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**Success Conditions in Competitive Tendering:
First Empirical Evidence from
Germany's Bus Transportation**

**Conference
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Katrin Augustin, Matthias Walter **EE²**

Chair of Energy Economics and Public Sector Management

Agenda

1. Motivation
2. Data and Descriptive Analysis
3. Methodology
4. Estimation Results
5. Conclusions and Further Research

Our Research Approach Aims at Identifying Structural Factors that Determine Operator Changes in Competitive Tendering

Literature overview Germany

- Beck & Wanner (2007):
 - Increased working intensity
- Wanner & Zietz (2008):
 - Competitive tendering leading to increased quality in Rhein-Main Verkehrsverbund around Frankfurt and Münchner Verkehrsverbund area, while prices remain unchanged
- Beck & Wanner (2008):
 - Decreasing costs, in particular in the first tender round

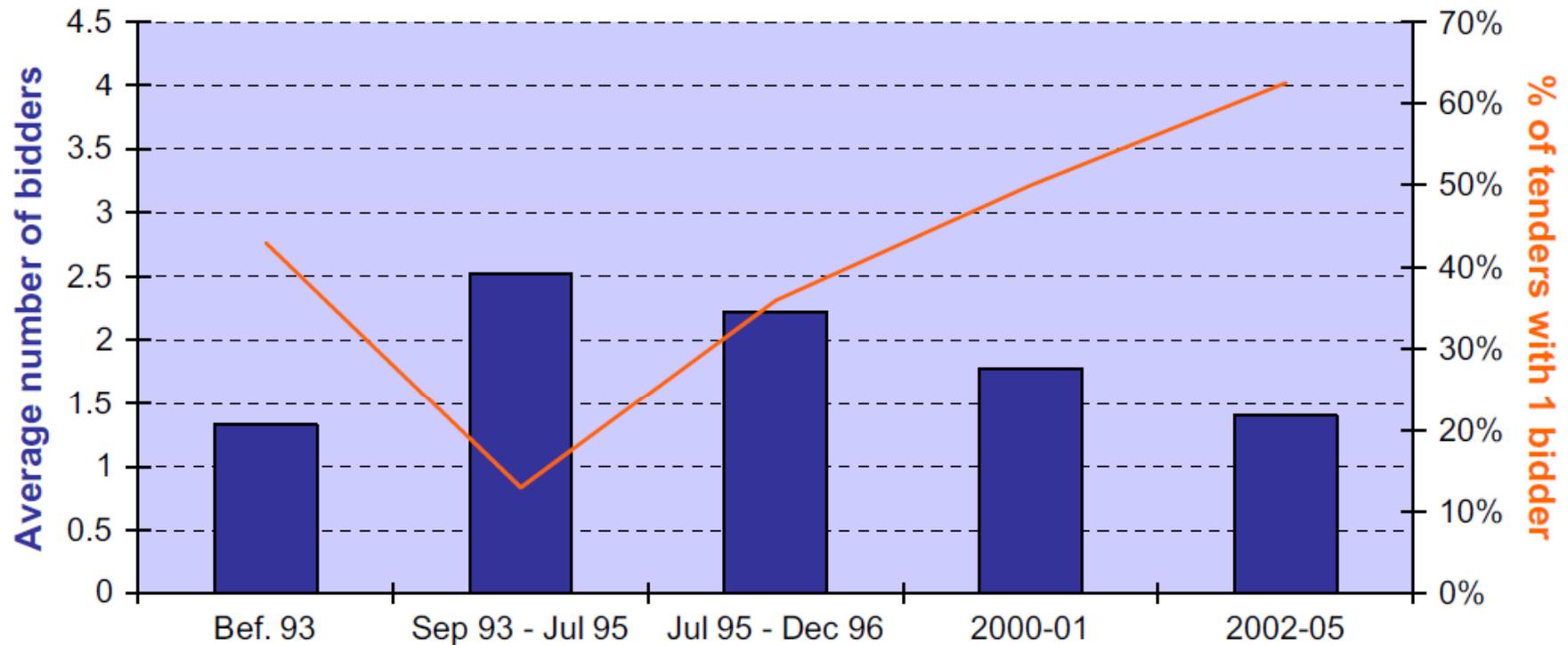


Our approach

- Determination of **success conditions** for an **operator change** in competitive tendering of bus services, i.e. exogenous factors
- Definition success conditions: Exogenous factors like **federal state, operation period** or **volume**
- **Not** looking at **managerial** success factors like organization or experience of a specific company
- **Optimal tender setup**: Exogenous factors should have no influence

International Experience, here France, Shows a Decreasing Number of Bidders per Tender

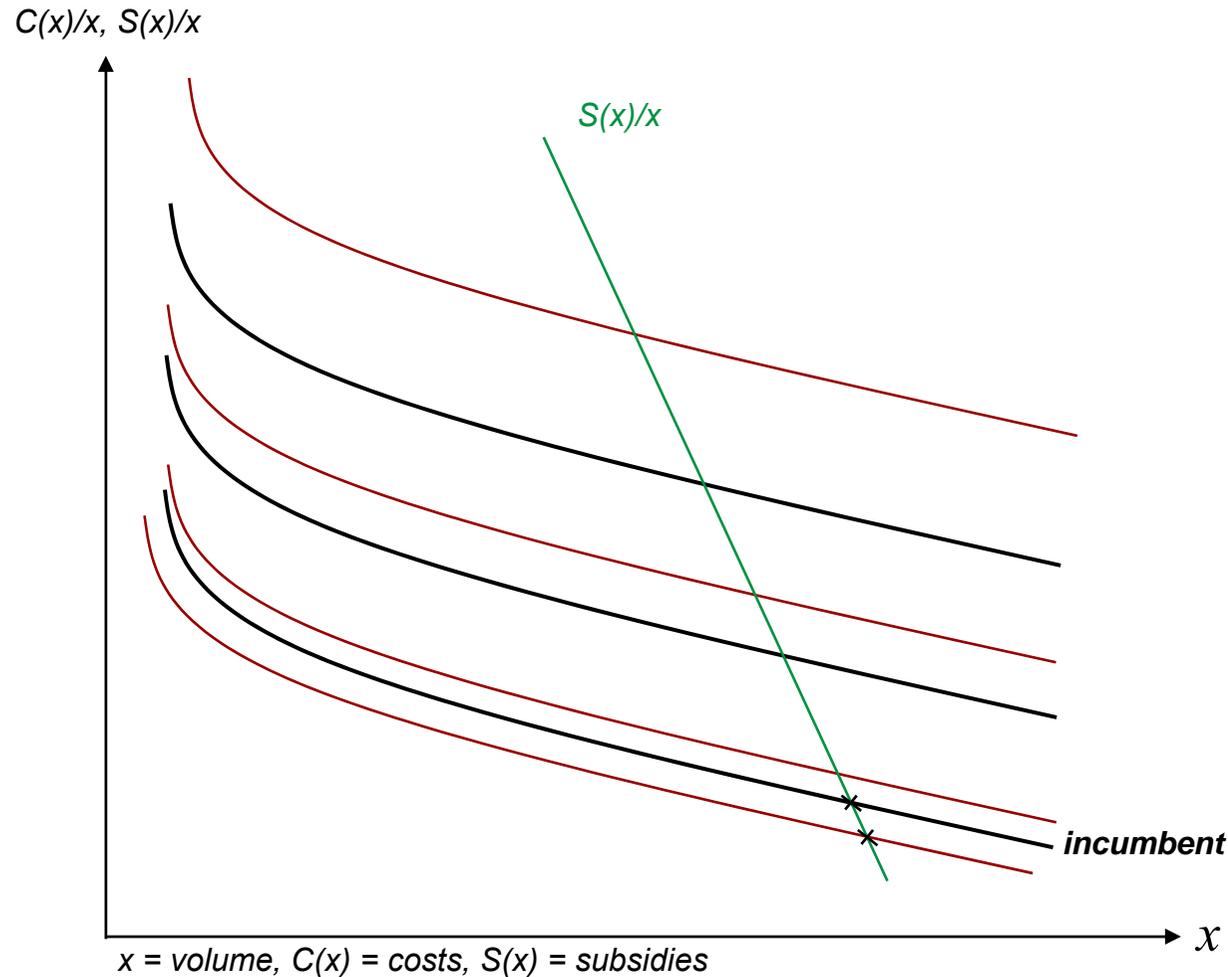
Mean number of bidders per tender in France



