DEREGULATION AND THE DETERMINANTS OF ENTRY: EVIDENCE FROM THE GERMAN INTERURBAN BUS INDUSTRY

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Agenda

Introduction I

- Importance of market entry for competition and innovation is twofold

    - ➔ compete away excess profits to an equilibrium level

    - ➔ introduction and diffusion of innovations

- Recently deregulated industries provide a particularly appealing environment to study both types of entry

- Since 1931 interurban bus services – above a travel distance of 50 kilometers – were factually prohibited by law (to protect long-distance railway services)

    - ➔ Full liberalization became effective in January 2013

- Numerous entries to the market were observed in subsequent months

    - ➔ Innovative entry – new markets

    - ➔ Imitative entry – existing (incumbent) markets

Introduction II

Two separated but related research questions:

1. What are key determinants of route entry in the deregulated interurban bus industry?

2. Given their (eventually) clear role as market leaders, the question whether and how the entry strategies of MeinFernbus (MFB) and FlixBus (FB) differ suggest itself

Data - Sources

- Route-level data covering each connection from (Simplex Mobility)

    - Observation period: 01/2013-12/2014 ➔ 24 periods (months)

    - 3,402 (routes within the first 2 years) + 757 (in 2015) = 4,159

        ➔ Panel with 99,816 observations

    - Entered by 28 different providers (MFB, FB, BLB, ADAC, 13 others, 11 regionals)

- Additional information

    - Competitor presence

    - Spatial structure

    - Demographics

    - Mode characteristics

Data – Overview I

| Variable	Description	Mean	Std. dev.	Min.	Max.
Competitor presence variables					
Present MFB	= 1 if MeinFernbus already served the route upon entry	0.17	0.38	0.00	1.00
Present FB	= 1 if FlixBus already served the route upon entry	0.09	0.29	0.00	1.00
Present others	=1 if at least one competitor other than MFB or FB served the route upon entry	0.26	0.44	0.00	1.00
Spatial structure variables					
Centrality in Germany	Maximum linear distance (in km) to the center of Germany for either origin or destination city	-280.38	90.51	-438.14	-39.82
Max. motor-way distance	Maximum distance to next motorway of origin or destination city (in minutes)	14.52	210.72	1	70
Distance	Road distance (in km) between origin and destination city centers	278.03	182.56	50.20	1080.00
Demographic variables					
Market size (ln)	Logarithm of the sum of city populations in origin and destination cities	5.45	1.85	-0.66	8.53
Max. share under 24	Maximum share of population under 24 years in either origin or destination city	24.95	1.68	18.70	28.90
Max. higher education	Maximum share of population with A levels in either origin or destination city	39.62	9.92	13.20	65.20
Max. tourism	Maximum value of overnight stays per inhabitant at either orig. or dest. city	3.24	1.08	1.60	6.20
Mode characteristics variables					
Airport shuttle	=1 if the origin and/or destination city is an airport	0.07	0.26	0.00	1.00
Changes (train)	Number of train changes needed to travel from origin to destination city by rail	1.98	1.23	0.00	7.33

