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The Gender Pay Gap and Its Impact on Female Entrepreneurship: A Panel Data Analysis of Indian States

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ABSTRACT

The gender pay gap has been a prominent issue in India. Using panel data from the periodic labour force reports, this paper examines how the gender wage gap affects the female entrepreneurship rate in 36 Indian states and union territories across 2017 and 2024. The paper also focuses on factors such as working time for female entrepreneurs, female labour force participation rate, female unemployment rate, share of females in higher education and state-wise GDP using FGLS regression analysis. Additionally, in order to ensure accurate reporting and interpretation of data, diagnostic tests for multicollinearity, autocorrelation and heteroskedasticity were conducted. The results of the study revealed that there is no significant relationship between the gender pay gap and the female entrepreneurship rate in India, suggesting that income inequality for females does not directly correlate with the female entrepreneurship rate. However, the female labour force participation rate shows a positive impact, while working time, female unemployment rate and share of women in higher education depict an inverse relationship with the female entrepreneurship rate. The gender wage gap remains highly concentrated across states and formal sectors that are generally male-dominated, making it a less relevant factor for women entrepreneurs in India to consider, as they usually start small, informal businesses from home. Future policy implementations should provide access to finances like loans and credits for women, and awareness programs that encourage flexible working schedules and prevent gender-based stereotypes, essential for shaping female entrepreneurship decisions in India.

1. Introduction

1.1. General Background

India's GDP has approximately doubled in the past decade, making it the world's fifth-largest economy by 2025 (Forbes India, 2025). It has increased from $2.1 million in 2015 to approximately $4.3 million as of 2025, which is a 105% growth in GDP (Ani, 2025). Despite rapid economic growth and technological advancements, gender inequality remains a prevalent

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issue in India. Gender inequality in India is evident in various cultural, historical, and economic avenues. The foundation of this gender inequality stems from traditional patriarchal norms and socioeconomic barriers that continue to restrict women's access to equal opportunities in the workforce. One of the key indicators of gender inequality is the gender pay gap, which is the average difference in earnings between men and women for the same work. It is a quantitative representation of the overarching gender-based discrimination in the workplace. Despite controlling for other factors like years of experience, expertise, education, and ability between men and women, women are paid less across several occupations and sectors (World Bank, n.d.).

India's Gender Pay Gap is among the highest in the world. According to the World Economic Forum, as of 2024, Indian women earn 32% less than men for the same work. Whereas in the informal sector, the gender pay gap is 19% with women still earning significantly less (Agency Reporter, 2025). In addition, India ranks 129 out of 146 countries in the gender pay gap according to the Global Gender Pay Gap Report published in 2024 (Saadia Zahidi, 2024) . Solving the problem of gender inequality, specifically achieving gender parity, can contribute up to $700 billion to India's GDP by 2025 (Woetzel et al., 2015). Therefore, suggesting how "Asymmetries abound in India's labour market and closing the gap is key to achieving social justice for working women" and improving labour market outcomes. "A fair distribution of the fruits of economic progress will spur further economic growth and the benefits it brings to India" (*The Gender Pay Gap, Hard Truths and Actions Needed*, 2022).

The gender pay gap is increasing in India due to several reasons, like an increase in employment in informal sectors, a lack of pay transparency, and most importantly, because the majority of women in India are hired in low-paying jobs and sectors, which have greater gender pay gaps (Soni & Pattanaik, 2025). Additionally, technological advancements and increased automation in the economy have disproportionately benefited men, but women are still employed in low-paying jobs with negligible power in the workforce (Casey & Nzau, 2019). Moreover, the weak legal frameworks to ensure equal pay for males and females further widen the pay gap (World Bank Group, 2024). Gender-based income inequality, exhibited in the form of high gender pay gaps, limits women's economic opportunities in India. A greater gender gap results in lower income for women, weakening their bargaining power and thus decreasing their financial independence and living standards (*Understanding the Gender Pay Gap: Definition, Facts and Causes | Topics | European Parliament*, n.d.; *What's Gender Equality Got to Do With Financial Independence?*, 2024). On a larger scale, the World Bank suggests that women contribute to only 17% of India's GDP, which is one of the lowest contributions of women to GDP globally (Dixon, 2018).

However, many women turn to entrepreneurship to compensate for wage discrimination. There are other negative consequences of the gender pay gap, such as limited access to finance, that pose difficulties for women (*Gender Pay Gap Doesn't Stop for Women Entrepreneurs*, 2016). All over India, only 14 % of women are in formal businesses, and over 90% operate in the informal sector, where wages are significantly lower. Despite this, the gender pay gap leads to increased self-employment/women's entrepreneurship, which empowers women financially, making them more socially independent (Banu & Baral, 2021). While the gender pay gap may have some indirect advantages, it leads to restricted access to capital and funding and is a major reason why women have to experience discrimination across various avenues in the work environment (*Gender Bias in Access to Finance and Implications for Capital Misallocation*, 2025; Hewa-Wellalage et al., 2021).

This highlights a contrast, while the gender pay gap poses significant limitations on women's financial agency, at the same time, it influences women to build identity and gain freedom

through entrepreneurship, thus acting as both a push and pull factor. Women's empowerment can be defined as the process through which women gain a stronger voice to stand up against gender inequality in their workplace, their home, and in the community as a whole (*Women's Empowerment*, n.d.). They become increasingly aware of the presence of gender inequality in different avenues of their life and take ownership to become financially and socially independent. Social enterprise both challenges and reflects gender inequalities in wider society, and it offers recommendations to close the gender gap within the sector and support the growth of social enterprise for women's empowerment (*Activist to Entrepreneur: The Role of Social Enterprise in Supporting Women's Empowerment | British Council*, n.d.). Entrepreneurship acts as a vital instrument to empower women both financially and socially (Muhammad et al., 2021). Women who start their businesses can start generating their income and become financially independent, reducing their dependency on their male counterparts or other family members (Muhammad et al., 2021). Long-term participation in entrepreneurship can allow them to reinvest in their businesses and contribute to economic growth (Chakrabarty, 2024). To fully make use of economic benefits, it is essential to address the systemic barriers that obstruct women's entrepreneurial potential.

