

RESEARCH ARTICLE

The Role of Women and Macroeconomic Factors in Sustainable Development

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Abstract

Women's economic participation and financial stability are key drivers of sustainable development, forming the foundation for equitable growth and long-term progress. This study investigates the relationship between macroeconomic factors, women's economic participation, and sustainable development in Kazakhstan from 2013–2023. The analysis is focused on key indicators, including gross value added, deflator indices, shadow economy metrics, employment rates, and environmental protection investments. Two hypotheses were tested. Regression analysis was used: (1) structural factors such as economic growth, employment, and environmental policies significantly influence sustainable investments, and (2) women's workforce participation positively impacts sustainable development.

The results confirmed the first hypothesis, supporting those macroeconomic indicators, particularly deflator indices and the shadow economy, significantly impact shaping investment patterns. However, the second hypothesis is only partially supported, as women's employment correlates with economic growth but is hindered by persistent disparities in workforce representation and access to resources. The findings of the research contribute to the existing body of knowledge on the dual role of macroeconomic stability and gender inclusion in driving sustainable development while identifying structural barriers limiting women's full economic potential. The results reveal the importance of targeted, inclusive policies to enhance gender equity and sustainable progress, offering valuable insights for policymakers in Kazakhstan and other emerging economies.

Keywords: Gender, Gender Wage, Economy, Gender Inequality, Structural Barrier, Employment, Kazakhstan

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1. INTRODUCTION

Global economy is at the stage of revealing new challenges related to achieving sustainable development. Observed changes and transformations encompass environmental issues, social equity, and economic resilience. Altogether, it forms the foundation for implementing global Sustainable Development Agenda. One of the key objectives of this agenda is achieving gender equality and empowering women, which is considered an integral part of sustainable issues related to employment, access to resources as finance, professional and occupational promotion leading to decision making participation, are affected by gender imbalance and there appears the need for gender equality in the economy. It is directly linked to economic efficiency, social stability, and environmental responsibility, and it requires our entire engagement and commitment to the cause. Broader inclusion of women in economic activities accelerates innovation and improves overall labour productivity. Women's participation in the economy and investments contributes to portfolio diversification of financial institutions and operations, sustainable development, and strengthening corporate social responsibility.

Particular attention is given to investments in environmental protection to ensure ecosystem preservation and stimulate job creation, including opportunities for women. Thus, combining ecological responsibility and gender equality is a key driver in achieving sustainable development goals.

These issues are equally relevant to Kazakhstan as women are less engaged in economic processes, particularly in sectors such as the financial market and investments, as the result of gender pay gap and limited access to financial resources.

Mutual funds are regarded as a tool or a mechanism for collective investment, which enables funds accumulation. Moreover, it is another mechanism for funds allocation to

economic sectors or environmental projects. However, the country's current structure of mutual funds poorly reflects gender aspects. Further analysis is required to understand women's participation and role in developing these funds. The aim of current research is to analyze the factors affecting the development of mutual funds in Kazakhstan.

2. LITERATURE REVIEW

The relationship between macroeconomic and gender-specific factors in sustainable development has been widely discussed, including various topics such as investment, employment patterns, and environmental policies—well, the impact of gender disparities, particularly in the labour market.

Some studies focused on macroeconomic indicators, such as gross value added (GVA) or deflator indices, as key measures of economic performance, productivity and growth potential. According to some studies, while macroeconomic indicators remain central, they cannot fully capture sustainability unless augmented with ecological and social dimensions. Hanley (2000) evaluated the integration of sustainability into macroeconomic measures through flow-based and stock-based approaches that can be assessed by adjusting the Net National Product (NNP) to account for environmental depreciation or by monitoring changes in natural and human capital stocks. Nevertheless, the need to view sustainable development is required apart from the traditional growth paradigm. Jespersen (2004) analyzed growth-dependent economic systems and suggested to pay attention to three models. First, zero-growth strategies focused on maintaining a stable level of production and consumption instead of continuously increasing them, aiming to reduce pressure on natural resources. Second, labour-sharing mechanisms can redistribute work among the population to decrease unemployment and improve social equity. Third, effective demand

focuses on maintaining sufficient demand for goods and services to ensure economic stability and balance the economy without exerting excessive pressure on the environment. Ezigbo (2012), on the contrary, focused on financial instruments as monetary and fiscal policies essential for managing inflation, employment, and growth in achieving sustainable development. Countries where economic management directly impacts poverty reduction and environmental health are considered primarily dependent.

