The future of public transport design in a postpandemic world

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The future of public transport design in a post-pandemic world

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Abstract

The COVID-19 pandemic has instigated substantial changes to daily routines and behaviors. Specifically, one lasting impact of the pandemic has been more flexible work arrangements. Such increased time and commuting flexibility can fundamentally impact future public transport use. Accordingly, the pricing and business models of public transit providers are being increasingly questioned. Yet, the post-pandemic future of public transportation usage remains unclear.

Here public opinion plays a crucial role – particularly regarding which types of service delivery modes people think the government should support. Should the government support increased number of connections throughout the day and to peripheral regions, or rather incentivize shifting towards more demand-based services? How much public funding should be provided for these services? And lastly, how do these preferences vary by individual characteristics? We explore citizen preferences for the case of public transportation in Switzerland via a full factorial survey experiment within a nationally representative survey (Winter 2022). We find that generally, people are in favor of higher government contributions. While we find that increased ticket prices are only accepted if both number of connections and connections to peripheral regions are improved, people seem to be accepting more demand-driven forms of service when ticket prices are lowered.

Keywords

Public opinion, Public transport, COVID-19, Conjoint experiment

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1 Introduction

During the COVID-19 pandemic, there was a substantial reduction in personal mobility worldwide (Abdullah *et al.*, 2020). While travel activity was heavily reduced due to lockdowns and 'work from home' mandates, there has also been a modal shift towards increased car usage, and to a lesser extent, active transport (e.g. walking, biking). At the same time, travel activity has shifted away from public transport, largely due to fears of contagion and covid rules, such as social distancing and mask mandates on public transport (Dingil and Esztergár-Kiss, 2021; Molloy *et al.*, 2021; Zhang *et al.*, 2021).

Yet, it remains unclear how activity patterns and modal splits will continue to develop in the post-COVID pandemic future (Axhausen, 2022; Molloy *et al.*, 2021). As more flexible work arrangements might impact the recovery of public transport use, and enact a significant decrease in the purchase of season passes such as the Swiss Generalabonnement (GA) (SBB, 2022), the current pricing and business models of public transport providers are being questioned. Accordingly, policy makers and public transport operators are facing insecurity about future public transport demand and preferences for public transport provisions. However, a high-quality public transport system with a high modal share is essential in order to reduce negative externalities from private motorized transport, such as congestion, local air and noise pollution as well as carbon emissions (Creutzig *et al.*, 2018; Mattioli *et al.*, 2020; Petersen, 2016).

So far, little is known about citizen policy preferences towards public transport service delivery within the post-pandemic landscape. Here we explore these preferences within the case of public transportation in Switzerland. Currently, public transport services in Switzerland provide a network that is attractive, as it provides regular services throughout the day that minimize transfer times and connects remote areas where demand is generally low. Yet, such a system is expensive, and is only sustainable through high levels of government subsidies Petersen (2016). However, with decreasing usage of public transport systems, public support could shift away from preferring a system that prioritizes regular services and connections to remote areas, and towards one that is more demand-responsive and provides better services at times and in areas where demand is highest in order to reduce costs. At the same time, decreases in public transport use could negatively impact support for publicly financed forms of transport infrastructure.

In the next section we outline a set of arguments and theoretical expectations on how public support towards public transport service delivery could look like. We then present the study design and the empirical findings, and discuss their implications and options for

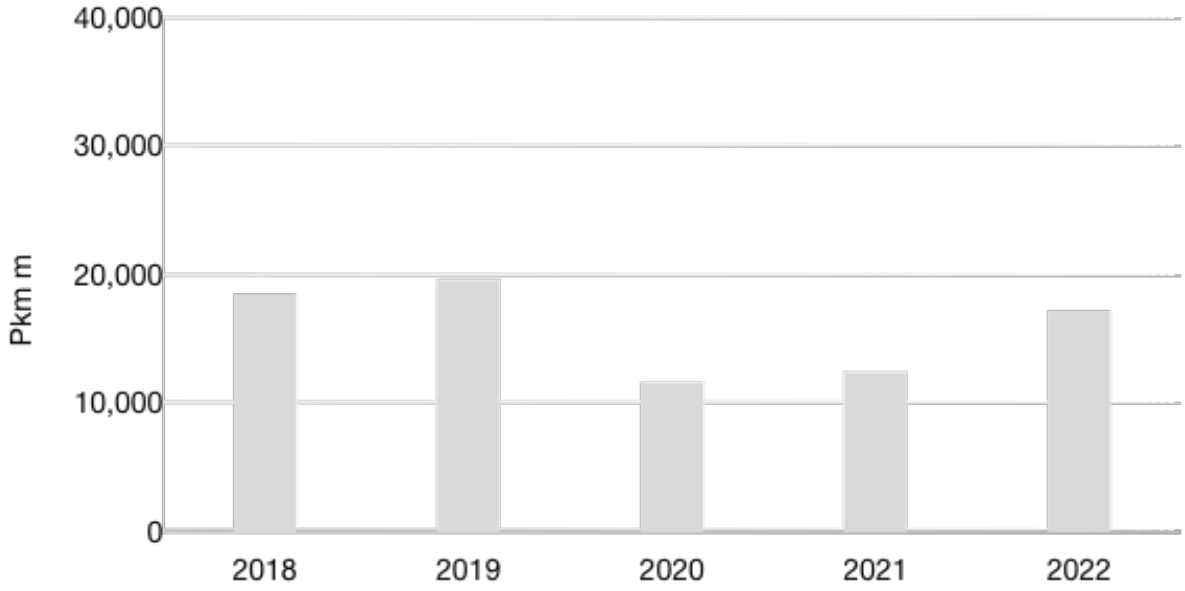
further research.

2 Public transport, the Covid-19 pandemic, and public opinion

2.1 The impact of Covid-19 on public transport

The COVID-19 pandemic has led to a profound reduction of public transport use, mainly due to covid rules such as mandatory work-from-home rules, but also due to social distancing and mask mandates on public transport (Dingil and Esztergár-Kiss, 2021; Molloy *et al.*, 2021; Zhang *et al.*, 2021). Fig. 1 shows passenger traffic performance for the case of Switzerland. It is clearly discernible that public transport use has been almost halved in 2020 and still not fully recovered from the COVID-19-related reduction in personal mobility by the end of 2022.

