

Choosing the Deutschlandticket - Stated and revealed evidence from the year-long panel study “Mobilität.Leben”

Allister Loder

Professorship of Mobility Policy, Technical University of Munich, Germany

Sebastian Goerg

Professorship of Economics, Technical University of Munich, Germany

Extended Abstract

The German transportation system recently underwent a transformation: the government introduced the so-called *9-Euro-Ticket* in June, July, and August 2022 as a response to the 2022 cost-of-living crisis. It allowed for unlimited travel on all local and regional public transportation services in the entire country for just 9 Euro per month. It was cheap and innovative as such a nationwide ticket did not exist before. Many immediately demanded a permanent successor, which has been introduced in May 2023. It is called *Deutschlandticket*, costs 49 Euro per month and is only available as a subscription. Forecasting its demand was widely discussed: the Association of German Transport Companies predicted around 5.6 million new customers in addition to 11 million customers (Verband Deutscher Verkehrsunternehmen (VDV), 2023), while others predicted around 11-12 million customers in total (Krämer, Wilger, and Bongaerts, 2022). As of writing, the current sales numbers are around 11 million customers (Verband Deutscher Verkehrsunternehmen (VDV), 2023). Nevertheless, it can be expected that sales numbers will increase as more companies and authorities start to offer subsidized tickets.

We observed this natural experiment with our year-long panel study “Mobilität.Leben”. It ranged from May 2022 to July 2023 and comprised a six-wave online survey and a smartphone app for semi-passive generation of travel diaries. In total, 3,080 participants were recruited with 1,706 (55.4%) through our own media campaign and 1,374 (44.6%) through a professional panel agency. The first group was primarily recruited from the Munich metropolitan region, while the second group was a representative nationwide sample. Participants recruited through the panel agency did not receive the smartphone app. Considering panel drop-outs, we have 818 participants who completed all relevant questionnaires and 170 participants who tracked their travel behavior continuously throughout the study and completed all six survey waves (Loder et al., 2023).

Our study contains several different measures to obtain **stated preferences** for the *Deutschlandticket*, collected at different points in time:

- Measure 1. Linear scale: Stating maximum willingness to pay on a slider scale from 0 to 250 Euro.
- Measure 2. Ordinal scale: Stating maximum willingness to pay from 9 to 99 Euro in ten-Euro increments, includes a “no ticket” option.
- Measure 3. Discrete choice experiment with various ticket options and a no-ticket choice at different price levels.
- Measure 4. Yes/no question of having or wanting to buy the *Deutschlandticket*.

In the last survey wave, we asked respondents to **reveal** their actual choice of *Deutschlandticket* ownership. Combining stated preferences, the revealed choice, and socio-economic and travel-behavior-related variables allow an in-depth analysis of consumer and travel behavior and to explore the validity of the selected stated preference measures. In this ongoing research, we present our analysis on the willingness to pay for the *Deutschlandticket* and model the two choices of stating interested in the *Deutschlandticket* and buying the *Deutschlandticket*.

In Table 1 we contrast the stated preferences for the *Deutschlandticket* with the revealed choice of *Deutschlandticket* ownership of 508 respondents (we excluded unreasonable respondents and all who had already a public transport season ticket before). We converted Measures 1., 2. and 3. into a yes/no coding to match Measure 4: it is equal to 1 if they indicated a maximum willingness to pay equal or greater than 49 Euro per month, or if they chose at least once the *Deutschlandticket* for 49 Euro or more in the DCE, and 0 otherwise. It should be noted that the maximum willingness to pay is different from explicitly stating interest as well as that the final features of the *Deutschlandticket* were unknown in 2022. Thus, a comparison of the re-coded stated interest with the revealed choice should be taken with care and is expected to contain substantial noise. Nevertheless, we see that the share of respondents stating (no) interest in the ticket and ultimately (not) buying the *Deutschlandticket* increases over time. Still, in 2023, more than 40% of respondents who explicitly indicated interest did not materialize their choice as of summer 2023. When comparing Measures 2 and 3 collected in the same survey, we find that around one third of respondents had contradicting preferences, i.e., having a willingness-to-pay larger than 49 Euro per month, but never selecting a *Deutschlandticket* in the DCE. We attribute these inconsistencies to the different measures and to the then-uncertain *Deutschlandticket* attributes.

Table 1: Revealed preferences for the Deutschlandticket vs. stated Deutschlandticket choice.

