The Impact of Employment Protection on the Quality of Job Match

: Evidence from Job Duration Data in South Korea

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I. 2007 Reform in Korean Labor Market:

Primary change introduced in the 2007 reform: restrict the length of fixed-term employment with one employer to maximum of 2 years

✓ 2007 regulation requires employers to convert temporary worker to permanent after 2 years

❖ Fixed-term employment contract
   : Employment contract that terminates at specific future date, or when particular task is completed

❖ Example of Fixed-Term Contracts after Reform
Exceptions of reform:

- Workers aged 55 or older
- Firms with fewer than 5 employees in private sector
- Workers who work less than 15 hours per week
- Workers holding doctoral degrees or highly technical and professional qualifications
- Workers subject to other special laws, etc
1. Previous Studies on the Effect of 2007 Labor Market Reform

- The previous studies have focused on whether the reform influenced total employment.

**Limited long-term effect of the regulation:**

- Decreases in fixed-term and total employment right after the reform (in the short run)
- The negative effects faded away by two years after the reform.

- This study relates the change in protection for temporary employment to job sorting mechanism.

- We focus on a firm’s screening process using duration analysis.
  - Boockmann and Hegen (2008), Marinescu (2009)
2. Change in Firms’ Options after Reform and its Possible Effects

[ Before the reform ]

1. Dismiss & replace with new employee
2. Continue hiring the worker under a fixed-term contract
3. Promote to permanent worker

[ After the reform ]

1. Dismiss & replace
3. Promote to permanent

[ Changes in firm's HR management practice ]

(a) Better recruitment practice:
   \[ \rightarrow \text{lower termination hazard for workers with low tenure} \quad (H2) \]

(b) Higher monitoring effort & rigorous evaluation:
   \[ \rightarrow \text{higher termination hazard for workers with low tenure} \quad (H3) \]

higher termination hazard
before 24th month (H1)

3. Possible Effects of Reform on Employment Termination

(1) Firm’s Perspective

- (H1) *Replacement channel* : Replace worker with new temporary worker
  ➔ *Higher termination hazard* right before the 24th month

- (H2) *Recruitment channel* : Better recruitment practice
  ➔ *Lower termination hazard* for workers with low tenure

- (H3) *Monitoring channel* : Higher monitoring on the job & rigorous evaluation
  ➔ *Higher termination hazard* for workers with low tenure

(2) Workers’ Perspective

- (H4) *Higher effort on the job*
  ➔ *Lower termination hazard* throughout the period of temporary contract
Possible Effects of Reform on Employment Termination

(H2) Recruitment channel

Termination $h(r) \downarrow$

(H1) Replacement channel

Termination $h(r) \uparrow$

Termination $h(r) \uparrow$

(H3) Monitoring channel

Termination $h(r) \downarrow$

(H4) Workers’ Higher Effort

$r$: Tenure in a job (month)

1  12  24
II. Analysis I : Firm’s Behavioral Change after Reform

1. Data : Job History Data of KLIPS (Korea Labor & Income Panel Study)

   • Sample: temporary contract jobs between Jan 2001 and Aug 2016

   • Temporary-contract jobs: 1 month ≤ the period of an employment contract < 1 year, or
     Current employment is expected to end within a year

❖ Job Classification in KLIPS

 KLIPS - Job classification

   • **Regular** job (67.6%)
     (Contract period ≥ 12 months)

   • **Temporary-contract** job (23.6%)
     (1m ≤ Contract period < 12m)

   • **Contingent (Daily)** job (8.8%)
     (Contract period < 1 month)

※ Fixed-term employment contract: Employment contract that terminates at specific future date
**Control and Treatment Group**

- Analysis time ($r$): Tenure of a worker in a job (months)
- Failure: Termination of a job ($r = \text{Job end date} - \text{Job start date}$)
- Censored: unobservable since the last interview ($r = \text{The last interview date} - \text{Job start date}$)

**Jobs in Control Group**

- Job start: Mar, 2005
- Job end: Sep, 2005
  - $r = 7$

- Job start: Feb, 2007
  - treated as being censored at the effective date ($r = 5$)

**Jobs in Treatment Group**

- Job start: Oct, 2007
  - Job end: Feb, 2008
  - $r = 5$

- Job start: Nov, 2008
  - Last Interview: May, 2009
  - Censored ($r = 7$)
2. Control and Treatment Group: Basic Statistics