Removing gender-based barriers to entrepreneurship could lead to a 3% increase in aggregate productivity and a 43% rise in real income in India (Secretariat, 2024). India's entrepreneurial landscape is witnessing a remarkable shift with time as women are breaking stereotypes and emerging as powerful leaders in the business world. Women entrepreneurship is thriving with 65% of women-led businesses growing in villages of India, which empowers more than 13.8 million women with the help of government schemes like Startup India and Beti Padhao Beti Bachao, as well as support from large corporations like Amazon (*WION: Breaking News, Latest News, World, South Asia, India, Pakistan, Bangladesh News & Analysis*, n.d.). In this way, successful women entrepreneurs can produce an empowerment chain effect, inspiring millions of other women and encouraging them to pursue entrepreneurship and other leadership roles. Eventually, this will help them fight against the gender-based stereotypes that are prevalent in India.

The gender gap both hinders and pushes women toward self-employment in different ways. As mentioned previously, women can turn to entrepreneurship as compensation for the significant wage gap discrimination. However, due to the existence of the gender pay gap, some women can be disincentivised to look for further work opportunities, which in turn restricts their access to funds and financial resources necessary to start a business from scratch. Reducing or eliminating the gender pay gap in India to a significant extent is the best way to ensure women remain motivated to choose entrepreneurship as a career option that is suitable for them.

1.2. Literature Review

The impact and consequences of the gender pay gap on female entrepreneurship have been widely explored in this literature. A study, in the same realm, conducted by Gaweł and Mroczek-Dąbrowska (2021) aimed to analyse whether the gender pay gap, measured by the rate of participation by women and levels of gender inequality in industries, affects women's decisions to become entrepreneurs in both male- and female-dominant industries. Using panel regression models from 22 European countries, the study assessed the data. Based on the results, it was concluded that the relationship between the gender pay gap and female entrepreneurship is inverse and significantly relies on the industry. This specificity is visible in male and female-dominant industries. In male-dominated industries like ICT and manufacturing, the gender pay gap has a strong negative influence on the entrepreneurship rate;

however, in female-dominated industries where women experience high entry barriers, there is an insignificant or weaker effect of the gender pay gap on female entrepreneurship.

Similar to this, a comprehensive study, based in the United Kingdom, by Uusitalo and the University of Twente (2023) evaluated the impact of the gender pay gap on different types of female entrepreneurship, specifically, in England and Wales, focusing on labour market theories and trends. Using quantitative data from 300 local Administrative Districts in the UK, this research analysed the data using linear regression analysis. The findings showed that the gender pay gap does not consistently act as a motivation for women's entrepreneurship, but acts as a barrier in male-dominated industries. This is because the gender pay gap hinders women's access to capital, which limits their opportunities in entrepreneurship. Lastly, it was found that there was a lower gender pay gap in industries with a high female participation rate.

Another research conducted by Kempers et al. (2023) aimed to investigate the differences in income between males and females in the public and private sectors and how these differences affect entrepreneurship in the UK. Using a similar methodology, the study assessed the public and private sector organisations' data through regression analysis. On the basis of the findings, it was revealed that the gender pay gap is lower in the public sector (9.94%) as compared to the private sector in the UK. Moreover, female classifications decrease across quartile classifications in both sectors. In the public sector, it decreased from 74.42% to 62.25% and from 47.04% to 26.79% in the private sector. Thus, the gender pay gap coexisting with government organisations negatively affects women's entrepreneurship, while the gender pay gap between different sectors has a positive impact on women's entrepreneurship.

Supportingly, recent research undertaken by Bonaparte (2023) aimed to investigate the relationship between the gender wage gap and participation of women in entrepreneurship in the US, in particular, how factors such as financial inequality influence women's choice towards entrepreneurship. Using regression analysis as the method for US state-level entrepreneurship activities, the study found that the gender pay gap significantly affects the proportion of female entrepreneurs within the self-employed population, and an increasing gender pay gap increases the share of female entrepreneurs, which suggests that women choose entrepreneurship as an alternative to corporate jobs.

Using a mixed methods approach, including a survey of 50 men and women as well as interviews with 3 female entrepreneurs, the study by Gupta and Phillips (2019) investigates factors affecting Female entrepreneurship in India, specifically, the barriers, motivations, and perceptions about women entrepreneurs. The key findings were that women have the skills, confidence, and ability to balance family with business; despite this, men remain doubtful about their entrepreneurial activities. Gender bias against women was prevalent, which led to internalisation of their capabilities towards successful entrepreneurship. It was also found that key motivations for starting a business include financial necessity, self-fulfilment, and inspiration; however, major obstacles were lack of funding, societal prejudice and limited awareness of government startup schemes.

Specifically for developing countries, a qualitative study aimed to analyse how gender inequality affects female entrepreneurship (Olarewaju & Fernando, 2020). Based on the theoretical analysis, the study concluded that women entrepreneurs face a relatively greater no of barriers than men. These include limited access to finance, gender discriminatory norms, and a lack of support from society, at home, and from institutions. Gender inequality that exists in various aspects of a woman's life decreases female participation in entrepreneurship. However, the women-led businesses that do exist struggle to get funding due to gender biases, restricting them from growing. Therefore, it is suggested by the study that the government should implement policies that prevent gender inequality and provide financial support for

female entrepreneurs, as the level of gender inequality varies across different countries, influencing the success of the economy as a whole.

