Employment Protection and Business Cycles in Emerging Economies

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Motivation

Business cycles in emerging economies display substantial differences with the pattern observed in developed economies.

- Higher GDP volatility.
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- Higher GDP volatility.
- Higher consumption volatility.
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- Higher GDP volatility.
- Higher consumption volatility.
- Higher countercyclicality of trade balance.
Motivation
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Motivation
Possible Explanations

Possible Explanations


We evaluate the role of employment protection in shaping business cycles in emerging economies.
Table 1: Business cycles Properties and Employment Protection Across Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>s.d.(y)</th>
<th>s.d.(l) / s.d.(y)</th>
<th>Employment Protection (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(percent)</td>
<td></td>
<td>DBI</td>
</tr>
<tr>
<td>Argentina</td>
<td>4.19</td>
<td>0.59</td>
<td>23</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.76</td>
<td>0.62</td>
<td>9</td>
</tr>
<tr>
<td>Chile</td>
<td>1.79</td>
<td>0.62</td>
<td>12</td>
</tr>
<tr>
<td>Colombia</td>
<td>1.74</td>
<td>0.88</td>
<td>19</td>
</tr>
<tr>
<td>Mexico</td>
<td>2.17</td>
<td>0.53</td>
<td>22</td>
</tr>
<tr>
<td>Average Emerging</td>
<td>2.33</td>
<td>0.65</td>
<td>17</td>
</tr>
<tr>
<td>Australia</td>
<td>1.10</td>
<td>1.08</td>
<td>8</td>
</tr>
<tr>
<td>Canada</td>
<td>1.28</td>
<td>0.67</td>
<td>5</td>
</tr>
<tr>
<td>Norway</td>
<td>1.35</td>
<td>0.66</td>
<td>0</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1.39</td>
<td>0.92</td>
<td>0</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.15</td>
<td>0.89</td>
<td>3</td>
</tr>
<tr>
<td>Average Developed</td>
<td>1.25</td>
<td>0.84</td>
<td>3</td>
</tr>
</tbody>
</table>
A canonical small open economy model calibrated to Mexico.
This Paper

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- Search frictions and endogenous separation.
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Employment protection limits the selection effect, resulting in lower productivity during recessions. We evaluate the role of employment protection in exacerbating business cycles in emerging economies. What would happen if firing costs in Mexico are reduced to levels observed in Canada?
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What would happen if firing costs in Mexico are reduced to level observed in Canada?
1. Lower firing costs reduces output volatility by 15 percent.

Explains 1/3 of the discrepancy between volatility in emerging and developed economies (2.17 in Mexico vs. 1.28 in Canada).

2. Decline of 7.6 percent instead of the actual 8.9 percent during the Great Recession.

Search and endogenous separation explains 30 percent of total labor frictions (Labor Wedge).
Results

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2. Lower output decline of 1.3 percentage points during the Great Recession.
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3. Search and endogenous separation explains 30 percent of total labor frictions (Labor Wedge).
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Outline

1. Related Literature
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2. Small Open Economy Model with Labor Market Frictions
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3. Quantitative Analysis:
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   3.a. Business Cycle Properties
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   3.b. Firing Costs and Business Cycles
   3.c. The Great Recession
4. Concluding Remarks
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- Shocks: Technology and Interest Rates.
Households

\[ E_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t - \varphi \frac{L_t^{1+\nu}}{1+\nu}}{1-\sigma} \]

- Non-separability between consumption and leisure.
Households

\[
E_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t - \varphi L_t^{1+\nu}}{1+\nu} \bigg[ \bigg( 1 - \sigma \bigg) \bigg]
\]

- Non-separability between consumption and leisure.
- No wealth effects on labor supply.
Non-separability between consumption and leisure.

No wealth effects on labor supply.

Interpretation: home production.
Intermediate Good: Produced with Labor.
1. **Intermediate Good**: Produced with Labor.

2. **Final Good**: Produced with Capital and Intermediate Goods with a Technology $A_t$. 

