

# GENDER-DIFFERENTIATED EFFECTS ON ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM A GLOBAL PERSPECTIVE (2010–2022)

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## ABSTRACT

This study examines the macroeconomic implications of gender inequality from a Kaleckian perspective, emphasizing how structural gender disparities in labor markets constrain economic growth. To empirically test this hypothesis, an international analysis was conducted using panel data from 60 countries between 2010 and 2022, drawing on data from WID, the World Bank, UNDP, and the ILO. The effects of socioeconomic, demographic, occupational, and political-representative characteristics on per capita income were estimated using different panel data models. The results indicate that although some structural variables affect income similarly across genders, their magnitudes vary. Time dedicated to unpaid domestic and care work is statistically significant only for women, highlighting its macroeconomic relevance. By empirically demonstrating the macroeconomic effects of gender disparities, the study argues that addressing them is not only a matter of social justice, but also a necessary condition for expanding aggregate demand and fostering economic growth—thus essential for inclusive and sustainable development.

Keywords: Gender inequality; Economic growth; Kalecki; Panel data

## 1. INTRODUCTION

The global economic slowdown since the 1970s and the sharp increase in income and welfare inequality—especially after the 1980s, both within and between countries—have sparked interest in understanding how income distribution affects macroeconomic outcomes. Kalecki (1954) developed a theoretical framework in which income distribution between profits and wages is a central element influencing investment spending, aggregate demand, and long-term growth. Building on this seminal work, a later generation of researchers expanded both theoretically and empirically Kalecki's contributions (BHADURI; MARGLIN, 1990; DUTT, 1984; ROWTHORN, 1981).

A recently developed strand that explores inequality—not by class, but segmented by gender—is the post-Kaleckian feminist structuralist models. These models differentiate labor supply and demand patterns, and consequently income levels, from a gender perspective (ONARAN; OYVAT; FOTOPOULOU, 2022; SEGUINO, 2010, 2012). While traditional Kaleckian models focus on the relationship between income distribution and macroeconomic outcomes, gender-structured models consider labor supply and demand patterns differentiated by gender (SEGUINO; GROWN, 2006).

One of the main justifications for this segmented analysis is the fact that women dedicate a considerable number of hours to unpaid care work (ILO, 2022; HUEPE, 2023), implying a significant reduction in female productive potential. Moreover, several other factors limit women's participation in remunerated activities and/or result in lower wages compared to men.

These include concentration in low-paying occupations and informal employment, underrepresentation in public policy design, and socially entrenched issues such as violence in its various forms against women. This last aspect, especially when occurring in the workplace, acts as an additional disincentive for women's labor force participation (ILO, 2024). Beyond these observable and clearly characteristic factors, there are also hidden traits related to gender-based discriminatory biases (URQUIDI; CHALUP, 2023).

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This article investigates the macroeconomic implications of gender inequality from a Kaleckian perspective, emphasizing how structural gender imbalances in labor markets restrict, via the distributive dimension, effective demand and, consequently, economic growth. The central question is: how do gender disparities in labor market participation and unpaid care work affect economic performance across countries? Based on the Kaleckian theoretical framework that income distribution between wages and profits influences demand and growth, we incorporate gender as a central distributive dimension. Drawing on recent feminist macroeconomic models (ONARAN ET AL., 2022), we hypothesize that reducing gender inequality—especially in labor market participation and unpaid care responsibilities—stimulates effective demand, particularly in wage-led models, by better mobilizing productive capacity, given that women face structural barriers such as the burden of unpaid care, concentration in low-paying jobs, informal employment, and low political representation.

To empirically test this hypothesis, we constructed a panel dataset of 60 countries from 2010 to 2022, using data from the World Inequality Database (WID), World Bank, United Nations Development Programme (UNDP), and International Labour Organization (ILO). The dataset includes variables capturing income distribution, inflation, exchange rates, education, life expectancy, demographic structure, labor force participation, hours worked, time spent on unpaid care work, and women's political representation. We estimated the effects of these variables on per capita GDP using different panel data models (pooled model, fixed effects, random effects, and first differences) to ensure robustness.

The paper is structured into two main sections, in addition to this introduction and the conclusion. The first section presents current discussions on growth and gender inequality at the international level, highlighting how this agenda fits at the frontier of knowledge. It also explores the Kaleckian literature with a gender focus, underscoring the relevance of the topic and the gap this research seeks to fill. The second section develops the empirical analysis, presenting the data, methodology, and main results. The aim is to measure the differential effects of gender inequality on economic growth at the international scale.

## **2. GROWTH AND GENDER INEQUALITY**

### **2.1. The Kaleckian Gender Literature: Theory and Evidence**

Building on the previous discussion, there is a broad interest in understanding how distribution affects macroeconomic outcomes. One of the factors driving this investigation is the global economic slowdown since the 1970s and the sharp increase in income and welfare inequality, both within and between countries. Beyond concerns with the social implications of inequality, this research agenda is motivated by the need to understand the systemic effects of stratification on the economy as a whole (SEGUINO, 2010).

More recently, this literature emphasizes the degree of gender inequality as a relevant distributive variable. This body of work constitutes an emerging subfield of macroeconomics dedicated to investigating the interrelationships between short-term macroeconomic outcomes, gender inequality, development, and economic growth.

Seguino (2012) incorporates the public sector and the effects of public investment in physical and social infrastructure on private investment. Seguino (2010, 2012) presents both short- and long-term analyses that incorporate endogenous technological change, including the effects of gender equality, demand, and public spending on productivity.

Braunstein, van Staveren, and Tavani (2011), in turn, add the effects of unpaid labor and care work as gendered inputs in market production, though they do not explicitly model the public sector or endogenous technological changes, even though the effects of care inputs on productivity are discussed implicitly. While Seguino (2012) and Braunstein, van Staveren, and Tavani (2011) focus on closed economies, Seguino (2010) details the effects of gender equality on the balance of payments.

To illustrate the empirical application of gender inequality on macroeconomic outcomes, studies focusing on developed countries were conducted by Onaran, Oyvat, and Fotopoulou (2019) and Oyvat and Onaran (2020), which provide econometric estimates for the United Kingdom and South Korea, respectively.

These authors identify positive effects of public social infrastructure investments on output and

employment—for both women and men—in the short and long term. It is worth noting that the impacts on female employment are significantly stronger than those on male employment. Moreover, the implementation of policies involving the hiring of more professionals such as early childhood educators, caregivers, nurses, and teachers, along with increased public sector wages, results in advances in gender equality, job creation for both sexes, and productivity growth.

### 2.1.1. The Onaran, Oyvatt, and Fotopoulou Model

Among Kaleckian feminist theoretical models, Onaran, Oyvatt, and Fotopoulou (2022) analyzed the fiscal and labor market effects on output, productivity, employment, and the public sector budget balance.

This model builds on the contributions of Braunstein, van Staveren, and Tavani (2011) and Seguino (2010, 2012) in the field of Kaleckian macroeconomics with a gender perspective. Its objective is to support empirical analyses of gendered macroeconomic policies in developing countries, while also expanding the concept of development to include gender equity as a central element.

