

## **CROSSING THE LINE – HOW ADMINISTRATIVE BORDERS AFFECT CUSTOMERS OF URBAN PUBLIC TRANSPORT SERVICES**

Emanuel BARTH (corresponding author)  
ETH Zurich, Institute for Transport Planning and Systems (IVT)  
Wolfgang-Pauli-Strasse 15  
8093 Zurich  
Switzerland

Telephone: + 41 44 633 26 52  
Fax: +41 44 633 10 57  
emanuel.barth@ivt.baug.ethz.ch  
[http://www.ivt.ethz.ch/people/barthe/index\\_EN](http://www.ivt.ethz.ch/people/barthe/index_EN)

Prof. Dr. Ulrich WEIDMANN  
ETH Zurich, Institute for Transport Planning and Systems (IVT)  
Wolfgang-Pauli-Strasse 15  
8093 Zurich  
Switzerland

Telephone: +41 44 633 33 50  
weidmann@ivt.baug.ethz.ch  
[http://www.ivt.ethz.ch/people/ulrichw/index\\_EN](http://www.ivt.ethz.ch/people/ulrichw/index_EN)

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### **Abstract**

Cross-border agglomerations face special challenges in providing high quality public transport service. Although the separating effect of borders is shrinking and traffic volumes are growing, cross-border public transport services are often not very well-developed and their modal shares are usually modest. As part of the effort to attract more cross-border public transport passengers, it is important to understand the perspective of current cross-border passengers. This paper describes research carried out to explore the perception, satisfaction and needs of both domestic and cross-border public transport customers. It presents results of a dedicated passenger survey carried out in the transboundary agglomerations of Geneva and Basel, involving Switzerland, France and Germany. The results show that satisfaction is primarily dependent on measurable elements of service quality as well as, to a certain extent, on the attitudes and expectations of the customer. While in some cases, cross-border local public transport services show a lower average satisfaction, this is always due to a lower level of measurable service quality elements. The authors conclude that cross-border local public transport can attract as many customers as on domestic routes, once the same level of service quality is offered. The existence of the border affects service only insofar as it makes the provision of public transport service more difficult. The border itself is not a reason for customers to forego using public transport.

## **CROSSING THE LINE – HOW ADMINISTRATIVE BORDERS AFFECT CUSTOMERS OF URBAN PUBLIC TRANSPORT SERVICES**

### **1. INTRODUCTION**

As congestion, traffic emissions and noise become a growing concern in many urban areas, the provision of local public transport has been identified as an important solution to tackle these problems [6]. Since the provision of public transport is characterized by a high level of planning and preparatory coordination, the interaction between the different institutions that are responsible for the public transport services plays a crucial role for the success of the offer.

This interaction between institutions, however, is often challenging and becomes even more difficult as the number of parties increases. The number of stakeholders increases significantly at administrative borders since different institutions exist for each administrative unit.

In all cases the will for co-operation and interaction is a crucial prerequisite on all levels. The public transport authorities responsible for planning and subsidizing public transport services in each area need to agree on a certain level of service as well as on the allocation of the costs to the different parties. The public transport operators need to comply with multiple regulations and may also need to cooperate with different partners in each administrative region. Furthermore, public transport service must be integrated (fares, schedules, connections, etc.) in each area.

These problems are common on for many regions where public transport service is operated in different communities, counties or even states. However they become very noticeable when public transport service is operated across an international border.

Even though those metropolitan areas where this need for cross-border interaction exists can be considered as a special case, they do exist all over the world. They are more frequent in Europe, where the net of international boundaries is relatively dense, but prominent examples can also be found, amongst others, at the US-Canadian border or around Hong Kong.

Moreover, it is most worthwhile to study these cases, because the number of stakeholders is very large and the impacts of their different backgrounds are most explicit. This provides a good situation for analysis of the general conditions needed for inter-jurisdiction coordination in the provision of public transport service.

Interestingly, while the number of public transport lines crossing international borders within urban areas is comparatively small, it is growing. Today economic activity is increasingly focused on urban areas; international borders are less important than in the past. The mobility of workers and customers is becoming ever less dependent on administrative borders. Urban centers with open borders usually profit from this situation, since the access to infrastructure, services, labor and work of multiple countries are a very positive locational factor.

Moreover, in European countries that are part of the Schengen Treaty, the crossing of borders has been facilitated to such an extent that the obligation to produce passports or equivalent documents at international borders has been waived. Similar developments, such as the reduction of visa requirements, can also be observed in other regions of the world, and further increases of local cross-border traffic can be expected.

Although all these obstacles for passengers to cross borders are shrinking, passengers can still observe a number of (primarily soft) factors which make a cross-border journey different from a domestic one: cultural aspects, languages, prices and currencies, but also the cost and level of service of public transport may be some of the factors that are still subject to significant variation along the course of a local cross-border journey.

