

Home-to-Work Trips During the Transportation Strikes in Ile-de-France at the End of 1995

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ABSTRACT

In November–December 1995, the region of Ile-de-France experienced strikes resulting in a virtually complete interruption of public transport. During this period, a majority of economic activity continued. The Direction Régionale de l'Équipement (Department of Transportation Local Service) carried out a survey of this time period from which several lessons can be learned. Considerable congestion on the roads increased the journey-to-work by 70%. Ninety percent of the workforce advanced their hour of departure from their residence by 90 minutes on average, and 80% left work more than 90 minutes early. The peak schedule of demand was advanced by up to 2 hours in the morning and 2½ hours in the evening. The peaks were broader and flatter, particularly in the morning. Almost 50% of those normally using public transport switched to private car, most often a carpool. The stopgap measures taken in the absence of public transport worked to some degree. Since the end of the strike, however, commuters returned to their earlier modes of transport.

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INTRODUCTION

For three weeks, from November 24 to December 17, 1995, the region of Ile-de-France (see box 1) experienced a situation hitherto unknown—a virtually complete public transport system strike. The RATP and the SNCF,¹ which normally provide close to 95% of passenger transportation, were paralyzed; only private services (the APTR and the ADA-TRIF provided 5%) remained. After December 8, the managing authority of public transport (the Syndicat des Transports Parisiens or the Syndicate of Parisian Transports) offered alternative modes of transportation, chartering buses between Paris and its suburbs, and running boats on the Seine. This substitute supply was always very marginal.

Although there was a prolonged lack of public transport, the other sectors of the economy suf-

¹ RATP: “Régie Autonome des Transports Parisiens” and SNCF: “Société Nationale des Chemins de Fer:” the two major public transport operators in the Ile-de-France Region.

BOX 1 Some Facts About Ile-de-France

The region of Ile-de-France is comprised of 12,000 square kilometers, or 2.2% of the territory of France, 19% of the population, and close to 23% of the actively employed population.

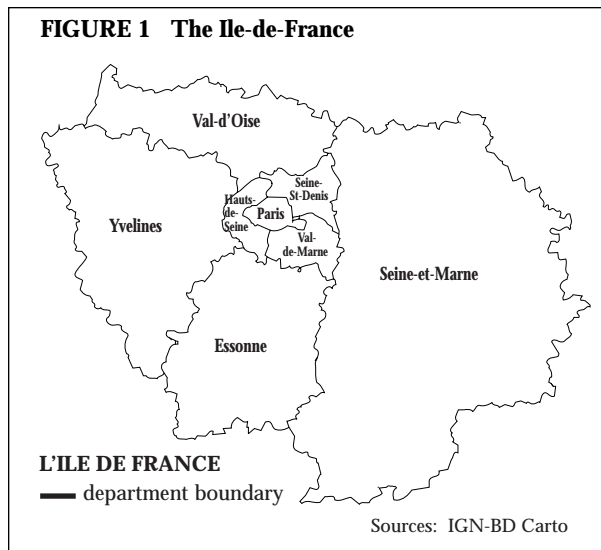
Ile-de-France has 1,300 districts, divided into eight departments (see figure 1):

- the Seine, with the same perimeter as the city of Paris, has 2,157,000 inhabitants over an area of 105 square kilometers;
- the Hauts-de-Seine, the Seine-St-Denis, and the Val-de-Marne consist of the inner suburbs, at the border of Paris, with 4,066,000 inhabitants over an area of 656 square kilometers;
- the Seine-et-Marne, the Yvelines, the Essonne, and the Val-d’Oise form the outer suburbs, at the periphery, with 4,746,000 inhabitants over an area of 11,251 square kilometers.

The residents of Ile-de-France complete 33 million trips daily, of which 34% are made on foot, 20% are made using public transportation, 2% are made by bicycle, and 43% are made by car. Parisians constitute 21% of this total, the residents of the inner suburbs make up 36%, and 42% are from the outer suburbs.

The Syndicat des Transports Parisiens (Syndicate of Parisian Transports) manages the public transportation for this region.

FIGURE 1 The Ile-de-France



fered very little from the effects of the strikes. Employed individuals were able to reorganize their trips, particularly to work, in an atmosphere that was unexpectedly user-friendly.

