

Public transport usage intensity of season ticket holders in the city of Innsbruck

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Public Transport Usage Intensity of Season Ticket Holders in the City of Innsbruck

Report to the Innsbrucker Verkehrsbetriebe GmbH

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OF SEASON TICKET HOLDERS IN THE CITY OF INNSBRUCK**

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ABSTRACT

This report describes a survey of public transport usage intensity in the city of Innsbruck, which was part of a larger study into traveller behaviour and mode choice in Innsbruck. Two samples with a total size of about 2600 persons over 18 years are used to enquire the number of trips undertaken with the services of the local public transport undertaking (*Innsbrucker Verkehrsbetriebe*) during the last week. One format of the question asks for all trips and the different types of tickets used and a second format request this information separately for each day of the last week.

The analysis shows that the average resident of Innsbruck, who owns any of the different longer term tickets (weekly, monthly, student card, six-monthly or annual) travels 11.01 times/week by local public transport (equivalent to 48 trips/month). This number is lower than past assumptions, but within the range of values recently reported elsewhere. The number of trips for younger persons should be slightly lower still, if the results from other cities hold in Innsbruck as well.

A detailed negative binomial regression of the number of trips indicated preliminarily that the question format had no impact on the number of trips reported. Given the larger amount of detail it is recommended to use the second more detail format (number of trips for each day and the ticket type used for each day) in any future study.

The analysis of the usage patterns of the week revealed that only a small share of travellers without a longer term ticket (about 13%) could have saved money by buying at least a weekly ticket. A rather larger share of those with a longer term ticket (about 22%) did not make full use of their ticket in the week surveyed.

KEYWORDS

Innsbruck - trip frequency - public transport - season ticket holders - telephone survey - seven day reporting period

1 INTRODUCTION

The consumer can choose the shares of the fixed and of the variable costs for any one journey through his long-term resource allocation: the acquisition of an annual season ticket buys zero-marginal cost travel for the year, the purchase of one of the many railroad discount cards entails a 20, 30 or even 50% fare reduction for a year (e.g. *Umweltticket* in Austria, *Halbpreispass* in Germany or *Halbtaxabo* in Switzerland), the type of car selected determines the amount of variable costs in comparison with the fixed costs of travel. For public transport operators the pricing of these ticket types and their detailed design is of crucial importance for their success. The elements of the design are the price, the duration (number of days), the type of period (e.g. 24 hours vs day, seven days vs week), the temporal validity during the period (e.g. peak included or excluded), the excluded types of services (e.g. express services or first class), the amount of price reduction, the persons eligible (e.g. young persons, families, retired persons etc.), the transferability, the benefits to accompanying persons (their number, the amount of price reduction granted to them, the types of persons covered (e.g. children only)), the extra benefits given (e.g. newsletters, price reductions with other operators etc.). The operator has to strike the right balance between the cost of operating the service for the usage made of the tickets given their design and the price charged for them.

The usage made of those prepaid tickets, which give the right to unlimited free travel during their period of validity, is therefore one of the key variables for a public transport operator. Without it the operator cannot properly assess the balance between usage and revenue, in particular, if the total ridership (in number of stages or trips (unlinked or linked trips)) is estimated by the number of these tickets sold and not from independent counts or surveys. Table 1 list the current assumptions of a number of the larger Austrian operators, which have not been checked against actual behaviour for some time, although the recent innovations in ticketing (transferable tickets, Verkehrsverbünde etc) suggest changes in behaviour.

The Innsbrucker Verkehrsbetriebe (IVB) therefore asked the authors to undertake a study to establish the usage intensity of its range of prepaid tickets. This study became part of a larger programme of work undertaken by the authors at the same time.

