Employment and Wage Effects of Privatization

Evidence from Hungary, Romania, Russia, and Ukraine

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Motivation

• Primary aim of privatization is to increase firm performance

• Much research shows privatization raises performance
  – Megginson and Netter (2001); Djankov and Murrell (2002)
  – Brown, Earle, and Telegdy (2006) on productivity effects:
    • Strong in Hungary & Romania, weak in Ukraine, minus in Russia
    • Foreign effects always much larger than domestic

• Do the gains come at the expense of workers?

• When privatization is less effective are workers better off? When more effective, are workers worse off?
Privatization and Workers

“Privatization serves first of all to enhance economic efficiency. But that has political and ethical implications which may come into conflict with the efficiency criteria.”

Janos Kornai (2008)
Privatization and Workers

Focus of this research

• Firm-level outcomes
  – Employment (E)
  – Wage (W)
  – Wage bill (E*W)

• Determinant of interest: ownership (state, domestic private, foreign)

• Populations of interest
  – Privatized manufacturing companies
  – Comparison group: state-owned firms in the same industry-year
  – Comparator countries: Hungary, Romania, Russia, Ukraine
Potential Effects of Privatization

Standard view (models due to Aghion and Blanchard, 1998; Boycko, Shleifer, and Vishny, 1996):

- State ownership leads to excessive employment & wages
- Private owners cut costs to raise efficiency

=> privatization reduces E & W of the firm
Potential Effects of Privatization

Standard view: private owners raise efficiency
⇒ E & W ↓

But private ownership may lead to firm growth:
• cost reduction implies higher sales
• entrepreneurial owners seek out new markets
• owners compete more aggressively for market share
⇒ privatization raises scale: E ↑
Potential Effects of Privatization

Standard view: private owners raise efficiency
⇒ E & W ↓

But private ownership may lead to firm growth
=> privatization raises scale: E ↑

And private owners may use different wage policies:
• need to attract workers to expand
• demand higher skill, more flexibility
• incentive pay
=> privatization raises the firm’s average wage: W ↑
Potential Effects of Privatization

Direction of privatization effect on firm performance is theoretically clear.

But consequences for employees are ambiguous. Three underlying mechanisms:

- Productivity increase -> E ↓, W ↑
- Cost reduction -> W ↓
- Scale Expansion -> E ↑

The net effects of privatization depend on relative size of these productivity, cost, and scale effects.
Previous Research

Very little - most privatization research about firm performance

Occasionally, E or W used as performance measure
- Usually tiny samples; cross-section or short time series, single country
- Selection bias problems

Some case studies in developing countries

Systematic research on E and W outcomes:
- Bhaskar & Khan (1995) – 62 Bangladeshi (1 year pre- and 1 post-priv)
- La Porta & Lopez-de-Silanes (1999) – 170 Mexican (all priv, 1 year post)

Recent *Lancet* (2009) paper claims privatization raised mortality
Contributions of this Research

• Estimate privatization effects using long panel data
  – Universal data for initially state-owned manufacturing firms
  – Long time series before and after privatization (10 years average)
  – Comparison group of state-owned firms

• Apply longitudinal methods from evaluation research
  – Firm FE and firm-specific trends FT (“random growth estimators”)
  – Difference-in-differences matching
  – Dynamics of effects (anticipation, selection bias, short vs. long run)
  – Specification tests
Contributions of this Research (continued)

• Estimate underlying mechanisms: productivity, scale, cost
  – Employment impact decomposed into productivity and scale effects
  – Wage impact decomposed into cost and productivity effects

• Distinguish foreign from domestic new private owners
  – Are foreigners more ruthless cost-cutters?
  – Are they better at raising productivity and scale?

• Exploit quasi-experiment of transition from socialism
  – No selection bias in initial state ownership
  – Different policies, institutions in Hungary, Romania, Russia, Ukraine
  – Comparable variable definitions and econometric methods
## Summary of Country Characteristics

<table>
<thead>
<tr>
<th>Privatization Policy</th>
<th>Hungary</th>
<th>Romania</th>
<th>Russia</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Methods</strong></td>
<td>Sales</td>
<td>Mixed</td>
<td>Insider/mass</td>
<td>Insider</td>
</tr>
<tr>
<td>Speed</td>
<td>Fast</td>
<td>Slow</td>
<td>Fast</td>
<td>Slow</td>
</tr>
<tr>
<td><strong>Overall Reform</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World Bank Grouping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(1996)</td>
<td>(advanced)</td>
<td>(second)</td>
<td>(lagging)</td>
<td>(way behind)</td>
</tr>
<tr>
<td>EBRD Average Score for Progress in Transition</td>
<td>3.13</td>
<td>2.29</td>
<td>2.43</td>
<td>1.46</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>3.74</td>
<td>2.84</td>
<td>2.54</td>
<td>2.54</td>
</tr>
</tbody>
</table>
Data