The characterization of this “crisis,” and the lessons drawn from it regarding the possibilities for the evolution of a balance between the different modes of transport in an urban setting, is the subject of this paper. The agencies responsible for the *Enquête Globale de Transport* (General Survey on Transports) carried out a survey during the course of the first trimester of 1996 concerning the trips of the Franciliens (inhabitants of the Ile-de-France region) during the strikes (see boxes 2 and 3 about the General Survey on Transports). The survey relied on the ability of individuals to remember trips made the day before. In this paper, we focus on the most common trips, that is, the trips from home to work or school, and back. In addition, information was gathered regarding trips for other purposes, which will not be presented here.

The following sections analyze absenteeism, effects on the duration of trips, adaptation of schedules, the effects on the choice of transport mode, and the longevity of the mode changes.

ABSENTEEISM²

Among the 3.370 million individuals likely to have made home-to-work trips (see table 1), 360,000, approximately 11%, claim to have given up, at

² Employed people working outside the home, who were in Ile-de-France during the strike period.

least once, the attempt to go to work. Whatever the reasons behind this decision, the data confirm the general opinion that “everybody went to work.” In addition, 40,000 individuals reported that they worked at home during the strike.

The rate of absenteeism varied with proximity to the workplace, or, more precisely, the relative geographic positions of residence and workplace. The long-distance radial links (Paris to the outer suburbs) were the most affected, with 20% of the

individuals experiencing some absenteeism; whereas commuters traveling within the outer suburbs experienced absences of only 5%.

The lack of public transportation obviously penalized, to a much greater extent, the populations who were the heaviest users, and who found themselves confronted with a substitute transport (essentially the car) whose efficacy was greatly decreased by congestion. Furthermore, the highest rate of absenteeism was for those individuals commuting to Paris.

BOX 2 Survey on Trips Before, During, and After the Strikes at the End of 1995

The survey on the trips before, during, and after the strikes at the end of 1995, was carried out by telephone during the first quarter of 1996, with 4,056 individuals at least 15 years of age, chosen by the method of quotas (using the results of the 1990 population census and the employment surveys of 1994, by sex, residence zone, and socioeconomic status). The survey’s objective was to collect the maximum amount of information on the trips of the Franciliens during the strikes and the modes used in the absence of public transportation. The survey especially focused on which modes were used most for work or study trips before, during, and after the strikes, the changes in modes used during the strikes, and their eventual longevity. It also addressed certain factors of economic importance, such as absenteeism or the reduction of the work day.

BOX 3 The General Survey on Transports

The Direction Régionale de l’Équipement d’Ile-de-France (Regional Service of the Administration in Ile-de-France) regularly carries out a survey on the trips of individuals, Enquête Globale de Transports (General Survey on Transports). Its objective is to compile a complete description of the trips of Franciliens within the region, on an average day of the week. It was carried out in 1976, 1983, and 1991, the years following the Recensement Général de la Population (General Census of the Population). The latest edition was associated with the Minister of Transports (Direction des Routes et Direction des Transports Terrestres (Direction of Roads and Direction of Land Transports)), the Conseil Régional d’Ile-de-France (Regional Council of Ile-de-France), the City of Paris, the Syndicat des Transports Parisiens (Syndicate of Parisian Transports), the RATP, the SNCF, and the Direction Regionale de l’INSEE (Regional Direction of the INSEE (National Institute of Statistics and Economic Studies)).

In 1991, the questionnaire, administered at the residences of 16,000 households, covered income, number of individuals, number of employed individuals, vehicle ownership, the characteristics of the individuals over six years old (age, sex, profession, location of work, etc.), as well as the trips of these individuals. Each respondent described the day before, detailing the hours of departure, arrival, the trip purpose, the mode of transport, the itinerary followed, and the destinations. The distances were calculated from a 300 meter grid. Durations were calculated from the hours of departure and arrival.

The principal survey was complemented by additional data-collection efforts:

- a survey on the trips at the end of the week;
- a qualitative survey, aimed at identifying the opinions and desires on the subject of transportation;
- a “handicap situation” survey, designed to evaluate the effect of limitations and incapacities on trips; and
- two surveys counting vehicles: one at the gates of Paris, the other at the boundaries of the region.