Daymard's (2015) study investigates the structural, cultural, and socioeconomic factors that affect the female entrepreneurship rate in India using a cross-country econometric analysis. The study delves into the effect of how education, labour market conditions, and institutional failures affect the likelihood of women becoming entrepreneurs. Women tend to entrepreneurship out of necessity, but are only able to establish small ventures and have limited financial opportunities in that too. This is because they face challenges such as a lack of inheritance, low access to credit, societal and gender norms, as well as the burden of household responsibilities that act as hindrances to their success. Finally, the study concludes that policies targeted to expand access to finance, improve women's education, tackle societal norms and promote childcare support programs.

In a similar context, Saadatmand & Barber (2019) examined the effects of gender inequalities on female entrepreneurship in a few OECD countries (Organisation for Economic Cooperation and Development) over a period of 14 years. These OECD countries were classified into two categories: low-income countries and high-income countries. The secondary data was evaluated using ordinary least squares methods. Contrary to expectations, the study found no significant relationship between female education and entrepreneurial activity. However, a higher female participation rate is positively related to the female entrepreneurship rate, except in low to middle-income countries, where this relationship is very significant. Additionally, the study highlights a negative relationship between fertility rates and female entrepreneurship activity. In conclusion, the findings highlight how socioeconomic factors act as notable obstacles relative to a lack of education for female entrepreneurship in both high and low-to-middle-income countries. Also, it underscores the importance of a higher female participation rate as a motivating factor for female entrepreneurship.

Lastly, a primary study conducted by Ilie et al. (2021) explored the impact of socially gender-discriminatory beliefs on female entrepreneurship. It analyses whether perception and societal norms act as barriers or facilitate the development of female entrepreneurs. Using a survey that was for 287 recent graduates, the study assessed the data with multivariate regression analysis. Based on the results, the study concluded that governments and institutions should continue to implement policies that reduce gender inequality, although without a change in societal perception, women's interest in entrepreneurship won't increase. Some of the commonly observed barriers to women's entrepreneurship include low levels of education and limited access to finance and capital. This study highlights how acknowledging structural obstacles is not sufficient, as social stereotypes and perceptions are deeply rooted within society, which decreases the female entrepreneurship rate even more.

1.3. Literature Gap and Rationale of the Study

The literature review conducted from already existing research papers explores the impact of gender inequality on female entrepreneurship across various countries, including the UK, the US, Europe, Spain, and OECD countries. However, there is negligible research that specifically focuses on the impact of the gender pay gap on female entrepreneurship in India. Moreover, most existing research analyses gender inequality and its impact on female entrepreneurship broadly and does not highlight the relationship between the gender pay gap and female entrepreneurship in particular. Hence, this research explores the impact of the gender pay gap on female entrepreneurship, specifically in India.

It is crucial to research to explore whether the gender pay gap acts as a significant catalyst for female entrepreneurship in India, a country where considerable gender inequality and

discrimination exist in different avenues of a woman's life, including the workplace. Along with the gender pay gap, the study will also investigate secondary motivators such as working time, level of education, female labour force participation rate, female unemployment rate, percentage of women in the population, the share of women in higher education, and state-wise GDP to fully understand how inequalities manifest in the form of female entrepreneurship.

2. Materials and Methods

2.1. Research aim and objectives

This research is focused on exploring the relationship between the gender pay gap and female entrepreneurship across various states in India. This study will assess whether wage disparity acts as a push factor for women seeking greater autonomy, financial equity, and career fulfilment in entrepreneurial ventures. Two key objectives are considered in this study:

- To understand the influence of the gender pay gap on female entrepreneurship
- To identify the impact of other possible factors, such as the working time of female entrepreneurs, the female unemployment rate, the female labour force participation rate,% of women in the population, the share of women in higher education and state-wise GDP, on female entrepreneurship.

2.2. Research Hypotheses

The following hypotheses have been assumed to evaluate the aim and objectives of this study.

- RH_1: There is no significant impact of the gender pay gap on female entrepreneurship
- RH_2: There is no significant impact of working time on female entrepreneurship
- RH_3: There is no significant impact of female labour force participation rate on female entrepreneurship
- RH_4: There is no significant impact of female unemployment on their entrepreneurship
- RH_5: There is no significant impact of female education on their entrepreneurship
- RH_6: There is no significant impact of State GDP on female entrepreneurship

Herein, RH represents the Research Hypothesis, and numbers in subscript represent the number of that hypothesis.

2.3. Data

This study aims to analyse the factors affecting female entrepreneurship in India. For the same, a secondary panel dataset was used from the consecutive years 2017-18 to 203-24 for 36 Indian States and Union Territories. The data was sourced from Period Labour Force Surveys for the years 2017-18, 2018-2019, 2019-20, 2020-21, 2021-22, 2022-23, and 2023-24. Data was collected from 36 states and UTs consecutively. Data for Ladakh is unavailable for 2017-2018, as it was established as a separate union territory of India only in 2019. Moreover, before 2020, Daman and Diu and Dadra and Nagar Haveli were two separate union territories (*Home | Ministry of Home Affairs*, n.d.) until they were merged into one single territory in 2020; therefore, an average of the data values from both states is taken for the years 2017-2020. Post data cleaning and organising, STATA18 software was used to process the data and analyse and calculate the results. Lastly, while setting the data as panel data in the software, it was found that the data was strongly balanced with a few missing values; hence, the data is processed in its initial form.

2.4. Variables

2.4.1. Dependent Variable

- Female Entrepreneurship (*Female_entrep):* The Female entrepreneurship rate is the percentage of all self-employed female workers among all employed females in a state or union territory (*Women in Inclusive Entrepreneurship*, n.d.). Measured in percentage, it is a direct quantitative method that measures the number of women involved in entrepreneurial activity (self-employed) compared to the total number of working women in the population. The rate being in a percentage allows for a comparison of the relative female entrepreneurship activity across regions, years and different socioeconomic conditions.

