Labor Market Models and Simulation, SimPLE

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Jobs Diagnostics
WHY MODELING THE LABOR MARKET?

• Jobs Diagnostics: identify and prioritize LM constraints through observable symptoms

• Next step towards Jobs Strategies and Solutions?
  • finding, comparing, and selecting possible interventions for best impact

• LM Models necessary to understand and communicate
  • how interventions or economic developments (incl. shocks) affect LM outcomes
  • typical targets:
    • Earnings
    • Employment levels

• Jobs Diagnostic with identified constraints can help to pick a suitable LM model
CONCEPTUAL FRAMEWORK: JOBS AND STRUCTURAL CHANGE

Modern Sector
- Rapid growth
- Capital deep
- Economies of scale
- Drives savings
- Higher productivity
- Better hours
- Better working conditions
- Skills training, on-the-job learning

Traditional Sector
- Slow growth
- Capital thin
- Low savings
- Low productivity
- Low hours worked
- Poor working conditions

Structural dualism holds (Lewis model)
- Low productivity coexists with high productivity
- Law of one price does not hold

Neoclassical Model holds
- Incentives to innovate
- Incentives to invest

Better Jobs

Capital accumulation
Innovation
Productivity Growth
Generates Savings
WHY A DUAL LM MODEL?

• Dual economy and dual labor market analysis, a milestone (Lewis, 1954 and thereafter)

• BUT why not “labor market segmentation” or “labor market fragmentation”?

• Stylizing Labor Markets (LM) through two distinct sectors:
  • useful
  • prevents overly complex approaches
  • better to communicate

• No restriction to further LM disaggregation if it adds value
  • e.g. informal and formal self-employment (gig economy)
WAYS TO DESCRIBE THE TWO SECTORS

1. Sector
   - modern
   - formal
   - manufacturing
   - urban

2. Sector
   - traditional
   - informal
   - agricultural
   - rural

labor market duality

used interchangeably

used interchangeably
LABOR MARKET MODELS OF WAGE AND EMPLOYMENT DETERMINATION

• Simple market-clearing partial equilibrium models of the labor market (LM):
  • limited explaining power
  • especially for economies with greatly diverging sectors (modern/traditional)
  • may be misleading when modeling the LM’s response to policy interventions

  → Which models exist to best describe the dual economy being analyzed?

• Fields (2004, 2017) typology of models for wage and employment determination:
  • 4 in the formal, modern or manufacturing sector of the economy,
  • 3 in the informal, traditional or agricultural sector of the economy, and
  • 3 on possible linkages between the formal and informal labor market

  → 36 possible combinations
FORMAL SECTOR LABOR MARKET MODELS

Four general directions:

1. **Full market clearing model**

2. 4. **Wage rigidity** due to

   - **Institutions**: minimum wage legislation, trade union agreements, public sector pay policies, multinational pay policies, restrictive labor codes, ...
   
   - **Efficiency wage** considerations of formal firms
   
   - **Strategic wage bargaining** by workers

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* formal wage above market clearing rate but no adjustment

** higher wages to increase workers’ productivity or efficiency, or reduce costs associated with turnover (when costs of replacing labor are high)
INFORMAL SECTOR LABOR MARKET MODELS

Three variations of key assumptions:

1. Informal sector is **employer of last resort**
   - everyone can become employed
   - **BUT** at lower wages and poorer working conditions compared to formal work

2. Informal **equally desirable** as formal employment
   - as non-monetary advantages compensate lower wages
     (e.g., greater work-hour flexibility or absence of bureaucratic red-tape)

3. Informal sector has **internal duality** (sub-sectors),
   - lower-tier sub-sector operating as an employer of last resort, while
   - higher-tier sub-sector competes with formal sector employment
FOUR LM INTER-SECTOR MODELS IN COMPARISON

Simulated Impact of an Increase in Labor Productivity on Employment and Wages under Different Modeling Assumptions

<table>
<thead>
<tr>
<th>Wage Differentiation</th>
<th>Unemployment</th>
<th>Assumption: the size of the total labor force remains fixed over the period of analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
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<tr>
<td>Yes</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>4</td>
</tr>
</tbody>
</table>
1. The Fully Integrated Market Model: Wage Equalization and No Unemployment

**Before Intervention:**
- Employed: Sector M: $O_M \leftrightarrow E$
- Employed: Sector A: $E \leftrightarrow O_A$
- Real Wage: Sector M: $O_M \leftrightarrow W_M$
- Real Wage: Sector A: $O_A \leftrightarrow W_A$

**After Intervention:**
- Employed: Sector M: $O_M \leftrightarrow E'$
- Employed: Sector A: $E' \leftrightarrow O_A$
- Real Wage: Sector M: $O_M \leftrightarrow W_M'$
- Real Wage: Sector A: $O_A \leftrightarrow W_A'$
2. The Multi-Sector Model with Wage Differentiation and No Unemployment

**Before Intervention:**
- Employed:
  - Sector M: $O_M \leftrightarrow E$
  - Sector A: $E \leftrightarrow O_A$
- Real Wage
  - Sector M: $O_M \leftrightarrow W_M^*$
  - Sector A: $O_A \leftrightarrow W_A$

