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Implementation gaps in cross-border co-operation: evidence from the regional train network in Greater Geneva

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ABSTRACT

The Léman Express (LEx) is Europe's largest cross-border rail network. As the backbone of public transportation that connects Geneva with its French suburbs, the LEx should contribute to increasing sustainable mobility and to achieving the 2050 carbon neutrality objective. Accompanying measures such as new bus routes and tramways connected to LEx stations as well as bicycle lines, park and ride, and pedestrian facilities should be implemented to ensure that LEx achieves its full impact on the modal shift and active mobility. However, the findings in this study demonstrate that more than half of the LEx's accompanying measures are overdue; planning quality, national co-funding, and municipal support are key factors for reducing delays in their implementation. Notably, these empirical findings hold across the Greater Geneva area despite the institutional peculiarities of the Swiss and French political and administrative systems. This case study adds to the literature regarding European border studies by analysing the consequences of a cross-border environment on territorially bounded projects.

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1. Introduction

As part of the Paris Agreement, which was ratified on 12 December 2015, the signatory countries – including France and Switzerland – committed to halving their greenhouse gas (GHG) emissions by 2030 (compared with their 1990 levels) and to achieving carbon neutrality by or before 2050. GHG emissions are primarily generated by the transportation sector, which accounts for over 32% of all GHG emissions in Switzerland (OFEV, 2023) and almost 29% in France. A modal shift from individual motorised transport (IMT) towards more environmentally friendly modes of transport is one of many other possible measures to lower GHG emissions in the transportation sector and thus to contribute to achieving these ambitious climate policy objectives.

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These policy stakes are particularly high in cross-border agglomerations such as Greater Geneva, where most jobs are supplied in the heart of the conurbation (i.e. within Geneva city limits in Switzerland) while housing is mainly developing in the suburbs (i.e. France), thus generating significant IMT commuter flows. The *Léman Express* (LEx), which is Europe's largest cross-border rail network, was inaugurated in 2019 to improve the public transportation offer, foster a modal shift, and eventually increase sustainable mobility at the agglomeration level. Accompanying measures such as new bus routes and tramways connected to LEx stations as well as bicycle lines, park and ride, and pedestrian facilities were included in the official agglomeration projects to ensure that LEx achieves its full impact on cross-border train ridership. Furthermore, the Swiss government granted significant co-funding to implement major accompanying measures in Greater Geneva. Despite these favourable conditions, more than half of LEx's accompanying measures are either overdue or have been abandoned.

This paper addresses this puzzle by presenting an investigation into the potential factors that can be derived from previous scholarship on planning and public policy to explain the unexpected implementation gaps. Statistical analyses were employed to assess whether and to what extent the planning environment, the distribution of property rights on land, the available administrative resources, and the political acceptance of LEx's accompanying measures at the local level matter. The empirical findings indicate that failures during the planning process and opposition from municipal authorities have significantly increased implementation delays, whereas the risk of losing federal funding has accelerated implementation. Furthermore, the impacts of these factors are similar in Switzerland and France, regardless of the major differences between the two political and administrative systems. Reorienting attention from presumed and naturalised national explanations to the underlying causes of dysfunction is a significant contribution to the existing literature on cross-border co-operation processes within the transportation infrastructure. The focus on the secondary accompanying measures is critical for demonstrating how the main obstacles inherited from the cross-border context materialise only once the LEx flagship project has been implemented.

The remainder of this paper is organised as follows. The next section describes the context of our case study and the empirical puzzle to solve. Then, we provide an overview of the existing literature and explain the research hypotheses. In the following section, we describe the data and methods that we used to test the hypotheses. After presenting and discussing the empirical results, the final section concludes the paper and paves the way for future research.

2. LEx's accompanying measures: favourable conditions with implementation gaps

Promoting a shift from IMT to public transportation is particularly relevant in the Greater Geneva area, which extends across Switzerland (the entire canton of Geneva and the Nyon district in the canton of Vaud) and France (the *pôle métropolitain du Genevois français*, which means 'metropolitan hub of the French Genevan territory'; this federation of eight inter-municipality councils spreads across the departments of Ain and Haute-Savoie). Despite the years-long efforts of public authorities in both Switzerland and France, the distribution of housing and jobs remains uneven across Greater Geneva

(see Gumy et al., 2022 for more details on socio-spatial inequalities). The majority of housing is in France, while the majority of jobs are in Geneva city limits, thereby generating a significant daily flow of approximately 105,000 non-Swiss commuters (as of December 2022). This is primarily due to the significant discrepancy in wages between the two countries, which has led to considerable residential mobility from other French regions and other countries towards Ain and Haute-Savoie. Accordingly, the development of public transportation in the cross-border region is critically important to prevent urban sprawl and the consequent loss of remaining green spaces. The continually growing metropolitan area population and ongoing cross-border integration process suggests that the flow of traffic is set to increase. According to demographic projections, the population of Greater Geneva, which currently stands at 1.02 million, will reach 1.34 million by 2040 (Pointet & Lerch, 2021); this is leading to longer commuting distances that place a considerable burden on the road network. Although public transport services have increased by 3% per year since 2014, disparities persist between the heart of the conurbation in Geneva and the suburbs in Ain and Haute-Savoie departments. Improving public transportation and cross-border continuity is therefore a policy priority.

