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### Examining the Role of Women's Employment on Labor Productivity in Iran

Mohammad Gaffary Fard<sup>1</sup>, Amir Khan Hussainzadah<sup>2</sup>  DOI: 10.22034/MWS.2024.728774

1. Associate Professor of Economics, Ahl al-Bayt International University, Tehran, Iran

2. Master of Science (M.Sc.) in Economics, Ahl al-Bayt International University, Tehran, Iran

\* **Corresponding author:** [mghaffaryfard@abu.ac.ir](mailto:mghaffaryfard@abu.ac.ir)

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#### ABSTRACT

Women's employment is one of the most important aspects of economic and social growth in contemporary societies. In recent decades, attention to the role of women in the labor market has significantly increased, and it has been recognized that their active participation can contribute to improving productivity, economic growth, and reducing social inequalities. Despite progress in the field of women's rights and job opportunities, there still exist various challenges and obstacles such as gender inequalities, cultural and economic restrictions, and problems related to work-family balance. Addressing these issues and striving to promote women's employment is not only to the benefit of women themselves, but can also contribute to sustainable growth and improvement in quality of life at the societal level. In this research, time-series data related to the model were collected and, by econometric methods and using version twelve of Eviews software, the effect of women's employment on labor productivity in the provinces of Iran was examined. The results of the research show that the share of women's employment in the provinces of Iran has a positive and significant relationship with labor productivity in the provinces of Iran. Also, the variables of wages, women's education, and GDP growth have a positive and significant effect on labor productivity in the provinces of Iran, while the variable of inflation has a negative and significant effect on labor productivity in the provinces of Iran. Therefore, economic policymakers, in order to promote human productivity in Iran, must consider various measures to increase women's economic participation alongside enhancing women's education, reducing wage inequalities, and fostering economic growth.

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### **Introduction and statement of the problem**

Productivity is considered one of the important factors of economic growth. These factors are particularly important for countries that are economically developed as well as those that are developing. One of the fundamental factors of economic growth in countries is labor productivity. There are also other factors such as capital, labor, and human capital that are highly important for economic growth. The increase of human capital depends on the enhancement of knowledge, skills, and expertise, which leads to increased production and improvement of quality (Qaderi, 2023: 43). In countries that are economically underdeveloped, women require economic growth in their society and country in order to improve the standard of living of their families. Since the enhancement of skills and training of employed women leads to an increase in their productivity, it also contributes to economic growth. Therefore, on the one hand, women's needs such as education and employment must be taken into consideration, and on the other hand, their motivations and the promotion of their physical and psychological health must be given importance, as they play a major role in achieving family welfare, child-rearing, job performance, and the advancement of society.

Low productivity in Iran is one of the fundamental challenges raised in development programs, and in the Seventh Development Plan, more than three and a half percent of economic growth is expected to be achieved through productivity (Rajaei, 2017: 98). The aim of this research is to examine the effect of women's employment share on labor productivity in all provinces of Iran. Although much research has been conducted on the effect of women's employment share on labor productivity, no independent research has specifically addressed the present topic. Therefore, the aim of this research is to investigate the effect of women's employment share on labor productivity in the provinces of Iran.

The main question of this research is: What is the effect of women's employment share on labor productivity in the provinces of Iran?

Therefore, the structure of the present research is such that, after the introduction, Section Two discusses the theoretical foundations and literature review. Section Three examines the model and data. The final section presents the research conclusion and suggestions.

### **2. Theoretical Studies**

Productivity refers to the optimal use of production factors in the production process. It is necessary to examine the factors that influence productivity. One of the effective factors on productivity is employment. Productivity includes all structural and systematic efforts to reduce losses caused by materials, machinery, humans, and other factors involved.

The concept of productivity in fact shows the relationship between the produced output and the factors used for its production. However, labor productivity is actually a criterion for evaluating and measuring the value created by labor in the production process.

The definition of labor productivity states: Labor productivity is the ratio of value-added to labor, or the amount of output obtained from each unit of labor. Labor productivity, as an economic indicator, is calculated by dividing the real value-added produced by each unit of labor (Esfahanian et al., 2022: 290).