In contrast, Missouri (2013), focusing on financial instruments, suggested an interdisciplinary approach, financial and non-financial metrics, that ties financial instruments to broader sustainability goals. Therefore, an integrated approach provides deeper analysis both at the macro and meso levels. State et al. (2019) suggested that for emerging economies, cluster analysis and empirical testing, indicators such as GDP and Human Development Index (HDI) are vital for evaluating countries' progress toward sustainability. Pieloch-Babiarz et al. (2021) suggested that macroeconomic stabilization policies encourage businesses to invest in sustainable technologies or adopt long-term environmental strategies to align with environmental and sustainability goals, such as reducing emissions, improving energy efficiency and optimizing resource use.

There is a great body of knowledge devoted to employment and economic growth. However, recent studies, relate workforce participation and employment rates as indicators of financial health. Central to this discussion is analyzing how workforce participation—particularly by women—shapes and is shaped by broader economic trends. Moreover, employment often reflects broader issues of gender inequality and barriers to economic inclusion. However, disparities in workforce structure and employment opportunities are still key challenges and subject to structural changes. Education and employment opportunities stand out as major factors for women workforce inclusion. Thus, poorly educated women are often pushed into

the labour force by necessity, driven by economic hardship rather than opportunity, whereas for women with higher education, pull factors such as better wages and improved employment conditions attract participation (Klasen & Pieters, 2012). In developing countries, female labour force participation is highly dependent on education, so progress is not uniform. Verick (2014) stressed the importance of improving employment quality, as women's participation often reflects economic necessity, with informal and low-wage jobs predominating. It is not merely economic growth but the composition of growth—such as the expansion of the service sector—that drives women's economic activity, and sector-specific policies targeting growth are critical in addressing gender-based structural barriers (Lahoti & Swaminathan, 2015). Policies supporting education, subsidies for childcare, and cultural shifts have indirect significant impact and affect increasing women's labour force participation as they are major drivers of disparities in male and female participation rates (Kumari, 2018). Hence, existing challenges showed that the labour force age range differs, and inclusive policies that facilitate participation across all age groups are necessary (Walwei & Deller, 2021).

Environmental sustainability and gender equality have emerged as central themes in sustainable development discourses, and related to various socio-economic and ecological domains. Women face various challenges in economic, political, and social spheres. In developing countries, empowerment of women is a moral imperative (Bayeh, 2016). Across all 17 Sustainable Development Goals (SDGs), gender is a cross-cutting issue influencing the success of other SDGs, such as poverty reduction and climate action and embedding gender perspectives transform, improve and reshape how sustainable development goals are achieved (Leal Filho et al., 2023; Wroblewski et al., 2023; Medina-Hernández & Fernández-Gómez, 2024).

Integrating gender perspectives into economic development frameworks has been

recognized as essential for achieving balanced and inclusive growth. For resource management, Kunst and Kruse (2001), particularly water, put their side on providing access for women's participation in decision-making processes improves resource allocation efficiency and ensures long-term sustainability. To promote gender equity in public finance, Rubin and Bartle (2005) suggested the implementation of gender-responsive budgeting to address systemic inequalities in resource allocation and revenue generation. Ogundana et al. (2021) presented a gender-based growth model revealing women's barriers, including limited access to capital and markets. According to Edwards (2021), inclusivity in achieving sustainable economic development will allow addressing the complex relationship between economic growth and sustainability and align growth objectives with ecological and social goals. While the literature provides substantial insights into the influence of macroeconomic factors, employment dynamics, and environmental policies, integrating these elements into gender-specific analyses remains underexplored. Existing studies often treat these dimensions separately, leaving a gap in understanding their combined impact on sustainable development. The following hypotheses were developed.