Additionally, obtaining necessary information for using public transport, which has been recognized as a very important factor in the mode and route choice process ([4] [7]), is more complicated as the number of transport operator companies and transport authorities increases.

These factors can be observed most explicitly at international borders, rather than at lower-level administrative borders, therefore this paper focuses mainly on the difference between domestic and international journeys on urban public transport. However, it is presumed that similar observations – with varying significance – may also be made at other boundary types.

Since most of these factors have a complex effect by themselves the question arises, how does the combination of these factors affect the behavior of cross-border passengers. In reality, transport models of cross-border conurbations often estimate the effect of the national boundary on the public transport demand by specific “border resistance” values, which reduce the demand that would result from the given input values for domestic lines. However, as Ahrens and Schöne have noticed, this impedance value changes from one border area to another [1]. Moreover, they found that in practice, many transport models do not derive these values from the different individual factors that would impact the behavior of cross-border passengers, but they are simply a result of a model calibration by a comparison of model outputs with actual flows.

The influence of the different factors is therefore still largely unknown. Also, the “border resistance approach” implies a clear suggestion that a border always acts as an element that reduces the potential demand for public transport passengers. This may be questioned in regard of the generally low modal share of public transport achieved on urban cross-border relations and the substantial potential of demand increase by a modal shift [3] [8].

This paper therefore focuses on the needs, perception and the resulting satisfaction of passengers on urban cross-border public transport services and compares these to those of domestic passengers using the same routes within only one country. It raises the question of whether it is worthwhile making efforts for providing cross-border urban public transport and if there is a market for such cross-border services. The research hypotheses are:

- Local public transport lines that cross administrative borders en-route are more difficult to provide, which often results in poorer level and quality of service.
- Independent of the actual level and quality of service provided, customers perceive the use of local public transport as less attractive for cross-border journeys than for domestic services.
- Trip purposes differ between domestic and cross-border trips; the latter involves a higher share of captive riders.

The paper is structured as follows: In the following chapter, the methodology and the setup of a dedicated passenger survey, are explained. This is followed by a presentation of the results and a subsequent discussion, in which the findings are interpreted and critically analyzed.

## **2. RESEARCH METHODOLOGY**

In order to examine the research questions, a survey of public transport passengers was designed with the aim of obtaining information about perception, satisfaction and behavior of passengers. This section outlines key information about the survey.

Since the survey focused on the difference between cross-border and domestic passengers – and not between current and potential passengers – questionnaires were distributed directly on board of public transport vehicles.

The routes on which the survey was carried out consisted of urban bus and local rail (S-Bahn) services in the agglomerations (i.e. urbanized regions) of Geneva and Basel. The Geneva agglomeration (population: 890,000 [2]) consists of two Swiss Cantons (Genève, Vaud) and two French Régions (Franche-Comté, Rhône-Alpes). The Basel agglomeration (population: 829,000 [5]) consists of three Swiss Cantons (Basel-Stadt, Basel-Land, Aargau), one French Région (Alsace) and one German Land (Baden-Württemberg).

The surveys were carried out on several bus and rail lines in each agglomeration. Most of the lines surveyed crossed the border between Switzerland and France or between Switzerland and Germany. Care was taken in selecting the lines to ensure that they had relatively high patronage (both within the single countries as well as cross-border) and that they were operated at relatively high frequency (i.e. minimum 16 services per direction between 7 a.m. and 7 p.m.). All lines are referred to with anonymous names according to the wishes of some transport operators. These names follow the format Bus/Train GE (Geneva) or BS (Basel); the international letter designations CH = Switzerland, F = France and D = Germany are used in tables and figures.

The surveys were carried out on weekdays (Mon-Fri) from October 11 to 21, 2011. Care was taken to ensure that the survey was not carried out during a holiday period in any of the concerned areas. Questionnaires were distributed every day from approximately 11:45 a.m. to 7:15 p.m. (non stop), thereby covering midday and evening peaks as well as the off-peak period in between.

The survey was four pages long and took approximately ten minutes to complete. It was provided in French and German. Survey participants could complete the survey on board or return it later in a postage-paid envelope. Special attention was given to formulating the questions in a way that they could be understood and interpreted in the same way in the different languages.

Approximately 10,000 surveys were distributed and 3,897 valid surveys were returned for a total return rate of 38%.

The questionnaire asked a series of questions including: origin, destination, trip purpose, frequency of usage on this line, a series of satisfaction questions, and socio-demographic profile. While the possibility of retroactive personal identification of participants was deliberately omitted, the use of serial numbers allows to track on which line and at what time the questionnaire was distributed.