The components of aggregate demand are determined by behavioral equations. Wages result from a bargaining process between employers and workers. From a feminist political economy approach, the gender wage gap is determined by the relative bargaining power of men and women vis-à-vis capital, which is exogenously determined.

Furthermore, social norms may reduce the likelihood of women completing secondary and/or higher education in many countries, creating a systemic disadvantage in the labor market. These norms also lead women to assume a larger share of unpaid care work, reducing their labor force participation and contributing to involuntary unemployment.

The model is developed with two types of workers: women ( $F$ ) and men ( $M$ ). It explicitly models paid employment for men and women in different sectors, rather than considering only aggregate output. Employment (in hours) is determined by output in different sectors and labor productivity, which changes endogenously. Demand influences output in both the short and long term, as the model is based on realistic structural characteristics of a capitalist market economy operating with idle capacity and involuntary unemployment.

In addition, it considers gender dynamics in the labor market, including the sectoral composition of employment, occupational segregation, institutions, and social norms that influence gendered consumption patterns and the distribution of unpaid domestic work. These structural characteristics directly affect output, productivity, and employment. In particular, unpaid care work plays a significant role by positively impacting long-term labor productivity, which in turn influences long-term output.

Profits are earned by capitalists, who are assumed to be gender-neutral for simplicity. The model comprises three sectors: the public social sector—government spending on education, childcare, health, and social assistance ( $H$ ); the rest of the economy ( $N$ ); and the unpaid care sector, defined as investment in social infrastructure. Additionally, household spending on marketized social services is included. Both public social spending and household spending have short-term demand effects and influence long-term labor productivity.

The theoretical analysis evaluates the effects of these different factors on GDP, productivity (GDP per worker), and male and female employment in both the short and long term. In particular, it examines the impacts of fiscal policies, emphasizing public spending on social infrastructure and reducing gender wage disparities, especially in the social sector, which tends to be female-dominated.

Based on this theoretical framework, the model also examines the effects of different trajectories for reducing gender wage inequalities, including the process of upward wage convergence—that is, wage increases for men and women, with faster growth for women. Moreover, it analyzes the impacts of other types of fiscal spending and taxation on labor and capital income.

The foundation of the model is given by the following set of equations. Aggregate output ( $Y_t$ ) results from the sum of the wage bill of men ( $WB_t^M$ ), women ( $WB_t^F$ ), and profits ( $R_t$ ):

$$Y_t = WB_t^M + WB_t^F + R_t \quad 1$$

The total wage bill for female workers ( $WB_t^F$ ) is a function of female wages in the social sector ( $w_t^{HF}$ ), female employment in the social sector ( $E_t^{HF}$ ), female wages in the rest of the economy ( $w_t^{NF}$ ), and female employment in the rest of the economy ( $E_t^{NF}$ ):

$$WB_t^F = w_t^{HF} E_t^{HF} + w_t^{NF} E_t^{NF} \quad 2$$

Similarly, the total wage bill for male workers ( $WB_t^M$ ) is a function of male wages in the social sector ( $w_t^{HM}$ ), male employment in the social sector ( $E_t^{HM}$ ), male wages in the rest of the economy ( $w_t^{NM}$ ), and male employment in the rest of the economy ( $E_t^{NM}$ ):

$$WB_t^M = w_t^{HM} E_t^{HM} + w_t^{NM} E_t^{NM} \quad 3$$

Empirically, Onaran, Oyvat, and Fotopoulou (2022) show that average hourly wages for men, both in the social sector and in the rest of the economy, are higher than the average hourly wages for women in most developing economies. There is also significant occupational/sectoral segregation, with women constituting the majority in the social sector and being substantially underrepresented in the rest of the economy.

The gender wage gaps ( $\alpha_t$ ) in the respective sectors are defined as:

$$\alpha_t^N = \frac{w_t^{NM}}{w_t^{NF}}, \alpha_t^H = \frac{w_t^{HM}}{w_t^{HF}} \quad 4$$

Aggregate output can also be represented as a function of household social expenditures ( $C_t^H$ ), consumption in the rest of the economy ( $C_t^N$ ), private investment ( $I_t$ ), government spending on social infrastructure ( $G_t^H$ ), government consumption ( $G_t^C$ ), public investments other than those in the social sector ( $I_t^G$ ), exports ( $X_t$ ), and imports ( $M_t$ ) of goods and services:

$$Y_t = C_t^N + C_t^H + I_t + G_t^H + G_t^C + I_t^G + X_t - M_t \quad 5$$

Public social expenditures, in turn, are a fiscal policy decision allocated as a share of aggregate output ( $\kappa_t^H$ ) and constitute the output of the public social sector ( $Y_t^H$ ). The remaining part of GDP is the market output in the rest of the economy ( $Y_t^N$ ):

$$Y_t^H = G_t^H = \kappa_t^H Y_t \quad 6$$

$$Y_t^N = Y_t - G_t^H = Y_t(1 - \kappa_t^H) \quad 7$$

Government consumption ( $G_t^C$ ) and public investments other than those in social infrastructure ( $I_t^G$ ) are also determined by the government as a share of aggregate output:

$$G_t^C = \kappa_t^C Y_t \quad 8$$

$$I_t^G = \kappa_t^G Y_t \quad 9$$

Employment in sector  $N$  is given by output divided by labor productivity ( $T_t^N$ ) in  $N$ :

$$E_t^N = \frac{Y_t^N}{T_t^N} = \frac{Y_t(1 - \kappa_t^H)}{T_t^N} \quad 10$$

The share of female employment in sector  $N$  is exogenous, institutionally and socially determined by occupational segregation, and is denoted by  $\beta_t^N$ . Male workers in  $N$  constitute  $(1 - \beta_t^N)$  of the sector:

$$E_t^{NF} = \frac{Y_t(1 - \kappa_t^H)}{T_t^N} \beta_t^N = \frac{Y_t^N}{T_t^N} \beta_t^N \quad 11$$

$$E_t^{NM} = \frac{Y_t(1 - \kappa_t^H)}{T_t^N} (1 - \beta_t^N) = \frac{Y_t^N}{T_t^N} (1 - \beta_t^N) \quad 12$$

It is assumed that public social spending consists of payments to workers (men and women) in the social sector, considering that this social sector does not generate profits. Any non-labor inputs used are considered part of government consumption ( $G^C$ ). Public social spending can be expressed as a function of employment ( $E_t^H$ ), average female wages ( $w_t^{HF}$ ), average male wages ( $w_t^{HM}$ ), the share of female employment ( $\beta_t^H$ ), and the share of male employment ( $1 - \beta_t^H$ ) in the social sector.

$$G_t^H = \kappa_t^H Y_t = \beta_t^H E_t^H w_t^{HF} + (1 - \beta_t^H) E_t^H w_t^{HM} \quad 13$$

Using equations 12 and 13, the total employment, female employment, and male employment in the social sector can be expressed as a function of public social expenditures and female wages in the social sector.

$$E_t^H = \frac{G_t^H}{w_t^{HF}(\beta_t^H + \alpha_t^H - \beta_t^H \alpha_t^H)} \quad 14$$

$$E_t^{HF} = \frac{\beta_t^H \kappa_t^H Y_t}{w_t^{HF}(\beta_t^H + \alpha_t^H - \beta_t^H \alpha_t^H)}, \quad E_t^{HM} = \frac{(1 - \beta_t^H) \kappa_t^H Y_t}{w_t^{HF}(\beta_t^H + \alpha_t^H - \beta_t^H \alpha_t^H)} \quad 15a, b$$

Empirically, it is observed that the share of female workers in  $H$  is higher than the share of female workers in  $N$  for all countries analyzed. Therefore, increasing the share of  $H$  in aggregate output would also increase the share of female workers in total employment in most cases.

