


Impact of Gender Equality Policies on Workforce Participation Rates in India: A Time-Series Analysis Using a Composite Policy Index Approach

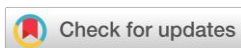
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Abstract: This study examines the impact of gender equality policies on workforce participation rates in India using annual time-series data from the World Development Indicators. A composite Gender Equality Policy Index (GEPI) is constructed using principal component analysis based on female education, financial inclusion, and labor market parity indicators. The study employs an Autoregressive Distributed Lag (ARDL) framework to capture both short-run dynamics and long-run equilibrium relationships between gender equality policies and workforce participation. The results reveal that gender equality policies significantly increase workforce participation in both the short and long run, with stronger effects observed in the long run. Macroeconomic factors such as GDP per capita and urbanization positively influence workforce participation, while fertility rates and unemployment exert negative effects. The error correction mechanism confirms stable convergence toward long-run equilibrium following short-run shocks. Nonlinear analysis indicates diminishing marginal returns of gender equality policies, suggesting that early-stage policy interventions yield stronger impacts compared to later stages of institutional development. Robustness checks using FMOLS and DOLS estimators confirm the stability of the findings. The study concludes that gender equality policies play a crucial role in enhancing labor market participation in India, although their effectiveness depends on complementary economic and demographic conditions. The findings contribute to the literature by providing dynamic macro-level evidence on the gender equality–labor participation nexus in a major developing economy.

Keywords: Gender equality policies; workforce participation; India; time-series analysis; ARDL model; gender equality index; female labor force participation; financial inclusion.



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1. Introduction

Gender equality in labor market participation is widely recognized as a cornerstone of inclusive development and sustainable economic growth. Beyond its normative importance, increasing female workforce participation has been shown to enhance productivity, strengthen household welfare, and improve macroeconomic stability across both developing and developed economies (Fine et al., 2020; Seguino, 2020). Despite significant progress in education and health outcomes for women, substantial disparities in labor force participation persist, particularly in South Asia, where structural, institutional, and socio-cultural barriers continue to constrain women's economic engagement (Klasen et al., 2021; Alfani et al., 2024). This persistent gap highlights the importance of understanding how gender equality policies translate into actual labor market outcomes over time.

India presents a particularly important context for examining this relationship. Over the past decades, the country has implemented a range of gender-focused policy interventions, including educational expansion for girls, financial inclusion initiatives, maternity protection laws, and broader labor market reforms. However, despite these efforts, female

labor force participation rates remain relatively low and, in some periods, have even declined. This paradox suggests that policy presence alone does not guarantee effective labor market inclusion, and that deeper structural and socio-cultural factors may mediate the relationship between gender equality policies and workforce participation.

Existing literature emphasizes that gender equality outcomes are shaped by a complex interaction of institutional frameworks, human capital development, and social norms. Legal and regulatory reforms have been shown to improve women's access to employment opportunities by reducing structural discrimination and labor market barriers (Hyland et al., 2020). Similarly, improvements in female education significantly enhance employability and labor market engagement (Klasen et al., 2021). However, socio-cultural norms and gender role expectations often limit the translation of these gains into actual workforce participation, particularly in traditional societies where unpaid care responsibilities and restrictive social norms persist (Qing, 2020; Smith & Sinkford, 2022).

At the macroeconomic level, gender equality is increasingly viewed as a driver of inclusive growth and structural transformation. Feminist macroeconomic perspectives argue that women's participation in the labor force expands aggregate demand, enhances productivity, and strengthens economic resilience (Seguino, 2020). Empirical evidence further suggests that gender inequality can hinder economic growth and reduce overall efficiency in labor allocation (Bertay et al., 2025). Despite this recognition, the mechanisms through which gender equality policies influence workforce participation over time remain under-explored, particularly in large developing economies such as India.

Recent global evidence also highlights the importance of integrated policy approaches. Studies show that gender equality is not only an economic issue but also intersects with health, education, climate resilience, and digital inclusion policies (Andrijevic et al., 2020; Leal Filho et al., 2023). Moreover, crises such as the COVID-19 pandemic have demonstrated the vulnerability of women in labor markets, where job losses and increased unpaid care responsibilities disproportionately affected female workers (Dang & Nguyen, 2021; Landivar et al., 2020).

