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Public Transport Reliability and Season Ticket Ownership: The Case of the Deutschlandticket

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Abstract

This paper provides a systematic analysis of peoples' decision to purchase the Deutschlandticket, identifying primary customer groups and the role of public transport irregularities such as delays and cancellations. It builds on a panel dataset covering survey answers from almost 3000 participants between March and December 2023 and applies a series of binary logit models. The results confirm that the main customer group of the Deutschlandticket consists of younger people and (fulltime) workers. The ticket does not significantly contribute to a modal shift towards public transport, as it is primarily purchased by people who were frequent public transport users or even owners of a season ticket already in the past, whereas car owners refrain from purchasing the ticket. It cannot be confirmed that an increase in public transport reliability could boost ownership of the Deutschlandticket, as the impact of irregularities on the purchase decision is small and limited to specific subgroups.

Keywords: Public transport fares, Ticket purchase decision, Travel surveys, Public transport reliability

JEL classification: D12, R41, R48

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1. Introduction

Ownership of public transport season tickets represents a significant commitment towards this mode of transportation, suggesting that season ticket owners rely on public transport for a large share of their mobility. The introduction of attractive season ticket offers can therefore be an important pillar of policies aiming at increasing the use of public transport and shifting mobility towards more sustainable transport modes. The German government introduced the Deutschlandticket, a monthly ticket allowing for unlimited travel on all local and regional public transport services in Germany at a fixed price of initially 49€ per month (58€ as of 2025), in May 2023 with exactly this goal. However, data collected early on show that the majority of people owning the Deutschlandticket were frequent public transport users or even owned a season ticket already before, and that the share of customers newly attracted to public transport by the ticket is rather low. While socio-economic contexts as well as the availability and reliability of public transport have been mentioned as potential reasons, a systematic analysis of the determinants of peoples' Deutschlandticket purchase decision has not been conducted yet.

This paper addresses this gap by estimating a series of binary logit models, using a survey-based panel dataset covering monthly data of almost 3000 participants from April to December 2023. It analyses the role of socio-economic characteristics and personal travel behaviour in a baseline specification before focusing on the impact of public transport reliability and peoples' experiences of delays and cancellations in an extended model. The baseline specification identifies a significant age gap in Deutschlandticket ownership, which is attributed to the ticket being available only as a digital subscription. The ticket is primarily owned by (fulltime) workers, while we cannot confirm an income effect, suggesting that the ticket does not specifically serve as financial relief for lower-income households. Furthermore, the ticket is primarily purchased by people who were frequent public transport users or even season ticket owners already before its introduction, whereas people with access to a car and people primarily travelling in rural areas generally refrain from purchasing the Deutschlandticket. Overall, we find little evidence that the Deutschlandticket reached the goal of attracting new public transport customers and supporting a modal shift away from cars.

A potential reason and subject of an ongoing public debate is that public transport in Germany is generally perceived as unreliable. Caused by a multitude of factors, delays, cancellations, and other irregularities are encountered by users across the country on a regular basis, deterring potential new customers and working against the intended modal shift towards public transport. An extended model specification addresses this point, analysing how the experience

of irregularities in public transport trips affect the Deutschlandticket purchase decision in future months. It is found that the reliability of public transport has little impact on season ticket ownership, with significant effects being limited to specific cases. Public transport users experiencing delays on all public transport trips slightly tend to refrain from purchasing the Deutschlandticket in the future, whereas we find no effect for people at least occasionally having trips without irregularities. The analysis does therefore not confirm that more people purchased the Deutschlandticket if public transport were more reliable, even though reliability could be relevant for other decisions in the context of mobility behaviour.

The remainder of the paper is organised as follows. Section 2 summarises the findings from available research. Section 3 explains the methodological approach and derives the specification of the logit model. Section 4 discusses the data used for the analysis. Section 5 presents the empirical results for the mentioned model specifications. Section 6 draws conclusions and describes approaches for further research.

2. Literature Overview

This paper builds on previous research of multiple strands and connects them in a novel way. First, some early work on the owners and mobility effects of the Deutschlandticket and its predecessor, the 9-Euro ticket, has been published. Second, various existing studies analyse peoples' public transport ticket choice, accounting for both short-term and season tickets. Third, the role of public transport reliability for mode choice and other mobility decisions is discussed in multiple publications.

The majority of the existing work focusing on the Deutschlandticket analyses its modal shift effects based on surveys (stated preference approach, SP). While comprehensive overviews of these studies are provided in Gaus & Link (2025) and Koch et al. (2025), the general conclusion is that the Deutschlandticket has contributed to a growth in public transport use, but the size as well as the attribution of modal shift and induced demand vary significantly between studies. The two largest studies, VDV & DB (2024) based on survey data and Koch et al. (2025) using cell phone tracking data, estimate a total increase of public transport trips of 25% and 34%, respectively, which is significantly higher than most other studies.

Nationwide studies analysing the ownership of the Deutschlandticket are still missing, but particular regions have been examined. Krämer & Korbutt (2023) analyse data for the greater Hamburg area and find that 28% of the people living in this area own a Deutschlandticket (compared to 17% for entire Germany). It must be noted that the hvv as the responsible transit authority abolished the majority of its other season tickets with the introduction of the

Deutschlandticket, essentially forcing existing season ticket owners into the Deutschlandticket. In addition, the Deutschlandticket ownership share is generally higher in urban areas (Helferich et al, 2024). Consequently, 64% of the Deutschlandticket owners in the hvv area are previous season ticket owners, and only 4% did rarely use public transport before the introduction of the ticket (Krämer & Korbutt, 2023). In a similar study for the greater Frankfurt area, Bongaerts et al. (2023) find that 50% of potential Deutschlandticket customers[1] are previous season ticket owners. In addition, 13% of the participants of this study plan to keep other season ticket options. Overall, these descriptive analyses point out two aspects of the Deutschlandticket: On the one hand, a large share of its owners are previous season ticket owners. On the other hand, the ticket is purchased by people who already used public transport on a regular basis, but not often enough for a season ticket to pay off, due to its lower price point than previously available season tickets.

As part of the research project "Mobilität.Leben", Loder et al. (2024) present a systematic analysis of Deutschlandticket ownership in the greater Munich area applying a binary logit model. Based on 386 observations of combined survey and tracking data, they find that socio-economic characteristics generally have little impact on people's decision to purchase the Deutschlandticket, with the exception of employed and retired participants being more likely to own the ticket. Instead, the decision depends primarily on mobility patterns: Participants with a higher average public transport distance per day are more likely to purchase a Deutschlandticket, whereas higher car use decreases the ownership probability.[2]

While Loder et al. (2024) as well as this paper apply a binary logit model to analyse the purchase decision of a specific season ticket, existing research commonly approaches public transport ticket purchase decisions on a more general basis, modelling peoples' choice between multiple types of tickets. The majority of these studies apply multinomial logit models (e.g., van den Berg et al., 2008) or related approaches such as nested logit (Püschel et al, 2023) and mixed logit (van den Berg et al., 2008) models. A long-term perspective is presented by Beige & Axhausen (2008), analysing mobility decisions such as car and season ticket ownership during the life course for a Swiss dataset. In a similar fashion, Scott & Axhausen (2006) as well as Becker et al. (2017) connect the purchase of public transport season tickets with car ownership and access to other modes of transport. Overall, the existing research confirms that mobility decisions are interrelated and require a comprehensive framework. On the one hand, strong substitution effects exist between modes of transport. On the other hand, there is significant

[1] This study asked people about their plans of purchasing a Deutschlandticket instead of actual ownership.
[2] It must be noted that the model does not control for the inherent endogeneity of these variables, as ownership of a season ticket commonly leads to higher public transport usage due to the non-existent marginal trip costs.

heterogeneity among individuals and groups with respect to the utility obtained from particular characteristics of each option such as the price or validity limitations of public transport season tickets.