Modeling household unpaid work for a given demographic structure that defines a society's care needs, higher paid employment for men and women is expected to have some negative impact on the supply of unpaid work, as it would reduce the time available for care. Additionally, higher government spending in  $H$  is expected to reduce the need for domestic care, thereby decreasing unpaid work.

Finally, profits ( $R$ ) in  $N$  are defined. Profits are earned by capitalists, representing the income in  $N$  after wage payments.

$$R_t = Y_t^N - w_t^{NF} E_t^{NF} - w_t^{NM} E_t^{NM} \quad 16$$

The profit share in  $N$  is the share of profits in output in  $N$ . Therefore, the profit share can also be expressed as a function of female wages and labor productivity in  $N$ :

$$\pi_t = \frac{Y_t^N - w_t^{NF} E_t^{NF} - w_t^{NM} E_t^{NM}}{Y_t^N} \quad 17$$

The considerations of the model are particularly relevant in the context of developing countries, characterized by largely informal economies, high gender wage and employment inequalities, low female labor force participation, and high occupational segregation.

Important policy implications regarding gender gaps arise from this analysis. First, in the realm of fiscal policy, public investment in social infrastructure is expected to reduce women's unpaid domestic work while increasing their labor market participation, enabling them to dedicate more time to paid employment.

Furthermore, if the short – and long – term multipliers and productivity effects of public investment in social infrastructure are more pronounced than those of public investment in physical infrastructure (considering that social infrastructure is labor-intensive, oriented toward domestic demand, and subject to occupational segregation), such investment is expected to generate significant increases in female employment. Moreover, it may create a substantial number of jobs for men in various sectors of the economy due to the indirect demand effects of the social sector on the rest of the economy. In this way, this policy also contributes to reducing gender disparities in employment. That is, since the social sector ( $H$ ) is more labor-intensive than the rest of the economy ( $N$ ), the impact of a wage increase in  $H$  on output should be substantially greater.

Finally, it is possible to evaluate scenarios combining different policies, integrating the impact of increased public spending and wages. The latter is particularly relevant in the long term in a wage-led economy, where employment in  $N$  may decrease despite output growth if productivity effects outweigh

production effects. In this case, fiscal spending can ensure that growth driven by equality is accompanied by employment expansion for both women and men.

Overall, the model allows for empirical analysis of a specific economy and the formulation of policies for equitable gender development, taking into account the behavioral parameters of aggregate demand components and the structural characteristics of the economy.

### 3. DIFFERENTIAL GENDER EFFECTS ON ECONOMIC GROWTH: AN INTERNATIONAL PERSPECTIVE

Following a review of the theoretical contributions on the relationship between gender inequality and economic growth – with particular emphasis on feminist Kaleckian models that endogenize the effects of gender disparities on aggregate demand – we now turn to the empirical examination of this association. Specifically, we aim to investigate whether, from an international perspective, gender inequalities in the labor market, time allocation, and political representation influence countries' per capita income levels over time.

Although the theoretical model proposed by Onaran, Oyvat, and Fotopoulou (2022) is structurally formulated around the interaction between gender inequalities, productive structure, and aggregate demand, testable hypotheses can be derived from its core mechanisms. The empirical analysis therefore seeks to evaluate whether gender inequalities—particularly in the labor market and unpaid work—are associated with lower levels of economic development, as measured by per capita income.

To this end, a fixed-effects panel data model is estimated, in which per capita income ( $Y_{it}$ ) is the dependent variable, explained by a set of gender inequality indicators and macroeconomic and demographic control variables. The basic specification of the model is:

$$Y_{it} = \alpha + \beta_1 GENDER_{it} + \beta_2 X_{it} + \mu_{it} + \varepsilon_{it}$$

Where: (i)  $GENDER_{it}$  is the vector of variables related to gender inequalities, such as inactivity rate, average time devoted to unpaid domestic and care work, female parliamentary representation, average hours worked, and occupational structure by skill level; (ii)  $X_{it}$  is the vector of control variables, including the income share of the bottom 50% and top 1%, inflation, exchange rate, average education, life expectancy at birth, total population, and the proportion of the population aged 0–14 and 65 or older; (iii)  $\mu_{it}$  are country-specific fixed effects, controlling for unobserved characteristics that are constant over time; and (iv)  $\varepsilon_{it}$  is the idiosyncratic error term.

#### 3.1. Data

This study aims to understand the influence of gender inequality on per capita income in a sample of countries over time, based on data from international sources. A panel was constructed with 60 countries, listed in Table 1, covering a 13-year period from 2010 to 2022.

Table 1 – Countries Included

Argentina	Dominican Republic	Israel	Portugal
Australia	Ecuador	Italy	Romania
Austria	El Salvador	Japan	Serbia
Belgium	Estonia	Latvia	Slovakia
Bolivia	Finland	Lithuania	Slovenia
Brazil	France	Luxembourg	South Africa
Bulgaria	Georgia	Mexico	South Korea
Canada	Germany	Moldova	Spain
Chile	Greece	Netherlands	Sweden
Colombia	Guatemala	Norway	Switzerland
Costa Rica	Honduras	Panama	Turkey
Croatia	Hungary	Paraguay	United Kingdom
Cyprus	Iceland	Peru	United States
Czech Republic	Indonesia	Philippines	Uruguay
Denmark	Ireland	Poland	Venezuela

Source: Author's elaboration based on data from multiple international databases, 2010–2022

The databases used in this study were: WID, World Bank, UNDP, and ILO.

The WID is a database developed based on the work of economists such as Thomas Piketty, Emmanuel Saez, and others. Its goal is to provide broad and open access to information on the historical evolution of global income and wealth distribution, both within and between countries.

World Bank data are collected from various sources, including government institutions, international organizations, and academic research. The database offers a wide range of indicators organized into areas such as economy, health, education, environment, and infrastructure. Its focus is on economic and social development, providing long historical series and covering nearly all countries worldwide. It is widely used in macroeconomic analyses, public policy planning, and international comparisons.

The UNDP provides data related to different dimensions of human and sustainable development, including social, economic, political, and environmental indicators. The database produces widely recognized indices, such as the Human Development Index (HDI), as well as data on education, life expectancy, per capita income, inequality, and gender. This information is essential for assessing quality of life and multidimensional development both between and within countries.