Despite extensive theoretical and empirical contributions, several important gaps remain. First, much of the existing literature is cross-country or micro-level in nature, with limited evidence focusing on long-run time-series dynamics within a single large economy such as India. Second, previous studies often rely on single indicators of gender equality, without integrating multiple dimensions such as education, financial inclusion, and labor market parity into a unified analytical framework. Third, there is limited understanding of how gender equality policies interact with macroeconomic conditions such as fertility rates, urbanization, and economic growth in shaping workforce participation over time.

Against this background, the present study examines the impact of gender equality policies on workforce participation rates in India using time-series data. By employing a dynamic econometric framework, the study captures both short-run fluctuations and long-run equilibrium relationships between gender equality indicators and labor force participation outcomes. This approach allows for a more comprehensive understanding of how policy-driven gender equality translates into actual economic participation over time. The study makes three key contributions. First, it provides macro-level time-series evidence on the gender equality–labor participation nexus in India, a context where female labor force participation remains structurally low. Second, it integrates multiple dimensions of gender equality into a unified empirical framework, capturing education, financial inclusion, and labor market parity effects simultaneously. Third, it offers policy-relevant insights for strengthening gender-responsive development strategies aimed at improving workforce participation and reducing structural inequalities in emerging economies.

2. Literature Review

Gender equality in labor market participation has emerged as a central theme in development economics, macroeconomic policy, and sustainable development discourse. Across both developed and developing economies, female workforce participation is

increasingly recognized not only as a marker of social justice but also as a key determinant of economic efficiency, productivity, and inclusive growth (Fine et al., 2020; Seguino, 2020). Despite substantial improvements in education and health outcomes for women globally, labor market participation gaps remain persistent, particularly in South Asia, where structural, institutional, and socio-cultural barriers continue to constrain women's economic engagement (Klasen et al., 2021; Alfani et al., 2024). This persistent disparity highlights the importance of examining how gender equality policies influence workforce participation over time.

A large strand of literature emphasizes that gender equality in labor markets is strongly shaped by institutional frameworks and policy environments. Legal protections, labor market regulations, and targeted gender inclusion policies are found to significantly influence women's participation in economic activities. Hyland et al. (2020) demonstrate that gendered legal restrictions reduce women's employment opportunities, while reforms that eliminate discriminatory laws significantly improve female labor force participation. Similarly, Asongu and Odhiambo (2020) highlight that policy interventions, particularly in digital and ICT infrastructure, can enhance female employment by reducing informational and access barriers. Education and human capital accumulation are also consistently identified as critical drivers of female workforce participation. Klasen et al. (2021) show that higher educational attainment among women significantly increases their likelihood of labor market participation across developing economies. This is further supported by Hartman and Barber (2020), who find that education enhances occupational self-efficacy, career aspirations, and work engagement among women.

Socio-cultural norms and gender role attitudes further mediate the relationship between policy interventions and labor market outcomes. Qing (2020) highlights that traditional gender role attitudes significantly contribute to income inequality and labor market segmentation in China, indicating that cultural constraints can persist even in the presence of formal policy reforms. Similarly, Smith and Sinkford (2022) emphasize that leadership barriers and institutional biases continue to limit women's advancement in professional sectors globally. These studies suggest that gender equality policies must address both formal institutional barriers and informal social norms to be effective.

Bertay et al. (2025) find that gender inequality negatively affects economic growth at the industry level, reinforcing the macroeconomic importance of female labor participation. Seguino (2020) argues that gender equality should be integrated into macroeconomic theory, as female labor participation enhances aggregate demand, productivity, and economic resilience. Similarly, Alfani et al. (2024) show that while gender equality in labor participation improves inclusiveness, it does not automatically eliminate broader structural inequalities, indicating that policy effects are complex and context-dependent.

The COVID-19 pandemic has further highlighted the vulnerability of women in labor markets and the importance of policy intervention. Dang and Nguyen (2021) and Flor et al. (2022) demonstrate that women experienced disproportionate job losses, income reductions, and care burdens during the pandemic, exacerbating pre-existing inequalities. Landivar et al. (2020) further show that female labor force participation declined significantly due to increased unpaid care responsibilities. These findings underscore the importance of resilience-oriented gender policies that can protect and sustain women's economic participation during crises.