The rest of the report is structured as follows. The next section reviews the available information about the usage intensities of season tickets of different type to set the scene. The following section describes the survey approach, the field work experiences and the response behaviour of the respondents. The analysis of the data is distributed across the two then following sections, one concentrating on the overall usage and the other on the pattern of usage. The final section summarizes the results and

Table 1 Current assumptions of Austrian operators about the usage intensity of different ticket types (1998)

City	Type of ticket [Trips/period]					
	Day ticket	24h- ticket	Weekly ticket	Monthly ticket	Annual ticket	Education ticket
Graz	-	5	30	130	1440	110
Innsbruck	4	4	25	100	1200	100
Linz	5	-	20	90	1080	960
Salzburg ¹	3	3	25	100	1080	900
Wien	-	4	19	90	960	960

¹ Salzburg also conducts regular counts using automatic counters at the doors of selected buses, which are rotated around all lines.

highlight areas for action for the operator, including areas for further study.

2 REVIEW

There are two main methods to estimate the number of trips¹ made by each type of ticket:

- counts of ticket type usage in the vehicle combined with sales statistics
- surveys of usage and ticket ownership

While the first method was used extensively in the past, the recent changes brought by large-scale regional joint ticketing (*Tarifverbände*) have made the application of this technique infeasible in Germany or Austria, unless the whole of the regional area is surveyed, which is generally too expensive. The currently preferred method is therefore to survey users at home about their ticket usage. Typical for recent studies is the survey carried out in 1995 for the Münchner Verkehrsverbund by EMNID (EMNID, 1995). The survey firm telephoned households from a sample frame including known owners of season tickets. The firm phoned up to five times at different times of the day to reach a person at the address. The respondents were asked about the number of trips to work/education

¹ The following terminology is used throughout:

- stage: movement with one means of transport (unlinked trip, *Etappe*)
- trip: sequence of stages between two activities (linked trip, *Fahrt*)
- journey: sequence of trips starting and ending at home (*Reise, Ausgang*)

during the last three days, the number of other trips during the last three days and the type of ticket owned.

To gain an understanding of the range of possible values a number of operators were contacted, of which a small number provided the relevant information, which is summarized in Table 2. It is clear, that tickets of a shorter temporal validity tend to have higher usage intensities. The differences between weekly and other longer duration seasons are small in comparison². Across the longer duration ticket types the number of public transport trips/month ranges from (31) 42 to 78 with a median of 51,5. There is a clear tendency for the values to fall in line with the current real reductions in prices and the increases in sales.

3 DATA COLLECTION

3.1 Survey design

The usage intensity survey had to be undertaken as part of a larger exercise aimed at understanding the behavioural responses of travellers in Innsbruck to changes in the public transport system (Axhausen, Köll und Bader, 1998). Because of the overall budget constraints the surveys were undertaken as telephone surveys of residents of the City of Innsbruck. The sample was drawn from two sources:

- a main sample of telephone numbers (2223) obtained from an address dealer
- an additional sample of known owners of six-monthly and annual season tickets (373), which was obtained from the IVB

The survey covered the following topics:

- Availability of public transport at home and at work, where relevant, in terms of distance to the nearest stop and number of lines available (Main sample)
- Availability of a car or of a season ticket (Main sample)
- Availability of parking at home and at work, in terms of distance to the parking space, its type and its costs. (Main sample)

² The factors used for conversion to monthly figures are: (365/12) for daily tickets; (365/12)/7 for weekly tickets, 1/12 for annual tickets.

Table 2 Usage intensities of season tickets (converted to public transport trips/month)