Finally, the ILO focuses on indicators related to the labor market and working conditions. It covers information on employment, unemployment, informality, child labor, wages, gender inequality, and working hours. It is a key source for monitoring trends in the world of work and for formulating public policies aimed at promoting employment.

The international variables to be used in the proposed empirical exercise are listed in Table 2.

Table 2 – Variable Framework

Database	Indicator	Classification
UNDP	GNI per capita (2017 PPP\$)	Sex: male and female
WID	Income share of the top 10% (%)	National income before taxes
WID	Income share of the bottom 50% (%)	National income before taxes   adults   equal-split
WID	Income share of the top 1% (%)	National income before taxes
World Bank	Inflation, consumer prices (annual %)	
World Bank	Exchange rate (local currency per US dollar, period average)	
World Bank	Population	Sex: male and female
World Bank	Share of population aged 0–14	Sex: male and female
World Bank	Share of population aged 65 and over	Sex: male and female
UNDP	Life expectancy at birth (years)	Sex: male and female
UNDP	Mean years of schooling	Sex: male and female
ILO	Working-age population by labor market status (thousands)	Sex: male and female; Labor market status: employed, unemployed, out of labor force
ILO	Inactivity rate (%)	Sex: male and female
ILO	Number of employed by skill level of occupation (thousands)	Sex: male and female; Occupation (skill level): high, medium, low
ILO	Average monthly earnings of employees (US dollars)	Sex: male and female
ILO	Average weekly hours actually worked per employee (hours)	Sex: male and female
UNDP	Proportion of seats held in parliament (%)	Sex: male and female
World Bank	Time spent on unpaid domestic and care work (hours)	Sex: male and female

Source: Author's elaboration based on data from multiple international databases, 2010–2022

It is worth noting that the variable “time spent on unpaid domestic and care work” contained a significant number of missing observations. Since this variable is essential for the analysis, a projection was performed based on the methodology proposed in a UN Women technical note (2020) to estimate the missing values. The estimated variable aligns with statistics from the World Bank (2024) and UN Women (2020), which indicate that women spend, on average, 2.4 hours (World Bank, 2024) and 2.3 hours (UN Women, 2020) more per day on this type of work compared to men. Details on the variables used in this projection and the choice of regression model can be found in Appendix A.

### 3.2. Method

To test the model in question, we employ a panel data approach. Following Pesaran (2015) and Wooldridge (2010), panel data consist of observations collected for multiple individual economic units over two or more periods. These units are referred to as cross-sectional units and, in economic and financial applications, typically correspond to individuals, firms, asset returns, sectors, regions, or countries.

Panel data offer several advantages over datasets with only a temporal or cross-sectional dimension. One of the main reasons for their use is the ability to control for unobserved, time-invariant heterogeneity that may be correlated with the explanatory variables. This allows for the identification and measurement of effects that would not be detectable with other approaches, as well as accounting for latent individual heterogeneity. Another important advantage compared to time-series data is the reduction of multicollinearity among regressors and the increased efficiency of econometric estimators.

These benefits, however, come with certain challenges. One key issue arises when the explanatory variables cannot be considered strictly exogenous. In such cases, traditional panel model estimators become inconsistent, requiring specific methodological care. Another important challenge is the presence of dependence between cross-sectional units, even after controlling for unit-specific variables. In this situation, conventional estimators may lead to incorrect inferences and even inconsistent estimates. Finally, additional difficulties emerge when panel data suffer from issues such as non-response or measurement errors.

The estimates will consider pooled panel models, fixed-effects, and random-effects models, identifying the results that best respond to the variables used.

### 3.3. Results

#### 3.3.1. Characteristics and Dynamics of Gender-Differentiated Effects: An International Analysis

Using the sample of 60 countries as the analytical unit, the analysis shows that between 2010 and 2022 socioeconomic characteristics, demographic composition, occupational parameters, and the political-representative profile differed by gender both across and within countries. On average, men display higher values than women in GNI per capita, educational attainment, employment and unemployment rates, the proportion with medium-level qualifications, monthly earnings, working hours, and political representation. By contrast, women surpass men in life expectancy, inactivity rates, the proportion with high or low qualification levels, and time devoted to domestic and care work (Table 3).

Beyond averages, the analysis of standard deviations highlights that cross-country differences are more pronounced than within-country variations, suggesting temporal stability within nations but significant heterogeneity across them. An exception is unpaid domestic and care work, where variability is low both within and between countries, underscoring a uniform yet unequal pattern: women devote more than twice as much time as men to these activities. Combined with lower participation and earnings, this persistent sexual division of labor continues to shape women's income disadvantages.

Examining trends over time, men consistently show higher values in GNI per capita, youth population share, educational attainment, medium-level qualifications, working hours, and parliamentary representation. Women consistently lead in elderly population share, inactivity, high and low qualifications, and unpaid care work. These patterns remain stable throughout 2010–2022, indicating that time is not a major confounding factor for subsequent econometric analysis. Nevertheless, some gradual changes emerge: both genders experienced rising GNI per capita, educational attainment, and elderly population shares, while female parliamentary representation increased. Conversely, the youth share and male representation declined (Figure 1).

To further explore the interaction between aging and gender, the sample was stratified by the elderly population share, using the 2020 male average as a threshold. This segmentation reveals that, for some variables, aging exerts a stronger influence than gender. For example, GNI per capita and educational attainment are highest among men and women above the threshold. By contrast, in the case of inactivity



rates, unpaid care work, and parliamentary representation, gender proves a stronger determinant than aging, with women consistently showing higher inactivity and care burdens, and men higher representation. Finally, the magnitude of gender gaps also varies with aging: disparities in GNI per capita and elderly shares are greater among countries above the threshold, while gender gaps in inactivity, unpaid care work, and representation are wider below it (Figure 2).

Table 3 – Descriptive statistics with variability decomposition – overall mean, between-country and within-country standard deviation (2010–2022)

	Média Geral	Desvio-Padrão - Entre -	Desvio-Padrão - Dentro -
Female GNI per capita (2017 PPP\$)	24.467	14.294	2.651
Male GNI per capita (2017 PPP\$)	38.850	21.800	3.529
Female share of the population (%)	50,90	1,10	0,10
Male share of the population (%)	49,10	1,10	0,10
Female life expectancy (years)	80,35	4,33	0,73
Male life expectancy (years)	74,55	5,08	0,90
Female mean years of schooling	10,89	2,18	0,40
Male mean years of schooling	11,08	2,10	0,34
Employed female working-age population (%)	49,10	8,40	2,30
Employed male working-age population (%)	65,30	8,30	2,50
Unemployed female working-age population (%)	4,20	2,30	1,10
Unemployed male working-age population (%)	5,10	2,70	1,60
Female working-age population out of labor force (%)	46,70	7,70	1,90
Male working-age population out of labor force (%)	29,60	7,00	1,70
Share of employed women in high-skill occupations (%)	40,70	10,10	2,80
Share of employed men in high-skill occupations (%)	32,30	11,70	2,10
Share of employed women in medium-skill occupations (%)	43,80	7,20	3,00
Share of employed men in medium-skill occupations (%)	53,20	8,10	2,80
Share of employed women in low-skill occupations (%)	15,50	8,70	2,00
Share of employed men in low-skill occupations (%)	14,50	9,60	2,40
Female average monthly earnings (US\$)	1.829	1.624	734
Male average monthly earnings (US\$)	2.450	2.315	1.028
Average weekly hours actually worked by women	36,47	4,25	0,78
Average weekly hours actually worked by men	40,99	3,58	0,87
Share of parliamentary seats held by women (%)	26,90	9,60	4,00
Share of parliamentary seats held by men (%)	73,10	9,60	4,00
Time spent by women on unpaid domestic and care work (hours)	4,28	0,37	0,25
Time spent by men on unpaid domestic and care work (hours)	1,94	0,36	0,18

