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The Consequences of Gender Inequality on Latin America's Economic Growth: Macroeconomic Evidence

Matheus Koengkan [1,*], José Alberto Fuinhas [2], Matheus Belucio [3], Emad Kazemzadeh [4], Yormy Eliana Melo Poveda [5], Nooshin Karimi Alavijeh [4] and Renato Santiago [6]

1 Governance, Competitiveness and Public Policies (GOVCOPP), Department of Economics, Management, Industrial Engineering and Tourism (DEGEIT), University of Aveiro, 3810-193 Aveiro, Portugal
2 Centre for Business and Economics Research (CeBER), Faculty of Economics, University of Coimbra, 3004-512 Coimbra, Portugal; fuinhas@uc.pt
3 Economy of Francesco (EoF) Academy, CEFAGE, University of Évora, 7000-809 Évora, Portugal; matheus.belucio@hotmail.com
4 Department of Economics, Faculty of Economics and Administrative Sciences, Ferdowsi University of Mashhad, Mashhad 9177948974, Iran; emad.kazemzadeh67@mail.um.ac.ir (E.K.); n.karimi.alavijeh@gmail.com (N.K.A.)
5 Department of Economics, Federal Fluminense University, Niteroi 24020-150, Brazil; yemelop@gmail.com
6 NECE-UBI and Management and Economics Department, University of Beira Interior, 6200-209 Covilhã, Portugal; renato_santiago17@hotmail.com
* Correspondence: matheuskoengkan@ua.pt

Abstract: This research analysed the effect of gender inequality on the economic growth of seventeen countries in the Latin America and Caribbean (LAC) region from 1990 to 2016 using an ordinary least squares (OLS) regression model with fixed effects and a quantiles via moments model. Electricity consumption from new renewable energy sources, general government capital stock, private capital stock, trade openness, and urban population were used as control variables, and a battery of preliminary and post-estimation tests were conducted to guarantee the adequacy and suitability of both methodologies. The OLS model with fixed effects supports that gender inequality negatively affects gross domestic product (GDP) per capita. The quantiles via moments (QvM) model confirms the results of the OLS model with fixed effects and reveals that with increasing quantiles (25th, 50th, and 75th), gender inequality leads to decreases in LAC countries' growth. LAC countries' policymakers and institutions should improve gender equality to reach a higher development level and a more prosperous society. Developing policies that contribute to increasing women's participation in the labour market, reducing the gender pay gap, supporting women's education and training, constructing a more women-friendly and less patriarchal society, and developing measures to limit violence against women and early pregnancy and maternal mortality rates and increase women's decision-making positions, particularly in public policy decision making, must be implemented.

Keywords: economics; macroeconomics; gender inequality; renewable energy; social science; urbanisation; capital stock; trade openness; Latin America and the Caribbean

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1. Introduction

Western societies are now fiercely fighting gender inequality. At a global level, debates involving gender inequality have gained momentum. Proof of this concern is that, in 2006, the World Economic Forum (WEF) introduced the Global Index of Gender Differences as a framework to capture the magnitude of gender disparities and monitor their progress over time [1].

According to the World Economic Forum report, progress towards gender parity occurs simultaneously [2]. Latin America and the Caribbean (LAC) rank third in two crucial aspects of gender inequality: (i) the gender gap closed to date by region and (ii) the overall index, behind Western Europe and North America, which are ranked first and second, respectively [2].

The recent literature points out that gender inequality and economic growth are related. Minasyan et al. [3] found a positive association between gender equality in education with economic development in their systematic literature review. Bertay et al. [4] studied whether gender inequality inhibits economic growth by constraining the use of female labour potential. Cabeza-García et al. [5] focused on the gender factors that trigger economic growth in high- and low-income countries.

As far as is known, little research has related the gender inequality index and gross domestic product (GDP) per capita (a proxy for economic growth) in LAC countries. Moreover, this is the first time that other factors, such as the private and general government capital stock, urban population, electricity consumption from new renewable energy, and trade openness, are considered as other simultaneous explicative variables in a regression analysis. Seventeen countries from the LAC region were selected for this empirical analysis, and this study included annual data from 1990 to 2016 due to data availability for the chosen variables.

It is known that the region has evolved favourably in the last few years but remains one of the most unequal in the world. According to the World Economic Forum [2] forecast, it will take another 59 years to close the gender gap at this rate. Thus, the existence of inequality must not be ignored. In addition, the time factor becomes increasingly important, as public policies can collaborate to close the gender gap more quickly in the region.

The background behind this theme's importance leads us to this investigation's general aim to verify the relationship between economic growth and gender inequality in LAC and, in this way, contribute to the contemporary literature indicating relevant aspects of the gender–economics relationship in LAC. Two specific purposes were defined to fulfil the aim: (i) to compile statistical information from secondary data obtained from public databases (which facilitates the replicability and extension of this study) and (ii) to identify the best econometric model for the treatment of the data from the analysis of the literature and pre-statistical tests to assess the variables' nature. As a result, two hypotheses were proposed for verification in this study: (i) gender inequality in Latin America and the Caribbean region has a negative effect on countries' economic growth; (ii) in an analysis by quartiles, the separators of gender inequality have symmetrical effects on economic growth. In addition to these hypotheses, it was anticipated that other insights might arise through the empirical results since other variables were added to the model from the economic literature.

The third hypothesis is that other insights would emerge through the empirical results since other variables were added to the model according to the relationship with economic data from the literature. These insights can be transformed into solid proposals for public policies to combat gender inequality in the labour market, in the hours of domestic activity, and in care for children and the elderly. In this way, policies can improve the quality of life of LAC women and seek to combat inequality in access to employment and the division of other tasks.

