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JEL classification : E24, O33, C53

1 Objective

- Identifying gender disparities in high-skill professions among 25 countries in the Organization for Economic Co-operation and Development (OECD), which uncovers patterns of gender bias in the OECD labor market.
- Forecasting employment by Occupation (Skill level): Skill levels 3 and 4 ~ which correspond for highly skilled females and males to evaluate the influence of Artificial intelligence and anticipate a reshape in demand for skills.
- This research provides new insights for policymakers to develop gender-responsive labor market strategies aimed at addressing the underrepresentation of women in high-skilled professions, where females represent 27% and males 73% in high-talent professions with AI talent (OECD. AI, 2024).
- Provides a comprehensive lens to examine the impact of artificial Intelligence, which favors male workers with high skills over female workers with high skills.

2 Research Background

- The theoretical background of this study draws on multiple aspects of economics:
- Economic growth theory, particularly the hardware-software model, emphasizes the dual role of human physical labor and capital (hardware) and human cognitive work (software) in driving long-term economic development (Growiec, 2022). This is closely linked to Schumpeter’s concept of creative destruction, where innovation continuously disrupts existing structures, leading to productivity gains but also potential job displacement.
- Human capital theory underscores the importance of education and skills development in enhancing individual productivity.
- The skill-biased technological change (SBTC) (Acemoglu & Restrepo, 2020), postulates that recent technological innovations, including artificial intelligence, tend to favor high-skilled workers, thereby widening the employment and wage gap between skilled and unskilled labor.

3 Methodology

This research employs machine learning techniques to forecast future employment in high-skill occupations for both females and males, highlighting the impact of artificial intelligence (AI) on gender bias across 25 OECD countries. These countries include the United States, France, Israel, Sweden, Luxembourg, Estonia, Greece, Finland, Switzerland, Australia, the Czech Republic, Germany, Lithuania, the United Kingdom, Norway, Belgium, the Netherlands, Turkey, Portugal, Poland, Italy, Denmark, Costa Rica, Chile, and Mexico. The data, covering the period from 2016 to 2023, was sourced from the World Bank, the International Labour Organization (ILO), and the OECD. The forecast period extends from 2024 to 2028. To begin, LASSO regression (Ranstam et al., 2018) with fixed effects is used to select the most relevant variables and to forecast the impact of AI on employment (high skills) for both genders in the OECD countries.

Model I: Dependent variable- Employment for females

(1) Preliminary Equation:

$$EMPF_{it} = f(AIF_{it}, LP_{it}, GEFF_{it}, CPI_{it}, FDI_{it}, EDUATF_{it})$$

(2) Selected by LASSO:

$$EMPF_{it} = f(AIF_{it}, CPI_{it})$$

Model II: Dependent variable- Employment for males

(1) Preliminary Equation:

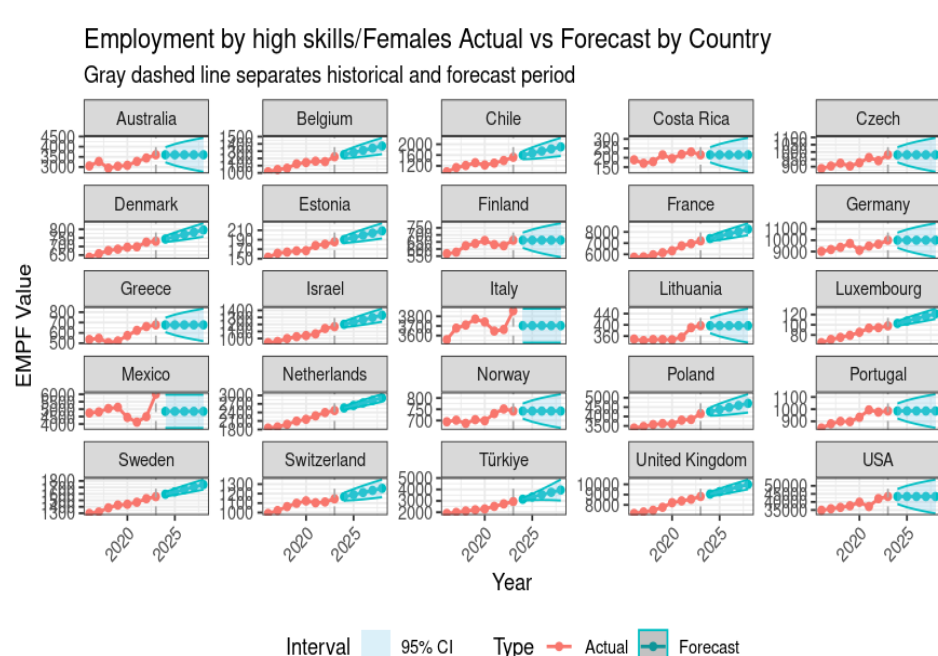
$$EMPM_{it} = f(AIM_{it}, LP_{it}, GEFF_{it}, CPI_{it}, FDI_{it}, EDUATM_{it})$$

