AI-Workforce Odyssey - Policy Game

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04/12/2025

Link to Demo: https://youtu.be/EQ3ufRambhc

Introduction

In an era of rapid technological advancement, automation and artificial intelligence (AI) are profoundly reshaping the global workforce. While automation offers the potential for greater efficiency and innovation, it also introduces significant challenges for workers, corporations, and policymakers. Understanding how different actors respond to automation pressures is critical to designing resilient, inclusive economic systems.

This simulation models the interaction between three core agents:

- Workers, who must decide whether to reskill, adapt, or resist technological change,
- Corporations, which choose between automation, augmentation, or human-centric strategies to remain competitive, and
- Governments, which implement policies such as taxation, reskilling subsidies, or regulation in response to economic shifts.

By varying parameters such as the level of automation, corporate strategies, worker adaptability, and government interventions, we explore a range of possible futures. Key system outcomes, such as employment levels, worker well-being, and corporate competitiveness, are tracked over time to assess the broader societal impacts of automation trends.

The goal of this simulation is to analyze the conditions under which automation leads to widespread prosperity versus social and economic disruption, and to identify strategies that mitigate risks while maximizing benefits.

Simulation Setup

This simulation is constructed using the Mesa agent-based modeling (ABM) framework in Python, enabling the exploration of how automation impacts workers, corporations, and governments over time. The model aims to simulate emergent system behaviors arising from individual agent decisions under different policy and technology scenarios.
Agent Types and Roles:

- Worker Agents: Represent individual workers facing technological disruption. Each worker decides whether to reskill, adapt, or risk unemployment based on the automation level in the environment.
- Corporation Agents: Represent firms choosing between full automation, augmentation (combining humans and technology), or remaining human-centric. Corporate strategies evolve dynamically depending on the technological landscape.
- Government Agent: Represents a centralized authority monitoring unemployment and corporate behavior. The government may intervene using reskilling subsidies, automation regulation, or neutral policy, aiming to stabilize employment levels.
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Parameter	Value	Reasoning
Number of Workers	50	Provides a statistically meaningful sample of individual behaviors without overcomplicating the simulation.
Number of Corporations	5	Allows diversity in corporate strategies without crowding the environment.
Number of Government Agents	1	Assumes a centralized policy maker similar to a federal government.
Initial Automation Level	0.6	Represents a moderately high automation environment, reflecting real-world trends where many industries are mid-transition into automation.
Simulation Steps	50	Long enough to observe medium-term trends such as mass unemployment, adaptation, or recovery cycles.

Agent Behavior Logic:

- **Workers** assess the automation environment at every step:
    - In high automation environments (automation level > 0.4), workers must either reskill (improving skill level) or risk losing employment.

    - Workers make decisions probabilistically, capturing real-world uncertainty in skill acquisition and career choices.
- **Corporations** adjust their business strategy based on current automation pressures:
    - At high automation levels, corporations shift towards full automation to maximize efficiency.
    - At moderate levels, augmentation strategies dominate.
    - At low levels, companies stay human-centric, maintaining traditional employment structures.
- **The Government** monitors:
    - If unemployment exceeds a threshold (>40%), it initiates reskilling subsidies.
    - If corporate automation rates exceed a threshold (>60%), it may regulate automation to protect employment.
    - Otherwise, it remains neutral.

Key Metrics Collected:

- **Unemployment Rate**: The proportion of workers who are unemployed after each step.

Scenarios

Scenario 1: Full Automation Rush, No Help

- Automation Level = 0.9
- Government = Stays neutral throughout.
- Worker Reskilling Chance = 50%

