Intra-firm Dividend Repatriation Policies of German Multinational Enterprises
An Application of the Lintner Model

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\textsuperscript{2}Department of Economics  
University of Economics Vienna, Austria

\textsuperscript{3}Department of Economics  
University of Economics Vienna, Austria
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   - The FWF Projekt on International Tax Coordination

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   - Theory
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   - Descriptive Evidence
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Method: Pooled Tobit and correlated random effects estimator for dynamic models (Wooldridge 2005).

Results: (i) The target payout ratio is quite low in general, but adjustment to the target occurs rather quick; (ii) true state dependence (i.e. dividend smoothing) is given, yet to minor degree than implied by pooled analysis ignoring unobserved heterogeneity.
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Lintner (1956)

\[ \Delta DIV = a_i + c_i (DIV_{it} - DIV_{i(t-1)}) + u_{it} \]  
\text{with} : DIV_{it} = rE_{it}  
\[ DIV_{it} = a_{it} + (cr)E_{it} + (1 - c)DIV_{i(t-1)} + u_{it} \]

- DIV = Dividends paid by firm to personal shareholders
- E = current earnings net of taxes
- Partial adjustment model (|c| < 1) derived from a survey of 28 firms dividend policy
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- target payout ratio ’r’
- gradual adjustment to the target: ’c’
- current net earnings and own (short) history as main determinants
- When is the ’Lintner hypothesis’ supported?
  - If the speed-of-adjustment and target payout ratio are significant and the median adjustment lag is of ’plausible length’.
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Dividend smoothing in practice

"We will be paying a dividend but I will not be announcing it here."
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### Results Summary

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<th>Averaged long-run payout ratio</th>
<th>Mean adjustment lag</th>
<th>Median adjustment lag</th>
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<tr>
<td>Lintner 1956 (AER)</td>
<td>0.30</td>
<td>0.50</td>
<td>2.33</td>
<td>1.94</td>
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<td>Fama and Babiak 1968 (JASA)</td>
<td>0.40</td>
<td>0.38</td>
<td>1.50</td>
<td>1.36</td>
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<tr>
<td>van Eije and Megginson 2008 (JCF)</td>
<td>0.57</td>
<td>0.44</td>
<td>0.75</td>
<td>0.82</td>
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<td>Skinner 2008 (JCF)</td>
<td>0.18</td>
<td>0.61</td>
<td>4.56</td>
<td>3.49</td>
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<td>Behm and Zimmermann 1993 (ZWS for GE)</td>
<td>0.16</td>
<td>0.52</td>
<td>5.45</td>
<td>4.12</td>
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<td>Da Silva et al. 2004 (OUP, for GE)</td>
<td>0.22</td>
<td>0.40</td>
<td>3.46</td>
<td>2.73</td>
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<tr>
<td>Average across 14 studies</td>
<td>0.40</td>
<td>0.44</td>
<td>2.58</td>
<td>2.09</td>
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## Intra-firm dividends

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<tr>
<td>Lehmann and Mody 2004 (IMF, for GE)</td>
<td>0.65</td>
<td>0.23</td>
<td>0.54</td>
<td>0.66</td>
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<td>Desai et al. 2001 (NTJ)</td>
<td>0.73</td>
<td>0.56</td>
<td>0.36</td>
<td>0.53</td>
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<td>Desai et al. 2006 (FM)</td>
<td>0.77</td>
<td>0.48</td>
<td>0.29</td>
<td>0.47</td>
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<td>Desai et al. 2006 (FM)</td>
<td>0.53</td>
<td>0.61</td>
<td>0.87</td>
<td>0.91</td>
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<tr>
<td>Average across 5 studies</td>
<td>0.70</td>
<td>0.38</td>
<td>0.46</td>
<td>0.60</td>
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Econometric Problem

- **Aggregate vs. firm-level data**
  - Data on dividends are left censored
  - Coefficients vs. average partial effects (APEs)
  - Time-invariant unobserved firm-level heterogeneity (TIUFLH) is potentially important in explaining firms dividend policy decisions (Loudermilk 2007) (OVB and ‘spurious state dependence’)
  - Estimating the Lintner model involves a lagged-dependent variable (LDV): ’initial conditions problem’ in non-linear panel data.
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Econometric Approach
Correlated random-effects estimator of Wooldridge 2005, JAE

- As a random effects estimator it considers TIUFLH
- and thus allows the estimation of true state dependence
- Allows correlation between regressors and TIUFLH
- Allows the calculation of APEs from the coefficients.
- Necessitates balanced panel and
- requires strict exogeneity of regressors as well as
- strong distributional assumptions about the firm-level heterogeneity.