Figure 1: Passenger Traffic Performance in Million Passenger Kilometres per Year.

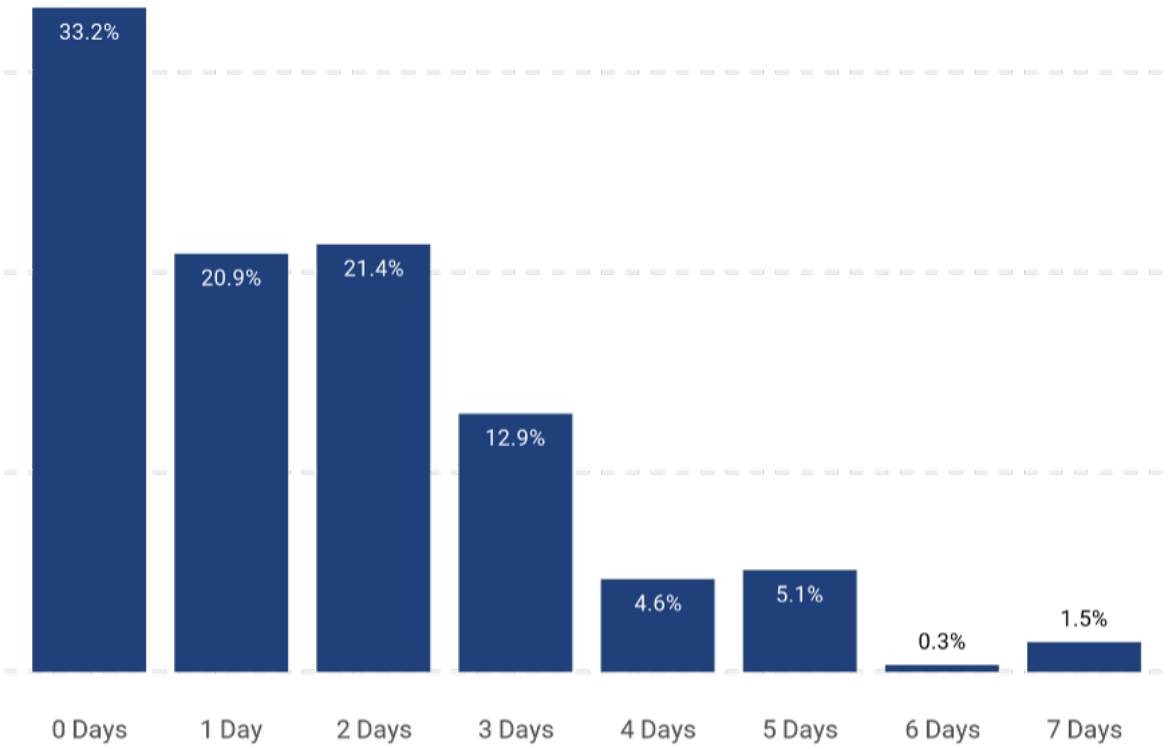


Source: Swiss Federal Railways (SBB)

While there has been at least a short-term change in mobility patterns due to COVID-19,

it is not clear how people adapt to the new situation in the long term, and what the ramifications are for public transport (Axhausen, 2022). While first evidence (see Fig. 2) hints at the fact that generally a majority of the working population would prefer to work from home at least one day a week, this is also dependent on whether and to what extent firms (continue) to allow for such a possibility (Aksoy *et al.*, 2022). However, it is generally expected that home office will stay to some extent (Adrjan *et al.*, 2021) and demand for (commuting by) public transport subsequently will continue to be lower than before the pandemic. There is evidence that for those that work from home office, the number of commutes by train have decreased, but trip lengths on commuting days increased (BFS Bundesamt für Statistik / ARE Bundesamt für Raumwentwicklung, 2023). This can serve as a potential explanation for the lower attractiveness of season passes such as the Swiss GA (SBB, 2022).

Figure 2: Preference for Number of Days in Home Office in Switzerland.



Source: Swiss Mobility Panel Wave 4 (2023)

However, these patterns have not fully crystallized yet, and as a result policy makers and

public transport operators alike are facing insecurity about future public transport demand and preferences for public transport provisions. However, a high-quality public transport system with a high modal share is essential in order to reduce negative externalities from private motorized transport, such as congestion, local air and noise pollution as well as carbon emissions (Creutzig *et al.*, 2018; Mattioli *et al.*, 2020; Petersen, 2016).

2.2 The role of public opinion for the political feasibility of transport policies

In the light of these uncertainties, it is crucial to know how public preferences towards future public transport service delivery look like, as (the lack of) public support serves as an important boundary condition for the political feasibility of public policies: According to the "thermostatic" model of democracy (Wlezien, 1995; Soroka and Wlezien, 2010), policy-makers react dynamically to changing demands for political action. Busemeyer (2022) summarizes this as followed: If public support increases for certain political actions, policy-makers deliver more of these policies. Citizens react to this once their preferred level of political action is achieved by lowering support. Policy-makers in turn provide less of that particular policy until support increases again. This model has been empirically supported by a wide array of literature that finds a strong influence of (changing) public opinion on policy change (e.g. Burstein, 2003; Erikson, 2015; Hakhverdian, 2010, 2012; Stimson, 1991; Stimson *et al.*, 1995; Wlezien and Soroka, 2012).While there is some bias in public policy choices towards preferences of the rich compared to those of lower-income citizens (Gilens, 2005, 2012; Persson and Sundell, 2023), public policy has been found to be responsive to changes in public opinion *on average* over time (Schakel *et al.*, 2020).

Public opinion plays a particularly important role for shaping policymaking compared to other factors when policies are politically salient and bear clear personal costs (Culpepper, 2011). Recently, transport policies and the provision of public transport have become increasingly salient topics as changes to transport infrastructure, travel speed and accessibility have been touching fundamental questions of distributional fairness (Martens, 2021). Examples are the (unsuccessful) efforts to introduce higher taxes that target road-based motorised transport (e.g. Carattini *et al.*, 2017; Douenne and Fabre, 2020) or raises in public transport fares (Somma *et al.*, 2021).