Productivity Indicators:

In general, productivity indicators can be divided into two categories:

Indicators that consider the relationship between output and a single input.

Indicators of total factor productivity, which consider the relationship between output and all inputs.

Partial Productivity Indicators are mainly divided into two parts:

Labor Productivity Indicators:

To measure labor productivity in an economic sector, one can use the method of dividing value-added by the number of employees.

To measure capital productivity in a sector of the economy, the ratio of value-added to the available capital in that sector is used. Normally, for calculating this, value-added is divided by the existing capital, and capital productivity is obtained at a fixed price.

The Impact of Women's Employment on Labor Productivity

Although having a job for women is more important than merely achieving financial independence and economic security, through it they wish to utilize their abilities and step beyond their household roles, gaining greater social dignity and self-confidence in society.

An important issue influencing women's employment is the multiple pressures such as household work and some maternal responsibilities, which, when combined with job duties, affect women's mental health. If these problems persist without solutions, both women's physical and mental health will be endangered, and household tasks will also be disrupted (Raf'at & Kheirkhah, 2013: 65).

Generally, women are motivated to work for various reasons, with economic factors being the most important. Women work to compensate for income shortages, increase purchasing power, gain personal freedom and independence, or as a form of security for their own and their families' future.

Economic participation in Iran's economy can be of great importance, where women play a significant role in social and economic life. There is consensus that women's participation in economic activities not only enhances their own abilities and capacities but also plays a vital and key role in Iran's economic growth (Azarbjani, 2009: 23).

In Iran, women have always contributed alongside men to the country's economic growth. However, their presence and participation have never been seriously translated into visible roles in social, economic, and political arenas. Usually, women work in the simplest jobs and the lowest sectors, but in recent years, with social changes, women's inclination toward technology, knowledge, and entrepreneurship has significantly increased.

The relationship of the women's employment variable with labor productivity is examined below:

Women's employment can have a significant impact on labor productivity. With women entering the labor market, the workforce increases, GDP rises, and economic growth is achieved. Since women often have different perspectives and approaches compared to men in solving problems and creating innovations, their presence in the workplace increases innovation, creativity, and efficiency, thereby enhancing labor productivity. Furthermore, investment in women's education and development increases human capital, which in turn enhances labor productivity. However, it must be noted that women's employment enhances labor productivity only when equal opportunities, absence of gender discrimination, necessary support, and proper training are provided. Women's employment can also increase family income, improve living standards, and promote knowledge and skills, thus raising productivity. Increased women's employment in light industries and gender equality, as well as their growing presence in companies, will also boost productivity (Lotfi et al., 2022: 79).

Appropriate wages can increase employee motivation. When employees know that their wages are proportional to their efforts, they will likely work with greater motivation. Competitive wages also help attract and retain talented employees. For example, organizations that offer higher wages are usually able to attract the best workforce, which in turn improves productivity. Overall, wages are one of the important factors determining labor productivity. Wages and labor productivity are related in such a way that changes in one can affect the other. An increase in labor productivity is often influenced by rising wages (Souri et al., 2010: 311).

Education effectively increases the knowledge and skills of employees. They are in fact equipped with new knowledge and skills, enabling them to perform their tasks better and faster, thereby increasing productivity (Ghaffarifard et al., 2024: 92). Education can be considered an influential factor on labor productivity because it helps employees update their skills and knowledge, enabling them to perform their duties correctly. Employees who have received proper training usually have better work quality compared to others. This improvement in quality can lead to reduced errors and increased customer satisfaction. Education, as an investment in the workforce, can enhance work quality and employees' job satisfaction (Rajaei, 2017: 98).

### 3. Research Background

Prada and colleagues (2024) examined the effect of factors influencing labor productivity in the global construction industry. The results of the research indicate that there has been great interest in studying productivity and related topics, and over time this subject has evolved further. In recent years, more emphasis has been placed on labor productivity, management, and the technical work environment. The findings show that internal project factors such as planning, technical considerations, and management resources are more predictable and controllable than external factors.