Data – Overview II

- Number of served routes in German interurban bus industry
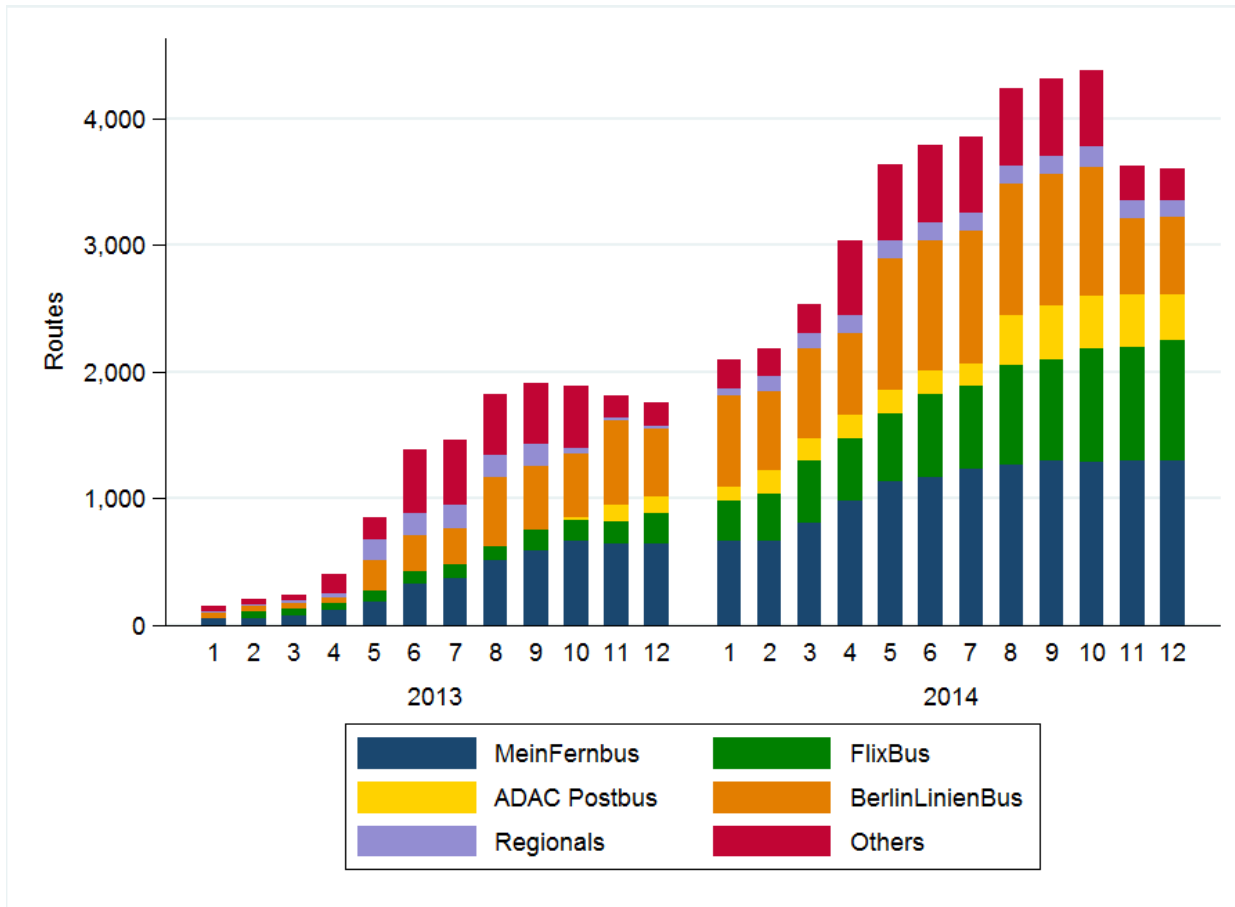
Data – Overview III

