Can women's literacy and education spending serve as robust pillars of development in Madagascar?

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Abstract

The economic inclusion of women constitutes a pivotal catalyst for sustainable development. In Madagascar, notwithstanding women's substantial engagement in economic activities, persistent disparities in access to education, formal employment, and productive resources continue to constrain the full realization of female human capital. Employing an econometric framework spanning the period 1990 to 2023, this study quantifies the influence of female literacy rates and educational expenditures on per capita GDP. The findings indicate that a one-percentage-point increase in female literacy corresponds, on average, to an augmentation of approximately 7.9 USD in per capita GDP. These results underscore the statistically significant and positive role of women's education in fostering economic growth. However, a paradox remains evident: despite considerable female economic participation, their skills remain markedly underutilized. Accordingly, the study advocates for nuanced policy interventions centered on enhancing girls' education, promoting the formalization of women's labor, and expanding financial inclusion to unlock and sustain this latent developmental potential.

Keywords: female economic inclusion, educational expenditure, GDP per capita, Madagascar, human capital, gender inequality, economic growth, financial inclusion

1 Introduction

In low-income countries such as Madagascar, economic development cannot be fully achieved without the effective inclusion of women in productive dynamics. Although they represent more than half of the population, Malagasy women remain largely concentrated in informal activities often low-paid, lacking social protection, and offering limited prospects for economic mobility. This marginalization undermines not only their individual autonomy but also the country's structural transformation toward equitable and sustainable development.

Numerous studies in development economics highlight the pivotal role of women's education in enhancing collective well-being. Female literacy, in particular, serves as a crucial lever for strengthening human capital, encouraging household investment in health and education, and promoting women's active participation in formal economic processes. When women gain access to basic skills and decent employment, they contribute directly to poverty reduction, inclusive growth, and the expansion of opportunities for future generations.

In this context, a central question arises: *to what extent does investment in female human capital accelerate economic development in Madagascar, within an environment still marked by deep gender inequalities?*

To address this question, this article tests the hypothesis that women's literacy, supported by public education spending, has a positive and significant effect on per capita gross domestic product. This relationship is particularly relevant, as it allows for an assessment of the concrete outcomes of education policies on human and economic development trajectories.

The study is based on an econometric analysis covering the period 1990–2023, drawing on national data

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and World Bank gender indicators. It aims to provide empirical evidence on the effects of female human capital on development dynamics, while accounting for the structural specificities of Madagascar's economy. Through this approach, the article seeks to contribute to the policy debate on how to strengthen women's empowerment and lay the foundations for more inclusive long-term development.

2 Literature review

For several decades, women's economic inclusion has been at the heart of debates on sustainable development. Numerous empirical studies have demonstrated that increased female participation in the labor market is a key driver of economic growth, inequality reduction, and improved social well-being (World Bank (2012); Kabeer & Natali (2013)). In the context of developing countries, Duflo (2012) highlights that women's economic empowerment strengthens investment in human capital, particularly in children's health and education.

The relationship between gender, growth, and economic development is multidimensional. Gender equality is recognized not only as a development goal in itself but also as a critical lever for achieving sustainable economic outcomes (Agrawal & Jariwala (2025)). When women actively participate in the economy, they contribute not only to productivity but also positively influence household investments in education and health (Gakidou et al. (2010); Duflo (2012)).

Econometric analyses have confirmed the existence of a significant correlation between gender equality and economic growth. Xu (2025) shows that greater access for women to the labor market leads to an increase in GDP per capita. Similarly, the work of Cuberes and Teignier (2016) demonstrates that gender gaps in employment and entrepreneurship result in productivity losses at the macroeconomic level.

In Sub-Saharan Africa, persistent inequalities in education, access to formal employment, and control over economic resources hinder women's full contribution to development (IMF (2022); Seguino (2000)). According to the International Labour Organization (2021), women remain predominantly concentrated in the informal sector, often without access to social protection, labor rights, or financial security.

Moreover, Klasen (2018) emphasizes the importance of institutions and public policies in sustainably reducing gender inequalities and fostering inclusive development. According to K.B. (2024), increased female participation in strategic sectors promotes better resource allocation and enhances the resilience of economies to shocks. In this regard, gender equality should not be viewed as an isolated goal but rather as an integral component of a comprehensive growth strategy.

