality (that is: $M = \frac{\bar{w}_t}{w_t^d}$ and, $M > 1$), the median/decisive individual will choose the tax rate that maximizes their utility, as the government, according to the assumption, cannot ignore the demands of those adversely affected by economic inequality.

Equation (5) can be rewritten in the following form:

$$c_t^d = (1- x_t)(w_t^d(1-\tau_l) + \tau_l \bar{w}_t) + d_t(R_t^d - g)$$

Where (economy's growth rate) is calculated as:

$$g = \frac{d_{t+1} - d_t}{d_t}$$

In equilibrium, the capital stock k_t equals the amount of the deposit d_t, this leads to the following equation:

$$k_t = d_t$$

From the consumer's intertemporal margin, we also have [3]:

$$R_t^d - g = \rho(1+g)$$

Therefore, the consumption demand can be expressed in a more familiar format as:

$$c_t^d = (1 - x_t)(w_t^d(1-\tau_l) + \tau_l \overline{w}_t) + \rho(1+g)k_t$$

And equation (4) implies that:

$$x_t = \frac{\alpha c_t^d}{w_t^d(1-\tau_l)}$$

After substituting x_t to the above consumption equation, the consumption function can be expressed by the following equation.

$$c_t^d = [w_t^d(1-\tau_l) + \tau_l \overline{w}_t + \rho(1+g)k_t]\left[\frac{w_t^d(1-\tau_l)}{w_t^d(1-\tau_l)(1+\alpha)+\alpha\tau_l\overline{w}_t}\right] \quad (6)$$

To define consumption inequality in a comparable manner across countries, let us assume that a country's per capita consumption level c_t exceeds another country's per capita consumption level $c_t{}^*$, indicating that the first country (with c_t) enjoys a higher standard of living than the second (with $c_t{}^*$). This inequality can be expressed through the ratio $\frac{c_t}{c_t{}^*}$ where a higher ratio indicates greater relative consumption. Similar to the approach of Jones and Vollrath (2013), this metric allows us to capture disparities in consumption levels across countries and over time.

Assuming that $c_t > c_t{}^*$, consumption inequality can be expressed by the following equation:

$$\frac{c_t}{c_t{}^*} = \frac{\frac{\left[w_t^d\left[(1-\tau_l)^2+\tau_l M(1-\tau_l)\right]+\rho k_t(1-\tau_l)\right]}{(1-\tau_l)(1+\alpha)+\alpha\tau_l M}}{\frac{\left[w_t^{d^*}\left[\left(1-\tau_l^*\right)^2+\tau_l{}^* M^*\left(1-\tau_l^*\right)\right]+\rho k_t^*\left(1-\tau_l^*\right)\right]}{\left(1-\tau_l^*\right)(1+\alpha)+\alpha\tau_l^* M^*}}$$

Letting $\frac{c_t}{c_t{}^*} = \hat{c}_t$, the following equation shows the consumption inequality across countries.

$$\hat{c}_t = \frac{\left[w_t^d[(1-\tau_l)^2+\tau_l M(1-\tau_l)]+\rho k_t(1-\tau_l)\right]}{\left[w_t^{d^*}\left[\left(1-\tau_l^*\right)^2+\tau_l{}^* M^*\left(1-\tau_l^*\right)\right]+\rho k_t^*\left(1-\tau_l^*\right)\right]}\frac{\left[\left(1-\tau_l^*\right)(1+\alpha)+\alpha\tau_l^* M^*\right]}{\left[(1-\tau_l)(1+\alpha)+\alpha\tau_l M\right]} \quad (7)$$

In equation (7), the parameters and variables marked with stars represent the country with lower consumption level that is $c_t{}^*$.Pasinetti's (1962) perspective can be applied to equation (7) to examine how the savings behaviors and capital accumulation patterns of countries in different income groups influence consumption inequality. [4] By deriving the first-order conditions of

3 This condition follows the Ramsey (1928) equilibrium condition for the case of zero growth, as outlined in Gillman (2011). ρ represents the subjective rate of discount ($\frac{1}{1+\rho} \equiv \beta$), and the full derivation of this condition is provided in Gillman (2011).