The completed questionnaires were analyzed statistically to evaluate several questions with a focus on differences in satisfaction between various groups of passengers. Different satisfaction parameters were analyzed including: service hours, frequency, price, served stops, travel time, reliability, comfort, security and the overall impression. For the interpretation, it has been assumed that the level of satisfaction represents the attractiveness of the service offer and thus also embodies – together with other factors such as possible alternatives – the propensity of people to choose this mode of transport.

Survey results are summarized in the following section.

### **3. SURVEY RESULTS**

#### **Dataset and Respondents Identification**

The first analysis of the data considered the characteristics of the obtained data and the properties of the survey participants in detail. The age of participants turned out to be quite evenly distributed between the ages of 15 and 55, and gradually decreasing beyond 55. With quartiles at 26, 39 and 51, the sample should represent the different age groups of passengers well. 43% of respondents had their place of residence in France, 30% in Switzerland and 27% in Germany (the latter only represented in the agglomeration of Basel). 43% of returned questionnaires were distributed in peak time services between 5 p.m. and 7 p.m.

The general use of public transport varied widely: 31% of respondents said they would never or almost never use local public transport for domestic journeys, whereas 39% (almost) never use local public transport on cross-border journeys. 60% of all passengers made a cross-border journey at the time the survey was distributed.

Table 1 shows further travel characteristics broken down for each line that was surveyed.

**TABLE 1 Passenger Characteristics of Surveyed Public Transport Lines**

Line	N	Cross-Border Riders [%]	Period Ticket Holders (>1d) [%]	Evening Peak Riders [%]	Trip Purposes [%]			
					Work/Professional	Education	Shopping	Leisure, Other
Bus BS 1 (CH-D)	83	38.6	55.4	27.7	37.8	14.6	28.0	19.5
Bus BS 2 (CH-D)	148	57.4	75.0	37.2	44.5	15.1	21.9	18.5
Bus BS 3 (CH-D)	155	81.9	60.0	27.7	40.3	11.7	17.5	30.5
Bus BS 4 (CH-F)	143	81.8	50.3	30.8	47.2	9.2	28.2	15.5
Bus GE 1 (CH-F)	108	79.6	67.6	40.7	67.0	14.2	4.7	14.2
Bus GE 2 (CH-F)	290	59.7	72.4	32.8	52.2	14.2	11.4	22.1
Bus GE 3 (CH-F)	353	84.7	64.0	37.7	55.1	22.4	8.5	13.9
Train BS 1 (CH-F)	375	84.3	80.5	54.9	82.4	6.9	1.9	8.8
Train BS 2 (CH)	297	0.0	79.8	26.6	45.2	16.8	8.2	29.8
Train BS 3 (CH-D)	846	66.0	75.2	35.6	65.6	15.0	5.9	13.5
Train GE 1 (CH-F)	670	20.3	82.1	53.6	71.8	9.2	5.7	13.4
Train GE 2 (CH-F)	429	99.5	80.2	71.8	80.0	12.4	1.4	6.3
Total	3,897	60.5	74.4	43.4	63.4	13.3	8.1	15.2

As shown in Table 1, the different lines on which the survey was carried out also differ in terms of ridership types. While on some lines, the share of passengers with work as their main trip purpose is 80% or more, others have a share of as low as 40% or even lower. Education, shopping and leisure trip purposes vary accordingly between 1% and 31%. The proportion of season ticket holders, who can be regarded as the more frequent customers, ranges from 50% to over 80%.

The share of cross-border passengers – as opposed to domestic passengers – varies significantly, mainly due to the geographical situation of the different lines and their stations. For example, since “Train BS 2” only approaches the border without crossing it, there are no border-crossing passengers on this line. In contrast, due to its particular geographic route, “Train GE 2” has very few domestic passengers.

The proportion of passengers who were surveyed during the peak hours (between 5 and 7 p.m.) in relation to the total number of passengers taking part in the survey (from 11:45 a.m. to 7:15 p.m.) is strongly correlated to the share of passengers travelling for work purposes. It varies from 27% to over 70%, whereby the actual share of passengers travelling during this peak period may be even higher, since for practical reasons, a few passengers may not have had the chance to obtain questionnaires in some crowded trips during rush hour.

It is also interesting to examine how passenger travel characteristics vary by whether they were taking a domestic only or an international trip. Table 2 presents the basic travel characteristics broken down by domestic or international (and which countries were involved).