Specifically, the challenge is to maximise the potential for a modal shift. Results of a mobility survey conducted in autumn 2022 by the Swiss Federal Institute of Technology in Lausanne (EPFL) throughout the Greater Geneva area indicate that approximately 60% of respondents living in Ain and Haute-Savoie departments reported IMT as their main travel method to their workplace in Geneva.¹ Conversely, the proportion of exclusive IMT users residing in the canton of Vaud is 37% and 32% in the canton of Geneva. There is therefore an interest in adopting policy measures that encourage cross-border workers to use public transportation rather than their private cars to travel to work.

LEx is the backbone of public transportation in the Greater Geneva area and is designed to increase sustainable mobility. This cross-border regional rail network connects Geneva with its suburbs in France and the canton of Vaud via tunnels under the city of Geneva. The construction of this new train line is a symbol of transnational urban co-operation in the Greater Geneva territory; it represents an investment of CHF1.6 billion for the 14 kilometres on the Swiss side, and EUR232 million for the two kilometres on the French side. These new railways (16 new kilometres total) allow connections to the previous infrastructures, making LEx span over 230 kilometres of rail line. The opening of this line in mid-December 2019 connected 42 train stations (20 in France, 19 in the canton of Geneva, and three in the canton of Vaud) on either side of the national border (see Figure 1). Some of the new LEx stations are more than transportation hubs since they offer access to multimodalities (e.g. park and ride, car sharing, e-bikes, etc.) and, as public spaces and shopping centres, provide retail and services (Wicki et al., 2023).

Swiss and French political authorities were aware that accompanying measures were needed for LEx to achieve its full potential as well as to encourage a significant shift from IMT to public transportation (i.e. bus lines, tramways, and railways) and active mobility (i.e. pedestrians and bikes). Accordingly, the Local Grouping of Transnational Co-operation (*Groupement local de coopération transfrontalière*), which, under Swiss law, is a public political entity responsible for organising co-operation within Greater Geneva

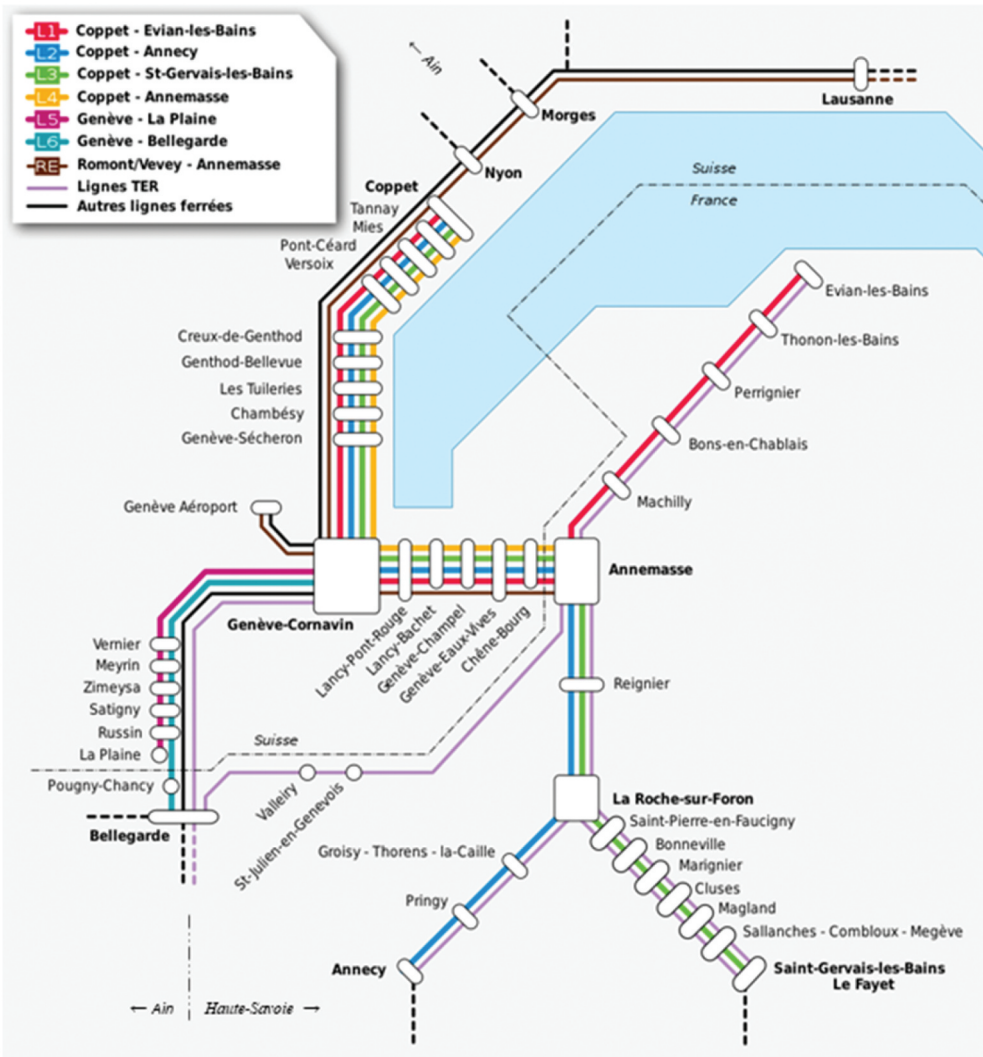


Figure 1. Map of the léman express. **Source:** Lémanis SA

(see Noferini et al., 2020), approved the 2019–2023 cross-border road map of associated measures to accompany LEX development.

LEX’s 145 accompanying measures are in the cantons of Geneva and Vaud as well as the French departments of Ain and Haute-Savoie. The bulk comprises mobility measures such as bicycle lanes or pedestrian walkways (55%) and bus feeder services to LEX stations and tramways (17%). In financial terms, the 118 infrastructure measures for which costs are known represent CHF1.142 billion, as detailed in the following table per territory and type of measure (Table 1).