Source: Author's elaboration based on data from multiple international databases, 2010–2022

Figure 1: Trends in socioeconomic characteristics, demographic composition, occupational parameters, and political-representative profile, by sex (2010–2022)

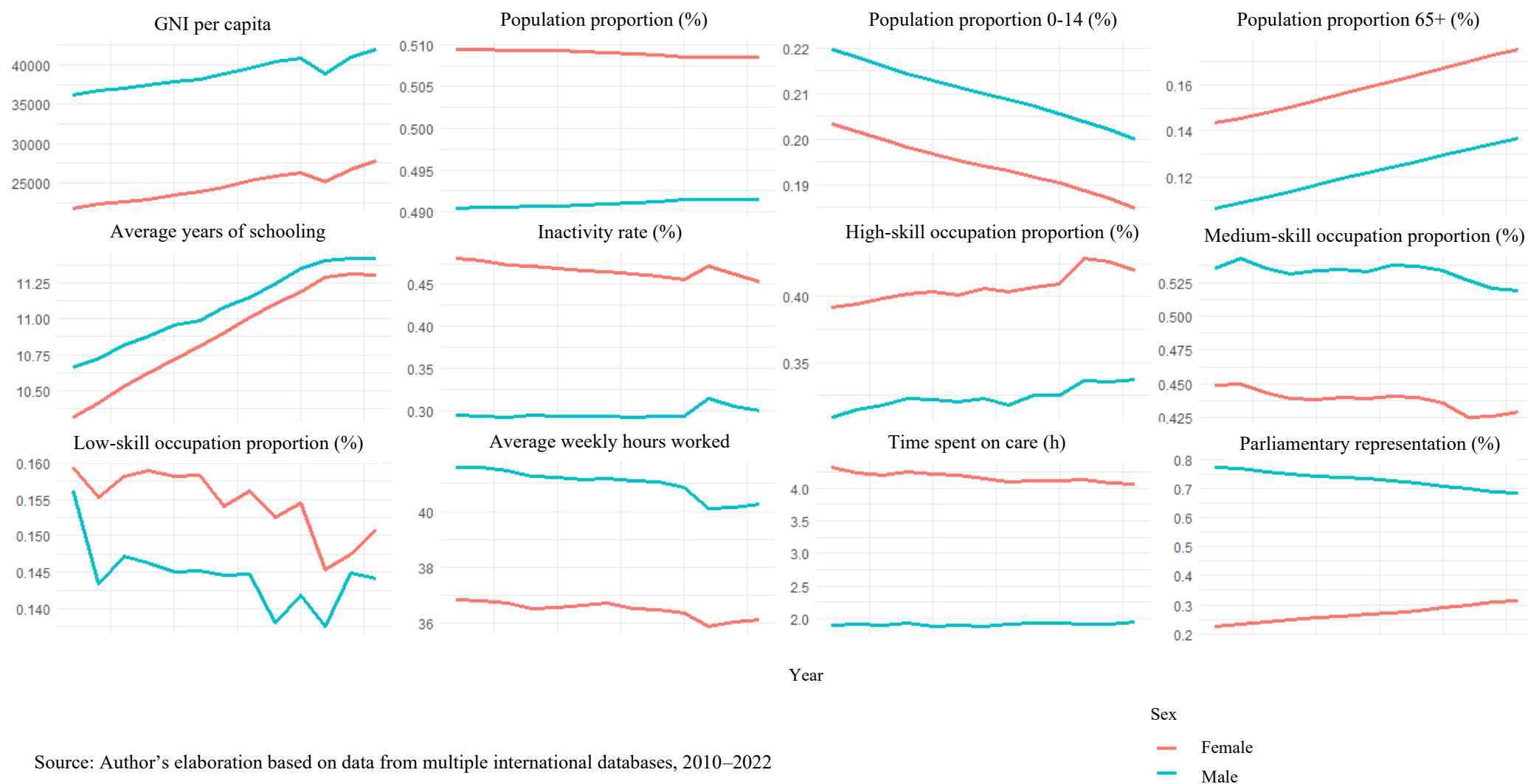
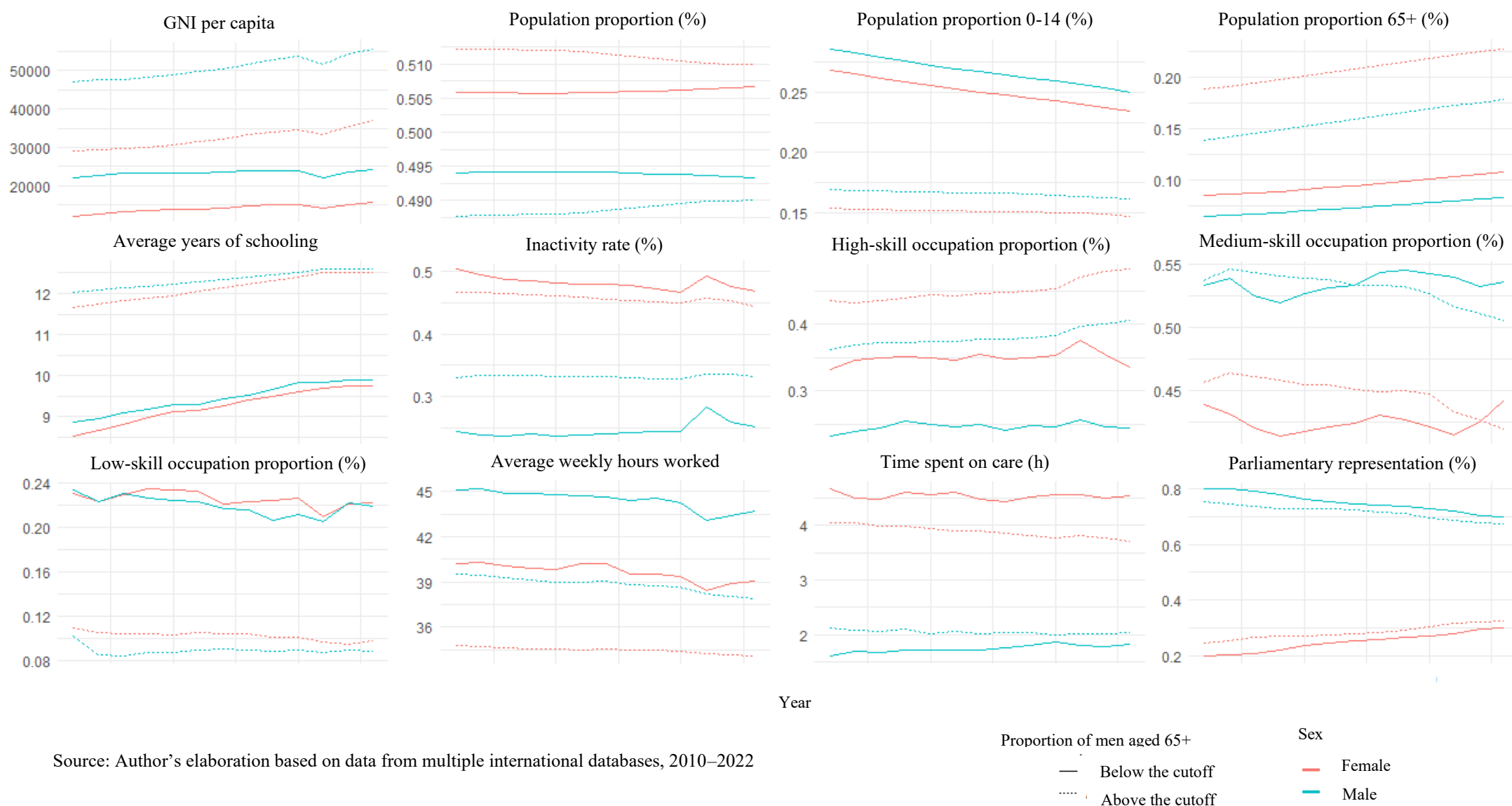