Continuum of jobs or matches between one firm and one worker.
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Jobs are indexed by a labor efficiency shock $\omega$, hence each job produces $\omega$ units of output.
Intermediate Goods

1. Continuum of *jobs* or matches between one firm and one worker.
2. Jobs are indexed by a labor efficiency shock $\omega$, hence each job produces $\omega$ units of output.

2.a. $\omega$ is a random variable independently distributed over time with distribution function $G$. 
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2.b. We assume a Pareto distribution for idiosyncratic shocks:

$$G(\omega) = 1 - \left( \frac{\bar{\omega}}{\omega} \right)^{\sigma_\omega}.$$
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3. After observing the shocks at the beginning of the period, the planner can decide to destroy a job if the labor efficiency is too low.
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After observing the shocks at the beginning of the period, the planner can decide to destroy a job if the labor efficiency is too low.

3.a. Endogenous threshold level $\hat{\omega}_t$ depending on the aggregate state of the economy.
Intermediate Goods

\[ G'(w) \]

Matches destroyed

Threshold productivity

Density of Pareto distribution

Average productivity of remaining matches

\[ W \text{ (Productivity)} \]
Intermediate Goods

\[ M_t = L_t \int_{\hat{\omega}_t}^{\infty} \frac{dG(\omega_t)}{1 - G(\hat{\omega}_t)} d\omega_t = \left[ \frac{\Gamma(\hat{\omega}_t)}{1 - G(\hat{\omega}_t)} \right] L_t \]

- The higher the cut-off \( \hat{\omega}_t \).
Intermediate Goods

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- The higher the cut-off \( \hat{\omega}_t \).
  - the higher the level of job destruction.
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- The higher the cut-off \( \hat{\omega}_t \).
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  - the higher the average productivity in the production of intermediate inputs.
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- The higher the cut-off \( \hat{\omega}_t \).
  - the higher the level of job destruction.
  - the higher the average productivity in the production of intermediate inputs.

- This will typically occur in a recession.
Final Goods

- Combines capital and intermediate good with a technology level $A_t$

$$ Y_t = A_t (K_t)^\alpha (M_t)^{1-\alpha} $$

- Aggregate production function can be rewritten

$$ Y_t \overset{GDP}{=} \left[ A_t \left( \frac{\Gamma (\hat{\omega}_t)}{1 - G (\hat{\omega}_t)} \right)^{1-\alpha} \right] (K_t)^\alpha (L_t)^{1-\alpha} $$

- Higher job destruction is associated with higher measured TFP.
Labor Markets

- Labor flows:

\[ L_t = L_{t-1} + H_t - S_t \]

- Matching function (Hirings):

\[ H_t = D(U_t)^\theta (V_t)^{1-\theta} \]

- Separations:

\[ S_t = G(\hat{\omega}_t)[L_{t-1} + H_t] \]
Closing the Model

- Feasibility:

\[ Y_t = C_t + I_t + NX_t + \eta V_t + \kappa S_t \]
\[ B_{t+1} = (1 + r_t^*) B_t - NX_t \]

- Posting a Vacancy \( (V_t) \) entails a cost \( \eta \), while a separation \( (S_t) \) a cost \( \kappa \).

- Law of motion of capital:

\[ K_{t+1} = (1 - \delta) K_t + I_t - \frac{\vartheta}{2} \left( \frac{I_t}{K_t} - \delta \right)^2 K_t \]

- Labor endowment allocation:

\[ L_t + U_t = 1 \]
Shocks

\[
\begin{align*}
\log (A_t) &= \rho_A \log (A_{t-1}) + \varepsilon_t^A, \\
\log (1 + i_t^*) &= \rho_i \log (1 + i_{t-1}^*) + (1 - \rho_i) \log (1 + i^*) + \varepsilon_t^i.
\end{align*}
\]
Social Planner Solution: Selection Effect.

\[ \pi_t(\omega) = p_t^M \omega - \varphi L_t^v - \lambda_t^U / \lambda_t^C + \beta E_t \left( \lambda_{t+1}^C / \lambda_t^C \right) \int \max \left\{ \pi_{t+1}(\omega') , -\kappa \right\} dG(\omega') . \]

- **Social value of a standing job**: expected present value of the output generated by the job net of the shadow price of an unmatched worker.
πₜ (ω) = pₜ^M ω - φLₜ^v - λₜ^U / λₜ^C 
+ βEₜ (λₜ₊₁^C / λₜ^C) ∫ max {πₜ₊₁ (ω'), -κ} dG (ω').