Another aspect that has been identified as a determinant of peoples' mobility choices in previous research is the reliability of transport modes. A multitude of studies find that a higher travel time reliability increases the chances of a mode being chosen, with particular emphasis on public transport. Examples include Sweet & Chen (2011) for the greater Chicago area, van Loon et al. (2011) for the Netherlands, and Wardman & Batley (2014) for the British railway market. Cantwell et al. (2009) find that unreliable public transport has a strong impact on peoples' commuting satisfaction and can lead to changes in commuting mode choices, while Chakrabarti (2017) confirms this relationship for both public transport and car trips. Soza-Parra et al. (2021) identify that public transport users in Santiago even prefer reliability over speed, being willing to face longer travel times for service regularity, whereas Ehreke et al. (2019) find that travellers in Germany value travel time slightly higher than reliability. Despite the evidence for the impact of public transport reliability on mode choice and public transport usage, very little research analyses how irregularities hinder the sales and ownership of season tickets. This lack of research is apparent in the context of the Deutschlandticket: While the unreliability of public transport, caused by ill-maintained infrastructure and capacity limits, is the subject of constant public and political debates in Germany (e.g., Wieland et al., 2023), scientific evidence on its effects is scarce. This paper addresses this gap with an analysis of the effects of experienced public transport irregularities, such as delays and cancellations, on subsequent Deutschlandticket purchase decisions.

3. Methodology

As the previous chapter points out, existing research analyses peoples' public transport ticket choice using multinomial logit models. In this approach, the choice is commonly explained by characteristics of the ticket, such as its price and validity period and area. However, the Deutschlandticket – which is available for everyone with identical price and validity characteristics – has sparked the discussion what determines whether people buy it or not. Specifically, the question whether certain groups of people benefit particularly and are more likely to buy it than others is subject to ongoing research. Consequently, this paper models the decision of people to purchase the Deutschlandticket or not in a binary logit model similar to the revealed choice model in Loder et al. (2024), aiming at identifying factors that influence this decision.

The analysis applies a two-step procedure, starting with a baseline specification followed by a model focusing on public transport irregularities.

3.1. Baseline Specification

As the Deutschlandticket is available for everyone with identical characteristics, personal factors must be the primary determinant of the purchase decision. Two sets of such variables are considered in the baseline model presented in this paper: socio-economic characteristics and travel behaviour. For the socio-economic characteristics, five variables are included in the model based on a previous analysis of the 9-Euro ticket (Gaus et al., 2023) and other literature (cf. Chapter 2). First, we assume that the Deutschlandticket purchase behaviour differs between age groups, considering that the ticket is available only as a digital subscription, and include an age group variable, *Age*, with age groups based on the German Socio-economic Panel (SOEP, 2022) in our model. Second, the previous analysis showed a clear income effect of the 9-Euro ticket, particularly benefitting lower-income households due to its very low price. To find out whether the Deutschlandticket has a similar effect, we include a household income variable, *HHInc*. Third, we use the number of people in the household, *HHSize*, as an explanatory variable, expecting that people living in larger households face different mobility alternatives and restrictions (e.g., shared cars). Fourth, we account for peoples' occupational status, *Status*, as peoples' mobility patterns (e.g., commuting) and purchase decisions differ strongly depending on their employment status (cf. MiD, 2025). In addition, the Deutschlandticket is also available as a so called "Jobticket", an employer-subsidised public transport ticket, with many employers. Fifth, we control for gender in a dummy variable, *Male*.

Travel behaviour and the availability of certain modes of transport are major determinants of peoples' public transport ticket choice. Consequently, we include up to six transport-related variables in our baseline models. It is easily understood that people without access to public transport are less likely to purchase not only the Deutschlandticket, but any kind of public transport ticket. We therefore include a dummy variable describing whether people state to have access to regional public transport or not, *AvailPT*. Similarly important is the availability of alternative modes of transport, primarily cars. The respective variable included in the model, *AvailCar*, differentiates between no car access, access to a privately owned car as a passenger, access to a privately owned car as a driver, and access to a company car. Two variables identify the environment people travel in: The primary region type, *PRT*, defines whether a person conducts the majority of their trips in urban or rural areas or in a mixture of the two, and *intNUTS3* provides information on the share of trips that cross a county (NUTS3) border. This variable is

included to account for the complexity of German public transport pricing outside of the Deutschlandticket: Crossing county borders often means transferring from one public transit authority to another, which can come with a significant ticket price increase. The Deutschland-ticket could thus be particularly useful for people doing this on a regular basis. For simplicity, the variable is defined as a dummy describing whether a person's share of multi-county trips is above the median of all participants. Finally, it can be assumed that the Deutschlandticket is primarily bought by regular public transport users, which are likely to have owned a season ticket already before May 2023. However, owning a Deutschlandticket decreases the marginal costs of a public transport trip to zero, making it more likely for owners of the ticket to choose public transport for their trips. To account for this two-way causality, two variables are included in the model: *PTApr* describes the individuals' modal share of public transport in April 2023 (i.e., before the introduction of the Deutschlandticket), and *SeasApr* identifies whether a person owned a season ticket before the Deutschlandticket was available.

Including all mentioned explanatory variables in a binary logit model of the form

$$P(Y_i = 1|X_i) = \frac{e^{\beta_0+\beta X_i}}{1+e^{\beta_0+\beta X_i}} \tag{1}$$

our baseline specification is defined by

$$\begin{aligned}\beta X_i = \beta_1 Age_i + \beta_2 HHInc_i + \beta_3 HHSize_i + \beta_5 Status_i + \beta_5 Male_i + \beta_6 AvailPT_i + \\ \beta_7 AvailCar_i + \beta_8 PRT_i + \beta_9 intNUTS3_i + \beta_{10}\log(PTApr_i) + \beta_{11} SeasApr_i\end{aligned} \tag{2}$$

As can be seen, all variables are time-constant and individual-specific. Consequently, the model is estimated as a cross-sectional model using GLM in R. However, as our original data has an unbalanced panel structure (cf. chapter 4), the baseline model is estimated using a cross-sectional subset. For this subset, one random observation (i.e., month) is drawn for each individual in order to give equal weights to all individuals. For a comparison with the subsequent panel-based public transport reliability specification, the model is also estimated using the full panel dataset (using PGLM in R).

3.2. Public Transport Reliability Model

As chapter 2 points out, the German public transport system is subject to significant reliability issues, particularly measurable in terms of delays and cancellations. While this is likely to influence peoples' trip-specific mode choice, it can be expected to also decrease the need for and use of a season ticket such as the Deutschlandticket. The second part of the analysis therefore expands the baseline model by adding further explanatory variables covering public transport reliability. An assumption underlying this analysis is that peoples' decision whether to purchase

a Deutschlandticket is not based on objective reliability measures, but on their own, subjective experience. This controls for unreliable lines existing also in otherwise reliable networks, which can be difficult to measure but can be expressed by the individual using the respective line. Similarly, regular public transport users might experience or perceive delays and cancellations in a different way than occasional users. To cover such aspects in the model and identify how the experience of irregularities affects Deutschlandticket ownership, two separate model approaches are applied.