These accompanying measures were supported by the Swiss national state, which has ‘facilitated’ (Sohn & Reitel, 2016; see also Durand & Lamour, 2014) cross-border metropolitan collaboration in Greater Geneva by financially supporting infrastructures related to transportation policies. Accordingly, the Swiss Office for Spatial Development (ARE)

Table 1. Number and budget of the measures according to their types and territory .

Type of measures	Nb of measures (in %) Budget in millions CHF (in%)			
	Geneva	France	Vaud	Total
Mobility measures such as bicycle lanes and pedestrian walkways	52 490,08	15 62,43		67 (57 %) 552,51 (48 %)
Bus feeder services to the LEx stations and tramways network complements	18 172,50	7 229,25		25 (21 %) 401,75 (35 %)
Park and ride facilities	7 123,62	9 45,60	1 2,25	17 (14 %) 171,47 (15 %)
Bicycle parking facilities	7 10,72	1 2,71		8 (7 %) 13,43 (1 %)
Motorized two-wheeler parking facilities	1 3,20			1 (1 %) 3,2 (>1 %)
Total	85 (72%) 800,11 (70%)	32 (27%) 340,00(30%)	1 (>1%) 2,25 (>1%)	118 (100 %) 1142,36 (100 %)

Source: Cour des comptes, 2023.

This table gathers only the 118 measures (out of the 145 measures) for which financial costs were available.

in 2001 launched the federal agglomeration policy to strengthen coherence in the spatial development of urban agglomerations. Greater Geneva has recurrently applied for federal funding of its agglomeration projects (*projets d'agglomération* in French; hereafter referred to as *AP*). The ARE positively evaluated the relevance and expected effectiveness of these successive Genevan APs (AP1: 2009–2013, AP2: 2014–2018, and AP3: 2019–2023). Thus, the Swiss Confederation granted co-funding to implement transportation policy measures in Greater Geneva. Indeed, 70% of all of LEx's accompanying measures (i.e. 102 out of 145) were included in the first-, second-, or third-generation APs, and 39% of the measures (i.e. 57 out of 145) received financial support from the ARE. The federal grants total CHF162 million, which corresponds to approximately 14% of the total budget for all of LEx's accompanying measures. Furthermore, CHF112 million have been allocated to measures that are to be implemented in the Swiss territory and CHF51 million to measures that are to be realised in neighbouring France.

Three points should be highlighted here (see also Sohn & Reitel, 2016, p. 310 and 316). First, it is unusual for a national state to lend financial support for infrastructural transportation measures in a cross-border metropolitan area. Second, Switzerland rarely provides financial incentives at the same relative level (14% of the total Lex accompanying measures' budget) on either side of the national border. Third, the ARE's agglomeration policy is oriented for the long term, and Switzerland has a key role in facilitating the emergence, institutionalisation, and legitimacy of Greater Geneva. Furthermore, the French government's commitments over time to consider the Franco-Valdo-Genevan region as a priority for the metropolitan co-operation programme, which was developed in June 2004 by the Inter-ministerial Delegation for Territorial Planning and Regional Attractiveness, contributes to the territorial recognition and organisational stabilisation of Greater Geneva. Essentially, when neighbouring countries' policy views converge across decades (see also Perkmann, 2003, p. 163 and 166) and when local authorities on both sides of the border enjoy financial support, one can reasonably expect that LEx's accompanying measures will be implemented in due time.

However, our study – which is based on data collected during the joint audit conducted by the three supreme audit institutions,² which are responsible for the three territories within the Greater Geneva area – indicates that this is not the case. More than half of LEX's accompanying measures are either overdue (50%) or have been abandoned (7%). Overdue measures are, on average, three-and-one-half years behind schedule, with delays ranging from five months to 10 years. Furthermore, the measures that have been or are being delayed account for CHF600 million, which corresponds to 75% of the estimated investment for all of LEX's accompanying measures. The measures lagging furthest behind are infrastructure for active mobility and park and ride facilities. Finally, these findings are identical for each of the three agglomeration territories (i.e. Geneva, France, and Vaud). The puzzling question then arises as to why such a delay has occurred when, a priori, favourable conditions for implementation success were established.

3. Explaining implementation delays: theoretical framework

The literature on spatial planning has long neglected the whys and wherefores of how elected representatives or preferential actors change the plan and why and how executive officers depart from the formally approve[d] plan. (...) Political decision-making and implementation are processes of their own, with different actors and different rationales interspersed with sector and local/regional logics. New actors, new agendas, new goals and new strategies turn up with political decision-making and implementation (Albrechts, 2006, p. 1489). Conversely, the scholarship on policy implementation and programme evaluation aims to bridge the gap between planning, administrative output, and societal impact. These policy studies focus on the interactions between public administrators and civil society representatives, interpreting implementation as an interactive and negotiated process (Hill & Varone, 2021:206ff.). Typically, implementation is a complex and strategic game (Bardach, 1977) that leads the non-execution or selective application of certain planning, legislative, or regulatory provisions. Such implementation deficits might be due to missing co-ordination between public administration (affiliated with different ministries or levels of government), their insufficient endowment with resources (e.g. personnel, money, expertise, or time), opposition from target groups (e.g. NGOs or residents' associations), or reluctant attitudes from street-level bureaucrats on the frontline (Hupe et al., 2105; Lipsky, 19805).

