

Outline

- 1 Project Description
 - The FWF Projekt on International Tax Coordination
- 2 The Lintner Model
 - Theory
 - Results of Empirical Studies
- 3 Methodological Issues
- 4 Results
 - Descriptive Evidence
 - Results of Analysis

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Abstract

- **Objective:** The validity of the Lintner model for intra-firm dividend payments of majority-owned affiliates abroad to their parent companies in Germany is analyzed empirically. Particular emphasis is put on the isolation of true state dependence in dividend payments.
- **Data:** MiDi database of the Deutsche Bundesbank, firm level data, 1999-2004, 5.000 firm-year obs.
- **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)

$$\Delta DIV = a_i + c_i(DIV_{it} - DIV_{i(t-1)}) + u_{it} \quad (1)$$

$$\text{with : } DIV_{it} = rE_{it} \quad (2)$$

$$DIV_{it} = a_{it} + (cr)E_{it} + (1 - c)DIV_{i(t-1)} + u_{it} \quad (3)$$

$$(4)$$

- 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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Implications of the Model

- 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

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

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Firm - Personal Shareholder Sphere

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

Intra-firm dividends

	Speed Speed of ad- justment	Averaged long-run payout ratio	Mean ad- justment lag	Median ad- justment lag
Lehmann and Mody 2004 (IMF, for GE)	0.65	0.23	0.54	0.66
Desai et al. 2001 (NTJ)	0.73	0.56	0.36	0.53
Desai et al. 2006 (FM)	0.77	0.48	0.29	0.47
Desai et al. 2006 (FM)	0.53	0.61	0.87	0.91
Average across 5 studies	0.70	0.38	0.46	0.60

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
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- Loudermilk 2007, JBES, on share repurchases
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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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 - profit or loss for the financial year after tax, prior to profit distribution
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 - + withdrawal of revenue reserves
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Descriptive Evidence I

Variable	Unit	1999	2001	2004
Nr. of affiliates	Number	984	984	984
Nr. of observations	Number	5904	5904	5904
Thereof: observations reporting positive dividends	Percent	Approx. 46	Approx. 46	Approx. 46
Thereof: Majority-owned	Number	213	195	178
Thereof: 100-% owned	Number	771	789	806

Descriptive Evidence II

			1999	2001	2004
OECD					
Dividends	In 1.000	Average	868.5	1312.7	1209.6
		Std.dev.	2783.9	3348.2	3116
		Nr.	960	960	960
Net-income	In 1.000	Average	1022.9	1186.1	2002.5
		Std.dev.	3747.8	4692.2	6721.1
		Nr.	960	960	960
Average Payout ratio	percentage		84.9	110.7	60.4
Dividends earnings ratio	Percentage	Average	67.2	90.8	48.4
		Std.dev.	478.4	597.4	242.8
		Nr.	911	923	944
Dividends assets ratio	Percentage	Average	16.59	24.8	27.3
		Std.dev.	53.6	108.8	99.8
		Nr.	744	743	744
Turnover	In 1.000	Average	32601.3	40292.6	48059.06
		Std.dev.	52865.3	58087.2	92532.2
		Nr.	745	745	745
Employees	Number	Average	228	241.4	256.5
		Std.dev.	307.3	319.9	377.7
		Nr.	745	745	745
FDI stock	In 1.000	Average	13621.9	16287.6	20349.2
		Std.dev.	20364.1	23334.6	31172.3
		Nr.	745	745	745