Figure 2: Trends in socioeconomic characteristics, demographic composition, occupational parameters, and political-representative profile, by sex and according to the proportion of elderly (2010–2022)



Source: Author's elaboration based on data from multiple international databases, 2010–2022

### 3.3.2. Panel Data

This study investigates how socioeconomic, demographic, occupational, and political gender differentials affect economic growth internationally. A balanced panel of 60 countries was built for the period 2010–2022, drawing on data from WID, the World Bank, UNDP, and the ILO.

Several estimation strategies were tested, including pooled OLS, fixed effects, random effects, and first-difference estimators. Hausman tests indicated the superiority of the fixed effects specification, confirming correlation between unobserved individual effects and the explanatory variables (Appendix B). A one-way fixed effects model by country was therefore adopted, rather than a two-way specification, since many explanatory variables show limited variation over time. Including year fixed effects would absorb this variation, undermining coefficient estimation. The chosen approach thus controls for cross-country heterogeneity without compromising identification.

The model was developed through the progressive insertion of variables (Appendix C). First, the relationship between income inequality and growth was tested (Model 1). Next, HDI-related indicators such as education, life expectancy, and age structure were added (Model 2). Macroeconomic and demographic controls—including inflation, exchange rate, and population – were then introduced (Model 3), followed by labor market variables such as inactivity rates (Model 4). Finally, explicitly gender-differentiated variables were incorporated, including occupational status, working hours, unpaid care work, and political representation (Model 5).

Table 4 – Fixed-effects regression results for GNI per capita (2017 PPP\$), by sex – Model including life expectancy

	Female	Male
Income share of the bottom 50% (%)	-0,667**	-0,798***
Income share of the top 1% (%)	-0,064	-0,188
Life expectancy (years)	0,018***	0,019***
Mean years of schooling	0,091***	0,067***
Log (population)	0,092	-0,080
Inflation (%)	-0,088***	-0,033
Exchange rate (local currency per US dollar, period average)	0,00003***	0,00004***
Inactivity rate (%)	-1,417***	-1,516***
Share of employed in high-skill occupations (%)	0,243	0,375*
Share of employed in medium-skill occupations (%)	0,037	0,095
Average weekly hours actually worked	-0,011***	-0,009**
Time spent on unpaid domestic and care work (hours)	-0,055***	-0,030
Share of parliamentary seats (%)	0,515***	-0,517***
Observations	658	658
R <sup>2</sup>	0,575	0,412
Adjusted R <sup>2</sup>	0,526	0,344

**Note.** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Source: Author's elaboration based on data from multiple international databases, 2010–2022

The direction of the relationship between income and explanatory variables is consistent across male and female models, with the exception of parliamentary representation (Table 4). Life expectancy, education, exchange rate appreciation, and the share of medium- and high-skilled workers are positively associated with income, meaning that increases in these indicators raise income for both genders. By contrast, income inequality, inflation, inactivity rates, working hours, and unpaid domestic and care work are negatively associated with income.

Parliamentary representation diverges by gender: greater female representation is linked to higher income, whereas greater male representation correlates with lower income. Population was included as a control.

When comparing gender-specific effects, income inequality, life expectancy, inactivity, and occupational level exert stronger impacts on male income. This reflects men's higher labor force

participation and lower life expectancy, making their income more sensitive to labor market exit, qualifications, and years of activity. Conversely, education, average working hours, and unpaid care work have stronger effects on female income. These results align with prior discussions: women's generally lower educational attainment implies greater marginal gains from additional schooling, while reducing unpaid care responsibilities enables higher participation in paid labor, thereby raising income.

The main statistically significant determinants of income in both models were income inequality, life expectancy, education, exchange rate, inactivity, working hours, and parliamentary representation. Time devoted to domestic and care work was highly significant in the female model but not in the male model, underscoring women's disproportionate burden of unpaid labor.

As a robustness check, life expectancy—potentially endogenous—was replaced with population aging indices: the share of the population aged 0–14 and the share aged 65 or older. The results of this alternative specification are presented in Table 5.

Table 5 – Results of per capita GNI regressions (2017 PPP\$), fixed effects: gender comparison – Model with the proportion of the population aged 0–14 and the proportion of the population aged 65 or older

	Female	Male
Income share of the bottom 50% (%)	-0,566**	-0,875***
Income share of the top 1% (%)	-0,053	-0,202
Share of population aged 0–14 (%)	0,538	-1,241***
Share of population aged 65 and over (%)	5,507***	4,486***
Mean years of schooling	0,001	0,010
Log (population)	0,533***	-0,075
Inflation (%)	-0,096***	-0,030
Exchange rate (local currency per US dollar, period average)	0,00003***	0,00004***
Inactivity rate (%)	-1,252***	-1,678***
Share of employed in high-skill occupations (%)	-0,050	0,226
Share of employed in medium-skill occupations (%)	0,019	0,204
Average weekly hours actually worked	-0,002	0,007*
Time spent on unpaid domestic and care work (hours)	-0,018	0,001
Share of parliamentary seats (%)	0,126	-0,117
Observations	658	658
R <sup>2</sup>	0,674	0,518
Adjusted R <sup>2</sup>	0,636	0,462

Note. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Source: Author's elaboration based on data from multiple international databases, 2010–2022

With the change in variables, the direction of the relationship between income and the explanatory factors remains largely the same as in the previous analysis, except for high skill level, working hours, and unpaid activities: the first turns negative for women, while the latter two become positive for men. Other gender comparisons remain valid, except for education, whose impact is now greater for men.