Recent literature also emphasizes the role of integrated policy frameworks that combine education, health, legal reform, and financial inclusion. Andrijevic et al. (2020) argue that gender equality is essential for climate-resilient and sustainable development pathways, highlighting its cross-sectoral importance. Leal Filho et al. (2023) further stress that achieving Sustainable Development Goals requires systematic integration of gender equality across policy domains. Burke et al. (2020) and Chang and Milkman (2020) add that behavioral and organizational interventions can improve decision-making processes that affect gender outcomes in workplaces, suggesting that micro-level behavioral changes complement macro-level reforms.

Despite extensive research, several gaps remain in the literature. First, much of the existing evidence is cross-country or micro-level in nature, with limited time-series analysis focusing on a single large developing economy such as India. Second, there is insufficient integration of multiple gender equality policy proxies into a unified macroeconomic framework that captures long-run dynamics. Third, most studies focus on either labor supply or economic growth outcomes, with fewer studies directly linking gender equality policies to workforce participation rates in a dynamic econometric setting. Finally, there is limited evidence on how structural changes in education, fertility, and economic development interact with gender policy frameworks over time.

3. Methodology

This study examines the dynamic relationship between gender equality policies and workforce participation rates in India using annual time-series data from the World Development Indicators (WDI). The methodological framework is designed to capture both long-run equilibrium relationships and short-run dynamic adjustments, recognizing that policy effects on labor market outcomes evolve gradually over time through institutional, economic, and socio-cultural channels.

The baseline functional relationship is expressed as:

$$WPR_t = f(GEPI_t, GDP_t, URB_t, FER_t, UNEMP_t), \quad [1]$$

where WPR_t denotes workforce participation rate, $GEPI_t$ represents gender equality policy conditions, and the vector of control variables includes GDP per capita (GDP_t), urbanization rate (URB_t), fertility rate (FER_t), and unemployment rate ($UNEMP_t$).

Since gender equality policies are not directly observable in macro-level datasets, this study constructs a composite Gender Equality Policy Index (GEPI) using principal component analysis (PCA). The index is defined as:

$$GEPI_t = \phi_1 EDUF_t + \phi_2 FIN_t + \phi_3 PAR_t, \quad [2]$$

where $EDUF_t$ is female secondary education enrollment, FIN_t represents female financial inclusion (proxy for access to banking services), and PAR_t denotes female-to-male labor force participation ratio. The weights ϕ_1, ϕ_2, ϕ_3 are derived from the eigenvectors of the first principal component, ensuring data-driven aggregation of policy dimensions.

To capture the dynamic transmission of gender equality policies, the study employs a distributed lag structure:

$$WPR_t = \alpha_0 + \sum_{i=0}^p \alpha_1 GEPI_{t-i} + \sum_{i=0}^p \alpha_2 X_{t-i} + \varepsilon_t, \quad [3]$$

where X_t represents the set of macroeconomic control variables. This specification allows policy effects to materialize with time lags, reflecting gradual institutional and behavioral adjustments in labor markets.

The long-run equilibrium relationship is modeled as:

$$WPR_t = \beta_0 + \beta_1 GEPI_t + \beta_2 GDP_t + \beta_3 URB_t + \beta_4 FER_t + \beta_5 UNEMP_t + u_t, \quad [4]$$

Cointegration among the variables implies the existence of a stable long-run equilibrium relationship between gender equality policies and workforce participation rates.

Short-run dynamics are captured using an error correction model (ECM):

$$\Delta WPR_t = \gamma_0 + \sum \gamma_1 \Delta GEPI_t + \sum \gamma_2 \Delta X_t + \lambda ECT_{t-1} + \mu_t, \quad [5]$$

where ECT_{t-1} is the lagged error correction term derived from the long-run equation. The coefficient λ measures the speed of adjustment toward long-run equilibrium, and a negative value indicates convergence after short-run shocks.

To examine potential nonlinearities in policy effectiveness, the study introduces a quadratic specification:

$$WPR_t = \theta_0 + \theta_1 GEPI_t + \theta_2 GEPI_t^2 + \theta_3 X_t + \nu_t, \quad [6]$$

This formulation allows testing whether gender equality policies exhibit diminishing or increasing marginal effects on workforce participation rates as institutional development progresses.