The first approach adds additional reliability measures as explanatory variables to the baseline specification. Two different definitions are used:

$$\beta X'_{it} = \beta X_i + \beta_{12_a} IrregPT_{it-1} \tag{3}$$

$$\beta X''_{it} = \beta X_i + \beta_{12_b} DelayPT_{it-1} + \beta_{12_c} CancPT_{it-1} \tag{4}$$

IrregPT in equation (3) captures how often people state to encounter any kind of irregularity in their public transport trips, including delays, cancellations, replacement service, and shuttle service and differentiating between "never", "barely", "sometimes", "often", and "always". As the occurrence and effect of replacement and shuttle services is considerably lower than that of delays and cancellations, equation (4) focuses on the individual effects of these two types of irregularities. Both specifications are formulated as panel models using the reliability experiences made in the previous month as an explanatory variable.[3] To still account for the time-constant personal characteristics of the baseline model, a random-effects estimator is applied. In addition, the model is estimated using the full available sample as well as using the subsample of regular (at least weekly) public transport users.

The second approach builds on the hypothesis that regular public transport users react differently to irregularities than less frequent users. It accounts for this potential relation by including an interaction term between the frequency of irregularities and the frequency of public transport usage:

$$\beta X'''_{it} = \beta X_i + \beta_{12_d} IrregPT_{it-1} FreqPT_{it-1} \tag{5}$$

$$\beta X''''_{it} = \beta X_i + \beta_{12_e} DelayPT_{it-1} FreqPT_{it-1} + \beta_{12_f} CancPT_{it-1}\, FreqPT_{it-1} \tag{6}$$

FreqPT in this specification measures how often people report to use public transport, differentiating between at least weekly users and less frequent users. The overall approach thus

[3] A lag of two months has been tested, but provides similar findings and is therefore not presented.

allows identifying how personal characteristics, travel behaviour, and the experience of irregularities in public transport influence the decision to purchase a Deutschlandticket.

4. Data

This chapter presents the data sources used for the analysis as well as a descriptive overview of the dataset. As the general survey dataset is the same as the one used and presented in Gaus & Link (2025), the descriptive parts focus on the ownership of the Deutschlandticket and the participants' experiences of public transport irregularities.

4.1. Data Sources & Sample Characteristics

The main dataset used for the analysis presented in this paper stems from a survey conducted by the market research company *GIM Gesellschaft für innovative Marktforschung*. The roughly 5,000 participants of their online panel GIM Traces were representatively drawn from the German population by age, gender, household size and region and have agreed to install a smartphone app for small-scale surveys (which can also be answered on other devices such as a PC) and geolocation tracking. Three survey waves were conducted in June, September, and December 2023, respectively. These surveys aimed at collecting information on socio-economic characteristics (age, gender, education, household income, household size, number of children), travel behaviour, availability of transport modes (possession of a car, bike, motorcycle, etc.; access to public transport), and possession of public transport discount cards and season tickets including the Deutschlandticket (cf. chapter 4.2). In addition, participants were asked about experienced delays and cancellations[4] specifically on their last public transport trip as well as generally during their public transport trips in the respective months (cf. chapter 4.3). Each wave focused on the current month and the two previous months (e.g., the survey in September asked questions about July, August, and September), so that the overall dataset covers monthly data from April 2023 (i.e., the month before the introduction of the Deutschlandticket) to December 2023. In total, 2,920 individuals responded to at least one of the three survey waves (1,007 to all three waves), providing data on the time-constant characteristics and month-specific information for at least three months.

In addition to the survey data, we collected data on 3.97 million trips conducted by a total of 5,317 GIM Traces participants between April and December 2023. While more information on this dataset and its processing can be found in Gaus & Link (2025), the included variables cover the start and end locations and time, distance and duration travelled, transport mode

[4] We also asked for replacement and shuttle traffic, but find that these play less of a role.

Table 1: Socio-economic characteristics of sample at different stages of data processing

	Unbalanced panel[1]	Unbalanced with trips	Balanced panel[2]	Balanced with trips	SOEP (2022)[3]
Individuals	2920	2157	1007	962	32,022
Of these: no consistent routes	763	0	45	0	-
Answered surveys	6536	5560	3021	2886	-
Total observations	19,608	16,680	9063	8656	-
Age (mean)	47.49	47.92	50.64	50.58	44.0
Gender (% male)	50.12	50.69	54.42	54.68	50.6
Household size (mean)	2.43	2.42	2.29	2.30	3.13
Occupation (%)					
Full-time worker	55.60	56.16	54.45	54.40	38.6
Part-time worker	16.39	16.14	16.29	16.67	19.1
Education[4]	4.88	4.65	2.78	2.81	3.4
At home/not occupied	8.61	8.39	8.08	7.87	24.8
Retired	14.51	14.65	18.40	18.26	13.9
Income groups (%)					
<1000€	6.57	6.32	5.79	5.58	5.2
1000-2000€	18.45	18.72	19.20	18.85	18.0
2000-3000€	25.83	25.75	25.98	25.95	21.4
3000-4000€	20.37	20.32	20.39	20.79	17.5
>4000€	20.84	20.75	21.42	21.90	30.9
NA	7.94	8.14	7.22	6.93	7.0
Car availability (%)					
None	7.70	7.48	8.37	8.18	-
Private as passenger	8.26	7.98	8.37	8.25	-
Private as driver	65.97	66.39	66.27	66.25	-
Company car	18.07	18.16	16.98	17.33	-
Public transport availability (%)	83.91	84.13	83.48	83.71	-
With Deutschlandticket (%)	17.32	16.98	17.29	16.89	-
With season ticket in April (%)[5]	6.89	6.95	6.65	6.86	-
Public transport share (mean, %)[6]	-	17.59	-	18.31	-
PT share in April (mean, %)[7]	-	16.32	-	16.99	-
Primary Region Type (%)[6]					
Urban	-	41.47	-	41.37	-
Rural	-	44.87	-	44.80	-
Mixed	-	13.65	-	13.83	-

Notes: [1] Individuals who participated in at least one survey wave.- [2] Individuals who participated in all 3 survey waves.- [3] Sample consists of individuals older than 15 years.- [4] School, university, apprenticeship, job training.- [5] Only available for people participating in the first survey wave.- [6] Only available for people with consistently tracked trips.- [7] Only available for people with consistently tracked trips in April.

(walk, bicycle, car, public transport), and trip purpose (work/education, food/drink, shopping, leisure). These data were used to determine the participants' public transport share (km travelled in public transport divided by km travelled overall) and primary region type, differentiating between urban and rural regions based on the Thünen institute classification (Küpper, 2016).

For this, the region types of all start and end locations of a person were combined. If at least 75% of the locations were in one region type, the person was identified as travelling primarily in this region type; otherwise, the person was classified as a mixed region type traveller.