Hypothesis 1. Structural factors such as

economic growth, employment, and environmental policies significantly influence investments in sustainable development, including those tied to women's participation.

Hypothesis 2. Women's economic participation positively impacts sustainable development, with their inclusion in the workforce and access to resources driving broader economic and environmental.

3. METHODOLOGY

Based on the hypotheses developed, the research is focused on a comprehensive analysis of the factors influencing the development of mutual funds (PIFs) in Kazakhstan, which have implications for sustainable development goals and gender-specific dynamics. This study aims to understand how macroeconomic factors and gender-specific dynamics influence investments in sustainable development, particularly those tied to women's participation. Data for 2013–2023 were obtained from the official website of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. The selected indicators are presented in Table 1.

TABLE 1. Key indicators for analysing the development of mutual funds in Kazakhstan

Code	Indicator	Measure	Dependent/Independent
INV_ENV	Investments in Environmental Protection	million tenge	Dependent (Model 1)
CURR_ENV	Current Expenditures on Environmental Protection	million tenge	Dependent (Model 2)
SHADOW_ECON	Share of the Shadow Economy in Gross Domestic Product (GDP)	%	Independent
IFO_GVA	Index of Physical Volume of Gross Value Added (GVA)	%	Independent
DEF_GVA	Deflator Indices for Gross Value Added (GVA)	%	Independent
GVA_2010	Gross Value Added by Sector in 2010 Constant Prices	million tenge	Independent
WORKFORCE	Total Workforce	Thousand,people	Independent
WORKFORCE_POP	Share of Workforce in Total Population	%	Independent
EMPLOYED	Total Employed Population	thousand,people	Independent

Note: compiled by authors

Two models will be constructed for the analysis: the first analyses overall environmental investments and expenditures, while the second analyses women's role in economic activity.

4. RESULTS

Women have taken a central role in the transition to sustainable economy. The main

contribution is observed in economic and social equity, and environmental progress. Current analysis examines how structural factors such as economic growth, environmental policies, and employment patterns influence sustainable investments and women's role in advancing these outcomes.

The following sections present the detailed findings and discuss their implications for policy and practice (Table 2).

TABLE 2. Model Fit Metrics for Regression Analysis for environmental investments and gender dynamics

Model	R	R ²	Adjusted R ²
M ₁	0.990	0.980	0.934
M ₂	0.956	0.914	0.714
Models include SHADOW_ECON, IFO_GVA, DEF_GVA, GVA_2010, WORKFORCE, WORKFORCE_POP, EMPLOYED			

Note: compiled based on calculations

The analysis of the model fit metrics provides insights into the validity of the hypotheses and the models' ability to capture the dynamics of women's economic participation and its influence on sustainable development.

For the first hypothesis, which suggests that structural factors like economic growth, employment, and environmental policies significantly impact investments in sustainable initiatives, Model 1 demonstrates strong explanatory power. With an R-value of 0.990 and an R² of 0.980, the model explains nearly all the variance in the dependent variable. The adjusted R² of 0.934 confirms the fitness of the model, that predictors such as the deflator indices and shadow economy are closely aligned with changes in environmental investments. Hypothesis 1 is supported, that macroeconomic indicators are significant in shaping investment trends, including those affecting women's employment indirectly through overall economic dynamics.

For the second hypothesis, focusing on the role of women's economic participation in sustainable development, Model 2 shows a slightly weaker explanatory power than Model 1. Although the value of R (0.956) and R² (0.914) indicate a strong relationship between

the predictors and the dependent variable, the adjusted R² (0.714) reflects prompts chosen gender-specific economic dynamics in the model may not explain or need more predictor to give a deeper picture of relationship between the dependent and independent variables.

Thus, the results validate the first hypothesis by demonstrating the significant influence of macroeconomic factors on investments in sustainability. However, the second hypothesis can be partially accepted as there were revealed limitations in the predictors' ability to explain the roles of women economic activity.