- **Social value of a standing job:** expected present value of the output generated by the job net of the shadow price of an unmatched worker
- The planner destroys jobs such that πₜ (ω) < -κ.
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- The planner destroys jobs such that \( \pi_t(\omega) < -\kappa \).
- Monotonicity of \( \pi_t \) in \( \omega \) implies that the optimal rule is to shred jobs with \( \omega < \hat{\omega}_t \), where \( \hat{\omega}_t \) satisfies \( \pi_t(\hat{\omega}_t) = -\kappa \).
Social Planner Solution: Selection Effect.

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- A higher firing cost will imply a lower cut-off \( \hat{\omega}_t \), hence less job destruction and lower measured TFP.
Social Planner Solution: Selection Effect.

- Matches destroyed with high firing cost.
- Threshold productivity with high firing cost.
- Density of Pareto distribution.
- Lowering firing costs moves threshold to the right.
Selection Effect: Labor Flows in Mexico.

Table 2: Transitions between Occupational Status and Selection Effect in Mexico

<table>
<thead>
<tr>
<th></th>
<th>Employed $\rightarrow$ Unemployed</th>
<th>Self-Employed $\rightarrow$ Unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percent</td>
<td>selection</td>
</tr>
<tr>
<td>1988-99</td>
<td>1.67</td>
<td>0.74</td>
</tr>
<tr>
<td>1995</td>
<td>2.76</td>
<td>0.68</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Employed $\rightarrow$ Out Labor Force</th>
<th>Self-Employed $\rightarrow$ Out Labor Force</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percent</td>
<td>selection</td>
</tr>
<tr>
<td>1988-99</td>
<td>7.06</td>
<td>0.32</td>
</tr>
<tr>
<td>1995</td>
<td>7.48</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Diagnostic of Labor Market Frictions

- TFP or productivity wedge:

\[
TFP = \frac{Y_t}{F(K_t, L_t)}
\]

- Can be interpreted as the level of technological efficiency in the use of inputs (Solow residual).

- Labor wedge:

\[
Labor \ Wedge \equiv \frac{-U_l(C_t, L_t) / U_c(C_t, L_t)}{A_t F_L(K_t, L_t)}
\]

- Can be interpreted as the size of the distortion in the labor market required for the optimality condition (consumption/leisure choice) to hold.
### Table 3: Parameters for the Baseline Economy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>discount factor</td>
<td>$\beta$</td>
<td>0.99</td>
</tr>
<tr>
<td>World average interest rate</td>
<td>$i^*$</td>
<td>$1/\beta - 1$</td>
</tr>
<tr>
<td>depreciation rate</td>
<td>$\delta$</td>
<td>1.25%</td>
</tr>
<tr>
<td>capital share</td>
<td>$\alpha$</td>
<td>0.3</td>
</tr>
<tr>
<td>curvature Pareto distribution</td>
<td>$\sigma_\omega$</td>
<td>1.5</td>
</tr>
<tr>
<td>persistence of exogenous productivity shock</td>
<td>$\rho_A$</td>
<td>0.95</td>
</tr>
<tr>
<td>Frisch elasticity of labor supply</td>
<td>$1/\nu$</td>
<td>2.65</td>
</tr>
<tr>
<td>elasticity of matching function</td>
<td>$\theta$</td>
<td>0.40</td>
</tr>
<tr>
<td>hiring cost</td>
<td>$\eta$</td>
<td>0.1</td>
</tr>
</tbody>
</table>
### 3. Quantitative Analysis: Calibration

