TRAM OR BUS; DOES THE TRAM BONUS EXIST?

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Abstract

The tram bonus is a much discussed topic as there is severe uncertainty about its definition and its existence. In this paper the tram bonus is considered to be the extra value it generates for travellers, which causes a new tram service to gain more passengers when compared to an equivalent bus service. The tram bonus is examined by comparing the alternative specific utility attached to tram and a bus while controlling for level of service attributes.

To examine the alternative specific utility, a stated choice experiment is conducted. Respondents make a series of choices between a tram and a bus alternative, which are both described in the same attributes and levels. These attributes involve access travel time, frequency, in vehicle travel time, transfer time, and egress travel time. As in this way the level of service is the same for both alternatives, the alternative specific utility captures the additional value that is attached to tram compared to bus.

In addition, it is examined to what extent the alternative specific constant is influenced by perceived differences between bus and tram. To that effect, respondents responded to a list of 26 statements about characteristics related to driving, reliability, the vehicle, recognisability, and environmental friendliness. Respondents were requested to what extent they felt each of these characteristics belonged to either only tram or only bus, or to both to the same extent (hence, a five point rating scale was used). Factor analysis was applied to construct common factors. These factors were added to the utility function.

The results indicate that if only the service level variables are included in the utility function, the alternative specific utility of the tram is, as expected, positive and statistically significant, This suggests that the tram bonus exists. If the perception factors are added to the utility function, the alternative specific constant becomes statistically insignificant, suggesting that extra utility of trams can partly be explained by these perceptions factors. The perception factors atmosphere in the vehicle, characteristics of the vehicles

and the displaying of travel information were found to be statistically significant.

Further analysis indicated that the tram is preferred over bus in the three major tram cities in the Netherlands (Amsterdam, Rotterdam and The Hague) but that the extent of these preference differences varies among these cities, whereas in the cities without a tram the bus is preferred. This suggests that the intrinsic value attached to tram is influenced by being familiar with the tram and even depends on the specific tram system. In addition, it was found that travellers that nearly ever use public transport have a preference for bus, while travellers that weekly use public transport have a preference for tram. Furthermore, cyclists and tram passengers have a clear preference for tram, while car drivers and bus passengers have a preference for bus.

Finally, a rough estimate is made of the impact of tram preference on the increase of the number of passenger if a bus line is replaced by a tram line.

1 CONTEXT AND MOTIVATIONS

It is widely agreed that cities cannot do without a good public transport system to arrive at sustainable transport system. As part of their transport system, many cities consider the construction of tram lines. However, the investment costs of tram lines are substantially higher than of bus lines. To warrant these higher costs, a tram line needs to attract a higher ridership than a bus line. A significant question is therefore whether the so-called tram bonus exists and to what extent: this is an extra value the tram generates for travellers compared to an equivalent bus service, which results in a higher ridership. Some experts are convinced that the tram bonus exists, often without a clear explanation, while others do not.

The literature is not conclusive on the existence of the tram bonus nor on its value. Several studies have been conducted by comparing the number of passengers before and after the implementation of a tram line. These studies have mainly been conducted in Germany (Hüsler, 1996, Arnold and Lohrmann. 1997, Kasch and Vogts, 2002), where diverging values that range from +15% to 54% more passengers are found. However, these outcomes do not purely describe the extra value attached to tram compared to bus, because other factors that influence ridership typically also change when the tram line is introduced. For example, trams often ride with a different frequency, tram lines have a better visibility because of the rails, new tunnels are constructed, or a complete new tram network is implemented. Since the construction of a tramline might take several years, changes in spatial development, economic conditions and transport policies may also affect the number of passengers on a public transport line.