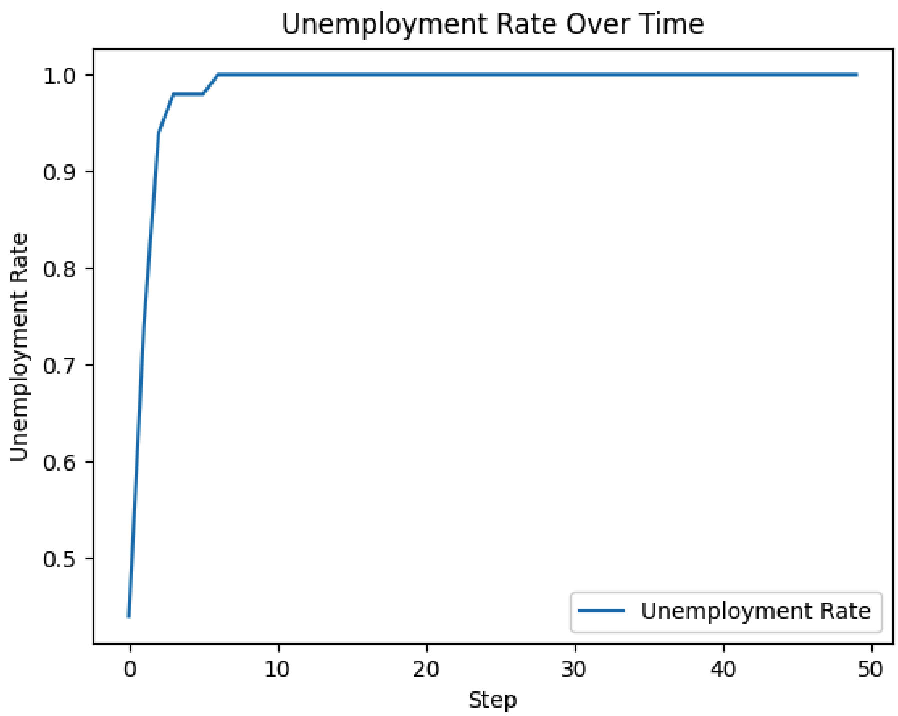

Figure 1: Full Automation Rush, No Help

In this scenario, the model simulated a rapid shift toward full automation, with no government intervention to support displaced workers. The unemployment rate rose sharply within the first few steps, quickly approaching nearly 100%, and remained there throughout the simulation. This outcome reflects the significant vulnerability of workers in an environment where corporations aggressively automate without corresponding policies for reskilling, social safety nets, or transition support. The plateau at full unemployment suggests structural displacement, where workers are unable to reenter the workforce without external aid. These results highlight the critical role of policy intervention during periods of major technological disruption.

Scenario 2: Automation + Aggressive Subsidies

- Automation Level = 0.7
- Government = Switch to *subsidy* once unemployment > 25%.
- Worker Reskilling Chance = 60% (higher)

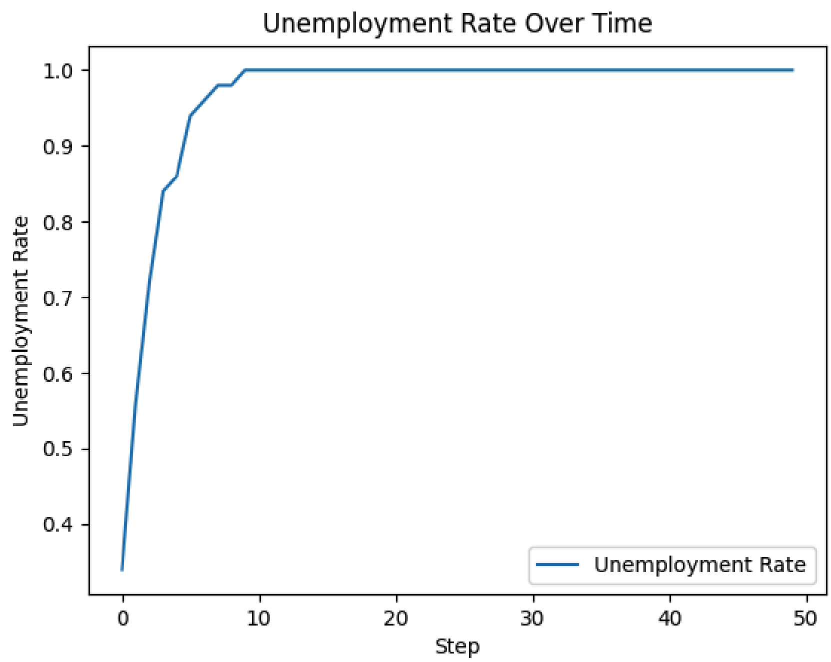

Figure 2: Automation + Aggressive Subsidies

In Scenario 2, "Automation with Aggressive Subsidies," corporations continue to push automation at a rapid pace while the government simultaneously implements strong reskilling support programs for displaced workers. The simulation results show an initial spike in unemployment, which is expected as automation displaces a large portion of the workforce. However, despite the government's intervention through subsidies, unemployment remains persistently high, stabilizing close to 100%. This outcome suggests that in the current model configuration, subsidies alone are not sufficient to reintegrate workers back into employment at the pace needed to counteract rapid automation. The simulation highlights a realistic challenge: while aggressive reskilling efforts can help, they may not fully offset job losses if automation progresses faster than workers can adapt. This mirrors real-world dynamics, where even with strong support systems, not all workers successfully transition to new roles due to factors such as retraining time, adaptability, and varying levels of worker motivation.