- Number of served routes by MeinFernbus and FlixBus and route overlap
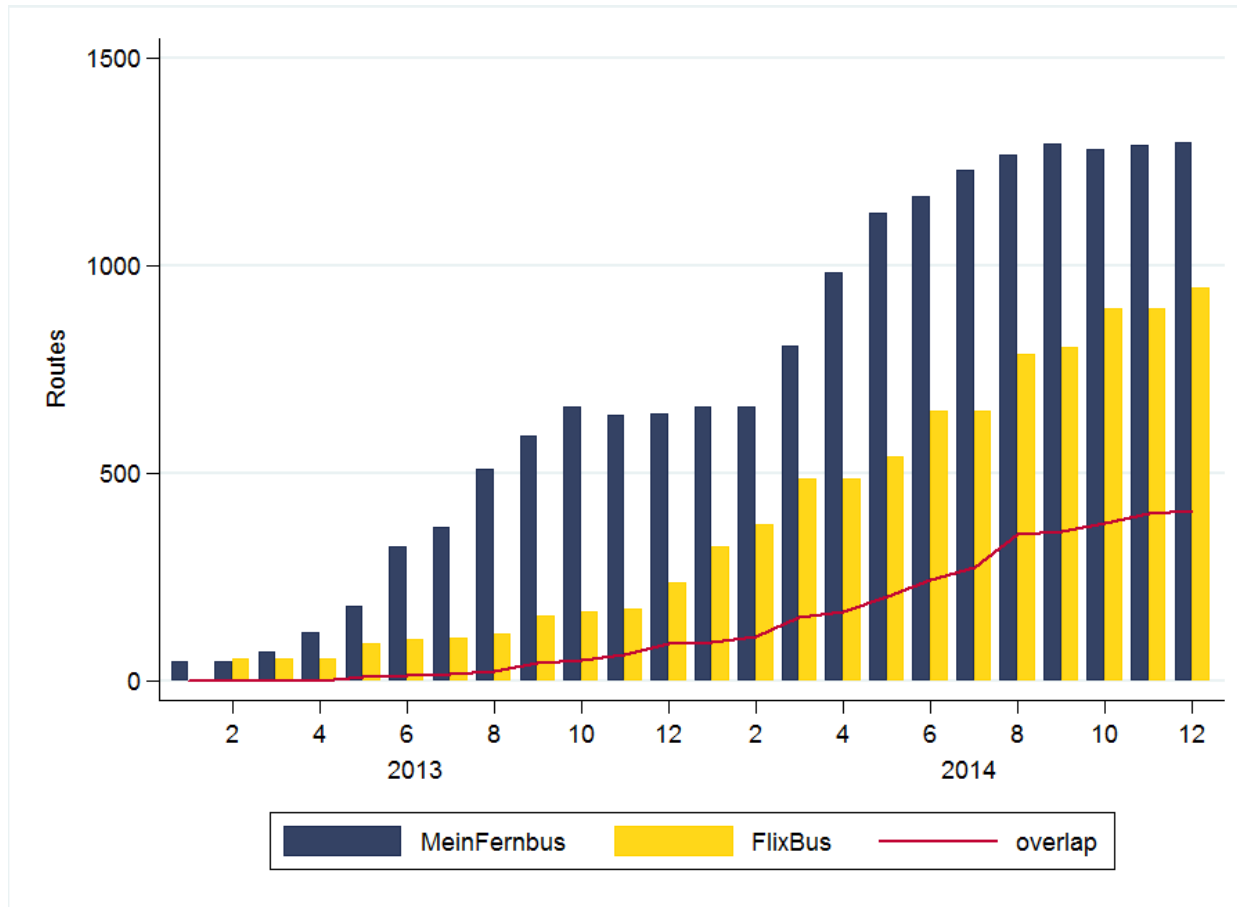
General determinants of entry

(1)

$$entry_{irt} = \beta_0 + \beta_1 present_{other\ rt} * l\_market + \beta_2 present_{other\ rt} * m\_market + \beta_3 present_{other\ rt} * s\_market + \sum_{i=1}^{N} \gamma_n X_{nr} + u_{ir}$$

- Estimated with survival analysis
  - ➔ Addresses right-censoring (in our case, entry goes on after the observation period)

General determinants of entry

Results:

	(1)	(2)	(3)	(4)
	Entry FlixBus	Entry FlixBus	Entry MeinFernbus	Entry MeinFernbus
Competitor presence variables				
Any competitor present	0.9302		0.7478***	
	(0.0630)		(0.0554)	
Any present =1 # Small market		0.1907***		0.0801***
		(0.0733)		(0.0403)
Any present =1 # Medium market		0.7485**		0.6359***
		(0.0847)		(0.0856)
Any present =1 # Large market		1.1747**		1.0173
		(0.0930)		(0.0878)
Spatial structure variables				
Centrality in Germany	1.0021***	1.0021***	1.0011***	1.0010***
	(0.0004)	(0.0004)	(0.0003)	(0.0003)
Max. motorway distance	0.9629***	0.9623***	0.9953*	0.9958
	(0.0051)	(0.0051)	(0.0026)	(0.0026)
Distance	1.0004*	1.0004*	1.0002	1.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Demographic variables				
Market size (ln)	1.3936***	1.2904***	1.2116***	1.1673***
	(0.0509)	(0.0489)	(0.0297)	(0.0289)
Max. share under 24	1.1262***	1.1220***	1.0746***	1.0841***
	(0.0282)	(0.0280)	(0.0196)	(0.0197)
Max. higher education	1.0032	1.0040	1.0170***	1.0179***
	(0.0041)	(0.0041)	(0.0037)	(0.0037)
Max. tourism	0.7244***	0.7372***	1.1720***	1.1789***
	(0.0316)	(0.0321)	(0.0348)	(0.0351)
Mode characteristics variables				
Airport shuttle	0.7872**	0.7786**	0.2129***	0.2089***
	(0.0936)	(0.0925)	(0.0384)	(0.0377)
Changes (train)	0.5966***	0.6020***	0.7255***	0.7382***
	(0.0257)	(0.0260)	(0.0228)	(0.0233)
# Obs.	89,835	89,835	81,737	81,737