Nejadkoshki and colleagues (2023) investigated the effect of wages and inflation on labor productivity in selected developing countries. The findings show that inflation has a negative relationship and wages a positive relationship with labor productivity in both regimes (boom and recession). Regarding control variables, factors such as human capital, trade liberalization, and business environment have positive effects on labor productivity in both regimes. However, foreign direct investment and corruption control have a positive relationship in the first regime and a negative relationship in the second regime.

Yinita and colleagues (2023) studied factors influencing labor productivity in palm oil farms. This research surveyed workers in the PT sector, totaling 110 workers. According to workers' opinions, the productivity of palm oil harvesting with non-group labor conditions was examined using descriptive approaches, while multiple linear regression was applied to study the influencing factors. The results show that labor productivity has a direct relationship with age, education, and skills of individuals; the greater the skills and education, the higher the labor productivity.

Fattah and Paslawski (2023) examined factors influencing construction productivity in northern Iraq. The findings reveal that site complexity was identified as the primary challenge in construction, ranked first, while lack of worker

## 22 Examining the Role of Women's Employment on Labor Productivity in Iran

motivation was the second major factor affecting productivity. Respondents agreed that site engineers had the greatest influence on construction projects compared to contractors and designers.

Hassan and Cooray (2015) investigated the effect of male and female education on economic growth in some Asian countries. Their results show that investment in women's education can lead to faster economic growth in these countries.

Hafner and Mayer-Foulkes (2017) examined the role of women's empowerment through education in promoting growth and reducing poverty in parts of Pakistan. The findings indicate that women's empowerment not only fostered economic growth in the studied areas but also reduced poverty.

Tellez, Airola, and Juhn (2010) studied the effect of trade liberalization on Mexican women's labor during the 1990s using household and firm-level data. The statistics show relative wage stability for women alongside increased employment, which led to higher nominal wages for women. Structural changes in trade-based industries increased women's wages by up to 40 percent between 1990 and 2000. Reducing export tariffs had a positive and significant relationship with industrial growth and women's benefits.

Jayaweer (1998) conducted a study entitled *Women, Education, and Empowerment in Asia*. He argued that education, in its broader sense, is an indicator of women's social status and, more importantly, a means of empowering women. Jalali and Chaibakhshi (2023) investigated the impact of job satisfaction on increasing employee productivity. The findings show that individuals experience relative satisfaction with employment from a review-based perspective. For better explanation of the relationship, attention must be given to the pivotal role of human resources in productivity, as humans are considered the most important element of productivity, and fulfilling their essential needs is necessary.

Esfahanian and colleagues (2022) examined total factor productivity and employment levels. The findings show that there is no relationship between productivity and employment with capital stock in the industrial sector, and the relationship between wage levels and productivity is inverse.

Yousefi and colleagues (2019) studied the effect of total factor productivity on employment in Iran's manufacturing industries. The findings show that increased specialization of labor resources and new machinery can lead to higher productivity and employment in Iranian industries.

Fallahi and colleagues (2012) investigated the relationship between changes in productivity and employment in Iran's industry. The findings indicate that policies aimed at enhancing productivity in the long run can themselves lead to reduced labor employment.

Farzaneh (2011) analyzed the effects of productivity and trade on employment in Iran's manufacturing industries. The results show that import competition has a negative effect on employment, while export demand has a positive effect. Therefore, the effects of export-related productivity are positive, but the effects of import competition productivity are negative.

Malekzadeh (2006) examined women's employment in Iranian statutory laws. The findings show that factors influencing access to employment positions for women and the balance of supply and demand are essential for preventing family instability and anxiety. He emphasized that since women today constitute a large part of the educated and specialized workforce, all barriers to their employment must be removed.

Nazari and colleagues (2021) studied the impact of women's job quality on quality of life. The results show that high-quality employment for women has a positive and significant effect on women's mental and psychological health. Furthermore, women's job quality has a positive and significant relationship with their life satisfaction.