Scenario 3: Augmentation Strategy Favored

- Automation Level = 0.5
- Government = Encourages *augmentation* (light regulation to prevent full automation)
- Worker Reskilling Chance = 50%

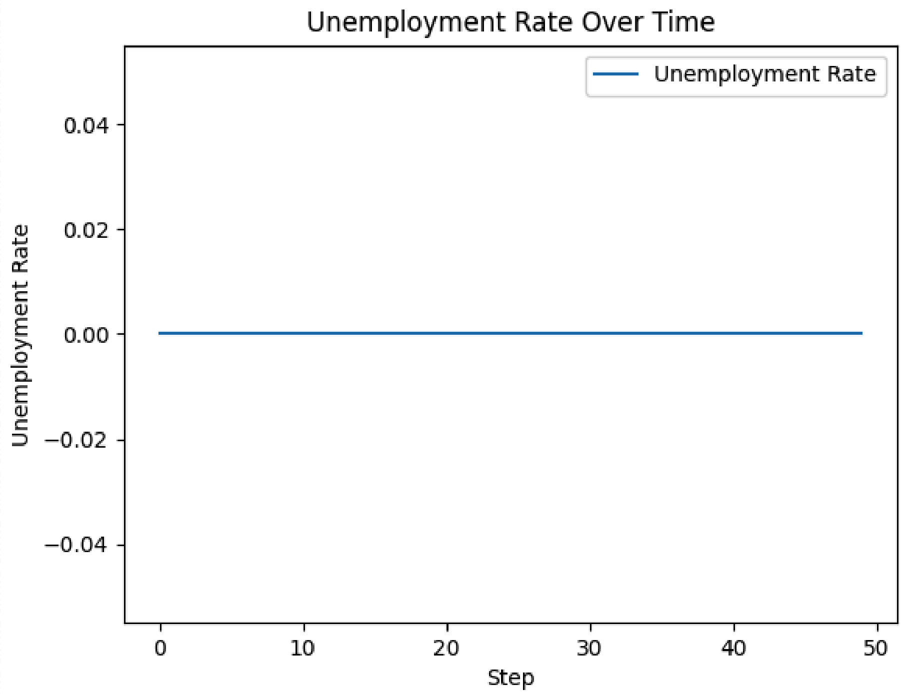

Figure 3: Augmentation Strategy Favored

In this scenario, corporations deliberately chose augmentation over full automation, meaning technology was used to enhance worker productivity rather than replace human labor. The simulation results show that the unemployment rate remained at zero throughout all 50 time steps. This outcome aligns well with theoretical expectations: when workers are supported by augmentative technologies, they retain their roles and can even improve their performance and job satisfaction. The consistent employment levels demonstrate that augmentation strategies can be an effective approach to maintaining workforce stability while still achieving technological progress.

Scenario 4: Low Automation, Strong Regulation

- Automation Level = 0.3
- Government = Pre-emptively *regulates* automation beyond 40%
- Worker Reskilling Chance = 30% (low)