Some authors caution against overly narrow approaches that focus exclusively on the gender dimension. It is crucial to consider the complex interactions between social norms, economic policies, and institutional structures in order to understand the actual mechanisms shaping development trajectories (Mbatha (2024)).

Finally, certain perspectives from feminist economics offer a valuable complement to conventional analyses. The capabilities framework developed by Sen (1999) and further elaborated by Nussbaum (2000) emphasizes the real freedoms individuals possess to lead lives they have reason to value. From this viewpoint, women's education is not merely a factor of production; it is a fundamental condition for autonomy, agency, and social justice. Lourdes Benería (2003), for her part, highlights the need to recognize the economic value of unpaid labor often performed by women which sustains social reproduction and community stability. These approaches broaden the understanding of women's economic inclusion by incorporating symbolic, institutional, and intersubjective dimensions that are often overlooked in traditional models.

2.1 Synthesis

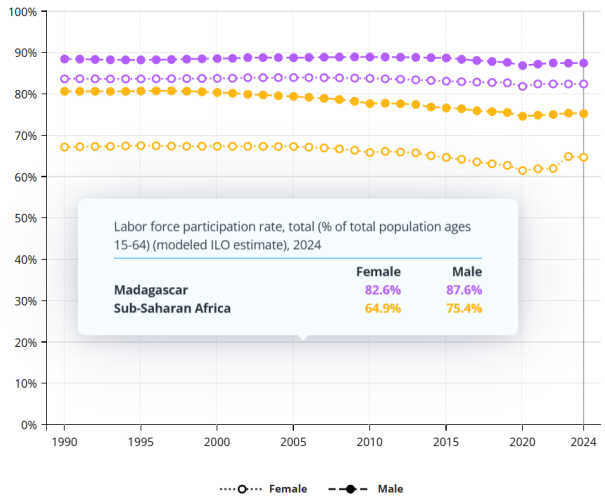
Thus, the literature converges on the idea that women's economic inclusion is a major lever for economic development. It also underscores the need for comprehensive public policies that combine equal opportunities, access to education, institutional reform, and the promotion of female employment to fully unlock women's economic potential in developing countries including Madagascar.

3 Overview of gender inequalities in Madagascar

3.1 Labor market participation

In Madagascar, women's participation in the labor market is relatively high. Figure 1 below shows that 82.6% of women aged 15 and over participate in the labor force in 2024, compared to 87.6% of men. This figure is even above the average for the Sub-Saharan African region. This small gap could suggest near parity. However, this raw data conceals profound qualitative inequalities in women's employment conditions and economic prospects.

Figure 1: Labor Market Participation Rates by Sex

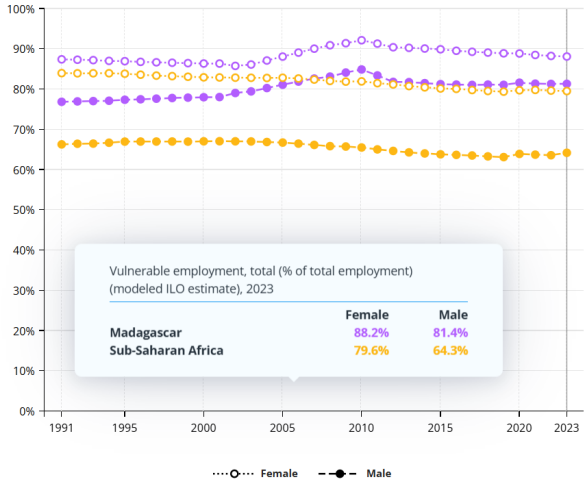


Source: International Labour Organization

3.2 Vulnerability in Women's employment

Figure 2 strikingly illustrates the extent of job precariousness affecting women in Madagascar. In 2023, 88.2% of economically active women were in vulnerable employment situations, compared to 81.4% of men, representing a gap of 6.8 percentage points. This indicator includes unpaid contributing family workers, unpaid own-account workers, and employees in the informal sector without contracts or access to minimal social protection.