TABLE 1 “During the Strikes, Did You Regularly Go to Work?” (Population: employed individuals working outside the home)

Type of link home-work	Yes	No	Total number
Paris-Paris	87%	13%	415,000
Paris-inner suburbs	86%	14%	650,000
Paris-outer suburbs	79%	21%	331,000
Inner suburbs-inner suburbs	90%	10%	657,000
Inner suburbs-outer suburbs	92%	8%	480,000
Outer suburbs-outer suburbs	95%	5%	837,000
Whole of the Ile-de-France	89%	11%	100%
Total number	3,009,000	361,000	3,370,000

A strong presence at work was encouraged by employers who, most frequently, authorized adjustments of schedule. Most employees (87%) were not required to maintain their normal work hours. The 13% required to keep these hours usually did so the same day, for example, those arriving late stayed later in the evening.

Finally, approximately 180,000 individuals (3% of employed persons and students) found a temporary residence during the strikes that was closer to their workplace or place of study in order to minimize commuting time.

DURATION OF TRIP

In the special strike survey, trip time data were recorded as declared by respondents, and not calculated, in contrast to the normal practice of the Enquête Globale de Transports. Direct comparison of the data of the two systems is therefore impossible. As an example, the average travel time for home to work in the strike survey was 31 minutes, compared with 35 minutes in the Enquête Globale de Transports.

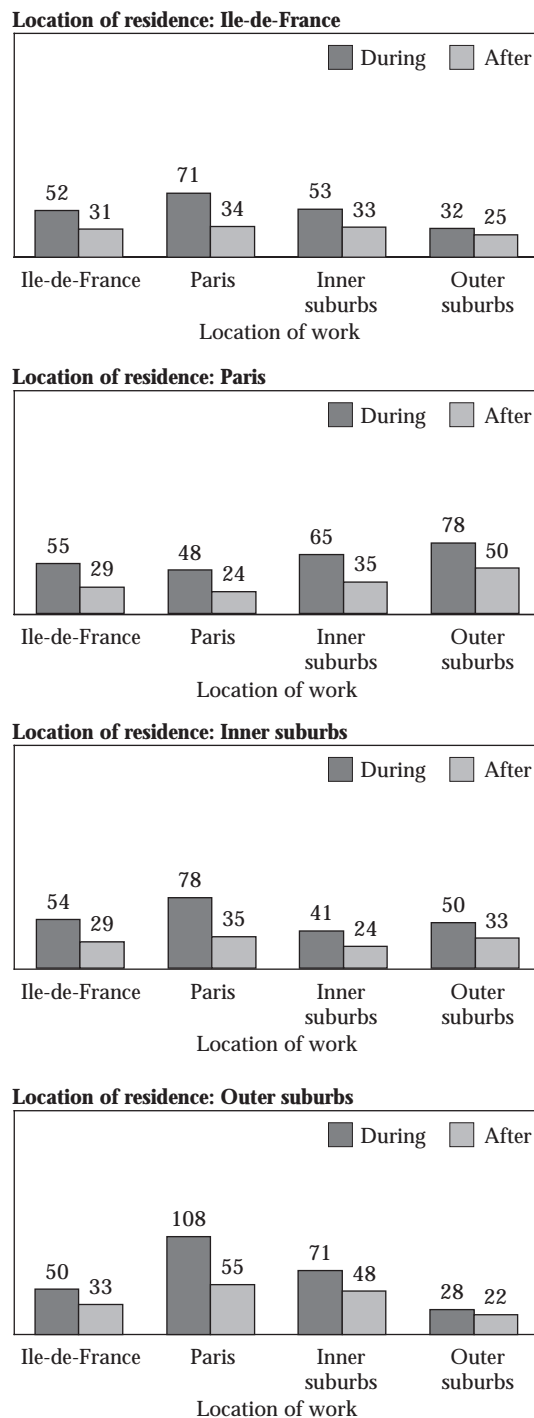
The survey on trips during the strike provides information about minimum and maximum trip duration, average trip duration (defined as the trip time at the end of the strike period), as well as trip times after the situation returned to normal. This latter time constitutes a useful reference to evaluate the effect of the strikes.