Year	City/Region	Market segment/ Validity	Ticket type				
			Daily	24-hours	Weekly	Monthly	Annual
1987	Freiburg ¹	Full price				70,00	
		In education				65,00	
1991	London ²	LT area	102,50		67,48		
		Heavy rail within	109,50		66,96		
		Heavy rail without	119,54		66,70		
1992	Essen ⁹	Full price				68,13	
		In education				74,98	
1992	Paris ²	Centre only			54,19		
		All zones			49,23		
1993	Germany ³	Full price	106,46	136,88	59,75	58,50	54,58
		In Education			65,18	64,50	48,00
1993	VOR ¹⁰	Rural areas				52,32	
	VOR ¹⁰	Suburban				50,15	
	VOR ¹⁰	Urban				53,20	
1994	Victoria ⁴	Full price	69,65		70,87	78,32	71,88
1995	München ⁵	Full price			44,84	47,65	45,39
		Transferable				58,73	
1996	RMV ⁹	All monthlies				42,00	
1996	Berlin ⁹	Full price				48,38	49,73
	Berlin ⁹	Seniors				31,03	32,09
1996	VRN ¹¹	Full price		98,85	52,14	52,00	50,83
		In education			53,01	51,00	
1997	Chicago MetraRail ⁶	Full price				38,11	
1998	Bregenz ⁷	Full price	91,25		69,52	49,00	49,58
1998	Welser ⁸	Full price	60,83		43,45	43,00	43,33

¹ IVV, 1987; ² Private communication; ³ VDV, 1993 - Midpoint of the recommendations; ⁴ Private communication; ⁵ EMNID, 1995 - The value for the transferable ticket includes trips made by others and accompanying persons; ⁶ Personal communication; mean of annual values for 1991-1997; ⁷ Values developed on the basis of the numbers suggested by the public transport operator Welser; see below; ⁸ Values used by the public transport operator Welser (Traun, OÖ) and other operators in the *Verkehrsverbund Oberösterreich* (outside Linz) based on recent counts; ⁹ Personal communication with Target Group, Nürnberg, midpoint of the range given; ¹⁰ Herry, Rittler and Snizek, 1994 - values include an average of 8.1 weekend trips per month; ¹¹ PTV System, Karlsruhe, private communication

- Socio-demographic description of the respondent, including the ownership of a driving licence (Main sample; reduced set for the additional sample)
- a recent trip to either work, shopping or an evening leisure activity within the City of Innsbruck including destination, access-, wait-, in-vehicle, parking search and egress times,

transfers, availability of seat, means of public transport (bus, trolley or tram), fare and parking fee (for the chosen and the competing modes) (Main sample)

Two formats were used to elicit information about the number of trips undertaken by public transport. One half of the general sample was asked to report the total number of trips made during the last week and the types of tickets used, for which multiple answers were possible. The other half and all of the respondents from the additional sample were asked to report the number of trips made on each day of the last week and the tickets used on that day. (See Figure 1 and Figure 2)

Figure 1 Interview guide: 1. Alternative

Minimum (bei gerader Haushaltsnummer):

Wie oft sind Sie letzte Kalenderwoche mit der IVB gefahren ? mal

Welche Arten von Fahrkarten haben Sie dabei verwendet ? (auch Mehrfachangaben) 

EK	4FK	TK	24H	WK	MK	HK	JK	STK		

Figure 2 Interview guide: 2. Alternative

Maximum (bei ungerader Haushaltsnummer):

Wie oft sind Sie an den einzelnen Tagen der letzten Kalenderwoche mit der IVB gefahren und welche Fahrkarten haben Sie dabei verwendet ?

Tag	Datum	Fahrten	EK	4FK	TK	24H	WK	MK	HK	JK	STK
Mo											
Di											
Mi											
Do											
Fr											
Sa											
So											

3.2 Fieldwork and response behaviour

The survey work was conducted in two parts during the Winter of 1997 (second week of November to second week of December) and during the early Spring of 1998 (third week of February to middle of March) to avoid the clash with the Christmas holidays and school holidays at the beginning of February.

The addresses of the main sample of households in the City of Innsbruck were obtained from an address dealer (addresses and current telephone numbers). The numbers were screened against the current post office CD of telephone numbers and any erroneous addresses were discarded. Every address/telephone number was tried five times at different times of the day over a number of days before it was classified as unreachable. To obtain a random sample of persons we asked to speak to the person over 18 years of age with the birthday closest to the date of the interview.

The additional sample was provided by the IVB. Here only one attempt was made per household.

The overall response was positive with 66% of those reached giving the full interview in the general sample and 36% of those reached at the first trial and interviewed for the additional sample (See Table 3). The 36% is consistent with expectation about the likelihood of a persons answering the phone at the first attempt and being willing to participate.