Census-type official registry data on most state and former state enterprises in manufacturing (state-entry sample)

Sources; years; and sample sizes:
- Russia: Goskomstat; 1985-2004, 2006; 26,402 firms
- Ukraine: Derzhkomstat, Securities Commission; 1989, 1992-2006; 8,688 firms

Variables (limited)
- E, W, output, K stock observed each year
- Ownership (state; private = domestic+foreign)
Data: Variable Definitions

• Employment
  – Russia and Ukraine through 1996: average number of registered employees in industrial production divisions
  – Hungary, Romania, and Ukraine from 1997: average number of all employees

• Wage
  – Annual wage bill, including monetary and nonmonetary benefits, divided by employment, deflated by CPI

• Ownership
  – *Private* if more than 50 percent of the shares are privately held
  – *Domestic* if private, and domestic shareholding > foreign
  – *Foreign* if private, but not domestic
<table>
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<tr>
<th>Country</th>
<th>Always State Total</th>
<th>Privatized Domestic Total Before</th>
<th>Privatized Domestic Total After</th>
<th>Privatized Foreign Total Before</th>
<th>Privatized Foreign Total After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>6,102</td>
<td>6,956</td>
<td>13,740</td>
<td>951</td>
<td>2,816</td>
</tr>
<tr>
<td>Romania</td>
<td>3,539</td>
<td>11,986</td>
<td>15,366</td>
<td>1,065</td>
<td>1,006</td>
</tr>
<tr>
<td>Russia</td>
<td>90,000</td>
<td>107,263</td>
<td>106,947</td>
<td>1,383</td>
<td>1,706</td>
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<tr>
<td>Ukraine</td>
<td>22,068</td>
<td>25,575</td>
<td>37,671</td>
<td>355</td>
<td>330</td>
</tr>
</tbody>
</table>

**Employment Regressions**

**Wage Regressions**

<table>
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<th>Always State Total</th>
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<th>Privatized Domestic Total After</th>
<th>Privatized Foreign Total Before</th>
<th>Privatized Foreign Total After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>6,014</td>
<td>6,881</td>
<td>13,519</td>
<td>938</td>
<td>2,784</td>
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<tr>
<td>Romania</td>
<td>3,342</td>
<td>11,488</td>
<td>14,588</td>
<td>1,017</td>
<td>941</td>
</tr>
<tr>
<td>Russia</td>
<td>66,787</td>
<td>46,131</td>
<td>103,913</td>
<td>632</td>
<td>1,632</td>
</tr>
<tr>
<td>Ukraine</td>
<td>21,013</td>
<td>25,373</td>
<td>37,161</td>
<td>355</td>
<td>330</td>
</tr>
</tbody>
</table>
Estimation

\[ y_{it} = f(Domestic_{it-1}, Foreign_{it-1}) \]

\[ y_{it} \] represents, in alternative equations:

- \( \ln(E) \) – employment
- \( \ln(W) \) – wage rate per worker
Estimation Issues

1. aggregate industry and time effects
   - control for industry-year interactions

2. selection bias arising from:
   - political objectives
   - demand from potential investors
   - interests of workers
   → control for firm fixed effects (FE)
   → control for firm-specific trends (FT)
   → Heckman-Hotz “preprogram test” to evaluate estimators

3. timing of privatization and effects
   - privatization process (announcement, tender, shareholder mtg)
   - effects may take time
   → estimate dynamics around event time

4. nonrandom exit from database (true v. spurious)
   → estimate exit probit, regressions imputing 0 in first year of exit
Econometric Specifications (1/3)

\[ y_{it} = D_{jt}\gamma_{jt} + w_t\alpha_i + \theta_{it}\delta + u_{it} \]

\( i \) indexes firms (1-N); \( j \) industries (1-J); \( t \) years (1-T)
\( y_{it} \) is alternatively ln(E), ln(W)
\( D_{jt} \) is a 1 × JT vector of industry-year interactions
\( \gamma_{jt} \) is the associated JT × 1 vector of coefficients
\( w_t \) is a vector of aggregate time variables
\( \alpha_i \) is the vector of associated firm-specific slopes
\( \theta_{it} \) is the vector of ownership measures
\( \delta \) is the vector of ownership effects
\( u_{it} \) is an idiosyncratic error

The forms of \( f_j, w_t, \) and \( \theta_{it} \) vary across specifications
Econometric Specifications (2/3)

- $\theta_{it}$ (ownership variables)
  - Domestic and Foreign (based on largest private owner type)
  - Dynamics: $\theta_{it} \equiv (\text{Domestic}_{it_\tau}, \text{Foreign}_{it_\tau})$ where $\tau$ is event time around the privatization year, so that $\tau = (-5-, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5+)$ with -5- including all years prior, and 5+ all years afterward