Table 1 presents the socio-economic characteristics of four different stages of our data processing and of the SOEP (2022). The first column refers to the full survey sample, including all participants that answered at least one survey wave. The second column restricts this sample to those participants that have a least one consistent trip in the tracking data. The third column represents the balanced sample of participants that answered all three survey waves. The fourth column again restricts this sample to participants with valid GPS tracking data. While we refer to Gaus & Link (2025) for a more detailed discussion of the data processing and the various stages of the dataset, we find the distortions in our dataset to be acceptable, particularly with respect to the differences caused by participants without consistent GPS tracking information.

4.2. Deutschlandticket Ownership

This chapter provides a descriptive analysis of the panellists' decision to purchase a Deutschlandticket based on the sample of participants that answered at least one survey and had consistently recorded trips (second column of Table 1). This dataset consists of 5560 answered surveys by 2157 participants, covering a total of 12,526 Deutschlandticket purchase decisions.

Throughout our observation period, between 15% and 19% of all participants owned a Deutschlandticket each month, with a steady increase from May to December 2023. This is in line with the notion that the fare intervention took some time to gain traction, particularly to attract non-season ticket holders: Starting May 1st, most existing season tickets were automatically changed into the Deutschlandticket, meaning that almost all season ticket holders were now owners of the new ticket. New customers were required to register for the subscription model of their regional transport company, which in some cases was reported to be rather complex. In addition, the ticket was subject to initial uncertainty due to the short time between the political decision to introduce the ticket and its market start. Consequently, a large share of previous non-season ticket holders purchased the Deutschlandticket in June or later months.

Nevertheless, Deutschlandticket ownership appears to be a one-time decision for many people: 46% of the participants that purchased the ticket at one point in time kept it for the remainder of the observation period. 22% of the purchasing panellists tried the ticket only in one or two months, before cancelling their subscription again, while one third of the Deutschlandticket customers switch between purchasing and not purchasing the ticket on a regular basis despite the additional effort of having to cancel and re-register for a subscription.

Table 2: Deutschlandticket ownership share by socio-economic characteristics (%)

Gender		**Occupation Status**	
Male	18.39	Full-time working	19.75
Non-male	15.54	Part-time working	15.24
Age Group		Education	33.10
<31	25.93	Non-working	11.44
31-45	16.02	Retired	7.17
46-55	18.49	**Availability**	
56-65	16.15	No car	35.48
>65	9.14	Private car as passenger	28.88
Income Group		Private car as driver	13.55
<1000	19.13	Company car	16.25
1000-2000	17.18	Regional public transport	19.65
2000-3000	17.22	No regional public transport	3.52
3000-4000	16.64	**Primary Region Type**	
>4000	16.25	Urban	24.85
NA	16.79	Rural	7.66
		Mixed	23.60

Furthermore, the data show that a significant number of participants held their non-Deutschlandticket season tickets despite the new offer: Between June and December, 25% to 29% of the panellists owning a ticket valid throughout the entire month owned an alternative ticket instead of the Deutschlandticket. Even if owners of the Bahncard 100 (which also grants access to long-distance trains) and student tickets (which are not freely chosen) are left out, 20% chose a “normal” monthly or yearly subscription instead of the Deutschlandticket. While this is in line with previous findings (e.g., MiD, 2025), an explanation could be that alternative tickets offer additional benefits in some regions, such as free transport of bikes or other people during certain times of the week.

While the overall share of participants purchasing the Deutschlandticket is rather constant over time, there are significant differences between subgroups of the sample. Table 2 presents the ownership shares differentiated by various socio-economics characteristics. It shows a clear decline in ownership with increasing age, from 26% of people under the age of 31 to 9% of the participants above 65 years of age. This corresponds to a similar decline by occupational status, even though it must be noted that the age distribution and the occupational status groups do not necessarily coincide: 19% of the people above 65 years of age are still working (10% full-time, 9% part-time), and only 36% of the people under 31 years are in education. The two variables thus tell similar, but not identical stories. In contrast to the 9-Euro ticket, which was the predecessor of the Deutschlandticket in the summer of 2022 (cf. Gaus et al., 2023), the data do not show much of an income effect of the Deutschlandticket: Across all income groups, the purchase share is between 16% and 19%, suggesting that the offer is not particularly beneficial for

or purchased by people of specific income groups. Based on this finding, it is questionable whether the Deutschlandticket serves as a financial relief for poorer households or allows these mobility they could not afford before.

Large variation is found with respect to access to transport modes and the primary region type. On the one hand, it is unsurprising that very few people without access to regional public transport purchase a Deutschlandticket. On the other hand, the data underline the importance of public transport for people without a car. 35% of the participants without access to a car as a driver or a company car purchased a Deutschlandticket, even though only 14% of them were season ticket owners in April (i.e., before the introduction of the Deutschlandticket; compared to 7% of people with access to a car). However, it should be noted that this affects only a small fraction of all participants, as the large majority has access to a car (cf. Table 1). In addition, there are large differences between region types. While almost one out of four participants travelling at least occasionally in urban areas holds a Deutschlandticket, the share for panellists travelling primarily in rural counties is only 8%. This is not necessarily caused by poor public transport access: 78% of the primarily rural travellers state that they have access to regional public transport. However, 88% of them also have access to a car (as driver or company car), compared to 79% of people travelling primarily in urban areas. It is therefore reasonable to assume that the availability and habituation of car usage plays at least as much of a role for the lower share of Deutschlandticket owners in rural counties as public transport connectivity does.

4.3. Public Transport Irregularities

As described in chapter 4.1, we also asked the survey participants about delays, cancellations, and other irregularities they experienced during public transport trips. While these data can provide insights into multiple aspects of peoples' mode choice and mobility behaviour, they can also contribute to explaining ticket purchase decisions, assuming that negative experiences can drive people away from regular public transport usage and the purchase of season tickets.

Table 3 provides an overview of the responses on the questions on general public transport irregularities, differentiating between regular (at least weekly) and occasional public transport users. It shows that roughly half of the participants experience public transport irregularities on a regular basis (at least "sometimes"), with delays being slightly more common than cancellations. In addition, regular public transport users seem to experience delays and cancellations more often than less frequent users, with a particular difference in the share of users never experiencing issues. A further analysis (not shown here) shows that the shares are very

stable over time, with little differences between months. A Spearman coefficient of 0.73 implies a positive correlation between delays and cancellations.

The data furthermore point out that the frequency of public transport irregularities is related to multiple socio-economic characteristics: On the one hand, the data show a decrease of irregularities with increasing age, suggesting that older people are less often affected by delays and cancellations than younger participants. An explanation for this observation is that older travellers are more risk-averse and plan their trips in order to minimize the danger of interruptions, achieving a share of 52% of participants above 65 to "never" experience delays and 61% to "never" experience cancellations. On the other hand, male participants report more often to "rarely" experience delays (and less often to "often" encounter them) than the non-male group, while the frequency of other disturbances does not show gender-specific differences. A potential reason could be differences in the perception of delays, which could also explain a relation between public transport delays and car ownership: Car owners (15.66%) – and even more pronounced owners of a company car (16.94%) – report more often to encounter irregularities on regular basis ("often" or "always") than participants without access to a car (12.72%). Since these participants could avoid using delayed public transport by using their car instead, it is unlikely that car owners are indeed more often affected by public transport irregularities than people without a car. Instead, it seems likely that car owners perceive and remember delays in a stronger way due to the availability of an alternative. While this is not the focus of this paper, it suggests a course for further research to get a better understanding of peoples' mode choice and the role of public transport reliability.