There were no difficulties reported with either of the question formats. All respondents used only one ticket type on any one day.

3.3 Weighting

The resulting sample included more females and older persons than expected from known distributions of age by gender. Based on the official statistics of age by gender for the resident population obtained from the Statistical Office of the City of Innsbruck, the sales statistics for different types of tickets and the known age and gender distribution for owners of six-monthly and annual season tickets both provided by the IVB suitable weights were calculated to reproduce the age and sex distribution of the population divided by three types of ticket-ownership (long-term season ticket holders, weekly and monthly season ticket holders and users of other types of tickets). Unless otherwise stated all results are calculated using these weights, either weights considering the additional sample or weights not considering the additional sample.

Table 3 Response behaviour

Response			Share of all
<i>General sample</i>			
Unreachable	391	(18%)	18%
Reached	1832	(82%)	
Refused	487	(27%)	22%
Aborted	130	(7%)	6%
Full interview	1215	(66%)	55%
Sum		2223 1832	2223
<i>Additional sample</i>			
Unreachable & refused	238		64%
Full interview	135		36%
Sum			373

4 INTENSITY OF USAGE

4.1 Descriptive analysis

The overall average number of public transport trips is 2.85 trips/week, which is equivalent to 0.41 trips/day for the residents of Innsbruck, which compares to the 0.46 public transport trips/day reported by Socialdata (1994) for 1993. Given the information available it is impossible to say, if this difference is either significant or, even if, if this is due to a true reduction in public transport usage or due to the differences in the methodology between this and the Socialdata study. The Socialdata study was a postal survey supported by telephone interviews, which covered all persons and public transport services, including the regional bus services, which were excluded here due to their lack of importance. The value is reasonable and credible.

Table 4 breaks this average down by different ticket types. While the averages of the longer term ticket types are statistically significant from each other in pairwise tests, their means are close enough in practical terms to pool them for further discussion. The average number of 11.01 trips/week over all longer term ticket types is equivalent to

≈ 48 trips/month

with a 95% confidence interval of ± 0.64 public transport trips for the weekly estimate.

This number is at the lower end of the range reported elsewhere (s.a.), but consistent with the fare structure, which equates the price of the monthly ticket to only 19.05 single tickets or 27.59 trips with a four-trips-ticket respectively.

The distribution of trips per day or week respectively for a given ticket type is shown in Table 5. There is a substantial share of a season ticket holders, which did not make full use of their ticket during the week surveyed, but it is not possible to say, how large this share would be over a monthly or even longer period, as there are clearly substantial variations in the usage from week to week. The distribution is bimodal with the large mode representing persons undertaking about two trips per working day and the smaller mode undertaking four about four trips per working day.

The residents without a season ticket average 1.87 trips/week overall. The users of day tickets make 2.77 trips/day ticket, a substantially higher number. Given the fare structure one would expect travellers to buy a daily ticket, if they are planning at least two trips, if they compare the price with the price of a single ticket, and at least three trips in the comparison with the price of a four-trip ticket respectively. From the results it is clear that the majority compares the price of daily ticket with the price of the single fare, as a majority undertakes only two trips with the daily ticket.

Table 4 Ticket usage by ticket type [public transport trips/week]

Ticket type	Main sample		Additional sample		All	
	Mean	St. Dev.	Mean	St. Dev.	Mean.	St. Dev.
Short term tickets	1.87	3.11	-	-	1.87	3.11
Day ticket	2.77	1.45	-	-	2.77	1.45
Longer term tickets	10.97	6.15	11.20	6.49	11.01	6.21
Weekly ticket	10.76	6.84	-	-	10.76	6.84
Monthly ticket	11.06	6.43	-	-	11.06	6.43
Six monthly and longer season	10.87	4.67	11.20	6.49	11.03	5.62
All ticket types	2.69	4.36	11.20	6.49	2.85	4.56