This article is divided into six sections. The first section (introduction) presents the aim and hypotheses of this investigation. The second section is dedicated to the literature review. The third section presents the data and method. The fourth section shows the results of the pre-tests, econometric model, and robustness tests. The fifth section is dedicated to discussing the results and theoretical relationships. Finally, in the last section (sixth section), the conclusion of this investigation is presented.

2. Literature Review

The gender gap or gender inequality refers to gender differences in dimensions such as education, labour force participation, wages, or access to productive resources [6]. Despite considerable progress in recent decades, gender gaps persist in most parts of the world, especially in Latin America. In the following, studies on the effects of gender inequality on economic growth are reviewed.

Pervaiz et al. [7], in a study of Pakistan for the period from 1972–2009, found that gender inequality has a significant and negative impact on Pakistan's economic growth. Models of gender inequality and economic development by Kim et al. [8] showed that improving gender equality can contribute to economic growth by changing women's time allocation and promoting human capital accumulation. They found that if gender inequality were eliminated, total income would be about (6.6%) and (14.5%) higher than the standard economy after one or two generations. Bertay et al. [4], in an industry-level study, found that gender inequality affects economic outcomes. Kim et al.'s [8] results for South Korea showed that when inequalities between men and women in the home and labour market are eliminated, the female labour force participation rate increases from (54.4 to 67.5%). As a result, the per capita income growth rate jumps from 3.6 to reach the mark of (4.1%). Egbulonu and Eleonu [9], in a study of Nigeria for the period from 1990–2016, found that reducing gender inequality in the labour market significantly impacts economic growth.

Kennedy et al. [10] studied Australia using tax statistics from 1942 to 2013 and found that inequality, with several years of delay, negatively affects economic growth. The study results reported by Karoui and Feki [11] for African countries using a dynamic panel model with a generalised method showed a negative and significant relationship between the threshold of (10%) of the gender inequality index and economic growth. Another study by these researchers found that increasing enrolment rates for girls improved living standards in African countries. It also seems that increasing women's participation in the labour force compared to men leads to decreased economic development [12]. In a study of Brazil, Agenor and Canuto [13] found that strengthening gender equality may significantly affect Brazil's long-term economic growth. Farooq et al. [14] examined the effects of globalisation and gender equality on the Organization of Islamic Cooperation (OIC) member countries' economic growth using the Gaussian mixture model (GMM) panel data technique for the period from 1991 to 2017. They stated that globalisation harms economic growth in the overall OIC country sample, while gender equality positively impacts economic growth.

While Bandiera and Natraj [15] found no evidence of a causal relationship between gender inequality and economic growth, Kleven and Landais [16] examined the effect of gender inequality on economic development in 53 countries during 1967–2014. They argued that the only crucial factor behind this convergence is population transfer. In addition, Amin et al. [17], in a study of 107 rich and emerging countries, found that higher gender inequality is strongly associated with low economic growth. However, this negative relationship between gender inequality and economic growth is pronounced in emerging countries, not rich ones.

Several other studies have examined gender inequality in education. Baliamoune-Lutz and McGillivray [18], in a survey of African and Middle Eastern countries, showed that gender inequality in primary and secondary education has a statistically negative and significant effect on income, especially in North Africa and the Middle East. Klasen [19] studied the impact of gender inequality in education on economic development using panel regression. The results showed that gender inequality in education, with a decrease in the average level of human capital, directly affects economic growth. Economic growth is also indirectly affected by the impact of gender inequality on investment and population growth. Klasen [6], in a study of developing countries, showed that reducing gender inequality in education leads to higher economic performance. Fatima [20], in a comparative study between Pakistan and Sri Lanka using the GMM method for the period from 1975 to 2009, confirmed that the gender gap in education, through rapid population growth and low investment, has direct and indirect impacts on economic growth. The results also show that gender inequality in human capital is higher in Pakistan than in Sri Lanka. Karoui and Feki's [21] study of Tunisia for the period from 1970 to 2009 showed that gender inequality in education negatively affects economic growth. According to the econometric analysis results, there is a long-term relationship between higher education levels, primary and secondary school graduates, and GDP.

Baliamoune-Lutz and McGillivray [18] studied the impact of gender inequality on the decline in economic growth in 31 sub-Saharan African and 10 Arab countries from 1974 to 2001 using the Arellano–Bond method. The findings showed that gender inequalities in education have a statistically significant negative effect on economic growth. Moreover, gender inequality has a more substantial impact on the economic development of Arab countries. Klasen and Lamanna [22], in a study of a group of countries (e.g., Middle East, North Africa, South Asia, and East Asia) using panel regression from 1960 to 2000, found that gender gaps in education and employment significantly reduce economic growth. Chaudhry [23], in a study of Pakistan, showed that gender inequality in education has a substantial and significant impact on the decline in Pakistan's economic growth. Yumusak et al.'s [24] results for Turkey from 1968 to 2005 found that increasing women's education positively affects the next generation's education level. They also showed a long-term relationship between gender inequality in education and economic growth. Altuzarra et al. [25], in a study of 105 developing countries from 1990 to 2017, stated that gender equality in education contributes to economic growth, a common feature in developing countries. The share of equality in education in sub-Saharan Africa seems to be higher than in all developing countries. They also found a significant link between the presence of women in parliaments and economic growth in all developing countries, which is negative for sub-Saharan Africa.

Another group of studies examined the impact of gender wage inequality on economic growth. Seguino [26] examined the effect of gender wage inequality on economic growth from 1995 to 1995. In this study, women played a key role in the export sector of export-oriented semi-industrial economies. Experimental results showed that income inequality slows economic growth. Evidence also indicates that part of the gender wage inequality's impact on economic growth is transmitted through its positive effect on investment as a share of GDP. Kennedy et al. [10], in a study of Australia for the period 1986–2013, found that a (10%) reduction in the gender wage gap could increase per capita economic growth by up to (3%). However, Schober and Winter-Ebmer [27] stated that there is no evidence that more discrimination can lead to more remarkable economic growth.