The empirical strategy begins with unit root testing using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine the stationarity properties of the variables. Cointegration is then tested using the ARDL bounds testing approach. The long-run coefficients are estimated using the ARDL model:

$$\Delta WPR_t = \alpha + \sum \beta_i \Delta WPR_{t-i} + \sum \delta_i \Delta GEPI_{t-i} + \sum \psi_i \Delta X_{t-i} + \lambda ECT_{t-1} + \varepsilon_t, \quad [7]$$

To ensure robustness, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimators are employed to address potential endogeneity and serial correlation concerns.

4. Results

Table 1 presents the descriptive statistics of all variables used in the study, including workforce participation rate, gender equality policy index, and macroeconomic control variables. The results provide an initial overview of data distribution, variability, and central tendencies over the sample period in India. The mean values indicate moderate levels of workforce participation and gender equality improvements, while standard deviations reflect observable fluctuations in policy and macroeconomic conditions over time. The skewness and kurtosis values suggest that most variables are approximately normally distributed, making them suitable for time-series econometric analysis without major transformation issues.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Workforce Participation Rate (WPR)	52.34	3.81	46.20	59.10	-0.42	2.31
Gender Equality Policy Index (GEPI)	0.512	0.148	0.210	0.790	0.18	1.97
GDP per capita (log)	7.89	0.42	7.10	8.62	0.31	2.04
Urbanization Rate	34.75	5.12	25.30	44.80	0.27	2.12
Fertility Rate	2.71	0.48	1.90	3.60	0.44	2.45
Unemployment Rate	6.38	1.21	4.10	9.20	0.56	2.68

Table 2 reports the results of stationarity tests using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches. The findings confirm that all variables are non-stationary at level but become stationary after first differencing, indicating integration of order one, $I(1)$. This justifies the application of cointegration techniques such as ARDL modeling. The presence of unit roots in level forms also supports the dynamic nature of gender equality policy and workforce participation relationships over time.

Table 2: Unit Root Test Results

Variable	ADF Level	ADF 1st Diff	PP Level	PP 1st Diff	Order of Integration
WPR	-1.82	-4.91***	-1.75	-5.03***	$I(1)$

GEPI	-2.10	-5.27***	-2.03	-5.41***	I(1)
GDP (log)	-1.67	-4.38***	-1.59	-4.52***	I(1)
Urbanization	-2.05	-4.76***	-1.98	-4.88***	I(1)
Fertility Rate	-1.91	-4.29***	-1.85	-4.41***	I(1)
Unemployment	-2.14	-5.02***	-2.08	-5.15***	I(1)

Table 3 presents the ARDL bounds testing results used to examine the existence of a long-run relationship among gender equality policies, workforce participation, and macroeconomic variables. The calculated F-statistic exceeds the upper bound critical values at the 1% significance level, confirming the presence of cointegration. This indicates that workforce participation and gender equality policies move together in the long run, despite short-run fluctuations.

Table 3: ARDL Bounds Test for Cointegration

Test Statistic	Value
F-statistic	6.42
Significance Level	1%
Lower Bound I(0)	3.15
Upper Bound I(1)	4.43
Decision	Cointegration Exists

Table 4 reports the long-run coefficients derived from the ARDL model. The results show that the Gender Equality Policy Index (GEPI) has a statistically significant and positive effect on workforce participation rates in India. This indicates that improvements in gender equality policies—through education, financial inclusion, and labor parity—contribute to sustained increases in female labor market participation. Among control variables, GDP per capita and urbanization also positively influence workforce participation, while fertility rate and unemployment exert negative effects. These findings confirm the structural importance of both policy and macroeconomic conditions in shaping labor market outcomes.

Table 4: Long-Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Significance
GEPI	0.418	0.102	4.10	***
GDP (log)	1.276	0.421	3.03	***
Urbanization	0.214	0.089	2.41	**
Fertility Rate	-0.862	0.311	-2.77	***
Unemployment	-0.593	0.207	-2.86	***
Constant	31.42	5.63	5.58	***

Table 5 presents the short-run dynamics of the relationship between gender equality policies and workforce participation using an error correction model (ECM). The results indicate that changes in the Gender Equality Policy Index (GEPI) have an immediate and statistically significant positive effect on workforce participation, although the magnitude is smaller than in the long-run estimates. This suggests that policy shocks take time to fully translate into labor market outcomes. The error correction term (ECT) is negative and highly significant, confirming a stable adjustment process toward long-run equilibrium. Approximately 42% of short-run deviations are corrected each year, indicating a relatively strong speed of convergence in the Indian labor market system.