Exponentiated coefficients Standard errors in parentheses, clustered at route-level * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Model Extension

(2)

$$entry_{irt} = \gamma_0 + \gamma_1 present_{jrt} * l\_market + \gamma_2 present_{jrt} * m\_market + \gamma_3 present_{jrt} * s\_market + \gamma_4 present_{others\,rt} + \sum_{i=1}^{N} \gamma_n X_{nr} + u_{ir}$$

- Estimated with survival analysis
  - ➔ Addresses right-censoring (in our case, entry goes on after the observation period)
- Robustness Checks with fully parametric and probit model

Model Extension

Results:

	(1)	(2)	(3)	(4)
	Entry FlixBus	Entry MeinFernbus	Entry FlixBus	Entry MeinFernbus
FB # Small Market		0.4988		0.4643
		(0.2507)		(0.2334)
FB # Medium Market		0.8537		0.7961
		(0.1277)		(0.1196)
FB # Large Market		1.5109***		1.4086***
		(0.1468)		(0.1418)
MFB # Small Market	0.1373***		0.1202***	
	(0.0693)		(0.0607)	
MFB # Medium Market	0.7619**		0.7125***	
	(0.0939)		(0.0885)	
MFB # Large Market	1.1525*		1.1334	
	(0.0989)		(0.0975)	
Others present	1.3735***	0.5757***	1.2888***	0.5360***
	(0.1327)	(0.0601)	(0.1263)	(0.0567)
ADAC # Small Market			0.0000	0.0000
			(0.0000)	(0.0000)
ADAC # Medium Market			0.1336***	0.5301
			(0.0775)	(0.2193)
ADAC # Large Market			0.9865	1.2964*
			(0.1287)	(0.1985)
BLB # Small Market			0.3001***	0.2038***
			(0.0943)	(0.0498)
BLB # Medium Market			0.7750	0.6101***
			(0.1318)	(0.1048)
BLB # Large Market			1.2386*	0.7845**
			(0.1427)	(0.0890)
Control variables	Yes	Yes	Yes	Yes
# Obs.	89,835	81,737	89,835	81,737

Exponentiated coefficients Standard errors in parentheses, clustered at route-level * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Conclusion I

## Key quantitative results:

- MFB and MF apply very similar entry strategies

    ➔ Increased probability to enter in populous, central routes with high shares of young inhabitants

    ➔ Avoid airport connections and badly served rail connections

    ➔ In small and medium markets they avoid each other

    ➔ In large markets they show an increased probability of entry irrespective the presence of the other competitor

- Both serve important backbone markets, but differentiate themselves on small and medium markets

- In contrast to smaller providers like BLB (particular region) and ADAC (only backbone)

- Over time less routes were left to enter and overlaps increased ➔ possibly an additional reason for the observed merger

Conclusion II

- Differences

    ➔ touristic routes pronounced by MFB

    ➔ MFB enters ADAC routes

    ➔ FB enters BLB routes

- FB actively avoids MFB in small and medium markets and is indifferent on its presence in large markets

- MFB is indifferent on the present of FB in small and medium markets and actively seeks competition with FB in large markets