2.4.2. Independent Variables

- Gender Wage Gap (*WageGap):* The Gender Wage Gap is the average difference between the median earnings of men and women relative to the median earnings of men during the preceding calendar month from regular wage employment among regular wage employees in CWS (compressed work schedules) for each State and Union Territory. It is a measure of what women are paid relative to men for both rural and urban areas and is calculated by subtracting female wages from male wages and dividing them by male wages.
- Female Education (*FemEduc):* Female education is represented by the share of women in higher education. The share of women in higher education (meaning secondary education and above)refers to the number of enrolled female students in tertiary education as a percentage of the total population of tertiary students in both rural and urban areas for each state and Union territory ("Ministry of Statistics and Programme Implementation," n.d.; Government of India et al., 2024).
- Working Time (*WorkTime):* The working time of women entrepreneurs is the average number of hours worked per week that women who run their businesses spend in economic or business-related activities in CWS(Compressed work schedules) in both rural and urban areas in each state and Union Territory (Government of India et al., 2024; *ILO Homepage*, n.d.).
- Female Labour Force Participation (*FemLFPR):* The female Labour Force Participation Rate refers to the number of females aged 15 and above who are willing or able to work and participate in the labour force as a percentage of the total labour force population in each state and Union territory (Government of India et al., 2024; Ravi et al., 2024); Kapsos et al., 2014).
- State-wise GDP (*SGDP):* SGDP is a measure in monetary terms of the total volume of all finished goods and services produced within the geographical boundaries of a state. It is calculated by summing the gross value added across different sectors in a state, including primary, secondary and tertiary sectors. It is a key indicator used to analyse the economic performance of each state within a country (*Desco Government*, n.d.).

2.5. Data Analysis Method

This section presents the process and methods of analysing the cleaned and organised dataset. It involves finalising the variables, conducting diagnostic tests, and selecting the appropriate regression model.

2.5.1. Correlation analysis

Table 1 depicts the correlation values between the independent variables of the study. Correlation is a statistical concept that measures the strength of a relationship between two variables, basically, the degree to which two variables are in relation to each other (Discovery, n.d.). It also describes the direction of this relationship. Correlations are measured using the correlation coefficient, where a coefficient that is close to 1 means there is a very high correlation, a coefficient of 0.5 is a moderate correlation and closer to 0, there is a very low correlation. Correlation analysis is conducted because a high correlation between independent variables leads to the problem of multicollinearity, which results in unreliable results. As a result, variables with a high correlation are eliminated to avoid the problem of multicollinearity. From the table above, it can be noted that the independent variables are not highly correlated with each other.

Table 1. Results for the correlation between the independent variables considered in the model

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Wage Gap	1.000					
(2) Worktime	-0.116	1.000				
(3) FemLFPR	-0.020	-0.209	1.000			
(4) FemUnemp	-0.019	0.202	-0.205	1.000		
(5) FemEduc	-0.024	0.259	0.038	0.371	1.000	
(6) SGDP	0.005	-0.059	-0.028	-0.357	-0.025	1.000

WageGap has a lower and negative correlation with WorkTime (r = -0.116), FemLFPR (r = -0.020), FemUnemp (r = -0.019) and FemEduc (r = -0.024). However, it has a lower and positive correlation with SGDP (r = 0.005). Moreover, WorkTime has a low and negative correlation with FemLFPR (r = -0.209) and SGDP (r = -0.059), but a low and positive correlation with FemUnemp (r = 0.202) and FemEduc (r = 0.259). FemLFPR has a negative and low correlation with FemUnemp(r = -0.205) and SGDP (r = -0.028). On the other hand, a low and positive correlation with FemEduc (r = 0.038). Next, FemUnemp has a negative and low correlation with SGDP (r = -0.357) and a positive and low correlation with Female Educ (r = 0.371). Lastly, FemEduc has a negative and low correlation with SGDP (r = -0.025).

2.5.2. Multicollinearity

As mentioned above, variables that have a high correlation are eliminated to avoid the problem of multicollinearity. Multicollinearity occurs when two or more independent variables have a high correlation in a study. This causes problems as it becomes difficult to check which of the independent variables has the most significant impact on the dependent variable, as the variables output similar information. Each independent variable must have a non-redundant and unique effect on the dependent variable of the study to generate a regression model with accurate and reliable results (Discovery, n.d.). The problem of multicollinearity may lead to inflated standard errors, increasing the variance of coefficient estimates, which in turn inflates the standard errors that reduce the precision of estimates (*PMC Home*, n.d.). Another consequence of multicollinearity is that larger standard errors decrease statistical power, making it difficult to determine significant relationships between variables (*PMC Home*, n.d.). Moreover, when variables are highly correlated, minor changes in the model can lead to larger fluctuations in regression coefficients, which can influence the interpretation of the final results due to unreliable coefficient estimates (*Multicollinearity*, n.d.).

A statistical test used to check for multicollinearity is the Variance Inflation Factor (VIF). The Variance Inflation Factor measures the variation caused in the regression coefficient due to the problem of multicollinearity(*PMC Home*, n.d.). The null hypothesis for the VIF test is that there is no problem of multicollinearity. If the Mean VIF is less than 10, it indicates that there

is no problem with multicollinearity. For this study, the Mean VIF is 1.202, which is substantially lower than the threshold value of 10; hence, the problem of multicollinearity does not exist in the model.