Model based studies that control for various mode attributes therefore seem to be more suitable to analyse the tram bonus. Typical methods to determine the value of the tram bonus are to estimate an alternative specific constant for tram alternatives and to determine mode specific parameters for e.g. in-vehicle time. Axhausen (2001), Megel (2001), Ben Akiva (2002), Currie (2004), Bovy & Hoogendoorn-Lanser (2005), Cain (2009) and Arentze and Molin (2013) show that in most cases a preference for the tram or rail exists compared to bus. A clear explanation or distinction in preference is not given in these studies, as the scope of these studies was wider with the result that tram was often categorized together with rail and light rail. Hence, research that specifically compares tram to bus services is largely missing.

The aim of this paper is to contribute to this literature by examining the extra value derived from tram compared to bus, by controlling for other variables that may play a role. To that effect, the results of a stated choice experiment are reported that is conducted among the inhabitants of major Dutch cities with and without a tram. In this choice experiment respondents make a series of choices between a route with a tram and a route with a bus. Both alternatives are described in the same widely applied mode choice attributes. As the level of service of both alternatives is therefore comparable, the alternative specific constant provides an indication of the difference in preference between the alternatives. The tram bonus is thus defined as the value of the alternative specific constant for tram alternatives. In addition, perceptions on different mode characteristics are measured in this study, which are included in the utility functions to explain the preference difference. Finally, some respondent characteristics are included.

2 METHODOLOGY

2.1 Choice experiment

If an existing bus line is replaced by a tram line, more travel related aspects change than just the change of modes. Hence, simply comparing ridership before and after the introduction of the tram does not give a valid measurement of possible tram bonus as already argued in the Introduction. As completely comparable situations are not found in reality, a stated preference experiment was constructed in this study to create such a situation. In this experiment, the respondent are presented a series of choice sets that each describe a route with a tram and a route with a bus. Both routes vary in the same most widely used attributes to describe route decisions, that is access time, frequency, in vehicle travel time, transfer waiting time, and egress time that each vary in the same attribute levels (see Table 1). The mean attribute values of access time, frequency, in vehicle travel time and egress time are based on the average values as found in the Dutch cities Amsterdam, Rotterdam and The Hague. The attribute level for transfer waiting time is set on 0, 2 and 4 minutes. 0 minutes equals no transfer. 2 and 4 minutes equal a short and a somewhat longer waiting time.

Table 1: Attributes with their attribute levels

Attribute	1e	2e	3e
Access time	4 min	6 min	8 min
Frequency	4 per hour	6 per hour	8 per hour
In vehicle travel time	10 min	15 min	20 min
Transfer waiting time	0 min	2 min	4 min
Egress time	4 min	6 min	8 min

Hence, as the same attributes enter the utility functions of both bus and tram, a significant positive alternative specific constant of tram compared to bus provides an indication of the extra value attached to tram.

The choice sets are constructed using the ‘D-efficient design method’ (Bliemer and Rose, 2005). The advantage of this method is that it results in estimates with the smallest possible standard errors, which allows reliable estimates with a relatively small number of respondents. To construct a D-efficient design priors are necessary, which are the best guesses of the coefficients to be estimated. The priors of the current study are gained from a mode choice experiment conducted in Flanders in Belgium (Brederode, 2010). This procedure resulted in nine different choice sets that each contained a bus and tram route.

To prevent that the choice sets became an numerical endeavour only, which might stimulate that respondents to heuristically calculate the smallest overall travel time for each route in order to arrive at a choice, the routes were visualised. An example of a choice set is given in figure 1. The upper route shows the route with the tram and the lower the route with the bus.