Table 3: Frequency of public transport irregularities (% of participants)

Delays	Never	Rarely	Sometimes	Often	Always
Occasional users	39.74	26.89	20.57	9.58	3.21
Regular users	21.15	28.26	32.35	15.63	2.61
All	29.32	27.66	27.18	12.97	2.87
Cancellations					
Occasional users	55.28	19.66	16.54	7.08	1.43
Regular users	30.20	26.85	28.28	12.73	1.94
All	41.22	23.69	23.13	10.25	1.72
Any irregularities[1]					
Occasional users	32.48	21.46	22.16	15.87	8.03
Regular users	16.13	21.42	31.63	23.57	7.25
All	23.31	21.44	27.47	20.19	7.59

Notes: [1] Includes delays, cancellations, replacement service, and shuttle service.

5. Estimation Results & Discussion

This chapter presents the estimation results. It follows the distinction between a baseline specification and a model incorporating public transport reliability as discussed in chapter 3.

5.1. Baseline Specification

The estimation results of all baseline models are presented in Table 4. As can be seen, three cross-sectional models with increasing sets of explanatory variables and a decreasing sample size are estimated. The reason for this trade-off is that the additional explanatory variables impose additional data requirements that are not fulfilled by the entire sample: While the set of variables used in model 1 requires only participation in at least one survey wave, model 2 (with additional variables *PRT* and *intNUTS3*) faces the additional requirement of at least one consistently tracked trip. The additional variables *PTApr* and *SeasApr* in model 3 rely on survey and tracking data from April, respectively, limiting the sample further to participants providing this information. Finally, model 3 is also estimated as a panel model using the full (unbalanced) panel presented in column 2 of Table 1 (limited to participants with the required information in April).[5] It should be kept in mind that this is essentially a weighting approach, giving higher weight to individuals that answered more survey waves, as the explanatory variables are time-constant for each individual (with few exceptions).

In line with the descriptive findings, the estimation results point out that the probability of an individual owning a Deutschlandticket decreases with increasing age. The cross-sectional models find this relation to be statistically significant only in some cases (particularly in model 1), whereas the panel model finds that participants above 55 years of age are significantly less likely to purchase the ticket than people below 31. As mentioned before, a reason could be that the Deutschlandticket is available only as a digital subscription, while 53% of people above 65 years do not own a smartphone (Bitkom, 2021), imposing significant difficulties for these people to purchase the ticket.

In contrast to the 9-Euro ticket (Gaus et al., 2023), the Deutschlandticket does not seem to have an income effect. Across all specifications, the household income is not related to the probability of owning a Deutschlandticket, suggesting that the ticket is not particularly beneficial for specific income groups. The same holds for the household size, with no significant relation between the size of the household a person lives in and the person's probability of owning a Deutschlandticket. The results do therefore not support the notion that the

[5] Due to some incomplete surveys and inconsistent data points, the number of observations in the estimated models is slightly lower than in the descriptive analysis and Table 1.

Table 4: Estimation results of the baseline specification

	Cross-Sectional Models			Panel-Model
	Model 1	**Model 2**	**Model 3**	
(Intercept)	-1.53 ***	-1.49 ***	-0.78	2.19 ***
	(0.39)	(0.50)	(0.75)	(0.70)
Age.31-45[a]	-0.38 **	-0.16	0.23	-0.03
	(0.17)	(0.22)	(0.37)	(0.37)
Age.46-55[a]	-0.24	-0.09	0.16	0.26
	(0.18)	(0.23)	(0.40)	(0.38)
Age.56-65[a]	-0.47 **	-0.20	0.08	-1.08 **
	(0.20)	(0.24)	(0.41)	(0.45)
Age.>65[a]	-0.45	-0.36	-0.07	-2.55 ***
	(0.31)	(0.39)	(0.58)	(0.58)
HHInc.€1000-2000[b]	-0.15	-0.02	0.27	-0.81
	(0.23)	(0.28)	(0.43)	(0.52)
HHInc.€200032000[b]	-0.11	0.03	0.27	-0.92
	(0.23)	(0.29)	(0.43)	(0.54)
HHInc.€3000-4000[b]	-0.02	0.14	0.31	-0.17
	(0.25)	(0.30)	(0.45)	(0.57)
HHInc.>€4000[b]	-0.14	-0.14	0.31	-0.27
	(0.26)	(0.32)	(0.47)	(0.55)
HHInc.NA[b]	-0.09	-0.22	-0.09	-1.77 ***
	(0.27)	(0.34)	(0.53)	(0.63)
HHSize	-0.05	-0.02	-0.06	0.05
	(0.05)	(0.06)	(0.09)	(0.10)
Status.Parttime[c]	-0.18	-0.23	-0.29	-1.06 ***
	(0.16)	(0.19)	(0.30)	(0.31)
Status.Education[c]	0.21	0.60 **	0.07	-0.91
	(0.23)	(0.28)	(0.50)	(0.54)
Status.UnemplHouse[c]	-1.14 ***	-0.96 ***	-0.73	-3.00 ***
	(0.24)	(0.29)	(0.44)	(0.49)
Status.Retired[c]	-1.03 ***	-1.05 ***	-0.53	-3.00 ***
	(0.25)	(0.31)	(0.43)	(0.45)
Male.TRUE	0.24 **	0.19	0.19	-0.46 **
	(0.11)	(0.13)	(0.20)	(0.22)
AvailRegPT.TRUE	2.03 ***	1.91 ***	1.13 *	0.74 **
	(0.27)	(0.33)	(0.49)	(0.30)
AvailCar.Passenger[d]	-0.51 **	-0.27	0.34	0.42
	(0.21)	(0.26)	(0.40)	(0.39)
AvailCar.Driver[d]	-1.51 ***	-1.34 ***	-0.32	-0.68 **
	(0.18)	(0.22)	(0.34)	(0.31)
AvailCar.Company[d]	-1.53 ***	-1.51 ***	-0.26	-1.27 ***
	(0.21)	(0.26)	(0.40)	(0.36)
PRT.rural[e]		-1.20 ***	-0.86 ***	-1.76 ***
		(0.20)	(0.31)	(0.42)
PRT.urban[e]		-0.11	-0.15	0.01
		(0.18)	(0.27)	(0.36)
intNUTS3.TRUE		-0.02	-0.09	0.22
		(0.14)	(0.21)	(0.28)
log(PTApr)			0.55 ***	1.97 ***
			(0.07)	(0.12)
SeasApr.TRUE			-0.71 **	-2.42 ***
			(0.34)	(0.32)
Sigma				5.58 ***
				(0.29)
N	2864	2105	1051	6650
Pseudo R2	0.15	0.21	0.28	-

Notes: ***, **, and * denote significance at the 99, 95, and 90% level, respectively.- Standard errors in parentheses.- Reference categories: [a] Age.<31; [b] HHInc.<€1000; [c] Status.Fulltime; [d] AvailCar.None; [e] PRT.mixed.

Deutschlandticket can particularly support the mobility of larger or lower-income households or can increase the public transport usage of these households.