Figure 2: Employment Vulnerability by Gender



Source: International Labour Organization

This imbalance reveals a form of structural economic exclusion, whereby women despite their substantial presence in the labor force (82.6% according to Figure 1) remain confined to low-valued, unstable jobs deprived of rights. These conditions expose them more acutely to market fluctuations, climatic or economic shocks, and limit their prospects for capital accumulation, savings, or investment.

The analysis also highlights a significant contradiction: while women's literacy rates are improving (78.9% according to Figure 4), this gain in human capital is not translated into quality employment. In other words, female human capital is mobilized but underutilized due to limited integration into the formal sector. This prevents women from fully realizing

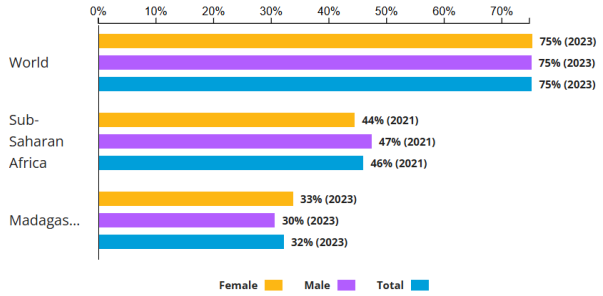
their economic potential, thereby directly hindering inclusive growth.

Moreover, this persistent precariousness reinforces their economic dependence within households and reduces their capacity to make autonomous financial decisions, including those related to health, children's education, or entrepreneurial investment. Consequently, it exacerbates intergenerational gender inequalities by limiting the redistributive impact of women's empowerment on human development.

3.3 Women's education

Gender gaps in economic inclusion originate from the earliest stages of the schooling pathway. Figure 3 shows that in 2023, only 33.5% of Malagasy girls completed the first cycle of secondary education, compared to 30.3% of boys. Although this gender gap here favors girls, it overall reflects a very low level of schooling among Malagasy youth, well below regional averages (Sub-Saharan Africa) and low-income countries, where female completion rates often exceed 40%.

Figure 3: Secondary School Completion Rate by Gender



Source: International Labour Organization

This low coverage of secondary education constitutes a major barrier to building female human capital. Completion of the secondary cycle is an essential prerequisite for entering higher education, accessing technical training, and securing more favorable labor market opportunities. In the absence of this educational foundation, women are overwhelmingly confined to informal, low-productivity, and vulnerable jobs, as confirmed by Figure 2 on precarious employment.

Furthermore, this schooling deficit undermines women's economic and social empowerment. It limits their access to information, financial education, civic rights, and more broadly, to any form of negotiation in domestic or professional spheres. This situation perpetuates intergenerational exclusion dynamics, where girls from poor backgrounds are the first to drop out of school, often during adolescence, to undertake domestic responsibilities or enter into early marriages.

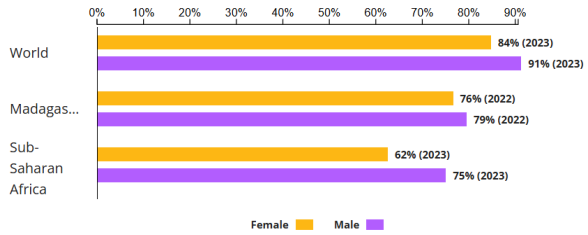
Finally, this observation fully justifies the choice of female literacy as a central variable in the econometric model of this study. Although basic literacy rates are relatively high in Madagascar (Figure 4), insufficient secondary school completion restricts the depth and multiplier effect of female human capital. It thus becomes crucial to support educational policies not only focused on school access but also on retention and academic success of girls at the secondary level, if the aim is to strengthen their effective contribution to economic development.

3.4 Women's literacy

Figure 4 shows that in Madagascar, of women were literate, compared to 76% of men. On this indicator, Madagascar performs better than the regional average (74.5% for women) as well as the average for low-income countries (70.5%). This result is encouraging and reflects sustained efforts in basic education, notably through public literacy policies and expanded access to primary schooling over recent decades.