2.5.3. Model Specification

This research aims to interpret the impact of the wage gap on female entrepreneurship in India. For the same purpose, a panel dataset across the Indian states from 2017-18 to 2022-23 has been considered. Hence, a regression framework for the panel is created in accordance with the data. The following equation is a panel regression equation showing how different independent variables affect female entrepreneurship.

$$Female\_entrep_{it} = \beta_0 + \beta_1 WageGap_{it} + \beta_2 WorkTime_{it} + \beta_3 FemLFPR_{it} + \beta_4 FemEduc_{it} + \beta_5 SGDP_{it} + e$$

In analysing panel data, different econometric methods can be used, including fixed effects, random effects, or pooled OLS. Pooled Ordinary Least Squares is a statistical method that applies the linear regression model to panel data by estimating parameters that combine cross-sectional and time-series observations. These observations are considered to be homogenous and not controlled for; therefore, they ignore any state-specific or time-specific effects. This model may not be the most appropriate as it ignores the state variation, leading to unrealistic and biased results (Tilburg Science Hub, n.d.). To overcome the limitations of the Pooled OLS method, the Fixed Effects and Random Effects models can be considered to be more appropriate when analysing panel data.

The fixed effects model controls for time and state-varying characteristics that are correlated with the independent variables, providing consistent, unbiased results. The Random Effect model also accounts for the unobserved heterogeneity of state-specific and time conditions, although it assumes that these variations are random and unrelated to the independent variables. To choose between fixed effects and random effects or pooled OLS, the Hausman test is conducted. The Hausman test is a statistical model-selection test used to determine whether the errors in the panel data are correlated with the independent variables (Spatial Econometrics, 2017). The null hypothesis for the Hausman test is that the Random effects or pooled OLS model is appropriate. If the P-value is less than 0.05, the null hypothesis must be rejected, implying fixed effects must be considered. From the results, the P-value was found to be 0.417, hence the null hypothesis is not rejected, meaning the Random Effects or Pooled OLS method is appropriate for the model. Therefore, the Breusch Pagan Lagrange Multiplier Test has been done to choose between Random Effects or pooled OLS.

2.5.4. Breusch Pagan Lagrange Multiplier Test

The Breusch Pagan Lagrange Multiplier Test is also a statistical test further used to decide between the Random Effects Model and the Pooled Ordinary Least Squares (OLS) model. The purpose of this test is to investigate whether random effects, i.e. unobserved individual-specific effects, are statistically significant (Lef, 2025). The null hypothesis is that the Pooled OLS model is appropriate for the study. If the P value is less than 0.05, the null hypothesis must be rejected. For the current model, the p-value is 0.000, hence the null hypothesis was rejected, which implies that the Random Effects Model is appropriate for the analysis.

2.5.5. Diagnostics

Diagnostics refers to tests carried out to check the reliability, validity and strength of a regression model. It is important to use diagnostics to ensure that the model used is accurate and is working properly, meaning it is testing the research's aim, despite any assumptions or

discrepancies (Comprehensive Chemometrics, 2009). The diagnostics used in this study are autocorrelation and heteroskedasticity.

Autocorrelation

Autocorrelation occurs when the error terms in a panel data regression show a correlation across time. This can result in inefficient estimates and go against the concept of independent errors. Independent errors refer to the concept that errors for one observation do not influence the error for another. The Wooldridge test was conducted to check for the presence of autocorrelation in the panel data. The null hypothesis for the Wooldridge test is that there was no autocorrelation (R.S, 2023). If the p-value is less than 0.05, then there is a problem with autocorrelation. For the current model, the test resulted in a p-value of 0.000, hence the null hypothesis was rejected, concluding that the panel data has a problem of autocorrelation.

Heteroskedasticity

When a regression model's error variability is not consistent across observations, it is said to be heteroscedastic. It is vital to check for heteroskedasticity as it may cause inefficient coefficient estimates and lead to invalid hypothesis tests. The Log-likelihood test, Lagrange Multiplier test and Wald test were deployed to test for heteroskedasticity under the random effects model (*Science Direct*, n.d.). The null hypothesis for all the tests was that there was no heteroskedasticity or that there was homoskedasticity. A p-value of less than 0.05 indicates the problem of heteroscedasticity. The findings showed that the p-values were 0.000 for all the tests. As a result, the null hypothesis was rejected, indicating that there is a problem of heteroscedasticity in the framework.

Correction for Autocorrelation and Heteroskedasticity

As found above, in this model, there exists a problem of both autocorrelation and heteroskedasticity; therefore, it has been corrected by using FGLS regression. Feasible Generalised Least Squares Regression, or FGLS, is a method used when regular regression (OLS) doesn't work efficiently due to problems of heteroscedasticity and autocorrelation. It is a method that estimates the coefficients and their covariance matrix in a multiple linear regression model when the errors do not follow a constant, regular pattern, and the exact structure of their variance is unknown (*Fgls - Feasible Generalised Least Squares - MATLAB*, n.d.).

3. Results and Discussion

3.1. Descriptive Analysis

Table 2 represents the descriptive statistics of the final variables considered in the model. It can be depicted that, on average, over the past few years, the female entrepreneurship rate in India is 56. 94 percent. The standard deviation is 21.67 per cent, implying a high variability in the data within the states. Moreover, the female entrepreneurship rate ranges from 0 to 92.1 per cent, depicting that in some states the rate is as high as 92 per cent, and in some, it is zero in some years. From the data, it was observed that Jammu and Kashmir had the highest female entrepreneurship rate in 2023. On the other hand, the average gender pay gap from 2017 to 2024 is 21.304 per cent, having a high variability in data across the 27 states and UTs, evident with a standard deviation of 45.387. Additionally, it can be seen that the wage gap spreads from -254.15 to 546.1,7, with Punjab having the highest wage gap in 2020 (546.17) and Rajasthan having the lowest (-254.15).