**TABLE 2 Passenger Characteristics by Domestic-International Trip**

Countries Involved in Trip	N	Captive Riders [%]	Riders of Car-free household [%]	Period Ticket Holders (>1d) [%]	Trip Purposes [%]			
					Work/Professional	Education	Shopping	Leisure, Other
Switzerland (domestic)	1,070	34.4	21.2	80.1	58.7	12.0	9.1	20.3
Germany (domestic)	365	45.8	29.6	73.7	53.5	19.7	12.4	14.4
France (domestic)	106	50.5	30.3	61.3	42.9	28.6	8.6	20.0
Germany, Switzerland	802	36.4	23.5	70.0	60.7	13.0	9.2	17.1
France, Switzerland	1,554	29.3	16.5	73.9	71.5	11.9	5.9	10.6
Total	3,897	34.3	20.8	74.4	63.4	13.3	8.1	15.2

In examining Table 2, it is striking that so few questionnaires from domestic journeys within France and Germany were returned. While this may partly be due to the fact that the most densely populated parts of the chosen agglomerations were located in Switzerland, it is also a clear expression of a lower demand for public transport for domestic journeys within Germany and France, compared to journeys either entirely within Switzerland or to/from Switzerland.

Additionally, French and German domestic passengers also constitute of a higher share of captive riders, which indicates a lower attractiveness of public transport in these areas. However, interestingly, the highest share of choice riders can be found on cross-border journeys between France and Switzerland.

Captive riders have been identified by their indication in the questionnaire that the reason for their current use of public transport was due to a lack of car / bicycle / motorcycle availability, of driving license or of driving training. It is therefore not surprising that the share of captive riders correlates with the proportion of passengers living in car-free households.

When considering the trip purposes, it is striking that the share of trips for educational purposes is greater where there are many captive riders. The proportion of journeys made for education purposes is highest on domestic journeys in Germany and in France.

Another important characteristic is the fact that more passengers travelling for work purposes can be found on cross-border trips, as opposed to domestic trips. No clear image can be drawn from the share of shopping journeys (cf. tables 1 and 2), although the juxtaposition of served stops to shopping facilities has been identified as an important factor.

Since no direct public transport connection between France and Germany exists in the surveyed areas, no questionnaires of journeys including both French and German territory have been obtained. This category does therefore not show in Table 2.

### Overall Passenger Satisfaction

The overall satisfaction, which has been declared by the passengers in the survey (1 = very poor, 5 = ideal), can be used as an indicator of the general attractiveness of a service to its customers. Figure 1 presents overall passenger satisfaction comparing only domestic versus international trips for each route surveyed in the study.

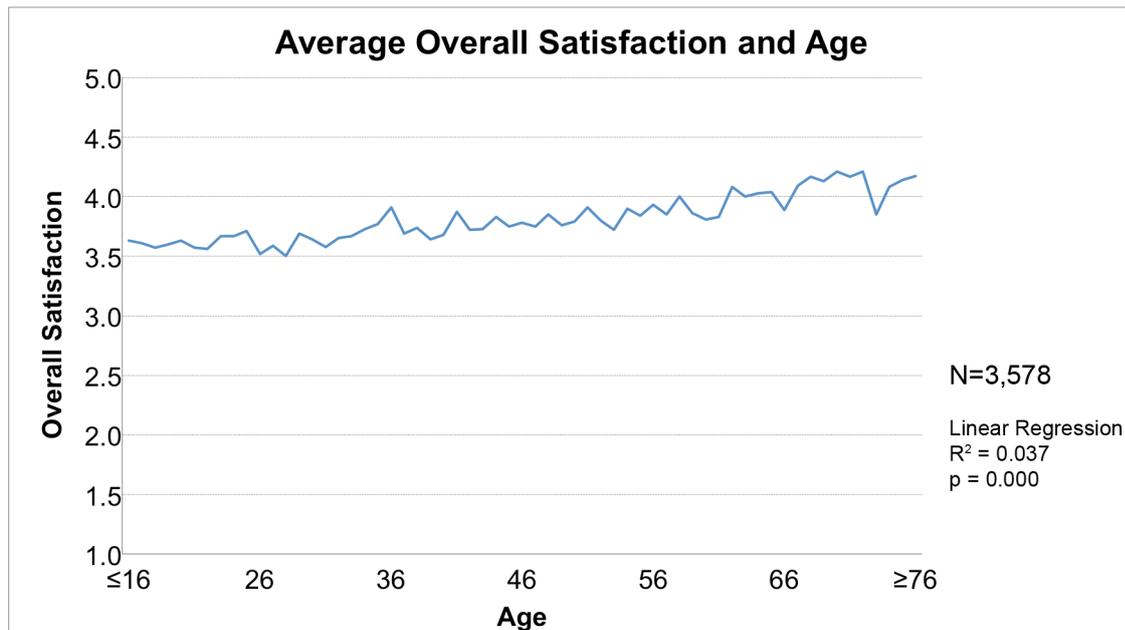
As shown in Figure 1, the overall satisfaction varies slightly between the different lines. This is not surprising, as the quality of service offered on the different lines also varies. However, it is surprising that the rating of cross-border and domestic passengers is almost identical on all lines, with a low correlation coefficient R of -0.129. The only exception is “Train GE 2”, where cross-border services are offered less frequently and with different rolling stock than domestic services.