Thank you for your attention!
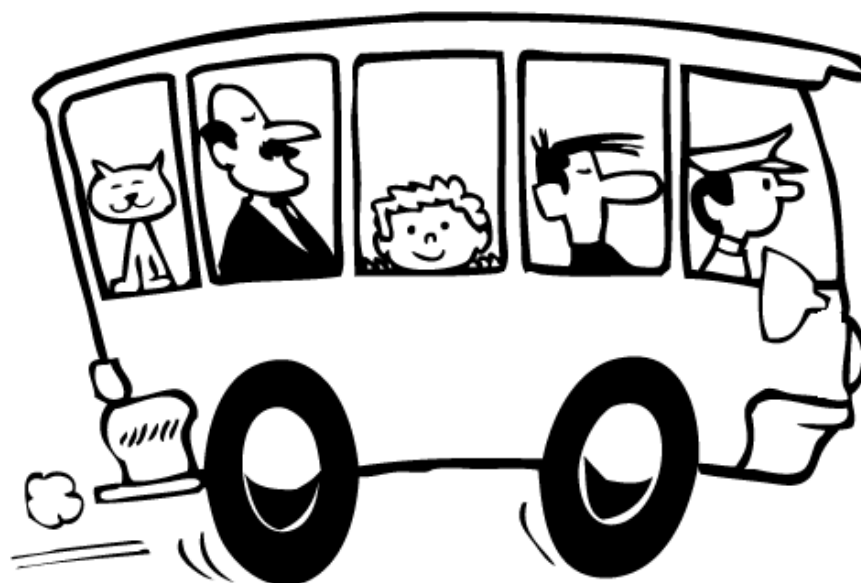
Appendix

Information criteria for parametric model extension:

		Exponential	Log Logistic	Log Normal	Weibull	Gamma	Gompertz
AIC	FlixBus	4,992.33	4,492.11	4,605.16	4,494.50	4,495.16	4,545.24
	MeinFernbus	7,332.47	7,059.12	7,067.81	7,132.22	7,065.58	7,249.22
BIC	FlixBus	5,124.01	4,633.20	4,746.25	4,635.58	4,645.66	4,686.32
	MeinFernbus	7,462.83	7,198.79	7,207.48	7,271.89	7,214.56	7,388.89

Appendix

Parametric model extension:

	Weibull		Log logistic	
	(1)	(2)	(3)	(4)
	Entry FlixBus	Entry MeinFernbus	Entry FlixBus	Entry MeinFernbus
FB # Small Market		0.3851* (0.1890)		2.0295** (0.6603)
FB # Medium Market		0.6694*** (0.0979)		1.2698* (0.1596)
FB # Large Market		1.3203*** (0.1197)		0.6623*** (0.0609)
MFB # Small Market	0.1267*** (0.0641)		2.5963*** (0.5575)	
MFB # Medium Market	0.7180*** (0.0882)		1.1918*** (0.0721)	
MFB # Large Market	1.1048 (0.0917)		0.9232* (0.0441)	
Others present	1.2804** (0.1303)	0.6444*** (0.0644)	0.8340*** (0.0462)	1.5304*** (0.1164)
Control variables	Yes	Yes	Yes	Yes
# Obs.	89,835	81,737	89,835	81,737

Appendix

Probit model extension:

	(1) Entry FlixBus	(2) Entry MeinFernbus	(3) Entry FlixBus	(4) Entry MeinFernbus
Present FlixBus=1 # Small market		-0.2527 (0.1844)		-0.3395[*] (0.1858)
Present FlixBus=1 # Medium market		-0.0287 (0.0592)		-0.1238[**] (0.0619)
Present FlixBus=1 # Large market		0.2499[***] (0.0400)		0.1818[***] (0.0423)
Present MeinFernbus=1# Small market	-0.5563[***] (0.1611)		-0.7551[***] (0.1642)	
Present MeinFernbus=1 # Medium market	0.0548 (0.0468)		-0.1240[**] (0.0501)	
Present MeinFernbus=1 # Large market	0.2274[***] (0.0330)		0.0742[**] (0.0366)	
Others present	0.1675[***] (0.0380)	-0.1451[***] (0.0397)	0.1176[***] (0.0421)	-0.1691[***] (0.0407)
# Large cities still available			-0.0010[***] (0.0001)	-0.0003[***] (0.0000)
Control variables	Yes	Yes	Yes	Yes
Constant	-3.0387[***] (0.2510)	-3.3693[***] (0.1956)	-2.4297[***] (0.2718)	-3.2005[***] (0.2050)
# Obs.	91,777	84,077	91,777	84,077