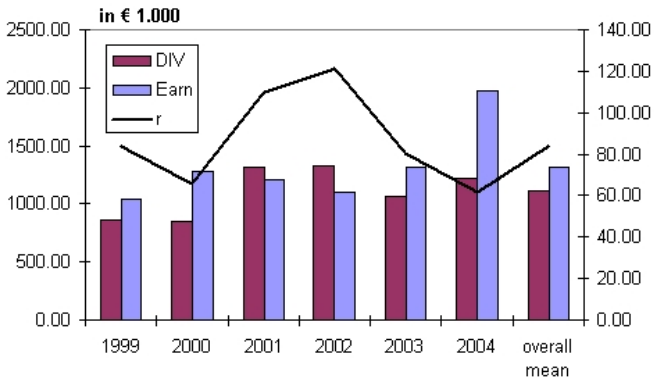
Descriptive Evidence III

EU-26			1999	2001	2004
Dividends	In 1.000	Average	773.3	1087.1	1256.2
		Std.dev.	2438.9	2973.6	3021.1
		Nr.	769	769	769
Net-income	In 1.000	Average	1087.5	1206.3	2273.5
		Std.dev.	3343.8	4768.2	6805.8
		Nr.	769	769	769
Average Payout ratio	percentage		71.1	90.1	55.3
Dividends earnings ratio	Percentage	Average	68.1	90.5	39.3
		Std.dev.	522.1	584.2	176.7
		Nr.	7333	742	756
Dividends assets ratio	Percentage	Average	16.3	24.5	26.7
		Std.dev.	52.9	159.3	98.4
		Nr.	768	767	767
Turnover	In 1.000	Average	32044.2	39659.3	47404.4
		Std.dev.	52247.5	57435.7	91296.3
		Nr.	769	769	769
Employees	Number	Average	233.4	247.6	262.2
		Std.dev.	311.7	323.4	383.1
		Nr.	769	769	769
FDI stock	In 1.000	Average	13426.9	16087.9	20129
		Std.dev.	20104.3	24569.5	30813.2
		Nr.	769	769	769

Descriptive Evidence IV

CEEC-12				1999	2001	2004
Dividends	In 1.000	Average	665.8	1213.6	1309.3	
		Std.dev.	2641	3542.9	2933	
		Nr.	234	234	234	
Net-income	In 1.000	Average	906	1531.6	3733	
		Std.dev.	2598	3294.6	8129.1	
		Nr.	234	234	234	
Average Payout ratio	percentage		73.5	79.2	35	
Dividends earnings ratio	Percentage	Average	31.9	83.3	29.3	
		Std.dev.	64.7	774.5	228.6	
		Nr.	228	230	232	
Dividends assets ratio	Percentage	Average	10.7	12.3	16.3	
		Std.dev.	35.1	30.2	44.1	
		Nr.	234	233	233	
Turnover	In 1.000	Average	22803.4	34042.7	51523.5	
		Std.dev.	48784	53310.7	130037.9	
		Nr.	234	234	234	
Employees	number	Average	309.2	348.2	422.4	
		Std.dev.	386.1	417.5	550.5	
		Nr.	234	234	234	
FDI stock	In 1.000	Average	11449.4	16287.57	20349.2	
		Std.dev.	16421.5	23334.59	31172.26	
		Nr.	234	234	234	

Dividends, Earnings and Payout Ratio



Outline

- 1 Project Description
 - The FWF Projekt on International Tax Coordination
- 2 The Lintner Model
 - Theory
 - Results of Empirical Studies
- 3 Methodological Issues
- 4 **Results**
 - Descriptive Evidence
 - **Results of Analysis**

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	.4704604	.0222392	21.15	0.000	-.4268616 .5140591
p32a	.2846371	.0148252	19.20	0.000	.2555732 .3137011
time2	-936.6425	220.9732	-4.24	0.000	-1369.849 -503.4363
time3	37.99808	216.4818	0.18	0.861	-386.403 462.3991
time5	-1023.239	220.9132	-4.63	0.000	-1456.327 -590.1502
time6	-737.9273	220.0111	-3.35	0.001	-1169.247 -306.6072
_cons	-1464.199	159.805	-9.16	0.000	-1777.488 -1150.909
/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**

Number of obs = **4920**
Number of groups = **984**

Random effects u_i ~ **Gaussian**

Obs per group: min = **5**
avg = **5.0**
max = **5**

Log likelihood = **-23541.943**

Wald chi2(12) = **699.88**
Prob > chi2 = **0.0000**

repb	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
repb_1	.1067716	.027716	3.85	0.000	.0524494	.1610939
repb00	.2278128	.038355	5.94	0.000	.1526383	.3029872
p32a	.2194936	.0215404	10.19	0.000	.1772753	.2617119
profit2000~0	.1767709	.0313142	5.65	0.000	.1153961	.2381457
profit2001~0	.067229	.0283197	2.37	0.018	.0117234	.1227345
profit2002~0	.1263398	.0319934	3.95	0.000	.0636339	.1890458
profit2003~0	-.0384291	.0241642	-1.59	0.112	-.0857901	.008932
profit2004~0	-.060447	.0203828	-2.97	0.003	-.1003965	-.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	.2709864	.0217043			.2301798	.3151125

Observation summary:

2642 left-censored observations
2278 uncensored observations
0 right-censored observations

Results Summary Table

	Speed Speed of ad- justment	Averaged long-run payout ratio	Mean ad- justment lag	Median ad- justment lag
pooled tobit	0.530	0.538	0.888	0.919
Wooldridge estimator	0.893	0.246	0.120	0.310

Summary

- 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).

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Summary cont'd

- 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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More information and paper at:

<http://www.sfb-itc.at/>

<http://www.wu-wien.ac.at/usr/vw4/bellak/>