
DAILY MOBILITY IN THE ALPS AFTER THE COVID CRISIS RECOVERY



TRANSPORT WORKING GROUP OF THE ALPINE CONVENTION
-MANDATE 2021-2022-



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1. MANDATE GIVEN BY THE ALPINE CONFERENCE

Setting the scene

The lockdown suddenly ordered by almost all world's governments in March 2020, after the experience of the Chinese metropolis of Wuhan, revealed, amongst others, the adaptation capacity of people, companies and institutions. Phenomena such as the escape from big cities and remote working appeared openly. It is now hard to foresee how long-lasting these trends will be and what impact the new lifestyles could have on the regional development and on the environment of the Alpine massif.

This report aims to synthesize observations, analyses and recommendations already drawn in the Alpine and in other countries since the pandemic's outburst, and to propose answers to this question of the relationship between Alpine residents and their daily environment in the future.

The Alpine Conference requests

On 10 December 2020, in a virtual meeting held during the sanitary crisis, the XVI Alpine Conference entrusted the Transport Working Group (Transport WG or TWG) with six tasks. One of them consists in analysing *"the evolution of commuters' behaviours triggered by the sanitary crisis"*. It's enunciated as follows:

"Analyse the effects of the evolution of commuters' behaviours in the Alpine area concerning home-office mobility as well as everyday activities triggered by the recent sanitary crisis. Based on available reports in the member states of the Alpine Convention and on the results of the 2020 study report on possibilities for the reduction of transport demand through transport-saving spatial structures, new working or coworking solutions, pooling of shipments, regional and local distribution chains, changed mobility and behavioural patterns, recommendations for the implementation of measures in order to enhance quality of remote working life will be elaborated."

Former publications of the Transport WG related to the topic



The Alpine Convention Transport Working Group recently released a report related to the topic of daily commuting behaviours. During its 16th session on 10 December 2020, the Alpine Conference adopted its report on *Reduction of mobility demand and shift to*

*environmentally sustainable modes - Strategies and measures in the Alps*¹ whose recommendations include the following:

- To employers: establish relevant rules for remote working and foster “tele-houses” for coworking purposes;
- To schools and universities: ensure students aren't left alone far from their teachers and friends;
- To public transport companies and local authorities: adapt ticketing policies towards remote workers who commute seldomly;
- To logisticians: foster sustainable logistics;
- To municipalities: motivate people to spend leisure time near home; improve cycling and pedestrian networks; promote green buildings.

¹ https://www.alpconv.org/fileadmin/user_upload/Organization/TWB/Transport/Transport_Annex2_AT-CH_Reduction-of-mobility-demand.pdf.

2. ACTIONS BY PARTNER INSTITUTIONS

The Transport WG was invited by the Alpine Conference to work in cooperation with:

- EUSALP Action Group 4 (AG 4 Mobility);
- The Alpine Climate Board of the Alpine Convention;
- iMONITRAF!;
- Arge Alp;
- Interreg Alpine Space Programme;
- Zurich Process and its follow-up;
- Relevant stakeholders depending on each of the objectives: local authorities, employer associations, academics, environmental associations.

i) The European Union Strategy for the Alpine Region (EUSALP)



EUSALP, funded by the European Union, encompasses an area wider than just the Alpine Convention perimeter.

During its 2020 EUSALP presidency, France developed a programme² along seven axes. The third axis, *Developing sustainable mobility and transport solutions*, aims “to promote sustainable transport, develop information and ticketing services, the transition from road to rail, and to promote the networking of players to avoid redundancy of action”.

The first objective of EUSALP group on ‘inter-modality and interoperability in passenger and freight transport’ also called Action Group 4 (AG 4³) was “to promote inter-modality and interoperability in passenger and freight transport by supporting and fostering the removal of infrastructure bottlenecks, by bridging missing links, coordinating planning and timetables of public transport, modernizing infrastructure and enhancing cooperation. AG 4 is addressing this objective by focusing on infrastructure for sustainable transport in passenger- and combined transport as well as interconnecting

² Programme of the 2020 French Presidency of EUSALP, 4 February 2020, <https://www.alpine-region.eu/publications/french-presidency-work-programme>.

³ *État des lieux des activités des groupes d'action* (Situational analysis of action groups activities), European Union Strategy for the Alpine Region, October 2019.

*public transport systems, focusing on operations and information and ticketing services*⁴.

On 21 November 2019 (just before the pandemic outburst), *EUSALP* AG 4 released a report on *Cross-border mobility in the Alpine region*, that concerns about 600,000 people within the *EUSALP* perimeter, above all around Genève and Basel and in the Alpine Rhine valley. It calls for raising awareness among enterprises and commuters towards sustainable ways of commuting.

It also labelled infrastructure projects and Smart villages projects for good practice in mobility.

It took part in the Interreg Alpine Space project LinkingAlps and extended the *EUSALP* Platform of knowledge for Transport and Mobility.

EUSALP presidency was taken over by Italy on 26 January 2022 in Bozen / Bolzano. The 19th AG 4 Action Group Meeting took place on 15 and 16 March 2022. Its priorities remain the same as previously.

ii) CIPRA and the Alpine Climate Board



The *Commission internationale pour la protection des Alpes* (International Commission for Alps Protection – *CIPRA*) federates approximately one hundred Alpine organizations.

On behalf of the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, *CIPRA* is taking part to the *European Environment initiative – EURENI* devoted to saving land, for a shift in the way land is used in peri-urban areas. It aims at making good examples visible, elaborating conflict resolution models and gaining knowledge in the pilot regions on how to solve conflicts in land consumption. That project is indirectly linked with the question of commuting all-day mobility.

The *Alpine Climate Board* (ACB), created by the Alpine Conference and chaired by Austria, envisages for *CIPRA* the role of a “coordinator of coordinators”, in a think tank approach. It focuses on freight transport.

⁴ <https://www.alpine-region.eu/action-group-4-mobility>.

iii) iMONITRAF!



iMONITRAF! brings together the Alpine transit Regions. Its priority thus is shifting on rail the transport of goods.

On 9 November 2021, it held an event in Bruxelles in the frame of the European Year of Rail.

iv) Arge Alp

The *Arbeitsgemeinschaft Alpenländer* (Arge Alp - Alpine Countries' Work Community) promoted the Youth Alpine Interrail 2021 initiative. Moreover, it has been one of the organizers of the 3rd *Healing Power of the Alps* workshop devoted to the link between tourism and health, that took place as a hybrid event on 8 and 9 October 2021 in Bad Hofgastein and online. At its 30 September 2020 summit in Salzburg, it discussed the regulation measures to be undertaken against the Coronavirus.

v) Interreg Alpine Space



The *Interreg Alpine Space* programme, funded by the European Union, encompasses all the Alpine Regions (NUTS 2), that is more than just the Alpine range.

It has fostered the project *LinkingAlps* on interconnecting passenger transport information in an intermodal way.

vi) The Zurich Process



The *Zurich process* has been launched by the Declaration of Zurich, on 30 November 2001. It aimed at "*the improvement of road safety particularly in tunnels in the Alpine region*". During its 16 September 2021 online steering committee, the Swiss presidency suggested focusing in the future on the core question of freight transport modal shift. This question will be on the agenda of two meetings at ministerial level organized by Switzerland on 14 January and 26 October 2022.

3. REVIEW: WHAT COULD BE OBSERVED

i) A boom of teleworking

In the Parisian region, which is taken here as an example, the ratio of workers teleworking more often grew from 22% before the pandemic to 54% in July 2020, dropping back to 47% in September 2020. Active population teleworked on average 2.1 days a week. 40% of the respondents said they moved less than before⁵.

It is interesting to underline that in France, in 2019, only 3% of the employees (7% including occasional teleworkers), 5.5% in the Parisian region, regularly teleworked at least one day per week. This practice was quite usual for executives (14% of them being concerned), much less for intermediates (3%), and very rare for office workers and workers. Teleworking was mainly carried out from home (64%), otherwise in other establishments of the company (21%) and in proximity networks and coworking rooms (15%)⁶.

ii) No urban exodus yet, but a trend for citizens to leave town centres towards suburbs, or even peripheral mid-sized towns

The trend of flight from big cities seems for the moment imperceptible. Citizens grant their town a pragmatic, if not sentimental, attachment. On the other hand, the harshness of living conditions in towns during the mobility restriction times could in the future increase the trend of urban sprawl. This could raise the difficult question of reinforcement of interurban and far suburban public transport networks. For instance, a spot survey carried out in April 2020⁷ showed that 38% of Parisian metropolis inhabitants wished to move away from the city. The real estate market had been strongly dampened at that time, especially in the biggest cities. At the same time, outlying smaller towns and even rural zones experienced an unexpected real estate boom. This phenomenon could become stronger in the future, considering the long-time memory of people.

iii) Countryside people behaviours seem close to those of people living in cities

The question that interests us here is whether mobility patterns in the countryside are different from those in townships, and what sort of impact the pandemic has had on both. According to the two charts below, it seems obvious that behavioural patterns aren't quite different from each other (considering the distance covered per day) and that the rural world seems a bit more resilient than the urban one.

⁵ Source: Inov 360 survey carried out by Institut Paris Région (Paris Region Urbanism Institute).

⁶ *Qui sont les salariés concernés par le télétravail ?* (Who are the employees concerned by teleworking?), French ministry of Work, DARES, 4 November 2019.

⁷ Forum vies mobiles Survey.

It could thus be expected a quasi-status quo if people moved from towns to the country without staying tied up to their former residence.

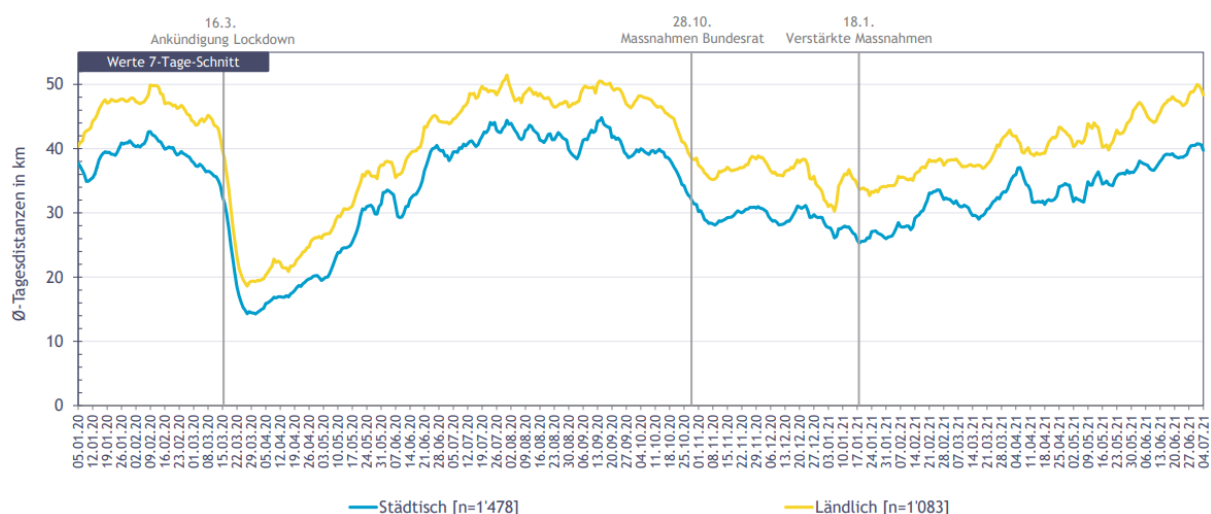


Figure 1: Daily average distance covered by citizens (blue) and countryside people (yellow) in Switzerland, source: *Mobilitäts-Monitoring COVID-19, Intervista*, 6 July 2021

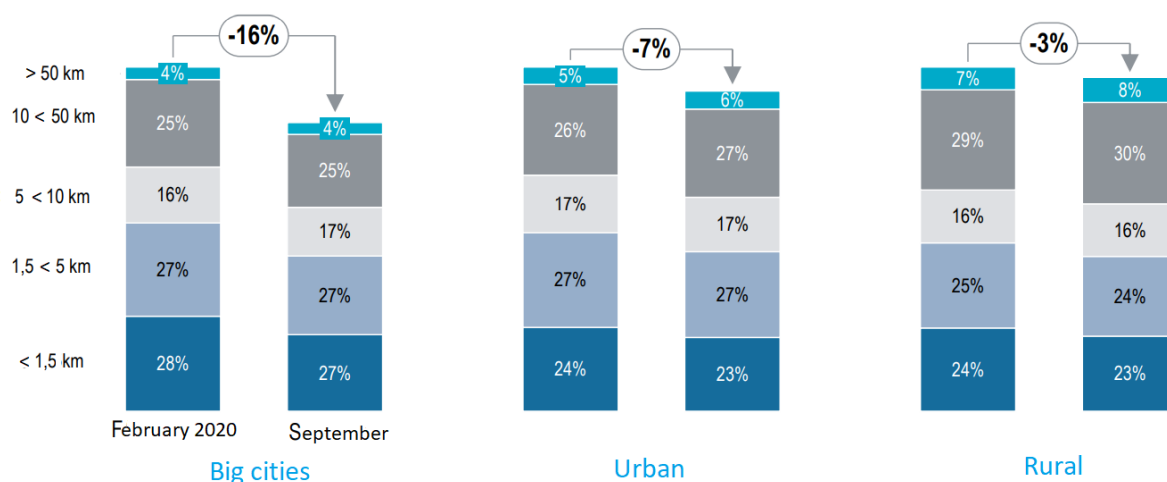


Figure 2: Evolution of trips number according to residence and distance in France in 2020, source: *Covid-19, Etat des lieux de la mobilité urbaine post-confinement* (Covid-19, inventory of urban mobility after confinement), *Kisio and Roland Berger*, 15 October 2020

iv) Hard drop of public transport, for the benefit of bike and soft modes, but above all individual car

The pandemic increased people's distrust towards public transport means, presumed unsafe. Almost all the Alpine countries were confronted with this phenomenon. Of course, traffic moved to other means, especially walking and private car, the volume of which growing significantly after recovery.

