

# **DEREGULATION, COMPETITION, AND CONSOLIDATION: THE CASE OF THE GERMAN INTERURBAN BUS INDUSTRY**

**Niklas Dürr, Sven Heim and Kai Hüschelrath**  
Centre for European Economic Research (ZEW)

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# Agenda

1. Introduction
2. Data: Sources and Overview
3. Empirical Approach and Estimation Results
  - a. General Price Determinants
  - b. Potential Merger Effects
4. Conclusion

# Introduction I

- Since 1931 interurban bus services – above a travel distance of 50 kilometers – were factually prohibited by law (to protect long-distance railway services)
  - ➔ Exceptions existed for trips with an insufficient rail connection only
- In 2009, the foundation of DeinBus together with increasing pressures from the European Commission smoothed the way for liberalization
  - ➔ Full liberalization became effective in January 2013
- Numerous entries to the market were observed in subsequent months
  - ➔ Increasing number of lines, routes as well as frequencies offered
  - ➔ Majority of providers rely on a subcontractor-type business model to enable rapid growth
- Since the end of 2014, market consolidation (i.e. exits and mergers) can be observed
  - ➔ Most important event: Merger of the two market leaders MFB and FB
  - ➔ Transaction was not investigated by the German competition authority as sales thresholds were not met

# Introduction II

- Research questions investigated in the paper:
  1. What are the determinants of route-level prices in the industry? Are these results in line with our expectations from oligopoly theory?
  2. Based on the identification of general price drivers, what can be said on the possible effects of the merger between MeinFernbus and Flixbus?
    1. Which route types are especially affected by the merger?
    2. How significant are potential (short-term) price increases post-merger?
    3. Are competitive pressures in the industry strong enough to avoid a misuse of market power particularly in markets in which the merging parties competed directly?

# Data - Sources

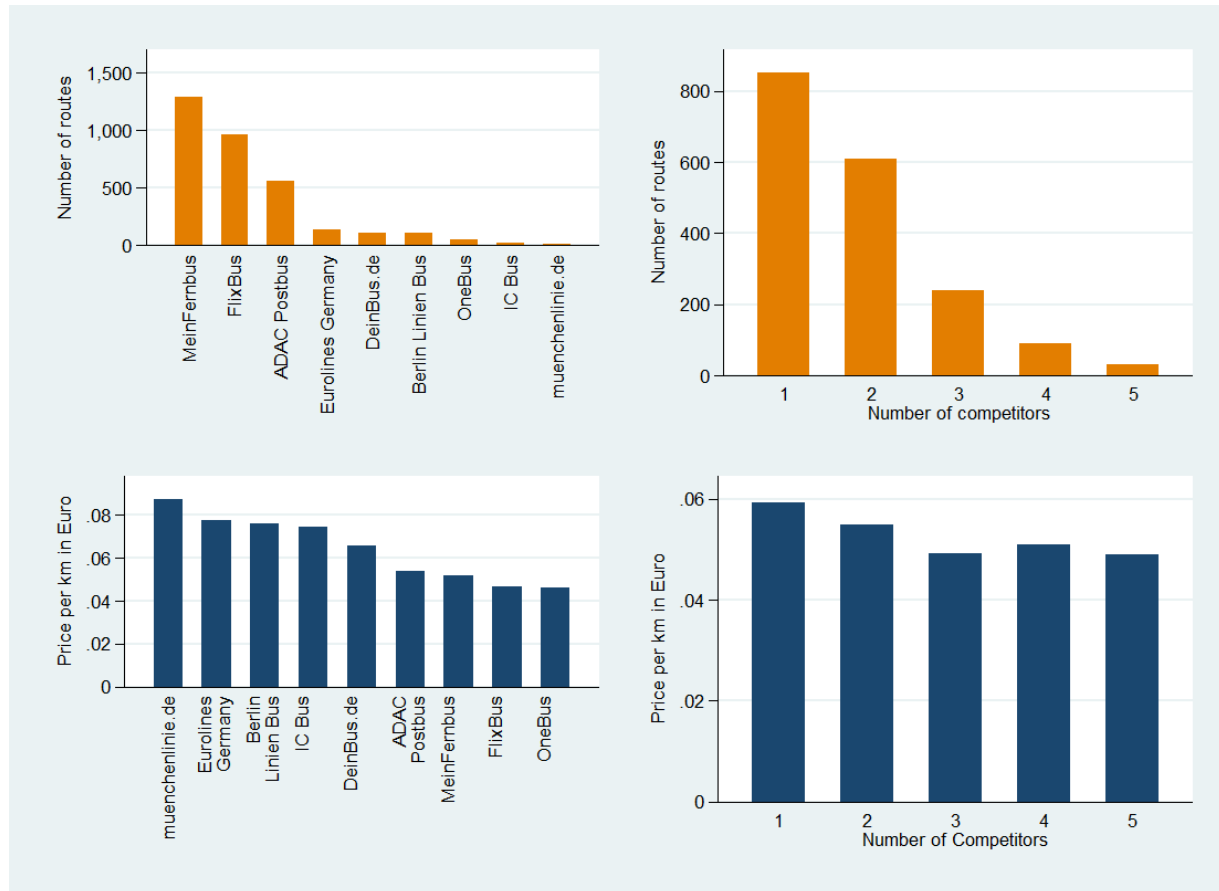
- Route-level data was obtained from internet price comparison site, 7 days before traveling
  - Observation period: Tuesday 11<sup>th</sup> to Monday 17<sup>th</sup> of November 2014
  - Additional period for robustness checks: Saturday 17<sup>th</sup> to Friday 23<sup>rd</sup> of January 2015
- Additional information
  - Data on ICE trains stops
  - Population, share of young people, and income both for the origin and the destination cities
  - Road distances and durations for the respective routes
- Unit of analysis: Route-level
  - Line is a regular service from a particular origin (departure) city to a particular destination (arrival) city
  - Each line can obtain several stops where each combination between two stops defines a route, i.e. a line with  $N$  stops results in  $\sum_{i=1}^{N-1} i$  routes