In this study, we adopted a policy design approach (see Linder & Peters, 1987) and considered failures in both the planning phase (i.e. policy 'crippled at birth'; see Hogwood & Perers 1985) and the implementation process (i.e. policy sabotaged by resistance from implementing organisations or policy target groups) as explanatory factors for the observed delays in the execution of LEX's accompanying measures. Four main categories of potential explanatory variables were identified. We must note that the list of potential explanatory variables was derived theoretically and then validated through intensive exchanges between the researchers and Swiss and French civil servants responsible for the mobility policy in Greater Geneva. The four categories of explanatory variables refer to a variety of theoretical approaches (e.g. policy analysis, institutional economics, procedural justice, etc.) that were applied in previous studies based on

qualitative case studies or quantitative surveys (including conjoint experiments). This interdisciplinary theoretical framework is innovative among empirical studies on the implementation of cross-border mobility policies, as it moves beyond spatial determinism in which the national border is viewed as an obstacle in itself. Furthermore, the application of this framework to a range of accompanying measures, as opposed to cross-border flagship infrastructures such as LEx, illuminates the multiplicity of potential causes for the observed delays.

3.1. Planning environment matters

First, any co-ordination problems which remain unsolved during the planning phase will probably reappear during the implementation stage. This concerns especially challenging issues related to inter-policy coordination and integration (Trein et al., 2021). As many of LEx's flanking measures have spatial impacts, there is a need to proactively coordinate the public transportation policy with the land-use policy and to ensure heritage or environmental protection (underground water, forest, and fauna conservation) policies. For example, if a park and ride facility is to be built on partially wooded land and if the public administration in charge of forest protection has not been consulted and given its approval during the planning phase, then the park and ride will probably face fierce opposition or even legal obstruction from this administrative unit, leading to delays in the park and ride construction. More generally, we expected that if the quality of the ex ante co-ordination between policies was weak (i.e. poor planning quality), then the likelihood of implementation gaps would increase.

3.2. Property rights matter

In addition to coordinating different public policies, which is political scientists' focus, empirical studies on infrastructure must also incorporate property rights granted to land users (Gerber et al., 2009). Property rights are considered to be the determining institutional rule – enshrined in the national civil code or constitution – by scholars in resource and institutional economics (e.g. Bromley, 1991, Cole & Grossmann 2002; Steiger, 2006). Accordingly, if the implementers of LEx's accompanying measures do not uphold the formal property rights (i.e. no public domain) or fail to restrict private landowners' use rights (i.e. no expropriation for public interest), then implementing transportation policy falls foul of the legal guarantee of property rights. Specifically, landowners will resort to court arbitration to defend their property titles and related use rights. The theoretical assumption is thus as follows: the more landowners are affected by LEx's accompanying measures, the more likely are judicial litigation processes and implementation delays. Conversely, if the public project owner in charge of realising a LEx flanking measure is the only landowner involved, then no delays should be observed during the implementation phase in that regard.

3.3. Resources matter

The availability of different resources to the public actors involved in a policy process as well as those resources' management, combination, and exchange exert a significant influence on implementation processes and policy outputs (Knoepfel

et al., 2007). The main policy resources considered by policy scholars are the law, which constitutes the source of legitimation par excellence for all public actions; money to finance the delivery of services or the realisation of public infrastructures; and personnel with the professional qualifications and technical expertise required to manage the implementation process. If a project owner responsible for the realisation of a LEx accompanying measure is not endowed with sufficient legal, monetary, and human resources, then implementation will probably be delayed. Conversely, if a French or Swiss implementing agency benefits from financial support because its infrastructure measure is part of the AP and is partially co-funded by the ARE, then this agency will implement the measure in due time so as not to lose the Confederation's financial support. Essentially, we expected that the greater the lack of crucial resources available to the project owner, the greater the implementation delays. This expectation might be particularly relevant to municipal actors, who are not experts in transportation and infrastructure policy and who may lack personnel resources, such as skills in managing and monitoring complex projects, organising competitive bidding for public contracts, or negotiating contracts with private construction companies.

3.4. Participation and community acceptance matter

Researchers on the siting of transportation-related infrastructures have repeatedly emphasised the well-known not-in-my-backyard syndrome. Furthermore, studies on local projects that benefit everyone (i.e. modal shifts and GHG reductions) but have localised negative effects (i.e. land required for a Park & Ride and induced traffic) suggest that procedural aspects, such as informing and involving local politicians and citizens in the planning and implementation process, should increase the perception of procedural fairness and thus the support for the infrastructure realisation (Gross, 2007; Dermont et al., 2017; Serra & Casademont 2022; Stadelmann-Steffen & Dermont, 2021). Conversely, lack of procedural justice (e.g. missing information and inclusion in decision-making), concern about local image and reputation, and the perception that local autonomy is negatively affected by actors at a higher level of government might explain the citizens or local authorities' resistance to infrastructure projects (see Suskevics et al., 2019). Furthermore, we expected that either residents or elected politicians' opposition at the municipal level would have a stronger negative impact on policy implementation in Switzerland than in France. This is expected, as the autonomy of communes is higher in the Swiss federalist system than in France and because opponents to an infrastructure measure can use direct democracy instruments (i.e. asking for a popular referendum) to voice their concerns and block the implementation process.

In addition to the four main categories of explanatory factors, we also controlled for additional variables that may impact implementation gaps, such as the institutional setting, by using a binary variable for the French and Swiss territories³ as well as the estimated costs of the measure. Specifically, we assumed that LEx's accompanying measures might be overdue if the realisation of the accompanying measure depended upon another adjacent development project (e.g. public works or private construction encroaching on the site), faced unforeseen technical contingencies (e.g. soil geology), or was expanded due to changes in mobility needs (e.g. more parking space for e-bikes).