In Germany, according to the *DENA* survey (16 December 2020), 66% of regular public transport users reduced their use of public transport, in favour of biking, walking, carpooling and, a bit less, private car. The use of public transport dropped slightly in the thirty-year-old population. The main reason for this trend was the fear of contamination.

Before that, the German *ADAC* survey (24 November 2020) confirmed these trends: 20% of interviewees didn't use any more public transport; 22% thought of walking, even after recovery of the crisis; and 17% thought of riding on bike instead of using public transport.

In France, the main public transport means have been the last ones to gain their clientele back. That's particularly striking in the biggest cities like Paris, even one year after the pandemic outbreak. Bike traffic for example, as measured by meters put in the towns on cycle tracks, grew by 25% between 2019 and 2021. Nevertheless, since summer 2020, this growth stopped, although cities made big investments favouring it.

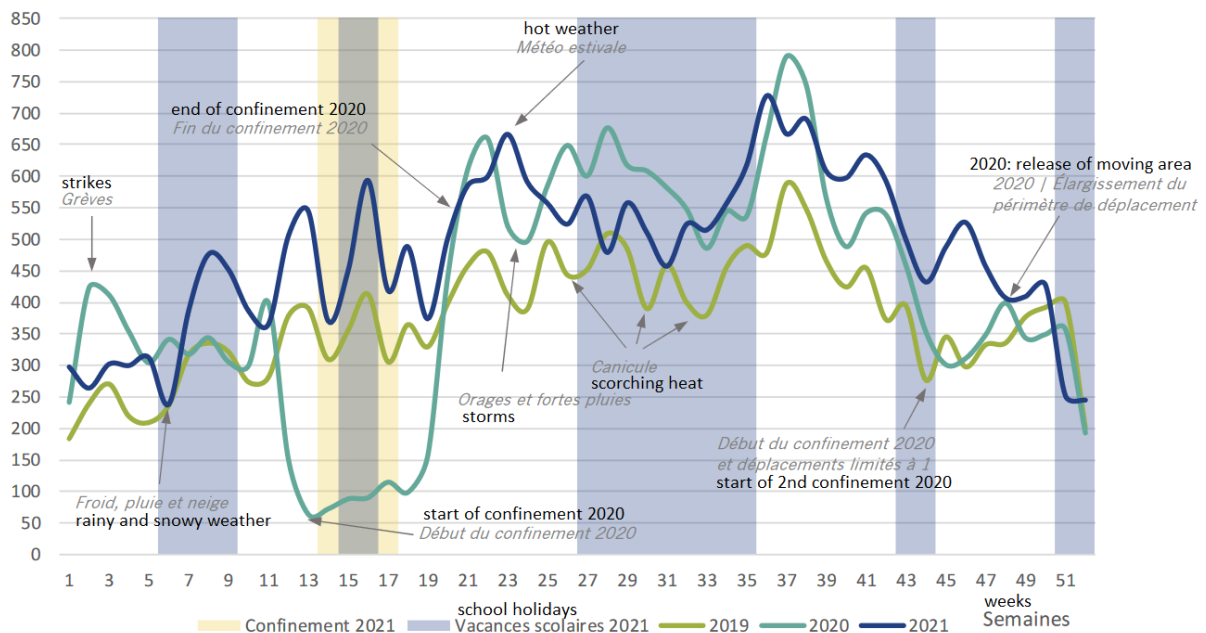


Figure 3: Average number of bicycle passages per day and per counter since 1 January 2019, source: *Vélo & Territoires*, 5 January 2022, https://www.velo-territoires.org/wp-content/uploads/2022/01/2022_01_05_Bulletin-Frqmentation-vlo-en-France_9.pdf

In Italy, traffic dropped in 2020 far more in railway transport than on the road: in midsummer, it reached only 50% compared as previous year in trains and urban transport, against 90% on the road for car traffic. Soft modes didn't take off: their modal share doesn't exceed 3.5% of all movements. The private car gathers most of the passenger transport modal shift.

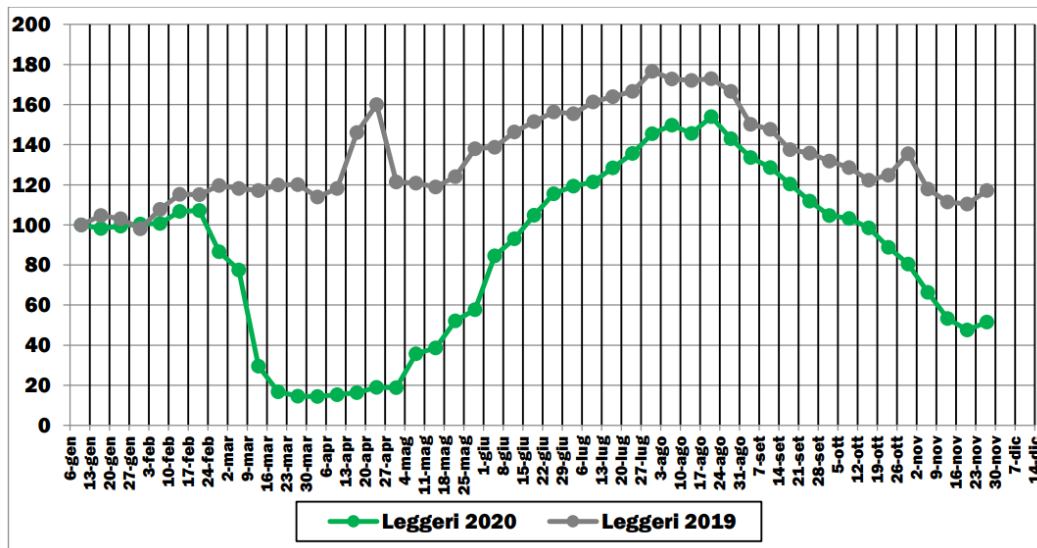


Figure 4: Traffic in 2020 compared to 2019 on the Italian highways, base 100 = 1st January, source: *Osservatorio sulle tendenze di mobilità durante l'emergenza sanitaria del COVID-19* (Observatory on mobility trends during the COVID-19 sanitary crisis), n° 2, 1 January 2021, <https://mit.gov.it/sites/default/files/media/notizia/2021-01/Monitoraggio%20COVID%20volume%202.pdf>

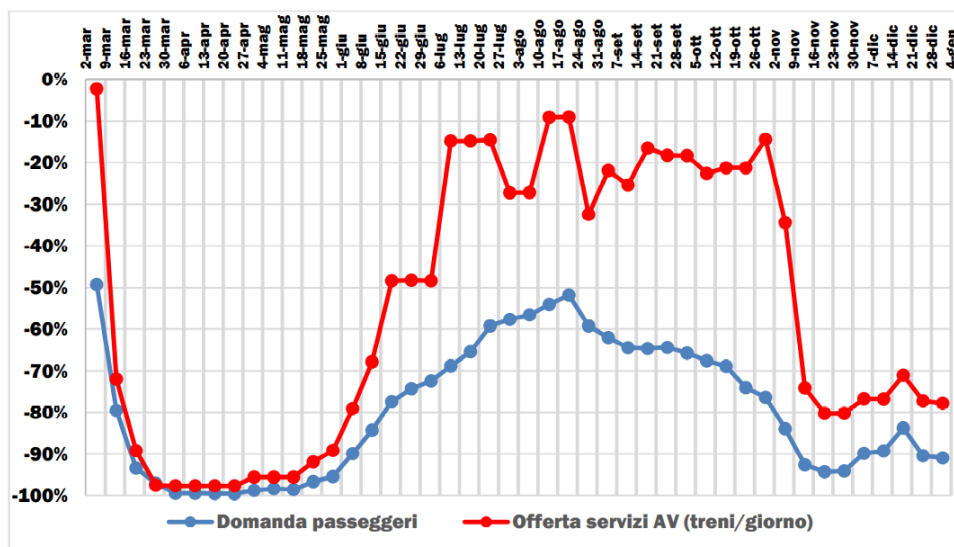


Figure 5: Supply and traffic in Italian trains between March and December 2020 compared to 2019, source: *Osservatorio sulle tendenze di mobilità durante l'emergenza sanitaria del COVID-19*, n° 2, 1 January 2021

In Switzerland, bus, according to the *MOBIS-COVID19* survey, tramways and trains remain durably full 40 to 60% below their 2019 level. At the same time, bike meets an impressive keen interest within people.

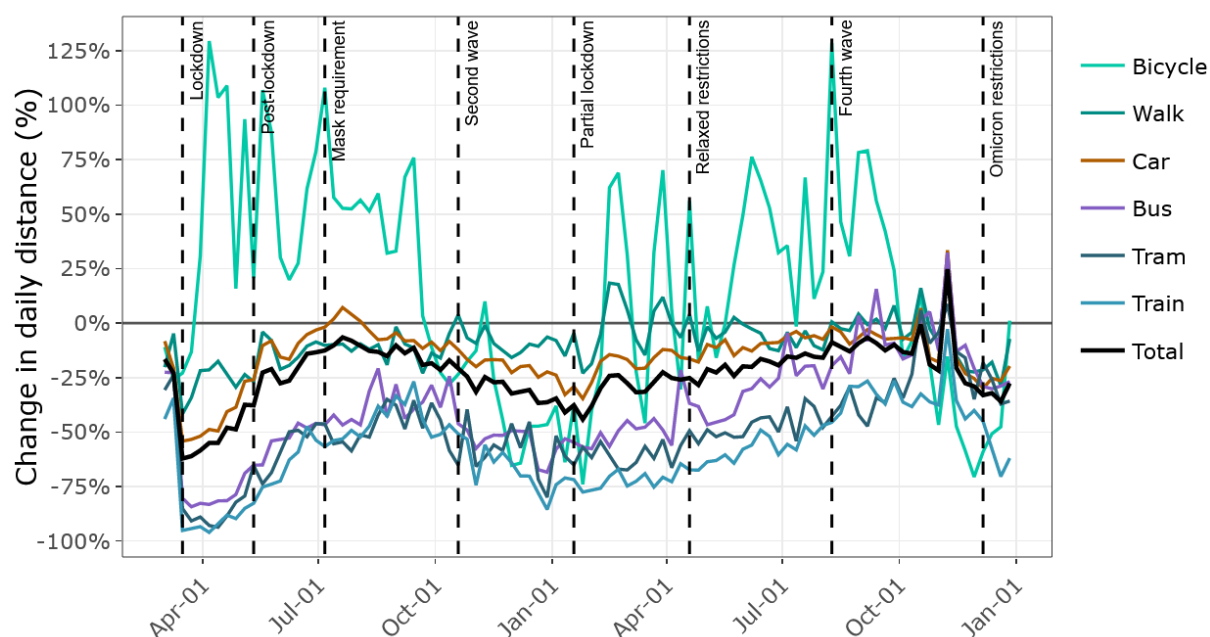


Figure 6: Evolution of daily distances travelled in Switzerland according to transport means from March 2020, source: *Mobis Covid 19*, ETHZ et al., 3 January 2022, <https://ivtmobis.ethz.ch/mobis/covid19/reports/latest>