Raf'at Jah and Kheirkhah (2013) examined the issues and challenges of women's employment in Iran from the perspective of women in managerial positions. The findings show that everyone believes in the socioeconomic importance of women's jobs, but women emphasize more on the economic necessity, while men emphasize more on the social aspect of women's employment. Overall, the views of both men and women suggest that women's employment benefits both themselves and society, and therefore, structural and cultural barriers to women's employment must be removed, creating suitable conditions for women's jobs.

Amini and Ghanizadeh (2010) studied the factors influencing women's employment. The results show that the labor demand model for women has a positive and significant effect on women's employment and productivity. Therefore, by removing barriers in production industries, greater support can be provided for women's productivity and employment. Furthermore, the substitution hypothesis between women's labor, cultural capital, and men's labor is confirmed. Finally, the findings indicate that women's real wages have a negative, but insignificant, effect on women's employment.

Dadgar and Naderi (2005) examined the effect of trade globalization on employment in Iranian industries. The results show that trade globalization generally has a negative impact on employment in Iran's industries. Two hypotheses were tested: the first is that globalization in the long run increases industrial employment; the second is that globalization increases employment in export-oriented industries and decreases employment in competitive import-

oriented industries. The results reveal that globalization negatively affects overall industrial employment, import-competitive industries, and export-competitive industries. Although the main hypotheses were rejected, given Iran's economic structure and its link with globalization, the findings are noteworthy.

Despite the abundance of research on women's employment and labor productivity in Iranian provinces, limited studies have directly examined women's employment share on labor productivity.

Haghshenas (2024) studied the factors and contexts behind the low rate of women's economic participation in Iran. The findings show that traditional factors and cultural limitations reduce women's employment share in labor productivity in Iranian provinces. This study examined the indirect effects of these factors on labor productivity.

Research conducted by the specialized economic website Eghtesad-e-Iran (EcoIran, 2024), based on official statistics from the Iranian National Statistics Center, shows that women's employment conditions differ across provinces. Both this and other studies in this area reveal similarities and differences. The similarity with the present research lies in the study of women's employment share, but the difference is that no study so far has directly examined women's employment share on labor productivity in Iranian provinces over the period 2013–2019, which constitutes the novelty of this research.

#### 4. Research Methodology

The spatial scope of the present research is 31 provinces of Iran, and the temporal scope covers the years 2013 to 2019 (1392–1398). The data of this study were collected from the official website of the Iranian Statistics Center. The analysis was conducted using the panel data econometric method, estimated by Ordinary Least Squares (EGLS), and processed with Eviews version 12 software.

Based on the discussions in the theoretical foundations, in order to examine the effect of women's employment share on labor productivity in the provinces of Iran, the following model is presented:

$$LP = \alpha_0 + \alpha_1 WEMP + \alpha_2 WAG + \alpha_3 WOEDU - \alpha_4 INF + \alpha_5 GDP + UT$$

##### Variables:

- **LP (Labor Productivity):** Calculated by dividing the total value added of economic sectors in each province by the employed labor force.
- **WEMP (Women's Employment):** Share of employed women.
- **WOEDU (Women's Education):** Female education levels.
- **WAG (Wages):** Wage levels.
- **INF (Inflation):** Inflation rate.
- **GDP (Gross Domestic Product):** Economic growth.
- **UTUT:** Error term

Labor productivity is calculated by dividing the total value-added of the economic sectors in each province of Iran by the employed labor force in that province.

#### 5. Research Findings

Based on the research model, using the panel data method, various tests were conducted and the results are analyzed as follows:

##### Unit Root and Stationarity Test

Since non-stationarity of variables leads to spurious results, including spurious regression, before estimating the model it is necessary to test the stationarity of the data. If the variable is not within the range of 0.0000 to 0.05, then the variable is not stationary.

**Table 4-1: Levin, Lin & Chu Stationarity Test, Research Variables after Differencing**

Variable	Level	Dynamics	Statistic	Prob	Result
EDW			-10.4470	0.0000	Stationary
EMPW			-7.7894	0.0000	Stationary
WAG			-2.4060	0.0081	Stationary (1)
LP			-6.2583	0.0000	Stationary
INF			-9.9011	0.0000	Stationary (2)
GDP			-1.3280	0.0092	Stationary

## 24 Examining the Role of Women's Employment on Labor Productivity in Iran

Source: Research findings

### Kao Cointegration Test

To prevent spurious regression before model estimation, cointegration tests must be applied to ensure whether there is a long-term relationship among variables. If the Kao statistic falls between 0.0000 and 0.0555, it indicates a significant long-term relationship between independent and dependent variables.