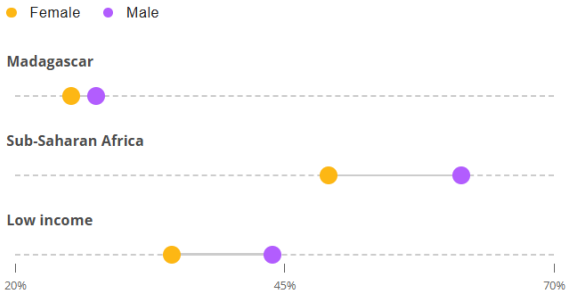
However, this progress in fundamental skills is not sufficient to guarantee a structural improvement in the economic position of women. Literacy, while indispensable, represents a minimal threshold of human capital. In the absence of secondary school completion (as shown in Figure 3) and access to technical or higher education, these basic skills rarely translate into qualified, stable, or well-paid employ-

Figure 4: Literacy Rate



Source: International Labour Organization

Figure 5: Financial Inclusion Rate by Gender



Source: International Labour Organization

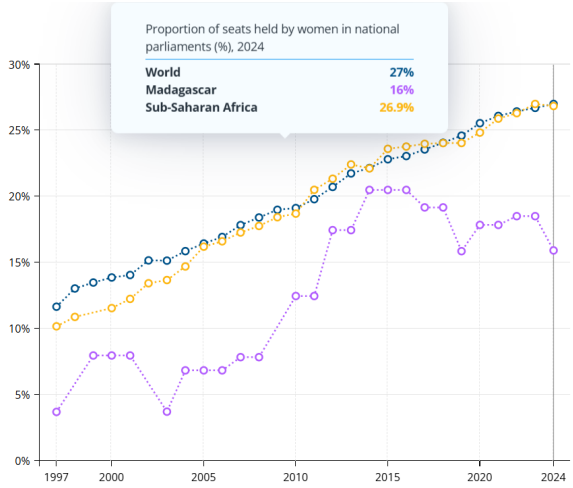
ment. In other words, literate women are often confined to informal or low-productivity roles without prospects for advancement. This limits their bargaining power within the household, their access to economic resources (such as credit or property), and their capacity to undertake entrepreneurial activities or hold positions of responsibility. This situation reinforces the paradox identified in this study: improvements in basic education indicators do not necessarily produce significant economic effects if not accompanied by policies aimed at extending educational pathways and sustainably integrating women into the formal economy. Thus, positive performance in literacy should be interpreted with caution: it constitutes a necessary but not sufficient condition for the economic inclusion of women.

3.5 Women's Economic empowerment and Decision-Making power

In terms of financial inclusion, Figure 5 shows that in 2022, only 25.2% of women held a bank or mobile money account, compared to 27.5% of men. These rates are far below those of Sub-Saharan Africa (around 45%) and low-income countries (around 35%). This limited access to the formal financial system constitutes a major barrier to women's economic independence, the development of their entrepreneurial activities, and their financial resilience.

Figure 6 indicates that in 2024, only 16% of parliamentary seats are held by women, a figure well below the regional average. This reflects structural barriers to women's political participation and limits their influence in the formulation of public policies.

Figure 6: Proportion of Women in parliament



Source: International Labour Organization

In the private sector, Figure 7 reveals that only 28.6% of managerial positions are held by women. This figure highlights that, despite their high participation in the labor force, women rarely reach decision-making roles in companies. This limits their ability to influence economic strategy and to promote gender equality within organizations.

3.6 Reproductive health

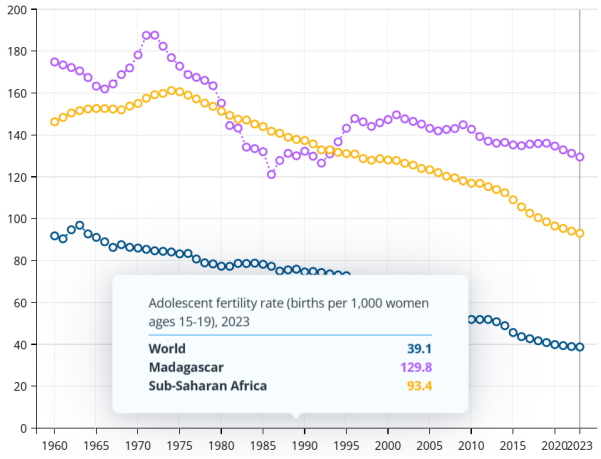
In terms of reproductive health, Figure 8 shows a still concerning rate of 130 births per 1,000 adolescent girls in 2023. This rate, which exceeds the average for

Figure 7: Managerial positions by gender

Source: International Labour Organization

low-income countries, indicates that Malagasy girls often become mothers at a very young age, interrupting their educational trajectories and reducing their future professional opportunities.