Table 3: Parameters for the Baseline Economy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated to Steady State Statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disutility of Labor</td>
<td>$\varphi$</td>
<td>6.39</td>
</tr>
<tr>
<td>Efficiency of Matching Function</td>
<td>$D$</td>
<td>0.67</td>
</tr>
<tr>
<td>Scale of Pareto Distribution</td>
<td>$\omega$</td>
<td>0.99</td>
</tr>
<tr>
<td>Estimated from EMBI Data for Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.D. of World Interest Rate</td>
<td>$\sigma_i$</td>
<td>1.37%</td>
</tr>
<tr>
<td>Persistence of World Interest Rate</td>
<td>$\rho_i$</td>
<td>0.96</td>
</tr>
<tr>
<td>Calibrated to Business Cycle Volatilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.D. of Exogenous Productivity Shock</td>
<td>$\sigma_A$</td>
<td>1.14%</td>
</tr>
<tr>
<td>Covariance Interest Rate and Productivity Shocks</td>
<td>$\sigma_{A,i}$</td>
<td>$-0.038$</td>
</tr>
<tr>
<td>Firing Cost</td>
<td>$\kappa$</td>
<td>3.90</td>
</tr>
<tr>
<td>Adjustment Cost of Capital</td>
<td>$\theta$</td>
<td>65</td>
</tr>
</tbody>
</table>
### Table 4: Business Cycle Statistics: Data and Model

<table>
<thead>
<tr>
<th></th>
<th>Data Mexico</th>
<th>Baseline Model</th>
<th>No $i^*$ shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sigma(y)$</td>
<td>2.17</td>
<td>2.17</td>
<td>2.21</td>
</tr>
<tr>
<td>$\sigma(l)/\sigma(y)$</td>
<td>0.53</td>
<td>0.54</td>
<td>0.52</td>
</tr>
<tr>
<td>$\sigma(i)/\sigma(y)$</td>
<td>3.34</td>
<td>3.37</td>
<td>1.29</td>
</tr>
<tr>
<td>$\text{Corr}(1 + i^*, y)$</td>
<td>-0.16</td>
<td>-0.17</td>
<td>–</td>
</tr>
<tr>
<td>$\sigma(c)/\sigma(y)$</td>
<td>1.15</td>
<td>1.46</td>
<td>0.89</td>
</tr>
<tr>
<td>$\text{Corr}(n\times/y, y)$</td>
<td>-0.78</td>
<td>-0.14</td>
<td>0.80</td>
</tr>
<tr>
<td>$\sigma(tfp)$</td>
<td>1.98</td>
<td>1.36</td>
<td>1.41</td>
</tr>
<tr>
<td>$\text{Corr}(tfp, y)$</td>
<td>0.93</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>$\text{Corr}(l, y)$</td>
<td>0.40</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>$\sigma(l\wedge)$</td>
<td>2.11</td>
<td>0.59</td>
<td>0.62</td>
</tr>
<tr>
<td>$\text{Corr}(l\wedge, y)$</td>
<td>-0.73</td>
<td>-0.96</td>
<td>-0.98</td>
</tr>
</tbody>
</table>
3. Quantitative Analysis: Firing Costs and Business Cycles

(a) Productivity Shock
(b) Measured TFP
(c) GDP
(d) Employment
(e) Hirings
(f) Separations
(g) Labor Wedge
(h) Consumption
(i) Investment

High Firing Costs
Low Firing Costs
# 3. Quantitative Analysis: Firing Costs and Business Cycles

Table 5: Separation Costs and Business Cycle Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mexico</th>
<th>Model: $\kappa \approx 4$</th>
<th>Model: $\kappa \approx 1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sigma(y)$</td>
<td>2.17</td>
<td>2.17</td>
<td>1.86</td>
</tr>
<tr>
<td>$\sigma(tfp)$</td>
<td>1.98</td>
<td>1.35</td>
<td>1.08</td>
</tr>
<tr>
<td>$\sigma(l)$</td>
<td>1.15</td>
<td>1.16</td>
<td>1.16</td>
</tr>
<tr>
<td>$\sigma(l)/\sigma(y)$</td>
<td>0.53</td>
<td>0.54</td>
<td>0.62</td>
</tr>
<tr>
<td>$\sigma(lwedge)$</td>
<td>2.11</td>
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</tr>
<tr>
<td>$\text{Corr}(lwedge, y)$</td>
<td>-0.73</td>
<td>-0.96</td>
<td>-0.71</td>
</tr>
<tr>
<td>$\sigma(c)/\sigma(y)$</td>
<td>1.15</td>
<td>1.49</td>
<td>1.72</td>
</tr>
<tr>
<td>$\text{Corr}(nx/y, y)$</td>
<td>-0.78</td>
<td>-0.14</td>
<td>-0.12</td>
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</table>
3. Quantitative Analysis: Firing Costs and Business Cycles