Conversely, the impact of gender inequality on economic growth has also been found to be negative. Barro [28], in a study of 84 countries, stated that higher income inequality causes a delay in economic growth in emerging countries but leads to growth in rich countries. The Kuznets curve also showed that inequality first increases in economic development and then decreases. Altuzarra et al. [25] investigated the role of gender inequality in economic growth from 1990 to 2017 in developing countries. The results showed that gender equality in developing countries contributed to economic growth. There was also a significant relationship between the presence of women in politics and economic development. Girón and Kazemikhasragh [29] stated that a negative and significant relationship exists between gender inequality and economic growth in developing and less developed countries by using the panel vector autoregressive (PVAR) model on data from 2010 to 2018. Baerlocher et al. [30] evaluated the role of female labour force participation (FLFP) on economic growth using the GMM model. The authors found that increasing FLFP positively and significantly affects economic growth. Ali et al. [31], studying Pakistan using the auto-regressive distributed lag (ARDL) model for the period from 1980 to 2019, showed that gender inequality has a negative impact on human well-being. Santos Silva and Klasen [32] examined the role of gender inequality in economic development from the perspective of the theoretical literature. Most studies stated that gender inequality is an obstacle to economic growth in the long run.

As seen in the literature, most studies have examined the effect of gender inequality on economic growth in different countries and regions using various econometric models. However, this study's novelty is that due to the large gender gap in Latin American countries, comprehensive research in this field has not been conducted for this group of countries. To this end, this study examined the impact of gender inequality on the economic growth of Latin American countries. On the other hand, in this research, ordinary least squares (OLS) with fixed effects and the quantiles via moments (QvM) model were used

simultaneously to check the accuracy and robustness of the results, which have not been used in earlier studies. The data and models used in this research are presented in the next section.

3. Data and Method

This section shows the variables and methodological approach used. Therefore, the first part, Section 3.1, describes the data/variables, while Section 3.2 presents the methodological approach.

3.1. Data

As mentioned before, the data/variables used in this analysis are presented in this subsection. Seventeen countries from the Latin America and the Caribbean (LAC) region were selected to realise this empirical analysis (i.e., Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela). Furthermore, this study opted to use data from 1990 to 2016 due to data availability for all countries. Table 1 below shows the variables that were used in this empirical investigation.

Table 1. Variable acronyms, descriptions, and sources.

Dependent Variable			
Variable Acronyms	**Variable Descriptions**	**Source**	**QR Code**
EG	GDP per capita (constant 2011 international USD).	World Bank Open Data [33]	
Independent variables			
GENDER_INE	Gender Inequality Index. This variable measures gender inequalities in three essential aspects of human development—reproductive health, measured by the maternal mortality ratio and adolescent birth rates; empowerment, measured by the proportion of parliamentary seats occupied by females and the proportion of adult females and males aged 25 years and older with at least some secondary education; and economic status, expressed as labour market participation and measured by the labour force participation rates of female and male populations aged 15 years and older. Moreover, this variable is based on the same framework as the Human Development Index (IHDI) to reveal more significant differences in the distribution of achievements between women and men. Finally, it measures the human development costs of gender inequality. Thus, the higher the gender inequality index value, the more disparities between females and males and the more loss of human development.	IMF [34]	
REN_CONSU	Electricity consumption from new renewable energy sources, excluding hydroelectric (% of total).	World Bank Open Data [33]	
PUBLK	General government capital stock (constant 2011 international USD).	IMF [34]	
PRIVK	Private capital stock (constant 2011 international USD).	IMF [34]	
TRADE_OPEN	Trade openness is measured as the sum of a country's exports and imports as a share of that country's GDP (in %).	World Bank Open Data [33]	
URBA	Urban population (% of the total population).	World Bank Open Data [33]	

Notes: The authors created this table.

It is essential to note that the control variables that were included in the model were the ones whose influence on a country's economic growth levels had already been empirically demonstrated (e.g., Apergis and Payne [35]; Ramirez and Nazmi [36]; Santiago et al. [37];

Koengkan and Fuinhas [38]; Alavijeh et al., [39]; Brueckner and Lederman [40]; Nguyen [41]), if possible, in Latin American and Caribbean countries, and for which there was a satisfactory amount of data. Therefore, after presenting the countries included in this investigation and the variables used, we present the method/approach used to conduct this investigation in the following subsection.

3.2. Method

This empirical investigation followed the methodological strategy presented in Figure 1 below.