While public transport operators can be businesses that compete with other providers in a market and are not directly outcome of policymaking, governments are usually major

shareholders or owners of these companies, and the regulatory framework and financial support provided by the government exerts a strong influence on how these companies are able to operate (Mendez *et al.*, 2021). Public support can thus be expected to serve as a strong boundary condition for the political feasibility of changes to future public transport service delivery.

2.3 The case of Switzerland

As a context for this research, we adopt Switzerland as a case study, as it provides a unique opportunity to investigate the role of public opinion dynamics. In addition to the structure of public transportation service delivery in Switzerland noted above, implementation of major federal policies necessitates approval of the Swiss citizenry, via referendum and initiatives. Accordingly, the Swiss citizenry engages in direct democracy, every 3 months voting on approval of public policy initiatives which grants the population the capacity to wield a strong veto power in political decision-making processes (Stadelmann-Steffen, 2011; Tsebelis, 2002). In this case, the study benefits potentially from a high level of external validity as the envisaged experimental setup mimicks a choice environment that respondents are used to when they vote for a referenda in a real world setting (Huber *et al.*, 2020).

2.4 Theoretical expectations

Generally speaking, public good provisions such as public transport are valence issues, for which almost all people have the same directional preferences, as long as they do not need to state their willingness to prioritize public funds or to pay compared to other uses of that money (Holland, 2023; Stokes, 1963). We therefore expect on average higher levels of support for increased service and expansion of the existing 'fixed interval' timetable. Accordingly, we expect that Swiss people will on average prefer public transport designs which increase the number of connections per day and connections to peripheral regions despite low demand. In contrast, we'd expect lower levels of support for more demand-driven public transport provision on average. The implications for how public transport should be financed are obvious as well. People will generally be in favour of stronger government financial contributions in contrast to increases in ticket prices, as with government subsidies the personal costs are obfuscated and potentially also lower

(Stadelmann-Steffen and Dermont, 2018).

In terms of policy design, we do not hold any specific expectations with regards to a 'most-preferred' combination or the ordering of these. Rather, we do have some more preliminary expectations regarding trade-offs between the costs and benefits of policy designs. For example, people will be more likely to support less popular instruments (such as decreased services) if the cost of tickets is reduced, and there are fewer publicly funded contributions to public transportation. While alternatively, as cost increases (in both tickets and public contributions), the public will support designs which provide greater benefits (such as more regular interval service to extended regions), as they will expect more benefits to justify these costs. While less supported designs will be those where the benefits are minimal, yet the costs increase.

Last, we are interested to see whether support for public transport aspects differ by certain societal subgroups. Here, we suspect two main potential mechanisms that could be at play: One following a rational, utility maximizing model, another a more ideological model.

Following the rational choice approach, we would expect that people that are more likely to use public transport due to season pass ownership and a lack of car access will be more in favor of better connections (expansion of 'fixed interval' timetable) than others. Similarly, people with primary residential locations in rural areas will be more in favor of better connections to rural areas than others and more opposed to demand-driven forms of service.

On the other hand, in contrast to material interests, political orientation has been associated strongly with support for different forms of public good provision (Hoenig *et al.*, 2023), and there is also concrete evidence when it comes to support for public transport at the ballot (Palm and Handy, 2018; Manville, 2019). Left-leaning people will therefore most likely be in favor of increases in both number of connections per day as well as better connections of peripheral regions. Regarding the cost financing mechanism, they can be expected to be in favor of public sector financial contributions while at the same time favoring a lowering of ticket prices. In contrast, while right-leaning people are not necessarily more in favor of more demand-driven services than left-leaning people, they will most likely be more in favor of market-based pricing mechanisms for public transport compared to left-leaning respondents.

3 Data and methods

3.1 Data

The survey has been administered to existing panelists that take part in the Swiss Mobility Panel (SMP), a population-representative survey of the Swiss resident population (see `https://istp.ethz.ch/research/swiss-mobility-panel.html`), as part of Wave 4 of this panel survey. The fourth wave has been fielded between 18/11/2022 and 02/2023. The respondents were invited based on a random sample of the Swiss resident population over 17 years of age from the population register of the Federal Statistical Office (BFS/SRPH). The BFS sample mirrors, besides random error, the Swiss resident population. The questionnaire has been administered online only. The total raw sample comprises 9'460 respondents from the first 3 Waves of the SMP, alongside 11,000 respondents that were tried to be newly recruited as part of a 'panel refreshment'. The final sample consists of 8442 respondents. The survey is administered in three language regions of Switzerland, offered in German, French, Italian as well as in English. The survey instrument was written in German, and professionally translated into English, French and Italian.

Unfortunately, the SMP contained not enough respondents to draw meaningful conclusions about differences between respondents depending on whether they continued to buy a season pass or not. In order to overcome this limitation, we fielded a shortened version of the survey described above among a sample of customers of the Swiss Federal Railways (SBB). From the complete pool of SBB customers (i.e. persons that bought their ticket/pass with SBB), two random samples were drawn amongst customers that fulfilled certain criteria (i.e. were in possession of a season pass before the onset of the pandemic on the 29th of February 2020, are aged between 28 and 65, are DE, FR or IT), the only difference being whether the customer at the time of the survey (20/12/2022) still owns a season pass such as a GA, a half fare ticket or a regional pass (sample A, N = 10'000) or not (sample B, N = 10'000). The final sample consists of 1365 respondents.

3.2 Experimental design

We adopt a survey-embedded experimental design to explore public transportation service delivery preferences in Switzerland (Mutz, 2011). Environmental, transport and social

public policies are often quite complex – incorporative of varied instruments and regulations. Such policies often incorporate elements of bans (or restrictions) to incentivize adaptations, while at the same time some measures of redistribution to compensate business and people that are most affected by these regulatory elements, as well as those that have the least capacity for change. Yet, public support varies substantially by instrument. Accordingly, recent empirical research has focused how policy designs (policy packages incorporative of diverse instruments) shape policy support (e.g. carbon taxation, mobility pricing) (Bergquist *et al.*, 2020; Fesenfeld *et al.*, 2022; Wicki *et al.*, 2019). Such research has commonly adopted survey-embedded experimental designs, such as conjoint and factorial experiments.