Regarding aging, the results indicate that a larger share of young women raises income, while a larger share of young men reduces it. An increase in the elderly population positively affects income in both models, with a stronger impact for women.

The main difference from the previous model concerns statistical significance. Here, the key determinants of income for both genders are income distribution, the share of elderly, exchange rate, and inactivity. The inclusion of the elderly population now captures effects previously explained by life expectancy, parliamentary representation, and (for women) unpaid work. In sum, aging is closely tied to national income levels: wealthier countries tend to be older and display smaller gender disparities in political representation and unpaid care.

## 4. CONCLUSION

At the international level, gender disparities generate asymmetric macroeconomic effects on men's and women's incomes. The results indicate that while some structural variables affect income similarly across genders, the magnitude of these effects differs. For instance, income distribution and occupational status exert stronger effects on male income, whereas education, hours worked, and especially unpaid care work have greater influence on female income. Crucially, the time devoted to domestic and unpaid care work is statistically significant only for women, underscoring its macroeconomic relevance and the structural constraints women face in the labor market.

These empirical findings are consistent with post-Kaleckian feminist theoretical contributions, particularly the model developed by Onaran, Oyvat, and Fotopoulou (2022), which integrates gender inequalities into the analysis of aggregate demand, productivity, and growth. The model demonstrates that public policies aimed at reducing unpaid work—such as investment in social infrastructure—and promoting gender equality in labor markets are not only socially just but also macroeconomically effective. Importantly, Onaran, Oyvat, and Fotopoulou (2022) observe that in wage-led models, increasing women's income tends to stimulate consumption and economic activity. However, in more profit-led economies, the positive effects of gender equality on growth largely depend on the private investment response to functional income redistribution. Since this study's sample includes countries with different growth patterns, it is important to recognize that the impact of reducing gender inequalities may vary according to the prevailing demand regime in each country, although developing economies generally tend to exhibit wage-led characteristics.

In sum, overcoming gender disparities is not only a normative or social justice issue but a necessary condition for expanding aggregate demand, raising productivity, and sustaining economic growth. Promoting gender equality is, therefore, essential for achieving inclusive, sustainable, and structurally balanced development.

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## APPENDICES

### APPENDIX A – Estimating Time Spent on Unpaid Care and Domestic Work

The available variable regarding time spent on unpaid care work is expressed as the proportion of a 24-hour day devoted to domestic and care activities, disaggregated by sex. The data are based on national statistics from time-use surveys and were extracted from the World Bank.

The dataset covers 89 countries, with information available between 2000 and 2020. However, most countries have data for at most three years within this period, which limits both time-series analysis and the ability to forecast this variable.

To address this gap, and based on the methodology and variables indicated in the UN Women technical note (2020), missing values for this variable were estimated for years and countries without available data. The variables considered in this exploratory analysis are listed in Table A1.

Table A1 – Explanatory Variables for the Regression on Time Spent in Unpaid Domestic and Care Work

Database	Indicator
UNDP	Gender Development Index (GDI) (value)
UNDP	Gender Inequality Index (GII) (value)
UNDP	GNI per capita (2017 PPP\$)
UNDP	Female labor force participation rate (% of population ages 15 and older)
World Bank	Fertility rate
United Nations	Median age

Source: Author's elaboration based on data from multiple international databases, 2010–2022

The explanatory variables were analyzed in different combinations to assess their predictive capacity. Table A2 presents a non-exhaustive selection of the estimated regression results.

Table A2 – Regression Results for the Proportion of Time Spent on Unpaid Care and Domestic Work, by Sex

Male Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Fertility rate	-0,232					
Gender Development Index (GDI)	29,932***					
Gender Inequality Index (GII)		-9,440***		-7,517***	-7,047***	-7,016***
Median age		0,621***	0,937***	0,811***	0,781***	
(Median age) <sup>2</sup>		-0,011***	-0,013***	-0,013***	-0,013***	
Female labor force participation			0,067***	0,068***	0,065***	0,055***

GNI per capita					0,00001	0,00002
Constant	-20,668***	1,964	-11,877***	-5,588	-5,278	6,353***
Observations	182	177	182	177	177	177
R <sup>2</sup>	0,246	0,246	0,248	0,308	0,312	0,259
Adjusted R <sup>2</sup>	0,238	0,233	0,235	0,292	0,292	0,247

<b>Female Model</b>						
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>
GNI per capita	-0,0001***				-0,0001***	-0,0001***
Median age	1,138***	0,937***	0,813***	0,634**	0,790***	
(Median age) <sup>2</sup>	-0,018***	-0,017***	-0,015***	-0,013***	-0,015***	
Gender Inequality Index (GII)		-1,871		-4,939	-7,411**	-3,858*
Female labor force participation			-0,099***	-0,108***	-0,096***	-0,103***
Constant	2,688	7,089	12,851***	19,137***	17,505***	26,457***
Observations	183	177	182	177	177	177
R <sup>2</sup>	0,166	0,092	0,186	0,196	0,268	0,213
Adjusted R <sup>2</sup>	0,152	0,076	0,173	0,178	0,247	0,200

**Note.** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Source: Author's elaboration based on data from multiple international databases, 2010–2022

As highlighted by UN Women (2020), the R-squared of the estimated regressions is not strong. This result is expected given the limited data availability and the inherent complexity of measuring time spent on unpaid care work.

In the projections conducted for both men and women, the variables average age and average age squared were statistically significant in almost all specifications, reflecting the widely recognized inverted U-shaped pattern in the literature. This indicates that men and women tend to devote more hours to unpaid care work during their productive life stage, and that the time allocated to this type of work is strongly related to the age composition of the population. The female labor force participation rate was also significant in the regressions for both sexes, although with effects in opposite directions.

The Gender Inequality Index (GII) showed unexpected behavior. In combination with other variables, higher levels of gender inequality were associated with fewer hours of unpaid care work by women. This contradictory result may be related to sample limitations and the possible presence of omitted variables.

This projection adopted a specification in which the time spent on unpaid care work for men and women is estimated based on average age, average age squared, female labor force participation rate, and GII (Model 4, Table A2).

## APPENDIX B – Alternative Methods: Robustness Tests

In addition to the fixed effects method, the pooled, random effects, and first-difference methods were tested for both the male and female models, using both the life expectancy variable (Table B1) and the variables representing the proportion of the population aged 0–14 and 65 or older. The results for the latter were not presented, as they led to the same conclusions as Table B1.

Overall, the correlation between the explanatory and dependent variables, as well as their statistical significance, was very similar across models, particularly between the fixed effects and random effects models.

The pooled model was discarded because it ignores unobserved heterogeneity between countries, which could generate biased estimates. The random effects model was also not the most appropriate, as it assumes no correlation between individual effects and regressors—a condition not supported by the tests. Finally, the first-difference model, while useful for eliminating fixed effects, could result in the loss of important information by removing all between-country variation.