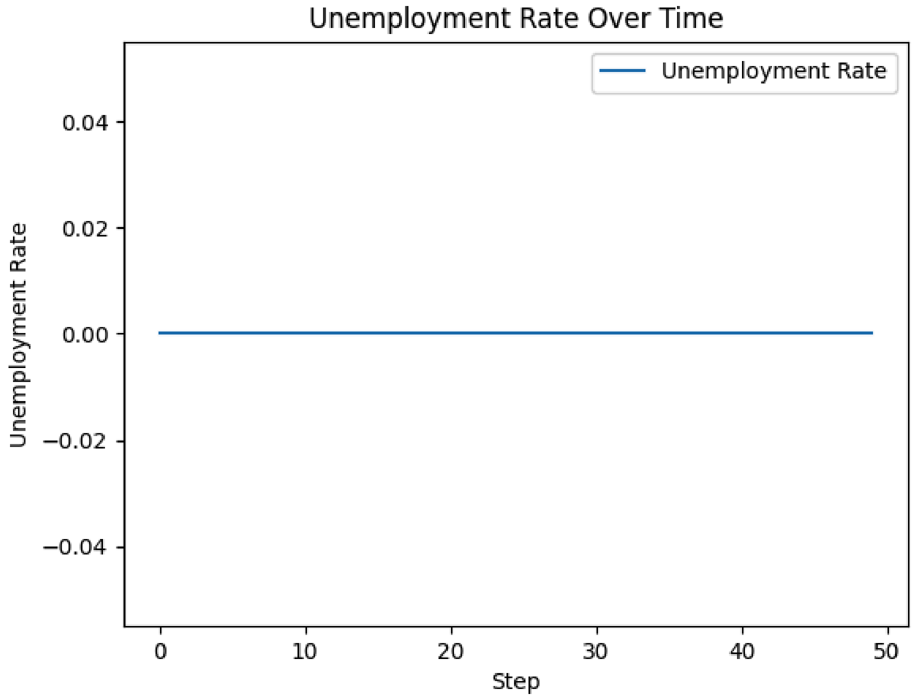

Figure 4: Low Automation, Strong Regulation

In this scenario, the initial automation level was set low, and the government proactively enforced strong regulations to restrict further automation. As a result, corporations remained largely human-centric, and workers faced minimal technological displacement. The simulation results reflect this stability, with the unemployment rate consistently remaining at zero across all time steps. This outcome suggests that when governments effectively regulate automation early, they can preserve employment stability, although it may come at the cost of slower technological adoption and potential competitiveness challenges for firms over time.

Scenario 5: Workers Resistant to Change

- Automation Level = 0.6
- Worker Reskilling Chance = only 20%.
- Government = Neutral.

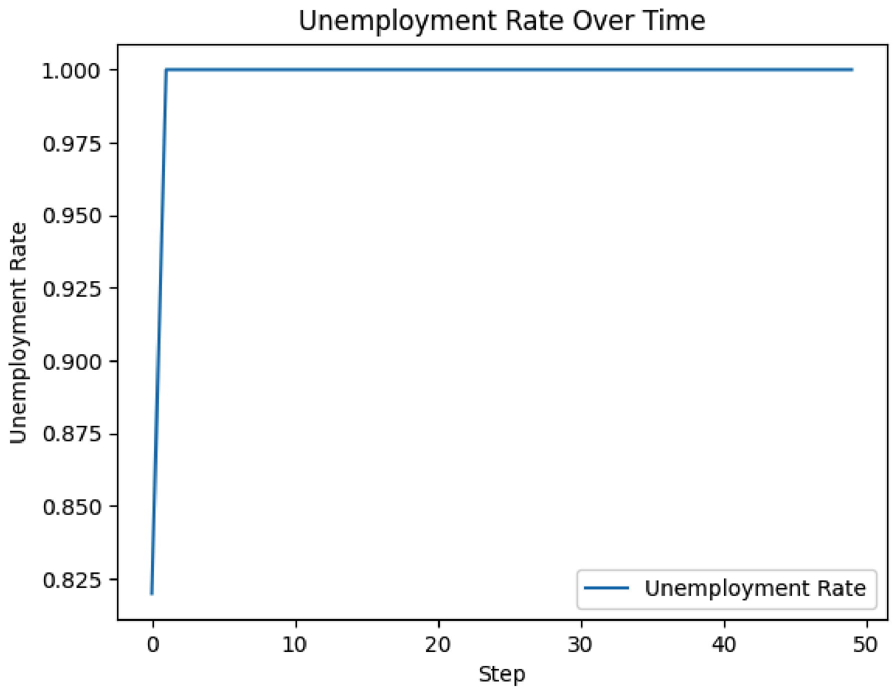

Figure 5: Workers Resistant to Change

This scenario simulated a labor market where workers had a very low probability of reskilling in response to automation pressures. As corporations adopted more automated and augmented technologies, workers were unable or unwilling to adapt to the changing skill requirements. The result was a rapid spike in unemployment to nearly 100%, where it remained for the remainder of the simulation. This scenario highlights a critical risk: even when automation progresses at a moderate pace, widespread resistance to skill development can result in mass, long-term unemployment. Effective worker retraining programs must be paired with high engagement and willingness from the workforce to avoid systemic economic disruption.