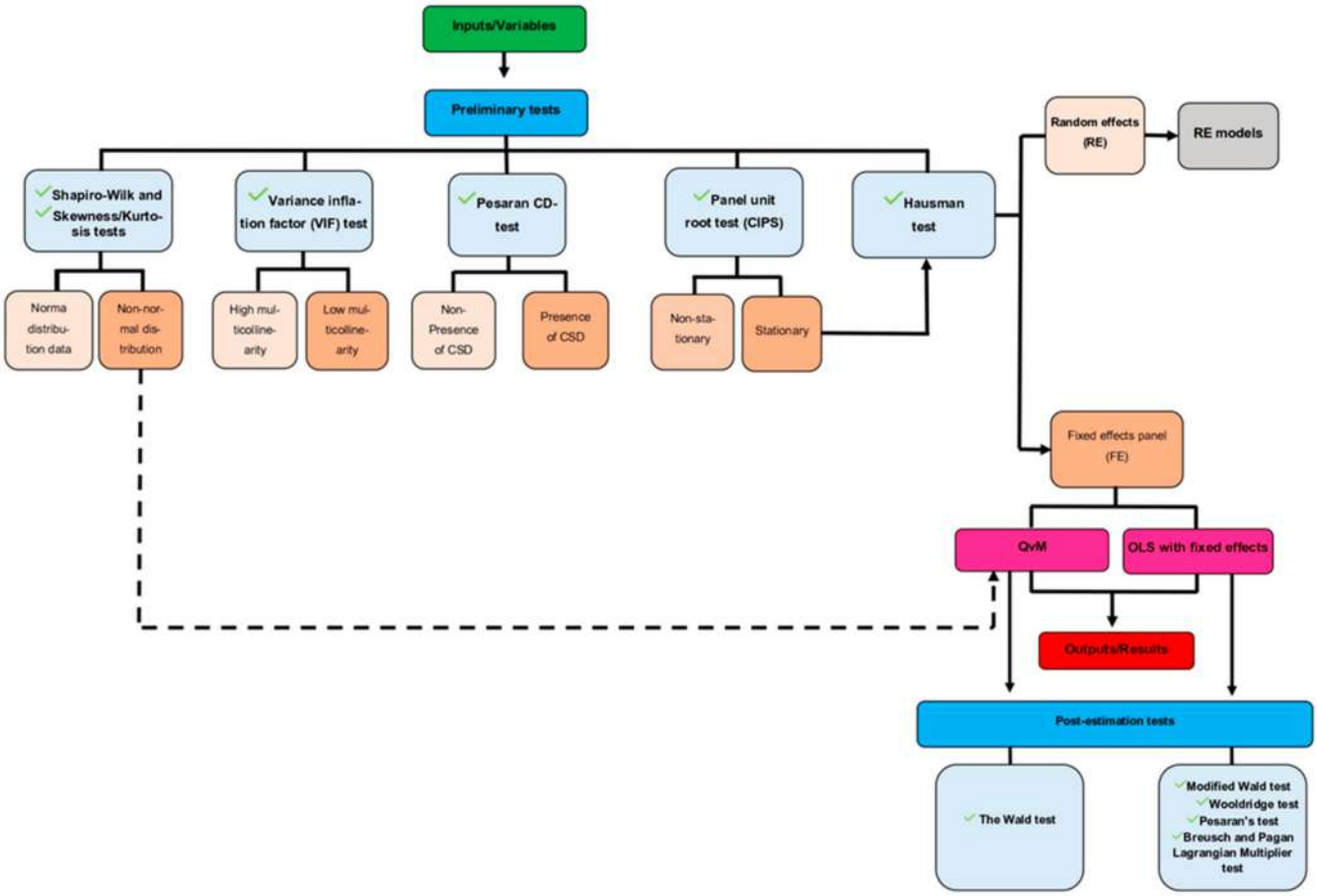

Figure 1. Methodological strategy. The authors created this figure.

After presenting the methodological strategy that this investigation followed, it is also necessary to present the OLS model with fixed effects, the QvM model, and the preliminary tests [42]. This investigation used the OLS with fixed-effects and QvM models as methods. The OLS with fixed-effects model was our main model in this study. Indeed, the OLS model with fixed effects follows Equation (1) below.

$$Y_{it} = \beta_1 X_{1,\,it} + \cdots + \beta_k Z_{k,it} + \alpha_i + \mu_{it} \quad (1)$$

where $i = 1, \cdots, n$, and $t = 1, \cdots, T$. α_i is an entity-specific intercept that captures heterogeneities across entities. This model was used in this investigation because it can capture differences in the constant and intercept terms of the regression model that vary across cross-sectional units [43,44]. In this model, α_i is the intercept term and is countries' fixed effects.

However, the QvM model was used to verify the robustness of the results found by the earlier method. Machado and Silva [45] developed this method, and this model is an

alternative for quantile regressions. Therefore, after a brief explanation of the QvM model used as a robustness check, it is necessary to show the equation of the QvM model (see Equation (2) below).

$$\lambda_{it} = \lambda_i + x'_{it}\vartheta + \left(\delta_i + Z'_{it}\gamma\right)U_{it} \quad (2)$$

where λ_{it}, x'_{it} are from a panel of N individuals, $i = 1, \ldots, N$, over T periods with $P\{\delta_i + Z'_{it}\gamma > 0\} = 1$.

Indeed, it was necessary to perform preliminary tests before realising the OLS model with fixed effects and QvM model regressions. Post-estimation tests were computed after model estimation. Table 2 below shows the initial and post-estimation tests that were used in this empirical investigation.

Table 2. Preliminary and post-estimation tests for the OLS model with fixed effects and QvM model.

Preliminary Tests for the OLS Model with Fixed Effects and QvM Model	
Tests	**Objective**
Shapiro–Wilk test [46]	To verify the normality of the model.
Skewness and kurtosis test [47]	To combine the two tests into an overall test statistic to check the normality based on skewness and again based on kurtosis.
Variance inflation factor (VIF) test [48]	To check for the presence of multicollinearity between the variables.
Cross-sectional dependence (CSD) test [49]	To detect the presence of cross-sectional dependence (CSD) in the panel data.
Panel unit root test (CIPS) test [50]	To detect the presence of unit roots.
Hausman test [51]	To check heterogeneity, i.e., whether the panel has random effects (RE) or fixed effects (FE).
Post-estimation tests for the OLS model with fixed effects and QvM model	
The OLS model with fixed effects	
Modified Wald test [52]	To assess the panel groupwise heteroscedasticity in the residuals of FE estimation.
Wooldridge test [53]	To assess the autocorrelation in panel data.
Pesaran's test [54]	To assess the cross-sectional independence of residuals.
Breusch and Pagan Lagrangian multiplier test [55]	To assess the independence for contemporaneous correlation of residuals.
The QvM model	
The Wald test [52]	To verify the global significance of the estimated models.

