The dark side of making transit irresistible: The example of France

Dominique Bouf, David A. Hensher

BOUF D., HENSHER D. A. *The dark side of making transit irresistible: The example of France*. Transport Policy, 2007, vol. 14, n° 6, pp. 523-532

The Dark Side of Making Transit Irresistible: The Example of France

Dominique Bouf[1]
LET (Transportation Economics Laboratory)
Chercheur CNRS
National Center for Scientific Research
Lyon, France
dominique.bouf@let.ish-lyon.cnrs.fr

David A. Hensher
Institute of Transport and Logistics Studies
Faculty of Economics and Business
The University of Sydney
Davidh@itls.usyd.edu.au

25 January 2007 (revised September 2007)
Version4.0

Abstract

The French experience in developing policies to reduce car use in metropolitan areas is presented in this paper as an illustration of the lack of recognition of the broader set of criteria on which specific policy frameworks should be judged. One of the major challenges, and often failings of policies focussed on reducing car use, is the lack of a structure that ensures that the downside impacts are not relocated to other parts of a system such that potential gains end up being eroded by the potential losses. We draw on experiences throughout France as well as case studies in Lyon, to highlight the dark side of French transport policy promoting a switch from car to public transit and non-motorised modes, in terms of financial, equity, and environmental outcomes.

Keywords

French transport policy, modal share, charging, car dominance, challenges for public transport

Acknowledgements: The comments of two referees have assisted in preparing this final version.

[1] This paper is based on research undertaken during a sabbatical year (2005-2006) at ITLS Sydney.

1. Introduction

There are several reasons to favour public transit in comparison to cars. The first is pollution, with transport in France in 2004 being responsible for 5 percent of SO_2 emission, 26 percent of CO_2, 34 percent of CO and 47 percent of NOx (CITEPA 2004). This is all the more important when placed in the context of the generation of French electricity which is substantially produced by nuclear plants with very few emissions. The second reason is congestion. Ever expanding cities are struggling to accommodate increasing road congestion. The third reason is the promotion of wellbeing in societies with increasing numbers of inactive individuals, who would gain health benefits through walking to public transit. Finally, in the old world, ancient city centres are not very well suited to car traffic, making it increasingly necessary to protect the ancient cores of these cities.

To fulfil these objectives, many European countries have developed sets of measures to promote public transit and discourage the use of cars in cities. France is one of the countries which has moved a long way in this direction. In this paper we present some major elements of this policy and discuss its results.

2. Measures in France to promote public transit

2.1 A new resource for financing public transit and the subsidization process that ensued

Instituted in 1971 for Paris and progressively during the mid 70s for the other French agglomerations, the "versement transport" (hereafter the VT) is a payroll tax devoted to public transit. It is collected by the AOTU, an association of municipalities in charge of urban transport policy for an area coinciding with the urban areas. The rates, as of 2002, are summarised in Table 1. This tax is justified in terms higher productivity benefits of employers and employees located in a city because of agglomeration economies. Both employers and employees can benefit, with the transit system, from access to a larger employment market.

Table 1: The 2002 Rate of the Versement Transport

	Nature of the area	rates
Regions	10,000-100,000 inhabitants	0.55 %
	more than 100,000 inhabitants	1 %
	urban area with subsidized TCSP*	1.75 %
Paris metropolitan area	Centre (Paris city or municipality)	2.50 %
	inner suburbs	1.6 %
	outer suburbs	1 %

* Public transit line with full right of way: BRT, LRT, metro.
Source: GART.

This tax, in 2002, has raised 2.2 billion euro for the Paris urban area and around 2 billion for the regional cities. One of the implications of the VT is the reduced contribution to the financing of public transit paid by transit users, amounting to 17 percent in the Regions and 35 percent in Paris (GART 1999). Some of the money has

also been used to support new investment in public transit such as enhanced ticketing systems, more buses and modernised train carriages. Despite the benefit of lower cost transit use and support for new infrastructure, the VT has some major downsides. France is already a heavily taxed country with some costly fringes benefit imposed on employees, hence adding even more to the cost of labour in a country with a high unemployment rate. Moreover, by increasing the cost of labour, especially in central jurisdictions of urban areas, the VT tends to encourage urban sprawl, which is not favorable to public transit.

