Wage employment, unemployment and self-employment across countries

Markus Poschke

McGill University

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The distribution of employment status across countries

This paper

1. **documents** relationships between self-employment, unemployment and income per capita
2. develops a **model** for labor markets with a lot of self-employment
3. **quantitatively studies determinants** of self-employment and unemployment.
The distribution of employment status across countries

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1. **documents** relationships between self-employment, unemployment and income per capita
   1.1 Higher self-employment in poorer countries. A lot of this is low-productivity own-account work.
   1.2 Higher unemployment relative to wage employment ("UN ratio") in poorer countries.
   1.3 Higher self-employment where UN ratio is high.

2. develops a **model** for labor markets with a lot of self-employment

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The distribution of employment status across countries

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2. develops a model for labor markets with a lot of self-employment

3. quantitatively studies determinants of self-employment and unemployment.
   Labor market frictions
   3.1 can account for a very large fraction of the variation in not only unemployment but also self-employment across countries, and
   3.2 affect aggregate output via the quality of own-account workers.
Self-employment, unemployment and income per capita: Evidence from 150 censuses

- IPUMS International provides harmonized census data for 60+ countries
- covers 1960-2011
- Censuses typically about 10 years apart
- allows computing unemployment, employment and self-employment by urban/rural, education, age...
- sample used: urban, age over 16, country population > 1M
⇒ main sample: 137 censuses from 55 countries
- comparability code (3 tiers)
Empirical patterns

The classification of employment status

**EMPSTAT:**
- Inactive
- Unemployed
- Employed

**CLASSWK:**
- Self-employed
  - Own-account worker
  - Employer
- Wage/salary worker (employee)
- Unpaid
- Other
Empirical patterns

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Empirical patterns

Labor force composition and GDP per capita

Data: IPUMS International, 196 observations, 64 countries, urban areas, 1960-2011. PWT.

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### Labor force composition and GDP per capita

<table>
<thead>
<tr>
<th></th>
<th>self-employment rate</th>
<th>fraction own-account workers</th>
<th>fraction employers</th>
<th>fraction wage/salary workers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ln(Y/L)</strong></td>
<td>-0.132***</td>
<td>-0.143***</td>
<td>0.012***</td>
<td>0.138***</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.020)</td>
<td>(0.003)</td>
<td>(0.017)</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.507</td>
<td>0.512</td>
<td>0.236</td>
<td>0.543</td>
</tr>
<tr>
<td>observations</td>
<td>150</td>
<td>140</td>
<td>140</td>
<td>150</td>
</tr>
<tr>
<td>countries</td>
<td>58</td>
<td>53</td>
<td>53</td>
<td>58</td>
</tr>
</tbody>
</table>

Notes: Data on urban areas. Standard errors in parentheses. Between effects regressions. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.
Empirical patterns

**The distribution of employment status across countries**

Every time GDP per capita doubles,

- the self-employment rate declines by 9 percentage points,
- the wage employment rate increases by 9 percentage points.

Robust:

- similar for entire country
- for only top tier data
The distribution of employment status across countries

Every time GDP per capita doubles,
- the self-employment rate declines by 9 percentage points,
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Empirical patterns

Unemployment and GDP per capita

coeff.: 0.003 (0.009)

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Empirical patterns

**Measuring unemployment**

\[ u = \frac{U}{L} = \frac{U}{U + N + SE} \]

Data:
- \( U/L \) similar across countries.
- Rich countries: high \( N \), low \( SE \)
- Poor countries: high \( SE \), low \( N \)

\[ \Rightarrow \text{unemployment/employment (UN) ratio } \frac{U}{U + N} \text{ high in poor countries.} \]

Measures incidence of failed search.
Measuring unemployment

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Measures incidence of failed search.
Empirical patterns

The \textit{UN} ratio and GDP per capita

Notes: Data for urban areas.

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Empirical patterns

The distribution of employment status across countries

Every time GDP per capita doubles,
- the self-employment rate declines by 9 percentage points,
- the wage employment rate increases by 9 percentage points,
- the $UN$ ratio decreases by 2.5 percentage points.

Robust:
- similar for entire country
- for only top tier data
- within age groups
Empirical patterns

The distribution of employment status across countries

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- the self-employment rate declines by 9 percentage points,
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Empirical patterns

Self-employment and unemployment

Data: IPUMS International, data for urban areas, 135 observations, 54 countries, 1960-2011, bottom 90% of UN. PWT.