**Table 2: Results of Kao Cointegration Test**

Statistic	t-Statistic	Prob
ADF	-5.0711	0.0000

Source: Research findings

### Chow (F-Limer) Test

The Chow or F-Limer test is used to choose between pooled regression and fixed-effects regression, as well as to determine the nature of the data.

**Table 3: Result of Chow (F-Limer) Test**

Test	Prob.	Statistic	d.f.
Chow Test	0.0000	35.5179	30.181

Source: Research findings

According to the table, since the F-statistic is greater than the critical F-value, fixed effects are confirmed. The null hypothesis (H0) is rejected at 99% confidence.

### Hausman Test

After the Chow test indicated that the data are panel data, the Hausman test is used to determine the type of model (fixed or random effects). If the probability value is less than 5%, the model has fixed effects; otherwise, the null hypothesis (H0) is accepted and the model has random effects.

**Table 4-4: Result of Hausman Test**

Test Item	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Hausman Test	60.4935	5	0.0000

Source: Research results using Eviews12

According to Table 4, since the probability value in the Hausman test is (0.0000), the null hypothesis (H0) is rejected, confirming that the model has fixed effects.

## Model Estimation and Analysis

**Table 5: The Effect of Women's Employment Share on Labor Productivity in Iranian Provinces (Ordinary Least Squares Method)**

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Wages (WAG)	6.083591	3.989886	2.518177	0.0127
Women's Employment (WEMP)	0.000301	3.56E-05	8.455304	0.0000
Women's Education (WOEDU)	1.249039	0.500560	2.495282	0.0135
Gross Domestic Product (GDP)	9.61E-07	1.00E-07	9.564221	0.0000
Inflation (INF)	-0.084990	0.049283	-1.724529	0.0863
Constant	303.4238	18.29274	16.58712	0.0000

R<sup>2</sup> = 0.98

D-W = 1.07

F-statistic = 303.7 (Prob. 0.0000)

Source: Research results using Eviews12

### Interpretation:

The results show that 98% of the changes in the dependent variable (productivity) are explained by the independent variables (women's employment share, women's education, wages, inflation, and GDP). This indicates that the model is statistically valid and significant.

Wages have a positive and significant effect: one unit increase in women's wages increases labor productivity by 6.08 units in Iranian provinces.

Women's employment has a positive and significant effect: one unit increase in women's employment increases labor productivity by 0.000301 units, showing a direct positive relationship.

Women's education has a positive and significant effect: one unit increase in women's education raises labor productivity by 1.24 units.

Inflation has a negative and significant effect: one unit increase in inflation reduces labor productivity by 0.084 units. GDP has a positive and significant effect: one unit increase in GDP raises labor productivity by 9.61 units. The Durbin-Watson statistic (1.3) indicates that the model does not suffer from autocorrelation. The F-statistic (303.7) and its probability (0.0000) confirm that the regression model is significant. The coefficient of determination ( $R^2 = 0.98$ ) indicates that about 98% of the variation in productivity is clearly explained by the independent variables, showing the explanatory power of the model.

## 6. Research Conclusion

Women's employment is one of the important and fundamental issues in the economies of countries and has always been considered a notable policy by economic policymakers, which, using this discussion, also explores the factors affecting economic growth. Labor productivity in this research is considered as the dependent variable and is affected by the share of women's employment, which is the independent variable of this research. Labor productivity is actually a criterion to measure and assess the value created by labor in the production process. In the definition of labor productivity, it is stated: labor productivity is the ratio of value added to labor, or the amount of output obtained from each unit of labor. This criterion indicates to what extent an economy in a country functions properly.