Notes: The authors created this table.

This investigation computed all preliminary tests and model estimations using Stata version 17.0 (Stata Corporation, TX, USA). All Stata commands used in this empirical investigation and model regressions, as well as information on how to conduct each test, are shown in the QR Code below (see Figure 2 below). In addition, further information is provided in the notes of each table.

Figure 2. QR Code—All commands of Stata that were used in this investigation.

In this section, we present the data and method that were used in this empirical investigation. In the next section, we present the empirical results of this study.

4. Empirical Results

As mentioned before, this section shows the empirical results of preliminary tests, the results of the main model (OLS model with fixed effects) and their post-estimation tests, and results of the robustness check (QvM model) and their post-estimation tests. In addition, Table 3 below presents the descriptive statistics of variables used in this empirical investigation.

Table 3. Descriptive statistics.

Variables	Descriptive Statistics of Variables				
	Obs.	**Mean**	**Std. Dev.**	**Min.**	**Max.**
EG	459	8.5290	0.6572	6.9659	9.5966
GENDER_INE	459	0.3885	0.0695	0.0000	0.4946
REN_CONSU	459	2.4702	4.8957	−0.0260	22.7042
PUBLK	459	−12.2341	0.7010	−13.1709	−10.4755
PRIVK	459	−11.5043	0.5316	−12.6475	−10.5216
TRADE_OPEN	459	4.0034	0.4648	2.6212	5.1161
URBA	458	4.2327	0.2027	3.7374	4.5637

Notes: The command *sum* of Stata was used; Obs. denotes the number of observations in the model; Std. Dev. denotes the Standard Deviation; Min. and Max. denote Minimum and Maximum, respectively. All variables were transformed into natural logarithms.

In the descriptive statistics, the variables EG, REN_CONSU, PUBLK, and PRIVK are per capita values, and all variables are natural logarithms. Using variables' per capita values allows us to reduce the disparities between the variables caused by population growth over time, as Koengkan et al. [56] mentioned. Then, after calculating the descriptive statistics, preliminary tests were carried out. The first of them was the Shapiro–Wilk W-test for normal data. This test was used to verify the normality of the pooled regression residuals (i.e., Resid). The null hypothesis of this test is the presence of normality. Table 4 below shows the results of this test.

Table 4. Shapiro–Wilk W-test for normal data.

Variables	Obs.	W	V	Z	Prob > z
Resid	458	0.9543	14.200	6.353	0.0000

Notes: The command *sktest* of Stata was used.

As shown in the table above, the Shapiro–Wilk W-test for normal data rejects the null hypothesis, revealing the presence of non-normality. After performing the Shapiro–Wilk W-test, skewness/kurtosis tests for normality were carried out. This test was used to verify the normality of the fixed-effects regression residuals (i.e., Resid). This test checks and complements the results found by the earlier test. The null hypothesis of this test is the presence of normality in the model. The results from Skewness/kurtosis tests for normality can been seen in Table 5 below.

Table 5. Skewness/kurtosis tests for normality.

Variables	Obs.	Pr (Skewness)	Pr (Kurtosis)	Adj Chi2(2)	Prob > Chi2
Resid	432	0.0764	0.0000	NA	0.0000

Notes: The command *sktest* of Stata was used; NA denotes not available.

Table 5 above also rejects the null hypothesis of skewness/kurtosis tests for normality. That is, non-normality is present in the model. So far, the results are satisfactory for our empirical analysis. Moreover, the outcomes of these two tests add support for the adequacy of using quantile regression in our robustness check [57]. Therefore, we proceeded with the rest of the preliminary tests.

The subsequent tests were the variance inflation factor (VIF) and cross-sectional dependence (CSD). As we already mentioned, the VIF test checks for the presence of multicollinearity between the variables. Simultaneously, the CSD test only detects the presence of cross-sectional dependence (CSD) in the panel data. Therefore, the null hypothesis of the CSD test is the presence of cross-sectional independence CD~N(0.1). Table 6 below shows the results of both tests.

Table 6. VIF and Pesaran CD tests.

Variables	VIF	1/VIF	Mean VIF	CD Test	*p*-Value
EG	NA			53.57	***
GENDER_INE	1.96	0.5093		43.39	***
REN_CONSU	1.51	0.6643		NA	***
PUBLIK	1.81	0.5515	1.96	10.15	***
PRIVK	1.67	0.5989		17.17	***
TRADE_OPEN	1.41	0.7083		16.84	***
URBA	3.43	0.2918		59.44	***

Notes: The commands *vif* and *xtcd* of Stata were used; *** denotes statistical significance at (1%) level; NA denotes unavailable.

Therefore, the results of the VIF test show the presence of low multicollinearity between the variables, where the VIF values are lower than the usually accepted benchmarks of 10 and 6 in the case of mean VIF values. The CSD test results do not reject the null hypothesis, thus showing the presence of CSD in all variables used in this empirical investigation. The next test was the panel unit root test (CIPS). This test detects the presence of unit roots. The null hypothesis of CIPS is that all series have a unit root. Table 7 below shows the results of the CIPS test.

Table 7. Panel unit root test (CIPS test).

Variables	Panel Unit Root Test (CIPS) (Zt-Bar)				
	Without Trend			With Trend	
	Lags	Zt-Bar		Zt-Bar	
EG	1	−3.492	***	−3.077	***
GENDER_INE	1	1.221		−1.449	***
REN_CONSU	1	−1.369	*	−3.502	***
PUBLIK	1	1.221		−2.316	**
PRIVK	1	−0.382		0.585	
TRADE_OPEN	1	−3.574	***	−1.270	
URBA	1	−0.918		−4.680	***

Notes: The Stata command *multipurt* was used; the null for CIPS test is that series have unit root; the lag length (1) and trend were used in this test; ***, **, and * denote statistically significant at (1%), (5%), and (10%) levels, respectively.