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## Self-employment and unemployment, controlling for income

<table>
<thead>
<tr>
<th>dependent variable:</th>
<th>self-employment rate</th>
<th>fraction own-account workers</th>
<th>fraction employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>$UN$ ratio</td>
<td>0.702**</td>
<td>0.802**</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>(0.285)</td>
<td>(0.312)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>log GDP per capita</td>
<td>-0.122***</td>
<td>-0.136***</td>
<td>0.012***</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.020)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.556</td>
<td>0.575</td>
<td>0.229</td>
</tr>
<tr>
<td>observations</td>
<td>136</td>
<td>126</td>
<td>126</td>
</tr>
<tr>
<td>countries</td>
<td>54</td>
<td>48</td>
<td>48</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses. Between effects regressions. Bottom 90% of $UN$. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.
Empirical patterns

The distribution of employment status across countries

Every time GDP per capita doubles,

1. the self-employment rate declines by 9 percentage points,
2. the wage employment rate increases by 9 percentage points,
3. the $UN$ ratio decreases by 2.5 percentage points.

4. Self-employment rate rises by 0.5 percentage points as $U/(U + N)$ rises by 1 percentage point (at fixed GDP per capita).

Robustness:

- similar estimate for only top tier data
- 1.-3. also hold for entire country, 4. only significant in urban data

⇒ the SE-$UN$ relationship is an urban phenomenon

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Model
Main model ingredients

- Builds upon Diamond-Mortensen-Pissarides.
- 4 states: employed, unemployed, self-employed, employer.
- The unemployed choose whether to
  - search for a job, or
  - start a firm, at a cost.
  ⇒ endogenous firm entry rate.
- Firms differ in productivity $z$.
- $z$ is revealed after entry. Once known, two options:
  - Become an employer, post vacancies to hire workers: $y = zn\gamma$.
  - Become an own-account worker: $y = \zeta z$.
  ⇒ endogenous own-account/employer split.
Equilibrium

Equilibrium \( \theta, w \) pinned down by occupational choice and wage bargaining.

- **OC curve:** Value of search = value of entry: downward-sloping in \( \theta, w \)-space.
- **wage curve:** upward-sloping in \( \theta, w \)-space.
Quantitative Results
Quantitative Results

Quantitative exercises

1. Calibrate the model to eight countries spanning the distribution of income
2. Which factors drive cross-country differences?
3. The effect of labor market frictions
### Calibration strategy: targets

<table>
<thead>
<tr>
<th>parameter</th>
<th>target</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k_v$</td>
<td>vacancy posting cost</td>
</tr>
<tr>
<td>$A$</td>
<td>matching fct. prodty</td>
</tr>
<tr>
<td>$\xi$</td>
<td>match destruction rate</td>
</tr>
<tr>
<td>$k_f$</td>
<td>entry cost</td>
</tr>
<tr>
<td>$\zeta$</td>
<td>rel. SE productivity</td>
</tr>
<tr>
<td>$\lambda_f$</td>
<td>firm exit rate</td>
</tr>
<tr>
<td>$\sigma_z$</td>
<td>productivity variance</td>
</tr>
<tr>
<td>$\delta$</td>
<td>probability casual work</td>
</tr>
<tr>
<td>$\eta$</td>
<td>worker bargaining power</td>
</tr>
<tr>
<td>$b$</td>
<td>$u$ flow value</td>
</tr>
</tbody>
</table>
## Quantitative Results

### Calibration: target countries

<table>
<thead>
<tr>
<th>Country</th>
<th>$u$ (%)</th>
<th>$u$ outflow rate (%)</th>
<th>own-account workers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>23.7</td>
<td>4.4</td>
<td>28.8</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5.8</td>
<td>9.1</td>
<td>31.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>4.2</td>
<td>39.8</td>
<td>22.1</td>
</tr>
<tr>
<td>Italy</td>
<td>15.2</td>
<td>6.2</td>
<td>15.7</td>
</tr>
<tr>
<td>France</td>
<td>13.0</td>
<td>8.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Germany</td>
<td>10.7</td>
<td>6.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Canada</td>
<td>6.9</td>
<td>25.6</td>
<td>6.9</td>
</tr>
<tr>
<td>US</td>
<td>5.1</td>
<td>44.0</td>
<td>4.9</td>
</tr>
<tr>
<td>average</td>
<td>10.6</td>
<td>18.0</td>
<td>14.9</td>
</tr>
</tbody>
</table>
### Calibrated parameters: some highlights