4. Data and methodology

To identify the respective role of each explanatory factor on the observed implementation delays, we launched a survey to collect data on the implementation of LEx's accompanying measures. This survey was sent in February 2023 to the 98 project owners responsible for the 145 flanking measures. These project owners included a variety of organisations such as public administrations, transportation public utilities, autonomous foundations that manage public parking, and the Swiss national railway company, among others. The written questionnaire comprised 51 questions that ranged from the characteristics of the accompanying measures to the challenges faced by the owners during their implementation, the effective use of these measures by citizens, and projected improvements. All project owners responded to the questionnaire. This (in comparison to other studies) participation rate is an asset of our empirical study. The statistical analysis presented in this paper covers 116 measures that are considered abandoned; measures with incomplete variables were eventually withdrawn from the analysis. Overall, the sample gathers 79 LEx flanking measures implemented in Geneva (out of 91), one in Vaud (out of two), and 36 in France (out of 41).

Overall, 60% of LEx accompanying measures faced a delay during their implementation, with the average delay amounting to no less than three-and-one-half years (42.6 months). From the detailed delay breakdown according to the type of measure, LEx accompanying measures that lagged furthest behind primarily concerned (1) infrastructure for active mobility, including cycle paths and pedestrian walkways; (2) bus feeder services to LEx stations and complementary tramways; and (3) park and ride facilities, and motorised two-wheeler parking facilities. A simple regression model was estimated to uncover the statistically significant determinants of these delays; the number of months late was the dependent variable. Relying on the theoretical framework described in the previous section, we included many explanatory variables in our econometric estimation; this coding is depicted in [Table 2](#). Some of these variables were coded according to the project owners' self-reported perceptions, such as 'quality of planning', 'degree of legal constraint of the planning document', 'sufficiency of personnel resources', or 'sufficiency of legal competence'.

Beyond the mere identification of overdue measures and the tentative explanation of implementation delays, we also investigated whether the delayed measures aligned with Greater Geneva residents' mobility practices. Through the EPFL's mobility panel survey that was conducted in autumn 2022, we gathered information on the current use of LEx's accompanying measures and the related expectations of LEx users and nonusers.

Survey participants were selected to ensure a representative sample of the Lake Geneva region. We collected 11,248 completed questionnaires, which represents a 24% response rate. Statistical analyses for the Greater Geneva area were eventually based on respondents who said they travelled at least once a month within the Greater Geneva area, which totalled 5,703 respondents. Within this sample, 53% of respondents (2,998 individuals) cited at least one LEx accompanying measure that could make them use the LEx more often. Conversely, 38.2% (2,176) said that no measure could make them use the LEx

Table 2. Potential determinants of the implementation delays.

Category	Variable	Scale	Mean	Sd	
Planning environment	Quality of planning	1 (bad)	2,57	0,64	
		2 (average)			
		3 (good)			
	Degree of legal constraint of the planning document	0 (non-binding) 1 (binding)	0,57	0,5	
	Inclusion in the agglomeration project	0 (no) 1 (yes)	0,73	0,44	
		Land ownership of project owner	1 (none) 2 (partial) 3 (full)	2,14	0,62
Property rights	Multiple landowners	1-6 (number of landowner)	2,27	1,32	
		Federal co-financing	0 (no) 1 (yes)	0,41	0,49
Resources	Sufficient personnel resources	1 (not sufficient) 2 (partially sufficient) 3 (sufficient)	2,66	0,58	
		Sufficient legal competences	1 (not sufficient) 2 (partially sufficient) 3 (sufficient)	2,78	0,51
			Opposition from the residents	0 (support) 1 (opposition)	0,11
Participation and acceptance	Opposition from the Municipality	0 (support) 1 (opposition)		0,06	0,24
		Control variables	Dependence on another development project	0 (no) 1 (yes)	0,59
Technical contingencies	0 (no) 1 (yes)			0,21	0,41
	Use of technological innovations		0 (no) 1 (yes)	0,13	0,34
Downsizing of the measure		0 (no) 1	0,16	0,37	
	Scaling up of the measure	0 (no) 1 (yes)	0,21	0,41	
		Estimated costs (in Million Swiss Francs)*	0 – 96,2	10,5	17,3

Source: Cour des comptes, 2023.

Data collected for 116 measures. However, the asterisk denotes that the “estimated costs” variable is available for a restricted sample of 108 measures only (out of the 116 for which all other variables are available). In addition, its reliability is rather low as the amounts were provided in different currencies and paid in different period of times during a period with important exchange rate fluctuations between Swiss Francs and Euro. Therefore, the comparison of the estimated costs in Swiss Francs across periods or between measures may not be fully reliable. For this reason, we provide a specification with this variable for robustness checks, but the specification excluding this variable is preferred for the interpretation of the results.

more frequently. Finally, 7.2% of the sample (410) cited no measures but said they already used the rail line regularly. We used these survey data to assess to what extent users and nonusers’ expectations for LEx improvements align with the LEx accompanying measures that are furthest behind schedule.