Table 2. Descriptive Statistics for all the variables of the study

Variable	Mean	Standard Deviation	Minimum	Maximum
FemEntr	56.95	21.050	0	92.1
WageGap	21.31	45.390	-254.15	546.17
Worktime	35.30	7.960	0	59.5
FemLFPR	26.85	10.89	2.8	57.9
FemUnemp	7.44	8.100	0	50.5
FemEduc	36.90	10.680	15.4	69.5
SGDP	693529.46	755996.32	6565	4044251

Furthermore, the average working time of women entrepreneurs is 35.3 hours per week, and the standard deviation is 7.962 per cent, suggesting that there is high variability. In a few states, working time was as high as 59.5 per cent, whereas for some it was zero, as can be seen, the working time for women entrepreneurs spreads from 0 to 59.5. Along with this, over the past 8 years, the labour force participation rate (LFPR) averaged 26.855 per cent, and there is very high variability as the standard deviation is 10.89 per cent. The data spreads from 57.9 to 2.8, meaning that one of the states had an LFPR of 57.9, being the highest and the lowest LFPR being 2.8 per cent.

In addition, the average female unemployment rate is 7.44 per cent, and the standard deviation is found to be 8.102 per cent, again showing very high variability. The data for the female unemployment rate ranges from 50.5 to 0, implying that the unemployment rate was maximum at 50.5 percent and went as low as 0. The share of women in higher education displays an average of 36.896 % indicating that, on average, women constitute over one-third of the total population enrolled in higher education. The standard deviation is 10.68 % suggesting high variability in data, meaning most values are clustered close to the mean. The range of the data spans from a minimum of 15.4% to a maximum of 69.5%, showing that there may be outlier states with very high or very low female participation. The last controlled variable is state-wise GDP with an average of 693529.46 per cent and a standard deviation of 755996.32 per cent, showing low variability. It has a range of 4037686 per cent.

3.2. Regression Analysis

Table 3 shows the results for the regression model considering female entrepreneurship as the dependent variable. The results show that there does not exist a significant relationship between the wage gap and female entrepreneurship rate, as the p-value (0.29) is greater than 0.05. Despite the coefficient being negative, the wage gap does not significantly influence the determination of the female entrepreneurship rate in India. This relationship can be explained by multiple factors. The majority of female-owned businesses in India are influenced by need rather than interest or motive, making them subsistence-oriented and not reflective of a chosen opportunity to become an entrepreneur, but as a manner of last resort in times of inflexible wages and work schedules (Jaitly et al., 2022).

Therefore, while women may be more willing to launch their small businesses, it is not to close the income gap but to overcome problems like low wages and not aim for any kind of growth or expansion. Also, women may prioritise flexible working schedules and independent control over factors such as working time that have a more significant effect on the female entrepreneurship rate than the gender pay gap in India, as explored through this research. Already, there is a limited number of jobs in the formal corporate sector with a low gender pay gap; hence, it is rare that women prioritise a low gender pay gap over high wages (*23% of Salaried Women in India's Metros Perceive a Gender Pay Gap, and 16% Report Gender Bias*

at Their Workplace: Survey by CRISIL and DBS Bank India, n.d.; *The Abdul Latif Jameel Poverty Action Lab (J-PAL)*, n.d.).

Table 3. Cross-sectional time-series FGLS regression results considering Female Entrepreneurship as the dependent variable

FemEntr	Coefficient	Standard Error	t-value	p-value	Significance
WageGap	-.023	.021	-1.09	.276	
Worktime	-.563	.16	-3.52	0	***
FemLFPR	.598	.102	5.88	0	***
FemUnemp	-.605	.195	-3.10	.002	***
FemEduc	-.733	.106	-6.91	0	***
FemEntr	**Coefficient**	**Standard Error**	**t-value**	**p-value**	**Significance**
SGDP	-2.576	.748	-3.44	.001	***
Constant	125.609	13.422	9.36	0	***
Mean dependent var		57.453			
Number of obs		224			
Prob > chi2		0.937			
*** p<.01, ** p<.05, * p<.1					

In India, jobs with a high gender pay gap are typically found in formal, male-dominated sectors. However, since women's labour force participation is largely concentrated in the informal sector, where employment contracts and wage structures are often informal and inconsistent, the gender pay gap tends to be less visible or less relevant in these contexts (Olarewaju & Fernando, 2020). Moreover, these informal sectors are generally already "women-entrepreneur friendly", such as beauty-related healthcare, clothing, and education sectors.

Thus, not the gender pay gap but the low wages, low capital requirements, and low expectations from women act as barriers affecting female entrepreneurship rates (I.F. India, n.d.). In addition to this, while the wage gap may at first seem like the biggest challenge in terms of gender inequality in India, which limits women's earnings and savings, the bigger and more prevalent obstacle is access to equal quantity and quality of financial resources as men (Ministry of Micro, Small and Medium Enterprises et al., 2021). As a result, women often do not get access to formal high-amount loans at low interest rates or have good credit scores at banks, limiting their opportunities for banking and lending credit for their businesses (Klapper & Arora, 2024). Hence, women struggle to scale up an existing startup and are hesitant to start their ventures to begin with, leading to a decline in the female entrepreneurship rate in India, without the gender pay gap itself having any impact.

However, the other independent variables significantly impact the female entrepreneurship rate, as the p-value is less than 0.05. To begin with, working time negatively impacts the female entrepreneurship rate in India. As working time increases by one hour a week, the female entrepreneurship rate significantly decreases by 0.563 per cent. This is because women entrepreneurs experience poorer working conditions that involve tighter working time constraints than men due to unfair opportunities and responsibility for unpaid care work ("Building a Care Economy: 4 Leaders on Why Investing Today Will Create a Virtuous Cycle of Prosperity," 2023; Nikore, 2024). Typically in India, women are expected to carry out all household chores and take care of the family single-handedly without the help of any male members in the household. As a result, Women entrepreneurs in India cannot devote as many work hours to their businesses as men on average, therefore decreasing the average rate of participation of women in entrepreneurship (Jaitly et al., 2022; Bajeli Datt, 2024).