# Data – Overview I

	# Obs.	Mean	Std. Dev.	Min.	Max.
Price (in €)	40,568	14.40	7.83	4	71
Duration in minutes	40,568	264.99	162.44	45	970
Distance	40,568	296.87	168.59	54.50	871.00
Price per km	40,568	0.05	0.02	0.02	0.29
Price per minute	40,568	0.06	0.02	0.02	0.25
ICE stops	40,568	0.74	0.44	0	1
Airport connector	40,568	0.06	0.23	0	1
Subcontractor business model	40,568	0.97	0.18	0	1
-----					
Daily frequency	1822	4.04	5.50	1	88
Number of providers	1822	1.81	0.95	1	5
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Monopoly	1822	0.47	0.50	0	1
Duopoly	1822	0.33	0.47	0	1
Triopoly	1822	0.13	0.34	0	1
-----					
Monopoly MeinFernbus	1822	0.25	0.43	0	1
Monopoly FlixBus	1822	0.09	0.28	0	1
Monopoly others	1822	0.13	0.34	0	1
-----					
Duopoly MeinFernbus	1822	0.08	0.27	0	1
Duopoly FlixBus	1822	0.05	0.23	0	1
Duopoly MeinFernbus + FlixBus	1822	0.19	0.39	0	1
Duopoly others	1822	0.01	0.11	0	1
-----					
Population ('0000)	203	17.75	40.74	0.04	332.60
Share of under 24 years	203	0.24	0.02	0.18	0.29
Available income ('000 €)	203	20.24	2.45	15.78	33.34

