Changing Cognitive Capital: A Conjoint Study on the Impact of AI Adoption on Skill Demand

Gayatri Rajendra Shejwal
Master's Thesis in Data Science for Public Policy (MDS)
Hertie School, Berlin

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Pre-Analysis Plan

1. Introduction and Research Motivation

The adoption of artificial intelligence (AI) technologies is reshaping organizational practices, workforce structures, and the skills required for employment across industries. While prior research has examined macroeconomic impacts of AI and worker-level responses such as reskilling, little is known about how organizational AI adoption alters employer hiring preferences, particularly at the level of candidate skills.

This study investigates how exposure to varying levels of organizational AI adoption influences employer evaluations of candidate skillsets, focusing on differences between generalist (Manager) and specialist (Analyst) job roles across respondents from the United States and the European Union.

2. Research Questions and Hypotheses

The study mainly seeks to answer the following research question: How does organizational adoption of AI impact employer preferences for candidate skills in generalist and specialist job roles in the US and EU?

The study will test the following pre-registered hypotheses based on the theoretical framework.

- **H1 (Main Effect Hypothesis):** High level of AI adoption within the organization increases employer preference for AI-relevant skills (e.g., machine learning proficiency, programming skills) relative to a low AI adoption context.
- **H2 (Interaction Hypothesis - Job Role Moderation):** This effect of AI adoption on preference for AI-relevant skills is stronger for specialist roles (Analyst) than for generalist roles (Managers).

- **H3 (Traditional Skill Preference Hypothesis):** Employer preference for traditional human skills (e.g., soft skills, leadership) remains relatively stable across AI adoption conditions, particularly in generalist roles.

Additionally, the following hypotheses are exploratory and will be tested if the data allow.

- **H4 (Age Bias Hypothesis):** Younger candidates (aged 25-35 years) are preferred over older candidates (aged 50-60 years) in high AI adoption contexts.
- **H5 (Education Level Hypothesis):** Candidates with higher education levels (Master's or PhD) are preferred overall, independent of AI adoption level.
- **H6 (Regional Differences Hypothesis):** Employers in the US exhibit a stronger shift toward AI-relevant skill preferences under high AI adoption conditions compared to those in the EU.

3. Research Design

The study employs a forced-choice conjoint experimental design. The experimental design features two sequential randomizations - one at the vignette/framing level and the other at the conjoint attribute level. First, respondents are randomly assigned to one of four between-subjects framing conditions in a 2×2 factorial structure: one of two levels of organizational AI adoption and one of two job roles. Second, within each condition, participants complete five forced-choice conjoint tasks in which candidate attribute levels are independently randomized. This layered design allows for clear identification of the causal effects of AI framing and job role on employer selection, and ensures that these effects are isolated from the effects of individual skill attributes.

The four framing conditions are:

- **AI Framing:** High AI Adoption vs. Low AI Adoption within the organization
- **Job Role:** Manager (Generalist) vs. Analyst (Specialist) being hired by the employer (the respondent).

Each respondent completes five forced-choice tasks, choosing between two randomly generated, hypothetical candidate profiles per task (Candidate A and Candidate B). The attributes levels within the candidate profiles are dynamically generated using seeded randomization via JavaScript. The seeded randomization is used for reproducibility across each participant, the four vignette conditions and five tasks. A constraint is applied to ensure that machine learning proficiency does not exceed programming/data analysis proficiency within any profile (in order to avoid meaningless combinations such as high machine learning proficiency and no programming skills). No other restrictions are placed on attribute combinations.

The survey is hosted on Qualtrics and distributed via Prolific, targeting HR professionals and hiring decision-makers in the United States and European Union. Eligibility is confirmed through a screening question regarding hiring involvement.

4. Attribute Design

The randomly generated candidate profiles vary along six key attributes:

- Age: Randomly drawn from a continuous uniform distribution between 25 and 60 years.
- Highest Education Level: Bachelor's, Master's, PhD
- AI/Machine Learning (ML) Proficiency: None, Basic, Intermediate, Advanced
- Programming/Data Analysis Skills: None, Basic, Intermediate, Advanced
- Soft Skills: Low, Medium, High
- Leadership/Decision-Making Skills: Low, Medium, High

Candidate attribute levels were dynamically inserted into the survey using embedded data fields, allowing recovery of attribute profiles for each forced-choice task at the analysis stage.

5. Outcomes and Measures

The primary outcome is the candidate selected (Candidate A or Candidate B) in each forced-choice task. The choice of candidate can be linked back to the attributes that are generated and saved for the given profile within the given task.

Some secondary/exploratory measures are also collected, which include:

- Task completion time
- Responses to the manipulation check questions
- Demographic characteristics of the respondent (e.g., age, gender, education level)
- Digital literacy and self-reported level of AI skills of the respondents
- Industry sector which the respondent is employed and carries out hiring responsibilities in
- Policy preferences related to AI adoption and its impact on the labour market

6. Analysis Plan

The experimental design enables causal inference regarding the effects of organizational AI adoption framing, job role type, and candidate skill attributes on employer's hiring decisions in the form of candidate choice. Random assignment to vignette conditions and independent attribute randomization across profiles ensure that the estimated effects represent unbiased causal estimates under the assumptions of experimental design.

Main analyses will estimate Average Marginal Component Effects (AMCEs) using logistic regression models with standard errors clustered at the respondent level. Average Component Preferences (ACPs) will also be estimated to account for the forced-choice

structure of the tasks.

Subgroup analyses will compare effects across:

- AI Framing (High vs. Low)
- Job Role (Generalist vs. Specialist)
- Region (United States vs. European Union)

Pre-specified contrasts will test whether AI-relevant skills are more strongly preferred under high-AI framing and whether traditional human skill preferences remain stable across framings.

7. Exclusion Criteria

Participants must complete all the five forced-choice tasks. However, they will be excluded from analysis if they:

- Are not actively involved in the hiring decisions in their organization.
- Fail more than one of two embedded attention/manipulation checks.
- Complete the survey in under two minutes.

8. Timeline

- Pre-registration date: 30 April 2025
- Data collection period: 1 May 2025 to 3 May 2025
- Analysis start date: 4 May 2025

9. Transparency and Deviations

Any deviations from this pre-analysis plan, such as additional exploratory analyses or modifications due to unforeseen data characteristics, will be transparently documented in the final thesis and in any future dissemination of results. Confirmatory analyses will be clearly distinguished from exploratory findings.