Weekly mode share by kilometers travelled

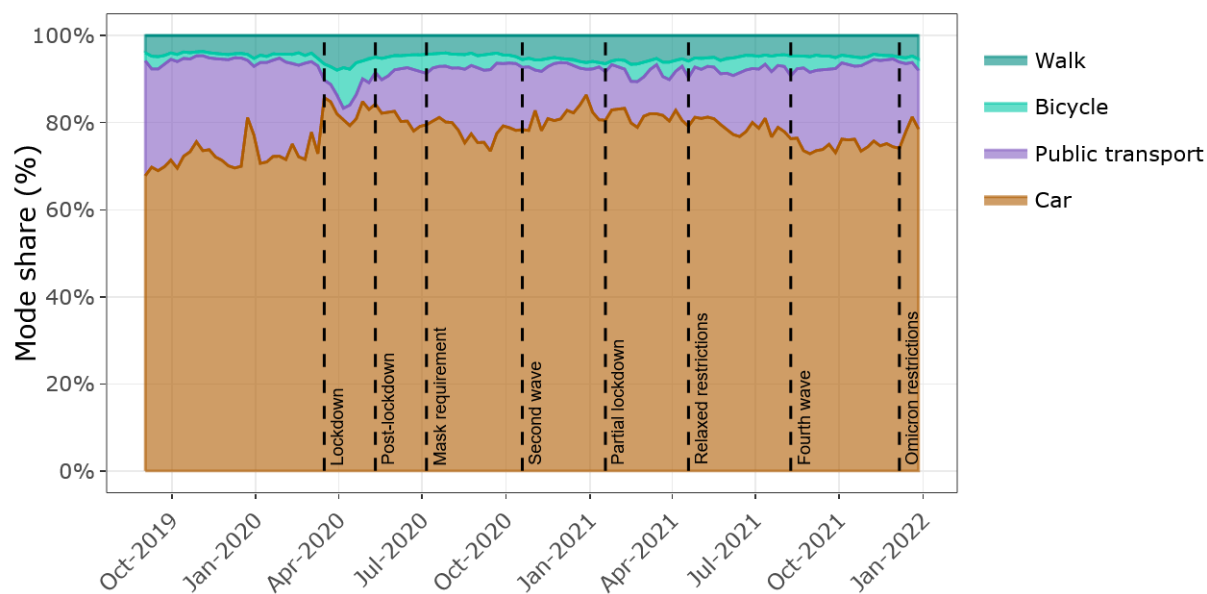


Figure 7: Weekly mode share by km travelled, source: *Mobis Covid 19*

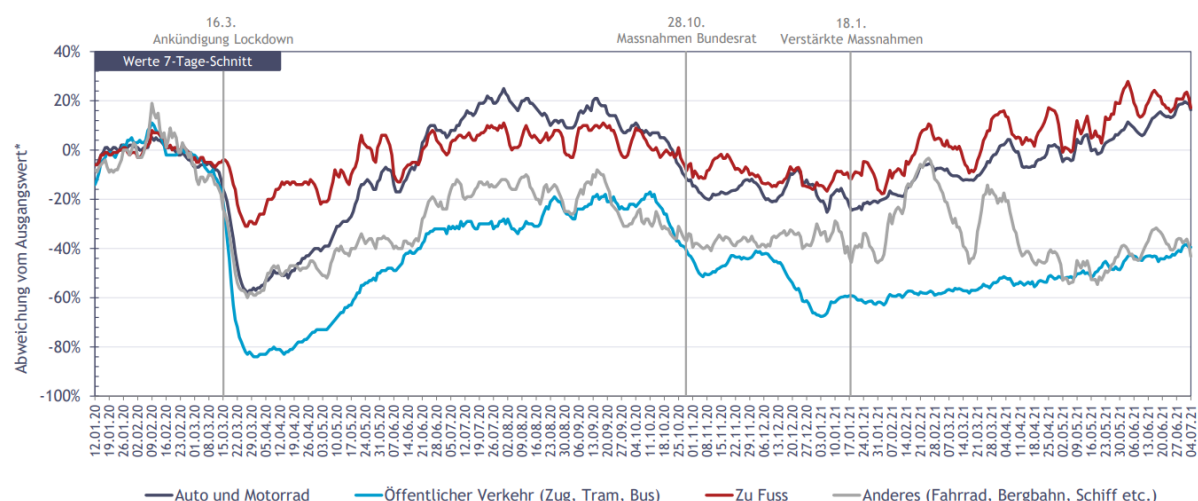


Figure 8: Evolution of daily distance covered by an individual according to the mode in Switzerland, source: *Mobilitäts-Monitoring COVID-19* (Mobility monitoring COVID-19), *Intervista*, 6 July 2021, https://www.intervista.ch/media/Report_Mobilitäts-Monitoring_Covid-19.pdf – Black: car and motorbike; blue: public transport (train, tramway, bus); red: pedestrian; grey: others (bike, cable car, boat, etc.)

v) Even weakened, urban transport still suffers peak-hour

Peak-hour management is of course, by disrupted service as well as normally, one of the most relevant problems in urban public transport.

The last surveys released on the mobility of French citizens show a very strong exacerbation of peak-hour, especially in the Parisian region. In substance, in public transport in the capital region, about 1/7th of the whole day-traffic flows during the morning peak-hour, against 1/12th on the road network, where the peak-hour phenomenon is less marked. At that same time, most of the journeys (89% according to the regional global transport survey 2010⁸) are for work or studies purposes. Evening peak-hour is broader, lower and more diversified. Besides work and studies purposes, people move for shopping, visits, leisure and other purposes, on a broader time period.

Moreover, population segmentation by socio-professional categories shows that their own peaks aren't synchronous: students and retired people leave earlier, while executives enter the transport system as latecomers. Were it possible to delay a bit executives' timetable, one could expect a substantial improvement of the morning peak. Even one hour delay would lower its volume by 30%. Adding two complementary hypotheses: (1) the generalization of teleworking (20% for intermediates, employees and workers, 40% for blue collars, every day of the week); and (2) that students and scholars turn by 50% to

⁸ Source: *Autorité pour la qualité de service dans les transports* (AQST - French Transport Service Quality Authority).

active modes (bike, walking, etc.), the peak-hour could be lowered by 46.5%, that is almost half of previous value, as show charts below⁹.

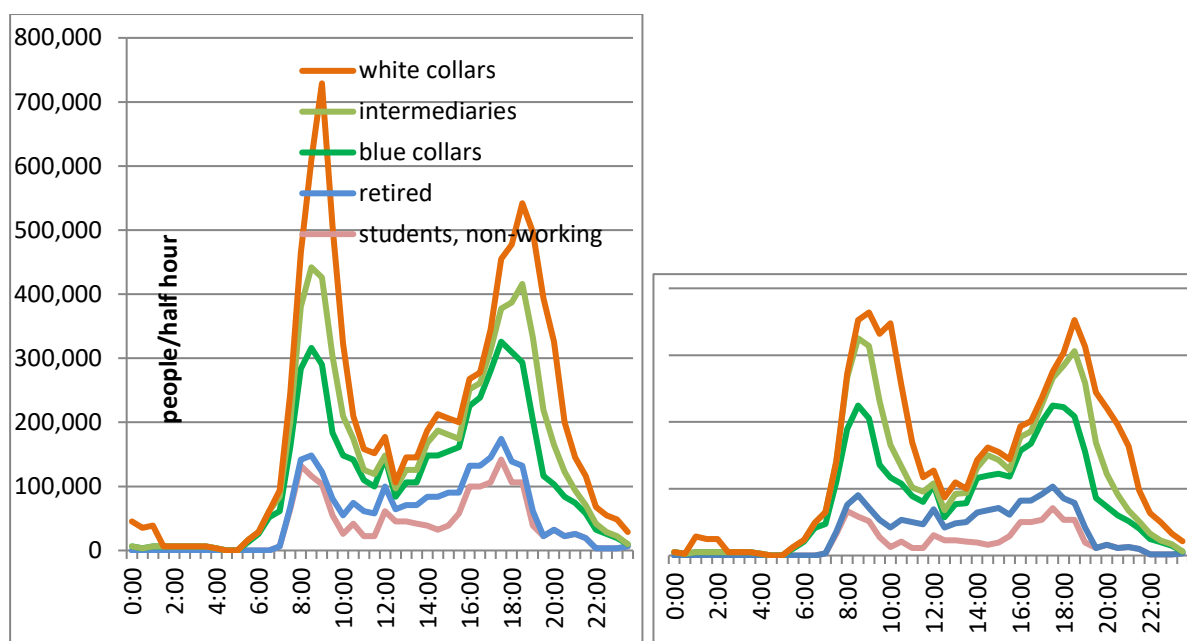


Figure 9: Working day movements in Paris region according to time of the day and to socio-professional group: as observed before pandemic (left, source: *Enquête nationale transports et déplacements 2008*), and under peak-hour applying our hypothesis (right).

It seems that active people are more flexible than expected, and that, if their interest matches that of their employers (from a sanitary point of view), lowering of peak-hour levels could be sustainable.

⁹ Calculated from Paris region experience.

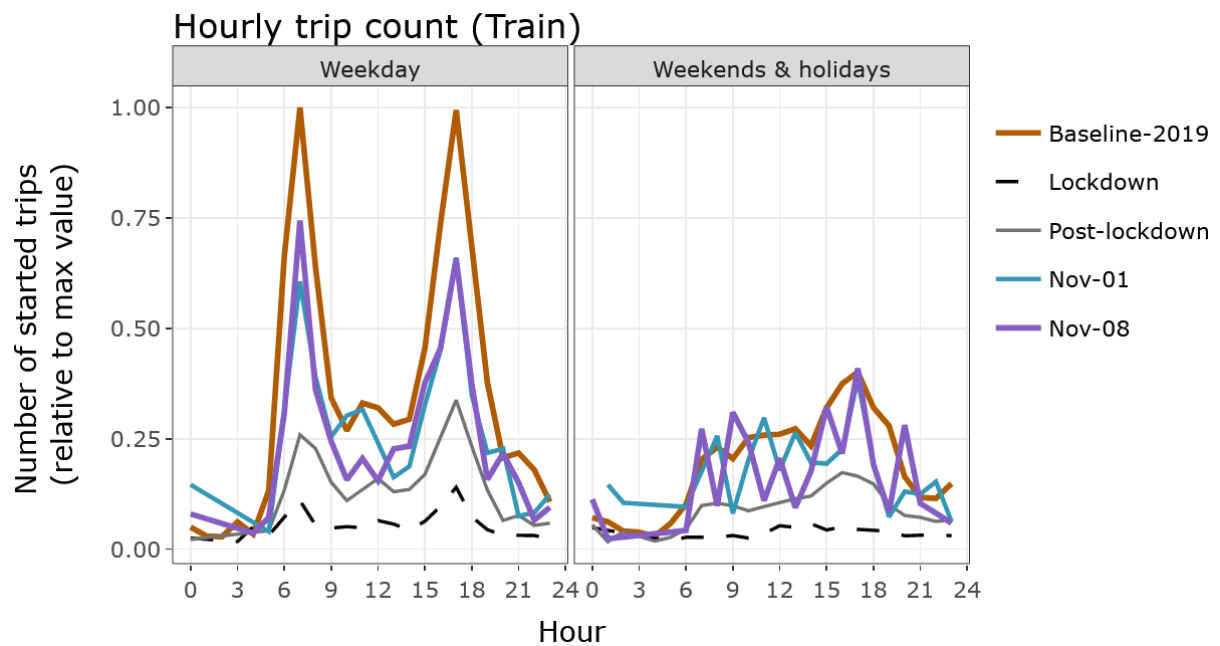


Figure 10: Railway hourly trip count in Switzerland, comparison 2019 / 2020, source: *Mobis Covid 19*, op.cit.

Long before the pandemic outburst, transport authorities started a negotiation with big employers concerning work time rearrangements in order to lower the peak. Lyon is a successful example of this.

4. HOW IT WAS OBSERVED

The comprehension of behavioural patterns changes requires their measurement, for which numerous techniques are available, which are described below.

i) Traditional tools: computing and population poll

First, authorities, especially in the field of transport, have been carrying out for a long time specific computation and poll surveys.

In France

Passengers' computing has been tested by numerous ways:

- Ticketing;
- On board of buses, notably at Dunkerque, with the help of videoscope cameras counting each boarding and getting off;
- In a rougher way, with the help of applications that request passenger inform users' community if vehicles are full or not.