**FIGURE 1 Overall satisfaction of domestic and cross-border passengers on all lines.**

The difference between the average overall satisfaction values of domestic and cross-border passengers is comparatively small (0.14 and 0.10 if “Train GE 1” is left out). However, the difference in overall satisfaction between the surveyed lines is clearly higher with values varying by up to 0.63.

Figure 2 compares average satisfaction to passenger age. As shown, the respondents’ age influences the overall satisfaction value by up to as much as 0.50. With a linear regression R<sup>2</sup> value of 0.037, this dependency is not very important, yet it is already stronger than the above-mentioned correlation with border-crossings. It thereby shows that passenger satisfaction is not only dependent on the level and quality of service provided, but also by the personal characteristics of the passengers, which are related to their attitudes and expectations.



**FIGURE 2 Overall satisfaction in relation to passenger age.**

Given the comparatively small influence of the border crossing on the overall satisfaction of passengers, it can be said that this border-satisfaction dependency is negligible. Moreover, influences on overall satisfaction could also not be found when analyzing various other factors, such as the usage frequency, the timespan since the first use of this route, or the travel purpose.

### Satisfaction and Passenger Fares

In addition to the overall satisfaction, passengers were also asked about their satisfaction with specific aspects of the trip/service. Figures 3 and 4 compare passenger satisfaction with fare for single journey purchasers and season ticket holders respectively. Each public transport line is represented by one to a maximum of three data points (one for cross-border passengers and two for domestic passengers on either side of the border), which represent the average satisfaction values of these groups. In some cases data points with a very small number of respondents have been omitted for reasons of statistical robustness.

Besides the graphical representation of the dependence, the key values of a multiple linear regression model are given at the bottom right-hand corner of the figures:  $R^2$  as an indicator of how well the model fits the empirical values, as well as for each independent variable its significance level  $p$  and the standardized correlation coefficient  $\beta$ , which indicates for each independent variable the extent to which it contributes to the regression estimation. It should be noted that the generally low  $R^2$  values can also be explained by the fact that the dependent variable only consists of five possible values (1, 2, 3, 4, 5), which can intrinsically not be well represented by a linear regression model.

The fare prices shown in figures 3 and 4 are based on the actual standard fare required for an average 5-km journey for cross-border and domestic journeys for each line. Single journey and annual season ticket holders have been treated separately; the satisfaction of passengers using other types of tickets (e.g. day tickets) is not shown in these figures. All prices are given in Swiss Francs (CHF); some of them have been converted from Euros (EUR). CHF 1 has been considered equivalent to EUR 1.20.



FIGURE 3 Satisfaction versus fare (single ticket purchasers).

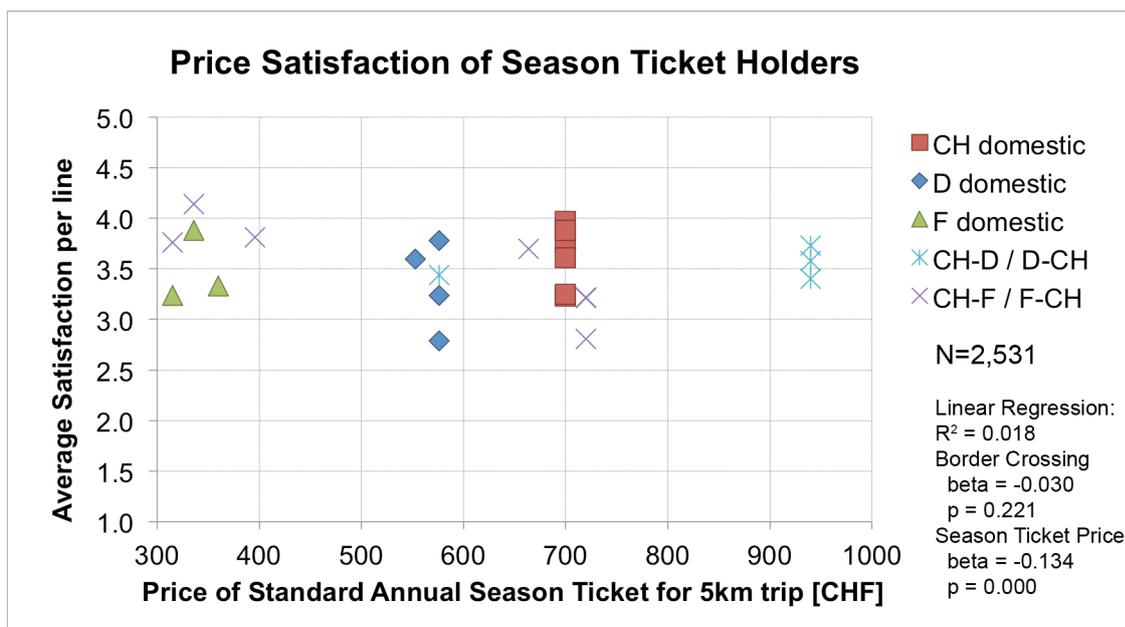


FIGURE 4 Satisfaction versus fare (season ticket purchasers).