Figure 8: Adolescent fertility rate by gender

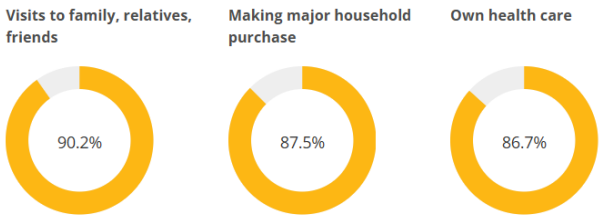


Source: International Labour Organization

3.7 Decision-Making Power

When considering the dimension of domestic decision-making power, Figure 9 shows that 74.9% of women participate in major household decisions, such as significant purchases or healthcare.

Figure 9: Adolescent Fertility Rate by Sex



Source: International Labour Organization

This figure reflects a certain level of autonomy within the household, yet this autonomy is not sufficiently reflected in formal economic and political spheres. Overall, the data reveal significant but precarious participation of women in the economy, persistent educational barriers, limited access to financial services, and chronic underrepresentation in decision-making positions.

Compared to other low-income countries and those in the Sub-Saharan African region, Madagascar displays mixed performance, with notable progress in literacy but substantial structural gaps in employment, secondary education, political participation, and economic empowerment. To bridge these gaps, targeted policies focusing on girls' education, access to formal employment, inclusive finance, and political representation are essential.

3.8 Global synthesis

The theoretical analysis has highlighted several key drivers education, economic participation, and empowerment whose effects remain insufficiently quantified in the Malagasy context. As evidenced by the examination of indicators from the World Bank's Gender Data Portal, significant gaps persist between men and women in terms of access to secondary education, employment quality, and economic representation.

To deepen these findings and test one of the central hypotheses, an econometric approach is employed. This modeling, based on available time series data for Madagascar from 1990 to 2023, enables the quantification of the impact of women's literacy and public education expenditure on national economic performance, while controlling for potential structural shocks.

4 Methodology

4.1 Theoretical Foundations

The analysis is based on an extension of the neoclassical Solow model (1956), in which human capital plays an explicit role in the growth dynamics. In its basic form, the aggregate production function is expressed as follows:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}, \quad \text{où } 0 < \alpha < 1 \tag{1}$$

where Y_t denotes the real gross domestic product at period t, K_t the physical capital stock, L_t the labor force, and A_t a measure of total factor productivity.

To analyze income per capita, this expression is divided by the labor force:

$$\frac{Y_t}{L_t} = A_t \left(\frac{K_t}{L_t}\right)^{\alpha} \tag{2}$$

However, this formulation overlooks a crucial dimension in developing economies: the accumulation of human capital, notably through education. To address this, a variable H_t, is introduced, representing the average human capital per worker. This corresponds to considering that the labor factor is more accurately measured in units of effective labor, i.e., $H_t L_t$.

The production function then becomes:

$$Y_t = A_t K_t^{\alpha} (H_t L_t)^{1-\alpha} \tag{3}$$

This yields, in terms of per capita income:

$$\frac{Y_t}{L_t} = A_t \left(\frac{K_t}{L_t}\right)^{\alpha} H_t^{1-\alpha} \tag{4}$$

In other words, income per capita depends not only on physical capital per capita but also on the level of human capital, represented here by H_t.

Within this framework, two fundamental channels of human capital accumulation are considered:

- the **female literacy rate**, which reflects girls' access to basic education and thus represents the average quality of female human capital;
- **public education expenditures**, which measure the collective effort made to strengthen formal education and improve the future productivity of the workforce.