<table>
<thead>
<tr>
<th>Jobs under temporary-contracts</th>
<th>The number of jobs</th>
<th>The number of failures</th>
<th>The number of censored cases</th>
<th>Median value of job tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control group</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(Jan. 2001 – Jun. 2007)</td>
<td>2,236</td>
<td>1,596 (71.4%)</td>
<td>640 (28.6%)</td>
<td>9 months</td>
</tr>
<tr>
<td><strong>Treatment group</strong></td>
<td></td>
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<tr>
<td>(Jul. 2007 – Aug. 2016)</td>
<td>3,454</td>
<td>2,282 (66.1%)</td>
<td>1,172 (33.9%)</td>
<td>13 months</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,690</td>
<td>3,878 (68.2%)</td>
<td>1,812 (31.8%)</td>
<td>11 months</td>
</tr>
</tbody>
</table>


\[
h(r) = \lim_{\Delta r \to 0} \frac{\Pr(r < R < r + \Delta r \mid R > r)}{\Delta r}
\]

\[
\hat{h}(r) = \frac{f_r}{n_r}
\]

\[f_r : \text{the number of jobs terminated at } r\]

\[n_r : \text{the number of jobs at risk of termination at } r\]
3. Kaplan-Meier Nonparametric Estimates for Hazard Function $h(r)$

$$\hat{h}(r) = \frac{f_r}{n_r}$$

- $f_r$ : the number of jobs terminated at $r$
- $n_r$ : the number of jobs at risk at $r$

[Kaplan-Meier hazard estimates for the workers on temporary-contracts]
4. Effect of Reform on Hazard of Employment Termination

[Probit Model]

- Unobserved latent variable, $Y_{it}^*$, for a job $i$ lasting at least $t$

$$Y_{it}^* = X_{it} \Pi + \sum_{r=2}^{30} \beta_r \ D_{rit} + \sum_{r=1}^{30} \delta_r \ (D_{rit} \cdot Post-job_i) + \varepsilon_{it}$$

- The observed variable, $Y_{it} = 1\{Y_{it}^* \geq 0\}$: Dummy variable indicating whether a job $i$ terminated at $t$.

- $Post-job_i$ : Treatment effect that has a value of one when a job began after the reform

- $D_{rit}$ is a dummy identifying month of tenure ($r$) for a job.
  \[ \delta_r : \text{Effect of reform on hazard of employment termination at tenure } r \]

- $X_{it}$ is set of controls including
  \begin{itemize}
  \item Worker characteristics (gender, marital status, education level, and age)
  \item Job characteristics (firm size, occupation, and industry)
  \item Macroeconomic conditions (the average unemployment rate)
  \end{itemize}
4. Effect of Reform on Hazard of Employment Termination

- The observed variable, $Y_{it} = 1\{Y^*_it \geq 0\}$

\[
Y^*_it = X_{it} \Pi + \sum_{r=2}^{30} \beta_r D_{rit} + \sum_{r=1}^{30} \delta_r (D_{rit} \cdot Post-jobi) + \epsilon_{it}
\]

[Average Marginal Effects]
### 4-1. Sensitivity test: Probit analysis with various sample periods

<table>
<thead>
<tr>
<th>Sample period</th>
<th>2001 - 2016 (Full sample)</th>
<th>2001 - 2013</th>
<th>2004 - 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D_1 \times \text{Post-job}$</td>
<td>-0.247***</td>
<td>-0.211**</td>
<td>-0.232*</td>
</tr>
<tr>
<td>$D_2 \times \text{Post-job}$</td>
<td>-0.474***</td>
<td>-0.449***</td>
<td>-0.374***</td>
</tr>
<tr>
<td>$D_3 \times \text{Post-job}$</td>
<td>-0.363***</td>
<td>-0.311***</td>
<td>-0.285***</td>
</tr>
<tr>
<td>$D_4 \times \text{Post-job}$</td>
<td>-0.319***</td>
<td>-0.296***</td>
<td>-0.222**</td>
</tr>
<tr>
<td>$D_5 \times \text{Post-job}$</td>
<td>-0.240***</td>
<td>-0.222***</td>
<td>-0.215**</td>
</tr>
<tr>
<td>$D_6 \times \text{Post-job}$</td>
<td>-0.104</td>
<td>-0.059</td>
<td>-0.087</td>
</tr>
<tr>
<td>$D_7 \times \text{Post-job}$</td>
<td>-0.103</td>
<td>-0.049</td>
<td>0.021</td>
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<tr>
<td>$D_8 \times \text{Post-job}$</td>
<td>-0.122*</td>
<td>-0.081</td>
<td>0.066</td>
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<tr>
<td>$D_9 \times \text{Post-job}$</td>
<td>-0.0619</td>
<td>-0.087</td>
<td>0.102</td>
</tr>
<tr>
<td>$D_{10} \times \text{Post-job}$</td>
<td>-0.078</td>
<td>-0.135</td>
<td>-0.106</td>
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<tr>
<td>$D_{11} \times \text{Post-job}$</td>
<td>-0.119</td>
<td>-0.117</td>
<td>-0.081</td>
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<tr>
<td>$D_{12} \times \text{Post-job}$</td>
<td>0.039</td>
<td>0.013</td>
<td>0.143</td>
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<tr>
<td><strong>Sample size</strong></td>
<td>85,530</td>
<td>74,874</td>
<td>40,933</td>
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</tbody>
</table>