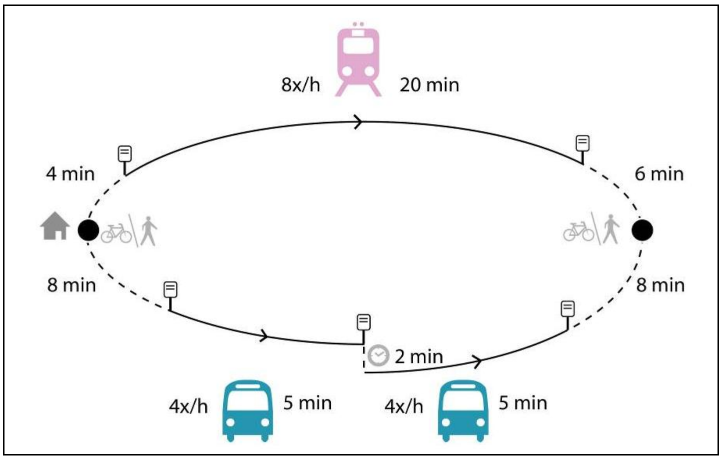

Figure 1: Example of a choice set

2.2 Perception measurement

The second part of the experiment measured perceptions. More specifically, we were interested in how 26 characteristics that either were related to driving characteristics, reliability, vehicle characteristics, recognisability, and environmental friendliness were differently perceived for bus and for tram. For each characteristic, the respondents indicated whether they felt that a certain characteristic belonged more to the tram or to the bus. They could express their perception on a five point scale, in which bus and tram were placed at the extremes.

Finally, the respondents were asked to answer questions about their own characteristics. This allowed testing for differences in preferences among segments in the population. Specifically, we were interested in differences between cities that have trams and those who have not and in potential differences among the different tram systems in various cities.

2.3 The sample

All three elements of the experiment are combined in an internet survey. Respondents are recruited from a panel of Global Market Insite (GMI). The survey is conducted among the inhabitants of different major cities in the Netherlands. This contains three tram cities (Amsterdam, The Hague and Rotterdam) and five cities without a tram line or network for which the tram is an option for improving the inner city accessibility (Eindhoven, Enschede, Groningen, Nijmegen and Tilburg). Inhabitants of small cities in the Netherlands are not included, while the chance of ever implementing a tram line in those cities is minimal. In total 294 respondents completely filled the questionnaire, distributed across the following cities: Amsterdam (99), Rotterdam (65), The Hague (64), and the other five cities (66).

2.4 Factor analyses

In order to reduce the number of perception variables, a factor analyses was conducted for the measurements of the 26 perception characteristics. Factor analysis analyses the correlations between the characteristics and determines which of these aspects have something in common and therefore are considered indicators of a more general underlying variable. The scores of these indicators are then summed to arrive at a score on a more general perception variable. The characteristics that do not cluster with any of the other aspects are left unchanged. This resulted in 12 different perception variables that will enter the utility functions, which are presented in Table 4.

Table 2: Perception variables and measured aspects

Perception variables	Measured 26 characteristics
Curves	Gently through the corners
Directness (of the vehicle)	Free flow through traffic High speed Less detours
Reliability	Travel time every time (almost) equal Fixed time the vehicle stops at a stop Punctuality of the transport mode
Certainty	Certainty that the line still exists in 5 years
Atmosphere (in the vehicle)	Pleasant atmosphere in the vehicle Possibility to read/work in the vehicle Driving noise low in the vehicle Visibility driver
Comfort	Stop nearby Easy boarding Large chance of a seat in the vehicle Good seat in the vehicle
Safety	Low chance on accidents Safe feeling in the vehicle
Recognisability	Clear stops Clear route Recognisability of the transport mode
Travel information	Good travel information at the stops Good information on delay
Environmental friendly vehicle	Environmental friendly vehicle
Noise pollution	Low noise pollution for the environment
Exhaust fumes	Harmful exhaust fumes

2.5 Model estimation

Based on the choices the respondents made in the survey, utility functions for the routes with the bus and the tram are estimated. These functions describe the contribution of each attribute to the overall utility derived from bus and tram. Hence, the estimated coefficients denote the weight of each attribute varied in the experiment. The utility function of tram is completed with an alternative specific constant, which indicates the basic preference of tram compared to bus. This preference denotes the impact of all characteristics that are associated with tram that are not captured by the five level of service attributes varied in the experiment (access time, frequency, in vehicle travel time, transfer waiting time and egress time). As may be argued that five level of service attributes are the most important mode choice attributes, a significant positive alternative specific constant indicates an intrinsic preference for tram controlled for service level variables. Hence, this would suggest that the tram bonus exists.