**After Intervention:**
- Employed:
  - $\uparrow$ Sector M: $O_M \leftrightarrow E'$
  - $\downarrow$ Sector A: $E' \leftrightarrow O_A$
- Real Wage
  - $\uparrow$ Sector M: $O_M \leftrightarrow W_M^*$
  - $\uparrow$ Sector A: $O_A \leftrightarrow W_A$
3. The Multi-Sector Model with Wage Equalization and Unemployment

Before Intervention:
- Employed: Sector M: $O_M \leftrightarrow E$
- Sector A: $E^\wedge \leftrightarrow O_A$
- Unemployed: $E \leftrightarrow E'$

Real Wage:
- Sector M: $O_M \leftrightarrow W_M^*$
- Sector A: $O_A \leftrightarrow W_A^*$

After Intervention:
- Employed: Sector M: $O_M \leftrightarrow E'$
- 0 Sector A: $E^\wedge \leftrightarrow O_A$
- Unemployed: $E' \leftrightarrow E^\wedge$

Real Wage:
- Sector M: $O_M \leftrightarrow W_M^*$
- 0 Sector A: $O_A \leftrightarrow W_A^*$

Diagram shows the real wage in sectors M and A before and after intervention, with changes in employment and unemployment indicated by arrows and symbols.
4. The Multi-Sector Labor Market Model with Wage Differentiation and Unemployment

Before Intervention:
- Urban Labor Force: $O_M \leftrightarrow E'$
- Employed: Sector M: $O_M \leftrightarrow E$ Sector A: $E' \leftrightarrow O_A$
- Unemployed: $E \leftrightarrow E'$
- Real Wage: Sector M: $O_M \leftrightarrow W_M^*$ Sector A: $O_A \leftrightarrow W_A$

After Intervention:
- Urban Labor Force: $\uparrow \uparrow O_M \leftrightarrow E^*$
- Employed: $\uparrow \uparrow$ Sector M: $O_M \leftrightarrow E'$ $\downarrow$ Sector A: $E^* \leftrightarrow O_A$
- Unemployed $\downarrow / \uparrow E' \leftrightarrow E^*$
- Real Wage: $0$ Sector M: $O_M \leftrightarrow W_M^*$ $\uparrow$ Sector A: $O_A \leftrightarrow W_A^*$

The diagram illustrates the quasi-demand for sector M with shifts in employment and real wages before and after an intervention.
## Simulated Impact of an Increase in Labor Productivity on Employment and Wages Under Different LM Models

<table>
<thead>
<tr>
<th>Defining Feature</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Wage Equalization, No Unemployment</td>
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<td>Wage Equalization and Unemployment</td>
<td>Wage Differentiation and Unemployment</td>
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<tr>
<td>Employment in Sector M</td>
<td>↑</td>
<td>↑</td>
<td>↑↑</td>
<td>↑↑</td>
</tr>
<tr>
<td>Real Wage in Sector M</td>
<td>↑</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Employment in Sector A</td>
<td>↓</td>
<td>↓</td>
<td>0</td>
<td>↓</td>
</tr>
<tr>
<td>Real Wage in Sector A</td>
<td>↑</td>
<td>↑</td>
<td>0</td>
<td>↑</td>
</tr>
<tr>
<td>Unemployment</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↓/↑</td>
</tr>
</tbody>
</table>
IMPLICATIONS FOR MODEL SELECTION

• same exogenous or policy stimulus led to very different LM outcomes

• need to identify the right LM model for guiding possible jobs interventions

• JD process seeks to identify the binding constraints
  • match symptoms observed in the data to hypothetical symptoms
  • as generated by the LM model in response to a particular constraint.

• choosing the wrong model can lead to mis-diagnoses and poor policy
SimPLE – SIMULATION OF POLICIES IN LABOR ECONOMICS

✓ Multi-sector approach with Wage Differentiation and Unemployment
✓ 5 sectors:
  ✓ Unemployed
  ✓ Formal Wage Employment
  ✓ Informal Wage Employment
  ✓ Formal Self-Employment
  ✓ Informal Self-Employment

✓ Job-Search-and-Matching Model
✓ Micro-simulation with heterogenous agents
✓ Nash wage bargaining
✓ Human Capital and State transitions
✓ Focus:
  ✓ labor costs,
  ✓ take-home pay, and
  ✓ labor market segmentation
SimPLE – Simulation of Policies in Labor Economics

Can model:

Benefits and Wages
Costs of Labor
Financing

and their Effects on Key Labor Market Outcomes

Works as follows:

Labor Force Data Inputs (incl. Grouping)
LM Indicators
DESIGN SCENARIOS
Outputs for each Scenario (Total and by Group)
Cost/Fiscal Impacts
Un-/employment
In-/formal wage &
Self-employment
Wages, Income Distribution, and Equity
SimPLE – Simulation of Policies in Labor Economics

Can model:

Benefits
- Unemployment Benefits (traditional UI, individual accounts, solidarity funds, severance pay, etc.)
- Cash-transfers

Costs (of Labor)
- Wage Subsidies
- Minimum Wage
- Firing Costs
- Severance Pay

Financing
- Social Security Contributions (Tax Wedge)
- Taxes on Labor

Works as follows:

Labor Force Data Inputs (incl. Grouping)

LM Indicators

DESIGN SCENARIOS

Outputs for each Scenario (Total and by Group)

Cost/Fiscal Impacts

Un-/employment

In-/formal wage & Self-employment

Wages, Income Distribution, and Equity

Outcomes
More on SimPLE in the presentation "20191105_1700_SimPLE_with_example"