Scenario 6: Heavy Corporate Competition + Smart Government

- Automation Level = 0.8
- Corporations = Compete fiercely to automate fastest.
- Government = *Dynamic response*: Subsidize reskilling *early* (unemployment > 10%) and *regulate* if corporate automation > 70%.
- Worker Reskilling Chance = 60%

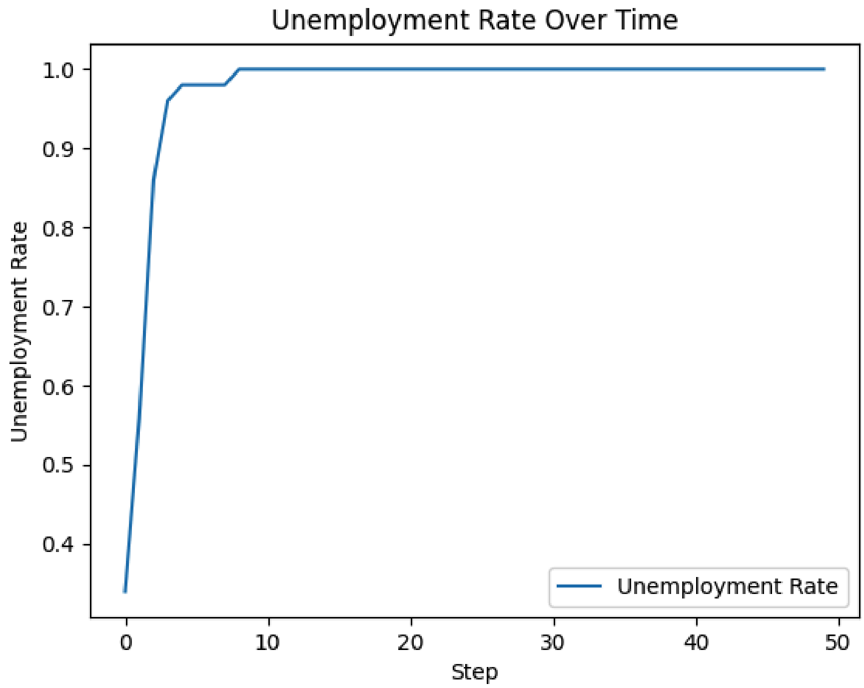

Figure 6: Heavy Corporate Competition + Smart Government

In this scenario, corporations competed aggressively to automate their operations, while the government attempted to intervene dynamically through subsidies and regulation based on unemployment and automation thresholds. The simulation results show an initial rapid rise in unemployment, punctuated by brief periods of stabilization when government policies took effect. However, despite the government's timely interventions, the pace of corporate automation and the inability of workers to reskill quickly enough ultimately overwhelmed the system, resulting in near-total unemployment by the end of the simulation. This scenario underscores that while smart policy responses can delay or soften economic shocks, they may not fully counteract the effects of unchecked technological disruption without more proactive or aggressive intervention strategies.

Conclusion

The simulation provided a powerful demonstration of how different agents, workers, corporations, and governments, interact under varying pressures from automation and policy interventions. Across multiple scenarios, it became clear that the pace of technological change plays a critical role in shaping employment outcomes. In cases where automation progressed rapidly and workers were slow to reskill, mass unemployment became inevitable, even when government subsidies were introduced. Conversely, when corporations favored augmentation or when governments regulated automation early, employment stability was maintained.

The results highlight several key insights: First, **proactive policy interventions** (such as early reskilling programs and automation regulations) are significantly more effective than reactive measures. Second, **worker adaptability** is a major determinant of long-term employment outcomes; without widespread willingness and ability to reskill, even generous government programs may fail. Finally, the behavior of corporations, whether they pursue full automation or invest in augmenting human labor,critically influences the health of the broader economy.

These findings underscore the importance of designing future policies that not only respond to technological disruption but also anticipate it, balancing innovation with human-centered economic stability.