The first thing to notice is that that price levels vary significantly: the price for a 5-km journey single ticket varies from CHF 1.54 to CHF 3.90, the latter being 2.5 times higher than the former. The price of annual tickets varies from CHF 315 to CHF 940 – almost 300%. While these differences can arise on one hand from different areas of validity, they are, on the other hand, also a clear expression of the different price levels that apply on either side of the border.

The price levels of the different journey types can be ordered as follows from cheapest to most expensive: France domestic, Germany domestic, Switzerland domestic; Switzerland-Germany cross-border. Interestingly, tickets for journeys between France and Switzerland vary over the entire range,

since they sometimes follow the French price levels, but are in other cases fully integrated to Swiss fare systems and thus clearly more expensive.

Figures 3 and 4 compare the overall satisfaction on each particular line with the calculated ticket price for a 5-km journey. The range of satisfaction values for the same price shown in the domestic examples and the low  $R^2$  values of the regression models show that price alone can not be the only determinant of satisfaction with price for these trips (a comparison of the price with the quality of service may have occurred instead). The CH-F cross-border tickets, however, varying from very cheap to the most expensive, show a quite clear connection between price and satisfaction.

Interestingly, while the values for price satisfaction seem to be related directly to the actual price, there is no direct effect of border crossings on price satisfaction (cf. beta and p values). However, it should be noted that cross-border passengers are often disadvantaged by the tendency that they need to pay more for a journey of comparable length.

### Satisfaction and Service Frequency

An important element of user satisfaction is service frequency or headway [9]. Figure 5 compares user satisfaction with service frequency to the actual frequency by route. Each public transport line is again represented by one to three average data points, depending on the possibilities of domestic and cross-border journeys and on whether the number of respondents per line section is sufficient for a robust result.

The time span considered for the service frequency analysis is 7 a.m. to 7 p.m. on Mondays to Fridays. During this period most lines offer a 30-minute headway, which equals 24 trips per direction. Some lines offer additional service during peak periods; on the other hand, a few rail lines have reduced off-peak service, leading to a minimum of 16 trips per direction on the considered routess. A further set of lines offer a 15-minute headway (48 trips per direction) and two lines operate on a 7.5-minute headway on their Swiss section.