The occupational status of the participants has a clear impact on their probability of owning a Deutschlandticket. Across all specifications, people that are not fulltime employed are less likely to own the ticket than fulltime workers, with a particularly strong (and statistically significant) difference for non-employed and retired participants. This is a clear hint that the Deutschlandticket is often used for commuting trips by people who use public transport on a regular basis (and are likely to have done so already before the introduction of the ticket). Despite the high share of people in education owning the ticket (cf. chapter 4.2), the estimation results are unclear about this group: While all three cross-sectional model find a positive relation, only model 2 finds a significant effect, and the panel model provides an insignificant negative coefficient. A reason for this could be that a large share of the education-related public transport tickets (i.e., tickets provided by schools and universities) were turned into Deutschlandtickets only with the start of the school year in September or the start of the university year in October.

As expected, the availability of transport modes is a major determinant of peoples' Deutschlandticket purchase decision. On the one hand, access to regional public transport increases the probability of owning a Deutschlandticket significantly. On the other hand, participants with access to a car are significantly less likely to purchase a Deutschlandticket. In line with previous findings (cf. Gaus et al, 2023; Guajardo Ortega & Link, 2025), the introduction of new public transport tickets or lower prices is not sufficient to attract people owning and regularly using a car into higher public transport usage. However, it must be noted that there are differences between types of car availability: While there is little difference between access to a private car as a driver and access to a company car, the availability of a car as a passenger has less of an impact on the decision to not purchase a Deutschlandticket. When controlling for the region type people primarily travel in (models 2-4), participants that can use a car as a passenger are not significantly less likely to purchase a Deutschlandticket than those that do not have access to a car at all. The decision to purchase the ticket and use public transport can thus be seen as a decision for individual and independent mobility without requiring someone else as a driver.

Another major determinant of the purchase decision is the region type people primarily travel in. Even when controlling for public transport availability, the ticket is primarily bought by participants who travel at least regularly in urban areas. While the purchase probability of people with mixed type travel behaviour and people with urban travel behaviour does not

significantly differ, participants that travel primarily in rural areas are significantly less likely to own a Deutschlandticket in all specifications. However, the results do not confirm that the ticket is particularly interesting for people crossing county borders (and thereby switching from one public transport authority to another) on a frequent basis.

Finally, the travel behaviour before the introduction of the Deutschlandticket is found to play an important role for the purchase decision. The mode share of public transport in April is statistically significantly related to the probability of owning a Deutschlandticket, suggesting that the ticket is primarily bought by people that used public transport on a regular basis already before the ticket was available. Nevertheless, it is found that people who owned a season ticket in April are less likely to purchase a Deutschlandticket. While this seems counterintuitive on first sight, it is important to note that there is a positive correlation (Spearman coefficient 0.19) between the ownership of a season ticket in April (*SeasApr*) and the share of public transport in April (*PTApr*).[6] As our specification uses both explanatory variables, the negative relation between season ticket ownership in April and ownership of the Deutschlandticket is found under the ceteris paribus assumption (i.e., holding the public transport share constant). In addition, a significant share of the previous season ticket holders kept their season ticket without switching to the Deutschlandticket (cf. chapter 2), whereas it is unlikely that new season ticket owners decided to purchase other season tickets than the Deutschlandticket.

Overall, the estimation results of the baseline specification identify several groups of people as particularly likely or unlikely Deutschlandticket customers. With respect to the socio-economic characteristics, the ticket is purchased less often by older people and more often by (particularly fulltime) workers, while the household income, household size, and gender do not play a role. Concerning the travel behaviour, the results point out that public transport availability is a prerequisite, whereas access to a car (particularly as a driver) offers an alternative that makes a Deutschlandticket purchase less likely. Finally, the ticket is significantly more often purchased by people who travel in urban areas and used public transport on a regular basis already before the ticket was available.

5.2. Accounting for Public Transport Reliability

The baseline specification focuses on the role of socio-economic characteristics and transport behaviour for the Deutschlandticket purchase decision. The models presented and discussed in this section analyse how experiences of irregularities such as delays and cancellations in public transport trips affect the ownership of a Deutschlandticket based on equations (3) to (6).

[6] Dropping *PTApr* as an explanatory variable leads to a positive and statistically significant coefficient of *SeasApr*.

Table 5: Estimation results of the public transport reliability specifications (Selected variables)

	Model 1: Full Sample	**Model 2: Regular PT Users**	**Model 3: Full Sample**	**Model 4: Regular PT Users**	**Model 5: Full Sample**	**Model 6: Full Sample**
IrregPT.Rarely[f]	0.28	-0.60			0.33	
	(0.29)	(0.41)			(0.47)	
IrregPT.Sometimes[f]	0.62 **	0.29			0.33	
	(0.30)	(0.40)			(0.54)	
IrregPT.Often[f]	0.21	-0.01			0.91	
	(0.31)	(0.41)			(0.56)	
IrregPT.Always[f]	-0.62	-1.03 **			-0.03	
	(0.35)	(0.48)			(0.70)	
Delay.Rarely[f]			0.11	-0.08		0.85
			(0.27)	(0.33)		(0.48)
Delay.Sometimes[f]			0.35	0.43		0.59
			(0.32)	(0.39)		(0.60)
Delay.Often[f]			-0.20	0.35		-0.24
			(0.40)	(0.52)		(0.79)
Delay.Always[f]			-0.97	-1.38		1.79
			(0.64)	(0.88)		(1.48)
Canc.Rarely[f]			0.34	0.11		0.15
			(0.26)	(0.33)		(0.53)
Canc.Sometimes[f]			0.51	0.24		0.16
			(0.31)	(0.35)		(0.68)
Canc.Often[f]			0.66	0.33		0.63
			(0.41)	(0.48)		(0.96)
Canc.Always[f]			-0.49	-0.40		-1.23
			(0.71)	(0.84)		(1.85)
FreqPT.TRUE					4.88 ***	4.49 ***
					(0.58)	(0.53)
IrregPT.Rarely[f]:FreqPT.TRUE					-0.40	
					(0.59)	
IrregPT.Sometimes[f]:FreqPT.TRUE					0.13	
					(0.65)	
IrregPT.Often[f]:FreqPT.TRUE					-0.98	
					(0.73)	
IrregPT.Always[f]:FreqPT.TRUE					-1.09	
					(0.84)	
Delay.Rarely[f]:FreqPT.TRUE						-0.78
						(0.58)
Delay.Sometimes[f]:FreqPT.TRUE						-0.06
						(0.71)
Delay.Often[f]:FreqPT.TRUE						1.09
						(0.94)
Delay.Always[f]:FreqPT.TRUE						-2.48
						(1.66)
Canc.Rarely[f]:FreqPT.TRUE						0.27
						(0.63)
Canc.Sometimes[f]:FreqPT.TRUE						0.31
						(0.78)
Canc.Often[f]:FreqPT.TRUE						-0.21
						(1.09)
Canc.Always[f]:FreqPT.TRUE						0.69
						(2.01)
Sigma	6.01 ***	6.91 ***	6.16 ***	5.60 ***	4.68 ***	4.44 ***
	(0.38)	(0.57)	(0.44)	(0.43)	(0.31)	(0.31)
N	3369.00	1941.00	3369.00	1941.00	3369.00	3369.00
logLik	-1093.04	-726.02	-1092.35	-732.50	-1048.05	-1046.34

Notes: ***, **, and * denote significance at the 99, 95, and 90% level, respectively.- Standard errors in parentheses.- All explanatory variables lagged by one month.- Reference category: [f] Variable.Never.