On the contrary, the female LFPR highlights a prominent positive impact on the female entrepreneurship rate, as the p-value (0.00) is less than 0.05. It is depicted that as the female

LFPR increases by one per cent, the female entrepreneurship rate also notably increases by 0.598 per cent. Female LFPR can be considered a key factor that affects the female entrepreneurship rate because greater female participation in the labour force ensures better access to networking. This further encourages women's entrepreneurship as women with better networks and connections will have greater access to affordable credit, investing options and a better general sense of the business world (Khokhar, 2019). The next independent variable, the female unemployment rate, further represents a negative relationship with the female entrepreneurship rate, with its p-value being 0.002.

When the female unemployment rate increases by one per cent, the female entrepreneurship rate falls by 0.605 per cent. This relationship can be explained by Schumpeter's effect, which suggests that there is a negative relationship between unemployment and entrepreneurship since high unemployment deters new business initiatives because of risk aversion, a lack of money and insufficient demand. At first, high unemployment discourages entrepreneurship, but over time, entrepreneurship can lower unemployment. The higher unemployment rate due to stereotypical and social barriers in India reflects labour market rigidities as well as economic growth uncertainties, and for this reason, women have restricted access to financial resources that are essential to start a business, thus reducing the women's entrepreneurship rate (Rani & Sundaram, 2023).

Notably, the share of women in higher education also has an inverse negative relationship with the female entrepreneurship rate in India. As the percentage distribution of women in higher education increases by 1 %, the female entrepreneurship rate declines by 0.733. This is because generally those with high levels of education mostly prefer jobs in government sectors or MNCS, so basically any white-collar jobs over entrepreneurship, as even despite significant economic advancements in India there is still an inflexible mindset towards entrepreneurship and there is huge respect for job holders in the society as compared to entrepreneurs. For this reason, women with a high level of education may be less likely to choose entrepreneurship as a possible career path (Paikaray, 2021).

With this inflexible mindset also comes the need to have high financial security which according to popular opinion of Indians can only be achieved by securing a job as being an entrepreneur involves high levels of uncertainty in terms of the amount of money one can earn and the amount that can be saved for the future in times of emergency (Aaddress.In, 2023; Kmenke, 2022). Furthermore, this means that the higher the level of education, the higher the risk aversion an individual from India has. As enterprise activation often involves high-risk bets, highly educated Indian females will be less willing to become entrepreneurs (Ilie et al., 2021). Finally, SGDP has a significant negative impact (p-value 0.001) on the female entrepreneurship rate as the SGDP increases by ₹1, the female entrepreneurship rate decreases by 2.576. Women in wealthier states, that is states with higher SGDP like Punjab in 2020, have greater access to employment in corporate jobs with fixed wages and other economic/financial opportunities, reducing the main incentive to choose entrepreneurship as a career while in states with lower SGDP Rajasthan, having the lowest in 2020, women have limited access to financial resources and wage employment hence, entrepreneurship is often driven by necessity rather than a more economically favourable choice (Daymard, 2015; Pandit, 2025; I. F. India, n.d.).

In accordance to the first objective of the paper, the impact of gender pay gap on female entrepreneurship in India was investigated in-depth. It was found that gender pay gap does not have a significant effect on female entrepreneurship in India. However, in order to analyse the second objective, the research explored other potential factors that affect female entrepreneurship including working time of female entrepreneurs, SGDP, female unemployment rate, female LFPR and Share of women in higher education. It was found that

SGDP, female unemployment rate, share of women in higher education and working time of women entrepreneurs have a prominent negative effect (act as a pull factor) on the female entrepreneurship rate in India whereas Female LFPR has a signnficant positive impact (acts as a push factor) towards female entrepeurhsip rate.

4. Conclusion

High levels of gender inequality have been prevalent in India consistently over the years, despite overall rapid economic growth, evident in the form of high gender pay gaps. This raises a question about how high levels of the gender pay gap affect opportunities for women, especially whether it has an impact on their motivation towards entrepreneurship, which seems like the prospective career path for most Indians in today's time. This study attempts to analyse the impact of the gender pay gap on the female entrepreneurship rate across 27 states and UTs in India using data taken from the Government of India's periodic labour force reports from the years 2017 to 2024. The study uses a correlational analysis and statistical tests like multicollinearity, the Hausman test, and the Breusch Pagan Lagrange Multiplier test to investigate the effect of working time, female labour force participation rate, female unemployment, female education, state-wise GDP and most importantly, the gender pay gap on the female entrepreneurship rate in India.

Besides this, the FGLS regression model has been used to correct problems of autocorrelation and heteroskedasticity, ensuring the data interpretation is carried out accurately. The results of the study reveal that there is no significant impact of the gender pay gap on the female entrepreneurship rate across the panel of India. However, other independent variables like the working time of women entrepreneurs, state-wise GDP, and female unemployment rate show a negative and significant relationship with the female entrepreneurship rate, suggesting that participation in society plays a crucial role in motivating entrepreneurship. Notably, the share of women in higher education also hurts female entrepreneurship, possibly due to an inflexible Indian mindset, increased risk aversion, and preference for higher financial security. Whereas the female labour force participation rate has a positive and significant impact on the female entrepreneurship rate in India.