$\delta_r$: The coefficient of $[D_{rit} \cdot \text{Post-job}_i]$
### 4-2. Placebo test: Probit analysis with false reforms

<table>
<thead>
<tr>
<th></th>
<th>Placebo test I:</th>
<th>Placebo test II:</th>
<th>Regular workers covered by social insurance¹ excluding exceptions of the regulation²</th>
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<tbody>
<tr>
<td>Sample period</td>
<td>2001 - 2006</td>
<td>2010 - 2015</td>
<td>2001 - 2013</td>
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<table>
<thead>
<tr>
<th></th>
<th>$D_1 \times \text{Post-job}$</th>
<th>$D_2 \times \text{Post-job}$</th>
<th>$D_3 \times \text{Post-job}$</th>
<th>$D_4 \times \text{Post-job}$</th>
<th>$D_5 \times \text{Post-job}$</th>
<th>$D_6 \times \text{Post-job}$</th>
<th>$D_7 \times \text{Post-job}$</th>
<th>$D_8 \times \text{Post-job}$</th>
<th>$D_9 \times \text{Post-job}$</th>
<th>$D_{10} \times \text{Post-job}$</th>
<th>$D_{11} \times \text{Post-job}$</th>
<th>$D_{12} \times \text{Post-job}$</th>
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<td>0.095</td>
<td>-0.028</td>
<td>-0.105</td>
<td>-0.010</td>
<td>0.092</td>
<td>0.120</td>
<td>0.032</td>
<td>-0.255*</td>
<td>-0.205</td>
<td>0.143</td>
<td>-0.139</td>
<td>-0.225**</td>
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<td>-0.027</td>
<td>-0.035</td>
<td>0.013</td>
<td>0.042</td>
<td>0.039</td>
<td>-0.231**</td>
<td>-0.181</td>
<td>-0.219</td>
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<td></td>
<td>0.162</td>
<td>-0.192*</td>
<td>-0.039</td>
<td>-0.054</td>
<td>-0.019</td>
<td>-0.069</td>
<td>-0.147</td>
<td>-0.137</td>
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<td>-0.163</td>
<td>-0.208*</td>
<td>-0.061</td>
<td>-0.126</td>
<td>-0.245**</td>
<td>0.201*</td>
<td>0.056</td>
<td>0.039</td>
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<td>-0.080</td>
<td>0.124</td>
<td>0.001</td>
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</tr>
<tr>
<td>Sample size</td>
<td>27,813</td>
<td>37,701</td>
<td>145,713</td>
<td>131,429</td>
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Note) 1. Social insurance programs in Korea include Unemployment insurance, National pension, National health insurance, and Industrial accident compensation insurance.

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Effects of Reform on Employment Termination

Firm’s Perspective

• *(H1) Replacement channel*  : replace the worker with new temporary worker

  ➞ Higher termination hazard before the 24th month  (NOT CONFIRMED)

• *(H2) Recruitment channel*  : better recruitment practice ➞ higher job matching quality

  ➞ Lower termination hazard for workers with low tenure  (CONFIRMED)

• *(H3) Monitoring channel*  : higher monitoring effort & rigorous evaluation

  ➞ Higher termination hazard for workers with low tenure  (NOT CONFIRMED)
III. Analysis II : Effects of Reform on Workers’ Effort

(H4) Temporary worker’s strategic behavioral change : **Higher effort on the job**