The availability of substantial sums of hypothecated funds, however, through the VT has provided an opportunity to develop very efficient public transit that compensates to some extent the decentralisation pull, pushing activity back towards the centre, albeit with longer journeys to work. The example of the RER in the Paris metropolitan area is one such example, detailed in the next section.

2.2 Investment in public transit: the example of the RER

The RER consists of a network of suburban trains with special characteristics: they are generally faster than ordinary trains; have higher frequency, facilitate ease of movement from suburbs to suburb; and are well interconnected to other RER trains, as well as metro and suburban trains. These attractive features were inspired by the Tokyo transit system. The RER system is today the core of the public transit network in Paris and is highly successful in attracting patrons.

The building of this sub network, however, has been very expensive. The RER stations inside Paris are old-styled metro stations with the two tracks in the middle and a platform on each side. The rationale for this design was based on the relative ease of digging a trench in the surface streets and then covering it up after construction was complete. For the RER Stations, this was no longer feasible because they were to be built very deep below the surface. Instead of building such “cathedral stations” (Gérondeau 2003), it would have been financially more attractive to adopt a design with the platforms in the middle of the station and two smaller parallel tunnels for train circulation. An example of the cost for a more recent RER station is Haussmann - Saint-Lazare. Opened on 12 July 1999 at a cost of 274m Euros (Gerondeau 2003), it is the terminus of the new Line E, situated beneath Boulevard Haussmann and directly connected to Gare Saint-Lazare, Auber RER, and two metro stations.

It is very easy to find many examples of costly choices for public transport in France such as oversized engines for metro locomotives, and magnificent but almost useless station for the airport at Lyon. The general belief is that if the people in charge of designing the project know that there is a lot of money potentially available, they will use it, with some unnecessary expenses.

2.3 Creation of difficulties for the car in cities

In France, transport policy at the urban level increasingly focuses of ways of creating obstacles to car use. The creation of a large number of bus lanes in Paris, for example has hampered the efficient movement of cars. This works relatively well in Paris, where there is a good transport network; however in cities in the regions which have

adopted the same strategy, this has been far less successful. The examples in Lyon of light rail transit (LRT) and the new planning (the "beautification") of the low wharves of the Rhone river illustrate the impacts.

2.3.1 Light Rail

After having almost disappeared from French cities in the 1950s, light rail transit has shown a revival since the mid 80s, linked to a government subsidy scheme for the "Transportation and Community and System Preservation" (TCSP) which consists of public transit with full right of way. Central government provided varying but generous subsidy levels for metro (20 percent), light rail transit (40 percent) and variable amounts for Bus Rapid Transit (BRT). The subsidy strategy was designed to meet a number of objectives.

The first one is to increase public transit ridership by increasing the quality and the quantity of the supply of public transit, with a full right of way. This new supply was supposed to be totally protected from traffic congestion, making transit more attractive than buses competing in mixed traffic. The second objective was to reduce the space available for cars in the cities. For example, the metro, which in France is mostly underground, was less subsidized than the light rail transit which has been constructed to the detriment of space available for cars. The third objective was the desire to create an industry with public subsidies in conformity with the "colbertist" model and to export public transport technology, especially light rail transit. To a certain extent this has been successful although the main expected market (China) is now heading increasingly toward BRT than light rail transit (Hensher 2007).

A further reason to favour implementation of TCSP was the desire to reduce the operating costs of public transit companies. As the speed of transit increases, the labour cost per vehicle kilometre diminishes. Moreover, with a greater capacity (as opposed to buses[2]), LRT decreases the driving cost per seat-kilometre offered This subsidization scheme has led, and continues to lead, to huge investment programs. For example Lyon invested 1.2 billion Euros between 1993 and 2002, and Toulouse has an impressive program of more than 3 billion Euros. For the period 2002-2015, LRT has been the favourite investment (see Table 2)

Table 2: Investment in TCSP 1994-2002

LRT	58 %
Metro	37 %
Bus (BRT)	7 %

Source: cour des comptes.