In this research, the effect of women's employment share on labor productivity was examined in 31 provinces of Iran. The required data from 2013 to 2019 (1392–1398) were collected from the Iranian National Statistics website. The collected data, which are time series data, were analyzed using **Eviews 12** software.

The main hypothesis of this research is that women's employment is related to labor productivity in the provinces of Iran. This research was conducted with the aim of examining the effect of women's employment share on labor productivity in the provinces of Iran using statistical data. Before describing and estimating the model, necessary tests such as unit root or stationarity tests, cointegration test (Kao's test), Chow test (F-Limer test), and Hausman test were conducted. According to the unit root test, the stationarity of all research variables, such as Levin-Lin-Chu unit root test, was accepted and confirmed. Similarly, the Kao cointegration test indicated that there is a long-term and significant relationship between dependent and independent variables, and the Chow test showed that the data are of panel type. The Hausman test, used to determine fixed and random effects, indicated that the estimated model has fixed effects and is confirmed.

According to the results obtained from estimating the research model, women's employment share in the provinces of Iran has a direct, positive, and significant effect on labor productivity, so that a one-unit increase in women's employment share indicates a 0.0003-unit increase in labor productivity in the provinces of Iran. Therefore, the hypothesis of the effect of women's employment share on labor productivity in the provinces of Iran is confirmed.

Based on the research findings for the subsidiary hypotheses, the variables of wages, women's education share, and gross domestic product have a positive and significant effect on labor productivity in the provinces of Iran, such that a one-unit increase in these variables (wages, women's education share, and GDP) causes an increase in productivity in the provinces of Iran. Therefore, the subsidiary hypotheses regarding the effect of wages, women's education, and GDP on women's employment share in the provinces of Iran are confirmed. Also, the variable of inflation has a negative and significant effect on labor productivity, so that an increase in inflation reduces labor productivity in the provinces of Iran.

The research results also show that the Durbin-Watson statistic is used to detect the existence or absence of autocorrelation problems in the model. If this statistic is in the range of 1.5 to 2.5, it indicates that there is no autocorrelation problem in the model (Refaat & Jazi-Zadeh, 2016: 42). The Durbin-Watson statistic obtained in this research is 1.6248, which indicates that there is no autocorrelation problem in the model, and the model does not have autocorrelation. The F-statistic indicates the overall significance of the regression equation; with  $F = 147.6655$  and probability = 0.0000, it explains that the estimated model has a positive and significant effect. The coefficient of determination ( $R^2$ ) is 0.98, indicating that about 98% of changes in productivity are clearly explained by the research variables. This value shows the explanatory power of the model.

## Research Recommendations

Based on the main hypothesis of the research—the significant positive effect of women's employment share on labor productivity in the provinces of Iran—the following recommendations are proposed:

## 26 Examining the Role of Women's Employment on Labor Productivity in Iran

- Creating a flexible work culture and supporting work-life balance for women can greatly help increase women's employment and labor productivity.
- Providing skills training and empowerment for women to enter the labor market and advance professionally can help improve labor productivity.
- Improving social infrastructure and supporting facilities related to childcare and eldercare can help women continue participating in the labor market and increase labor productivity.

Based on the subsidiary hypothesis regarding the negative and significant effect of inflation on labor productivity in the provinces of Iran, the following recommendations are proposed:

- Improving infrastructure: Investing in economic infrastructure such as transportation, communications, and energy leads to increased labor productivity and reduced costs.
- Encouraging entrepreneurship and small businesses: Supporting small and medium enterprises can create jobs and reduce the inflation rate.
- Strengthening the labor market: Creating incentives and suitable conditions for investment in production and service sectors increases employment and labor productivity.

Based on the subsidiary hypothesis regarding the positive and significant effect of GDP on labor productivity in the provinces of Iran, the following recommendations are proposed:

- Growth of skills related to local industries: Enhancing labor skills in production sectors such as agriculture, handicrafts, steel, and automobile industries.
- Encouraging entrepreneurship and employment in local industries: Providing financial and tax support to encourage the creation of new businesses in provinces.
- Promoting cooperation between government, industry, and universities: Encouraging active collaboration between universities and local industries to transfer technology and knowledge to employees.

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