- Loudermilk 2007, JBES, on share repurchases
- Benito and Young, 2003, OBES, probit on dividend omisions
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- Loudermilk 2007, JBES, on share repurchases
- Benito and Young, 2003, OBES, probit on dividend omissions
Econometric Approach
Correlated random-effects estimator of Wooldridge 2005, JAE

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## State Dependence

- **True state dependence**: As a consequence of experiencing an event, e.g. paying a dividend, preferences, prices or constraints relevant to future dividend decisions change. In this case payment of dividends in year $t_0$, the event experienced in the past, has a genuine behavioral effect on future dividend policy.

- **Spurious state dependence**: Firms may differ in unobserved time-invariant characteristics which determine the probability to pay dividends, yet, as time-invariant variables, these characteristics are not influenced by dividend payouts or (time-invariant) reasons not related to the behavioral smoothing effect postulated by Lintner - firms pay (or do not pay) dividends. Past dividend payments have no effect on the probability of paying dividends in the future (based on Baltagi 2005, p. 217).

**Source**: based on Heckman (1981)
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1. Project Description
   - The FWF Projekt on International Tax Coordination

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3. Methodological Issues

4. Results
   - Descriptive Evidence
   - Results of Analysis
Data


- Calculation of Dividends:
  profit or loss for the financial year after tax, prior to profit distribution
  +/- profit or loss carried forward
  + withdrawal of capital reserves
  + withdrawal of revenue reserves
  - addition to revenue reserves
  = (profit / loss according balance sheet)
  - profits carried forward into next year
  = repatriated profit or dividend
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  - profits carried forward into next year
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### Descriptive Evidence I

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<tr>
<th>Variable</th>
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<th>2001</th>
<th>2004</th>
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<td>Nr. of affiliates</td>
<td>Number</td>
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<td>Nr. of observations</td>
<td>Number</td>
<td>5904</td>
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<td>Thereof: observations reporting positive dividends</td>
<td>Percent</td>
<td>Approx. 46</td>
<td>Approx. 46</td>
<td>Approx. 46</td>
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<td>Thereof: Majority-owned</td>
<td>Number</td>
<td>213</td>
<td>195</td>
<td>178</td>
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<tr>
<td>Thereof: 100-% owned</td>
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<td>771</td>
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## Descriptive Evidence II

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<td>2783.9</td>
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<tr>
<td>Net-income In 1.000</td>
<td>1022.9</td>
<td>3747.8</td>
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<td>Average Payout ratio</td>
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<td>960</td>
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<tr>
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<td>67.2</td>
<td>478.4</td>
<td>911</td>
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<td>Dividends assets ratio</td>
<td>16.59</td>
<td>53.6</td>
<td>744</td>
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<tr>
<td>Turnover In 1.000</td>
<td>32601.3</td>
<td>52865.3</td>
<td>745</td>
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<tr>
<td>Employees Number</td>
<td>228</td>
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<td>FDI stock In 1.000</td>
<td>13621.9</td>
<td>20364.1</td>
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<table>
<thead>
<tr>
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<td>48059.06</td>
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<td>Employees Number</td>
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<td>FDI stock In 1.000</td>
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<td>Net-income In 1.000</td>
<td>2002.5</td>
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<td>Dividends assets ratio</td>
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<tr>
<td>Turnover In 1.000</td>
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</tr>
<tr>
<td>Employees Number</td>
<td>256.5</td>
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<tr>
<td>FDI stock In 1.000</td>
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## Descriptive Evidence III