The impacts of these investments have not been formally assessed, although it is required by law. The results on ridership are conflicting, but overall, an increase of patronage has been observed in the metropolitan areas with TCSP. Contrary to what was expected, the operating costs seem to have increased more for the large

[2] Although this is now being shown in Bogota, with the TransMilenio BRT, to be incorrect (Hensher 2007). Indeed The bus rapid transit system of Bogota, Colombia, has earned the distinction of being the world's first mass transport project to be approved for participation in the Kyoto Protocol's Clean Development Mechanism.

metropolitan areas (more than 300,000 inhabitants, which all have TCSP) than for the totality of the metropolitan areas.

We will take a closer look at what has happened in Lyon, which is indicative of many regional cities in France. Lyon (PTU[3] 1.3 millions, metropolitan area 1.6 millions) has four metro lines (among them one is very small) and three new LRT lines since 2001 (see Figure 1).

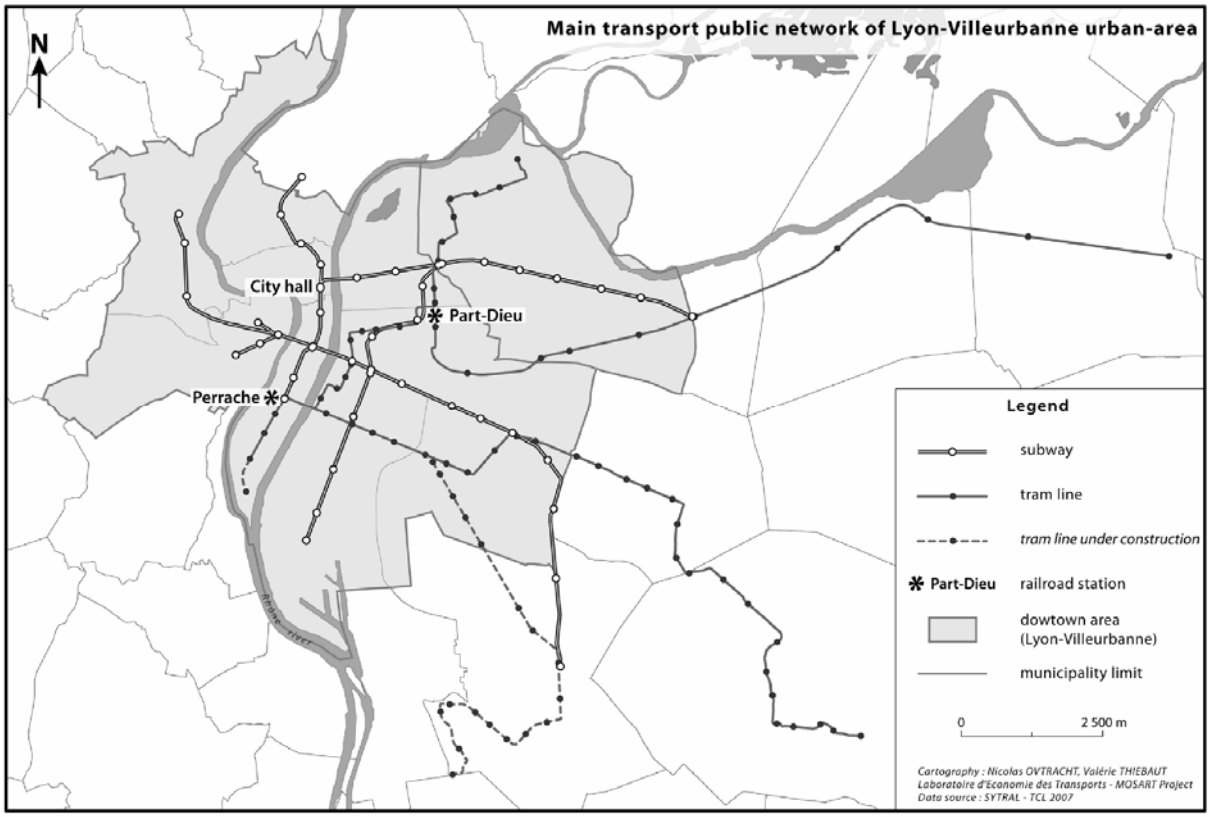

Fig. 1. The Lyon metropolitan area.