There have been numerous surveys since the beginning of the struggle against the Covid-19 virus:

- The Ministry for Transport entrusted Harris Interactive with a survey on people's intention to move the following week. The first was released on 11 May 2020, the same day people's confinement was over. The fifth and last one was released by the end of the year 2020.
- At the same time, big local authorities, transport organizing authorities, led their own surveys, such as *Inov 360* in the Parisian region and *Covimob* in Lyon.

Moreover, the Ministry for Work and Social Affairs (*DARES*) carries out surveys on work practices, especially teleworking. Unfortunately, its last survey has been released in 2019, that's before the pandemic outbreak, and cannot describe workers' adaptation to the new context.

In Germany

Numerous surveys have been carried out on people's behavioural change due to pandemic;

- The *Fraunhofer Institut für System- und Innovationsforschung* (ISI, Fraunhofer Institute for Research on Systems and Innovation), in collaboration with administrative and academic partners in Germany and Japan, carried out two surveys in August 2020 and March 2021;
- The *Deutsche Energie Agentur* (DENA, German Energy Agency), by call of 1,002 adults over 18 speaking German between 18 November and 1st December 2020;

- The *Allgemeiner Deutscher Automobil-club* (ADAC, German Automobile Club), by interview of 2,061 adults over 18.
- The *DLR Institut für Verkehrsforschung* (DLR, Institute of Transport Research) asked around 1,000 adults over 18 as part of an access panel (April 2020 - December 2021)¹⁰.

Moreover, the *Bundesverband mittelständische Wirtschaft Unternehmerverband Deutschlands e.V. – Der Mittelstand BVMW* (German Federation of Middle Size Companies) released an analysis of the economic stakes of new lifestyles arisen from the pandemic.

With *Mobilität in Deutschland - MiD*¹¹ (about every 5 years, cross-section, over 300,000 participants) and *Deutsches Mobilitätspanel* (annual, longitudinal, over 3,000 participants) there are two mayor surveys in Germany allowing permanent observation of mobility behaviour. Both were conducted on behalf of the *Bundesministerium für Digitales und Verkehr* (BMDV, Federal Ministry for Digital and Transport).

As part of the annual mobility survey *Deutsches Mobilitätspanel*¹² participants in winter 2020/2021 were asked about possible changes in their mobility behaviour due to the COVID-19 pandemic using an additional questionnaire.

Another survey on behalf of the BMDV is the semi-annually published *Gleitende Mittelfristprognose*¹³. As a basis for these medium-term forecasts of the traffic development in Germany, the effects of the pandemic-related restrictions on the modes of transport were examined monthly for the year 2020 by using various available indicators (mobile phone data, data from traffic counting points, accident statistics, etc).

In Italy

Many polls have been released, such as:

- *Istituto Nazionale di Statistica* (ISTAT, National Institute of statistics) on 16 August 2021, from a questioning of adults over 18;
- *Groupama Assicurazioni* (Insurer), on 10 May 2021;
- *Areté*, 6 May 2021;
- *Osservatorio Nazionale Sharing Mobility* (National Observatory on Sharing Mobility), 29 September 2020;

¹⁰ <https://verkehrsforschung.dlr.de/de/news/dlr-befragung-wie-veraendert-corona-unsere-mobilitaet>

¹¹ www.mobilitaet-in-deutschland.de

¹² www.mobilitaetspanel.de

¹³

https://www.bag.bund.de/SharedDocs/Downloads/DE/Verkehrsprognose/Monitoring_Personenverkehr_Corona.html?nn=3290816

- *Autorità di Regolazione dei Trasporti* (ART, Transport Regulation Authority), 14 July 2020, from a poll on 1,000 persons carried out between 19 and 23 May 2020.

ii) Mobile phones movements tracking by radio relays

If a land-line owner could be located according to his home address, a mobile phone owner may be located at any time by the closest relay (except when his phone is shut down). That allows his provider to follow him in his footsteps. Precision of location depends thus on the density of relays, that is relatively low: about 500 m in town, and some km in the countryside. By the way, this technique cannot notice little movements such as going with children to school or daily shopping. Otherwise, it can identify a longer movement such as commuting in big cities, and assess density of population or main gatherings (cultural, sporting) as well as their fluctuations. Thus, phone operators suggest it for three types of surveys: tourism (assessed according bed-nights), geo-marketing (gatherings in main events, commercial centres and suburbs) and mobility.

Therefore *Orange* was able to assess the loss of population in the main French cities at time of the first confinement (17 March 2020)¹⁴. The published figures, that is 600,000 people leaving Paris *intra muros*, about one quarter of people usually living there, didn't stay unnoticed. A specific advantage of this imprecise technique is that it respects the anonymity of personal data. The map of France below shows people's movements registered at that time. Main losers of inhabitants are both Paris and inner suburbs, and ski resorts. Otherwise, the rural world gained people.

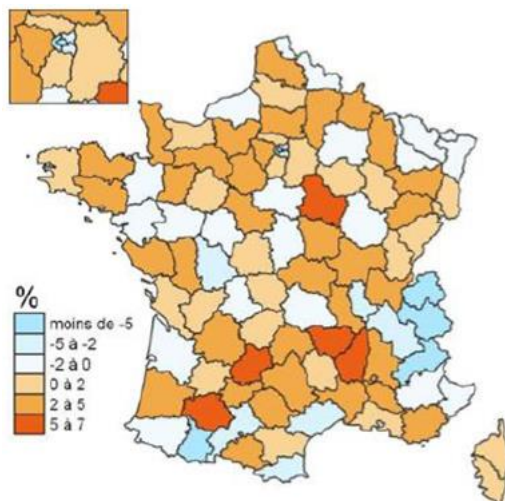


Figure 11: Evolution of French population distribution since Covid first confinement (17 March 2020), (source: Orange and INSEE - National Institute of Statistics and Economic Studies), showing population growth in the 100 French Departments during the early confinement time

¹⁴ *Population présente sur le territoire avant et après le début du confinement, premiers résultats* (Population present on the French territory before and after start of confinement, first results), press release, INSEE (French Institute of Statistics), 8 April 2020, <https://www.insee.fr/fr/information/4477356>.

Phone operators have some information about their clients, such as age bracket, home address or socio-demographic class. They can follow them in their daily movements provided they have their mobile phone with them. The analysis of their movements allows them to connect them together with temporary residence (when they stay a long time by night somewhere) or work place (the same by day). Thus, they can calculate the length and the density of commuting movements¹⁵. But it's more difficult for them to follow the itinerant workers.

This technique shows some weaknesses: it underrates the youngest people as well as the elderly, who quite often do not have any mobile phone in their pockets; it cannot reconstruct the precise route taken nor the transport means used; it ignores short neighbourhood movements that stay within the area covered by a single radio relay.

According to the Parisian mobility organizing authority *Ile-de-France Mobilités*, the first zooms carried out by *Orange* on the Stadium of France and the Saclay plateau, that were a matter for its field of relevance, proved disappointing. For the moment, other authorities seem likewise a bit sceptical concerning this technique. But in the near future, its geographic precision should grow thanks to the 5G and new triangulation techniques.

iii) Passive smartphones movements tracking by satellite

Movements tracking by satellite is a different technology available on smartphones. Every smartphone owner is quite frequently invited to download several applications, such as telephone book, information sites, weather forecast, games, etc. that have the geo-localization function. Since then, unless the GPS is switched off, such a user of mobile phone can be followed by a satellite constellation in all his movements.

Unlike the tracking by radio relays, that by GPS satellites is geographically very precise, about 10 m, or less. Companies specialized in processing these data, knowing the different transport networks characteristics and the route followed by every single mobile phone, indexed by the passing time at each point reached, can determine the transport mode used. For instance, a movement on street or road covered at 5 km/h will be naturally considered as walking; a 20 km/h movement with frequent stops at crossings will be attributed to bike or personal movement engine; otherwise, to bus, car or similar. Thus, the analysis can draw "*heat maps*" of the areas surveyed according to density of population and assess infrastructure load.

¹⁵ Fin mai, les trajets matinaux n'atteignaient que 60 % de leur volume habituel (By end of May, morning movements only reached 60 % of their normal volume), Conjoncture française, INSEE, 17 June 2020.

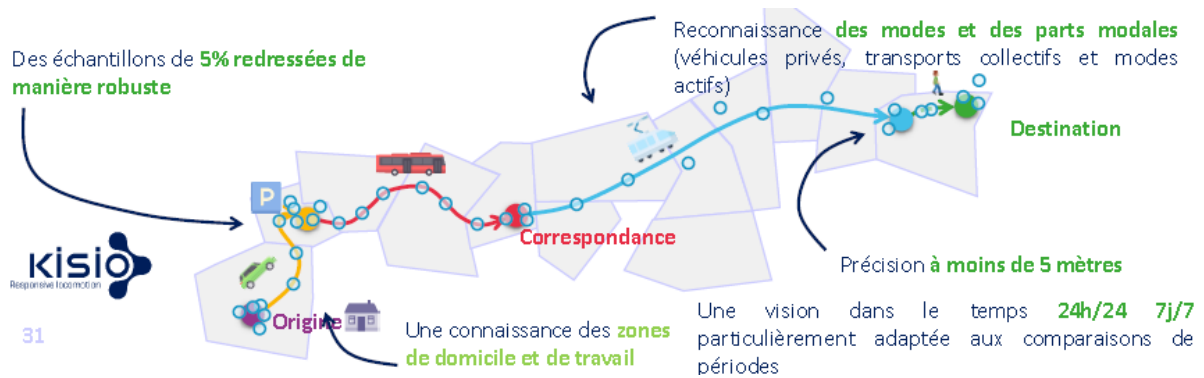


Figure 12: Principle of movements tracking by satellite, source: Kisiø (1) 5% samples robustly rectified; (2) modes and modal share recognition (private vehicles, public transport means, active modes); (3) precision at least 5 m; (4) home and work places knowledge; (5) H24, D7 vision, particularly fitted to time periods comparison

Temporarily going into a shadow zone, for instance a metro tunnel, doesn't any more affect software performance. In fact, the mobile phone has been pinpointed before entering the shadow zone (going down to the station of departure) and then as coming outside. Like applications for choosing a route, the software reconstructs then the most probable route taken between these two points.

Compared to the tracking techniques by radio relays, that by satellite is geographically far more precise. It allows reconstruct the route and transport means used there. However, it lacks a balanced cross-section of the population because, similarly to the previous technique, it doesn't monitor the youngest and oldest people, who don't have a smartphone. Another disadvantage, compared to the tracking by phone operators, is the lack of knowledge of the passenger's profile. Thus, it cannot easily segment socio-professional categories and movements reasons.

Some companies specialized in processing these big data. So did *Google*, *Apple*, and with more sophisticated algorithms, the Israeli start-up *Moovit*.

Google, Apple

Their systems allow *Google* (with *Google Maps*) and *Apple* (with *Apple Plan*) to track individual movements. On the other hand, they don't know how to allocate them to a given transport mode.

*Google*¹⁶ is interested in activity places, such as shopping and leisure centres, groceries and pharmacies, parks, public transport stops, workplaces, residential areas. It produces a quantified assessment of each of these variables, compared to a reference date, at the scale of a geographic unit of about 10,000 km² (as large as a little Austrian or German Land, a French *Département*, an Italian Province, Slovenia, a Swiss *Canton*, etc.).

¹⁶ <https://www.google.com/covid19/mobility/>

On its website *Mobility Trends Reports*¹⁷, *Apple* displays results at the scale of an area as large as that of *Google* or of a big city (München, Grenoble, Milano, Zürich etc.).

That gives a rough idea of people's mobility. But there is a bias in this system, because data aren't indexed according to sociodemographic parameters, and there is a gap between a request and the movement actually done (particularly during disruption periods).

The *Osservatorio Conti Pubblici dell'Università Cattolica* of Milan (Observatory of Public Accounting of the Catholic University) used *Apple* and *Google* data in order to produce its analysis of mobility in Europe, which has been released on 10 June 2021¹⁸.

Moovit

The Israeli start-up *Moovit*, since recently an Intel subsidiary, aims at helping people choosing their route by all available transport means inside a big city. It can, with the help of track analysis, reconstruct and aggregate route data and infer lines load at a given time and transport modes frequenting. In September 2020, *Moovit* could use the data of 840 million users.

Its statistics have been carefully scrutinized by the authorities during the Covid crisis.