The results for regression analysis are presented in Table 3.

The regression analysis results highlight the overall performance of two models examining environmental investments and gender dynamics. Model 1 demonstrates strong explanatory power with an F-statistic of 21.220 and a p-value of 0.015, below the conventional significance threshold ($\alpha=0.05$); predictors collectively have a meaningful and statistically significant impact on the dependent variable, the structural factors in this model effectively explain variations in environmental investments.

TABLE 3. Regression analysis results for environmental investments and gender dynamics

	df(M ₁)	F (M ₁)	P (M ₁)	df (M ₂)	F (M ₂)	P (M ₂)
Regression	7	21.220	0.015	7	4.565	0.120
Residual	3			3		
Total	10			10		

Note. The intercept model is omitted, as no meaningful information can be shown.

Note: compiled based on calculations

In contrast, Model 2 shows weaker explanatory power, with an F -statistic of 4.565 and a p-value of 0.120, which exceeds the $\alpha=0.05$ threshold. This lack of statistical significance implies that while the predictors in Model 2 may have some influence, their collective effect is not strong enough to explain the dependent variable

confidently. The results showed a disparity between the models, with Model 1 providing statistically strong results and Model 2 falling short of the significance threshold.

The results for regression coefficients are presented in Table 4.

TABLE 4. Regression coefficients for models analysing environmental investments and gender dynamics

Independent Variables	Standardised (M ₁)	t (M ₁)	p (M ₁)	Standardised (M ₂)	t (M ₂)	p (M ₂)
(Intercept)		5.140	< .001		10.514	< .001
		1.647	0.198		1.390	0.259
SHADOW_ECON	-1.015	-2.654	0.077	-0.986	-1.239	0.304
IFO_GVA	0.502	2.384	0.097	0.729	1.665	0.195
DEF_GVA	-0.733	-5.133	0.014	-0.746	-2.510	0.087
GVA_2010	0.512	0.670	0.551	-0.688	-0.432	0.695
WORKFORCE	-3.590	-2.599	0.080	-1.556	-0.541	0.626
WORKFORCE_POP	0.042	0.112	0.918	-0.818	-1.052	0.370
EMPLOYED	3.240	2.297	0.105	1.936	0.659	0.557

The intercept model is omitted, as no meaningful information can be shown

Note: compiled based on calculations

The analysis of Model 1 highlights that DEF_GVA (Deflator Indices for Gross Value Added) is the most significant factor, demonstrating a strong negative relationship ($p=0.014$) and indicating its critical impact on environmental investments. Higher deflator indices are associated with reduced investment levels, reflecting the sensitivity of such expenditures to inflation. SHADOW_ECON (Share of Shadow Economy) also exhibits a negative influence, albeit with marginal significance ($p=0.077$), suggesting that shadow economic activities may suppress sustainable investment potential. IFO_GVA (Index of Physical Volume of GVA) shows a positive

coefficient ($p=0.097$), which, though not statistically significant, implies a potential supportive role in driving environmental investments. Other predictors, such as WORKFORCE, WORKFORCE_POP, and EMPLOYED, show no significant effects. In other words, employment-related variables alone may not fully explain investment patterns.

The results for Model 2, focus on women's economic roles. DEF_GVA retains a negative relationship ($p=0.087$), indicating its marginal influence on gender-specific factors in economic activity. IFO_GVA exhibits a more substantial positive effect (0.729) than Model 1,

suggesting a potential but statistically insignificant ($p=0.195$) role in supporting women's economic contributions. SHADOW_ECON shows a weaker negative effect than Model 1 ($p=0.304$), implying that the shadow economy may have a limited but adverse impact on women's economic inclusion. The variables which reflect employment (GVA_2010, WORKFORCE, and EMPLOYED) showed statistical

insignificance. The results, align with model fitness results.

Overall, the findings emphasise that while inflation-adjusted metrics such as DEF_GVA significantly influence investment behaviour, their effects on women's economic roles remain marginal.

The results for Q-Q plots are presented in Figure 1.