Source: Amaral et al. (2008)

Economic Theory Suggests Higher Costs with Decreasing Number of Bidders

Number of bidders – subsidies relationship



Comments

- **Few bidders** ► Top-performer (incumbent) with no need to submit his lowest possible bid
- **More bidders** ►
 - Top-performer have to submit their lowest bids
 - Increased competition intensity more likely to lead to an operator change

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1. Motivation

2. Data

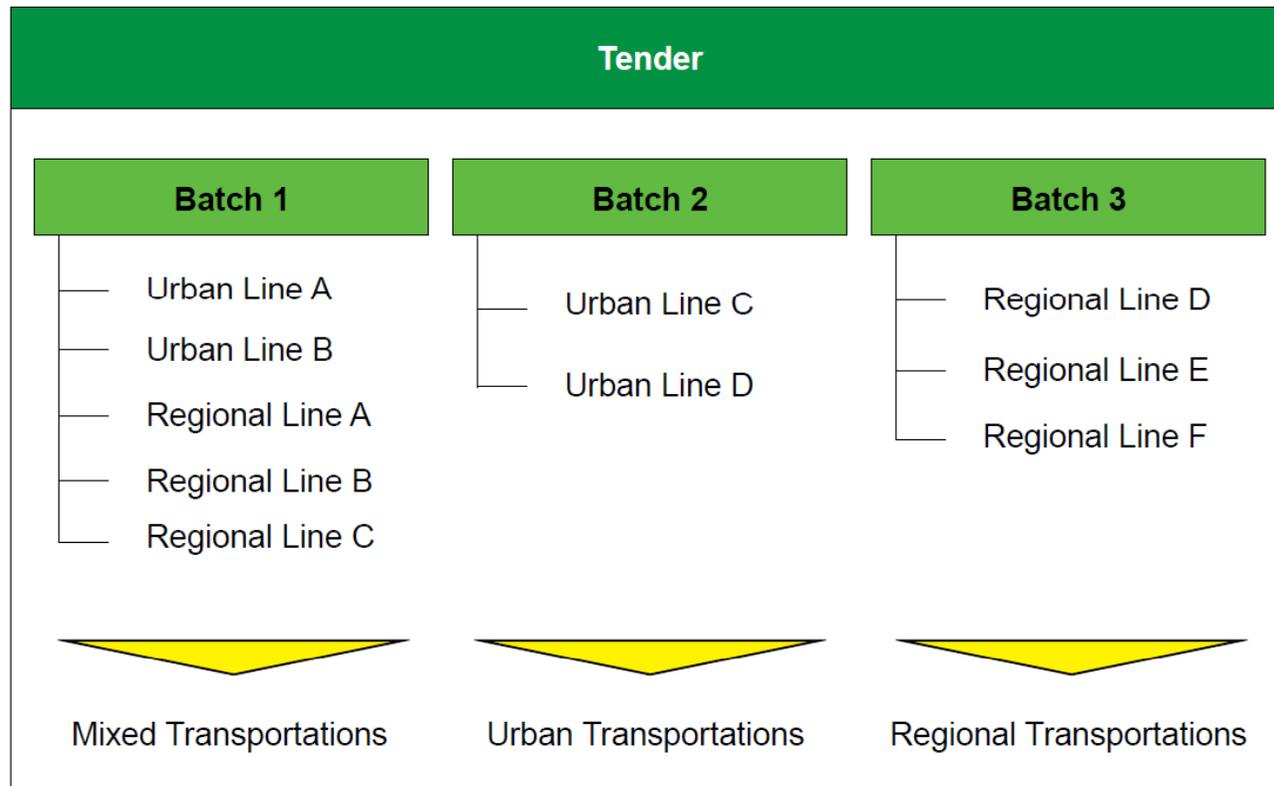
3. Methodology

4. Results

5. Conclusions and Further Research

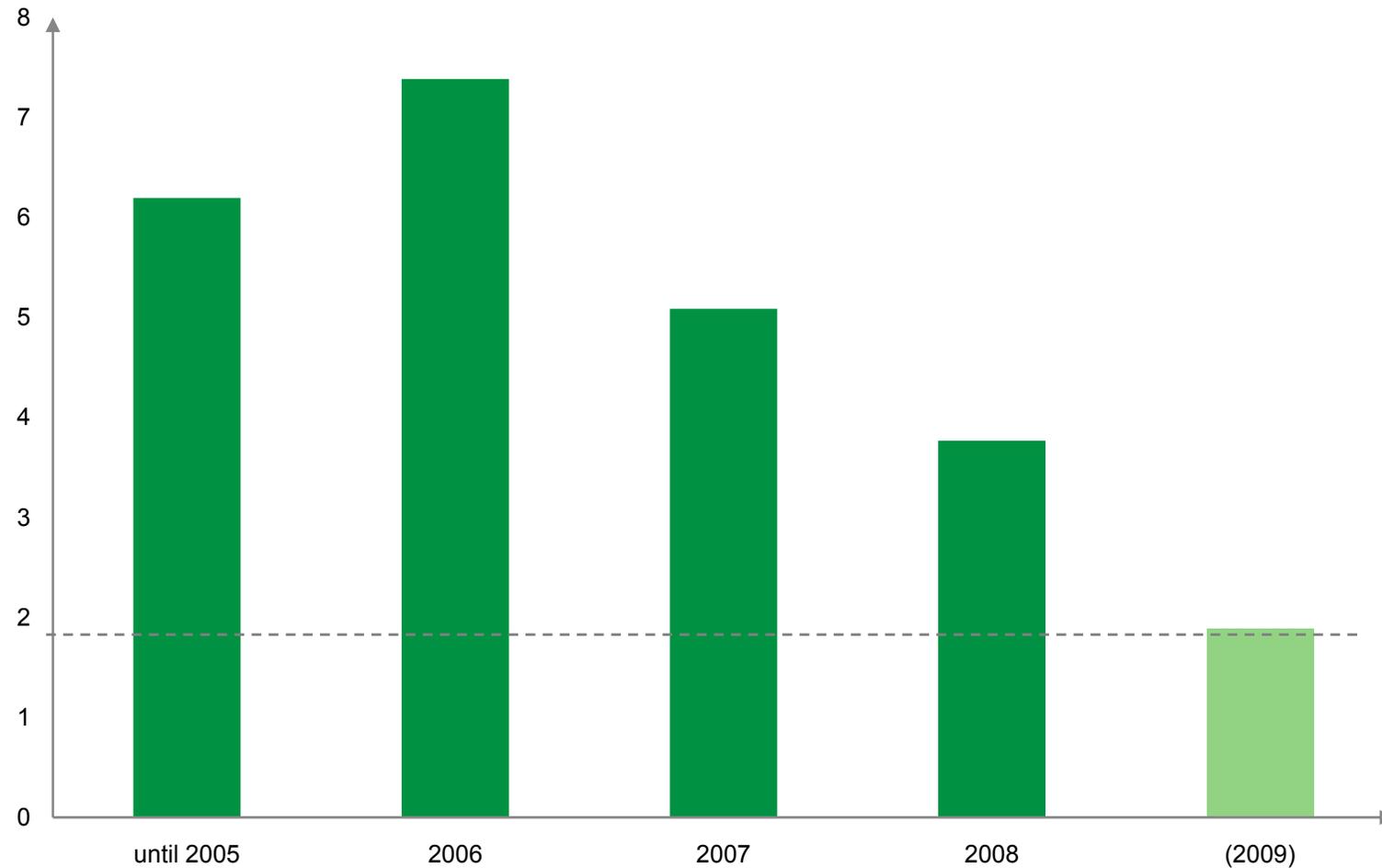
Our Analysis is Based on Batches (= Observations), not Tenders