Table 5 Distribution of public transport trips/day or /week by ticket type

Number of trips		Share [%]				
Per week observed	<i>Per day travelled</i>	Longer term tickets	Short term ticket	<i>Single ticket</i>	<i>Four-trips ticket</i>	<i>Daily ticket</i>
0		1.11	64.83			
1-5	1	21.97	24.29	36.47	13.93	2.58
	2			63.53	82.53	67.38
	3			-	-	4.24
	4			-	3.18	15.06
	5			-	-	15.06
6-10	6	38.07	8.97	-	0.35	-
	7			-	-	6.66
11-15		17.48	1.58			
16-20		4.45	-			
21-25		10.90	0.32			
26 and more		6.03	-			

Table 6 breaks the averages down for the available socio-demographic variables.

Table 6 Average number of public transport trips/week by socio-demographic characteristics

Characteristic	Ticket type Shorter term ticket		Longer term ticket		All	
	Mean	Std.	Mean	Std.	Mean	Std.
Sex						
Female	2.10	3.12	10.80	5.60	3.28	4.64
Male	1.61	3.08	11.44	7.31	2.35	4.41
Number of paid working hours						
Not working	2.28	3.12	10.86	7.29	3.09	4.49
1-13 hours	2.74	4.08	9.18	3.65	3.04	4.28
14-34 hours	1.74	3.15	10.27	3.87	2.91	4.39
35 and more hours	1.32	2.81	11.50	5.93	2.54	4.70
Decade of birth						
1910	2.49	2.58	8.01	5.03	3.98	4.21
1920	2.31	2.53	9.16	5.43	3.16	3.78
1930	2.15	2.58	13.39	6.82	3.15	4.52
1940	1.25	2.34	11.30	7.91	2.46	4.80
1950	1.64	3.03	12.49	5.07	2.64	4.53
1960	1.18	2.24	10.45	5.53	2.03	3.80
1970	3.76	5.26	11.22	5.51	4.74	5.86
Education level						
Compulsory (Hauptschule)	2.25	3.24	10.95	7.15	3.07	4.56
Apprenticeship (Lehre)	2.00	3.31	11.37	5.53	3.09	4.72
Vocational (Berufsbildend)	1.63	2.26	10.41	5.14	3.00	4.32
Highschool (Matura)	1.76	3.38	11.83	6.77	2.81	4.95
University	1.47	2.20	9.50	6.54	2.21	3.71
Other	1.69	3.12	11.20	3.61	2.41	4.04
Type of work						
White collar	1.30	2.67	11.32	5.22	2.48	4.46
Blue collar	2.29	4.46	12.29	6.69	4.25	6.36
Selfemployed	0.59	1.20	14.85	4.25	0.95	2.62
Civil servant	1.41	2.21	7.15	4.52	1.95	3.03
Housewife	1.52	1.94	8.03	4.01	1.79	2.44
Retired	2.33	2.63	10.82	6.53	3.36	4.36
Pupil/Student	3.55	5.03	8.27	3.38	3.80	5.07
Unemployed	1.34	2.85	21.49	12.31	5.31	10.03
On paid leave (Karenz)	2.05	2.67	-	-	2.15	2.63
Other	3.93	5.36	10.96	3.65	4.90	5.70

Table 7 provides the matching distributions of socio-demographic characteristics.