Table 5 presents the estimation results of the variables of interest (full results are presented in Table 6 in the appendix). The first two columns refer to equation (3) with an aggregate public transport irregularity measure accounting for delays, cancellations, replacement service, and shuttle service. This model is estimated for the full sample (first column) and the subsample of regular (at least weekly) public transport users (second column). The third and fourth column correspond to equation (4) differentiating between delays and cancellations for the two samples, respectively. Models 5 and 6 refer to the interaction models defined in equations (5) and (6) using the aggregate measure (column 5) and the individual measures (column 6), respectively. In all models and for all variables, the baseline category is defined as "never" experiencing the respective irregularities.

The aggregate measure of transport irregularities is found to have a very limited impact on peoples' Deutschlandticket purchase decision. While most of the estimated coefficients are insignificant, it is consistently (and for model 2 of regular users statistically significantly) found that participants stating to "always" experience irregularities are less likely to purchase a Deutschlandticket. The significance of this effect for the subsample of regular public transport users suggests that "always" experiencing irregularities has a slightly stronger effect on this group than on the overall sample. Model 1 points out that panellists facing issues "sometimes" are more likely to be Deutschlandticket owners than the reference group, which is probably caused by the reference group also being on average less frequent public transport users. Indeed, when focusing on regular public transport users (model 2) or controlling for usage frequency (model 5), the coefficient is not significant.

When differentiating between delays and cancellations, the findings are largely in line with those based on the aggregate measure. "Always" experiencing delays or cancellations in the previous month consistently lowers the probability of owning a Deutschlandticket, even though the effect is not statistically significant. "Often" experiencing delays has a similar, albeit smaller, effect, while several of the other coefficients are estimated to be slightly positive (even though statistically not significant).

Additionally accounting for the interaction between the public transport usage frequency and the frequency of irregularities supports these findings. As expected, frequent users are more likely to purchase a Deutschlandticket, which is in line with the results of the baseline model. The coefficients of the interaction terms are mostly negative, suggesting that frequent users react slightly more strongly to irregularities than non-frequent users, with the effect being particularly pronounced for people "always" experiencing irregularities. However, all coefficients of the interaction terms are statistically insignificant.

Overall, the results of the models focusing on public transport reliability can only provide findings with little statistical significance. They suggest that some of the people who "always" experience irregularities refrain from purchasing a Deutschlandticket in the future – especially if they are frequent public transport users and if they are affected by delays –, but the effect is small and limited to this specific group.

6. Conclusions

The Deutschlandticket was introduced in May 2023 with the goal of attracting new regional public transport customers and support a transition from individual transport (especially cars) to public transport. The ticket allows for unlimited travel on all local and regional public transport services in Germany at a fixed price of initially 49€ per month, which is significantly below the previously existing (region-specific) monthly tickets. However, early studies show that the majority of people owning the Deutschlandticket were regular public transport users or even owned a season ticket already before the introduction, and that the share of customers newly attracted to public transport is rather low.

This paper adds to these early studies with a descriptive analysis and the estimation of multiple binary logit models using a survey-based panel dataset covering monthly data of almost 3000 participants from April to December 2023. It analyses how socio-economic characteristics and travel behaviour patterns impact the probability of owning a Deutschlandticket, and by doing so identifies primary owner groups of the ticket in a systematic way. Based on an ongoing discussion about public transport reliability in Germany, special attention is paid to whether the experience of irregularities such as delays and cancellations affects the decision to purchase a Deutschlandticket.

It is found that the ticket is particularly purchased by younger people, whereas older people seem to be hindered by the ticket being available only as a digital subscription. Fulltime workers own the ticket more often, whereas unemployed and stay-at-home participants are less frequent ticket owners. In contrast to the expectations, no income effect is found, suggesting that the ticket is not particularly beneficial for lower-income households or offers such households mobility they could not afford before. Concerning the expected modal shift towards public transport, it is important that access to a car (particularly as a driver) offers an alternative that makes a Deutschlandticket purchase significantly less likely. In addition, the ticket is more often purchased by people who travel in urban areas and used public transport on a regular basis already before the ticket was available. These findings point out that a decrease in public transport prices alone is unlikely to lead to a significant shift towards public transport. On the

one hand, availability and reliability of public transport are important to attract new customers. On the other hand, mobility decisions are largely determined by long-term patterns and experiences.

With respect to the experience of public transport irregularities, little conclusive evidence is found. The results suggest that experiencing delays increases the chance of refraining from purchasing the Deutschlandticket in future months, but the effect is small and limited to participants that are subject to irregularities on (almost) all public transport trips. The analysis does therefore not confirm that more people would purchase the Deutschlandticket if public transport was more reliable. However, it should be kept in mind that our analysis does not consider mode choice or other mobility decisions, for which reliability could still play an important role.

Finally, the work presented in this paper provides several paths for further research. First, the decision to purchase a Deutschlandticket is a monthly one with significant autocorrelation due to the subscription model of the ticket. Consequently, a dynamic logit model could control for the interdependence of these monthly decisions, if a large enough balanced sample was compiled. Secondly, ticket purchase decisions are commonly modelled as decisions between multiple available ticket options using a multinomial logit approach. This paper applies a different approach due to the data requirements of a multinomial logit model (with public transport pricing structures differing strongly throughout Germany), but a more comprehensive modelling approach could provide further insights and a more reliable explanation of peoples' public transport ticket purchase decisions. Third, it has been noted that mobility decisions are often based on long-term patterns and the availability of transport modes, such as car ownership decreasing the chances of purchasing public transport season tickets and using public transport significantly. However, it is not clear so far whether the introduction of new ticket options has a long-term effect on the availability of alternatives. Future research should aim at closing this gap, for example by analysing whether the Deutschlandticket leads to a decrease in car ownership in the long-run. Finally, the descriptive analysis presented in this paper suggests that public transport irregularities are perceived differently by different groups of people. For example, the general availability of an alternative mode of transport seems to increase peoples' awareness and perception of delays. Further research systematically analysing these differences in perception could contribute significantly to understanding peoples' ticket purchases, mode choice, and other mobility patterns.

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Appendix

Table 6: Estimation results of the public transport reliability specifications (Full results)