Assuming that H_t is positively related to these two variables, we can consider a functional relationship such that:

$$H_t = f(ALPH\_FEM_t, DEP\_EDUC_t) \tag{5}$$

Therefore, the empirical relationship to be estimated can be derived in logarithmic form from the production function as follows:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln A_t + \alpha \ln\left(\frac{K_t}{L_t}\right) + (1-\alpha)\ln H_t \tag{6}$$

By replacing H_t with its observable determinants, we obtain an equation of the following form:

$$\begin{aligned} \ln\left(\frac{Y_t}{L_t}\right) = \beta_0 &+ \beta_1 \ln\left(\frac{K_t}{L_t}\right) \\ &+ \beta_2 \ln(ALPH\_FEM_t) \\ &+ \beta_3 \ln(DEP\_EDUC_t) + \varepsilon_t \end{aligned} \tag{7}$$

This specification allows for an empirical test of the impact of physical capital, female literacy, and public education expenditures on the average standard of living. It aligns with endogenous growth models (Lucas (1988); Barro (1991)), which posit that human capital accumulation is a key driver of economic development.

In particular, the female literacy rate represents a strategic lever in low-income countries: not only does it contribute to increasing individual productivity, but it also generates positive externalities on

health, fertility, and labor market participation.

4.2 Analytical Framework

This study employs an econometric approach based on the Ordinary Least Squares (OLS) method to estimate the effect of female literacy on GDP per capita (GDP/PC) in Madagascar. The objective is to assess, from a gender perspective, the specific contribution of female human capital to national economic performance over the period 1990–2023.

The basic estimated equation takes the following form:

$$PIB\_HAB_t = \beta_0 + \beta_1 \cdot DEP\_EDUC_t + \beta_2 \cdot ALPH\_FEM_t + \beta_3 \cdot DUM_t + \varepsilon_t \quad (8)$$

where:

- PIB_HAB_t denotes the gross domestic product per capita in year t ;
- DEP_EDUC_t represents the percentage of public education expenditure in GDP;
- $ALPH\_FEM_t$ is the female adult literacy rate;
- $DUM_t$is a dummy variable capturing a potential structural break;
- ε_t is the random error term, assumed to be normally distributed, homoscedastic, and serially uncorrelated.

4.3 Data and Observation Period

The dataset comprises 34 annual observations covering the period from 1990 to 2023. The data are primarily drawn from the World Bank's international statistical databases. All variables have been rigorously verified to ensure temporal consistency and cross-comparability.

4.4 Justification of the explanatory variables

The female literacy rate ($ALPH\_FEM$) is considered a robust indicator of female human capital, closely linked to productive capacities, household behaviors, and rational economic choices.

Public education expenditures (DEP_EDUC), expressed as a percentage of GDP, capture the fiscal effort made by the state to strengthen human capital. They are included as a control variable to distinguish the specific effect of female literacy from a general educational investment effect.

The variable DUM is a binary indicator designed to capture potential structural breaks in the time series, notably corresponding to crises that affected the Malagasy economy during the periods 1991, 2002, 2009, and 2020.

4.5 Methodological limitations

The analysis remains subject to certain limitations: the relatively small sample size may affect the statistical power of the tests, and some variables potentially influencing per capita GDP could not be included due to their lack of significance within the overall model.

These limitations are, however, partially offset by the rigor of the model specification and its theoretical coherence.

5 Empirical results

5.1 Presentation of results

The results of the econometric model estimation are presented in table 2. The model explains approximately 60% of the variation in GDP per capita over the study period, with a coefficient of determination (R^2) of 0,6018. All estimated coefficients align with theoretical expectations, except for the dummy variable DUM, whose effect is not statistically significant.

Table 1: Variables Used, Definitions, and Sources

Variable	Définition	Source
PIB_HAB	Gross Domestic Product per Capita (GDP per capita) (dollars constants de 2015)	World Bank
DEP_EDUC	Public Education Expenditure (% of GDP)	World Bank
ALPH_FEM	Female Literacy Rate (Aged 15 and Above)	World Bank
DUM	Binary Variable Capturing a Structural Break (Value 1 from a Given Year Onwards)	Constructed by the Authors

Table 2: Regression Results – Dependent Variable : *PIB_HAB*

Variable	Coefficient	Erreur std.	t-stat.	p-valeur
DEP_EDUC	48,1042	23,7071	2,0291	0,0514
ALPH_FEM	7,9068	1,9243	4,1088	0,0003
C	-242,6077	103,4453	-2,3453	0,0258
DUM	-8,2550	39,6516	-0,2082	0,8365
Global model statistics				
R^2	0,6018			
R^2 ajusté	0,5620			
Statistique *F*	15,1147	(p-valeur : 0,000004)		

5.2 Model Robustness

Beyond the individual significance of the coefficients and the overall explanatory power of the model (R^2 = 0,60), its robustness was assessed using structural stability tests based on recursive residuals: the CUSUM and CUSUM of squares tests.