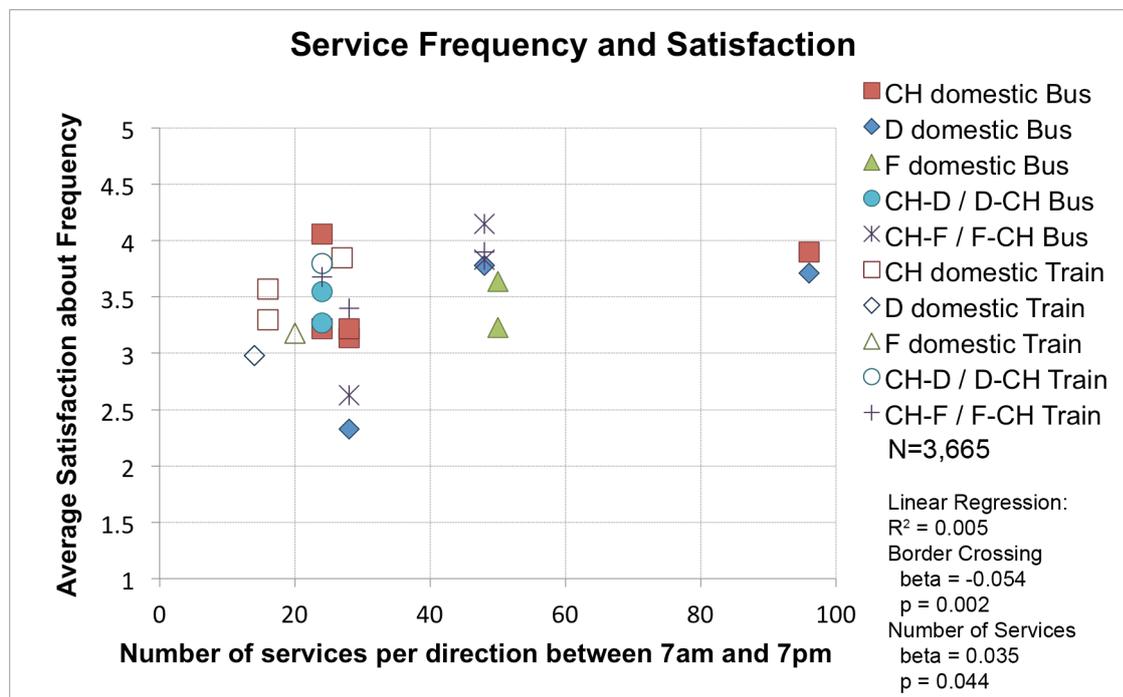


FIGURE 5 Satisfaction about frequency versus frequency.

When comparing the average values of satisfaction about service frequency on the different lines and line sections in Figure 5, it is striking that low satisfaction values occur mainly on routes with low service frequency.

Yet, interestingly, satisfaction values do not necessarily decrease with increasing headways. On some line sections with the highest considered headway (30-minute) satisfaction falls below 2.5, but other lines with 30-minute headways have satisfaction values as high as the lines operated with a 7.5-minute headway. Also, a linear regression model can not be set up with these variables, as can be seen from the  $R^2$  of 0.005.

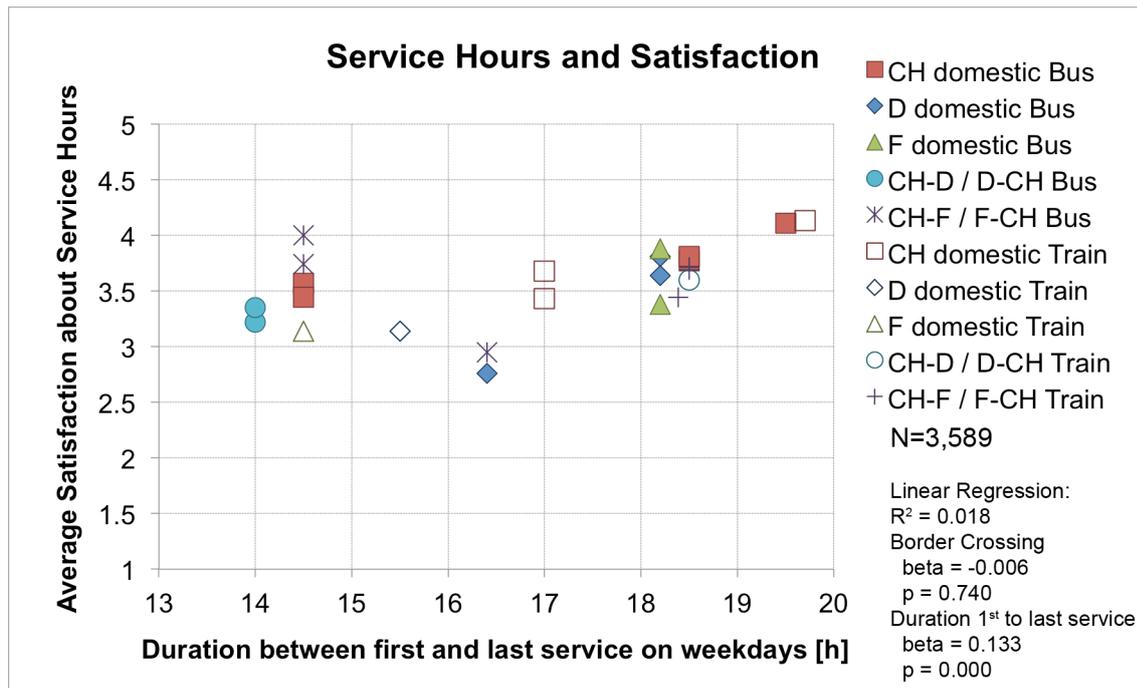
This demonstrates that other factors, such as vehicle size and comfort or the frequency of connecting lines, may also influence these satisfaction values. Rail lines (represented by hollow data points and crosses) tend to have slightly higher satisfaction values (average 3.53) than buses (shown as filled data points and stars; average 3.42); buses are apparently expected to operate more frequently, even though they already have shorter headways than trains.

Another important point to note in Figure 5 is the fact that cross-border lines (circles, crosses and stars) generally obtain satisfaction ratings similar to domestic routes (squares, rhombi and triangles). Thus, borders do not have a direct impact on passenger satisfaction with service frequency, nor on their expectations about service frequency. However, the fact that cross-border services tend to have longer headways might have indirect repercussions on passenger satisfaction and hence on the attractiveness of the offer.