5. Results and discussion

The results of the statistical analysis reveal that the three determinants were correlated (in a statistically significant way, with everything else being equal) with the number of months of implementation delay. First, a LEx accompanying measure with appropriate planning maturity had a delay of 12.2 months less than a measure with average planning quality. Second, obtaining federal co-financing

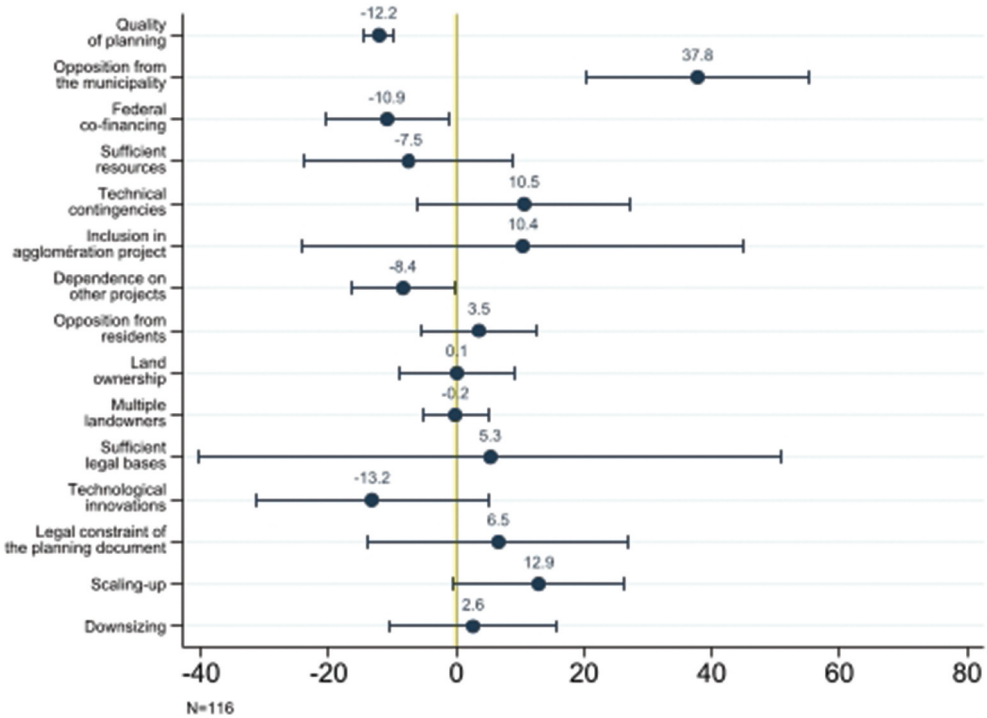


Figure 2. Coefficients from the OLS estimation. **Source:** Cour des comptes, 2023. The reported coefficients correspond to the results of the econometric estimation in column 1 of Table 3. The confidence intervals correspond to a 95 % significance level.

(by the Swiss Confederation) reduced the delay by an average of 10.9 months compared with a non-co-financed measure. Third, an accompanying measure opposed by the municipality in whose territory a measure was planned was, on average, 37.8 months later than a measure not opposed by the municipality. Figure 2 plots the estimated coefficients resulting from the OLS estimation procedure; Table 3 provides the detailed results for all variables included in the estimation.

The interpretation of the empirical findings provides three lessons. First, the key variables associated with implementation delays involve three of the four explanatory factor categories that were introduced in the theoretical framework. As expected, the factors that matter include the planning environment (see the quality of ex ante coordination among policies), the availability of resources (see the federal co-funding of the LEx accompanying measures), and the degree of community participation and acceptance (see the opposition from municipalities). Conversely, property rights are not a major predictor of implementation gaps. Neither public landownership (e.g. public domain in France) nor a small number of private landowners who must be financially compensated if their property is expropriated for public interest seems to be a necessary condition for successful implementation of the LEx accompanying measures.



Table 3. Results of the econometric estimation.