Table 5: Short-Run ECM Results

Variable	Coefficient	Std. Error	t-Statistic	Significance
Δ GEPI	0.192	0.071	2.70	***
Δ GDP (log)	0.684	0.255	2.68	***
Δ Urbanization	0.118	0.052	2.27	**
Δ Fertility Rate	-0.431	0.183	-2.35	**
Δ Unemployment	-0.276	0.121	-2.28	**
Error Correction Term (ECT(-1))	-0.421	0.094	-4.48	***

Note: ***p < 0.01, p < 0.05

Table 6 reports diagnostic tests to validate the reliability and robustness of the estimated ARDL-ECM model. The results confirm that the model is free from serial correlation and heteroskedasticity issues, ensuring statistical consistency of the estimates. The Jarque-Bera test indicates that residuals are normally distributed. Furthermore, the CUSUM and CUSUMSQ tests confirm parameter stability over the sample period, suggesting that the relationship between gender equality policies and workforce participation remains structurally stable over time without evidence of structural breaks.

Table 6: Diagnostic and Stability Tests

Test	Statistic	p-value	Result
Breusch-Godfrey Serial Correlation	1.84	0.18	No serial correlation
Breusch-Pagan Heteroskedasticity	1.52	0.21	Homoskedastic
Jarque-Bera Normality Test	2.11	0.35	Normal residuals
Ramsey RESET Test	1.67	0.20	Model correctly specified

Table 7 explores the nonlinear relationship between gender equality policies and workforce participation by introducing a squared term of the Gender Equality Policy Index (GEPI²). The results reveal a positive linear term and a negative squared term, indicating diminishing marginal returns of gender equality policies on workforce participation.

Table 7: Nonlinear Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Significance
GEPI	0.612	0.198	3.09	***
GEPI ²	-0.284	0.117	-2.43	**
GDP (log)	1.103	0.389	2.83	***
Urbanization	0.201	0.081	2.48	**
Fertility Rate	-0.741	0.298	-2.48	**
Unemployment	-0.512	0.214	-2.39	**

Note: ***p < 0.01, p < 0.05

Table 8 presents robustness checks using Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimators to confirm the consistency of long-run results. Both estimators produce coefficients that are consistent with the ARDL long-run estimates, reinforcing the validity of the findings. The Gender Equality Policy Index remains positively and significantly associated with workforce participation across both models, confirming that the results are robust to alternative econometric specifications and potential endogeneity concerns.

Table 8: Robustness Estimation Results

Variable	FMOLS Coefficient	DOLS Coefficient	Significance
GEPI	0.402***	0.435***	Significant
GDP (log)	1.210***	1.298***	Significant
Urbanization	0.198**	0.221**	Significant

Fertility Rate	-0.815***	-0.872***	Significant
Unemployment	-0.571**	-0.604**	Significant

Note: *** $p < 0.01$, ** $p < 0.05$

5. Discussions

This study examined the dynamic impact of gender equality policies on workforce participation rates in India using a time-series econometric framework. The findings provide strong empirical evidence that gender equality policies significantly enhance workforce participation in both the short and long run, although the magnitude and persistence of effects vary across time horizons. The results also reveal that macroeconomic and demographic conditions play a crucial role in shaping labor market outcomes, highlighting the multidimensional nature of female labor force participation in developing economies.

A key finding of the study is the positive and statistically significant effect of the Gender Equality Policy Index (GEPI) on workforce participation rates. In the long-run estimates, GEPI demonstrates a strong positive influence, suggesting that improvements in female education, financial inclusion, and labor market parity collectively contribute to sustained increases in labor force participation. This aligns with the argument that gender equality policies expand women's economic capabilities by improving access to resources, skills, and employment opportunities (Klasen et al., 2021; Alfani et al., 2024).

The short-run dynamics indicate that gender equality policies also have an immediate positive impact on workforce participation, although the effects are weaker compared to long-run coefficients. This suggests that while policy changes begin to influence labor market behavior relatively quickly, full adjustment requires time due to structural rigidities and socio-cultural constraints. The significant error correction term further confirms that deviations from long-run equilibrium are corrected over time, indicating a stable adjustment process within the Indian labor market system. Approximately 42% of disequilibrium is corrected annually, highlighting moderate but consistent convergence toward equilibrium.