In our case, we adopt a factorial experiment in order to identify how varying public transport designs shape public support. Factorial design proposal designs consist of 'attributes' that have varied 'levels'. Factorial experiments are also (in the most simple case) populated by randomly assigned levels within each attribute. In our case, each respondent is presented with one potential public transport design from a set of potential full factorial public transport designs (e.g. 3 attributes with 3 levels each has a set of 27 [3*3*3] full factorial public transport designs), which they are asked to evaluate. The measures used are 'proposal support' and 'proposal rating' similar to conjoint experiments (Bansak *et al.*, 2021).

Due to the randomized treatment assignment design, the factorial experiment allows for causal inferences to be made (Auspurg and Hinz, 2015). Analyses can identify differences in support based upon individual levels within an attribute (e.g. support for low/medium/high numbers of connections), as well as combinations of levels across attributes (e.g. comparing trade-offs between number of connections with levels of ticket prices).

Our experiment regarding different proposals for the future design of public transport in Switzerland include these four attributes:

- Number of connections (3 levels)
- Connection of peripheral regions (3 levels)
- Ticket prices (3 levels)
- Public sector financial contributions (2 levels)

Given the 4 attributes, with 3*3*3*2 levels, the experimental design incorporates a full factorial of 54 policy designs or profiles. An overview of how the experiment looks like for

the survey respondent can be seen in Appendix A.1. An overview of all the attributes and levels is provided in Appendix A.2.

Using a full factorial experimental design however decreases the efficiency of the experiment, can assign dominant policy designs to respondents that add little to our understanding of trade-offs between different attributes, and it can also assign implausible or even impossible combinations of attribute levels with unclear effects on respondents (Quoss *et al.*, 2023). While the full factorial set up, despite its inefficiency, is mainly chosen by political scientists because it allows to estimate the causal effects of many attributes simultaneously and is not reliant on an assumed behavioral model (Hainmueller *et al.*, 2014), the issue of dominant profiles and implausible or impossible combinations has been less discussed in the literature in political science (Quoss *et al.*, 2023). However, in our case this seems particularly problematic as out of 54 policy designs, 42 are dominant and/or implausible (i.e. because they are not cost-neutral).

While most ignore either explicitly or implicitly the issue (e.g. Breitenstein, 2019; Mares and Visconti, 2020; Kirkland and Coppock, 2018; Christensen *et al.*, 2020), some exclude either dimensions that lead to unrealistic profiles alltogether (e.g. Arnesen *et al.*, 2019), or exclude some combinations of attribute levels before fielding the experiment (e.g. Hainmueller *et al.*, 2014; Rehmert, 2022). In our case, we follow those that exclude combinations of levels after fielding (e.g. Funck and McCabe, 2022; Graham and Svolik, 2020; Ono and Burden, 2019) and only interpret those 12 combinations that allow for a substantive interpretation because they are plausible (i.e. they are cost-neutral).

3.3 Subgroups

We also explore how road pricing policy preferences vary by several subgroup characteristics. First, *car owners* are identified by an item asking 'do you have access to a car?'. If the respondent answers either 'yes, I own a car' or 'yes, I have a company car' then they are coded a '1' = car owner. If they do not, then they are coded as a non subgroup member ('0'). Second, in order to operationalize *political orientation* we use a well-established item that asks about left-right self-identification on a 11-point scale from '0' (left) to '10' (right) (Kroh, 2007). If Respondents choose a value, they are classified as 'left', between '4' and '6' as 'centre', and between '7' and 10' as 'right'. Next, using geocodes for respondents' registered address, we identify those living in an *urban residence* according to the Swiss Federal Office for Statistics' classification scheme 'Stadt/Land-Typologie 2012' (BFS

Bundesamt für Statistik, 2022). Lastly, in order to identify season pass ownership and changes therein in the survey fielded amongst customers of the Swiss Federal Railways, we use two items asking 'Thinking back to just before the COVID-19 pandemic (before March 2020), did you hold any annual public transit passes/travel cards?' and 'Currently, do you hold any annual public transit passes/travel cards?'. If respondents answer that they either hold a GA, half fare card or regional pass to both questions, they are coded as '1', otherwise they are coded as '0'.

3.4 Estimation strategy

Building upon methodological best practices (Bansak *et al.*, 2021; Leeper *et al.*, 2020), we first estimate regression coefficients for the evaluation measures (e.g. 'policy support) on dummy indicators for the levels of each attribute. Further, in order to aide substantive interpretation, we draw upon the regression estimates to calculate marginal means. Marginal means have the benefit of substantive interpretation (e.g. "60% of people support policy instrument X"), while allowing for differences to be made to other levels (e.g. "while 45% of people support policy instrument Y"). We also calculate 95% confidence intervals for the marginal means. In this case, we are able to interpret significant differences when the 95% confidence intervals for the marginal means do not overlap (akin to significance at an alpha=0.05).

In order to identify support for policy packages, we estimate regression coefficients for the evaluation measures (e.g. 'policy support') on an interaction term including all attributes. Again, in order to aide substantive interpretation, we draw upon the regression estimates to calculate marginal means. That allows to assess support for each policy design (e.g. "60% of people support policy package X"), while allowing for differences to be made to other packages (e.g. "while 45% of people support policy instrument Y").

Last, in order to identify subgroup differences, we look at conditional marginal means based on the main regression estimates. Here we further interact the policy design indicators by sub-group characteristics (e.g. left-right self-placement, car ownership) to understand the conditional effects on public support.