More specifically, the following utility functions are estimated:

$$V_{bus} = \beta_a * T_a + \beta_f * F + \beta_i * T_i + \beta_t * T_t + \beta_e * T_e \quad (1)$$

$$V_{tram} = \beta_a * T_a + \beta_f * F + \beta_i * T_i + \beta_t * T_t + \beta_e * T_e + C_{tram} \quad (2)$$

Where:

V_{bus}= utility derived from bus

V_{tram} = utility derived from tram

β_a = parameter access time

T_a = access time value

β_f = parameter frequency

F = frequency value

β_i = parameter in vehicle travel time

T_i = in vehicle travel time value

β_t = parameter transfer waiting time

T_t = transfer waiting time value

β_e = parameter egress time

T_e= egress time value

C_{tram} = alternative specific constant of tram (compared to bus)

It should be noted that apart from the utility specification having a mode-specific constant, alternative utility specifications were analysed as well. For each service attribute a model has been estimated having mode-specific parameters for that attribute (Bunschoten, 2012). These specifications yielded a similar or poorer model performance. For clarity only the results for the utility function described above are discussed in this paper.

Effects coding
To determine the influence on the preference of the tram of the aspects which are associated with the transport modes, the previously described perception variables are implemented in de utility functions. To be able to estimate the influence of the perceptions and the difference in segments effects coding is used. This coding technique is similar to dummy coding, however, the reference category (no preference) is not coded as 0, but as -1. This allows estimating the effect as a deviation of the alternative specific constant.

MNL and ML
The utility functions are estimated by applying a multinominal logit (MNL) and a panel mixed multinominal logit (ML) model. By estimating an MNL model one assumes that all travellers have the same preference for the tram compared to bus and consequently a fixed value for the alternative specific constant is estimated. By estimating an ML model, one assumes heterogeneity in preferences with respect to the ASC. Typically, it is assumed that the preference follows a normal distribution and therefore in addition to a mean ASC value also a standard deviation is estimated. A significant standard deviation indicates that heterogeneity in tram preference exists. In addition, the panel effect relates to the fact that a single respondent made several choices, may be taken into account. As a ML model is estimated by drawing error terms from a normal distribution for every choice made, a panel ML model takes the panel effect into account by drawing only a single error term for all choices made by a single respondent. By this procedure the number of observations is no longer equal to the number of observations, but becomes equal to the number of respondents. This corrects the estimated t-values and results in more valid significant levels. The models are estimated by applying Biogeme (Bierlaire, 2003), which is an open source software package for discrete choice modelling.

3 RESULTS

3.1 The basic models

The estimated coefficients of the MNL and the panel ML model that only includes that five attributes are presented in Table 3. It indicates that in both models the alternative specific constant is statistically significant and has a positive value. This suggests, as expected, that travellers on average prefer tram compared to bus once controlled for the most important mode choice attributes. In addition, the panel ML model shows a statistically significant standard deviation of the ASC, which indicates that heterogeneity in the tram preference exists.

Table 3: MNL and panel Ml model estimates

	Parameter	MNL	ML
Halton draws			1000
Parameters	#	6	7
Init LL	LL (0)	-1834,067	-1834,067
Final LL	LL (β)	-1747,149	-1545,300
Rho square	ρ^2	0,047	0,157
Adjusted rho square	Adj ρ^2	0,044	0,154
ASC tram	C_{tram}	0,258	0,348
Access time	β_a	-0,103	-0,144
Frequency	β_f	0,062	0,087
In vehicle travel time	β_i	-0,077	-0,108
Transfer waiting time	β_t	-0,172	-0,242
Egress time	β_e	-0,068	-0,095
Std. Deviation Tram	σ^2_{tram}		1,58