Average Trip Times During the Strikes

Figure 2 compares the average trip times during the strikes with trip times after the strikes. Figure 3 shows the maximum, average, and minimum trip duration at the end of the strikes, proving that after a certain number of experiments, the Franciliens were able to optimize their travel practices. For all Franciliens, travel time to work increased by 70% (from 31 to 52 minutes).

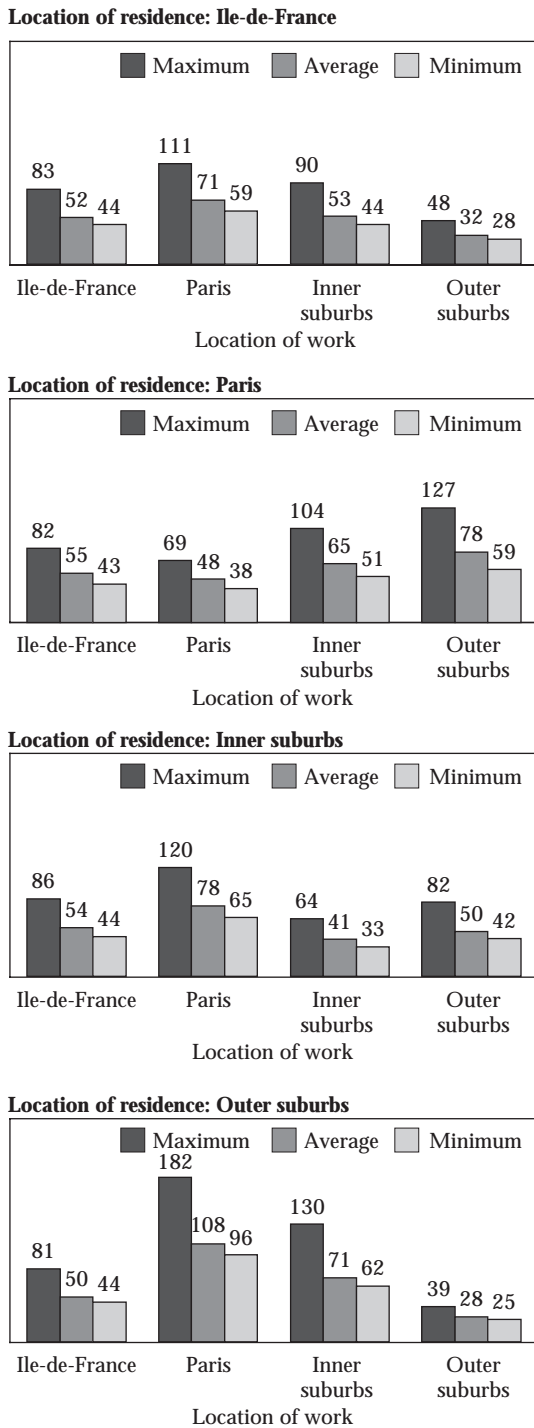
The residents of Paris and the inner suburbs experienced the most augmentations in trip duration (about 90%) corresponding to a loss of time averaging 26 minutes. Those in the outer suburbs suffered a lengthening of 50%, for a loss of 17 minutes. The Parisians suffered a relatively constant loss of time (from 24 to 29 minutes), regardless of the locality of their workplace.

FIGURE 2 Average Trip Time During and After the Strikes (In minutes)



Residents of the inner suburbs working in Paris were especially penalized, with an increase in duration of 43 minutes. The increase in time was much less (17 minutes) for those in the opposite situation. Residents of the outer suburbs who worked in the outer suburbs were barely affected (6 minutes), but were moderately affected if they had to

FIGURE 3 Minimum, Average, and Maximum Trip Duration at the End of the Strikes
(In minutes)



travel to the inner suburbs (24 minutes), and greatly affected if they worked in Paris (53 minutes).

For the overall population of Franciliens, the location of the workplace determined the duration of the commute: a job in the outer suburbs result-

ed in a loss of 8 minutes, but increased to 21 minutes for the inner suburbs, and to 43 minutes for a job in Paris or more than double the usual time (+ 120%).