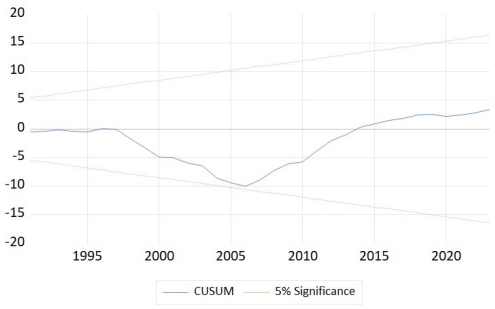
The graphical results of these tests are displayed in Figure 10. . In both cases, the test statistics remain within the 5% critical bounds, suggesting the absence of significant structural breaks over the study period. The model thus demonstrates satisfactory coefficient stability, which reinforces the reliability of the inferences drawn from the estimations.

5.3 Interpretation of results

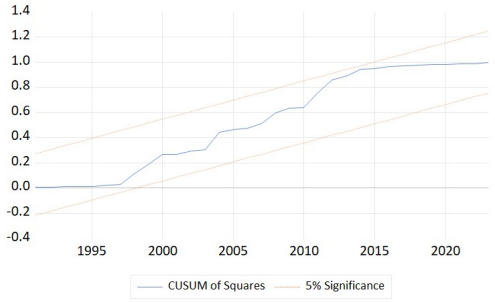
The coefficient associated with the female literacy rate (*ALPH_FEM*) is positive, statistically significant at the 1% level, and estimated at 7,91 USD in per capita GDP, all else being equal. This result underscores the critical importance of female human capital in driving economic performance.

Public education expenditure as a percentage of GDP (*DEP_EDUC*) also exhibits a positive effect, significant at the 5% level. An increase in this indicator is associated with a rise of 48 USD in per capita GDP, supporting the hypothesis that educational investment directly contributes to national wealth.

The constant term (*C*) is negative and statistically significant, suggesting that in the absence of the explanatory variables, per capita GDP would be structurally lower. Finally, the dummy variable (*DUM*), although included to test for a possible structural break, does not show any statistically significant effect on per capita GDP and will therefore be excluded from the main interpretation.



(a) Test CUSUM



(b) Test CUSUM of scares

Figure 10: Coefficient stability tests: CUSUM and CUSUM of squares

6 Discussions

The econometric results provide compelling evidence of the robust relationship between women's education and economic performance in Madagascar. This finding, firmly grounded in the literature on inclusive development, underscores the central role of female literacy as a transformative driver of economic growth, far beyond its intrinsic educational or social value. More precisely, the analysis reveals that a one-percentage-point increase in the female literacy rate is associated with an average increase of approximately USD 7.9 in GDP per capita a statistically significant effect at the 1% level. This elasticity highlights the direct and measurable contribution of female human capital to national growth dynamics, thereby validating the initial hypotheses of the study.

This result is empirically supported by data from the World Bank's Gender Data Portal. Figure 4 shows that in 2022, 78.9% of adult Malagasy women were literate a rate higher than that of men and above the regional average. However, this relative performance masks a deeper structural deficit: the low completion rate of secondary education, as illustrated in Figure 3 (only 33.5% for girls), hampers women's access to higher qualifications and limits the long-term returns on their human capital.

This disconnect between basic literacy and educational continuity reinforces the conclusions of the econometric model, which also highlights the positive effect of public education expenditure, statistically significant at the 5% level. This suggests that budgetary investment in education can foster growth, provided it is strategically directed toward reducing barriers specific to girls' education and improving teaching quality. In other words, simply increasing education budgets is not sufficient unless accompanied by a targeted strategy for inclusive female education.