The results of the CIPS test indicate that the variables GENDER_INE, PUBLIK, PRIVK, TRADE_OPEN, and URBA without trends and with trends appear to be somewhere between I(0) and I(1), while the variables EG and REN_CONSU without trends and with trends are shown to be I(0).

We performed the Hausman test to verify heterogeneity, i.e., whether the panel has random effects (RE) or fixed effects (FE). The null hypothesis of this test is that RE is the better estimator. Table 8 below shows the results of the Hausman test.

Table 8. The Hausman test.

chi2(6) = 156.31 ***

Notes: The Stata command *hausman* (with the option *sigmamore*) was used; *** denotes statistically significant at the (1%) level; Hausman results for H_0: difference in coefficients not systematic.

The Hausman test results reject the null hypotheses: i.e., there are FE in the model. This result is satisfactory for our empirical analysis because the fixed-effects and QvM models require fixed effects.

Thus, after the realisation of the preliminary test, the main model regression was carried out. As mentioned in earlier sections, this investigation opted to use the OLS model with fixed effects as our main model. Therefore, in this empirical analysis, we used the following estimators: fixed effects (FE), FE robust standard errors (FE Robust), and FE Driscoll and Kraay (FE D.-K.). Table 9 below shows the results from the fixed-effects estimation and their post-estimation tests.

Table 9. The OLS model with fixed effects estimation (main model) and the post-estimation tests.

Independent Variables	Dependent Variable (EG)			
	FE		FE Robust	FE D.-K.
GENDER_INE	−0.4561	***	*	***
REN_CONSU	0.0487	***	*	**
PUBLIK	0.4433	**	***	***
PRIVK	0.2947	***	***	***
TRADE_OPEN	0.1665	***	*	***
URBA	0.4730	***	***	***
Constant	14.7309	***	***	***
Obs	458		458	458
Post-estimation tests for the fixed-effects model				
Statistics	Modified Wald test	Wooldridge test	Pesaran's test	Breusch and Pagan Lagrangian Multiplier test
	chi2(17) = 639.27 ***	F(1, 16) = 297.105 ***	8.044 ***	NA

Notes: The Stata commands xtreg, xttest3, xtserial, xtcsd (with option Pesaran abs), and xttest2 were used; ***, **, and * denote statistically significant at the (1%), (5%), and (10%) levels, respectively; H_0 of Modified Wald test: sigma(i)^2 = sigma^2 for all i; H_0 of Wooldridge test: no first-order autocorrelation; H_0 of Pesaran's test: residuals are not correlated; H_0 of Breusch and Pagan Lagrangian multiplier test: no dependence between residuals; NA denotes not available.

The results of the OLS models show that the independent variable GENDER_INE exerts a negative impact of −0.4561 on the dependent variable EG, while the independent variables REN_CONSU (0.0487), PUBLIK (0.4433), PRIVK (0.2947), TRADE_OPEN (0.1665), and URBA (0.4730) exert positive effects of on dependent variable EG. All of these impacts are statistically significant at (1–10%) levels.

Then, after the OLS model regression, it was necessary to carry out the post-estimation tests. The results in Table 9 above show the presence of heteroscedasticity, where the null hypotheses of the Wald test are rejected at the (1%) level. Furthermore, the presence of first-order autocorrelation was rejected at the (1%) level by the Wooldridge test. Moreover, the presence of non-correlation was detected, where the null hypothesis of Pesaran's test cannot be rejected at the (1%) level. However, the Breusch and Pagan Lagrangian multiplier test could not be computed. Therefore, the correlation matrix of residuals was singular. According to Koengkan et al. [58], this situation occurs when the number of crosses is less than the number of years.

The next step after realising the main model regression was the verification of the results' robustness. Indeed, to accomplish this task, this investigation opted to use QvM model regression. This method uses the 25th, 50th, 75th, and 100th quantiles. These quantiles were used to simplify the presentation of empirical results. Table 10 below shows the results of QvM model regression.

The QvM model regression results show that the independent variable GENDER_INE in the 25th, 50th, and 75th quantiles have a negative impact on the dependent variable EG. However, the variables REN_CONSU, PUBLIK, PRIVK, TRADE_OPEN, and URBA in the 25th, 50th, 75th, and 100th quantiles positively impact the dependent variable EG. Moreover, all are statistically significant at the (1%) and (5%) levels. The post-estimation test

results of the QvM model show that the model estimator that this study chose is adequate to perform this analysis. Therefore, the QvM model results confirm that the investigation results are robust and reliable when changing the methodological approach.

Table 10. QvM estimation (robustness check).

Independent Variables	Dependent Variable (EG)							
	Quantiles							
	25th		50th		75th		100th	
GENDER_INE	−0.3609	**	−0.4471	***	−0.5623	***	−0.2857	
REN_CONSU	0.0518	***	0.0490	***	0.0453	***	0.0542	***
PUBLIK	0.4428	***	0.4432	***	0.4438	***	0.4424	***
PRIVK	0.2986	***	0.2950	***	0.2902	***	0.3017	***
TRADE_OPEN	0.1621	***	0.1661	***	0.1714	***	0.1587	***
URBA	0.5264	***	0.4779	***	0.4133	***	0.5685	***
Obs	458		458		458		458	
F/Wald test	Chi2(6) = 1591.28	***	Chi2(6) = 2710.37	***	Chi2(6) = 1405.25	***	Chi2(6) = 838.44	***

Notes: The Stata command xtqreg was used; *** and ** denote statistically significant at (1%) and (5%) levels, respectively.