Variability of Trip Times

Even if we assume that the average time stated at the end of the strike period constitutes in a certain sense an optimized trip, the relationship between the maximum times (corresponding, no doubt, to unsuccessful or difficult attempts) and minimum times (corresponding, in contrast, to strokes of “luck”) indicates the deterioration of the reliability of the duration of home-to-work trips. This relation is, on average, 1.9, and varies from 1.6 (internal migrations within the outer suburbs) to 2.2 (migrations between Paris and the outer suburbs). This uncertainty is independent of the location of residence (1.9), but depends instead on the location of the workplace: 1.9 in Paris, 2.0 in the inner suburbs, 1.7 in the outer suburbs.

Ability To Optimize Travel Time

If we consider that the ratio of the average stated travel time at the end of the strike period and the minimum time during the strike period gives some idea of the optimization of the organization of trips, a distinction emerges between the outer suburbs and the rest of the region. Location within the outer suburbs, either of work or of residence, is associated with an average time close to the minimum (+ 14%), for those in the rest of the region, average times are 20% to 25% greater than minimum travel times.

ADAPTATION OF DEPARTURE SCHEDULES

To cope with a considerable increase in the duration of their work trips, Franciliens noticeably advanced their departure times, whether in heading to work or in returning to their residences. The measurement considered here is the cumulative number of departures after the normal work hours, on one hand, in the period near the end of the strikes, and on the other, after the strikes.

Departures for Work

For all Franciliens, the time of departure advanced, beginning very early (from 4 a.m.), and increasing until the period between 6 a.m. and 7 a.m.; by 7 a.m., 33% of employed individuals had already departed compared with only 19% under ordinary circumstances (see figure 4). Furthermore, by 9 a.m., 90% of the workforce had departed, as usual. Globally, ignoring the compensating effect of strategies of leaving earlier or later, we can conclude that only 10% of the employed did not modify their hour of departure. On average, the hour of departure was advanced between 30 minutes and an hour during the worst of the strike (see figure 4).

The employed Franciliens made use of this strategy in varying degrees, except for those making trips within the greater suburbs, as their travel time penalties were very small.

Another way of looking at the strategy of travel time adjustment is to consider the maximum number of individuals who advanced their departure, and the significance of the given advancement. For those traveling between the outer suburbs and either Paris or the inner suburbs, the largest proportion advanced their departure time to between 6 a.m. and 6:30 a.m. Almost half of those who travel between the outer suburbs and Paris, and one-quarter of those going between the inner and outer suburbs advanced their departure times. The maximum rate of early departures occurred around

7:30 a.m. for internal links within the inner or outer suburbs as well as for those trips made between the inner suburbs and Paris. One-quarter of the departures between the inner suburbs and Paris were around 7:30 a.m., but were only 13% within the inner suburbs, and 6% within the outer suburbs. Finally, the peak of early departures for journeys within Paris was reached at 8:00 a.m. (15%).

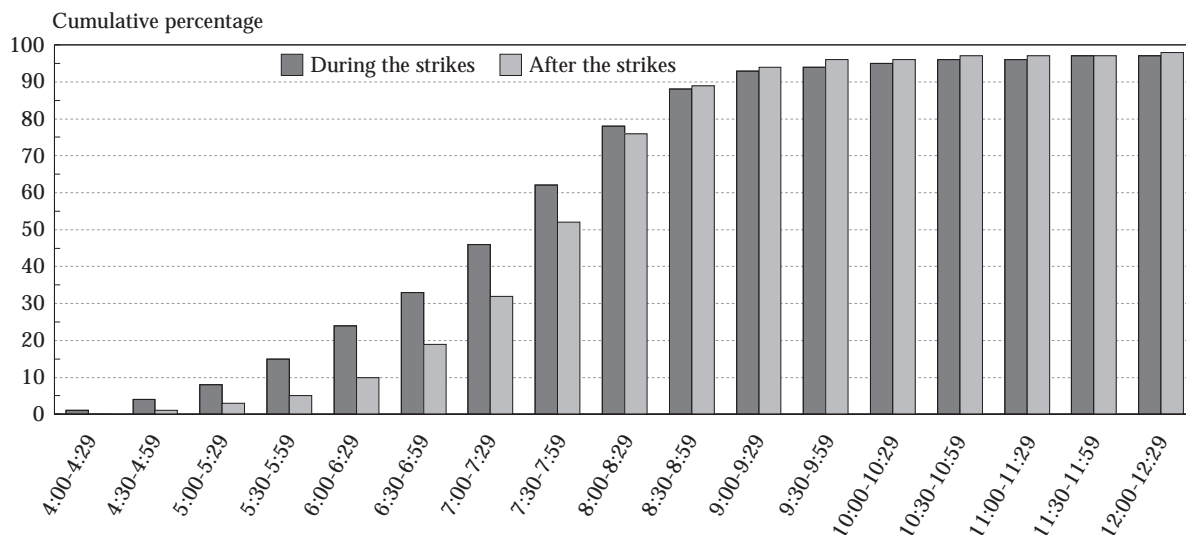
In most cases, a return to normal levels of departures occurs around 9 a.m., with about 90% of departures having taken place. However, the situation appears to be more complicated for the links between the outer suburbs and Paris, where the strategy of early departure is complemented by that of delayed departure: it is only by the end of the morning that the normal situation is reestablished.