4 This adaptation allows the study to examine how different national savings rates influence global consumption

equation (7) with respect to k_t and k_t^*, it becomes possible to identify the differential effects of capital accumulation across country classes, highlighting that countries wi th varying savings rates contribute to consumption inequality in distinct ways.

$$\frac{\partial \hat{c}_t}{\partial k_t} = \frac{\rho(1-\tau_l)}{\left[w_t^{d^*}\left[(1-\tau_l^*)^2+\tau_l{}^* M^*(1-\tau_l^*)\right]+\rho k_t^*(1-\tau_l^*)\right]} \frac{\left[(1-\tau_l^*)(1+\alpha)+\alpha\tau_l^* M^*\right]}{\left[(1-\tau_l)(1+\alpha)+\alpha\tau_l M\right]} > 0 \quad (8)$$

$$\frac{\partial \hat{c}_t}{\partial k_t^*} = -\left[w_t^{d^*}[(1-\tau_l^*)^2+\tau_l{}^* M^*(1-\tau_l^*)]+\rho k_t^*(1-\tau_l^*)\right]^{-2}\rho(1-\tau_l^*)[w_t^d[(1-\tau_l)^2+\tau_l M(1-\tau_l)]+\rho k_t(1-\tau_l)]\frac{\left[(1-\tau_l^*)(1+\alpha)+\alpha\tau_l^* M^*\right]}{\left[(1-\tau_l)(1+\alpha)+\alpha\tau_l M\right]} < 0 \quad (9)$$

Inequality (8) implies that higher capital accumulation in wealthier countries widens consumption inequality. In contrast, inequality (9) shows that increased capital accumulation in poorer countries can help reduce consumption inequality across countries.

As previously discussed, Pasinetti (1962) argued that increased savings by lower-income groups would ultimately exacerbate inequality. However, the situation presented here does not fully align with Pasinetti's (1962) approach, as increased savings in poorer countries appear to reduce consumption inequality across countries. At first glance, this may suggest a policy recommendation that wealthier countries should reduce their savings rates while poorer countries should increase theirs. However, such a recommendation would be detached from economic realities and oversimplify the complexities of global inequality. Therefore, the validity or limitations of Pasinetti's (1962) argument will be discussed in greater detail after the empirical results are presented.

3. Data, Methodology, and Empirical Results

This section presents the data, methodology, and empirical results to examine the relationship between savings behavior and consumption inequality across countries. The analysis is based on unbalanced panel data from the Penn World Table (PWT) version 10.01, covering a wide range of countries from 1960 to 2019. As mentioned, the dataset comprises 139 countries, with small countries (populations under 1 million) and oil-exporting countries excluded from the analysis. [5] The methodology includes Pooled OLS, Fixed Effects (FE), and the Two-Step System Generalized Method of Moments (GMM)

inequality. In line with the Solow-Swan growth model, this study assumes that savings are transformed into investment, which in turn adds to the capital stock. While savings is a flow variable representing the portion of income not consumed within a period, capital *k* is a stock variable that accumulates over time through investment *i*. Following this framework, the Gillman (2011) model incorporates the role of savings in shaping consumption patterns, which is further explored in this study through the $\hat{c}_t$ ratio to understand how national savings behaviors influence global consumption disparities.

5 Refer to Footnote 2 for the list of excluded countries.

estimator to address endogeneity concerns and ensure robust and reliable results. The findings emphasize the differential impacts of savings rates in high-income and low-income countries on global consumption inequality, following the theoretical framework outlined in the previous section.

The theoretical framework presented in this study highlights the role of savings behavior and capital accumulation in shaping consumption inequality. Building on the work of Gillman (2011), the theoretical model suggests that savings decisions made by different economic agents can lead to diverging consumption patterns over time. The following empirical model translates these theoretical insights into an empirical framework by examining how savings rates and capital accumulation impact global consumption inequality.

$$\ln\left(\frac{C_{US}}{C_i}\right) = \alpha + \beta_1 \ln(K_i) + \beta_2 \ln(K_i).D_R + \beta_3 Z_i + \varepsilon_i \quad (10)$$

In particular, the theoretical model emphasizes that the marginal effect of savings on consumption inequality depends on the economic class or country group in question. This idea is captured in the empirical model through the inclusion of an interaction term between capital accumulation and a high-income dummy variable, allowing us to test whether savings behavior in high-income countries differs in its impact on consumption inequality.

$$D_r = \begin{cases} 1 \; if \; C_i = High \; Income \\ 0 \; if \; C_i \neq High \; Income \end{cases}$$

The empirical model used in this study examines the relationship between savings rates and consumption inequality across countries. The dependent variable, $\ln\left(\frac{C_{US}}{C_i}\right)$, represents the log of the ratio between per capita consumption in a benchmark country and per capita consumption in the country. The key explanatory variable is $\ln(K_i)$, which measures the capital accumulation in the country. The term D_R is a dummy variable that takes 1 for high-income countries and 0 otherwise. The interaction term $\ln(K_i).D_R$ captures the differential impact of savings rates on consumption inequality between high-income and non-high-income countries. Additionally, Z_i represents a set of control variables while ε_i is the error term.