<table>
<thead>
<tr>
<th></th>
<th>Ethiopia</th>
<th>USA</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model moments:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment outflow rate</td>
<td>0.044</td>
<td>0.453</td>
<td>0.180</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.237</td>
<td>0.051</td>
<td>0.106</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>0.348</td>
<td>0.098</td>
<td>0.193</td>
</tr>
<tr>
<td>Fraction own-account workers</td>
<td>0.288</td>
<td>0.050</td>
<td>0.149</td>
</tr>
<tr>
<td>Share of employment firms with $n &gt; 10$</td>
<td>0.089</td>
<td>0.848</td>
<td>0.740</td>
</tr>
<tr>
<td><strong>Parameter values:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacancy posting cost $k_v$</td>
<td>69</td>
<td>12</td>
<td>45.4</td>
</tr>
<tr>
<td>Job destruction rate $\xi$ (%)</td>
<td>3.2</td>
<td>1.36</td>
<td>1.43</td>
</tr>
<tr>
<td>Firm entry cost $k_f$</td>
<td>13.54</td>
<td>56</td>
<td>7.5</td>
</tr>
<tr>
<td>Relative own-account productivity $\zeta$</td>
<td>0.519</td>
<td>0.657</td>
<td>0.605</td>
</tr>
<tr>
<td>Productivity dispersion $\sigma_z$</td>
<td>0.0224</td>
<td>0.164</td>
<td>0.32</td>
</tr>
</tbody>
</table>
What accounts for model fit?

Calibration: choose value for 8 parameters per country to match 8 targets.

Which parameters matter for capturing cross-country variation?

Approach:

- Benchmark: calibration outcomes for each country using parameters from average country calibration.
- Then allow 1, 2 or 3 parameters to be country-specific, to achieve best calibration fit in each country.
- Measure
  - decline in the calibration loss function (total across countries)
  - decline in sum of squared deviation between model outcomes and data for $u, UN, SE$
**Labor market frictions central for explaining variation**

<table>
<thead>
<tr>
<th>Overall fit</th>
<th>unemployment outflow rate</th>
<th>( u )</th>
<th>( UN ) ratio</th>
<th>SE rate</th>
</tr>
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<tr>
<td><strong>One country-specific parameter:</strong></td>
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<td></td>
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<tr>
<td><strong>Two country-specific parameters:</strong></td>
<td></td>
<td></td>
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<tr>
<td>( k_v, \xi )</td>
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<td><strong>Three country-specific parameters:</strong></td>
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**Quantitative Results**

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</tr>
</tbody>
</table>
Can the model account for the self-employment/unemployment relationship?

Parameters from the average economy calibration, except $k_v$ and $\xi$ (2 parameters), plus $b$ (3 parameters)
Summary of decomposition

1. Variation in labor market parameters \((k_v, \xi, b)\) across countries is key for
   - overall fit
   - variation in unemployment
   - variation in self-employment
   - joint variation in unemployment and self-employment.

2. Other parameters \((k_f, \zeta)\) fit variation in self-employment, but have counterfactual implications for unemployment.
Quantitative Results

The effect of labor market frictions

Illustrate their effect on

- labor market outcomes
- output

for different settings.
Quantitative Results

The effect of varying labor market frictions on unemployment and self-employment

(a) Low $k_f$ (from average country calibration): $k_v$ mostly affects SE

(b) High $k_f$ (from US calibration): $k_v$ mostly affects UN

Self-employment is an important margin for “escaping” frictions.

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The effect of labor market frictions on output

Experiment: reduce $k_v$ by half.

<table>
<thead>
<tr>
<th>% change in</th>
<th>calibration to</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>average economy</td>
</tr>
<tr>
<td>output:</td>
<td></td>
</tr>
<tr>
<td>aggregate output</td>
<td>4.0</td>
</tr>
<tr>
<td>counterfactual output:</td>
<td></td>
</tr>
<tr>
<td>only $u$ changes</td>
<td>2.9</td>
</tr>
<tr>
<td>only SE rate changes</td>
<td>1.2</td>
</tr>
</tbody>
</table>

- **High $k_f$:** labor market frictions mostly affect output via $u$.
- **Low $k_f$:** $k_v$ affects output via occupational choice and the quality of entrepreneurs.
Quantitative Results

Conclusion

1. Poor countries feature high unemployment and high self-employment.

2. An extended DMP model can serve to model poor country labor markets with high $u$ and SE.

3. The model suggests that cross-country differences in labor market frictions are the source not only for differences in unemployment, but also in self-employment.

4. Labor market frictions
   - strongly increase self-employment, and
   - can reduce output by encouraging low-productivity own-account work.
Challenges and future directions

- Worker and match heterogeneity
  ⇒ requires a decent-sized urban panel
- Entry investment choice, frictions at entry
- Life cycle
Appendix
Labor force composition and GDP per capita – countrywide

Data: IPUMS International, 214 observations, 68 countries, 1960-2011. PWT.
Labor force composition and GDP per capita – urban, incl. unpaid

Data: IPUMS International, 42 countries, 1960-2011. PWT.
Self-employment and unemployment

Are self-employment and unemployment mutually exclusive?

- UEUS data: average weekly hours worked are 50 for SE, 1.3 for the unemployed.
- Abebe et al. (2016) survey: Rare for job seekers to engage in self-employment.
- Franklin (2014): Job search is time consuming and costly. Often requires physical travel to read job ads and drop off applications.

- How is job search financed? With casual work. Readily available; does not require capital. Censuses capture casual work as a separate category.