Moreover, Figure 3 below summarises the impact of independent variables on the dependent ones. This figure is based on the results in Tables 9 and 10 above.

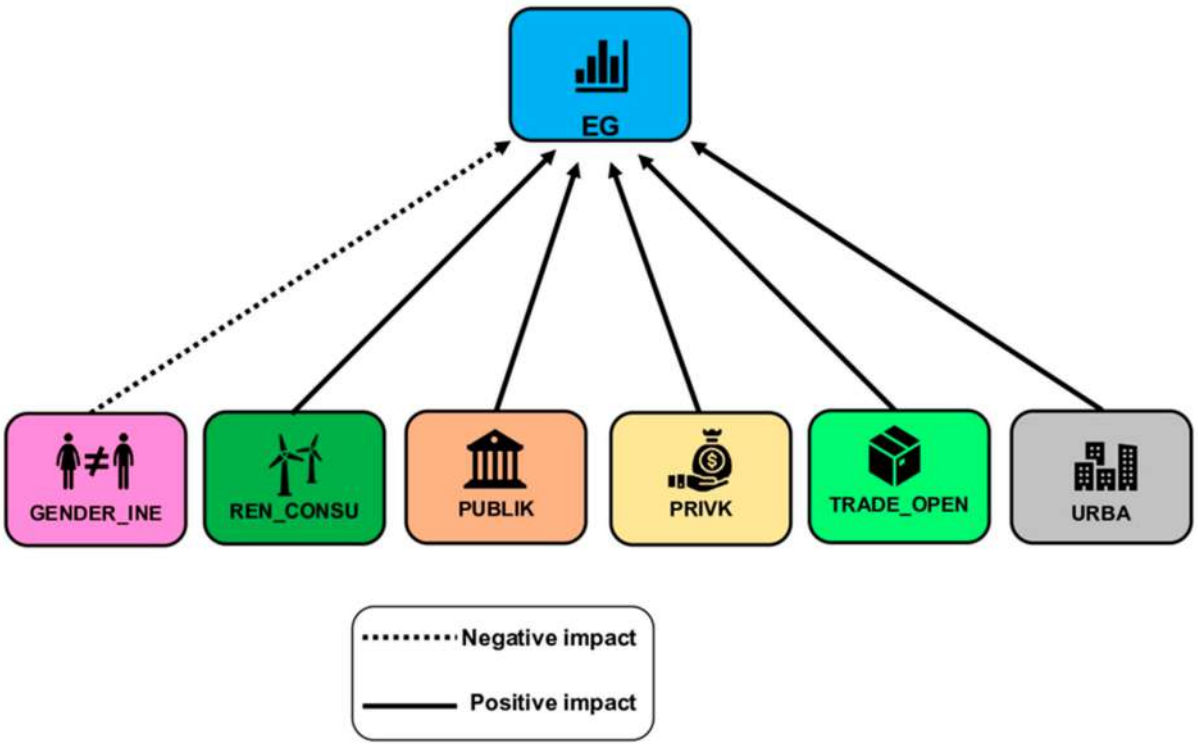

Figure 3. Summary of the variables' effects. The authors created this figure.

In the next section of this empirical investigation, we present the discussion of the found results.

5. Discussion

This study aimed to investigate the impact of gender inequality on Latin America and Caribbean countries' economic growth. According to the results reported in Table 9, the effect of gender inequality on the studied countries' economic growth is negative and significant. More specifically, the results indicate that with a unit increase in gender inequality, economic growth decreases by −0.4561. Therefore, it can be argued that increasing

gender inequality reduces economic growth through reduced capital and human growth. This result is consistent with the research of Bertay et al. [4], Cabeza-García et al. [5], Pervaiz et al. [7], Kim et al. [8]; Klasen [19], Klasen and Lamanna [22], and Klasen [59].

The impact of electricity consumption from new renewable energy sources on economic growth is positive and significant. Moreover, according to Table 9, the variable of electricity consumption from new renewable energy sources has the most negligible impact on Latin American countries' economic growth. A unit increase in REN_CONSU increases economic growth by 0.0487. Apergis and Payne [35], Al-Mulali et al. [60], Koengkan et al., [61]; Halkos and Tzeremes [62], Kula [63], Ibrahiem [64], and Aydin [65] confirmed a positive relationship between economic growth and electricity consumption from renewable energy.

Along the same line, according to the results, the impact of general government capital stock on economic growth is also positive and significant. Looking at Table 9, we see that a unit increase in general government capital stock leads to a 0.4433 increase in Latin America's economic growth. Thus, the government's implementation of investment projects improves infrastructure and is associated with increased economic growth. This finding is consistent with the research of Ramirez and Nazmi [36], Everaert [66], Romp and De Haan [67], Santiago et al., [68], Rabnawaz and Sohail Jafar [69], and Canh and Liem [70].

In addition to the general government capital stock, the private capital stock also positively and significantly affects economic growth in Latin America and the Caribbean region. According to the results presented in Table 9, a unit increase in private capital stock leads to a rise of 0.2947 in economic growth. This positive impact could be related to the main objective of private investment, which is to generate profit. Indeed, the incentive to make a profit leads to an increase in private investment, production, and economic growth. This result is in line with studies in the literature, such as Santiago et al. [37], Nwakoby and Bernard [71], Batool and Goldmann [72], and Ben-Salha and Zmami [73].

Regarding trade openness, as is shown in Table 9, this variable also presents a positive and statistically significant impact on growth. A unit increase in trade openness generates an increase of 0.1665 in economic growth. Therefore, it can be stated that trade openness increases GDP in the countries under study by contributing to increased investment. Thus, Latin American countries should increase international trade by reducing trade barriers. This finding is in accordance with the research of Brueckner and Lederman [40], Musila and Yiheyis [74], Hye et al. [75], and Keho [76].

