The Great Re-Valuation: A Structural Analysis of Remote Work

Project Status and Next Steps

Mitchell Valdes-Bobes, Anna Lukianova

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Introduction

Project Status: Significant Progress

High-Level Summary: The structural model is built, numerically stable, and shows strong identification. We are ready to move from development and testing to the main estimation phase.

Key Achievements:

- **Model Built & Solved:** A rich search and matching model with heterogeneous agents and continuous remote work choice.
- **Solver Optimized:** The solver is now highly efficient (low memory allocation) and robust (handles difficult parameter regions).
- **Identification Confirmed:** Extensive likelihood profiling and sensitivity analysis confirm that all key structural parameters are well-identified by observable moments.
- **Plausible Baseline Calibrated:** The model has been calibrated to a baseline that is numerically stable and operates in an economically plausible regime.

Expanded Research Question: Preferences vs. Technology

The project's scope has evolved from a narrow focus on wage gaps to a broader, more fundamental question.

Initial Focus:

- What is the compensating wage differential for remote work?

Expanded Scope:

- What were the fundamental drivers of the post-pandemic shift in work arrangements? We aim to disentangle two primary forces:
  1. **A Preference Shock:** Did workers' valuation of the remote work amenity fundamentally increase?
  2. **A Technology Shock:** Did remote work become significantly more productive?

Expanded Research Question: Preferences vs. Technology

Key Questions We Can Now Answer:

- How did the **average** preference for remote work (c_0) and the **diversity** of those preferences (μ) change from 2019 to 2024?
- How much did the **relative productivity** of remote work (ψ_0, ν) actually improve?
- Did the **relationship between skill and remote technology** (ϕ) change, altering sorting patterns in the labor market?

The Model at a Glance: Key Mechanisms

We use a structural search model to create a "digital twin" of the U.S. labor market, allowing us to measure the unobservable forces driving agent decisions.

Who is in the economy?

- **Workers:**
  - Heterogeneous in skill (h).
  - Have idiosyncratic preferences for remote (Gumbel shock).
- **Firms:**
  - Heterogeneous in remote efficiency (ψ).
- **The Market:**
  - A frictional (random) search market.

What are their key decisions?

- **Worker-Firm Pair (α):**
  - Jointly choose the optimal share of remote work (α).
  - Decision is driven by the trade-off between **productivity** and **amenity value** of remote.
- **Firms:**
  - Post vacancies based on free entry conditions.
- **Wages:**
  - Determined by bargaining (ξ) and include a compensating differential.

Estimation Strategy: Matching the Model to the Data

We estimate the model by forcing it to replicate key features of the U.S. labor market in two distinct periods: 2019 and 2024.

Overall Approach: Simulated Method of Moments (SMM)

1. **Establish Empirical Facts:** We construct a set of 9-10 key data moments that characterize the labor market in each period (e.g., wage levels, remote work shares, sorting patterns, market tightness).
2. **Find the Parameters:** We use a global search algorithm to find the set of structural parameters that allows the model to best replicate these empirical facts.
3. **Compare the Periods:** The core of the analysis is comparing the estimated parameter vectors (θ_{2019} vs. θ_{2024}) to identify the structural changes in the economy.

Estimation Strategy: Matching the Model to the Data

Identification is Confirmed: Our sensitivity analysis (see Appendix plots) confirms that our chosen moments are highly informative about the key parameters.

Data Moments Related To...	Inform...
Wages & Productivity	Skill Distribution & Technology (a_h, b_h, A_1)
Work Arrangements	Preferences (c_0, μ, χ)
Sorting Patterns	Remote Tech & Complementarity (ν, ϕ)
Market Frictions	Search Costs & Bargaining (κ_0, ξ)

Next Steps: A 10-Day Plan to Preliminary Results

- 1: Large-Scale Global Search (Days 1-4)
- 2: Final SMM Estimation (Days 5-8)
  - Task: Launch the final, precise SMM estimation using a local optimizer (e.g., BFGS), starting from the best vector found in Phase 1.
  - Goal: Obtain the final parameter estimates and their standard errors for both the 2019 and 2024 periods.
- 3: Preliminary Analysis & Results (Days 9-10)
  - Task: Analyze the differences in the estimated parameter vectors between the two periods. Run model fit checks.