These findings further imply that women are motivated to choose entrepreneurship as a career due to necessity rather than opportunity or privilege, and prioritise financial freedom and flexibility over income equality with men. Above all, the study highlights state-wise disparities in economic empowerment for women, concluding that access to financial resources and an adaptive shift in rigid societal norms are necessary and more influential than solely the gender pay gap in decisions regarding choosing entrepreneurship. Additionally, obstacles such as limited access to capital, lack of property ownership and gender-biased lending practices make it difficult for women to obtain sufficient capital for a start-up.

Social stereotypes and expectations around gender roles in households further limit the ability of women to dedicate good quality time and attention to entrepreneurial activity, as that requires undivided time and attention. In conclusion, the study conjectures that the gender pay gap in India does not have any significant impact on the female entrepreneurship rate instead variables less focused on in India like the working time of female entrepreneurs, female labour force participation rate, female unemployment rate and share of women in higher education have a significant impact on female entrepreneurship rate. These are generally affected by the sociocultural norms and typical mindsets/attitudes of Indians towards financial security that affect their decision to consider entrepreneurship.

5. Policy Implications

This study is particularly useful for existing and aspiring women entrepreneurs to help them understand how the gender pay gap alone is not a significant barrier to female entrepreneurship rate in India but rather limited accessibility to finance, working time, level of education, overall working conditions, and education-job mismatch that leads to high female unemployment rate act as key obstacles reducing female entrepreneurship rate. Therefore, they can use this learning to wisely position themselves and start ventures in sectors, industries, or niches with low-entry barriers, good working conditions, and flexible working schedules. In addition to this, the study highlights the importance of building strong connections with industry professionals and leaders to amplify scale, visibility, and obtain capital for female-led businesses. Another stakeholder that will potentially benefit from this research is policymakers based in the government of India. For example, Niti Aayog or perhaps those working in the Ministry of Women's Development can consider the sections for improvement. This study provides evidence for establishing gender-based policies that aim to increase equality for females in entrepreneurship by enabling greater access to capital, addressing work burdens, and reorganising formal hiring structures for females.

Although the Government of India has launched commendable initiatives like the Startup India Seed fund shcme, the Women Entrepreneurship Platform, Pradhan Mantri Mudra Yojana and StandUp India scheme among many others that are aimed at promoting women-led businesses, the extent of effectiveness of these schemes is obstructed by systemic and institutional gaps such as a lack of ground-level execution and rigiours monitoring mechanisms, lack of strict regulation and enforcement, and uneven distribution of fufnds across all states. Most importantly, in some cases funds allocated for empowerment of women entrepreneurs are underutlisised or diverted. In addition, most existing government schemes offer collateral-free loans or financial assistance only to small businesses, however there is little support for women hoping to scale their small businesses into larger,formalised ventures. Therefore there persists a profound gap: women who manage to establish small businesses have no structured and targeted guidance to help them expand further in scale.

Some recommended policy implications may be imposing a mandate on the number of working hours to be within 8-9 hours per day with the average females wokting no more than 48 hours per week which is the legally allowed workweek in India,preventing extra work time hours (Admin, 2025) , providing tax benefits to incentivize women-led businesses and promoting shared household responsibilities between men and women. This can be done by implementing more targetted version of existing policies like the policy of Gender Budgeting and Mainstreaming where the government of India formally integrates frameworks that address the different, specific needs for men and women and ensure that the policies and general laws consider effect on both genders and check whether sufficient funds are allocated to promote gender equality.

Also, it is advised that the government introduces parental leave and campaigns similar to few existing onces such as Mission Shakit, that increases awareness about women rights, Beti Bachao Beti Padhao which addresses declining girl child ratios and promotes education as well as the Daughter Nameplate initiative that breaks typical gender nroms. However these exisitng intaitives empower women in different ways there is still a lack of campaigns and intiatives that raise public awareness around equality in gender roles at home and especially in the workplace. Additionally, the government should make financial literacy, work experience, and entrepreneurship training compulsory for all females of working age within university programs.

Moreover, the government should expand the existing E-shram portal to include benefits, especially for women entrepreneurs, such as retirement benefits, insurance schemes, and offer support for registering their businesses, specifically in Tier 2 and 3 cities of India, which will motivate women to formalise and scale their businesses. As a result, this will also help boost the female labour force participation rate, which positively impacts female entrepreneurship. Overall, increased government spending on vocational training and upskilling programs for female entrepreneurs in each state will result in an increase in the state-wise GDP, which will also positively impact the female entrepreneurship rate.

6. Limitations

While this research paper provides valuable insights into the relationship between the gender pay gap and the female entrepreneurship rate, there are a few limitations that should be acknowledged. To begin with, the study analyses data only from 2017 to 2024, which is a restricted short period and has been conducted across 27 states only in India; this limits the generalizability of the findings of the study to all other developing countries in the world. Also, perhaps a longer period should have been used to form a well-rounded understanding of long-term shifts and trends in the gender pay gap and female entrepreneurship rate.

Secondly, union territories/states like Daman and Diu, Nagar Haveli, and Ladakh were either not established or were not recorded properly during the years 2017-2018, impacting the uniformity and accuracy of the panel data that has been used in this paper. Most importantly, this study has been carried out with the assumption that the economy was stable, not accounting for major economic shocks like the Covid-19 pandemic from 2019 to 2021, any recessions, or industry/sector-specific disruptions, which would have influenced a significant decline in the labour market and entrepreneurial decisions. On top of that, further research should involve a comparative analysis with economies of other developing countries like Bangladesh, Kenya, Brazil, Vietnam, Philippines and Colombia to evaluate whether the same relationship is observed between gender pay gap and female entrepreneurship rate, or a unique correlation is observed in other countries. However, despite these limitations, the study provides a strong starting point for the exploration of the relationship between the gender pay gap and female entrepreneurship rate in India, which provides strong empirical evidence for future policy designs and changes.

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