Finally, regarding urbanisation, we see that this variable has the highest coefficient; i.e., it seems to have the most significant impact on economic growth (see Table 9). A unit increase in the urban population is associated with a 0.4730 rise in Latin America and Caribbean countries' economic growth. Urbanisation can increase economic growth through increased investment and the accumulation of physical capital and human capital [77]. The study performed by Nguyen [41] reached the same conclusion. The results obtained in the present study are discussed in this section, and the next section displays the final conclusions and policy implications.

6. Conclusions and Policy Implications

In this study, we investigated the effect of gender inequality on the economic growth of seventeen countries in the Latin America and Caribbean region (namely: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela) using data on GDP per capita and the Gender Inequality Index from 1990 to 2016.

We used an OLS model with fixed effects as our primary model to achieve this investigation's goals. The QvM model was also computed to verify the results' robustness of the OLS analysis. The variables of electricity consumption from new renewable energy sources, general government capital stock, private capital stock, trade openness, and urban population were also included in the OLS and QvM models. Additionally, it is important to note that before and after estimating the OLS and QvM models, we computed a set of

preliminary and post-estimation tests to guarantee the adequacy and suitability of both methodologies for our empirical analysis (see Table 2).

From the results of the OLS model with fixed effects (see Table 9), we can conclude that gender inequality negatively affects the economic output of the countries in this region. The variable Gender Inequality Index proves to have a detrimental and statistically significant effect on the GDP per capita in the fixed-effects, fixed-effects robust standard errors, and fixed-effects Driscoll and Kraay analyses. As previously stressed, a QvM model was also computed after estimating the OLS model to verify the earlier results' robustness. However, this method becomes even more appropriate due to the possible presence of non-normality in the model (see Tables 4 and 5).

The QvM model results with the 25th, 50th, 75th, and 100th quantiles (see Table 10) show that the earlier results remain correct. In addition, we can see that the variable Gender Inequality Index has a negative impact on the growth of these countries in the 25th, 50th, and 75th quantiles, which, once again, reinforces the idea that gender inequality is a detrimental factor in this region's economic growth: i.e., higher levels of gender inequality lead to a decrease in these countries' growth.

Our estimations' outcomes clarify that the governments of Latin American and Caribbean countries need to increase their efforts on gender equality promotion. Beyond the underlying fact that gender equality is a fundamental human right, which is necessary for countries to reach a higher development level and a more prosperous society (in fact, it is the fifth point in the Sustainable Development Goals (SDGs) of the United Nations [78]), there is also the fact that, like other types of inequalities, gender inequality can produce undesirable economic effects. Therefore, this study concludes that gender inequality has an adverse impact on Latin American and Caribbean countries' economic growth (see Table 11).

Table 11. Summary of the overall impacts obtained through OLS model estimation.

Independent Variables		Signal	Impact on Economic Growth (EG) [2]
Gender inequality	GENDER_INE	(−)	0.4561
Electricity consumption from renewables [1]	REN_CONSU	(+)	0.0487
General government capital stock	PUBLIK	(+)	0.4433
Private capital stock	PRIVK	(+)	0.2947
Trade openness	TRADE_OPEN	(+)	0.1665
Urban population	URBA	(+)	0.4730

Notes: [1] Excluding hydroelectric; [2] Increase/decrease in EG promoted by a unit increase in the independent variable.

In this sense, we think that Latin American and Caribbean countries' governments and institutions must be capable of developing policies that could increase women's participation in the labour market (in similar conditions to men's). Reducing the gender pay gap also depends on measures to support women's education and training. However, economic inequality is not the only factor that policymakers should consider, as is known. To tackle gender inequality, it is also necessary that these countries construct a more women-friendly and less patriarchal society with, for example, the development of measures centred on reducing violence against women and early pregnancy and maternal mortality rates. To achieve all of these goals, we consider it imperative to increase women's decision-making positions, particularly in public policy decision making. Further research should be developed to unveil the economic and social impacts of gender inequality and used wisely by policymakers to increase inclusive economic growth.

Preoccupation with the promotion of gender equality is not new in Latin America and the Caribbean. However, more recently, with the drawing up of the Montevideo Strategy by regional governments and the Economic Commission for Latin America and the Caribbean (ECLAC), the region now has 74 concrete measures (under 10 implementation pillars) that need to be reached to achieve greater gender equality in the Latin America and Caribbean

region [79]. In our view, regional governments must implement these measures due to the social returns they could bring to their societies and the economic returns that lower gender inequality could bring to this region's economies. As the Economic Commission for Latin America and the Caribbean (ECLAC) and International Labour Organization (ILO) state in their report "Evolution of and prospects for women's labour participation in Latin America: "*increasing women's access to paid activities and reducing existing gaps in the labour market is crucial for boosting growth*" [80].

LAC public policymakers must rethink policies to encourage female employment with wages and functions equal to those of men. Access to work and job retention should be one of the priorities, given that in the early years of the pandemic period, men regained jobs more quickly in addition to losing fewer jobs compared to women in the region when comparing data based on the percentage of the labour force [81].

When encouraging public and private investment to promote economic growth, countries should link this investment to measures to tackle gender inequality in different economic sectors. The exercise of this mechanism will positively influence both objectives, achieving growth and increasing equity. An example of such a mechanism could be to equalise the number of new employment contracts; that is, for each new male contract, there should be at least one new female contract.

Finally, to accelerate the gender equality process, post-pandemic political and economic agendas must take advantage of the inclusion of short-term strategies that ensure a level playing field in the labour market, for example, increasing employee salary transparency measures in institutions from different sectors and creating tangible metrics to monitor the fight against gender inequalities.

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