	OLS	Poisson	OLS	Poisson
	(1)	(2)	(3)	(4)
Federal co-financing	-10.91** (3.466)	-0.483** (0.201)	-10.62*** (1.272)	-0.433*** (0.106)
Dependence on other projects	-8.384** (2.914)	-0.147 (0.226)	-8.312* (3.646)	-0.123 (0.211)
Quality of planning	-12.16*** (0.806)	-0.447*** (0.0850)	-10.83*** (1.703)	-0.410** (0.178)
Opposition from the residents	3.518 (3.272)	0.195 (0.119)	3.673 (3.696)	0.233 (0.167)
Opposition from the Municipality	37.78*** (6.251)	1.669*** (0.442)	40.09*** (8.384)	1.786*** (0.403)
Land ownership by project owner	0.0611 (3.232)	-0.103 (0.272)	-1.915 (2.580)	-0.159 (0.218)
Multiple landowners	-0.176 (1.836)	-0.0623 (0.0885)	-0.0300 (1.893)	-0.0178 (0.0737)
Sufficient HR resources	-7.528 (5.841)	-0.285 (0.315)	-8.006 (6.957)	-0.222 (0.318)
Sufficient legal bases	5.286 (16.45)	0.402 (0.417)	5.322 (15.54)	0.411 (15.54) (0.449)
Technical contingencies	10.55 (6.023)	0.571* (0.341)	11.11 (7.205)	0.604* (0.351)
Technological innovations	-13.23 (6.536)	-0.718*** (0.205)	-18.88* (7.331)	-0.924*** (0.158)
Legal constraint of the planning document	6.539 (7.328)	0.352* (0.182)	8.423 (6.419)	0.303 (0.237)
Inclusion in the agglomeration project	10.41 (12.42)	0.674 (0.510)	8.073 (10.93)	0.596 (0.469)
Scaling-up	12.88* (4.842)	0.503* (0.271)	13.01 (6.985)	0.522 (0.370)
Downsizing	2.593 (4.705)	0.101 (0.334)	2.314 (4.586)	0.0504 (0.217)
Estimated costs			2.88e-07**	1.18e-08**
			(8.94e-08)	(5.63e-09)
Project-phase : Pre-Project	-95.11** (30.47)	-2.226** (0.939)	-102.4** (30.59)	-2.788*** (0.891)
Project-phase : Programming	-99.68** (26.70)	-2.518*** (0.774)	-107.1** (26.53)	-3.102*** (0.660)
Project-phase : Project	-107.3*** (9.883)	-2.477*** (0.384)	-118.6*** (13.33)	-3.020*** (0.490)
Project-phase : Implementation	-94.44** (23.47)	-2.091*** (0.718)	-100.5** (22.85)	-2.617*** (0.557)
Project-phase : Preliminary analysis	-77.13** (20.04)	-1.312** (0.569)	-85.93** (19.87)	-1.920*** (0.887)
Type of measure : Active mobility	-63.64 (31.12)	-1.413 (0.868)	-70.47* (26.52)	-1.899*** (0.679)
Type of measure : Bus and tramway	11.07** (3.771)	1.053*** (0.263)	-1.286 (5.216)	0.137 (0.259)
Type of measure : Park and Ride facilities	-7.071 (6.496)	0.289 (0.406)	-22.02 (11.30)	-0.728 (0.716)
Type of measure : TW parking facilities	0.827 (3.314)	0.449*** (0.0728)	-13.62* (5.873)	-0.615 (0.448)
Project owner : Canton-Department	3.235 (2.446)	-14.64*** (1.156)	-0.702 (3.971)	-14.15*** (1.164)
Project owner : Municipality	-17.96 (16.98)	-1.168 (0.923)	-33.45 (19.75)	-1.659** (0.746)
Project owner : Private	-23.79 (19.77)	-1.314 (1.064)	-38.47 (24.27)	-1.812** (0.922)
Type of station : Agglomeration station	-17.22 (13.05)	-1.013 (0.894)	-42.64 (20.39)	-1.975** (0.918)
Type of station : Main station	-3.891 (7.997)	-0.366 (0.413)	-7.439 (6.719)	-0.554** (0.274)
Type of station : Local urban station	20.71** (6.694)	0.787** (0.321)	15.14 (8.542)	0.530 (0.392)
Territory : France	4.442 (5.002)	-0.0134 (0.170)	3.667 (4.131)	-0.00963 (0.115)
Constant	154.3*** (24.46)	5.788*** (1.973)	190.1*** (27.51)	7.479*** (1.682)
Observations	116	116	108	108
R-squared	0.457		0.471	

Source: Cour des comptes, 2023.

The reference category for the following variables are as follows: « Project phase »: « in operation »; « Type of measure »: « bike parking »; « Project owner »: « CFF-SNCF »; « Type of station »: « Small stations »; « Territory »: « Geneva canton ». Standard errors in parenthesis are robust and clustered at the type of measure level. *** $p < .01$; ** $p < .05$; * $p < .1$.

Second, running the same econometric models separately on different territories in the Greater Geneva area (France and Geneva)⁴ yielded no significant differences despite the political systems' institutional peculiarities. This result was unexpected since, for instance, direct democracy instruments (e.g. a referendum asking for a popular vote) are a key feature of the Swiss political system but are non-existent in France. However, opposition from residents who, in Geneva, could threaten a referendum against a LEx accompanying measure is not a determinant of implementation delays. The lack of major differences across the two institutional territories is also related to the low impact of property rights as mentioned previously. Here again, one would expect differences across territories since the residents' private property rights are more legally protected in Switzerland than in France, where expropriation for public interest is much easier to enact. However, empirical evidence demonstrates that implementation gaps of the LEx accompanying measures are not significantly associated with the legal guarantee of land property rights. Overall, the limited influence of institutional factors (e.g. direct democracy instruments and property rights systems) on implementation delays is positive for the promotion of cross-border projects. Indeed, all Greater Geneva territories face similar challenges despite different institutional settings; consequently, similar processes for planning and managing the LEx accompanying measures should eventually lead to converging implementation outputs in the Greater Geneva area.

Third, the EPFL survey results regarding Greater Geneva residents' mobility practices suggest that LEx users and nonusers' expectations regarding the improvement of this cross-border rail network correspond to the LEx accompanying measures that are furthest behind schedule. Approximately two-thirds of all survey respondents' requests ($N = 2,803$; 100%) for improving the LEx accompanying measures concerned public transportation to LEx stations (i.e. new bus routes or higher bus frequency; 39%), the creation of bicycle paths (14%), and the rated of park and ride facilities (13%). It should be noted that LEx users and nonusers largely agreed on this priority list (see Figure 3).

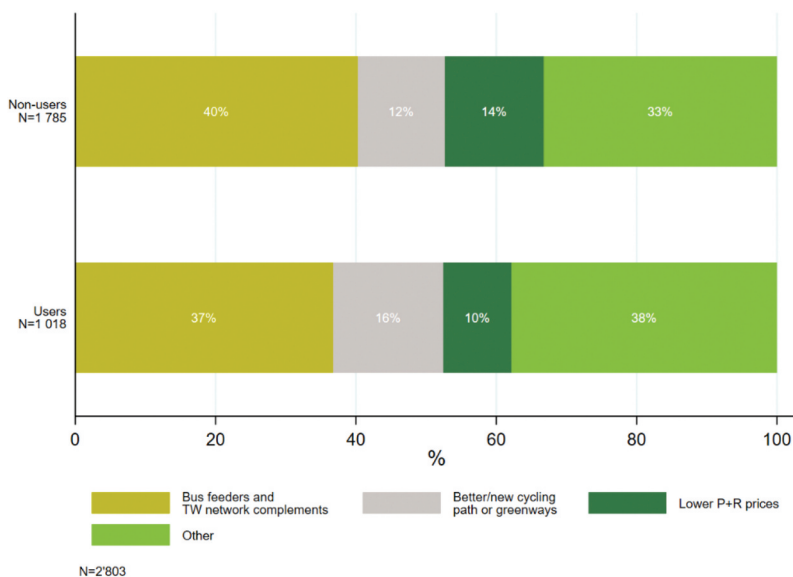


Figure 3. Measures cited by LEx users and non-users. **Source:** Cour des comptes and EPFL, 2023

