

# FDI and Wages: Evidence from Firm-Level and Linked Employer-Employee Data in Hungary, 1986-2008

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# Motivation: employer wage effects

- Industry, ownership, productivity
- Questions:
  - What firm characteristics associated with high/low wage?
  - Neutral or biased across types of workers?
  - What explains?
    - selection
    - measurement
    - compositional change
    - wage policy
    - productivity/rents

# Foreign ownership

- Ownership: potentially important characteristic of employer (residual rights)
- Policy ambivalence towards FDI
  - + Source of finance, technologies, markets and new jobs
  - Prohibited in strategic sectors, hostile unions, fears of “stealing” markets and downsize
- Major issue in shaping policies towards FDI: worker outcomes

# Previous research

- Data
  - Limited samples
  - Short time series
  - Few switchers between ownership types
- Results
  - Individual data: no control for selection bias
  - Firm level data: large effects
  - LEED: small/zero, sometimes negative effects

# Foreign-domestic wage differentials

- If competitive labor markets: no reason for differentials
- Productivity improvement and rent sharing
- Efficiency wages
  - Higher effort, more care
  - Lower turnover (fixed costs of labor, knowledge spillovers)
- Measurement problems
  - Longer working hours
  - Lower level of tax evasion
- Worker selection
  - Composition
  - Unobservables

# Contribution of this paper I

- Data
  - Firm-level data and Linked employer-employee data
  - Many ownership switches: 4,900/640
  - Long time series (20 years: 1986 - 2008)
- Matching combined with panel data methods
- Study acquisitions and divestments – can check the reversal of the foreign effect
- Effects on wage structure
- Examine explanations for foreign wage premium
  - Firm productivity
  - Worker composition
  - Measurement



## Contribution II: why is Hungary different?

- Capacity for improvement
  - Technology
  - Know-how
  - Knowledge of market economy
  - Access to financing
- Gaps in the industrial structure
- Low wages
- Foreign investors differ from domestic owners

# FDI in Hungary

- Before 1990: zero FDI
- After 1990: large FDI inflow
  - Supportive policy
  - Tax abatements/subsidies for FDI
  - EU accession (2004)
- From late 1990s: substantial divestments
- Result: approximately 15 percent of employment in foreign-owned firms



# Employee information: Hungarian Wage Survey

- Conducted in 1986, 1989, and then yearly by 2008
- Sampling of firms:
  - All firms with >20 employees
  - Random sample of small firms (11-20 employees in 1996-99, 5-20 in 2000-08)
- Sampling of workers:
  - Randomly based on day of birth in medium and large firms (5th and 15th for blue-collar, also 25th for white-collar)
  - All workers in small firms (<20 employees in 1996-2001, <50 since 2002)



# Worker wages

- Monthly gross earnings
  - As reported by the employer (contrast with HH surveys, e.g. CPS)
  - Monthly base salary
  - Overtime pay
  - Regular bonuses and premia, commissions, allowances...
  - Non-regular bonuses based on previous year's records



# Employer information: Tax Authority Data

- 1992-2008:
  - All legal entities using double-entry bookkeeping
  - Total employment in data  $\approx$  All business sector employees in Hungary
- 1986-1992:
  - Sample of firms from HWS
  - Balance sheet and income statement items, employment, legal form, industry, county of HQ



## Average wages and ownership

- Average annual wage bill per worker = total annual wage bill divided by yearly average statistical number of employees
- Foreign ownership status
  - If >50% share of total equity
  - Large number of ownership switches
  - For around 20% of all foreign acquisitions origin of investor known

# Sample

- For-profit firms in business sector
  - with not more than 2 ownership switches
  - with the following ownership histories: always domestic, single acquisitions, DO-FO-DOs (switches observed in the sample!)
  - in industries with any foreign presence
- In LEED sample: only full-time workers aged 15-74
- 377,000 companies (33,000 in LEED)
- 2,5 million worker-years in LEED

# Matched Sample

- Features of matching:
  - Control firms in probit weighted with #TREAT/#CONTR each year
  - Variables in probit:  $(\log \text{ wage})_{t-1}$ ,  $(\log \text{ wage})^2_{t-1}$ ,  $(\log \text{ emp})_{t-1}$ ,  $(\log \text{ emp})^2_{t-1}$ ,  $(\text{wage growth})_{(t-1)-(t-2)}$ ,  $(\text{emp growth})_{(t-1)-(t-2)}$ ,  $(\text{labor prod})_{t-1}$ ,  $(\text{labor prod})^2_{t-1}$ ,  $(\text{cap intensity})_{t-1}$ ,  $(\text{cap intensity})^2_{t-1}$ , industry and year dummies
  - Within industry and year NN matching with replacement, based on prop. score (common support enforced)
- 1,756 acquired firms matched to 1,661 control firms (476 to 416 in LEED)
- Very good covariate balance

# Estimation

- Reduced form wage equation (for LEED):

$$\ln(w)_{ijt} = \alpha + \delta ACQ_{j,t-1} + \rho DIV_{j,t-1} + X_{it}\beta + \sum \gamma_j REG_j + \sum \varphi_t YEAR_t + \varepsilon_{ijt}$$

- $i$ -workers;  $j$ -firms;  $t$ -time
  - $X_{it}$ : gender, education, potential experience + full interactions (+ sometimes new hire and occupations)
  - LHS: log individual earnings or log wage bill/emp
- For firm-level estimation drop index  $i$  and
- Estimate on both full and matched samples  $X_{it}$

## Treatment of the selection bias

- Future foreign owners, workers, managers, the state select firms into foreign ownership
  - Firm fixed effects (FE)
  - FE interacted with narrow worker characteristics effects (GFE)
  - FE interacted with worker effects (FWFE)