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<tr>
<td></td>
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<td>1999</td>
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<td>2004</td>
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<td>Dividends</td>
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<tr>
<td>Net-income</td>
<td>In 1.000</td>
<td>Average</td>
<td>1087.5</td>
<td>1206.3</td>
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<td>Average Payout ratio</td>
<td>percentage</td>
<td>Average</td>
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<td>90.1</td>
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<td>584.2</td>
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<td>Nr.</td>
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<td>Dividends earnings ratio</td>
<td>Percentage</td>
<td>Average</td>
<td>68.1</td>
<td>90.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Std.dev.</td>
<td>522.1</td>
<td>584.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nr.</td>
<td>7333</td>
<td>742</td>
</tr>
<tr>
<td>Dividends assets ratio</td>
<td>Percentage</td>
<td>Average</td>
<td>16.3</td>
<td>24.5</td>
</tr>
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<td></td>
<td></td>
<td>Std.dev.</td>
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<td>159.3</td>
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<td></td>
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<td>767</td>
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<td>Turnover</td>
<td>In 1.000</td>
<td>Average</td>
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<td>39659.3</td>
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<td></td>
<td></td>
<td>Std.dev.</td>
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<td>57435.7</td>
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<td>769</td>
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<tr>
<td>Employees</td>
<td>Number</td>
<td>Average</td>
<td>233.4</td>
<td>247.6</td>
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<tr>
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<td>Std.dev.</td>
<td>311.7</td>
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<tr>
<td></td>
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<tr>
<td>FDI stock</td>
<td>In 1.000</td>
<td>Average</td>
<td>13426.9</td>
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<tr>
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<td></td>
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## Descriptive Evidence IV

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<tr>
<th>CEEC-12</th>
<th>1999</th>
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<th>2004</th>
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<td>Dividends In 1,000</td>
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<td>Std.dev.</td>
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<td></td>
<td>Nr.</td>
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<tr>
<td>Net-income In 1,000</td>
<td>Average</td>
<td>906</td>
<td>1531.6</td>
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<td></td>
<td>Std.dev.</td>
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<tr>
<td>Average Payout ratio percentage</td>
<td>73.5</td>
<td>79.2</td>
<td>35</td>
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<tr>
<td>Dividends earnings ratio Percentage</td>
<td>Average</td>
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<td>Nr.</td>
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<td>230</td>
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<tr>
<td>Dividends assets ratio Percentage</td>
<td>Average</td>
<td>10.7</td>
<td>12.3</td>
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<td>Std.dev.</td>
<td>35.1</td>
<td>30.2</td>
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<td>Nr.</td>
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<td>233</td>
</tr>
<tr>
<td>Turnover In 1,000</td>
<td>Average</td>
<td>22803.4</td>
<td>34042.7</td>
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<td>Std.dev.</td>
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<td>Employees number</td>
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<td>348.2</td>
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<td>FDI stock In 1,000</td>
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<td>234</td>
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</table>
Dividends, Earnings and Payout Ratio

![Chart showing dividends, earnings, and payout ratio over years 1999 to 2004. The chart includes bars for dividends (DIV), earnings (Earn), and a line graph for payout ratio (r). The vertical axis is labeled in € 1,000, ranging from 0 to 250,000. The horizontal axis represents the years 1999 to 2004, with additional labeling for overall mean.]
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   - Descriptive Evidence
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**Results of pooled Tobit balanced sample**

**Tobit regression**

- **Number of obs** = 4920
- **LR chi2(6)** = 1115.82
- **Prob > chi2** = 0.0000
- **Pseudo R2** = 0.0230

Log likelihood = **-23714.135**

| repb  | Coef.  | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|-------|--------|-----------|-------|------|----------------------|
| repb_1 | 0.4704604 | 0.0222392 | 21.15 | 0.000 | 0.426816 to 0.5140591 |
| p32a  | 0.284631 | 0.0148252 | 19.20 | 0.000 | 0.255573 to 0.3137011 |
| time2 | -0.9366425 | 0.029732 | -4.24 | 0.000 | -0.969849 to -0.5034363 |
| time3 | 0.3799808 | 0.0185818 | 0.18  | 0.851 | -0.386403 to 0.4623991 |
| time5 | -0.1023239 | 0.029732 | -4.63 | 0.000 | -0.1456327 to -0.5901502 |
| time6 | -0.7379273 | 0.029732 | -2.35 | 0.001 | -0.816247 to -0.6586072 |
| _cons | -1.464199  | 0.159805  | -9.16 | 0.000 | -1.777488 to -1.150909 |

**/sigma** 4255.513 66.48669 4125.17 4385.857

**Obs. summary:**
- 2642 left-censored observations at `repb<=0`
- 2278 uncensored observations
- 0 right-censored observations
### Results RE Tobit