### **Satisfaction and Service Hours**

Another important element of user satisfaction is operating hours. Figure 6 compares user satisfaction with operating hours to actual operating hours by line. As in previous figures, each line is represented by one to three average data points, depending on the possibilities of domestic and cross-border journeys and on whether the number of respondents per line section is sufficient for a robust result.

As shown in Figure 6, service hours vary for buses and trains as well as for domestic and cross-border services equally: all these route types spread from 14 to approximately 19 hours of service hours per day Mondays through Fridays. Within this range, the average passenger satisfaction increases from short to long service hours by about 0.5 points. This applies in the same way to both cross-border and domestic routes; this is reflected in the beta values for border crossings of -0.006 as compared to 0.133 for actual service hours. Moreover, the dependence from the independent variable of border crossings is highly insignificant. With a value of 0.018, the  $R^2$  is in a similar range as in the previous linear regression models.



**FIGURE 6** Satisfaction about service hours versus service hours.

#### 4. DISCUSSION

One of the most striking results of this research, although it may be argued that it is a very logical fact, is that: Overall satisfaction for cross-border and domestic passengers does not vary significantly on almost all surveyed public transport routes (cf. Figure 1). No evidence could be found of an intrinsic resistance for passengers to cross borders, or in other words, of an effect that a border crossing itself would complicate and therefore negatively impact passenger satisfaction. On this basis, we can thus disprove the research project's first hypothesis:

- Independent of the actual level and quality of service provided, customers perceive the use of local public transport as less attractive for cross-border journeys than for domestic services.

However, this does not mean that no differences in satisfaction would exist between the different lines as well as between domestic and cross-border passengers. As the different lines have varying service levels, the satisfaction about these service elements changes accordingly. Clear effects on passenger satisfaction could be shown in terms of service frequency (headway) and fare price (both season and single tickets). These satisfaction differences were not directly dependent on international/domestic journey types, but rather depended on the actual service provided. The research did show that it is often the case that these service elements are less favorable for cross-border journeys. Therefore, the attractiveness of many urban public transport routes that include a border crossing is impaired indirectly. This leads us to the next hypothesis:

- Local public transport lines that cross administrative borders en-route are more difficult to provide, which often results in poorer level and quality of service.

While the poorer – or lower – level of service of cross-border services could be shown, and this part of the hypothesis can be accepted, the reason for this was not examined in the survey. However, as conversations with both transport authorities and transport companies responsible for operating the services analyzed in this research suggest, one of the most significant difficulties with cross-border service is the necessity to provide service that complies with the legal, regulatory, timetable (headways, connections) and fare systems on both sides of the border. Moreover, agreements need to be made

between (subsidizing) transport authorities and possibly between transport operator companies in order for the service to be provided. This is again complicated by the fact that in many cases, cross-border services need to be integrated into already well-established domestic systems, some elements of which can be difficult to reconcile. Finally, a lack of political attention, compared to domestic services, may additionally reduce the development of cross-border public transport service.

When considering that cross-border services are currently often less attractive, but that passenger satisfaction is not dependent on the border crossing per-se, it can be assumed that cross-border passengers could be equally satisfied as those on domestic services, if the service quality were brought up to a similar level of quality. Additionally, since the research also showed that passengers judge their satisfaction very rationally (i.e. dependent on the real service quality), it can be concluded that cross-border local public transport routes have the same potential to satisfy their current users, and to attract new users, as on domestic services.

This brings us to the third hypothesis:

- Trip purposes differ between domestic and cross-border trips; the latter involves a higher share of captive riders.

While it could be shown that the share of captive riders does vary between domestic and cross-border services (cf. Table 2), it should be noted that this difference might be related to the lower service quality and that more choice riders could be attracted by improving service. Interestingly, these service improvements could lead to a notable increase in cross-border passengers since, according to both this research and other studies, a large share of cross-border travelers are making work or professional trips [3] [10]. As these types of trips are often made on a regular basis and can thus usually be planned in advance, they are good targets for a possible modal shift.

To sum up, it can be concluded that cross-border urban public transport does currently have slightly lower attractiveness in some regards, but it is expected to have a similar potential of user attraction, compared to domestic routes. There is, however, no question that achieving this higher service quality on cross-border services will require special efforts by all the many stakeholders involved in providing these services.

## 5. CONCLUSIONS

This paper suggests that there is a widely unused potential for improving the attractiveness of urban public transport services across international borders. While bringing the service quality of cross-border routes to a similar level as domestic service might be a difficult task, the authors believe that taking this challenge and tackling these problems would be very rewarding for the concerned cross-border agglomerations, even though many processes will be slowed down by the the various stakeholders involved and positive effects may require patience. Taking advantage of the proximity of different nations and merging the different parts of these conurbations into a single functional region will boost one of the most important locational advantages of these agglomerations helping them become more attractive for residents and businesses.

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