## Foreign Wage Effect

Unconditional wage differential: 0.64 (firm), 0.47 (LEED)

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|                | Firm-Level | LEED    |         |
|----------------|------------|---------|---------|
|                | FFE        | FFE     | WGFE    |
| Full Sample    | 0.270**    | 0.162** | 0.137** |
| Matched Sample | 0.242**    | 0.126** | 0.121** |

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## Foreign wage effect – reversals

|  | Firm-Level | LEED    |         |
|--|------------|---------|---------|
|  | FFE        | FFE     | WGFE    |
| Single Acquisitions (Domestic-Foreign) |            |         |         |
| <i>Foreign</i>                         | 0.253**    | 0.132** | 0.127** |
| Reversals (Domestic-Foreign-Domestic)  |            |         |         |
| <i>Foreign</i>                         | 0.216**    | 0.111** | 0.135** |
| <i>Divestment</i>                      | 0.079      | 0.021   | 0.070   |

# Heterogeneity of the foreign effect

- Interact the acquisition dummy with
  - Gender
  - Education
  - Experience
  - New hire dummy
  - Occupation

## Effects on Wage Structure I (LEED)

- Ref. group: male, elementary, not new hire, 11-20 yrs of exp.

|  | Matching<br>with FE | Matching<br>with GFE |
|--|---------------------|----------------------|
| Acquisition Effect of<br>Reference Group | 0.116**             | 0.087*               |
| Female                                   | -0.017              | 0.019                |
| Vocational                               | 0.017               | 0.017                |
| High school                              | 0.048**             | 0.065**              |
| University                               | 0.118**             | 0.168**              |
| Experience: 0-10                         | -0.017              | -0.012               |
| Experience: 21-30                        | -0.038**            | -0.041**             |
| Experience: 30+                          | -0.044**            | -0.057*              |
| Recent Hire                              | -0.009              | 0.012                |

## Effects on Wage Structure II (LEED)

- ACQ interacted w/ fully saturated set of occup. dummies

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|                                    | FFE     | WGFE    |
|------------------------------------|---------|---------|
| <i><b>Foreign interactions</b></i> |         |         |
| Manager                            | 0.216** | 0.195** |
| Professional                       | 0.277** | 0.245** |
| Associate Professional             | 0.168** | 0.155** |
| Skilled non-manual                 | 0.110** | 0.091** |
| Service                            | 0.116   | 0.130   |
| Skilled manual                     | 0.090** | 0.090** |
| Unskilled                          | 0.105** | 0.108** |

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# Reasons for foreign effects: productivity

- Run productivity regressions

$$\ln(\text{out}_{jt}/\text{emp}_{jt}) = \alpha_0 + \alpha_1 \text{ACQ}_{jt-1} + \alpha_2 \text{YEAR}_t + \alpha_3 \text{REG}_j + \varepsilon_j$$

$$\ln(\text{out}_{jt}/\text{emp}_{jt}) = \beta_0 + \beta_1 \text{ACQ}_{jt-1} + \beta_2 \ln(\text{out}_{jt}/\text{emp}_{jt}) + \beta_3 \ln(\text{out}_{jt}/\text{emp}_{jt}) + \beta_4 \text{YEAR}_t + \beta_5 \text{REG}_j + \zeta_j$$

- Compare  $\alpha_1$  and  $\beta_1$  with the wage regresson coefficients

## Productivity and wage effects (matching, firm-level)

|   | (1)     | (2)     |
|---|---------|---------|
| Average Compensation  | 0.247** | 0.199** |
| Labor Productivity  | 0.261** | 0.161** |
| Controls for Capital<br>Intensity and Material<br>Cost/Worker | No      | Yes     |



## Other explanations: measurement error

- Working hours for 2002-2008 – same results
- Misreporting of wages
  - Industries with higher probability of cheating
  - Proportion of workers at the minimum wage



## Foreign acquisitions and worker composition (matched LEED)

- LPMs with FE (except experience in levels)

| Dependent Variable | Within-Firm<br>Acquisition<br>Effect |
|--------------------|--------------------------------------|
| Female             | -0.021**                             |
| Elementary         | -0.004                               |
| Vocational         | -0.018*                              |
| High school        | -0.023                               |
| University         | 0.045**                              |
| Experience         | -0.975**                             |

## Selection on unobservables

| <i><b>Foreign interactions</b></i> | <b>FFE</b> | <b>WGFE</b> | <b>WFE</b> |
|------------------------------------|------------|-------------|------------|
| <i>Non-incumbent</i>               | 0.153**    | 0.154**     | ---        |
| <i>Incumbent</i>                   | 0.064**    | 0.063**     | 0.041*     |



# Heterogeneity of the acquisition effect

- By sending country (interactions with GDP/cap of the source country)
- By transition period (1990-1998, 1999-2008)
- By the target firm (state-owned vs. domestic private)

## Heterogeneity of acquisition effect (FE)

|                   | Wage    | Productivity |
|-------------------|---------|--------------|
| GDP per capita    | 0.033** | 0.039**      |
| Early Acquisition | 0.247** | 0.257**      |
| Late Acquisition  | 0.251** | 0.270**      |
| State-Owned       | 0.310** | 0.326**      |
| Domestic Private  | 0.104** | 0.106**      |



# Conclusions

- Use firms and LEED to study the wage effects of foreign acquisitions
- Find large positive effects for all worker types
- The effects are larger for high skilled and young
- Divestments lead to declining wages
- The effects are correlated with firm level productivity change
- The effects are stronger for developed sending countries and for state targets