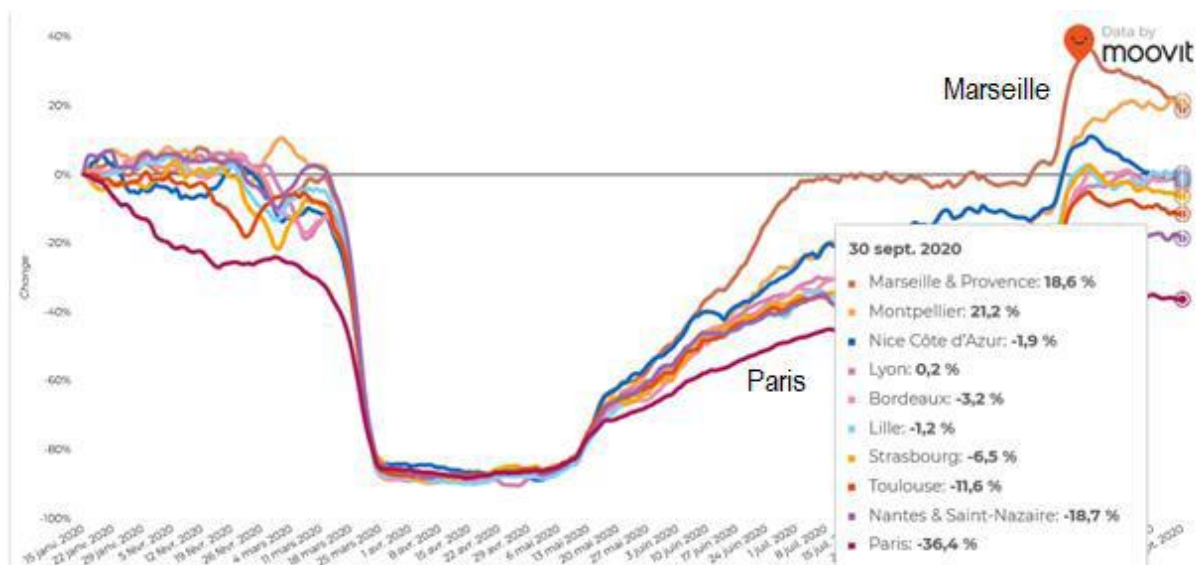


Figure 13: Public transport traffic evolution in 10 big French cities in 2020, source: *Moovit*.

Kisio

Unlike *Moovit*, the French *Kisio*, second degree subsidiary of SNCF, buys data to current applications (games, videos, telephone directory, weather forecast, etc.). In this way it can

¹⁷ <https://covid19.apple.com/mobility>.

¹⁸ <https://osservatoriocpi.unicatt.it/ocpi-pubblicazioni-segnali-positivi-sulla-ripresa-dai-dati-apple-e-google-sulla-mobilita>.

more easily sort out representative cross-sections. So, it gains a vision of lines load and transport means on one point and in one given place.

Passenger's trip time calculation could be one of the by-products of these applications. But it's a sensible parameter. The last surveys carried out in the big cities showed a quite rough growth of the citizens' movement time budget during last years, that was probably unintentional, but that asks questions on the functional organization of the city.

Kisio has opened with the Laboratory on Transport of the Parisian *Ecole des Ponts* (School of Civil Engineering) aiming at cooperate on smartphone tracks exploitation. This work could reveal "individuals' species" and "usage profiles" per individual on a day scale.

iv) Collaborative smartphones movements tracking by satellite

MOBIS-COVID19 (Switzerland): tracking by Catch-My-Day App

The *MOBIS-COVID19* project lead by the *Eidgenössische Technische Hochschule Zürich* (ETHZ, Swiss Federal Institute of Technology in Zurich) and the Basel University (WWZ) leans on the tracking, since March 2020, of a population of 3,700 volunteers, who have been recruited in September 2019 before the pandemic outbreak for mobility tracking purpose. It uses the application *Catch-my-Day*¹⁹ based on the *Motion Tag*²⁰ GPS technology and put on smartphone. In one and half year, from early 2020 to 9 August 2021, 1,300,000 movements had been recorded, for an average population of 662 volunteers, that is to say 3.6 movements per day.

This study raised some methodological questions: first of them, that of the cross-section size, that fluctuated from 500 persons in Autumn 2020 to more than 1,000 one year afterwards, and which urban zones seem to be overrepresented, what raises the question if the cross-section had been previously rectified; then, that of movements outside of the Swiss borders, that are followed, but not taken in account in the report; then, that of the criteria used for the selection of the initial panel, that took only individuals taking their car at least three times a week, condition that has been abandoned for the last recruits; finally, that evident question if individual have activated the application or not.

Movements are followed according to route (then, movement length) and time (then, duration). Analysis is made according to sex, age, travel mode, weather (considering that some modes aren't popular by rainy weather) and motive, as estimated from the declaration by individuals of their principal destination.

¹⁹ *Catch-my-Day* App has been developed by the Swiss company *MotionTag GmbH*. It's available on smartphones. It aims at helping people to have an overview of their own daily mobility.

²⁰ *Motion Tag* is a German company born 2015. It can be used as an undercoat by mobility service apps providing multimodal information.

This survey led to some conclusions:

- Mobility reduction during confinement time is far less important in Geneva than elsewhere;
- The duration and length of ride grows very significantly for men during confinement time, significantly for commuters (+40% on fine days), even more for leisure (+60 to 80%).

Mobilitäts-monitoring COVID-19 (Switzerland): GPS tracking by Footprints Research App

The *Mobilitäts-Monitoring COVID-19*, or *Panel Intervista*, is managed by the research institute *Intervista AG*, on behalf of several institutions: *Statistisches Amt des Kantons Zürich* (Zurich Canton Statistics Bureau), Swiss National COVID-19 Science Task Force, *Konjunkturforschungsstelle der ETHZ* (KOF, Research Team of the Swiss Federal Institute of Technology in Zurich). 2,561 people on average are followed in their movements, thanks to the application *Footprints Research*²¹ that relies on *Google* tracks. Its panel has been selected in 2018. It was mobilized during pandemic.

It analyses according to sex, age, sociodemographic profile, reason (as estimated from the declaration by individuals of their principal destination) and residence.

The survey raises some methodological questions: first of them, that of the cross-section representativeness, considering that people under 15 or over 79 and people without smartphones don't belong to it; then, that of travels by plane or outside of the Swiss borders, that aren't taken in account in the report; finally, that about the fact that individual must have activated the application.

v) Synthesis

The table below synthetizes the ways of computing daily traffic in the towns.

²¹ The *Footprints Research* App has been developed by the Swiss company *Axinova AG*. It's managed by *Intervista AG*. It aims at providing a basis for market research.

Technique	Author	Advantages	Disadvantages
4-steps model	Modus, Antonin, Global, Ares, etc.	Dimensioning of infrastructures and services to be built scenarios assessing	Unfit to crisis contexts
Opinion poll	Harris, etc.	Brings in light short-term tendencies	Qualitative blind concerning long term issues
Collaborative platform	RATP, etc.	Real time traffic vision	Poor reliability due to lack of data
Ticketing	Transport service owner	Quasi real time	Route allocation impossible (cf. metro) underestimation of traffic (boarding on the bus without validating)
Manual counting	Transport service owner		Low precision measure only charge at a given point, doesn't take in account profiles and motives
Automatic counting	Thetis...	Exhaustive counting allocation on the route segment	Vehicles equipment cost
Wi-fi tracking	Kisio...	Precise location including in uncovered area (metro)	Vehicles equipment cost
Radio relay tracking	Phone companies	Districts and towns frequenting assessment motive intuition (work...) knows passenger's profile	Imprecise location: can't take in account little trips, route allocation impossible
Satellite tracking	Google, Apple, Moovit, Kisio...	Precise location: route allocation possible, vision of modal choice intuition of motive (work...) through time series exploitation	Ignores passenger's profile sampling bias

RECOMMENDATION:

(To national and local authorities): organize permanent commuters' mobility tracking in order to identify and anticipate long-term behavioural trends.

5. IS IT POSSIBLE TO SHAPE LONG TERM BEHAVIOURAL CHANGES?

The pandemic outburst created a true shock in public opinion. People discovered other ways of life and communication.

In Italy, a poll carried out by *Grupama Assicurazioni* (10 May 2021) shows that 53% of interviewees would be ready to change their way of moving. But on the short-term they remain dependent on their usual transport means, that is for 90% their private car.

The *Swiss Re* prospective paper (10 December 2020) identifies five behavioural changes to be followed-up, concerning:

- Digital tools for all-day life and work;
- Mobility (teleworking, relative distrust of public transport);
- Consumption (e-commerce: in China, online orders on *Alibaba* websites gained 220% between February 2019 and February 2020; local products demand);
- Health and hygiene;
- Interindividual relationships (wedding, divorce, etc.).

Some of these address lifestyles, which will inevitably impact the job of insurances.

The *McKinsey* report, *The future of work after COVID-19* (18 February 2021), estimates that 20 to 25% of advanced economies workers could in the long run work at least three days a week at home, and reveals, from its survey on business leaders in August 2020, that they think of reducing their office surface by 30%. The same survey assesses that 25% of the active population could be faced with the necessity of changing job in the mid-term, whose impact on mobility would be negative. Moreover, it estimates that business trips could durably drop by 20%, provided that even if such trips represent a small share of plane trips (20%), they are for the companies an essential financial resource.

A report released by the chair *Pégase* in Montpellier (June 2021) estimates that the drop of business trips could be much stronger, by 38%.

i) Work, purchasing, daily mobility: people are less bound to fixed meeting points

The Covid pandemic let most of blue collars realize that they can now carry out their professional tasks elsewhere than in the office. Not all workers of course can do it as easily: those who have to work in contact with the public, those who work at goods production or transport, for instance, cannot as easily leave their work place. Such a distortion between those who can protect themselves and those who have to stay endangered in contact with other people could be considered by the latter, who often are the least regarded in the hierarchy of the company, as unfair, and thus make social dialogue harder.

New jobs did literally explode, such as e-commerce and quick delivery. Their agents often work for big companies, but under a freelance status. In France, these “little jobs”, the number of which had already tripled between 2017 and 2019²², were very much recruited during the pandemic. During the 60s, the Saturday pilgrimage to the hypermarket was regarded by the consumer as the top of the week. But the grandchildren of those consumers now stay at home, expecting their pizza delivery. If one considers the ecological impact of such changes, one has to dread a strong regression.

It remains a positive point, meaning in a henceforth constrained framework, the inevitable professional meetings had to invent other meeting places than the office.

ii) The pursuit for privacy

Fearing contamination, a large number of citizens gave up frequenting too crowded places such as town centres and public transport means. Some of them chose to move away from the city they worked in. This phenomenon isn't yet perceptible, considering real estate prices or big cities demography. But it's already visible in outlying small cities and villages, that have to meet a real estate boom and a related and unexpected leap in prices. Some statistics even clearly show it, such as that of school children, whose number dropped rapidly (-6,000 in one year in Paris). This trend, which could be expected long-lasting, is fuelling urban sprawl and car mobility that public bodies try otherwise to master. That's an actual challenge for them. Mobility authorities are confronted with the necessity of completely rethink their service schemes, that are historically structured by big radial backbone lines channelling suburbs to town centre, to reach the clientele living in far suburbs.

iii) A seamless mobility

Lastly, there is a need of interoperability of urban transport supply solutions. Traditionally indeed, the mobility authority conceded to a unique operator the public transport network exploitation on its whole area, which is not possible any more. On one hand, far suburbs railway service has gained a big weight due to the geographical extension of towns. But they aren't run by the same operator as urban transport. On the other hand, the new mobility supply is exploding: new taxis, carpooling, car sharing, and electrified or active micro mobilities (free-floating or non-bike rentals, e-scooter, etc.).

Under these conditions, it's important for user to easily link vehicles supplied by different operators. That's what's called “seamless mobility”. The first condition in this particular case is providing the user with an adequate information, answering the simple question: how to best travel from a point A to a point B? This information today is delivered by

²² Rapport 2020 de l'Observatoire prospectif des métiers et des qualifications dans les transports et la logistique (Prospective Observatory of jobs and skills in the Transport and Logistics sector), November 2020.

aggregators exploiting data provided to their clients by the operators. The most prominent are private companies, like *Google*, *Apple* or *Moovit*. But mobility authorities themselves can, on their competence area and upon agreement of private operators, deliver the same information. Going further, this seamless mobility could gain in relying on a unique pricing. That's what began to do the three bis Swiss-Alemannic cities of Bern, Basel and Zürich, by contract between the Federal Railways, their urban public transport operators and some private operators.