Tender structure



Since 2006, The Number of Bidders in Germany Has Been Steadily Decreasing

Mean number of bidders per tendered batch in Germany



Note: Based on 188 observations

The Econometric Analysis is Based on 149 Observations

Descriptive statistics

	Variable	Sum	Mean	Std. Dev.	Var. Coef.	Min.	Max.	Obs.
Geography	Type of Transportation	–	–	–	–	–	–	149
	Regional Transportation	–	–	–	–	–	–	41
	Mixed Transportation	–	–	–	–	–	–	81
	Urban Transportation	–	–	–	–	–	–	27
	Federal State	–	–	–	–	–	–	149
	Hesse	–	–	–	–	–	–	114
Contract	Start of Transportation	–	–	–	–	14/10/2002	13/12/2009	149
	End of Transportation	–	–	–	–	10/10/2005	14/12/2016	149
	Operation Period in Years	949	6.369	2.319	0.364	1.008	10.144	149
	No. of Batches per Tender	149	1.953	1.254	0.642	1	7	149
	No. of Lines per Batch	749	5.027	4.103	0.816	1	26	149
	Volume p.a. [km]*	98,653	667	632	0.949	8.6	3,931	148
	Planned Distance [km]*	73,752	723	573	0.792	57	3,710	102
	Planned Time [hours]*	2,922	30	33	1.101	2.4	190	98
	No. of Required Vehicles	1988	13.342	10.295	0.772	1	58	149
	Type of Contract	–	–	–	–	–	–	149
	Gross-Cost Contract	–	–	–	–	–	–	117
	Net-Cost Contract	–	–	–	–	–	–	10
	Sub Contract	–	–	–	–	–	–	22
	Bonus-Malus-System	–	–	–	–	–	–	127
	Bonus&Malus	–	–	–	–	–	–	77
only Malus	–	–	–	–	–	–	37	
none Bonus&Malus	–	–	–	–	–	–	13	
Security	–	0.055	0.018	0.319	0.000	0.100	125	
Competition	Operator Changed	109	0.732	0.445	0.608	0	1	149
	No. of Bidders	696	4.671	2.201	0.471	1	10	149

* in thousand

Subsidiaries of DB Stadtverkehr GmbH and Municipal Companies Lost the Majority Number of Operations for the Benefit of Privates

Share of Bus Operations Before and After Tender Process

		Winner is*			before tender
		(1)	(2)	(3)	
Observations	$\sum 232$	72	25	135	%
Incumbent is Subsidiary of DB	103	44.7	3.9	51.4	44.4
Municipal Incumbent	35	31.4	42.9	25.7	15.1
Private Incumbent	94	15.9	6.4	77.7	40.5
after tender	%	31.0	10.8	58.2	100.0

*Winner is (1) Subsidiary of DB, (2) Municipal Company, (3) Private Company

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In the Econometric Probit Estimation, an Operator Change (0/1) is Explained by Several Structural Variables