(2) Selected by LASSO:

$$EMPM_{it} = f(AIM_{it}, CPI_{it})$$

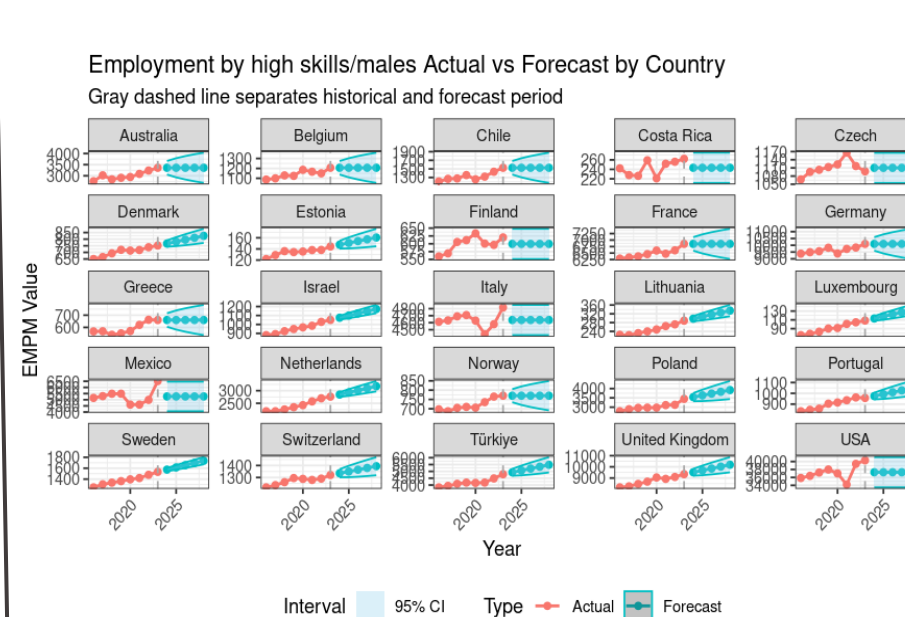
4 Analysis

Model I: Forecasting employment by high skills for females



The forecasting results show that the majority of countries are consistent with an upward trade of high-skilled female employment.

Model II: Forecasting employment by high skills for males



In many countries (e.g., France, Germany, USA), the forecasted Employment with high skills for males' values shows a stable or slightly increasing trend, suggesting the model expects continuity in employment patterns.

Evaluation Metrics	Model I	Model II
Mean Squared Error (MSE)	0.0017	0.0007
Root Mean Squared Error (RMSE)	0.0422	0.0268
Mean Absolute Error (MAE)	0.0342	0.0192

Countries	Increase in EMFM	Increase in EMFF	Decrease in EMFM	Decrease in EMFF	Constant EMFM	Constant EMFF	Dominance EMFM	Dominance EMFF
United States	X					X	X	
France		X			X		X	
Israel	X	X					X	
Sweden	X	X					X	
Luxembourg	X	X						X
Estonia	X	X					X	
Greece			X			X	X	
Finland			X			X	X	
Switzerland	X	X						X
Australia					X	X	X	
Czech Republic	X				X			X
Germany					X	X		X
Lithuania	X					X	X	
Poland	X	X					X	
United Kingdom	X	X						X
Norway		X			X			X
Belgium		X			X		X	
Netherlands	X	X						X
Turkey	X	X						X
Portugal	X					X		X
Italy			X	X				X
Denmark	X	X						X
Costa Rica	X	X						X
Chile		X			X		X	
Mexico			X	X				X

5 Conclusion

- Based on the estimation results from two models across 25 OECD countries, the findings show that 13 countries are dominated by males in high-skilled employment. The results indicate that male employment will increase in these countries, where AI appears to favor males over females.
- However, 12 countries have higher numbers of highly skilled females than males: the United States, France, Israel, Sweden, Estonia, Greece, Finland, Switzerland, Lithuania, Poland, Chile, and Belgium, while the remaining countries show male dominance in high-skilled employment. These two models demonstrate high performance based on key metrics and align with the theory of skill-biased technological change, which suggests that the higher the skill level, the greater the increase in employment.

Related literature

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