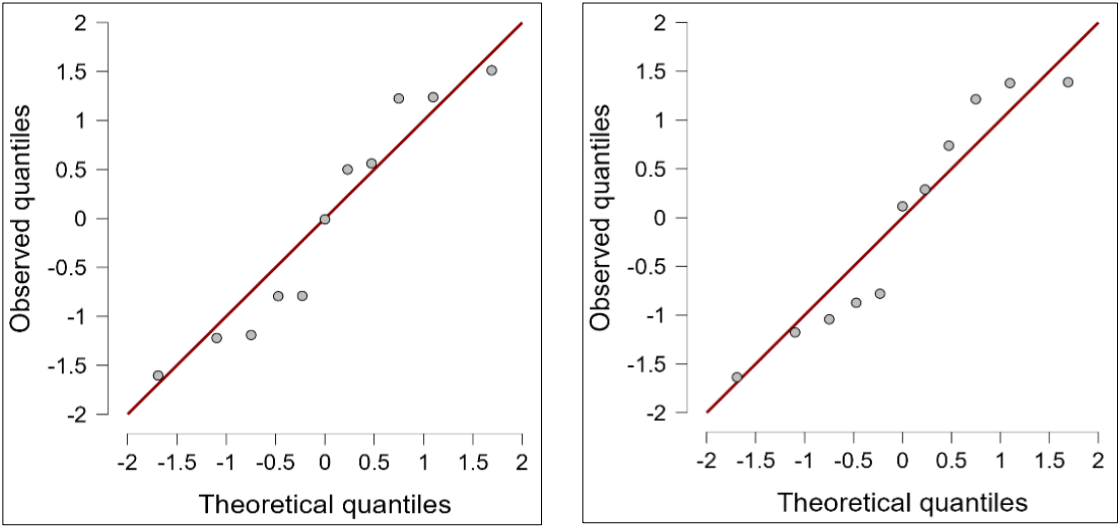


FIGURE 1. Q-Q Plots for Residual Normality in Regression Models

Note: The models from left to right environmental investments and gender dynamics

The Q-Q plots serve as diagnostic tools to evaluate the normality assumption of the residuals for two regression models. For Model 1, where the dependent variable is investments in environmental protection, the residuals align closely with the theoretical quantile line, indicating that the assumption of normality is well satisfied. This suggests that the model provides a reliable fit for the data. In contrast, Model 2, which examines current expenditures on environmental protection as the dependent variable, shows residuals that largely align with the theoretical quantile line but exhibit slight deviations at the tails. These deviations,

while minor, may reflect potential outliers or a mild departure from normality, particularly in extreme values. Together, the Q-Q plots provide a visual representation of the behavior of residuals in both models, highlighting how well the normality assumption is upheld in each case. These insights are crucial for determining the validity of subsequent statistical inferences drawn from the regression models.

Figure 2 presents the dynamics of key indicators over multiple years, showing how these changes are connected to women's economic and social participation.