Table 7 Average number of trips/week by socio-demographic characteristics

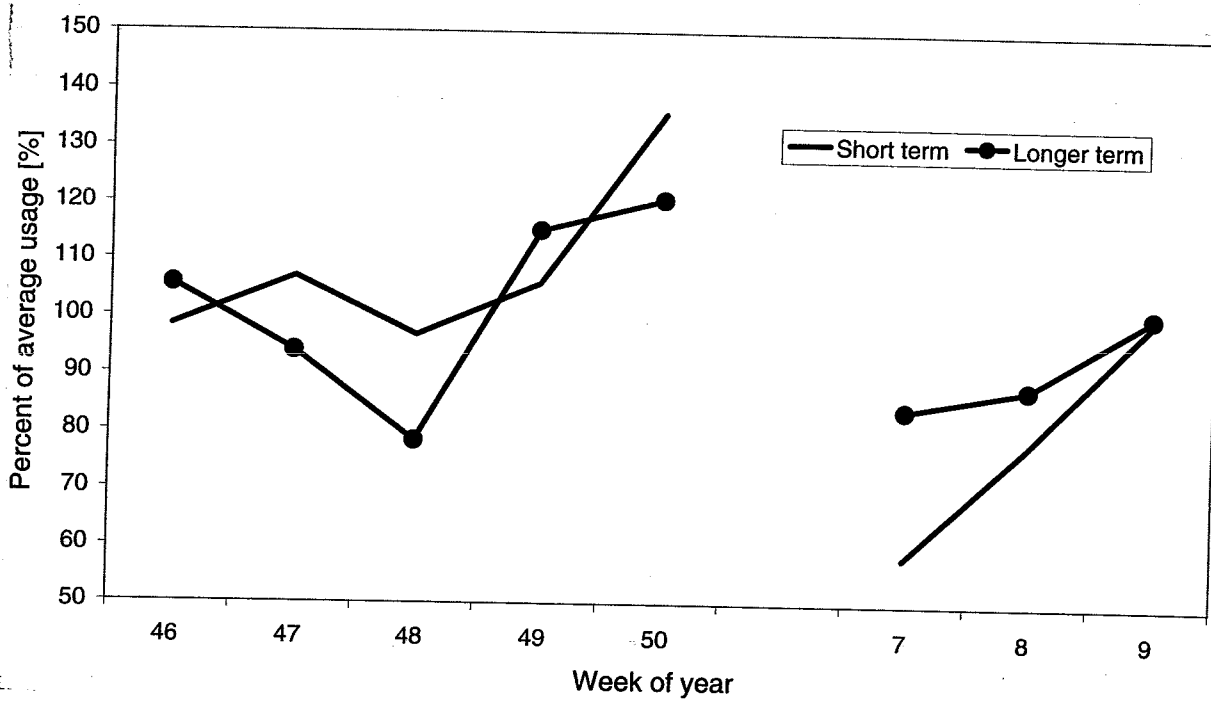
Characteristic	Share [%] of		
	Females	Males	All
Sex			
Female	-	-	53.6
Male	-	-	46.4
Number of paid working hours			
Not working	52.6	33.1	43.5
1-13 hours	6.7	2.8	4.8
14-34 hours	18.5	5.6	12.5
35 and more hours	22.3	58.5	39.1
Decade of birth			
1910	1.9	0.7	1.3
1920	16.9	10.7	14.0
1930	10.5	10.8	10.7
1940	17.7	16.9	17.3
1950	19.7	17.4	18.6
1960	22.7	26.4	24.4
1970	8.9	15.7	12.1
Education level			
Compulsory (Hauptschule)	23.2	16.6	20.1
Apprenticeship (Lehre)	27.2	28.7	27.9
Vocational (Berufsbildend)	12.7	4.1	8.7
Highschool (Matura)	22.1	28.9	25.2
University	10.4	16.6	13.3
Other	4.5	5.2	4.8
Type of work			
White collar	34.1	34.3	34.2
Blue collar	2.6	9.0	5.6
Selfemployed	2.9	6.2	4.5
Civil servant	3.1	11.8	7.2
Housewife	17.7	-	9.5
Retired	28.4	22.0	25.4
Pupil/Student	3.7	7.5	5.5
Unemployed	1.0	1.7	1.3
On paid leave (Karenz)	2.8	-	1.5
Other	3.7	7.6	5.5
Ticket use			
Short term ticket use	86.4	92.5	89.2
Longer term ticket ownership (weekly and longer)	13.6	7.5	10.8

There are no unusual or unexpected patterns in the usage. While men use public transport less overall,

they use it equally when they have committed themselves to a season ticket. The number of working hours has the expected effect. It reduces the usage for those without season tickets, but increases it for those with one.