6. SOME PATHS FOR MASTERING THE PHENOMENA

Will this pandemic leave behind its footprints in our children daily life and in the organization of cities? There's probably no evidence yet, it's a bit too early to assert it. The scientific observation of behaviours isn't yet structured enough in order to draw a forecast. Short term trends are at least ambiguous. They let foresee a strong increase, almost an exacerbation, and not a slowing, of mobility. The examples of e-commerce delivery and the flight of teleworkers towards remote small towns, far from their workplaces, obviously reveal trends towards the growth of mobility. The users' distrust for public transport means, which can be observed in all Alpine countries, shows a shift in favour of private car that counters the policies adopted by the authorities. Even investments made by towns in order to favour soft mobility after recovery from the sanitary crisis didn't always convince the public. So, the *DENA* inquiry (9 December 2020) revealed a shared feeling on the opportunity of the so-called *corona bike lanes* (*pop-up Radwege*), provided the crisis were over. It would be interesting to launch a new poll in order to see if the balance still weighs that way.

How could we cope with this maybe basic trends? How could they be combined with the ever-sharper requirements of sustainable development and public health? Here below some orientations are considered.

i) Fostering coworking solutions

A first orientation concerns teleworking. The Covid pandemic outburst suddenly made commuters "teleworkers", though this new form of relationship between worker, employer and job hadn't been previously defined. In fact, before then the teleworker was a member of staff who had to do his office job at home in front of its computer. One could notice that if the best equipped among them could rather comfortably succeed in this endeavour, that wasn't as easy for those who had to manage in a single narrow space a job and a family, being deprived of the stimulating contact with their colleagues. Managers themselves did painfully adapt their methods, provided the difficulty of managing a so scattered team.

But in fact, teleworking is a quite old notion: most of senior executives spend a lot of time in meetings, interviews or journeys and spend only a short time at the office. And an important part of their work can be achieved quite comfortably outside of the office.

Coworking allows to optimize remote working managerial efficiency. It consists in providing the employees with a possibility of working in a shared office close to their home. Thus, teleworkers don't sit anymore alone in front of their computer screen, but they are member of a new work collective, and benefit from facilities such as office equipment, restoration, parking, etc.. Their one-day colleagues may not be the same the day after but they are not alone any more. Well organized coworking allows companies

to reduce office surface and office costs: many companies are by now considering such solutions.

An example of coworking facility has been illustrated in the report Reduction of mobility demand and shift to environmentally sustainable modes strategies and measures in the Alps²³. It's that of miaEngiadina. "*MiaEngiadina is an association that merges together four organisations that offer mountain co-working spaces located in Scuol and Ftan right behind the Flüela Pass in the Swiss Alps. Together they offer 60 workplaces which offers good possibilities for local and new people to interact right there in the Engadin valley.*"²⁴ That report in particular recommends employers to "provide teleworking places e.g., in tele-houses for people who have no suitable home-office space".

The coworking supply develops quite quickly, in private employers, but also, especially in rural zones, on local authorities' initiative. Having already invested in a public health house or a start-up incubator, a small town can likewise create a coworking space for those of its (new) citizens, who could go to the office only a few days a week.

RECOMMENDATION:

Facilitate coworking practices in residential areas away from big cities.

ii) Better organizing teleworking from home

Even if coworking develops, it remains that an important part of remote working will be done from home. Thus, employers and employees have to think about the best ways of organizing work from home.

In the far past, when journeys were long and tiring, people met for several days and combined their meeting with some recreational activities. In the future, one may forecast that the workplace could become the place for regular meetings of the work team and better scheduled work or conviviality time.

RECOMMENDATION:

Better organize teleworking from home.

²³ https://www.alpconv.org/fileadmin/user_upload/Organization/TWB/Transport/Transport_Annex2_AT-CH_Reduction-of-mobility-demand.pdf.

²⁴ www.miaengiadina.ch/mountain-coworking.

iii) Coordinate work schedules and favour soft modes in order to lower peak-hour

Concerning big cities commuters, the problem remains that of the peak-hour. We've seen above how essential it is to try to lower peak-hour intensity. That way one could hope to let the same traffic flow in quite comfortable conditions. If the employers who can, accepted a certain flexibility, for example by allowing their staff shifted schedules, or special teleworking slots at the beginning or at the end of the day, one may forecast a substantial improvement of public transport conditions. At this price, one may forecast a progressive come-back of clientele in the public transport.

At the same time, it's essential to promote the use of soft modes by citizens.. There is of course no way to forbid the use of private transport means (mostly the car) to citizens, especially those living in suburbs, the elderly or the persons with disabilities.. The question is how to provide them, with attractive mobility solutions. There are numerous solutions, such as:

- Extension of bus services towards the far suburbs;
- Creation of secured ways and parking places for cars, bikes and personal moving vehicles to and in front of train stations in the suburbs in order to allow their residents to reach the neighbouring town in better conditions;
- Creation of relay car parks at the doors of big cities;
- Foster carpooling services between town and neighbouring rural areas;
- Etc.

If the local mobility authorities know how to provide people, insiders as well as outsiders, with an attractive service, it can notably reduce the impact of downtown traffic.

RECOMMENDATION:

- **(to employers, with the help of local authorities): ease work slots in order to lower peak-hour.**
- **(to local authorities): try to provide all their citizens and guests with solutions easing resorting to soft modes.**

iv) Rethink point-to-point passenger transport logistic chain in the suburbs in the *MaaS* spirit

Due to the widening of the urban infrastructure, a single transport operator won't be able to provide transport supply on the area of a big city and its hinterland. Movements at that scale already use, from the longest to the shortest trip, train (or car), metro, tramway, bus, personal moving engine (bike, scooter...), and walking. But what interests the traveller is

first to know before leaving what sort of transport modes he'll have to take successively in order to reach his destination as well as possible.

This question is that of *Mobility as a service* (MaaS).

A growing number of mobility authorities deal with public and private operators that serve them in order to supply user with applications computing the optimal itinerary, combining all of the possible means: walking to the nearest train station, then metro, taxi or free-floating bike, etc. Some big private aggregators also supply with such services, but only concerning the operators they have agreements with. Thus, there is room for local authorities for improving traveller's information. One can consider this service as mostly strategic, in terms of digital sovereignty.

Going one step further, one may expect a deepening of the efforts towards the standardization of ticketing, allowing users to buy a single ticket, or subscribing a single abonnement, which enables them to take various transport modes run by different independent operators. Such formulae already exist but remain partial: for instance, the mutualization between train and bus in the three big Swiss-Alemannic cities, or the *OùRA* card in the Auvergne Rhône Alpes region, which combines all the abonnements to the various urban and interurban public transport means of this broad region.

RECOMMENDATION:

(to local authorities): improve traveller's information and work towards the pricing and ticketing harmonization in the spirit of MaaS.

v) A more efficient urban logistics backing local economy

Provided e-commerce proved itself useful to numerous citizens during mobility restrictions time, it could be the solution for them, rather than traditional retail trade, in the future.

In Germany, *BVMW* estimates a 40 bil. €/year loss of turnover in city trade and the closedown of 50,000 shops.

Local authorities will have to confront these new actors of logistics to prevent urban spaces to be overrun by their vehicles and storage places. Quick delivery, which highly consumes space and natural resources, has to be strictly supervised. Building collective storage places networks will be a solution: deposit places put in passage places partner stores, locker sets on buildings ground floor, H24 open rooms at post office are examples in this direction.

Urban logistics needs to contribute to local economy, and not disturb it. As regards this phenomenon, local authorities' responsibility is crucial.

RECOMMENDATION:

(to local authorities): pay attention to industrial productivity progress of B2C distribution by the new channels deriving from e-commerce to respect urban space.

vi) Town and village planning: for a more desirable living environment

Real estate prices have been for a long time a secondary parameter in citizens' residential choices. Thus, although inside a city the price gap can be considerable, urban sprawl, though visible for almost half a century, didn't yet prevent downtown estates from remaining a safe investment.

On the three maps below, showing the real estate distribution in the agglomeration of Geneva, one can see that, though the canton never offers – on average – flats cheaper than 7,000 CHF/m² and sales are done essentially in the heart of the agglomeration where average prices are over 10,000 CHF/m², surrounding French cities and villages don't anymore offer flats over 5,000 €/m².

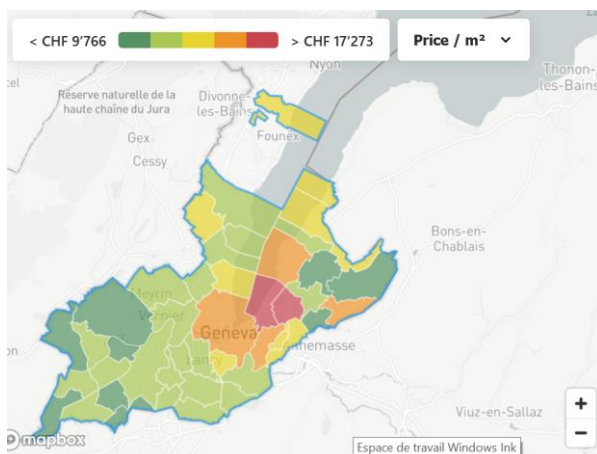


Figure 14: Real estate prices (CHF/m²) in the Canton of Geneva, 29 November 2021.

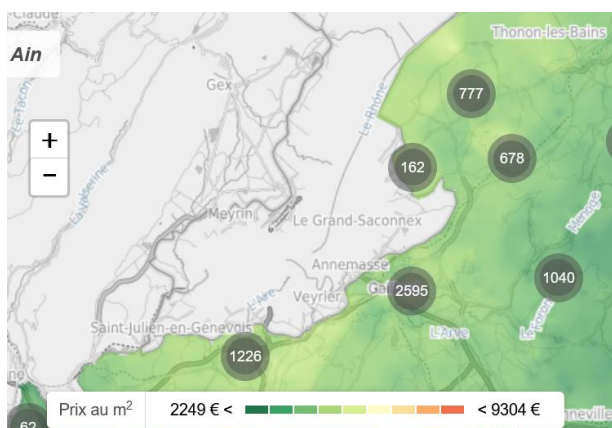


Figure 15: Flats prices (€/m²) in the French Geneva suburbs, 29 November 2021.

Ventes d'appartements en PPE
Canton de Genève, par commune

**Prix moyen,
en franc par m²**



Canton : 8 680

Nombre de transactions



Canton : 1 217

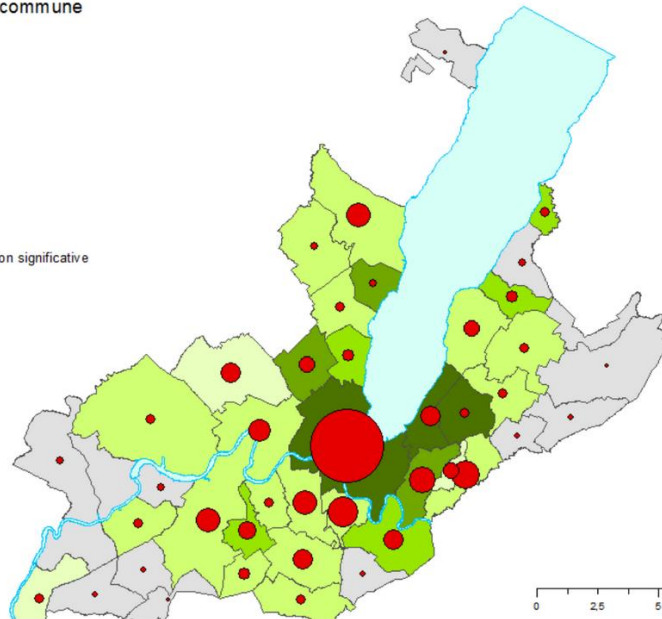


Figure 16: Flats sale (CFH/m²) in the Canton of Geneva in 2021 (source: <https://www.estimation-bien-immobilier.ch/evolution-prix-immobilier-geneve-2021/>).

Such a gap within a narrow geographical space has been noticed elsewhere, in France or in Italy for example, as one can see on the two maps below. It seems obvious that real estate prices being in a ratio of 1 to 10 between two cities as neighbouring as Mulhouse and Basel, important commuters' flows will arise between them. And though such an example seems to be extreme, big gaps exist too within each of the Alpine states.