		July 2022		Sept. 2022		Sept. 2022		April 2023	
		Willingness-to-pay \geq 49 Euro (Measure 1)		Willingness-to-pay \geq 49 Euro (Measure 2)		Selected Deutschlandticket in DCE (Measure 3)		Stated intention (Measure 4)	
		No	Yes	No	Yes	No	Yes	No	Yes
N=508		N=318	N=189	N=378	N=130	N=365	N=143	N=366	N=142
Deutschlandticket Ownership	No	87.2%	76.2%	87.6%	70.0%	87.7%	71.3%	98.1%	44.4%
	Yes	12.8%	23.8%	12.4%	30.0%	12.3%	28.7%	1.9%	55.6%
		100%	100%	100%	100%	100%	100%	100%	100%

Consequently, we focus for the modeling only Measure 4, the explicitly stated preference to buy the Deutschlandticket; all other measures are expected to provide too much noise resulting from uncertain Deutschlandticket attributes during data collection. We use logit models to explore the stated and revealed choice behavior (Hensher, Rose, and Greene, 2015). Table 2 presents first results. Model 1 is a logit model of stated interest for the Deutschlandticket (1=interest,0=no interest), Model 2 is a logit model of Deutschlandticket ownership (1=ownership,0=no ownership), and Model 3 is the same as Model 2, but it includes stated interest as an independent variable. All models only include respondents not having a season ticket before. Perhaps most interesting is that both outcomes seem to be independent of income, while car ownership has an intuitive negative influence on Deutschlandticket ownership. When including stated interest as an independent variable, its impact becomes intuitively substantial (as it predicts already much of ownership, see Table 1); it makes the previously significant effect of public transport usage insignificant as the information is now most likely carried by the stated interest variable, but it also makes being employed significant. This is intuitive as the Deutschlandticket is particularly attractive for commuters. Still, the large effect size of stating interest in Model 3 requires further investigation.

Table 2: First model estimates for stated interest in the Deutschlandticket and Deutschlandticket ownership. Nine observations are missing due to not reported income.

	Model 1		Model 2		Model 3	
	Stated interest for Deutschlandticket		Deutschlandticket Ownership		Deutschlandticket Ownership	
Weekly public transport usage before 9-Euro-Ticket						
More than 3 days per week	2.270 ^{***}	(3.94)	1.659 [*]	(2.49)	0.0325	(0.04)
2-3 days per week	2.657 ^{***}	(6.10)	2.451 ^{***}	(5.09)	1.009	(1.69)
Once per week	2.113 ^{***}	(5.49)	1.962 ^{***}	(4.33)	0.856	(1.55)
Less than once per week	1.190 ^{***}	(3.88)	1.003 [*]	(2.53)	0.249	(0.51)
Never (base)						
Is male	-0.263	(-1.13)	-0.0838	(-0.31)	0.226	(0.65)
Is employed	-0.233	(-0.88)	0.331	(1.02)	0.830 [*]	(2.05)
Household has at least one car	-0.418	(-1.27)	-0.874 [*]	(-2.55)	-1.027 [*]	(-2.27)
Cycles more than 3 days per week	0.670 ^{**}	(2.75)	0.437	(1.54)	-0.116	(-0.32)
Lives in urban environment	0.465	(1.65)	0.263	(0.77)	0.0279	(0.06)
Monthly net household income						
< 1500 Euro per month (base)						
1500-2500 Euro per month	0.575	(1.20)	0.376	(0.70)	0.0492	(0.07)
2500-4000 Euro per month	0.442	(0.96)	0.115	(0.22)	-0.383	(-0.57)
> 4000 Euro per month	0.700	(1.46)	0.163	(0.30)	-0.573	(-0.82)
Stated interest for Deutschlandticket					3.990 ^{***}	(8.80)
Constant	-2.545 ^{***}	(-4.72)	-2.716 ^{***}	(-4.43)	-3.790 ^{***}	(-4.62)
<i>N</i>	499		499		499	
pseudo <i>R</i> ²	0.177		0.160		0.463	
Log likelihood at convergence	-243.0		-188.6		-120.5	
Log likelihood without	-295.2		-224.6		-224.6	

t statistics in parentheses

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

For the full paper, we will first investigate the different measures of stated preference and try to explain its discordance with the revealed choice using survey data and smartphone-app data. Second, we will develop two-stage models that capture appropriately the self-selection into the group of people being interested in *Deutschlandticket* ownership (e.g., (Terza, Basu, and Rathouz, 2008).

References

- Hensher, D.A., J.M. Rose, and W.H. Greene, *Applied Choice Analysis, Applied Choice Analysis*, Cambridge University Press, Cambridge, 2015.
- Krämer, A., G. Wilger, and R. Bongaerts, 'Das 9-Euro-Ticket: Erfahrungen, Wirkungsmechanismen und Nachfolgeangebot', *Wirtschaftsdienst*, Vol. 102, No. 11, November 30, 2022, pp. 873–879.
- Loder, A., F. Cantner, V. Dahmen, and K. Bogenberger, 'The Mobilität.Leben Study: A Year-Long Mobility-Tracking Panel', *arXiv*, 2308.04973, 2023.
- Terza, J.V., A. Basu, and P.J. Rathouz, 'Two-Stage Residual Inclusion Estimation: Addressing Endogeneity in Health Econometric Modeling', *Journal of Health Economics*, Vol. 27, No. 3, 2008, pp. 531–543.
- Verband Deutscher Verkehrsunternehmen (VDV), 'Deutschland-Ticket: Bundesweiter Vorverkauf Startet', 2023. <https://www.vdv.de/230403-pm-vorverkauf-deutschland-ticket-startet.pdf>.
- , 'Deutschland-Ticket: Zwischenbilanz und Marktforschung', Leipzig, 2023.