- $w_t$ (aggregate time variables)
  - OLS: $w_t \equiv 0$
  - FE: $w_t \equiv 1$, so that $\alpha_i \equiv a_i$ is the unobserved effect
  - FE&FT: $w_t \equiv (1, t)$, so that $\alpha_i \equiv (\alpha_{1i}, \alpha_{2i})$, where $\alpha_{1i}$ is a fixed unobserved effect and $\alpha_{2i}$ is the random trend for firm $i$
Matching Estimator

- Multinomial logit regression (remain state, domestic privatized, foreign privatized), including industry dummies, year dummies, log employment, log employment sq., log wage, log wage sq., log capital/employment ratio, multifactor productivity, all in $t-1$, as well as difference in log employment between $t-2$ and $t-1$
  - Privatized firms are included in the regressions only in their year of privatization

- Each domestic (foreign) privatized firm matched to nearest always state-owned firm in the same industry-year cell, provided both are within common support, using propensity scores
Advantages, Disadvantages of Matching

• Aim is to provide more similar comparison group
• Problem with unbalanced panels
  – Privatized firm’s success could cause control firm to exit
  – Hard to study longer-term effects
• Timing of pre-privatization matching variables
• Ignores firms known to be treated at a later date
• Small fraction of sample is never treated -> matching with replacement
• Panel regression uses all non-privatized firms in the same industry-year as the benchmark
Specification Tests

• F-tests on joint significance of FE and FT, the $\alpha_i$ (firm-specific coefficients on $w_t$)

• Hausman test of equality of coefficients (for FE vs. OLS and FE&FT vs. FE)

• “Pre-program test” (Heckman-Hotz, 1989): Is $E(u_{isDomestic_i}|s<\tau)=0$? $\tau$ is the privatization date. If domestic privatization appears to affect firm productivity well before the privatization date, then selection bias may be affecting estimates.

Analogous tests can be specified for Foreign
Outline of Estimation Results

- Pre-privatization relative E, W
- Impacts of domestic and foreign privatization on E, W*
- Specifications incorporating exit
- Decompositions of E and W impacts into productivity, scale, and cost effects*
- Dynamics of pre- and post-privatization effects
- Specification tests
Foreign Privatization Effect on Employment

[Graph showing the effect of foreign privatization on employment for Hungary, Romania, Russia, and Ukraine, with different models (OLS, FE, MATCH, FE&FT) represented by colored bars.]
Domestic Privatization Effect on Wage

-0.15
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25

Hungary Romania Russia Ukraine

OLS FE MATCH FE&FT
Foreign Privatization Effect on Wage

- Hungary
- Romania
- Russia
- Ukraine

- OLS
- FE
- MATCH
- FE&FT
Explaining the Employment and Wage Effects: Decompositions

Three mechanisms: scale, productivity, costs

- Scale \((X = \text{output})\)
- Productivity \(LP \equiv X/E\) \((E = \text{employment})\).
- Unit Labor Cost \(ULC \equiv WE/X\) \((W = \text{wage})\)

From these definitions, expressed in natural logarithms:

- \(e \equiv x - (x - e) \equiv x - lp\)
- \(w \equiv (w + e - x) + (x - e) \equiv ulc + lp\)

The net effects of privatization on employment and wages depend on the relative size of these mechanisms.

Linearity of the estimators of regression equations with these dependent variables \(\Rightarrow\) coefficients are similarly related.
Decomposition of the Wage Effect into Cost and Productivity Effects

Domestic

Foreign

Hungary
Romania
Russia
Ukraine
Hungary
Romania
Russia
Ukraine

Wage
Unit Labor Cost
Labor Productivity
Conclusions

• Point estimates of the consequences of privatization for workers are sensitive to specification.

• No evidence of large negative effects of domestic or foreign ownership on E, W, or survival.

• Small effects result from offsetting mechanisms:
  – Employment: positive effects on productivity and scale
  – Wage: negative effect on cost, positive on productivity

• All mechanisms stronger for foreign than domestic ownership, and for domestic in Central Europe compared to ex-Soviet.

• Results suggest positive effects of foreign ownership
  – Employment: scale effect dominates productivity effect
  – Wage: productivity effect dominates cost effect
Caveats

• Many relevant variables not measured:
  – Hours, other work conditions
  – Worker characteristics and turnover (layoffs, hiring)
  – What happens to displaced workers
  – Spillovers on other firms

• Possible measurement error
  – Under-reporting, arrears, unpaid leave, misclassification
  – Analysis shows they tend to create downward biases

• Possible residual selection bias

• Results may not generalize to other countries, sectors
  – But the firms studied probably had greater excess E, W
  – Other disciplinary devices in market economies reduce excess E, W
  =>Services, market economies more likely to have positive results