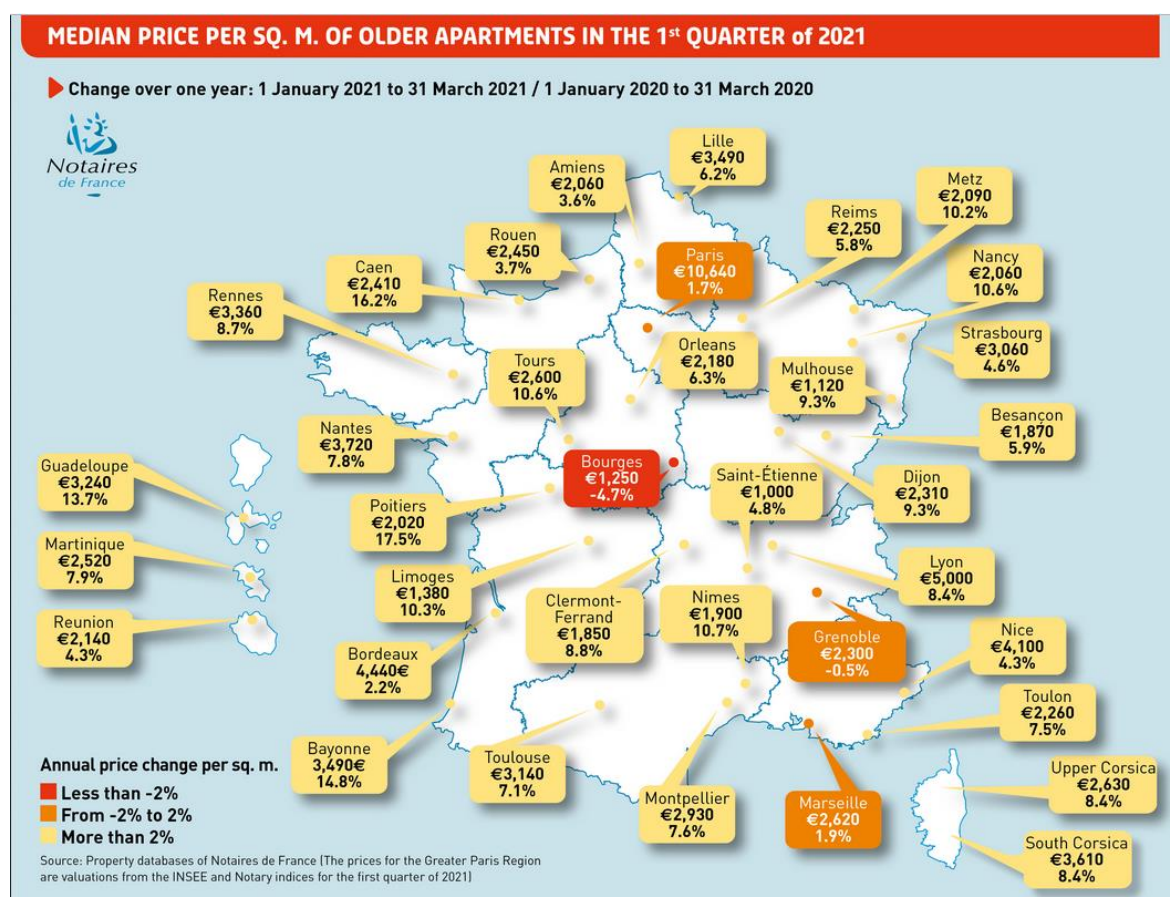


Figure 17: Median price (€/m²) of older apartments in the first term of 2021 in France, source: *Notaires de France* (French notaries), https://www.notaires.fr/multimedia/NCI/NCI_UK_52_prices_old_apartment.jpg

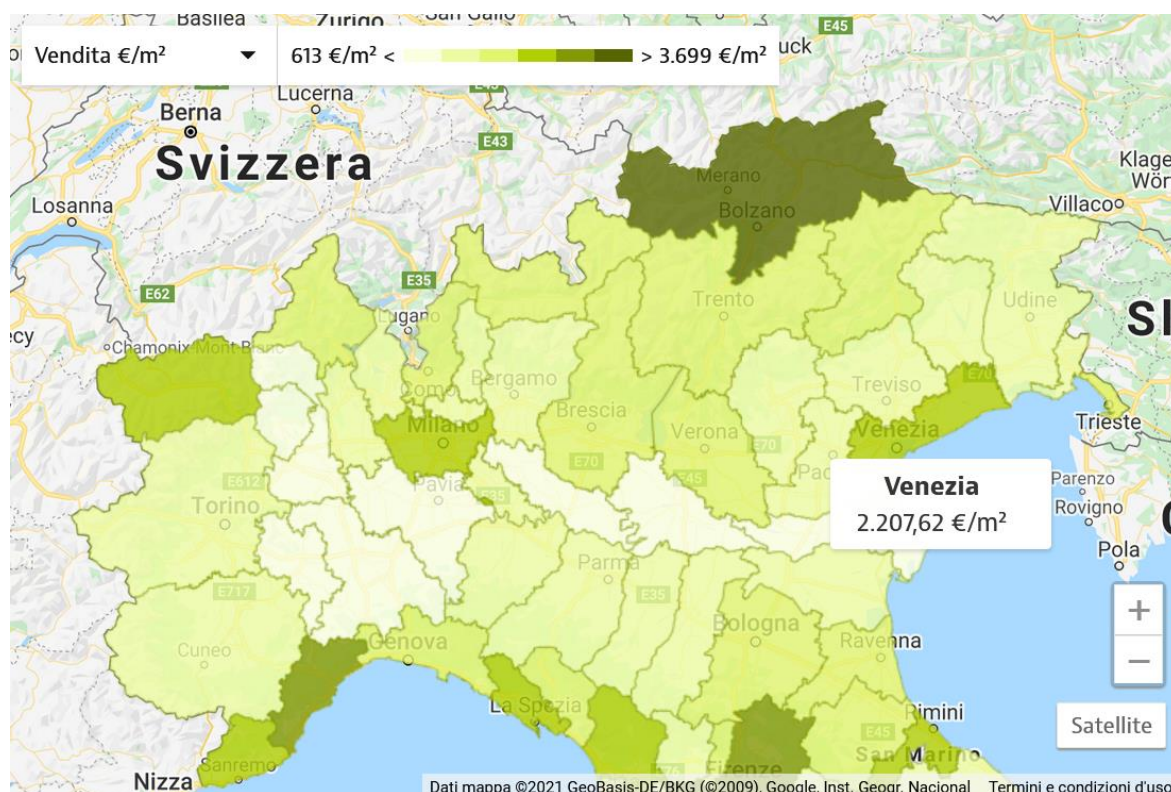
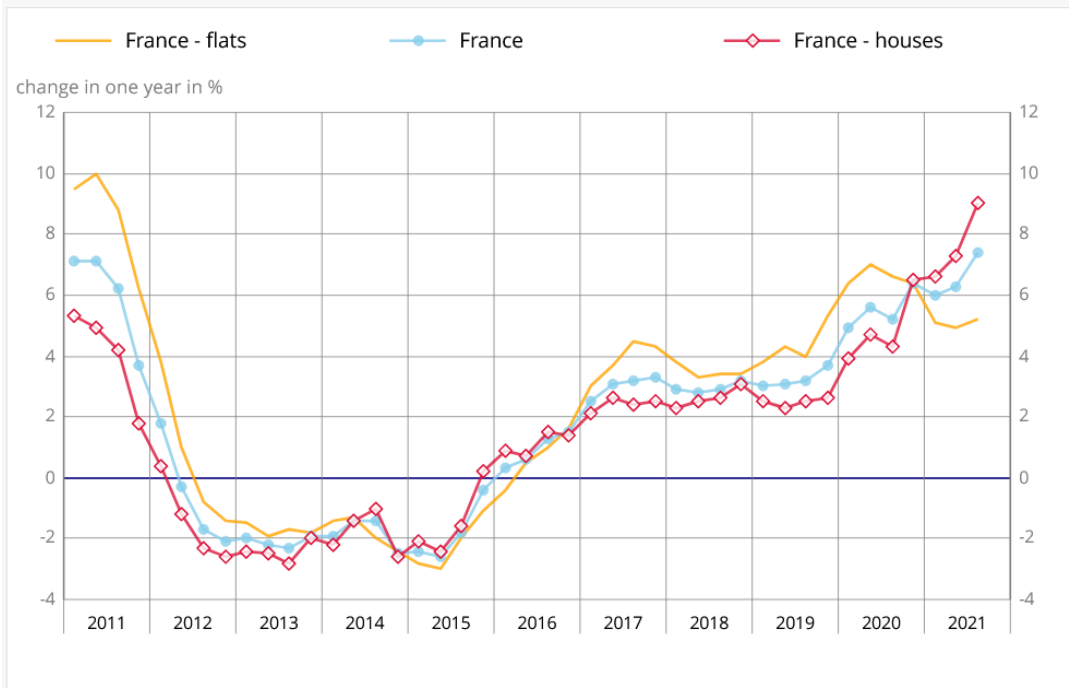


Figure 18: Real estate sale (€/m²) in Northern Italy in 2021, source: <https://www.idealista.it/maps/>

Nevertheless, it seems that the Covid crisis already begun changing people's attitudes. Square meter flat price for five years in France grew quicker than that of detached house: the two curves suddenly crossed in 2021. It's too early to assess if, what seems a flight from the big city, is purely cyclical or a long-lasting phenomenon. But nevertheless, this trend should probably be confirmed in the future, considering that big chunks of population showed their weakness during the pandemic time.

Variation in prices of second-hand dwellings in France over a year



Scope: France (excluding Mayotte).

Sources: INSEE, ADSN-BIEN-Grand Paris notaries, French notaries, Perval society.

Figure 19: Variation in prices of second-hand dwellings in France over a year, source: <https://www.insee.fr/en/statistiques/5892813>

In Switzerland, such a trend had been already noticed before Covid pandemic outburst, as can be seen on following chart. It's sure that the trend of demand orientation towards greener zones became stronger since then.

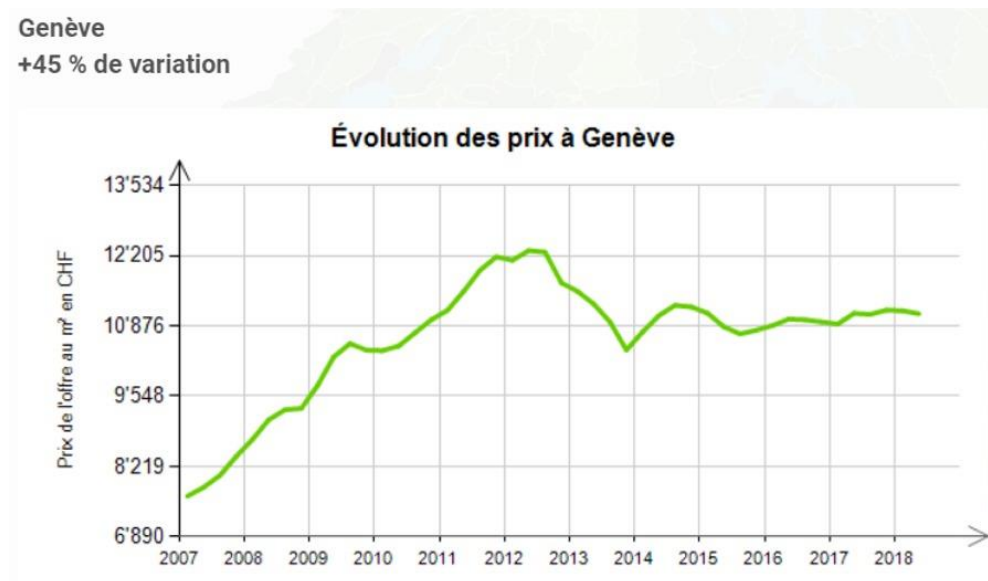


Figure 20: Real estate prices (CHF/m²) evolution in the Canton of Geneva since 2007, source: <https://www.estimation-bien-immobilier.ch/evolution-prix-m2-immobilier-geneve-2020/>

What can be done to ensure the attractiveness and soft power of historical cities? In Germany, *BVMW* calls to build greener cities, more open, open to all transport means, refusing the “ban and taxation culture”. The report *Reduction of mobility demand* of the Transport Working Group of the Alpine Convention underlines that “a possible consequence of Covid-19 is that also space-saving buildings for more families should provide private green, e.g., on terraces”, and thus recommends that city planners “consider this requirement by greening existing buildings, development of new building forms and support the implementation by planning laws”.

Nevertheless, it will be necessary to organize daily mobility at an ever bigger urban level, including a vast hinterland. Under these conditions, providing a performant frequent service between city centre and hinterland and making last mile service linked to this service easier will be essential.

RECOMMENDATION:

(to local authorities): provide amenities at the heart of town. Organize backbone service linking it to its hinterland, and not forget easing last-mile service there and linkage with the backbone network.

7. CONCLUSIONS AND RECOMMENDATIONS

The approach suggested herein intends to draft guidelines for a closer follow-up of quickly and unpredictably changing behaviour patterns after the sanitary crisis and mastering traffic troubles occurring because of these changes.