Furthermore, the EPFL's survey participants expected these measures in the LEx stations where they were planned but had not yet been implemented. Here again, this result is rather positive for public authorities in France, Geneva, and Vaud and should encourage them to close the implementation gaps, thereby promoting the modal shift from IMT to the LEx as well as the related GHG reduction.

6. Conclusion

This study assessed whether the LEx accompanying measures have been implemented in due time and meet the needs of LEx users and nonusers. This topic is relevant since LEx is Europe's largest cross-border regional rail network and an emblematic example of a supply shock in public transportation. Furthermore, the LEx accompanying measures are the concrete expression of strong political commitments and efforts to adopt a coordinated approach to mobility on the cross-border scale of Greater Geneva. However, empirical evidence indicates that half of the LEx accompanying measures are overdue and that delays are primarily related to a lack of maturity (in design and feasibility) of the planned measures and to opposition from local authorities.

From a theoretical perspective, this research adds to the existing literature on cross-border co-operation processes, particularly in transportation infrastructures (Medeiros, 2019; Walther & Reitel, 2013). Our analysis of national measures within a cross-border landscape indicates that there is no difference in the reasons for implementation gaps, regardless of whether they are located in Switzerland or France. This reiterates that these implementation gaps, akin to an important proportion of socio-political cross-border dynamics in Europe (Clément et al., 2023), cannot be fully comprehended through the lens of a simplistic dichotomy between the represented countries and their respective institutional differences. Rather, this study's emphasis on a variety of complementary measures underscores the fact that the underlying causes of the observed delays are often shared. Fostering cross-border co-operation could thus overcome shared shortcomings in promoting a modal shift despite significant differences in the functioning of Swiss and French transportation and political systems. However, further investigation is needed to understand why the quality of planning significantly predicts implementation gaps for transportation-related projects, regardless of the country considered. Border studies have demonstrated barrier effects for cross-border landmark projects such as the LEx (Bucken-Knapp, 2001; Reitel, 2023), but less is known about the consequences of a cross-border environment on territorially bounded projects. What remains unknown is the extent to which differences in the legal responsibility for road or rail public transportation, which may not operate at the same geographical scale in neighbouring countries, complicate the extension of the network on both sides of a border. How do professionals, who typically use tools, backgrounds, and frameworks developed in a single country (Durand & Lamour, 2014), anticipate the cross-border scope of their projects? Similarly, what is the role of the current shares for transportation modes on both sides of the border, given their specific morphological characteristics, regarding the urgency of developing alternatives to the car? Do distinct national political schedules, such as local or regional elections, further complicate cross-border

synergies due to the rapidly changing landscape of decision-makers involved? These are important questions to address in future studies since modal shifts close to national borders rely not only on major cross-border infrastructures but also on a myriad of smaller measures needed to support them.

From a practical standpoint, we recommend that the public authorities of the three Greater Geneva territories should improve the planning process. If the planned measures, which will be integrated in the upcoming AP, display a higher maturity level, then delays in their implementation, their resizing, or even their discontinuation should be reduced, and the risk of losing the Swiss federal co-financing, which is – in international comparison – a noteworthy support scheme, should also decrease. Additionally, a more inclusive planning process, with the involvement of municipalities' representatives and residents as well as the integration of LEx users and nonusers' demands, should increase the perception of planning process fairness and, subsequently, the acceptability of the LEx accompanying measures' implementation.

Finally, we stress the need to undertake cross-border performance audits of these types of transboundary infrastructure projects. Indeed, the present paper is based on data collected by the three supreme audit institutions that were responsible for the territories that comprise the Greater Geneva area. The French, Genevan, and Vaudois courts of auditors were pioneers in the European context in developing a joint cross-border audit on the LEx accompanying measures. They determined to be as transnational and collaborative as the policy actors involved in the transportation policy of the Greater Geneva area they were to assess. They agreed that the perimeter of their ad hoc functional space of control should ideally correspond to that of the mobility basin and commuters' flows. Their joint performance audit is thus a first step towards the emergence of a 'cross-border functional area' (Jakubowski et al., 2021; Varone et al., 2013) for policy monitoring, public performance auditing, and impact evaluation. Such institutional innovation should be further encouraged.

Notes

1. See the official website for more statistical details: https://statistique.ge.ch/domaines/informations.asp?filtreI=03_05
2. See <https://cdc-ge.ch/publications/n-185-audit-de-performance-portant-sur-les-mesures-d'accompagnement-du-leman-express-lex/>
3. Regarding the possible impact of the COVID pandemic on the LEx accompanying measures, we assume that the shock is faced by the whole sample and its effect, if any, is included in the constant of the econometric model.
4. Due to the limited number of measures in the Vaud territory (only one non-abandoned measure), the econometric specification could not be performed separately on this subsample.

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