Table 5: Separation Costs and Business Cycle Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mexico</th>
<th>Model: $\kappa \approx 4$</th>
<th>Model: $\kappa \approx 1$</th>
<th>Canada</th>
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</thead>
<tbody>
<tr>
<td>$\sigma(y)$</td>
<td>2.17</td>
<td>2.17</td>
<td>1.86</td>
<td>1.28</td>
</tr>
<tr>
<td>$\sigma(tfp)$</td>
<td>1.98</td>
<td>1.36</td>
<td>1.08</td>
<td>0.86</td>
</tr>
<tr>
<td>$\sigma(l)$</td>
<td>1.15</td>
<td>1.16</td>
<td>1.16</td>
<td>0.86</td>
</tr>
<tr>
<td>$\sigma(l)/\sigma(y)$</td>
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<td>0.54</td>
<td>0.62</td>
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<tr>
<td>$\sigma(lwedge)$</td>
<td>2.11</td>
<td>0.59</td>
<td>0.47</td>
<td>0.76</td>
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<td>$\text{Corr}(lwedge, y)$</td>
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<td>-0.71</td>
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<tr>
<td>$\sigma(c)/\sigma(y)$</td>
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<td>1.46</td>
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<td>0.86</td>
</tr>
<tr>
<td>$\text{Corr}(nx/y, y)$</td>
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<td>-0.14</td>
<td>-0.12</td>
<td>0.03</td>
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</tbody>
</table>
3. Quantitative Analysis: The Great Recession

![Graphs showing consumption, investment, employment, and total factor productivity during the Great Recession.](image-url)
3. Quantitative Analysis: The Great Recession

![Graphs showing economic indicators during the Great Recession.](image-url)
The Great Recession: Canada vs. Mexico.

Graphs showing the deviation from trend of various economic indicators for Mexico and Canada during the recession years from 2007 to 2011:
- GDP
- Employment
- Consumption
- Investment
- Total Factor Productivity
- Labor Wedge

Lama and Urrutia ()
Table 6: Sensitivity Analysis for the Mexican 2008 Great Recession Episode

<table>
<thead>
<tr>
<th></th>
<th>Baseline model (1/ν ≈ 2.6, σ_ω=1.5)</th>
<th>Frisch Elasticity 1/ν = 1</th>
<th>Frisch Elasticity 1/ν = 0.1</th>
<th>Curvature Pareto σ_ω = 1.1</th>
<th>Curvature Pareto σ_ω = 2</th>
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<tbody>
<tr>
<td>y</td>
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<td>1.25</td>
<td>1.73</td>
<td>1.05</td>
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<td>l</td>
<td>0.37</td>
<td>0.15</td>
<td>-0.09</td>
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<td>1.14</td>
<td>1.78</td>
<td>0.74</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Baseline model (θ=0.4, α=0.3)</th>
<th>Matching Elasticity θ = 0.2</th>
<th>Matching Elasticity θ = 0.6</th>
<th>Capital Share α = 0.25</th>
<th>Capital Share α = 0.4</th>
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</thead>
<tbody>
<tr>
<td>y</td>
<td>1.32</td>
<td>1.70</td>
<td>1.44</td>
<td>1.10</td>
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<tr>
<td>l</td>
<td>0.37</td>
<td>0.59</td>
<td>0.43</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>tfp</td>
<td>1.06</td>
<td>1.27</td>
<td>1.11</td>
<td>0.94</td>
<td></td>
</tr>
</tbody>
</table>
4. Conclusions

- Labor market institutions account for differences in business cycles between developed and emerging economies.
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- Endogenous selection provides a mechanism that mitigates the impact of negative shocks on output and productivity. Employment protection works against this mechanism.
- Extensions: Tradable vs. Non-tradable, Europe vs. U.S.