Table 2 presents a detailed description of the variables used in the empirical analysis, including their definitions, transformations, and data sources. The primary focus of this study is to investigate the relationship between savings behavior and global consumption inequality, using a dynamic panel data model estimated through the Two-Step System GMM approach. The variables in the table are carefully selected to capture key theoretical insights from the consumption function discussed in the theoretical framework.

Table 2: Description of Variables and Data Sources Used in the Empirical Analysis

Variable Name		Description	Source
Dependent Variable			

Consumption Inequality	*ln (CI)*	Consumption inequality is measured as the ratio of per capita consumption in the U.S. to per capita consumption in country *i*, and the natural logarithm of this ratio is then calculated.	PWT 10.01
Independent Variables			
Natural Log of Savings Rate	*ln (SR)*	Natural logarithm of the share of Gross Capital Formation (GCF) in GDP at current PPPs.	PWT 10.01
Savings Rate (High-Income Dummy Interaction)	*ln (SR).*D_r	The interaction term between the natural logarithm of GCF and a dummy variable D_r that equals 1 for high-income countries, capturing how savings behavior differs between high-income countries and other countries.	PWT 10.01
Natural Log of Real GDP per Capita	*ln (GDPpc)*	The natural logarithm of real GDP per capita is adjusted for purchasing power parity (PPP). This variable reflects the standard of living in each country.	PWT 10.01
Natural Log of Government's Share	*ln (GS)*	The natural logarithm of the government's share of GDP reflects the total output allocated to government consumption expenditures, including public services, infrastructure, and welfare programs.	PWT 10.01
Instrumental Variables			
Natural Log of Latitude	*ln(L)*	Latitude is a geographic variable that measures a country's distance from the equator.	DSPL*
British Legal Origin Dummies	*LO*	British legal origin dummy variable indicates whether a country's legal system is based on British common law traditions. It takes 1 for countries with a British legal origin and 0 otherwise.	LaPorta et al. (1999)

Note*: The DataSet Publishing Language (DSPL) is a format for structuring data and metadata for interactive visualizations.

Consumption inequality as a key metric in this study follows the existing literature highlighting its importance in assessing long-term well-being (Krueger and Perri, 2006; Meyer and Sullivan, 2013; Attanasio and Pistaferri, 2016). In the theoretical framework, consumption inequality was defined through the $\frac{c_t}{c_t^*}$. In the empirical analysis, the U.S. per capita consumption level is used as the benchmark, a choice that aligns with the approach taken by Jones and Vollrath (2013). The U.S. has consistently ranked among the top two countries in per capita consumption from 1960 to 2019. Therefore, $\frac{c_{US}}{c_i}$ is used as a proxy for consumption inequality in the empirical analysis to capture cross-country disparities in living standards.

In this study, gross capital formation (GCF) is used as a proxy for savings behavior, a common approach in the literature where GCF is often used as a substitute for investment (Rao, 1980; Akinola and Omodale, 2013). The interaction term between GCF and the high-income dummy is based on Pasinetti's (1962) class-based savings theory, which suggests that savings behavior differs across income groups. Previous studies have shown that wealthier economic agents – whether individuals or countries – tend to have higher savings rates, driven by differences in income levels and wealth accumulation (Carroll, 2000; Deaton, 1999; Fisher et al., 2020). This study investigates whether such differences in savings behavior contribute to consumption inequality across countries.

Real GDP per capita is included to account for economic differences across countries, a control variable widely used in growth and inequality studies (Hall and Jones, 1999; Mankiw et al., 1992;

Barro, 1991). This variable reflects the overall development level of a country and is essential for understanding disparities in consumption levels. The share of government consumption in GDP captures the redistributive role of government policies, which has been shown to influence inequality across countries (Alesina and Rodrik, 1994; Acemoglu et al., 2019). Government consumption can reduce inequality through public services and welfare programs.

Latitude is included as a proxy for geographic and climatic differences that influence economic development. Previous studies have shown that latitude correlates with institutional quality and historical development paths (Acemoglu et al., 2002). Furthermore, Jauch and Watzka (2016) use latitude as an instrumental variable for financial development while estimating the financial Kuznets curve. Finally, legal origin is included to account for institutional differences across countries. It has been used as an instrumental variable in various studies to capture the impact of historical legal traditions on economic outcomes. For example, Elgin et al. (2013) use legal origin as an instrument for religiosity in their analysis of the informal economy.