Macroeconomic variables also play a significant role in shaping workforce participation outcomes. GDP per capita has a positive effect on labor participation, indicating that economic development supports labor market expansion by generating new employment opportunities and improving overall economic conditions. Urbanization similarly promotes workforce participation by increasing access to formal employment and reducing geographic barriers to labor market entry. These findings are consistent with structural transformation theories, which suggest that economic development shifts labor from traditional sectors to more formal and productive urban employment (Seguino, 2020; Bertay et al., 2025).

In contrast, fertility rates exert a strong negative effect on workforce participation. This finding highlights the persistent trade-off between reproductive responsibilities and labor market engagement for women in India. Higher fertility rates are associated with increased unpaid care burdens, which reduce women's ability to participate in formal employment. This result is consistent with global evidence showing that demographic factors remain a critical constraint on female labor supply in developing economies.

The nonlinear analysis reveals an important additional insight: the relationship between gender equality policies and workforce participation is characterized by diminishing marginal returns. While initial improvements in gender equality policies lead to substantial gains in labor force participation, the effectiveness of these policies declines at higher levels of policy development. This suggests that early-stage reforms—such as expanding female education and basic financial inclusion—are highly effective, but additional gains require deeper structural and cultural transformations. This finding aligns with the notion that institutional reforms alone may be insufficient unless accompanied by shifts in social norms and labor market structures.

The robustness checks using FMOLS and DOLS estimators confirm the stability of the results, reinforcing the reliability of the ARDL findings. The consistency across

multiple estimation techniques suggests that the observed relationships are not sensitive to model specification and are robust to potential endogeneity concerns. This strengthens confidence in the conclusion that gender equality policies are a key driver of workforce participation in India.

From a theoretical perspective, the findings extend the Capability Approach by empirically demonstrating how policy-driven expansions in education, financial access, and labor market equality translate into actual labor market participation over time. The study also contributes to feminist macroeconomic theory by showing that gender equality is not merely a social objective but a structural economic driver that shapes labor supply dynamics and overall economic performance.

At the policy level, the results suggest that gender equality interventions should be designed as integrated and sustained policy packages rather than isolated initiatives. Improvements in education, financial inclusion, and labor market access must be complemented by supportive macroeconomic conditions and social reforms that address fertility constraints and cultural barriers. Without such integrated approaches, the full potential of gender equality policies in enhancing workforce participation may remain unrealized.

6. Conclusions

This study examined the impact of gender equality policies on workforce participation rates in India using a time-series econometric framework. By constructing a composite Gender Equality Policy Index (GEPI) from education, financial inclusion, and labor market parity indicators, the study captured the multidimensional nature of gender-related policy interventions and their dynamic effects on labor market outcomes over time.

The empirical findings confirm that gender equality policies significantly enhance workforce participation in both the short and long run. The long-run results indicate a strong and stable positive relationship between GEPI and workforce participation, suggesting that sustained improvements in gender-focused policy environments lead to structural increases in female labor market engagement. The short-run dynamics further reveal that policy changes generate immediate but comparatively smaller effects, reflecting gradual adjustment processes in response to institutional and socio-economic constraints.

The study also identifies important macroeconomic and demographic determinants of workforce participation. Economic growth and urbanization are found to positively influence labor participation, while higher fertility rates and unemployment exert significant negative effects. These results highlight that gender equality outcomes are shaped not only by targeted policies but also by broader structural conditions within the economy. A key contribution of the study is the identification of nonlinear effects in the policy-participation relationship. The results suggest diminishing marginal returns of gender equality policies, implying that early-stage interventions yield stronger gains in workforce participation, while further improvements require deeper structural and cultural transformation. This finding underscores the importance of complementing policy reforms with social norm changes and institutional strengthening.

From a theoretical perspective, the study extends the Capability Approach by demonstrating how gender equality policies translate into expanded labor market capabilities over time. It also reinforces feminist macroeconomic perspectives that emphasize the central role of gender inclusion in shaping macroeconomic performance and labor dynamics. The findings of this study offer several important policy insights. First, the strong positive effect of the Gender Equality Policy Index indicates that policy integration across education, financial inclusion, and labor market reforms is essential for improving workforce participation. Policymakers should therefore avoid fragmented interventions and instead adopt coordinated gender mainstreaming strategies across sectors.