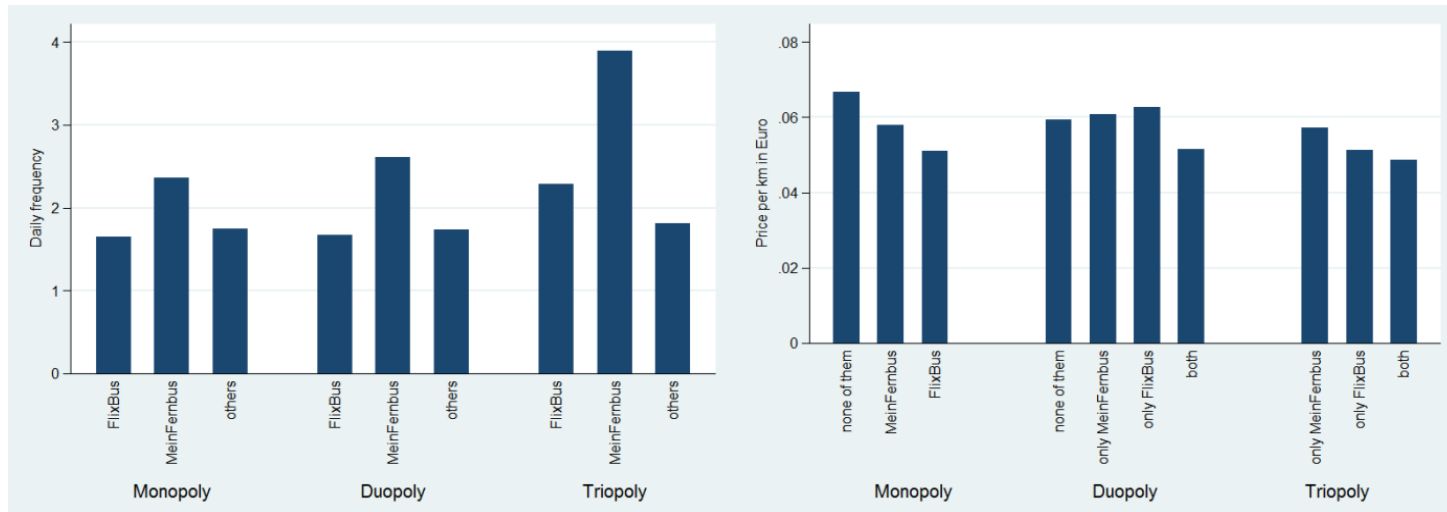
# Data – Overview II

- General market structure



# Data – Overview III

- Comparison of the two merging parties





# General price determinants I

## General price determinants IV regression:

- First stage regression:

1.  $Num\_Comp = \delta_{01} + \delta_{11}Pop_i + \delta_{21}Inc_i + \delta_{31}U24 + \delta_{41}Airport_i + \delta_{51}ICE_i + X'_i\beta_2 + \varepsilon_{i2}$

2.  $Daily\_Frequ = \delta_{01} + \delta_{11}Pop_i + \delta_{21}Inc_i + \delta_{31}U24 + \delta_{41}Airport_i + \delta_{51}ICE_i + X'_i\beta_1 + \varepsilon_{i1}$

- Basic model:

3.  $\ln price_i = \alpha_{11} + \alpha_{21}\widehat{Num\_Comp}_i + \alpha_{31}\widehat{Daily\_Frequ}_i + X'_i\beta_3 + u_{i1}$

4.  $\ln price_i = \alpha_{12} + \alpha_{22}\widehat{Mono}_i + \alpha_{32}\widehat{Duo}_i + \alpha_{42}\widehat{Trio}_i + \alpha_{52}\widehat{Daily\_Frequ}_i + X'_i\beta_4 + u_{i2}$

- Potential endogeneity from the simultaneity between the choice of entry and the expected profits resulting from price setting
  - instrumental variable approach
- Takes advantage of variation in population to instrument for the structure of the competition in the first stage equations (e.g. population in cities served by monopolies is 16% (59%) lower than in cities served by duopolies (triopolies))
  - Uses quintiles and terciles, respectively depending on first stage test statistics (K-P stat)

# General price determinants II

Results:

	(1) Price per km	(2) Price per km	(3) Price per km	(4) Price per km
Number of providers on relation	-0.0584***	-0.0557***		
Monopoly			0.220***	0.228***
Duopoly			0.116***	0.103***
Triopoly			0.00899	0.0164
Daily frequency	-0.00182***	-0.00197***	-0.00215***	-0.00232***
Distance in km	-0.00240***	-0.00247***	-0.00232***	-0.00239***
Distance in km squared	0.00000132***	0.00000137***	0.00000129***	0.00000135***
Duration in minutes	0.000706***	0.000752***	0.000666***	0.000699***
Day Dummies included		yes		yes
Daytime dummies included		yes		yes
Constant	-2.438***	-2.464***	-2.674***	-2.684***
Angrist-Pischke first stage F-Test (Freq.)	287.54	293.73	289.42	294.78
Angrist-Pischke first stage F-Test (# Comp.)	337.17	332.17		
Angrist-Pischke first stage F-Test (Mono.)			142.03	141.08
Angrist-Pischke first stage F-Test (Duo.)			247.41	244.13
Angrist-Pischke first stage F-Test (Trio.)			153.44	153.45
Kleibergen-Paap Wald rk F-Statistic	341.86	341.63	109.57	109.19
Test of endogeneity	0.0000	0.0000	0.0000	0.0000
Stock-Yogo weak ID test critical values (10%)	11.41	11.41	11.44	11.44
# of observations	40.568	40.568	40.568	40.568