3.2 Perceptions

The basic model is extended by including the 12 perception variables. The outcome of the model estimation is given in the tables below. Only three perception variables had a statistically significant coefficient, that is: Atmosphere (in the vehicle), Comfort and Travel information. The model shows positive estimates for tram for all three variables, which indicates that if persons associate an aspect more with tram than with bus, that this increases their preference for tram considerably. Likewise, the negative estimates for bus indicates that if an aspect is more associated with bus, the preference for tram decreases. That the neutral category is not equal to zero, indicates that perception variables have different effects on tram and bus. Introduction of the perception variables leads to a statistically insignificant value for the alternative specific constant. Hence, the perception variables provide a possible explanation for the preference for tram compared to bus. Interestingly, these perception variables and the associated perception characteristics are not necessarily unique for tram. This is especially true for the characteristics related to Comfort and Travel information. This finding suggests that it might be interesting to study whether it is possible to improve the quality of bus systems for these characteristics.

Table 4: MNL and panel Ml model estimates with perception variables

Perceptions		**MNL estimation**		**ML estimation**	
Halton draws				1000	
Parameters		12		13	
Init LL		-1834,067		-1834,067	
Final LL		-1617,587		-1499,866	
Rho square		0,118		0,182	
Adjusted rho square		0,111		0,175	
ASC tram		0,079* (p-val: 0,37)		0,060* (p-val: 0,70)	
Access time		-0,114		-0,144	
Frequency		0,069		0,087	
In vehicle travel time		-0,085		-0,108	
Transfer waiting time		-0,190		-0,242	
Egress time		-0,075		-0,095	
Std. Deviations Tram				-1,26	
		B	**p-val**	**B**	**p-val**
Atmosphere	Tram	0,597	0,00	0,788	0,00
	Bus	-0,340	0,00	-0,453	0,00
	Neutral[1]	-0,257		-0,335	
Comfort	Tram	0,497	0,00	0,643	0,00
	Bus	-0,333	0,00	-0,440	0,00
	Neutral[1]	-0,164		-0,203	
Travel information	Tram	0,502	0,00	0,690	0,00
	Bus	-0,737	0,00	-1,010	0,00
	Neutral[1]	0,235		0,320	

The * shows the insignificant values

[1] $\beta_{\text{No difference}}$ is defined as $-1*\beta_{\text{tram}} + -1*\beta_{\text{bus}}$

3.3 Segments

The models are further extended by including respondent characteristics. Similar to the analysis of the perception variables, effects coding is used to estimate the effect as a deviation of the alternative specific constant. The following characteristics are analysed:

- Car ownership;
- City where the tram mainly is used;
- Drivers license;
- Education;
- Gender;
- Income;
- Marital status;
- **Most often used transport mode;**
- Number of children;
- **Frequency of public transport usage;**
- **City of residence;**
- Year of birth.

Of these thirteen model specifications only three yielded a better model performance and showed statistically significant parameters. These are represented in bold above. The outcomes of these model estimations will be interpreted in the following.

Most often used transport mode

This traveller characteristic shows a clear difference in preference. Respondents who use tram and bike most often, have a higher than average preference for tram, while respondents who most often use bus or car, have a lower than average preference for tram. Respondents who most often use train, metro or motorcycle do not show a significant difference from the average preference for tram, however, this may be caused by the low number of observations in those categories.

Table 5: MNL and panel Ml model estimates with transport modes

Most often used transport mode	**MNL estimation**		**ML estimation**	
Halton draws			1000	
Parameters	13		14	
Init LL	-1834,067		-1834,067	
Final LL	-1677,373		-1522,037	
Rho square	0,085		0,170	
Adjusted rho square	0,078		0,162	
ASC tram	0,129* (p-val: 0,18)		0,138* (p-val: 0,48)	
Access time	-0,108		-0,144	
Frequency	0,066		0,087	
In vehicle travel time	-0,082		-0,108	
Transfer waiting time	-0,182		-0,242	
Egress time	-0,072		-0,095	
Std. Deviation Tram			1,41	
	Β	**p-val**	**β**	**p-val**
Bike	0,318	0,00	0,474	0,00
Scooter/moped	-0,381	0,04	-0,551*	0,22
Motorcycle	-0,071*	0,87	-0,078*	0,94
Car	-0,305	0,00	-0,405*	0,09
Bus	-0,596	0,00	-0,786*	0,05
Tram	1,080	0,00	1,490	0,00
Metro	0,105*	0,57	-0,091*	0,83
Train[1]	-0,150*		-0,235*	