The degree of advanced departures, calculated on average per half hour, varied according to the type of link. The maximum was about 30 minutes within the inner and outer suburbs, 30 to 60 minutes within Paris, 60 minutes between the inner suburbs and Paris or the outer suburbs, and 90 minutes between the outer suburbs and Paris.

The Morning Peak

The peak is defined here as the hour-long period recording the maximum number of departures. For the whole of Ile-de-France, the peak hour is between 7:30 and 8:30 a.m. for links outside of Paris. Within Paris, the peak is between 8 and 9

FIGURE 4 Cumulative Departures for Work or School: Whole of Ile-de-France



a.m. A forward shift occurs for commutes from Paris to the suburbs: 7 to 8 a.m. instead of 8 to 9 a.m. for the inner suburbs, and 5 to 6 a.m. instead of 7 to 8 a.m. for the outer suburbs.

The intensity of the peak was clearly dampened during the strikes. It fell from 43% to 32% of departures for the whole of Ile-de-France. Within Paris, the number of departures occurring during the peak hour dropped from 51% to 36%. In the outer suburbs peak departures declined from 48% to 44%.

Returning Home

In the evening, we found the same anticipatory strategy for departures at the end of work (see figure 5). This strategy starts in the early afternoon and reaches its peak around 5 p.m. with a return to normal around 7 p.m., at which time approximately 80% of the departures have occurred. It therefore appears that 20% of the employed individuals did not leave work earlier than usual. Those returning to their residences early advanced the time by 1 to 1½ hours.

Zone by zone, the shift forward is parallel to that of the morning, with increased values in general. In the evening, on average, the individuals traveling within the outer suburbs do not change their hours at all.

The Evening Peak

The evening peak (with the same definition as the morning) advanced by 30 minutes. This advancement varies considerably according to the type of trip, reaching 1½ hours within Paris, and up to 2½ hours for individuals traveling between Paris and the outer suburbs.

The evening peak, traditionally less intense than that of the morning, saw a somewhat reduced number of departures for home, from 32% to 26%.