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

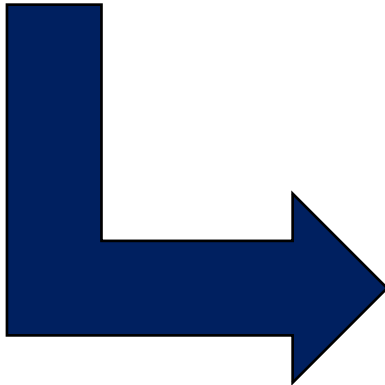
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# Potential Merger Effects I



# Potential Merger Effects II

Adaption of the IV regression:

- Structural model:

$$5. \quad \ln price_i = \alpha_{13} + \alpha_{23} \widehat{Mono\_MFB}_i + \alpha_{33} \widehat{Mono\_FB}_i + \alpha_{43} \widehat{Mono\_others}_i \\ + \alpha_{53} \widehat{Daily\_Freq}_i + X'_i \beta_5 + u_{i3}$$

$$6. \quad \ln price_i = \alpha_{14} + \alpha_{24} \widehat{Duo\_MFB}_i + \alpha_{34} \widehat{Duo\_FB}_i + \alpha_{44} \widehat{Duo\_MFB\_FB}_i \\ + \alpha_{54} \widehat{Daily\_Freq}_i + X'_i \beta_6 + u_{i4}$$

- Monopoly routes which are either served by MeinFernbus or by FlixBus or by neither of them
- Duopoly routes which are served by MeinFernbus or FlixBus only and Duopolies where they meet
- Reference group is markets with more than two providers in both cases

# Potential Merger Effects III

## Results:

	(1) Price per km	(2) Price per km	(3) Price per km	(4) Price per km
Monopoly MeinFernbus	0.160***	0.161***		
Monopoly FlixBus	0.019	-0.002		
Monopoly others	0.324***	0.326***		
Duopoly MeinFernbus			0.358***	0.371***
Duopoly FlixBus			0.311***	0.346***
Duopoly MeinFernbus + FlixBus			0.080***	0.089***
Daily frequency	-0.003***	-0.003***	-0.002**	-0.001***
Day Dummies included		yes		yes
Daytime dummies included		yes		yes
Angrist-Pischke first stage F-Test (1)	375.65	377.83	62.12	62.09
Angrist-Pischke first stage F-Test (2)	21.57	21.39	49.19	49.37
Angrist-Pischke first stage F-Test (3)	36.62	36.08	310.35	307.92
Angrist-Pischke first stage F-Test (Freq.)	518.04	529.35	296.33	302.09
Kleibergen-Paap Wald rk F-Statistic	16.39	16.29	51.48	51.87
Stock-Yogo weak ID test critical values (10%)	11.52	11.52	11.44	11.44
Test of endogeneity	0.0000	0.0000	0.0000	0.0000
# of observations	28,688	28,688	34,959	34,959

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Potential Merger Effects III

## Results:

	(1) Price per km	(2) Price per km	(3) Price per km	(4) Price per km
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# Potential Merger Effects IV

## Robustness check:

	November 2014		January 2015	
	Price per km (1)	Price per km Including Controls (2)	Price per km (3)	Price per km Including Controls (4)
<i>Monopoly routes</i>				
Monopoly MeinFernbus	16.0%***	16.1%***	16.5%***	16.9%***
Monopoly FlixBus	1.9%	-0.2%	34.2%***	35.0%***
Monopoly others	32.4%***	32.6%***	21.5%***	21.9%***
<i>Duopoly routes</i>				
Duopoly MeinFernbus	35.8%***	37.1%***	44.6%***	47.8%***
Duopoly FlixBus	31.1%***	34.6%***	40.7%***	75.9%***
Duopoly MeinFernbus + FlixBus	8.0%***	8.9%***	5.2%***	6.5%***