Before delving into the core analysis, the descriptive statistics and correlation matrix are presented to provide a foundational understanding of the key variables, distributions, and relationships. Table 3 presents the descriptive statistics of the key variables used in the empirical analysis. The table shows the number of observations, mean values, standard deviations, and the minimum and maximum values for each variable.

Table 3: Descriptive Statistics of Key Variables

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
C_{us}/C_i	7,509	11.66	14.07	0.84	203.72
GCF*	7,509	0.20	0.10	0.01	0.95
Real GDP pc	7,509	10608.35	12752.32	244.6	102354
Gov. Share	7,509	0.19	0.10	0.01	0.82
Latitude	8,335	20.25	25.35	-40.9	61.92

Note*: Five observations with negative or zero values in the gross capital formation (GCF) variable were excluded to facilitate the logarithmic transformation applied in the regression analysis.

Including summary statistics provides a general overview of the distribution and variability of the variables used in the regression models. Given the necessity of transforming some variables into their natural logarithmic form, special attention was paid to ensuring that all variables used in the analysis meet the requirements for such transformations. As noted, negative or zero values in the gross capital formation variable (GCF) were excluded from the sample to ensure accurate logarithmic calculations.

Table 4: Pairwise Correlation Matrix of Variables Used in the Empirical Analysis

	C_{us}/C_i	GCF	Real GDP pc	Gov. Share	Latitude	Legal O. D.
C_{us}/C_i	1					
GCF	-0.28***	1				

Real GDP pc	-0.45***	0.39***	1			
Gov. Share	-0.06***	-0.13***	-0.08***	1		
Latitude	-0.27***	0.22***	0.40***	0.12***	1	
Legal O. D.	0.02*	0.04***	0.02*	-0.14***	-0.32***	1

Note: The correlation coefficients are shown with significance levels indicated by stars. ***, **, and * indicate that the coefficient is significant at 1%, 5%, and 10%, respectively.

The correlation matrix reveals notable relationships between the dependent variable, C_{us}/C_i, and key independent variables. Gross capital formation (GCF) shows a negative correlation with consumption inequality, suggesting that savings behavior may reduce disparities across countries. However, the correlation matrix does not account for differences across country groups. This concern will be further investigated by including the interaction term in the upcoming regression analysis. Additionally, real GDP per capita shows a negative correlation, supporting the expectation that wealthier countries experience lower consumption inequality. Government share in GDP and latitude display negative correlations with consumption inequality, aligning with theories that associate institutional and geographic factors with inequality. The correlation coefficient between British legal origin and consumption inequality is significant. This positive but weak correlation suggests that countries with British legal origins tend to have slightly higher cross-country consumption inequality compared to countries with other legal systems.

Table 5: Regression Results

Dependent Variable: Consumption Inequality (*ln (CI)*)							
	POLS	POLS	POLS	FE	FE	FE	GMM
L. ln (CI)							0.999***
							(0.044)
ln (SR)	-0.814***	-0.467***	0.040***	-0.049	-0.034	0.018	-0.062**
	(0.019)	(0.016)	(0.010)	(0.042)	(0.045)	(0.023)	(0.031)
ln (SR). Dr		1.011***	0.113***		-0.171	-0.038	0.102*
		(0.014)	(0.010)		(0.105)	(0.044)	(0.054)
ln (GDPpc)			-0.859***			-0.628***	-0.006
			(0.007)			(0.040)	(0.030)
ln (GS)			-0.014			-0.020	-0.010
			(0.011)			(0.033)	(0.050)
Constant	0.174*	1.305***	8.732***	1.704***	1.660***	7.581***	
	(0.093)	(0.084)	(0.081)	(0.084)	(0.083)	(0.357)	
Obs.	7,509	7,509	7,509	7,509	7,509	7,509	5,485
R-squared	0.20	0.53	0.87	0.10	0.10	0.66	
Sargan							0.78
AB AR(1)							0.00
AB AR(2)							0.21

p values				
# of Countries	139	139	139	108

Notes: ***, **, and * indicate that the coefficient is significant at 1%, 5%, and 10%, respectively. Standard errors in parentheses. All estimations with time dummies and robust standard errors. Values in parentheses indicate standard errors.