EFFECT ON THE CHOICE OF TRANSPORTATION MODE

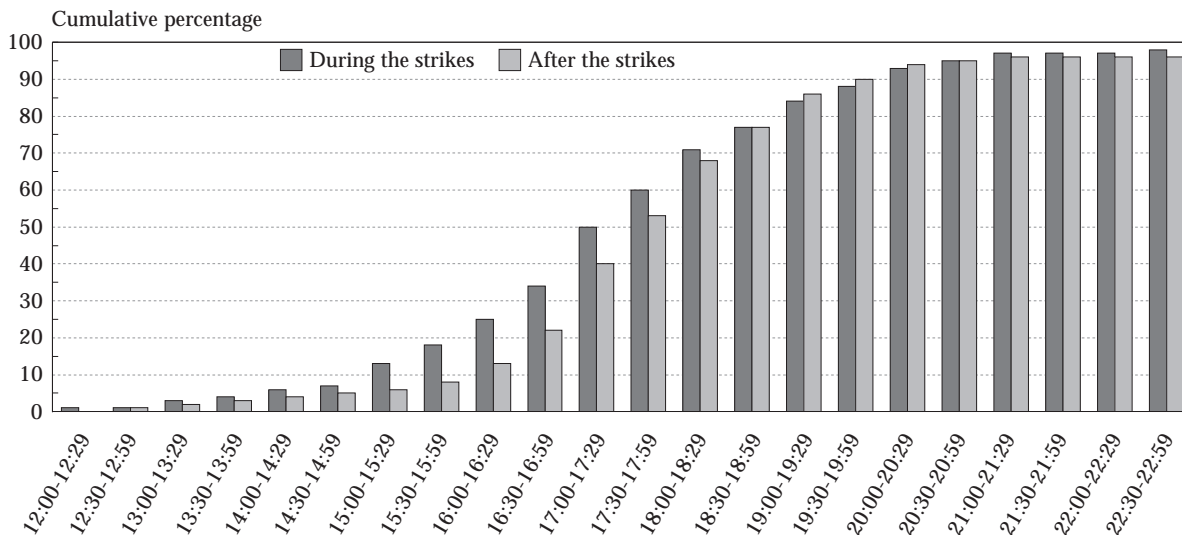
The population observed here is that of employed individuals and students traveling to a location more than one-quarter hour by foot from their residence. Only those who did not temporarily change their residence, and who made trips before, during, and after the strikes are included in the statistics presented in this section.

Modes of Transport During the Strikes

Given the almost total absence of supply, one is not surprised to see the near disappearance of the use of public transport (2% of the trips). As a result, 39% of the global demand turned to other modes as follows:

- Car passenger, 3%
- Carpool passenger, 5%

FIGURE 5 Cumulative Returns to Home from Work or School: Whole of Ile-de-France



- Car driver, 11%
- Walking, 11%
- Bicycle, 5%
- Other, 5%

Half the travelers turned to the car. Most drove (11%) but 8% traveled as a passenger. The percentage of work trips taken as a driver of a car increased from 51% to 62%, which is easily enough to create considerable congestion, in spite of the adaptations in schedules.

The second substitute mode of choice was walking (for trips of more than one-quarter hour), replacing public transport for 11% of commuters. The bicycle served as an alternative for 5% of commuters, conversely; the motorcycle does not seem to have played a significant role. Naturally, the availability of a bicycle is much more common than that of a motorcycle, and, moreover, the acquisition of bicycles increased considerably during the strike.

The Franciliens, with great imagination, used "other" modes of transport 5% of the time. Included in this percentage are the many novice roller skaters, occasionally "accepting a tow" from a motor vehicle!

The Return to Normal

Figure 6 shows evidence that one or two months after the end of the strikes, the mode of transport returned to the normal pre-strike configuration. None of the alternative modes used in a signifi-

cant manner saw its market share permanently influenced.

The sample size of the survey does not permit a close analysis of changes occurring in the utilization of the modes. It does, however, provide information about why those choosing two of the alternatives to public transport and car driver, namely the bicycle and carpooling, ultimately returned to public transport.³