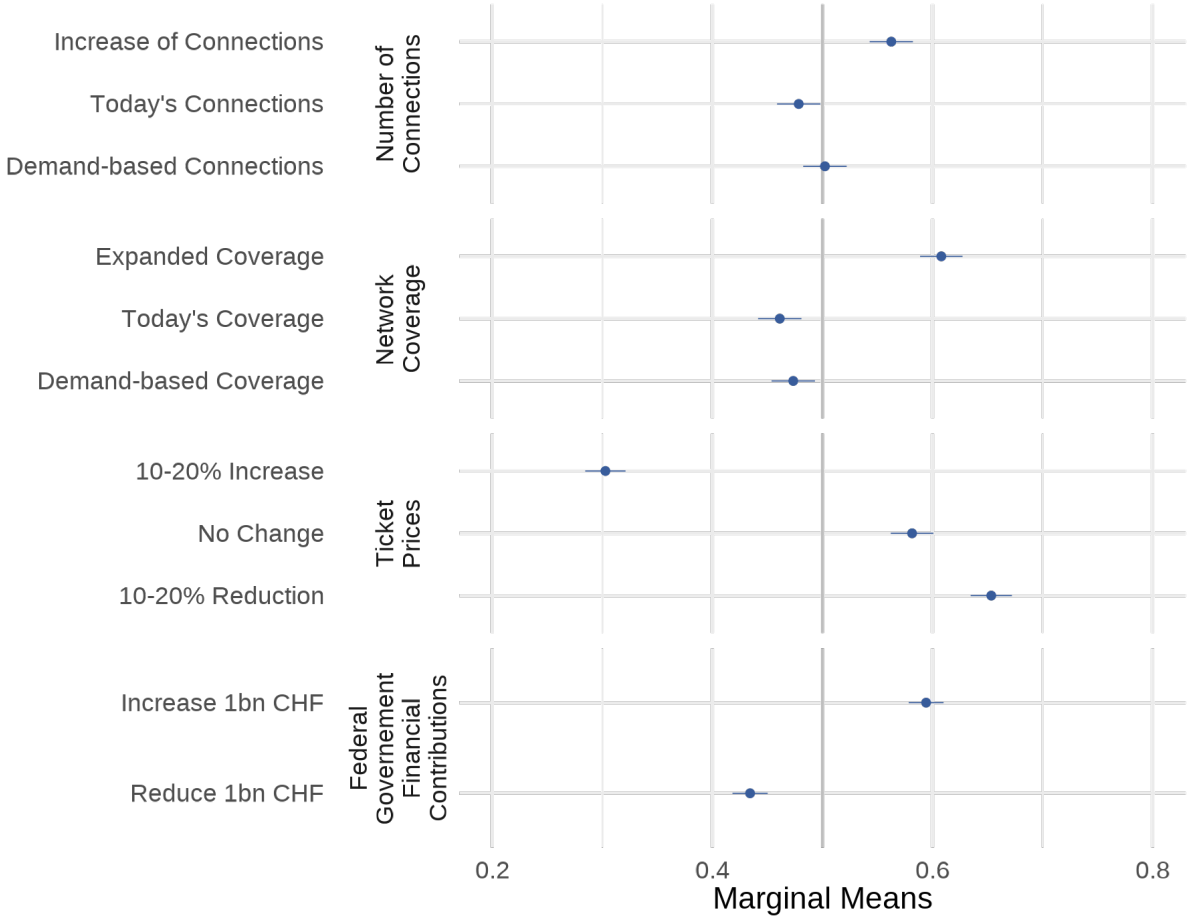
All analyses were performed using the statistical software R version 4.2.3 (R Core Team, 2023). Marginal means are calculated and plotted using the *cregg* package (Leeper, 2020).

4 Results

4.1 Public transport design

Fig. 3 shows the main effects of the different attributes on the probability for a public transport design to be selected. The results show that more than 50% of people support increases in both number of connections as well as expansion of connections to peripheral regions. Similarly, more than 50% support no change in ticket prices or ticket price reductions, while increased government financial contributions are preferred over reductions of these contributions.

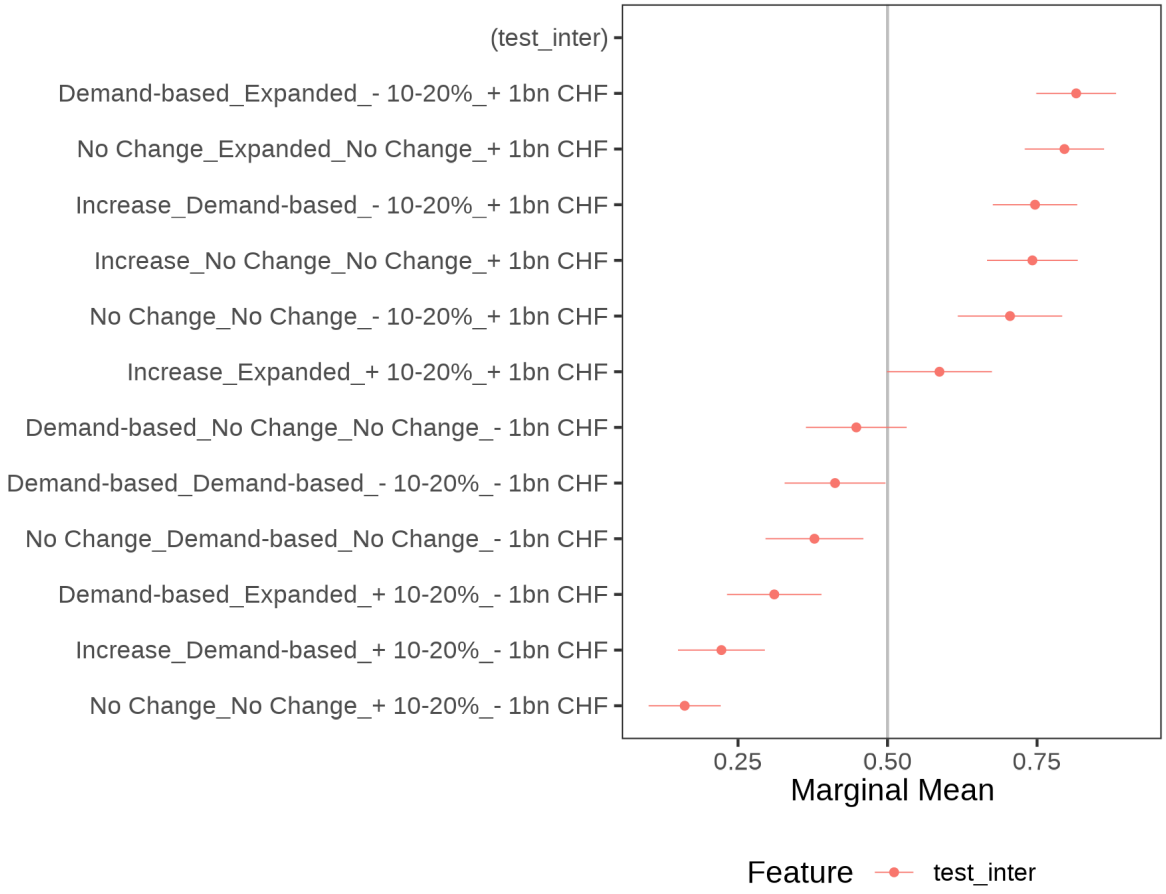
Figure 3: Marginal Means of Public Transport Design Attributes.