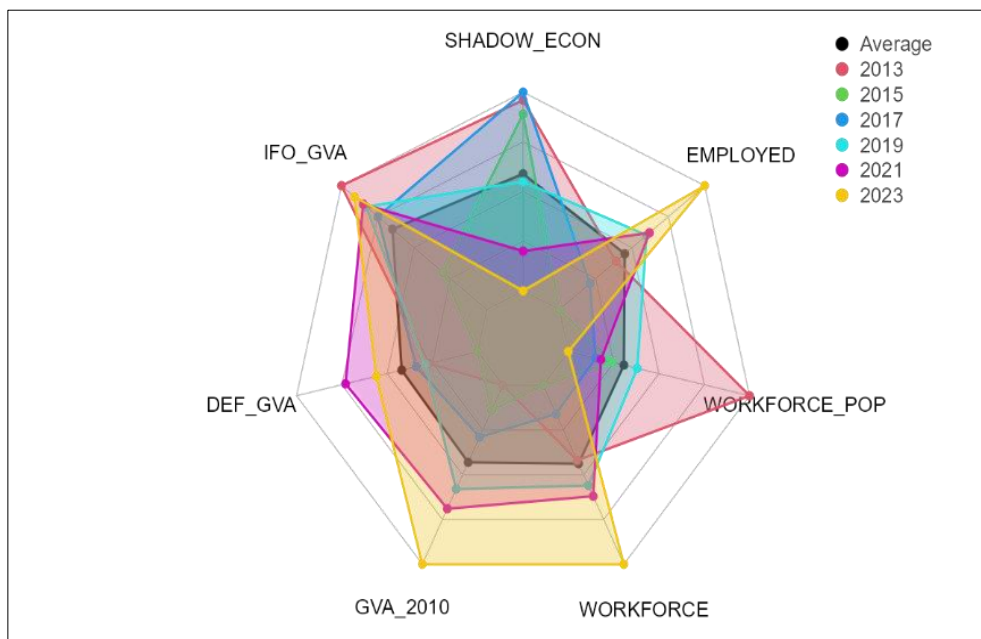


FIGURE 2. Dynamics of key indicators over multiple years

Note: compiled based on calculations

The chart reflects changes in key economic indicators and women's employment over the analyzed period. In the early years, such as 2013, the indicators show relatively stable but low values for most metrics, including women's employment, the overall workforce, and gross value added. Between 2013 and 2023, Kazakhstan's economy's structure was characterized by limited women's involvement in key sectors.

The identified changes in the regression analysis confirmed the first hypothesis that structural factors, such as economic growth, employment, and environmental policy, significantly impact economic development and women's role. The chart demonstrated that there was a gradual improvement in employment for women, including workforce growth and gross value added over the analyzed period. However, fluctuations in some indicators, particularly those related to productivity and value-added, indicate instability in economic dynamics in recent years. The dynamics supported regression analysis outcomes that economic growth can

have positive and negative aspects. From the perspective of sustainable development, such changes could serve as a prerequisite for strengthening governmental support for environmental initiatives, which would, in turn, positively impact the economy and women's involvement. The second hypothesis, that there is a correlation between women's employment growth and the economy's overall development, is partially confirmed.

The chart supported the regression analysis outcomes and showed differences in employment indicators and workforce share exhibiting disparities and limited access for women to key economic opportunities throughout the analyzed period. In the long term, the results prompt that policies directed at removing revealed barriers for women should lead to an increase in women's economic activity, which will help not only improve living standards but also sustain economic growth. The results also showed that the economy was undergoing structural economic changes, which could have affected women's employment and access to resources.

Over time, several indicators, such as the employed population and the share of the workforce in the total population, emphasize a positive trend. However, significant fluctuations are observed in the period's later years, particularly in gross value added and productivity indicators. Significant changes in indicators reflecting the share of the workforce do not always correspond to similar growth in metrics related to improved employment conditions or women's access to key economic sectors.

5. CONCLUSION

The main goal of current study was to analyze factors influencing the development of mutual funds in Kazakhstan, with a focus on the role of women in economic activity. The analysis has largely achieved this goal through identification of key trends and relationships between economic indicators, gender dynamics, and sustainable development.

The findings supported the first hypothesis, that structural factors (economic growth, employment, and environmental policies) significantly impact development.

The results highlighted those improvements in gross value added and workforce indicators

align with increased economic activity. Yet, these benefits are not distributed evenly, as disparities in women's participation in key sectors and access to resources remain evident.

The second hypothesis was partially accepted. It covered women's employment and its influence on sustainable development. Women's employment correlated with economic growth during periods of stability. Existing barriers, such as wage gaps and underrepresentation in key sectors, limited the full realisation of women work force potential.

There was observed progress in certain areas for women, but achieving equitable and sustainable development requires a stronger focus on gender equality. Women are overtaking the attention as vital contributors to driving economic transformation. Increase in the inclusion of women in decision-making processes, employment opportunities, and resource access are gaining their importance. Existing trends showed, there will be a prominent necessity in women workforce for the continued development of mutual funds and broader economic resilience in the country. While structural factors contribute to overall progress, their impact on women's economic roles is still limited.

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