Table B1 – Results of per capita GNI regressions (2017 PPP\$), by sex: comparison of methods – Model with life expectancy



<b>Male Model</b>				
	<b>Pooled</b>	<b>Fixed Effects</b>	<b>Random Effects</b>	<b>First Difference</b>
Income share of the bottom 50% (%)	-0,688	-0,798***	-0,381	-0,250
Income share of the top 1% (%)	1,239***	-0,188	-0,151	-0,001
Male life expectancy (years)	0,057***	0,019***	0,027***	0,008***
Male mean years of schooling	0,092***	0,067***	0,088***	0,001
Log (male population)	0,022***	-0,080	-0,025	-0,483***
Inflation (%)	0,008	-0,033	-0,060*	-0,084***
Exchange rate (local currency per US dollar, period average)	0,00001**	0,00004***	0,00002***	0,00001
Male inactivity rate (%)	0,272	-1,516***	-1,198***	-1,027***
Share of employed men in high-skill occupations (%)	2,473***	0,375*	0,996***	-0,413**
Share of employed men in medium-skill occupations (%)	1,728***	0,095	0,531***	-0,128
Average weekly hours actually worked by men	-0,023***	-0,009**	-0,014***	0,024***
Time spent by men on unpaid domestic and care work (hours)	-0,048	-0,030	-0,013	-0,004
Share of parliamentary seats held by men (%)	-0,218**	-0,517***	-0,305***	0,016
Constant	4,086***		8,385***	0,023***
Observations	658	658	658	602
R <sup>2</sup>	0,865	0,412	0,806	0,319
Adjusted R <sup>2</sup>	0,862	0,344	0,802	0,304

<b>Female Model</b>				
	<b>Pooled</b>	<b>Fixed Effects</b>	<b>Random Effects</b>	<b>First Difference</b>
Income share of the bottom 50% (%)	0,302	-0,667**	-0,370	0,079
Income share of the top 1% (%)	0,568	-0,064	-0,188	0,145
Female life expectancy (years)	0,059***	0,018***	0,032***	0,005*
Female mean years of schooling	0,101***	0,091***	0,104***	-0,017
Log (female population)	-0,005	0,092	-0,002	-0,167
Inflation (%)	-0,061	-0,088***	-0,098***	-0,100***
Exchange rate (local currency per US dollar, period average)	0,00000	0,00003***	0,00001	0,00000
Female inactivity rate (%)	0,578***	-1,417***	-1,084***	-1,234***
Share of employed women in high-skill occupations (%)	0,847***	0,243	0,423**	-0,016
Share of employed women in medium-skill occupations (%)	0,395**	0,037	0,140	0,116
Average weekly hours actually worked by women	-0,046***	-0,011***	-0,019***	0,007**
Time spent by women on unpaid domestic and care work (hours)	-0,001	-0,055***	-0,051***	-0,006
Share of parliamentary seats held by women (%)	0,399***	0,515***	0,438***	-0,047
Constant	4,870***		7,449***	0,024***
Observations	658	658	658	602
R <sup>2</sup>	0,885	0,575	0,838	0,227
Adjusted R <sup>2</sup>	0,882	0,526	0,835	0,210

**Note.** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Source: Author's elaboration based on data from multiple international databases, 2010–2022

## APPENDIX C – Alternative Models: Robustness Tests

Beyond the estimates from alternative methods, the construction of the model will be presented through the progressive inclusion of variables (Tables C1 and C2). Although this construction was tested using all the methods described, with different demographic variables (life expectancy, proportion of the population aged 0–14, and proportion aged 65 or older), for clarity, only the results from the fixed-effects models – selected for this study – with life expectancy as the demographic variable are shown here.

In general terms, the relationship between income inequality and economic growth was first tested (Model 1), following a classic Kaleckian framework. Next, variables that compose the Human Development Index (HDI), such as education and life expectancy or age structure, were added (Model 2), followed by macroeconomic variables, such as inflation and exchange rate, and demographic variables, such as population (Model 3), as well as labor variables, such as inactivity rate (Model 4). Finally, variables specifically capturing gender-differential effects in labor supply—such as occupational level, working hours, time spent on unpaid domestic and care work, and political representation—were included (Model 5).

Overall, in both Tables C1 and C2, the inclusion of new variables does not change the direction (positive or negative) of the relationships between explanatory variables and the dependent variable, income. Moreover, in general, variables do not lose significance when additional variables are included; on the contrary, some gain statistical significance. In sum, these results indicate that the model is well-specified.

Table C1 – Fixed effects regression results of per capita GNI (2017 PPP\$), by sex: progressive inclusion of variables – Model with life expectancy

<b>Male Model</b>					
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
Income share of the bottom 50% (%)	-0,438	-0,522	-0,647**	-0,669**	-0,798***
Income share of the top 1% (%)	-0,089	0,013	-0,079	-0,001	-0,188
Male life expectancy (years)		0,034***	0,026***	0,022***	0,019***
Male mean years of schooling		0,075***	0,102***	0,103***	0,067***
Log (male population)			-0,255***	-0,044	-0,080
Inflation (%)			-0,031	-0,021	-0,033
Exchange rate (local currency per US dollar, period average)			0,00004***	0,00004***	0,00004***
Male inactivity rate (%)				-1,244***	-1,516***
Share of employed men in high-skill occupations (%)					0,375*
Share of employed men in medium-skill occupations (%)					0,095
Average weekly hours actually worked by men					-0,009**
Time spent by men on unpaid domestic and care work (hours)					-0,030
Share of parliamentary seats held by men (%)					-0,517***
Observations	780	780	761	753	658
R <sup>2</sup>	0,002	0,171	0,291	0,350	0,412
Adjusted R <sup>2</sup>	-0,083	0,098	0,224	0,287	0,344
<b>Female Model</b>					
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
Income share of the bottom 50% (%)	-0,366	-0,259	-0,465	-0,427	-0,667**
Income share of the top 1% (%)	-0,280	0,200	0,078	0,240	-0,064
Female life expectancy (years)		0,032***	0,022***	0,020***	0,018***
Female mean years of schooling		0,163***	0,171***	0,150***	0,091***
Log (female population)			-0,031	0,051	0,092
Inflation (%)			-0,098***	-0,092***	-0,088***
Exchange rate (local currency per US dollar, period average)			0,00002**	0,00002***	0,00003***
Female inactivity rate (%)				-1,382***	-1,417***
Share of employed women in high-skill occupations (%)					0,243
Share of employed women in medium-skill occupations (%)					0,037
Average weekly hours actually worked by women					-0,011***
Time spent by women on unpaid domestic and care work (hours)					-0,055***
Share of parliamentary seats held by women (%)					0,515***
Observations	780	780	761	753	658
R <sup>2</sup>	0,001	0,349	0,484	0,560	0,575
Adjusted R <sup>2</sup>	-0,084	0,292	0,435	0,518	0,526

**Note.** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

Source: Author's elaboration based on data from multiple international databases, 2010–2022