⇒ **Lower termination hazard** throughout the period of fixed-term contract

Booth at al. (2002) and Engellandt and Riphahn (2005) use unpaid overtime work as a proxy for a workers’ effort

1. Dependent Variables as a Proxy for Workers’ Effort

<table>
<thead>
<tr>
<th>Continuous variables (censored at zero)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$HR_{it} = \text{Average weekly overtime hours (paid and unpaid)}$</td>
<td>$UHR_{it} = \text{Average weekly unpaid overtime hours}$</td>
</tr>
</tbody>
</table>

2. Data : KLIPS Data for Individuals

- Sample: *Temporary-contract* workers and selected *Regular* workers;

  Panel structure – 16 waves surveyed between 2001 and 2016

  ※ Selected *Regular* workers : Employment contract periods are not pre-specified
3. Proportion of Workers Providing Overtime Hours

- **Regular Overtime**: Stabilizes around 40% post-2007.
- **Temporary Overtime**: Decreases significantly from 2001 to 2007, then stabilizes around 10% post-2007.

- **Temporary Unpaid Overtime**: Decreases sharply pre-2007, then stabilizes post-2007.
Three Groups of Observations and Two Types of Treatment Effects

- **Group 1**
  - Interview < July, 2007: After$_t$ = 0
  - Job Start < July, 2007: Post-job$_{it}$ = 0
  - Regular
  - Temporary

- **Group 2**
  - Interview ≥ July, 2007: After$_t$ = 1
  - Job Start < July, 2007: Post-job$_{it}$ = 0
  - Regular
  - Temporary

- **Group 3**
  - Job Start ≥ July, 2007: Post-job$_{it}$ = 1
  - Interview ≥ July, 2007: After$_t$ = 1
  - Regular
  - Temporary

**Timeline**
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012

- **July, 2007** (Reform)

**Treatment Effects**
- Diff 1
- Diff 2 – Diff 1
- Diff 2
- Diff 3 – Diff 2
- Diff 3

**Calendar Time (t)**
4. Effect of Reform on Workers’ Overtime

\[ Y_{it}^* = X_{it} \Pi + \beta_1 Temp_{it} + \beta_2 After_t + \beta_3 Post\text{-}job_{it} + \beta_4 [Temp_{it} \cdot After_t] + \beta_5 [Temp_{it} \cdot Post\text{-}job_{it}] + \varepsilon_{it}, \text{ where } Y_{it}^* = HR_{it}^* \text{ or } UHR_{it}^* \]

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temp :</strong> ( \beta_1 )</td>
<td><strong>Temp :</strong> ( \beta_1 )</td>
<td><strong>Temp :</strong> ( \beta_1 )</td>
</tr>
<tr>
<td>(Temporary-contract)</td>
<td>(-4.768^{***})</td>
<td>(-3.152^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.620)</td>
<td>(0.934)</td>
</tr>
<tr>
<td><strong>After :</strong> ( \beta_2 )</td>
<td>1.484^{***}</td>
<td>0.755</td>
</tr>
<tr>
<td>(After=1, if surveyed after July, 2007)</td>
<td>(0.389)</td>
<td>(0.596)</td>
</tr>
<tr>
<td><strong>Post-job :</strong> ( \beta_3 )</td>
<td>0.451</td>
<td>0.544</td>
</tr>
<tr>
<td>(Post-job=1, if job began after July, 2007)</td>
<td>(0.403)</td>
<td>(0.573)</td>
</tr>
<tr>
<td><strong>Temp x After :</strong> ( \beta_4 )</td>
<td>0.201</td>
<td>(-0.186)</td>
</tr>
<tr>
<td></td>
<td>(1.107)</td>
<td>(1.602)</td>
</tr>
<tr>
<td><strong>Temp x Post-job :</strong> ( \beta_5 )</td>
<td>(-1.097)</td>
<td>(-1.570)</td>
</tr>
<tr>
<td></td>
<td>(1.105)</td>
<td>(1.553)</td>
</tr>
</tbody>
</table>

The Number of Observations 37,835 (The number of individuals: 8,497)

**(H4)** Temporary worker’s behavioral change: Higher effort on the job

\[ \Rightarrow \text{ Lower termination hazard} \] throughout the period of fixed-term contract

( NOT CONFIRMED )
IV. Conclusion

- Increased protection for temporary workers induces employers to improve recruitment process, which results in better-matched jobs.

- Temporary workers do not consider that reform help them be promoted to permanent employment.