This report proposes seven recommendations to this purpose, listed once again here below:

RECOMMENDATIONS:

- **(To national and local authorities): organize permanent commuters' mobility tracking in order to identify and anticipate long-term behavioural trends.**
- **Facilitate coworking practices in residential areas away from big cities.**
- **Better organize teleworking from home.**
- **(To employers, with the help of local authorities): ease work slots in order to lower peak-hour; (to local authorities): try to provide all their citizens and guests with solutions easing resorting to soft modes.**
- **(To local authorities): improve traveller's information and work towards pricing and ticketing harmonization in the spirit of MaaS.**
- **(To local authorities): pay attention to industrial productivity progress of B2C distribution by the new channels deriving from e-commerce to respect urban space.**
- **(To local authorities): provide amenities at the heart of town. Organize backbone service linking it to its hinterland, and not forget easing last-mile service there and linkage with the backbone network.**

It's obvious that all of them don't aim at the Alpine Convention itself, but at relevant institutions and bodies, Alpine Convention member States are members of.

8. BIBLIOGRAPHY

Title	Author	Editor	Date
Covid-19 collaborative research on housing and well-being: initiating a Swiss Corona Citizen Science Research Team	Vincent Kaufmann	Ecole Polytechnique Fédérale de Lausanne, Laboratoire de sociologie urbaine LaSUR	expected
Mobilitätsmasterplan 2030 für Österreich		Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	16/07/21
Mobilità: il Covid cambia frequenza e modalità. In calo il trasporto pubblico, non decolla quello 'dolce'	Istat	FoggiaToday	16/08/21
MOBIS-COVID19/54: Results as of 09/08/2021 (Second Wave) - UK, DE, FR - regular update	Joseph Molloy et al.	Eidgenössische Technische Hochschule Zürich (ETHZ), Institut für Verkehrsplanung und Transportsysteme Universität Basel, WWZ	09/08/21
Hat Covid-19 das Mobilitätsverhalten der Deutschen nachhaltig verändert?	Johannes Schuler (Projektleiter)	Fraunhofer ISI	29/07/21
Mobilitäts-Monitoring COVID-19	Beat Fischer (Intervista)	Kanton Zürich Swiss National Covid-19 Science Task Force ETHZ, Konjunktur Forschungsstelle	06/07/21
Segnali positivi sulla ripresa dai dati Apple e Google sulla mobilità	Carlo Cottarelli et al.	Università Cattolica del Sacro Cuore, Milano, Osservatorio Conti Pubblici	09/06/21
Bündnis für moderne Mobilität, Press release		Bundesministerium für Verkehr und digitale Infrastruktur	02/06/21
COVID-19 recovery and the global urban poor	Mahendra Sethi, Felix Creutzig		27/05/21

Title	Author	Editor	Date
Transport Innovation for Sustainable Development: Re-shaping Mobility in the Wake of Covid-19		OECD International transport Forum	12/05/21
Explaining Demand Patterns during COVID-19 using Opportunistic Data: a case study of the city of Munich	Vishal Mahajan, Technische Universität München	OECD International transport Forum	12/05/21
The Impacts of the COVID-19 Pandemic on Commuting Travel and Metro Passenger Flow in Shanghai	Xiaohe Zheng, Tongji University	OECD International transport Forum	12/05/21
Dopo Covid mobilità più green, 53% italiani pronto a cambiare	Bva-Doxa	Groupama Assicurazioni	10/05/21
Un anno di Covid: come è cambiata la mobilità?	Alfonso Rago	Aretè	06/05/21
More Americans Are Leaving Cities, But Don't Call It an Urban Exodus	Marie Patino, Aaron Kessler, Sarah Holder	Bloomberg	26/04/21
The future of work after COVID-19	Susan Lund and Anu Madgavkar (partners), James Manyika and Sven Smit (co-chairs and directors), Kweilin Ellingrud (senior partner in McKinsey's Minneapolis office), Mary Meaney (senior partner in the Paris office), Olivia Robinson (consultant in the London office)	McKinsey Global Institute	18/02/21
Did the COVID-19 Pandemic Cause an Urban Exodus?	Stephan Whitaker (Federal Reserve Bank of Cleveland)	Cleveland Fed	05/02/21
Osservatorio sulle tendenze di mobilità durante l'emergenza sanitaria del COVID-19	Giuseppe Pasquale, Roberto Catalano, Armando Carteni	Ministerio delle Infrastrutture e dei Trasporti	01/01/21

Title	Author	Editor	Date
Mobilitätsverhalten seit Covid-19: Individualverkehr nimmt in Corona-Zeiten deutlich zu, Fahrrad gewinnt an Beliebtheit, Öffentlicher Verkehr wird corona-bedingt gemieden	Irene Beringer	Deutsche Energie-Agentur GmbH (DENA)	16/12/20
All change: how COVID-19 is transforming consumer behaviour	Mahesh H Puttaiah (Senior Economist), Aakash Kiran Raverkar (Research Analyst), Evangelos Avramakis (Head Digital Ecosystems R&D), Swiss Re Institute	Swiss Re Institute	10/12/20
Retour d'expérience de la prévision de trafic dans les transports du quotidien en phase de déconfinement	Michel Rostagnat	Ministère de la transition écologique, CGEDD	01/12/20
Corona und Mobilität: Mehr Homeoffice, weniger Berufsverkehr	Helmut Mayer	Allgemeiner Deutscher Automobil-club - ADAC	24/11/20
Verändert Covid-19 unser Mobilitätsverhalten?	Kilian Harbauer (BVMW Referent für Energie, Nachhaltigkeit, Mobilität und Logistik)	BVMW der Mittelstand	20/10/20
Il fait un choc majeur d'offres de transports en commun et de contraintes sur la voiture pour réduire de 60% nos émissions d'ici 10 ans	Jean Coldéfy	Forum vies mobiles	19/10/20
Mobilitätsmasterplan 2030		Österreichische Verkehrswirtschaft	01/10/20
Mobilità post Covid: come sono cambiati gli spostamenti in città	Marta Ferrara	Osservatorio Nazionale Sharing Mobility	29/09/20
France relance		Gouvernement	03/09/20

Title	Author	Editor	Date
Folgerungen für die zukünftige Verkehrspolitik nach den Erfahrungen und dem Umgang mit der COVID-19-Pandemie	Institut für Verkehrswissenschaft Am Stadtgraben 9 48143 Münster	Wissenschaftlicher Beirat beim Bundesminister für Verkehr und digitale Infrastruktur	01/09/20
Etude sur la caractérisation des effets rebond induits par le télétravail	Sandrine Carballès	Agence de l'environnement et de la maîtrise de l'énergie	01/09/20
Indagine dell'ART sulla mobilità in tempi di Covid-19: cresce l'utilizzo di biciclette e mezzi in sharing		Autorità di Regolazione dei Trasporti	14/07/20
Les déplacements dans les périphéries	Yves Crozet	France stratégie et ministère de la transition économique / CGEDD	11/05/20
Covid 19, i dati di Apple e Google sugli spostamenti in Europa: da gennaio mobilità quasi azzerata in Italia e Spagna	Carlo Cottarelli	Università Cattolica del Sacro Cuore, Milano, Osservatorio Conti Pubblici	25/04/20
Di fronte all'epidemia COVID-19. Un'indagine sui comportamenti e gli atteggiamenti di cittadine e cittadini italiani	Monia Anzivino, Flavio A. Ceravolo, Michele Rostan	Università di Pavia, Centro Interdipartimentale di Studi e Ricerche sui Sistemi di Istruzione Superiore (CIRSIS)	10/04/20
Les impacts du confinement sur la mobilité et les modes de vie des Français		Forum vies mobiles	01/04/20
Communication from the Commission to the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal		European Commission	11/12/19
Cross-border mobility in the Alpine region, Project compendium		Eusalp	21/11/19

Title	Author	Editor	Date
Observatoire des mobilités émergentes		Cronos	01/11/18

9. ANNEX: WHAT COULD BE OBSERVED DURING THE PANDEMIC OUTBURST IN THE USA

No urban exodus, but an escape to the green and cheap suburbs

The question of citizen drain has prompted a hot debate in the United States of America. Newspapers emphasized that the pandemic outbreak exacerbated population fears concerning its safety, that had been brought back after violent events such as George Floyd's murder. Thus, there was a hot debate on sanitary lack of safety in big cities and a possible urban exodus. In practice, departure flows from urban neighbourhoods, as defined according to a population density over 2,700 inhabitants per square kilometre (Europe rather would put the threshold at 4,000), doubled during the pandemic, from 28,000 p/month to 56,000 in the whole country. New-York City and San Francisco were the most impacted cities, more than Chicago and Seattle. Thus, New-York lost 90 net departures per 100,000 inhabitants per month. According to a *World Built Environment Forum* – WBEF (13 July 2021), some American Cities could have lost more than 15% of their population since the pandemic outbreak. According to *Bloomberg* (26 April 2021), resumed by WBEF, 84% of moves from New-York and 79% of those from San Francisco were in fact in order to settle in their far suburbs, what contributes to hollow out the heart of the city. That phenomenon had been called "*donut effect*". In fact, there is no actual urban exodus, except maybe in New-York and San Francisco.

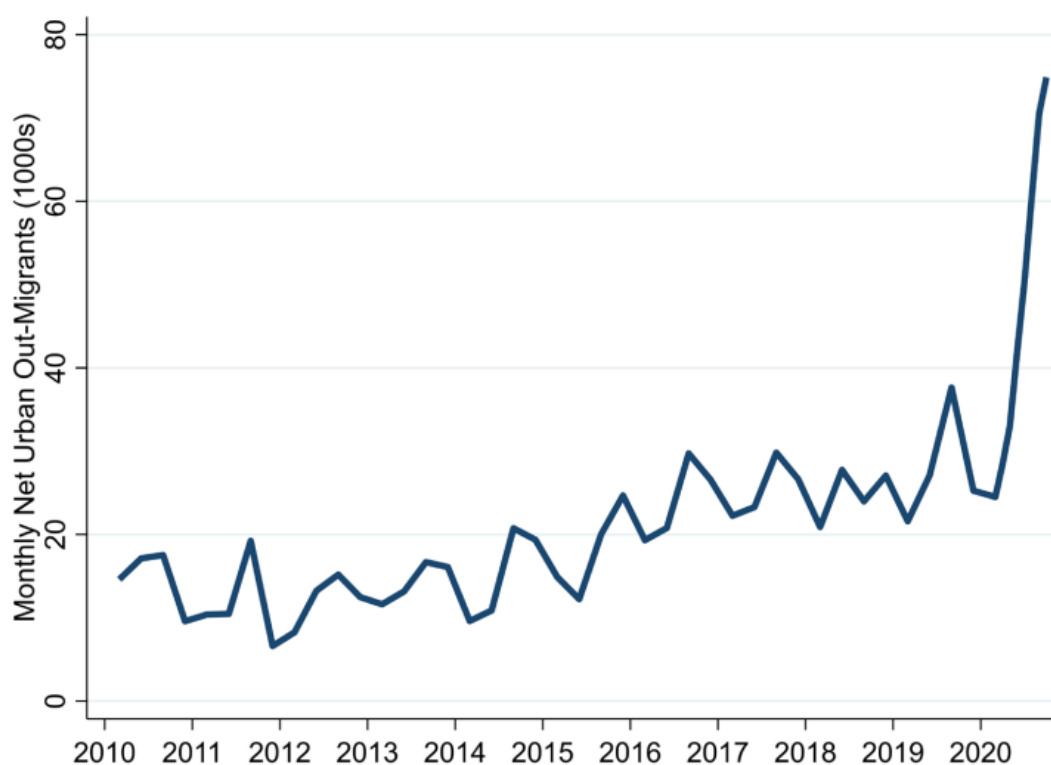


Figure 21: Monthly net out-migrants in the United States from 2010 to 2020, source: *Federal Reserve Bank of New York / Equifax Consumer Credit Panel, American Community Survey*

Moves tracking by post addresses

In order to follow long-term movement of population, the *Postal Office* database may be fruitful. It enables to follow movements and thus indicates where people intend to live.

Such a survey has been carried out in the United States of America. Home address can be there followed from two sources:

- The *Federal Reserve Bank of New York, Equifax Consumer Credit Panel* (CCP) consumer credit database, that holds an anonymous cross-section of 5% among American population holding a consumer credit, given the fact that 90% of Americans have subscribed one. Thus, this data base may be considered as representative. Lenders give each month to *Equifax* their borrowers' postal address;
- The *US Postal Office* database of addresses, that notices every change of address