	Model 1: Full Sample	**Model 2: Regular PT Users**	**Model 3: Full Sample**	**Model 4: Regular PT Users**	**Model 5: Full Sample**	**Model 6: Full Sample**
(Intercept)	3.04 ***	1.34	2.74 ***	2.72 ***	-2.84 **	-3.60 ***
	(1.05)	(0.91)	(0.79)	(0.95)	(1.11)	(0.97)
Age.31-45[a]	-1.48 ***	-0.38	-0.40	-1.42 ***	-0.53	-0.17
	(0.47)	(0.43)	(0.38)	(0.51)	(0.52)	(0.47)
Age.46-55[a]	-1.30 ***	1.66 ***	-0.09	-1.03	-0.17	-0.32
	(0.42)	(0.45)	(0.38)	(0.53)	(0.56)	(0.47)
Age.56-65[a]	-1.45 ***	-0.16	-1.33 **	0.13	-0.77	-0.22
	(0.49)	(0.56)	(0.54)	(0.56)	(0.61)	(0.53)
Age.>65[a]	-0.91	0.62	-0.57	-0.76	-1.06	-0.81
	(0.64)	(1.17)	(0.59)	(0.71)	(0.72)	(0.69)
HHInc.€1000-2000[b]	-0.59	-0.83	-0.95	1.17	0.55	-0.11
	(0.86)	(0.63)	(0.53)	(0.68)	(0.64)	(0.63)
HHInc.€2000-3000[b]	-1.49	-1.96 ***	-1.08	-0.09	-0.25	-0.20
	(0.93)	(0.62)	(0.59)	(0.72)	(0.65)	(0.64)
HHInc.€3000-4000[b]	-0.64	-0.68	-0.60	0.30	-0.13	0.21
	(0.97)	(0.67)	(0.58)	(0.72)	(0.68)	(0.68)
HHInc.>€4000[b]	-0.05	-0.23	-0.42	0.25	1.03	0.59
	(0.83)	(0.60)	(0.59)	(0.73)	(0.72)	(0.71)
HHInc.NA[b]	-2.72 ***	-3.01 ***	-1.84 ***	-0.48	-0.18	-0.02
	(0.87)	(0.70)	(0.56)	(0.71)	(0.74)	(0.70)
HHSize	0.28 **	0.37 **	-0.15	-0.06	-0.08	-0.06
	(0.10)	(0.17)	(0.12)	(0.15)	(0.10)	(0.10)
Status.Parttime[c]	-0.32	-0.87	-0.57	-0.19	-0.59	-0.05
	(0.39)	(0.46)	(0.38)	(0.56)	(0.49)	(0.44)
Status.Education[c]	-1.63 ***	-3.21 ***	-1.84 ***	-2.39 ***	-2.53 ***	-1.71 ***
	(0.52)	(0.55)	(0.64)	(0.60)	(0.70)	(0.55)
Status.UnemplHouse[c]	-2.41 ***	-1.53 ***	-2.93 ***	-3.21 ***	-2.37 ***	-1.88 ***
	(0.68)	(0.52)	(0.53)	(0.65)	(0.59)	(0.54)
Status.Retired[c]	-3.54 ***	-1.89 **	-3.26 ***	-3.15 ***	-1.07	-2.24 ***
	(0.60)	(0.80)	(0.52)	(0.61)	(0.60)	(0.58)
Male.TRUE	0.72 **	0.10	0.98 ***	-0.74 **	0.06	0.71 **
	(0.36)	(0.27)	(0.36)	(0.35)	(0.36)	(0.34)
AvailRegPT.TRUE	-0.27	1.31 ***	0.08	0.48	0.38	0.37
	(0.38)	(0.47)	(0.38)	(0.44)	(0.40)	(0.39)
AvailCar.Passenger[d]	-0.20	-0.03	-0.08	0.64	0.57	0.29
	(0.47)	(0.47)	(0.40)	(0.48)	(0.44)	(0.42)
AvailCar.Driver[d]	-0.63	-0.26	-0.56	0.25	0.09	0.05
	(0.45)	(0.42)	(0.35)	(0.41)	(0.36)	(0.39)
AvailCar.Company[d]	-1.84 ***	-1.61 ***	-1.74 ***	-1.25 ***	-1.12 **	-1.27 ***
	(0.51)	(0.51)	(0.46)	(0.47)	(0.44)	(0.44)
PRT.rural[e]	-2.80 ***	0.55	-1.68 ***	-0.52	-0.34	0.18
	(0.49)	(0.50)	(0.50)	(0.65)	(0.54)	(0.54)
PRT.urban[e]	-0.53	1.33 ***	-0.21	0.20	-0.20	-0.18
	(0.41)	(0.39)	(0.40)	(0.49)	(0.51)	(0.44)
intNUTS3.TRUE	0.24	-0.83 ***	-0.45	-0.53	-0.31	-0.21
	(0.30)	(0.30)	(0.26)	(0.42)	(0.34)	(0.33)
log(PTApr)	1.54 ***	0.94 ***	1.70 ***	1.05 ***	0.79 ***	0.87 ***
	(0.12)	(0.12)	(0.13)	(0.14)	(0.10)	(0.13)
SeasApr.TRUE	-1.70 ***	-5.26 ***	-3.49 ***	-3.34 ***	-3.06 ***	-3.16 ***
	(0.38)	(0.51)	(0.39)	(0.41)	(0.49)	(0.47)
IrregPT.Rarely[f]	0.28	-0.60			0.33	
	(0.29)	(0.41)			(0.47)	
IrregPT.Sometimes[f]	0.62 **	0.29			0.33	
	(0.30)	(0.40)			(0.54)	
IrregPT.Often[f]	0.21	-0.01			0.91	
	(0.31)	(0.41)			(0.56)	

IrregPT.Always[f]	-0.62	-1.03 **			-0.03	
	(0.35)	(0.48)			(0.70)	
Delay.Rarely[f]			0.11	-0.08		0.85
			(0.27)	(0.33)		(0.48)
Delay.Sometimes[f]			0.35	0.43		0.59
			(0.32)	(0.39)		(0.60)
Delay.Often[f]			-0.20	0.35		-0.24
			(0.40)	(0.52)		(0.79)
Delay.Always[f]			-0.97	-1.38		1.79
			(0.64)	(0.88)		(1.48)
Canc.Rarely[f]			0.34	0.11		0.15
			(0.26)	(0.33)		(0.53)
Canc.Sometimes[f]			0.51	0.24		0.16
			(0.31)	(0.35)		(0.68)
Canc.Often[f]			0.66	0.33		0.63
			(0.41)	(0.48)		(0.96)
Canc.Always[f]			-0.49	-0.40		-1.23
			(0.71)	(0.84)		(1.85)
FreqPT.TRUE					4.88 ***	4.49 ***
					(0.58)	(0.53)
IrregPT.Rarely[f]:FreqPT.TRUE					-0.40	
					(0.59)	
IrregPT.Sometimes[f]:FreqPT.TRUE					0.13	
					(0.65)	
IrregPT.Often[f]:FreqPT.TRUE					-0.98	
					(0.73)	
IrregPT.Always[f]:FreqPT.TRUE					-1.09	
					(0.84)	
Delay.Rarely[f]:FreqPT.TRUE						-0.78
						(0.58)
Delay.Sometimes[f]:FreqPT.TRUE						-0.06
						(0.71)
Delay.Often[f]:FreqPT.TRUE						1.09
						(0.94)
Delay.Always[f]:FreqPT.TRUE						-2.48
						(1.66)
Canc.Rarely[f]:FreqPT.TRUE						0.27
						(0.63)
Canc.Sometimes[f]:FreqPT.TRUE						0.31
						(0.78)
Canc.Often[f]:FreqPT.TRUE						-0.21
						(1.09)
Canc.Always[f]:FreqPT.TRUE						0.69
						(2.01)
Sigma	6.01 ***	6.91 ***	6.16 ***	5.60 ***	4.68 ***	4.44 ***
	(0.38)	(0.57)	(0.44)	(0.43)	(0.31)	(0.31)
N	3369.00	1941.00	3369.00	1941.00	3369.00	3369.00
logLik	-1093.04	-726.02	-1092.35	-732.50	-1048.05	-1046.34

Notes: ***, **, and * denote significance at the 99, 95, and 90% level, respectively.- Standard errors in parentheses.- Reference categories: [a] Age.<31; [b] HHInc.<€1000; [c] Status.Fulltime; [d] AvailCar.None; [e] PRT.mixed; [f] Variable.Never.