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



# Potential Merger Effects V

## Pricing behavior of the two merging parties:

- Comparable price premiums in duopoly markets (30 to 40 per cent)
- If the two compete directly in a duopoly price premiums are reduced to 5 to 8 per cent
  - ➔ Direct competition leads to lower prices
  - ➔ Merger would end direct competition on 348 routes, suggesting price increases
- Ex-ante not clear whether they will actually materialize post-merger
  - ➔ Future entry might create downward pressures on price
  - ➔ Realized post-merger efficiencies might partly be passed-on to consumers

# Conclusion

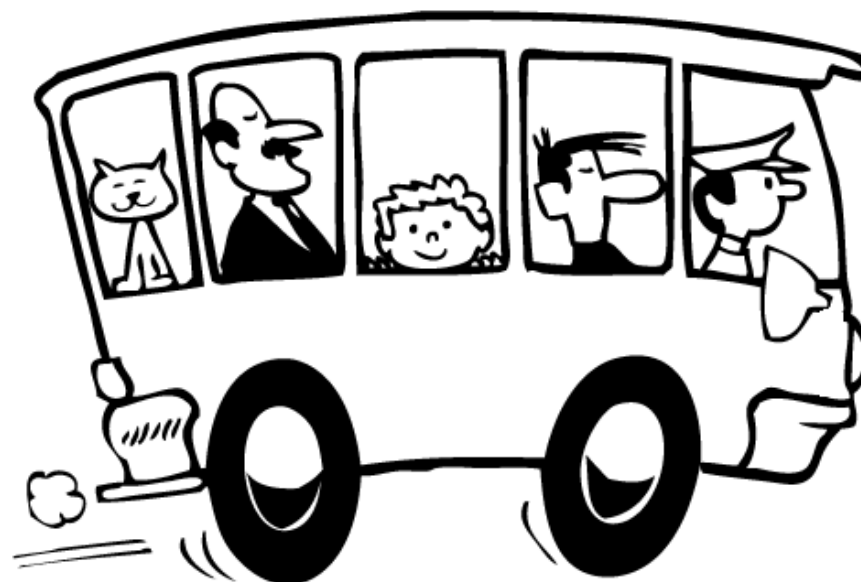
## Key quantitative results:

- Average route-level prices do not only depend on the number of competitors but also on the composition of firms operating on a particular route
- Results suggest short-term price increases on certain route types post-merger
  - ➔ Much more detailed analysis of the relevant antitrust market necessary
  - ➔ Demand- and/or supply-side merger efficiencies
  - ➔ Cost structure of the industry

## Policy implications:

- Potential barriers to entry have to be kept low to fight incentives to increase prices
- Access to existing infrastructure components such as bus stations have to be granted on a non-discriminatory and transparent basis
- The extension of (also road-related) infrastructures should be considered
  - ➔ Market entry and competition in the interurban bus industry will discipline pricing behavior also in adjacent industries such as railways or car sharing agencies (to the degree these modes are seen as close substitutes)

# Thank you for your attention!



# Appendix

## Variation of selected variables:

	Population origin	Population destination	Under 24 years origin	Under 24 years destination	ICE stop	Airport connector
Monopoly	523.1132	490.8703	0.2426	0.2417	0.4472	0.0552
Duopoly	548.7363	569.6048	0.2439	0.2438	0.6913	0.0328
Triopoly	787.4656	778.7168	0.2415	0.2417	0.834	0.0456
Monopoly MFB	581.8598	541.4207	0.2401	0.2387	0.3659	0.3548
Monopoly FB	482.8764	521.2876	0.2427	0.2412	0.6038	0.1887
Monopoly others	440.0675	376.6779	0.2473	0.2412	0.4959	0.1157
Duopoly MFB	489.3029	508.4222	0.2462	0.2458	0.5929	0.0714
Duopoly FB	525.6874	572.9124	0.2485	0.2486	0.6122	0.051
Duopoly MFB+FB	587.9911	603.5104	0.2414	0.2411	0.7528	0.0144
Duopoly others	414.771	414.9212	0.248	0.2508	0.6957	0