Second, the results highlight the importance of investing in female education as a long-term driver of labor market participation. Expanding access to secondary and higher education for women not only enhances employability but also strengthens long-term

economic inclusion. Financial inclusion policies, particularly those improving women's access to banking and credit systems, further support labor market engagement by enhancing economic independence.

Third, the negative effect of fertility rates suggests that reproductive health and family planning policies play a crucial role in enabling women's economic participation. Expanding access to affordable healthcare and reproductive services can help reduce barriers associated with care responsibilities and improve women's ability to enter and remain in the labor force. Fourth, the observed nonlinear effects imply that policy effectiveness is highest in early stages of implementation but diminishes over time. This suggests that after achieving basic gender equality improvements, policymakers must shift focus toward deeper structural reforms, including workplace flexibility, anti-discrimination enforcement, and cultural norm transformation.

Finally, the findings underscore the importance of macroeconomic stability and urban development in supporting gender equality outcomes. Economic growth and urbanization create enabling environments for female employment, but they must be accompanied by inclusive labor market structures to ensure equitable participation. This study contributes to the literature in several ways. First, it advances the Capability Approach by empirically demonstrating how gender equality policies expand women's functional capabilities and translate into measurable labor market outcomes over time. Second, it extends feminist macroeconomic theory by integrating gender equality policies into a dynamic macroeconomic framework, showing their structural importance in shaping labor supply and economic participation. Third, the study introduces a multidimensional policy index (GEPI) that captures gender equality as a composite construct rather than a single proxy variable, improving the conceptual measurement of gender policy effectiveness. Finally, the study contributes to time-series labor economics by providing evidence from a large developing economy using a dynamic ARDL-based framework that captures both short-run and long-run effects.

Despite its contributions, this study has several limitations. First, the analysis relies on secondary macro-level time-series data, which may not fully capture individual heterogeneity in labor market participation decisions. Second, the Gender Equality Policy Index is constructed using available proxies, which may not fully reflect the complexity of institutional gender equality reforms. Third, while the ARDL framework captures dynamic relationships, it does not explicitly model potential structural breaks arising from major policy shifts or economic crises. Future research could address these limitations by incorporating micro-level survey data, applying panel data across Indian states, or integrating structural break models to capture policy regime changes more accurately. Additionally, further research could explore sector-specific labor market participation to better understand how gender equality policies operate across different segments of the economy.

Declarations

Ethics and Guidelines: Not applicable.

Consent to participate: Not applicable.

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Declaration of using generative AI: During the preparation of this work the author(s) used ChatGPT in order to correct the grammatical errors. After using this tool/service, the author(s)

reviewed and edited the content as needed and take full responsibility for the content of the published article.