- Methodology → Probit Regression Model:

$$y_i = \alpha + \beta x + \varepsilon$$

$y_i \in \{0,1\}$; dependent variable

α constant

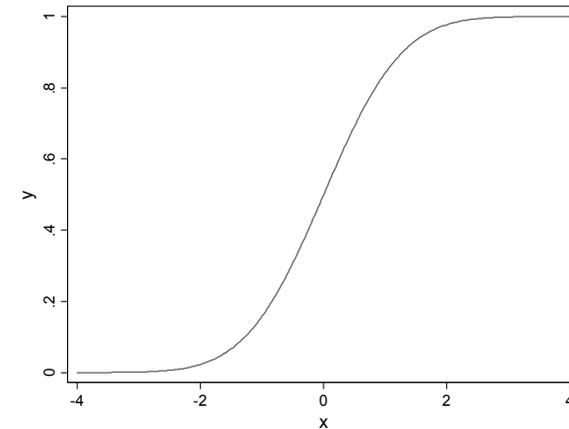
β vector of estimation parameters

x vector of explanatory variables

ε error term, independent and identically normally distributed



Distribution of the Probit Model



- Which factors influence the probability for an operator change?



e.g. $Operator\ Changed = \alpha + \beta_1(no.\ of\ vehicles) + \beta_2(no.\ of\ bidders) + \varepsilon$

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The type of contract in the German bus transportation does not vary a lot.

Estimation Results

	(1)	(2)	(3)	(4)
	Operator Changed	Operator Changed	Operator Changed	Operator Changed
Number of Bidders	0.313*** (0.063)			
Operation Period in Years		0.115** (0.052)	0.105** (0.053)	0.099* (0.057)
Year of Operation Start		-0.242** (0.101)	-0.224** (0.103)	-0.220** (0.104)
Number of Required Vehicles		0.037** (0.017)	0.038* (0.018)	0.033* (0.018)
Number of Lines per Batch		-0.066* (0.034)	-0.056 (0.036)	-0.058 (0.037)
Hesse $\in \{0, 1\}$			0.235 (0.303)	0.200 (0.325)
Type of Contract				-0.077 (0.255)
Constant	-0.708** (0.278)	0.453 (0.507)	0.296 (0.547)	0.455 (0.761)
Observations	149	149	149	149
Pseudo R^2	17.28%	13.97%	14.31%	14.36%

Note: Standard errors in parentheses.
Significance Level * 90%, ** 95%, *** 99%

Methodological Assumptions, the Dominance of Hessian Tenders and Including Subcontracts May Be Critical Aspects in the Model

- **Methodology:**

- Probit regression originally designed for a very large number of observations
- Possible exclusion of explanatory variables
 - Political objectives
 - Model a priori excludes management quality of bidders as success factor from the analysis
 - ▶ Possible consideration of variables about population density, demand or modal split
- Underlying statistical and distributional assumptions

- Data **originates** basically from **Hesse** ▶ Extend data set, in particular to missing observations from Münchner Verkehrsverbund

- Consideration of publicly announced tenders for **subcontracts** in the analysis ▶ Descriptive analysis showing the same tender structure for subcontracts and contracts initiated by the transportation authorities

Concluding Remarks

- High predicted probability for an operator change between 76-77%, probably because majority of batches is tendered for the first time
- Majority of tendered services in the past owned by DB Stadtverkehr and privates
 - ▶ Municipal services mostly preserved from competition so far
- Privates gain market shares through competitive tendering, DB Stadtverkehr and municipal companies lose market shares
- Tender setup:
 - **Operator changes are highly dependent on the number of bidders, but over time the competition intensity appears to decrease**
 - **Number of bidders depend on the tender structure (e.g. operation period)**
 - **Possible to identify significant success conditions ▶ The data shows a considerable amount of variation between the observations**



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Thank you very much
for your attention!
Any questions or comments?

katrin.augustin@mailbox.tu-dresden.de

matthias.walter@tu-dresden.de

EE²

Chair of Energy Economics and Public Sector Management

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