Random-effects tobit regression  
Group variable: nu2  
Random effects u_i ~ Gaussian

|   | Coef.  | Std. Err. | z     | P>|z| | [95% Conf. Interval] |
|---|--------|-----------|-------|------|----------------------|
| repb_1 | 0.1067716 | 0.027716 | 3.85  | 0.000 | 0.0524494 - 0.1610939 |
| repb00 | 0.2278128 | 0.038355 | 5.94  | 0.000 | 0.1526383 - 0.3029872 |
| p32a  | 0.2194936 | 0.0215404 | 10.19 | 0.000 | 0.1772753 - 0.2617119 |
| profit2000-o | 0.1767709 | 0.0313142 | 5.65  | 0.000 | 0.1153961 - 0.2381457 |
| profit2001-o | 0.067229  | 0.0283197 | 2.37  | 0.018 | 0.0117234 - 0.1227345 |
| profit2002-o | 0.1263398 | 0.0319934 | 3.95  | 0.000 | 0.0636339 - 0.1890458 |
| profit2003-o | -0.0384291 | 0.0241642 | -1.59 | 0.112 | -0.0857901 - 0.008932 |
| profit2004-o | -0.060447 | 0.0203828 | -2.97 | 0.003 | -0.1003965 - 0.0204974 |
| time2  | -1110.701 | 201.3146 | -5.52 | 0.000 | -1505.27 - -716.1316 |
| time3  | -177.497  | 196.7374 | -0.90 | 0.367 | -563.0952 - 208.1013 |
| time5  | -978.7132 | 200.6012 | -4.88 | 0.000 | -1371.884 - 585.542 |
| time6  | -708.0661 | 199.4695 | -3.55 | 0.000 | -1099.019 - 317.1131 |
| _cons  | -1534.923 | 167.9487 | -9.14 | 0.000 | -1864.097 - -1205.75 |
| /sigma_u | 2268.454 | 115.9662 | 19.56 | 0.000 | 2041.164 - 2495.743 |
| /sigma_e | 3720.694 | 62.40475 | 59.62 | 0.000 | 3598.383 - 3843.005 |
| rho    | 0.2709864 | 0.0217043 |        |       | 0.2301798 - 0.3151125 |

Observation summary:  
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### Results Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Speed of adjustment</th>
<th>Averaged long-run payout ratio</th>
<th>Mean adjustment lag</th>
<th>Median adjustment lag</th>
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<td>pooled tobit</td>
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<td>0.538</td>
<td>0.888</td>
<td>0.919</td>
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<tr>
<td>Wooldridge estimator</td>
<td>0.893</td>
<td>0.246</td>
<td>0.120</td>
<td>0.310</td>
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</table>
The RE Tobit model points to a much shorter adjustment lag than the pooled Tobit reason: true state dependence is isolated!

The Lintner hypothesis of dividend smoothing seems to be valid to a lesser extent at least for the intra-firm case if one fully exploits the information contained in panel data.

Yet, large differences between country groups.

According to Desai et al. (2006), similar results between the intra-firm and the personal shareholder level should be expected, if the affiliates dividends are only channeled through the parent to the personal shareholder. (Desai et al. 2006, p. 2).
Summary

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However, Analysis of intra-firm dividends is not comparable to the analysis of dividends paid to the personal shareholder in several respects, which contribute to the differences in the resulting shorter adjustment lag for intra-firm dividends apart from methodological differences:

- On the one hand, parent companies may not have a target payout ratio at all (or one at 100), while on the other hand, majority-owners should care about the effect of payouts on the stock prices (value of the firm), not least because of minority shareholders.
- Asymmetric information should not be a problem between parent and affiliate, therefore, signalling is not an issue.
- The lack of profitable investment opportunities in the host country, i.e. no need to reinvest profits, especially, if paralleled by the financial needs of a parent company would lead to a rather fast adjustment towards the target level.
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- Asymmetric information should not be a problem between parent and affiliate, therefore, signalling is not an issue.
- The lack of profitable investment opportunities in the host country, i.e. no need to reinvest profits, especially, if paralleled by the financial needs of a parent company would lead to a rather fast adjustment towards the target level.
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- On the one hand, parent companies may not have a target payout ratio at all (or one at 100), while on the other hand, majority-owners should care about the effect of payouts on the stock prices (value of the firm), not least because of minority shareholders.
- Asymmetric information should not be a problem between parent and affiliate, therefore, signalling is not an issue.
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