The seasonal patterns (see Figure 3) reflect mostly the weather during the survey periods. Note the effect of the surprisingly warm middle of February 1998, which reduced usage.

Figure 3 Public transport usage by week of year and class of ticket



4.2 Model estimation

The descriptive analyses above should be supplemented by a suitable joint analysis of all factors influencing trip making. The negative binomial regression, a specialized form of regression suitable for count data, allows this (Greene, 1997). Table 8 presents the results of the regressions for two specially constructed samples. The software package used (LIMDEP by Econometric Software, 1998) does not permit the use of weights for the negative binomial regression. To simulate the weights the observations were copied a number of times to roughly match their weights. Sample 1 reflects the weights without the additional sample and sample 2 with the additional sample. The regressions shown include only the significant variables. The sets of variables are different as the set of socio-demographic variables was smaller for the additional sample.

Table 8 Results of the negative binomial regression

Variable	Sample 1 Without additional sample		Sample 2 With additional sample	
	Parameter	t-value	Parameter	t-value
Trips reported separately for the seven days	-0.024	0.51	0.235	6.06
Born in the 1940's	-0.467	7.29	-0.326	5.77
Born in the 1960's	-0.477	8.29	-0.399	7.26
Highschool diploma	-	-	0.091	2.26
Car owner	-0.372	6.09	-	-
Working part time (15-34 h)	1.009	14.32	-	-
Working full time	0.740	9.61	-	-
6-monthly or annual ticket	1.724	5.98	2.149	10.08
Weekly or monthly ticket	1.809	9.14	1.955	10.02
Surveyed before Christmas	0.168	3.03	0.626	17.91
α	2.149	31.31	2.208	33.61
$\varrho(0)$		-14112		-15259
$\varrho(\beta)$		-9954		-10655
ρ^2		0.294		0.302
N		5204		5369

From the results it is not unambiguously clear, whether the format of asking about the number of trips/week has a significant impact on the reported number of trips or not. The balance of the evidence indicates that it has no impact, as in the fuller specification of the model (Sample 1), which includes more of the socio-demographic variables, it is not significant.

Sex and education level do not have a significant impact in the full model, where the work- and car-ownership related variables are significant and have the correct signs and relative magnitudes. The difference between the types of tickets is not significant, supporting the conclusion from above to treat the longer term tickets as one group.

The parameter of the negative binomial model (α) is significant in both cases indicating that it is appropriate to use this model form. The overall explanatory power is good.

5 USAGE PATTERNS

The averages reported above hide a variety of usage patterns over the week. Table 9 and Table 10 list all usage patterns with a share of more than one percent for those with and without longer term tickets. It is interesting to note, that only 13.27% of those using short term tickets (2 patterns among the top 31) could have reduced their costs by buying at least a weekly ticket (marked with an asterix), while 21.69% of those using longer term ticket (10 patterns among the top 28) could have reduced their cost in the week surveyed by using a mixture of short term tickets, again marked with an asterix. It is clear, that the users of longer term tickets must be accepting these short term losses either for the convenience of the longer term ticket (less waiting time for the purchase, less organisational effort for the purchase, no uncovered days, no chance of not having a ticket etc.) or because they are balancing these weeks with little usage with heavy usage in other weeks.

It is interesting to note, that the distribution of the 31 patterns for the travellers without longer term tickets is much more even (28 patterns to reach the 75%-percentile), while the distribution for the others is rather skewed and concentrated on a smaller number of important patterns (15 out 28 patterns to reach the 75%-percentile).