However, more insightful are potential interactions of different attributes. Fig. 4 shows predicted probabilities of supporting the 12 public transport designs that are fully plausible,

meaning that they are cost-neutral because they balance additional financial contributions/savings with increases/decreases of services.

Figure 4: Marginal Means of Public Transport Design Proposals.



First of all, the most obvious pattern that emerges is that no proposal where the financial contribution of the federal government is reduced achieves a predicted support of over 50%. Second, the only public transport system where ticket price increases would be just accepted is a system that also increases services both with regards to number of connections as well as connections to peripheral regions. Third, respondents do not mind demand based services either with regards to number of connections or connections to peripheral areas as long as ticket prices are reduced. Plausible proposals with increased government contribution (apart from the one that combines this with increased ticket prices) all reach quite substantively high predicted levels of support, namely between 75% and 82.5%. That means, three out of four people would be in favour of these proposals.

4.2 Subgroups

Lastly, we assess support for public transport design attributes by respondent subgroups in order to assess whether there are differences due to personal affectedness of the policy and/or whether there are differences based on somebody's political orientation. For each policy attribute represented in the factorial experiment, we compare the predicted probability (marginal means) of support between these groups. For the predicted probabilities, we plot 95% confidence intervals - where significant differences between subgroups are indicated by whether these confidence intervals overlap.

Figure 5: Marginal Means of Public Transport Design Attributes by Subgroups - Car Ownership and Residence.

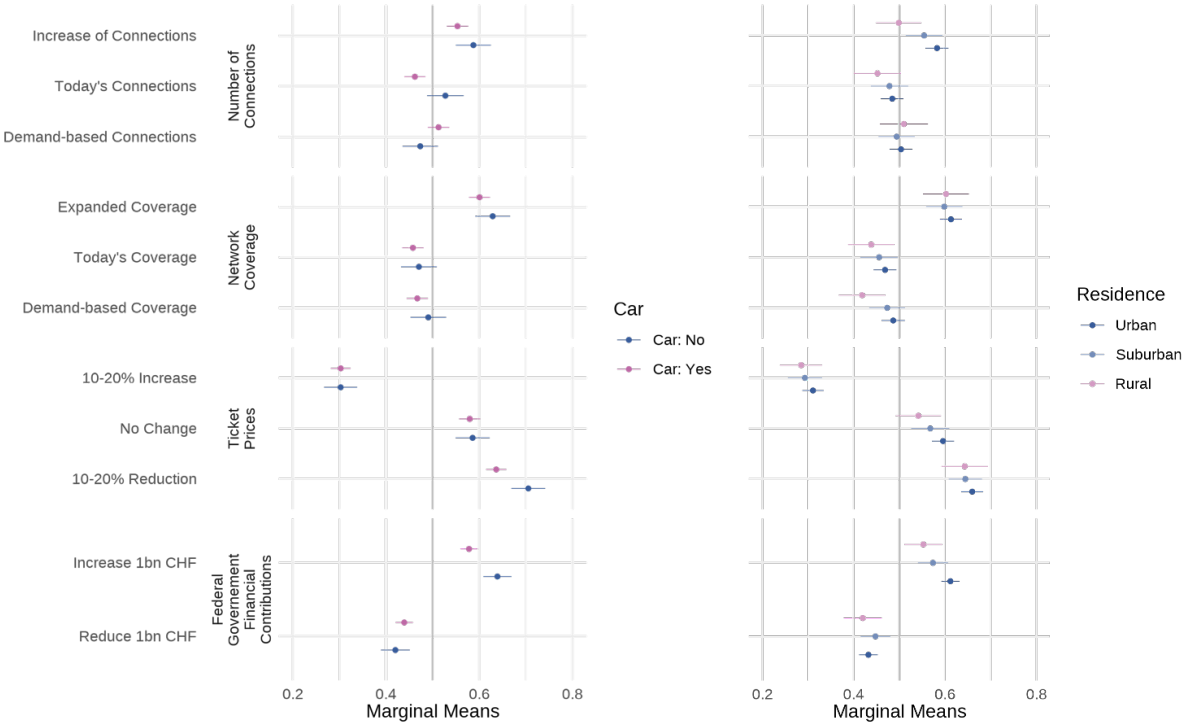


Fig. 5 shows subgroup differences for car ownership and location of residence. For car ownership, we only find a slight difference in support levels for ticket prices and government financial contributions. Car owners are significantly less in favour of reducing ticket prices than non-car owners ($\sim 8\%$), they are also slightly less in favour of increasing government financial contributions ($\sim 4\%$). For place of residence, the only significant difference seems to be with regards to increasing the number of connections, where urban dwellers are $\sim 8\%$ more in favour of compared to rural residents.

Figure 6: Marginal Means of Public Transport Design Attributes by Subgroups - PT Season Pass Ownership.