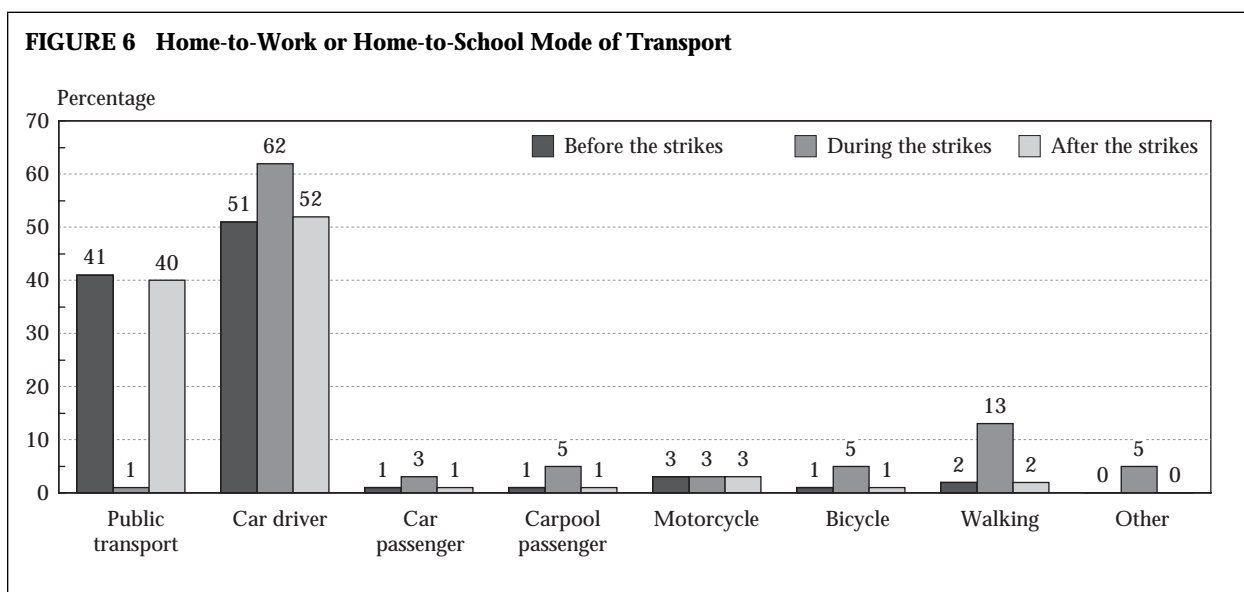
Individuals who temporarily used the bicycle as a replacement for public transport, listed the following as reasons for having abandoned it as a mode of transport:

- safety hazard,
- exposure to pollution, and
- convenience of public transport.

The regular users of public transport who found a replacement in carpooling listed the following as reasons for having abandoned it as a mode of transport:

- punctuality of public transport,
- difficulty of organizing carpools,
- speed of public transport, and
- absence of a carpooling supply under normal circumstances.

³ Further analysis has only limited applications because of the small sample size.



CONCLUSION

This exceptional period is rich in information regarding the behavior of Franciliens and the organization of trips in Ile-de-France. It is clear that the difficulties created by the lack of public transport throughout the region were worst in those regions where public transport traditionally plays a major role, that is, on the radial links and within the downtown area. The automobile was the primary alternative mode, causing congestion, and, as a consequence, considerable delay for the majority of those traveling. Nevertheless, after a short adaptation period, the local economy continued to function nearly normally.

The observed increase in travel times provides an indicator for the evaluation of the role of public transport in mitigating highway congestion. The increased duration of trips by 70% corresponds roughly to a daily loss of 3 million hours for commuting trips alone. Valued conservatively at 50 francs per hour, the corresponding annual loss would be 30 billion francs, or the equivalent of the running budget of public transport.

Although the strikes lasted three weeks, the situation was not a stable one. The strikes were accepted as temporary, and the generous support of the strike by the population was, no doubt, linked more to the social consequences anticipated by the strike than to any conviction of the pertinence of the demands of the strikers. Furthermore, the tolerance shown by the majority of employers in accepting altered schedules and, above all, the reduction in hours worked would certainly not have continued indefinitely. That the strikes were understood to be temporary limits the conclusions

one can draw from the changes in travel behavior observed.

The leveling off of the demand peak is a matter worthy of further analysis. Certainly, what was observed during this period was largely a result of constraints imposed by the capacity of the road network.

Nevertheless, the widespread practice of advancing departure times suggests that this behavior may play a significant role under normal conditions, a fact that remains to be fully evaluated in the area of road capacity management.

The last significant observation is the instantaneous reestablishment of the prior distribution in the modes of transport following the end of the strike. Although we know that travelers, and those using public transport in particular, are inclined to mass behavior, everything occurred as if the employed individuals were behaving economically rationally, and used the mode that, objectively, performed the best for them.

The possibilities offered by the presently marginal practices of carpooling and cycling remain unrealized. Since December 1995, and in the months that followed, some have declared that they see these modes as solutions to be encouraged. In fact, the survey shows very clearly that carpooling disappeared quickly, and many believe that carpooling will only develop in Ile-de-France if there are incentives. Similarly, policies implemented, especially in Paris, to make the road system more bicycle friendly, so far have not produced a spectacular return, and it is too early to determine whether in the future bicyclists will return to the large Parisian avenues.