Table 9 Usage patterns of persons without a longer term ticket

Pattern	Share [%]	Cumulative share [%]	Cheaper with weakly ticket
0200000	8.24	8.24	
0000200	7.38	15.62	
2222200	6.13	21.75	*
0020000	5.61	27.36	
0002000	4.74	32.10	
0202000	3.88	35.97	
0001000	2.78	38.75	
0010000	2.54	41.29	
2200000	2.43	43.73	
2020200	2.42	46.15	
0101000	2.25	48.39	
0102000	2.08	50.48	
0020200	1.95	52.43	*
2222000	1.89	54.31	
2000200	1.83	56.14	
2020000	1.81	57.95	
0000020	1.75	59.70	
2200200	1.55	61.26	
0202200	1.52	62.77	
2200400	1.40	64.18	
2200220	1.40	65.58	
1111000	1.40	66.98	
0222000	1.40	68.38	
0200220	1.40	69.78	
0000070	1.40	71.18	
0100000	1.33	72.52	
2000000	1.29	73.80	
1000000	1.16	74.96	
2220000	1.08	76.04	
0200200	1.08	77.12	
0000100	1.08	78.20	

The first number in the string equals the number of trips on Monday, followed by Tuesday and so on.

Table 10 Usage patterns of persons with a longer term ticket

Pattern	Share [%]	Cumulative share [%]	Cheaper with short term tickets
2222200	27.50	27.50	
2222220	7.33	34.82	
2222222	5.41	40.23	
3234334	5.10	45.34	
4444444	4.61	49.95	
2000200	3.33	53.28	*
2222000	3.24	56.52	
0200200	3.19	59.71	*
5555522	2.13	61.84	
4444420	2.13	63.98	
2000000	2.13	66.11	*
2020202	2.11	68.22	
4444220	1.84	70.06	
2222221	1.84	71.90	
0222200	1.84	73.74	
0222000	1.42	75.16	*
4442200	1.40	76.57	
2252200	1.40	77.97	
0442000	1.40	79.37	*
0222020	1.40	80.78	
0020200	1.40	82.18	*
0020022	1.40	83.58	*
2442422	1.13	84.71	
0220200	1.13	85.84	*
0022200	1.13	86.97	*
8888843	1.08	88.05	
2221100	1.08	89.12	
0000020	1.08	90.20	*

The first number in the string equals the number of trips on Monday, followed by Tuesday and so on.

6 SUMMARY AND CONCLUSIONS

This report describes a survey of public transport usage intensity in the city of Innsbruck, which was part of a larger study into traveller behaviour and mode choice in Innsbruck. Two samples with a total size of about 2700 persons over 18 years are used to enquire the number of trips undertaken with the services of the local public transport undertaking (*Innsbrucker Verkehrsbetriebe*) during the last week. One format of the question asks for all trips and the different types of tickets used and a second format request this information separately for each day of the last week.

The analysis shows that the average resident of Innsbruck, who owns any of the different longer term tickets (weekly, monthly, student card, six-monthly or annual) travels 11.01 times/week by public transport (equivalent to 48 trips/month). This number is lower than past assumptions, but within the range of values recently reported elsewhere. The number of trips for younger persons should be slightly lower still, if the results from other cities hold in Innsbruck as well.

A detailed negative binomial regression of the number of trips indicated preliminarily that the question format had no impact on the number of trips reported. Given the larger amount of detail it is recommended to use the second more detail format (number of trips for each day and the ticket type used for each day) in any future study.

The analysis of the usage patterns of the week revealed that only a small share of travellers without a longer term ticket (about 13%) could have saved money by buying at least a weekly ticket. A rather larger share of those with a longer term ticket (about 22%) did not make full use of their ticket in the week surveyed.

The results for the number of public transport trips/week obtained in this study are well below current Austrian assumptions for large urban areas. While in the range of values reported elsewhere, it seems prudent to check these results in two ways:

- A repeat study in Innsbruck to verify that the results are not an outlier caused by circumstances particular to period studied
- A national comparison study to verify that the Innsbruck results are typical of the situation in Austria

The usage patterns indicate, that certain ticket types are underpriced. In particular, the relation between the daily ticket and the single ticket seems to be too low. Equally the relationship between the price of the monthly/weekly ticket to the single ticket seems to be low. It would be worthwhile to explore

the possibility of changing the relationships to increase the revenue raised without major losses in ridership.

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