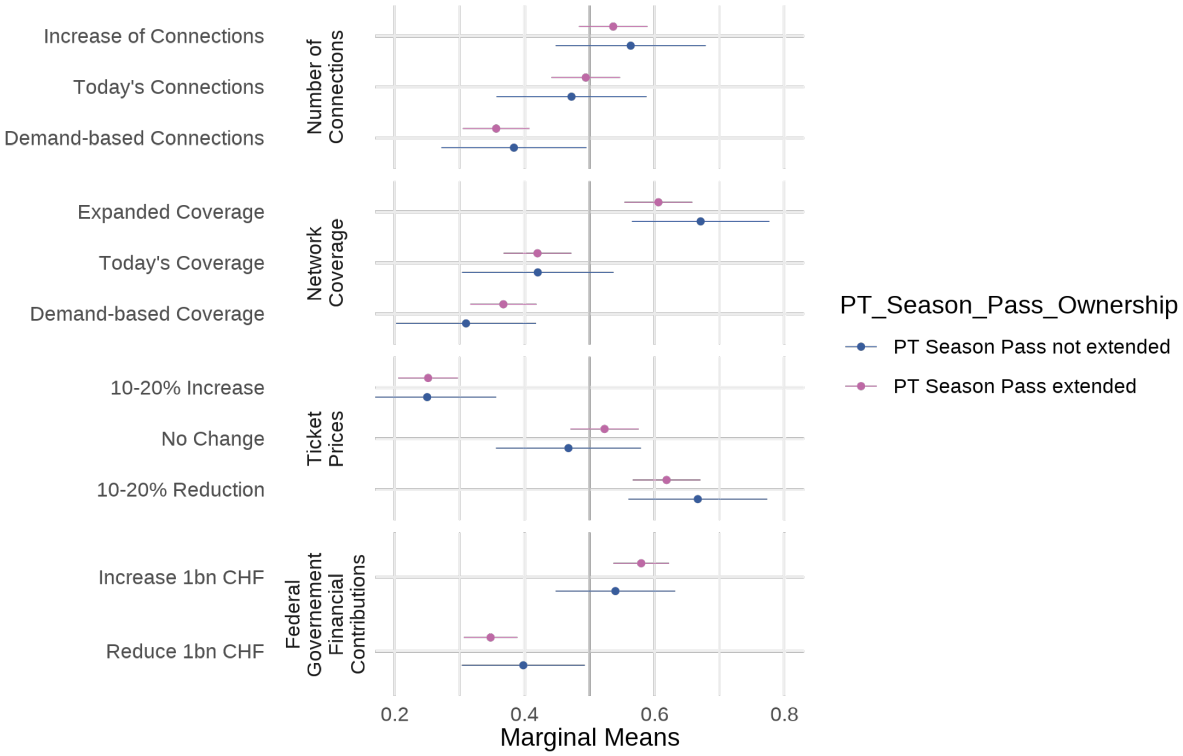
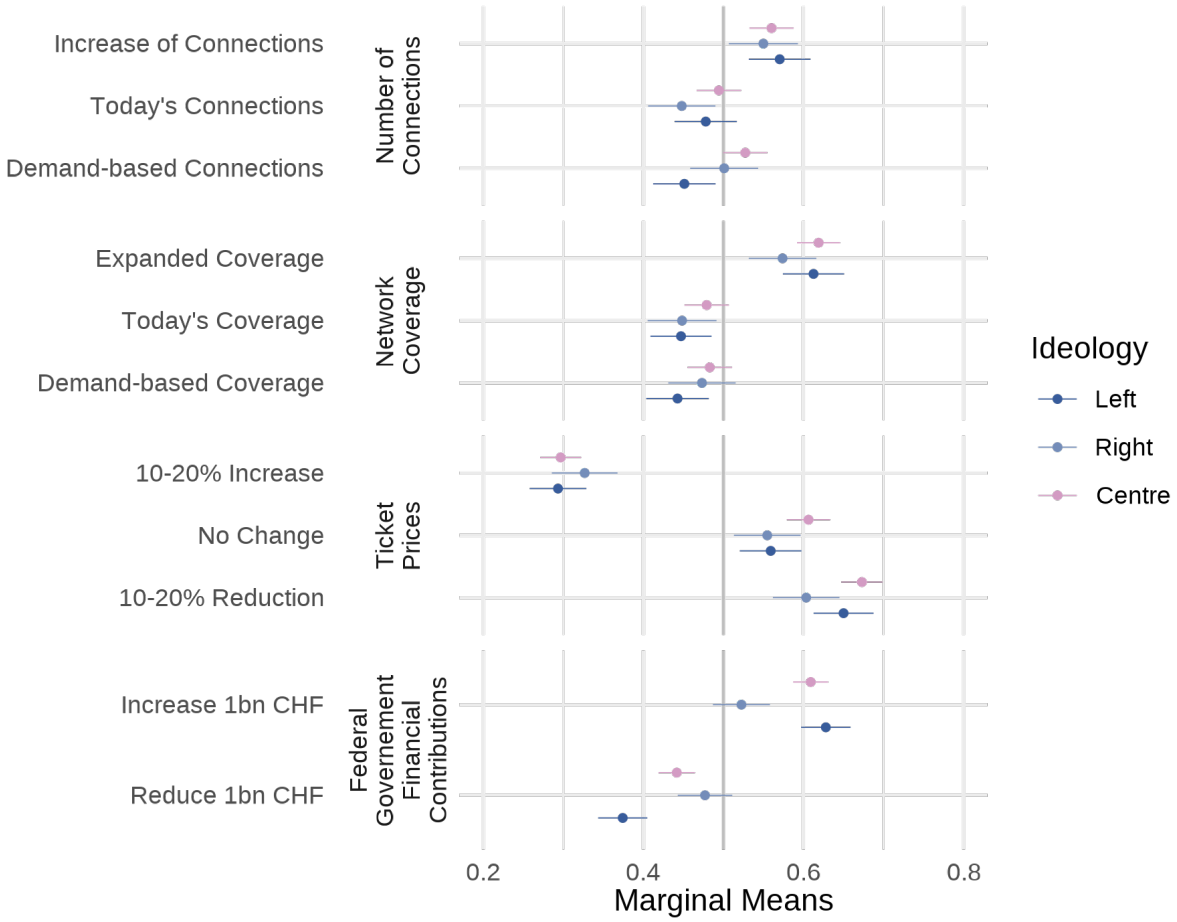


Fig. 6 shows subgroup differences depending on season pass ownership for public transport. Importantly, this is based on a sample of customers of SBB, and therefore not representative of the Swiss resident population. However, it allows to draw some conclusions about the immediate effect of season pass ownership on preferences for public transport. While there are some slight differences between those that continued to possess a season pass despite the COVID-19-pandemic and those who did not, none of them are at a significant level.

Turning to political orientation as a potential moderating factor between public transport design attributes and support , Fig. 7 shows differences between respondents that identify as politically left, centre or right. Again, significant differences between these groups are rather the exemption. Respondents that identify themselves to be in the political centre are $\sim 7\%$ more in favour of demand-based connections during the day compared to left-leaning individuals. Also, centre-leaning respondents are more in favour of ticket price reductions than their right-leaning counterparts. The strongest differences can be seen with regards to whether or not the government should increase or decrease its financial contributions. While a majority of respondents that identify as left- or centre-leaning is in favour of increased financial contributions, people that identify as politically right do not

Figure 7: Marginal Means of Public Transport Design Attributes by Subgroups - Ideology.



support either increases or decreases of government contribution by more than 50%.