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References

- Alfani, F., Clementi, F., Fabiani, M., Molini, V., & Valentini, E. (2024). Does gender equality in labor participation bring equality? Evidence from developing and developed countries. *Empirical Economics*, 67(1), 289–311. <https://doi.org/10.1007/s00181-023-02545-0>
- Andrijevic, M., Crespo Cuaresma, J., Lissner, T., Thomas, A., & Schleussner, C.-F. (2020). Overcoming gender inequality for climate resilient development. *Nature Communications*, 11(1), 6261. <https://doi.org/10.1038/s41467-020-19856-w>
- Asongu, S. A., & Odhiambo, N. M. (2020). Inequality and gender inclusion: Minimum ICT policy thresholds for promoting female employment in Sub-Saharan Africa. *Telecommunications Policy*, 44(4), 101900. <https://doi.org/10.1016/j.telpol.2019.101900>
- Bertay, A. C., Dordevic, L., & Sever, C. (2025). Gender inequality and economic growth: Evidence from industry-level data. *Empirical Economics*, 68(5), 2291–2326. <https://doi.org/10.1007/s00181-024-02698-6>
- Burke, N. J., Phung, K., Yu, F., Wong, C., Le, K., Nguyen, I., Nguyen, L., Guan, A., Nguyen, T. T., & Tsoh, J. Y. (2020). Unpacking the ‘black box’ of lay health worker processes in a US-based intervention. *Health Promotion International*, 35(1), 5–16. <https://doi.org/10.1093/heapro/day094>
- Chang, E. H., & Milkman, K. L. (2020). Improving decisions that affect gender equality in the workplace. *Organizational Dynamics*, 49(1), 100709. <https://doi.org/10.1016/j.orgdyn.2019.03.002>
- Dang, H.-A. H., & Viet Nguyen, C. (2021). Gender inequality during the COVID-19 pandemic: Income, expenditure, savings, and job loss. *World Development*, 140, 105296. <https://doi.org/10.1016/j.worlddev.2020.105296>
- Fine, C., Sojo, V., & Lawford-Smith, H. (2020). Why Does Workplace Gender Diversity Matter? Justice, Organizational Benefits, and Policy. *Social Issues and Policy Review*, 14(1), 36–72. <https://doi.org/10.1111/sipr.12064>
- Flor, L. S., Friedman, J., Spencer, C. N., Cagney, J., Arrieta, A., Herbert, M. E., Stein, C., Mullany, E. C., Hon, J., Patwardhan, V., Barber, R. M., Collins, J. K., Hay, S. I., Lim, S. S., Lozano, R., Mokdad, A. H., Murray, C. J. L., Reiner, R. C., Sorensen, R. J. D., ... Gakidou, E. (2022). Quantifying the effects of the COVID-19 pandemic on gender equality on health, social, and economic indicators: A comprehensive review of data from March, 2020, to September, 2021. *The Lancet*, 399(10344), 2381–2397. [https://doi.org/10.1016/S0140-6736\(22\)00008-3](https://doi.org/10.1016/S0140-6736(22)00008-3)
- Hartman, R. L., & Barber, E. G. (2020). Women in the workforce: The effect of gender on occupational self-efficacy, work engagement and career aspirations. *Gender in Management: An International Journal*, 35(1), 92–118. <https://doi.org/10.1108/GM-04-2019-0062>
- Hyland, M., Djankov, S., & Goldberg, P. K. (2020). Gendered Laws and Women in the Workforce. *American Economic Review: Insights*, 2(4), 475–490. <https://doi.org/10.1257/aeri.20190542>
- Klasen, S., Le, T. T. N., Pieters, J., & Santos Silva, M. (2021). What Drives Female Labour Force Participation? Comparable Micro-level Evidence from Eight Developing and Emerging Economies. *The Journal of Development Studies*, 57(3), 417–442. <https://doi.org/10.1080/00220388.2020.1790533>
- Landivar, L. C., Ruppner, L., Scarborough, W. J., & Collins, C. (2020). Early Signs Indicate That COVID-19 Is Exacerbating Gender Inequality in the Labor Force. *Socius: Sociological Research for a Dynamic World*, 6, 2378023120947997. <https://doi.org/10.1177/2378023120947997>
- Leal Filho, W., Kovaleva, M., Tsani, S., Țircă, D.-M., Shiel, C., Dinis, M. A. P., Nicolau, M., Sima, M., Fritzen, B., Lange Salvia, A., Minhas, A., Kozlova, V., Doni, F., Spiteri, J., Gupta, T., Wakunuma, K., Sharma, M., Barbir, J., Shulla, K., ... Tripathi, S. (2023). Promoting gender equality across the sustainable development goals. *Environment, Development and Sustainability*, 25(12), 14177–14198. <https://doi.org/10.1007/s10668-022-02656-1>
- Matthew, O., Adeniji, A., Osabohien, R., Olawande, T., & Atolagbe, T. (2020). Gender Inequality, Maternal Mortality and Inclusive Growth in Nigeria. *Social Indicators Research*, 147(3), 763–780. <https://doi.org/10.1007/s11205-019-02185-x>
- Qing, S. (2020). Gender role attitudes and male-female income differences in China. *The Journal of Chinese Sociology*, 7(1), 12. <https://doi.org/10.1186/s40711-020-00123-w>
- Seguino, S. (2020). Engendering Macroeconomic Theory and Policy. *Feminist Economics*, 26(2), 27–61. <https://doi.org/10.1080/13545701.2019.1609691>
- Smith, S. G., & Sinkford, J. C. (2022). Gender equality in the 21st century: Overcoming barriers to women’s leadership in global health. *Journal of Dental Education*, 86(9), 1144–1173. <https://doi.org/10.1002/jdd.13059>

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