The regression results highlight the complex relationship between savings behavior and consumption inequality across countries. The Pooled OLS models reveal substantial findings. In the first and second Pooled OLS models, savings rates *ln (SR)* alone appear negatively correlated with consumption inequality. However, in the second model when the interaction term *ln (SR).* D_r is included, and the combined marginal effect becomes positive, indicating that higher savings rates increase inequality across countries. In the third Pooled OLS model, both *ln (SR)* and the interaction term *ln (SR).*D_r are positive and significant, suggesting savings behavior reinforces consumption disparities rather than reducing them. In the Fixed Effects (FE) models, only *ln (GDPpc)* is statistically significant in the third model, showing a negative coefficient that suggests economic growth reduces consumption inequality. Other variables, including savings rates and their interaction term, are insignificant in the Fixed Effects models. The Two-Step System GMM model addresses endogeneity concerns and shows that the savings variables remain significant, whereas the control variables become insignificant. While one might interpret this as evidence that higher savings reduce inequality, this would ignore the heterogeneity across different economic classes like the second Pooled OLS model. The findings demonstrate that the effect of savings on consumption inequality varies significantly by country group, underscoring the importance of accounting for class-based differences in savings behavior, as emphasized in Pasinetti's (1962) theory. Overall, the results suggest that increasing savings rates without considering the economic class of countries can exacerbate consumption inequality across the globe.

It is necessary to assess the share of government consumption in GDP separately. Despite its lack of statistical significance in the models, its inclusion is warranted by the theoretical framework. The inclusion of the government in the theoretical model enhances its realism. Given that the theoretical model serves as the foundation for the empirical analysis, excluding the government from the empirical model would be unjustifiable.

4. Conclusion

This study builds upon insights from earlier research, where we explore the role of savings in explaining cross-country consumption dynamics (Elcin, 2024). Inspired by Chang's (2002) argument that a one-size-fits-all growth strategy is unsuitable for all nations, this study delves deeper into how savings behaviors impact global consumption inequality, particularly across countries with varying economic statuses. While Solow's (1956) model highlights the importance of savings in explaining economic disparities, my earlier work demonstrated that savings also play a crucial role in shaping consumption disparities. Integrating Pasinetti's (1962) class-based perspective further

underscores the necessity of considering heterogeneity in economic agents' behaviors. By bridging these theoretical insights, this study emphasizes the importance of tailoring economic strategies to account for the diverse savings behaviors of different country groups.

This study contributes to the literature by extending Pasinetti's (1962) class-based perspective on inequality to the context of cross-country consumption disparities. Pasinetti's (1962) approach, which assumes heterogeneity in individual savings behaviors within a country, is here adapted to analyze how heterogeneity in national savings behaviors affects global consumption inequality. Although the presented theoretical model and the empirical findings do not explicitly confirm Pasinetti's (1962) theoretical argument that savings by disadvantaged individuals increase inequality, his emphasis on distinguishing the effects of savings across different income groups remains highly relevant. The study underscores the importance of considering how savings behavior varies across economic classes and its implications for inequality dynamics. Applying this framework to countries instead of individuals demonstrates that assuming uniform savings behavior across nations is as unrealistic as expecting homogeneity in savings behaviors within a single country. The classification method used in Figure 1 plays a critical role in this adaptation. One striking observation from the calculations is that, between 1960 and 2019, countries in the top class exhibited an average GCF (a proxy for savings) of 0.28, while this figure was only 0.16 for the lowest-class countries. This gap in savings behaviors lays the foundation for analysis and highlights that policies aimed at reducing consumption inequality cannot rely on a 'one-size-fits-all' approach. Because increasing savings in lower-income countries may reduce global consumption inequality, the same cannot be said for wealthier countries, where higher savings exacerbate consumption disparities. The theoretical approach and the empirical findings confirm this divergence. The interaction term in the dynamic regression model shows that savings increases in wealthy countries have a statistically significant positive impact on consumption inequality, reinforcing existing disparities. This raises the critical question of whether savings should be discouraged in affluent nations. As the literature suggests, however, higher marginal propensities to save among the wealthy are well-documented (Carroll, 2000; Deaton, 1999; Alvarez and Vilalta, 2018; Fisher et al., 2020). While expecting wealthy nations to curb their savings is impractical, our findings suggest that global consumption inequality is likely to persist as long as savings behavior remains concentrated among these countries.

In formulating economic policies, ignoring the heterogeneity of economic agents and nations can lead to misguided outcomes. Each country possesses unique historical, cultural, and geographical contexts, and this diversity extends to economic agents and institutions. For instance, expecting a fish to climb a tree is as unrealistic as expecting a country or an individual to conform to a standard economic model without considering their unique circumstances. Therefore, economic policies must be flexible and context-specific, taking into account the heterogeneity of agents. Policies sensitive to differences can enhance the sustainability of economic growth and reduce inequalities. In this regard, the discipline of economics must adopt more inclusive approaches, placing heterogeneity at the core of both theoretical frameworks and practical applications.

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