Beyond education, other indicators from the Gender Data Portal reveal that female human capital remains structurally underutilized in the economic system. While Figure 1 indicates a strong presence of women in the economy (82.6%), Figure 2 shows that 88.2% of working women hold precarious jobs, compared to 81.4% of men. This imbalance reflects a dissociation between quantitative participation and qualitative valuation of women's work.

In other words, women are present in the economy but predominantly in informal, insecure, and low-quality employment conditions. This structural precariousness limits their ability to capitalize on their education, thereby reducing their effective contribution to national productivity.

This observation is further exacerbated by persistent financial exclusion. Figure 5 reveals that less than 26% of women have a bank or mobile money account well below the regional average. This lack of financial inclusion restricts their economic autonomy, access to credit, and ability to undertake

income-generating activities. Thus, even when literate, women have fewer tools to convert their human capital into economic capital.

The underrepresentation of women in decision-making spheres is another major constraint. Figures 6 and 7 show that only 16% of parliamentary seats and 28.6% of managerial positions are held by women. This political and institutional marginalization limits their influence on strategic orientations, public budgets, and development programs, perpetuating gender-blind economic policies.

Analytically, several explanatory channels help interpret the positive effect of female education on growth. Literacy improves cognitive skills, access to information, entrepreneurial ability, and individual productivity. It also promotes behaviors favorable to health, children's education, and household resource management. In this sense, it generates positive and lasting intergenerational externalities that strengthen the foundations of sustained growth.

Moreover, the impact of female education extends far beyond the purely economic realm. A substantial body of literature documents its social and institutional externalities, including significant declines in early fertility, improvements in reproductive health, reductions in infant mortality, and the strengthening of civic participation and local governance (Gakidou et al. (2010) ; Duflo (2012) ; Nussbaum (2000)). Although these outcomes are difficult to incorporate within traditional econometric models, they enhance community resilience and stabilize development trajectories. They reveal a dimension of female human capital often overlooked yet crucial its capacity to generate intergenerational, institutional, and communal externalities. Recognizing these effects entails valuing women's education not merely as an economic lever, but as the foundation of profound social transformation.

However, these positive effects remain conditional on the surrounding socioeconomic structure. When access to formal employment, financial resources, decision-making positions, or economic rights remains limited, education loses part of its economic potential. The data thus illustrate a phenomenon of underutilization of female human capital, linked to a lack of structural opportunities.

These findings therefore call for a rethinking of development policies through an intersectional and structural lens. It is necessary to invest simultaneously in girls' education, the formalization of female employment, financial inclusion, and political representation to fully unlock the potential of female human capital. Only under these conditions can women's education become a true engine of inclusive, equitable, and sustainable growth in Madagascar.

Ultimately, this work provides additional empirical evidence to a growing consensus in development circles: educating women is not only about correcting a historical injustice; it is about building a more robust economy, a fairer society, and a more viable future.

7 Conclusion

The findings of this study confirm that female literacy constitutes a key lever for stimulating economic development in Madagascar. The econometric analysis highlights a statistically significant relationship between the female literacy rate and GDP per capita, underscoring the direct impact of female human capital on the country's economic performance. In parallel, public spending on education while only moderately effective emerges as a complementary channel to strengthen this effect, provided it is appropriately targeted and equitably distributed.

However, sectoral analysis also reveals that the potential of female human capital remains underutilized. Although the majority of women are literate, they continue to face numerous structural barriers: low secondary school completion rates, precarious employment conditions, financial exclusion, and marginalization from decision-making spheres. These obstacles significantly reduce the social and

economic returns on educational investment.

In this context, structural reforms are essential. Improving girls' educational continuity, facilitating women's access to formal employment, enhancing their financial inclusion, and increasing their representation in economic and political institutions are all necessary measures. The articulation between education, economic, and social policies must be approached through a systemic and inclusive lens.

Thus, this research calls for a redefinition of development priorities by integrating gender equality as a precondition for the success of growth policies. Educating and empowering women in Madagascar is not merely a matter of social justice it is a strategic imperative for building a more productive, resilient, and inclusive economy.

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