5 Discussion

An attractive public transport system seems to enjoy unequivocal support by Swiss people despite changing mobility patterns in the aftermath of the Covid-19-pandemic.

First of all, it is not necessarily surprising that preferences for increased public transport services are on average stronger compared to the Status quo or even a more demand-based service provision, as well as it is not particular noteworthy that government financial support enjoys high levels of support, in contrast to further increases of ticket prices. People's stated preferences in surveys with regards to these goods are usually the same, as the provision of public goods is a valence issue unless this provision is in competition with

other government actions (Holland, 2023). The full factorial design of the experiment however, allows to assess trade-offs between different elements of the public transport system and put these costs in context in order to see for what people are willing to pay or prioritize funds more and for what not.

It is therefore noteworthy that support is most consistent for increased government financial contributions across all potential designs, and this also at substantively high levels. Not a single proposed public transport design which is plausible and incorporates higher government contributions reaches less than 50% support by Swiss people. 3 out of 4 people are in favour of these proposals. These preferences are robust amongst different subgroups, even though it is somewhat weaker for people that identify themselves as politically right.

Secondly, this goes hand in hand with strong preferences for reductions in ticket prices. The only package including ticket price increases that people support with more than 50% is if both number of connections and connections to peripheral areas are increased. This means that people are not per se against higher ticket prices, but only if they are matched with substantive improvements of services. There are no meaningful differences between subgroups with regards to ticket prices increases.

Third, surprisingly Swiss people are still highly supportive of public transport designs even if they include some sort of demand-based services. This is contrary to our expectations, where we would have expected that people show much lower support levels for these types of designs. Also, we would have expected stronger differences with regards to personal affectedness (e.g. lower support for demand-based designs amongst rural residents). However, this last point needs to be taken with caution as transport planners usually warn against incorporating to much flexibility in timetables as even one-time negative consumer experiences can have long-lasting effects on how people assess transport modes.

While therefore the results of this study shed a less dire picture on public preferences towards public transport in the context of Switzerland as some have feared, one needs to keep in mind that this is a context with a highly developed public transport system. The context in developing countries with less established public transit systems is potentially quite different, and preferences especially after the restrictions that came with Covid-19 might be less in favour for these types of public investment, particularly when public funds are scarce.

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A Appendix

A.1 Appearance of Full Factorial Experiment in Survey (Example)

Public transport is used differently by diverse groups within the Swiss population depending on the region, time of year and day. This raises the fundamental question of how public transport in Switzerland should be designed in the future. We would like to hear your opinion on this.

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Number of connections At the moment, large parts of the public transport system in Switzerland are characterized by a 'fixed interval' timetable. This means that connections are offered at regular, fixed intervals throughout the day. This also applies outside of typical rush hours when demand is rather low (e.g. during the day or in the evening after 8 o'clock).

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Connection of peripheral regions In addition, peripheral regions of Switzerland are also connected via public transport, regardless of how frequently these connections are actually used.

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Ticket prices The income generated by transport companies from ticket sales purchases and season ticket ownership currently covers about half of the actual costs for the operation, maintenance and expansion of the public transport infrastructure.

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Public sector financial contributions The public sector (federal government, cantons, municipalities) finances the other half of the public transportation costs.

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Proposals for the future design of public transport in Switzerland thus focus on these four aspects:

- Number of connections
- Connection of peripheral regions
- Ticket prices
- Public sector financial contributions

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Assume that popular vote is being held today on the future design of public transport in Switzerland. The proposed plan looks like:

- The number of connections per day **remains the same as today** (the 'fixed interval' timetable is maintained but not further expanded).
- Public transport connections to peripheral regions will **remain the same as today**, but will not be further expanded.
- Prices for tickets and season tickets (e.g. GA Travelcard, Half Fare Travelcard, Regional Travel Pass) will **remain the same as today**, i.e. they will not become more expensive or cheaper.
- Reduction of the annual public sector contribution to public transport **from today's CHF 9 billion to CHF 8 billion**.

Imagine you had to decide today only on this proposal in a popular vote, would you vote for or against it?

- Vote for
- Vote against

Please indicate, how much do you support or oppose this proposal?

- Strongly oppose
- Oppose
- Somewhat oppose
- Neither support or oppose
- Somewhat support
- Support
- Strongly support

A.2 Overview of Attributes and Levels of the Full Factorial Experiment

Table 1: Overview of Attributes and Levels

Attribute	Level	Text
Number of connections	**1**	The number of connections per day will be **increased** (the 'fixed interval' timetable will be expanded)
	2	The number of connections per day **remains the same as today** (the 'fixed interval' timetable is maintained but not further expanded).
	3	The number of connections will be **reduced at times when demand is low** and **increased at times when demand is high** (dismantling of the 'fixed interval' timetable).
Connection of peripheral regions	**1**	Public transport connections to peripheral regions will be **expanded**.
	2	Public transport connections to peripheral regions will **remain the same as today**, but will not be further expanded.
	3	Public transport connections to peripheral regions will be **reduced according to demand** (reduction of connections, replacement of trains through buses), and at the same time **connections will be expanded to regions where demand is higher**.
Ticket prices	**1**	Tickets and travel cards (e.g. GA Travelcard, Half Fare Travelcard, Regional Travel Pass) will become **10-20% more expensive**.
	2	Prices for tickets and season tickets (e.g. GA Travelcard, Half Fare Travelcard, Regional Travel Pass) will **remain the same as today**, i.e. they will not become more expensive or less expensive.
	3	Tickets and travel cards (e.g. GA Travelcard, Half Fare Travelcard, Regional Travel Pass) will become **10-20% less expensive**.
Public sector financial contributions	**1**	**Increase** of the annual public sector contribution to public transport **from today's CHF 9 billion to CHF 10 billion**.
	2	**Reduction** of the annual public sector contribution to public transport **from today's CHF 9 billion to CHF 8 billion**.