The * shows the insignificant values

[1] β_{train} is defined as the sum of -1 * β_{mode} for all other modes

Frequency of PT-usage

The results clearly show that the more respondents travel by public transport, the higher their preference for tram. This suggests that a clear preference for trams is only developed by those who use public transport on a regular basis, so by experienced public transport users.

Table 6: MNL and panel Ml model estimates with PT-usage

Frequency of PT-usage	**MNL estimation**		**ML estimation**	
Halton draws			1000	
Parameters	11		12	
Init LL	-1834,067		-1834,067	
Final LL	-1701,981		-1531,402	
Rho square	0,072		0,165	
Adjusted rho square	0,066		0,158	
ASC tram	0,125* (p-val: 0,07)		0,152* (p-val: 0,23)	
Access time	-0,107		-0,144	
Frequency	0,064		0,087	
In vehicle travel time	-0,080		-0,108	
Transfer waiting time	-0,179		-0,242	
Egress time	-0,070		-0,095	
Std. Deviation Tram			1,47	
	β	**p-val**	**β**	**p-val**
Never or 1x a year	-0,738	0,00	-1,070	0,00
2x or 3x a year	-0,379	0,00	-0,479	0,10
1x or 2x per quarter	0,100*	0,33	0,177*	0,49
1x, 2x or 3x a month	0,200	0,02	0,243*	0,25
1x, 2x or 3x a week	0,460	0,00	0,658	0,00
4x or 5x a week	0,357*		0,471*	

The * shows the insignificant values

[1] $\beta_{4x\ or\ 5x\ per\ week}$ is defined as the sum of -1 * $\beta_{PT\ usage}$ for all other PT usage categories

City of residence

The preference for tram also differs between the inhabitants of the different cities. In the cities that have a trams there is a clear preference for tram, while bus is preferred in cities that do not have a tram. Apparently travellers from none-tram cities have less experience with tram and are therefore less familiar with benefits the tram may provide.

In addition, differences exist between the cities that have a tram. The preference for tram is highest in The Hague, followed by Amsterdam and finally Rotterdam. These cities all have different tram and bus systems, which apparently affects the preference of tram compared to bus.

Table 7: MNL and panel Ml model estimates with cities of residence

City of Residence	MNL estimation		ML estimation	
Halton draws			1000	
Parameters	9		10	
Init LL	-1834,067		-1834,067	
Final LL	-1694,575		-1528,101	
Rho square	0,076		0,167	
Adjusted rho square	0,071		0,161	
ASC tram	0,248		0,318	
Access time	-0,107		-0,144	
Frequency	0,065		0,087	
In vehicle travel time	-0,081		-0,108	
Transfer waiting time	-0,180		-0,242	
Egress time	-0,071		-0,095	
Std. Deviation Tram			1,46	
	β	**p-val**	**β**	**p-val**
Amsterdam	0,183	0,01	0,267*	0,09
The Hague	0,523	0,00	0,730	0,00
Rotterdam	-0,034*	0,64	-0,026*	0,88
Non tram cities	-0,672		-0,971	

The * shows the insignificant values

[1] $\beta_{\text{non tram cities}}$ is defined as the sum of -1 * β_{city} for all other cities

4 EFFECT PREFERENCE ON PASSENGER NUMBER

As stated in the introduction, the discussion in practice usually focusses on the additional patronage due to the introduction of a tram rather than the choice modelling based definition of the tram bonus used in this analysis. The results of this study could be implemented in choice models in practice. The net effect on patronage will differ depending on the characteristics of the public transport line at hand, the demand pattern and the choice models that are used for demand estimation.

However, it is possible to give a rough estimate on the possible difference between a tram line and a bus line using elasticity values from the literature (Litman, 2010, de Beer et al, 2011, Wardman, 2012). These studies suggest in-vehicle time elasticity values of approximately - 0.6 and total travel time elasticities of about - 1.1. The elasticities are negative, because the patronage increases when the travel time is reduced.

The alternative specific constant can be translated into an expected reduction of in–vehicle time by dividing the constant by the parameter for in-vehicle time. Keeping all characteristics constant, replacing a bus by a tram is then equivalent to reducing the in-vehicle time with 3.3 minutes. For the average trip considered in the stated choice experiment (see table 1) the in-vehicle time is 15 minutes while the total travel time equals 29 minutes. The reduction for the in-vehicle time is thus 22% and for the total travel time 12%.

Multiplying these travel time reductions with the corresponding elasticities results in an increase of the patronage of 13%, independent of the approach. As the tram bonus is defined as a constant in the utility function, its impact will differ between short and long trips: for the shortest trip considered in the experiment this percentage will be higher (up to 20%), while for the longest trip this increase will be lower (10%). If instead of an alternative specific constant mode specific parameters for the in-vehicle time would be used, replacing a bus by a tram would be equivalent to a reduction of the in-vehicle time with 21% (Bunschoten, 2012). Using the corresponding elasticity the estimated effect on the patronage for the conditions considered in the choice experiment would be about 12% for all trip types.

5 CONCLUSION

The aim of this paper was to determine the extra value of tram compared to bus, often referred to as the tram bonus, while controlling for other variables that might play a role. To this end, a stated choice experiment was conducted, in which travellers had to choose between a tram and a bus option. The experiment was set-up such that the difference in preference could be captured in the alternative specific constant for the tram alternative. Furthermore, the respondents had to make an assessment of 26 characteristics that travellers might associate with tram or bus, and had to fill-in a brief questionnaire about their characteristics. Factor analysis was used to determine more general perception variables travellers relate to the public transport modes. Discrete choice models have been estimated to determine the value of the tram bonus, i.e. the alternative specific constant, as well as the possible impact of perception variables and traveller characteristics.

The main finding is that the tram bonus exists. From the estimated models can be concluded that in cities that have a tram, travellers have a clear preference for tram.

The model estimates further indicate that the tram preference is substantially higher for travellers who associate good vehicle atmosphere, higher comfort and better travel information more with tram than with bus. It is interesting to note that these characteristics are not necessarily unique for tram, suggesting that there might be options to increase the attractiveness of bus.

In addition, three traveller characteristics proved to be relevant: most often used transport mode, frequency of public transport usage, and city of residence. Travellers often using a bike or tram have a preference for tram, while frequent users of bus and car prefer bus above tram. Furthermore, it is shown that frequent public transport travellers have a positive preference for tram. With respect to the city of residence it is found that residents of cities having a tram system have a positive preference for tram, while inhabitants of non-tram cities tend to prefer bus over tram. These findings clearly show that the personal characteristics of the respondent, especially his/her personal experience and knowledge of the system, play an important role in the development of his/her travel preferences.

A rough estimate using travel time elasticities suggests that the positive preference for the tram might lead to an increase in patronage of about 12%, all other level of service characteristics being equal. However, the results may differ in actual applications depending on the specific conditions at hand and the demand models used.

Finally, the finding that tram is preferred in cities that have a tram system, while bus is preferred in other cities, illustrates that experience with the topic of research affects the results. Hence, a stated preference research conducted only in a city that considers introducing a tram system, would underestimate the value of tram, as it may be expected that after introducing a tram system, tram preference will change and will become more similar to the preference as measured in cities that already have a tram. This illustrates once more that it is important that the decision context in a stated preference experiment is as similar as possible to the decision context in the real world. Consequently, in case of mode choice modelling, this involves that one preferably recruits respondents among those that have experience with all modes of interest.

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