[3] The PTU is the public transit perimeter, where the transit policy is decided and implemented. It consists of a set of municipalities encompassing a large municipality which gives its name to the PTU.

In Lyon, the objective of reducing the space available to cars through the introduction of LRT has been largely achieved. The capacity of some major arterials has been seriously reduced (e.g., avenue Berthelot, quai du Rhone) as has the capacity of some minor arterials (e.g., rue de Marseilles). We estimate that on some major avenues the capacity has been reduced to less than half of the previous capacity. An important bridge on the Rhone River has been particularly affected.

In the absence of precise data, it is difficult to formally determine the results of this policy on car traffic. Anecdotal evidence suggests that congestion has increased significantly in some areas. It remains to be seen if this congestion will induce behavioural change, modal shifts and/or location changes. We will deal with this point later. In terms of public transit ridership, some increases are noticeable but many factors may have caused this. It seems very likely that the extensions of the LRT system in the suburbs have led to some increase of patronage. However the service level did not increase for all patrons. The desire to benefit from density economies has resulted in the re-configuration of many bus lines to serve the LRT lines, taking away the opportunity for much more systemwide multi-modal coverage in which buses can serve longer haul trips. It follows from this that more connections are needed and that the routes are less direct. For example, many students are unhappy with the frequencies and the route of a number of LRT services serving an external campus of one university.

Overall, LRT in Lyon has decreased the space available for cars, increased the comfort of some public transit users, and has compelled many users to incur a modal transfer. There has, disappointingly, been no significant shift in the modal share of each mode, with a mix of increased and decreased travel times of travellers; but most noticeably, the presence of LRT has contributed to increased congestion through a policy of 'take one lane' in contrast to 'add one lane'. In February 2007, the release of the 2006 Lyon Transport Survey results shows signs of some small increase in transit use, but overall total mobility in absolute terms of kilometres travelled has decreased use in large measure due to a reduction in car kilometres travelled. The reduction in car use however was not linked to a shift to public transit; indeed at best transit trip increase is less than 15 percent of the equivalent reduction in car trips[4]. It should also be noted that the results of the survey published in June 2007 show an extensive use of cars in the entire metropolitan area (which is about 1.9 million in this survey) compared with the preliminary results, published in February which concern only the "core" of the metropolitan area (the greater Lyon, about 1.3 millions).

This policy to restrict car access to the city has many consequences. We present briefly some aspects of another project related to the new planning for what we call the "low wharf" of the Rhone River to highlight the experience.

[4] We thank a referee for pointing this out. See http://www.emta.com/article.php3?id_article=545. "…in the greater Lyon area, less than half of trips are made by car (in fact the car modal share decreased from 53% to 47,5% within 10 years), the other trips are made by public transport and walking, on the reverse in the rest of the metropolitan area the car modal share increases up to 85%".

2.3.2 The low wharf of the Rhone river

The banks of the Rhone River in the central business district offer 10 kilometres of very green grass and tree covered parks that are very pleasant walking precincts. The planned low wharf project is designed to extend this green area along the river to the centre of the city and beyond. New recreational space will be created in space formerly devoted to free car parking, eliminating ten thousand parking spaces. On the left bank of the Rhône river, three parking lots are planned for a total of 1671 spaces, all of them charged (Greater Lyon 2007). The area has two hospitals and two universities and many small businesses. That means that this new recreational area, which will mainly benefit central residents, will create some serious difficulties for other people. The implicit assumption is that former car users will use the public transit, but even in a metropolitan area well served by public transit as Lyon is, it is not obvious that such a modal transfer will occur. It is very likely that a significant number of former users of the parking lots will be driving in the city looking for a space to park during the peak hours. Before the policy against the car was implemented, it took in 2002 at least 10 minutes to find a parking place in Lyon (Sytral 2007). We can reasonably assume that the search time has increased today, increasing the disutility of time spent in cars (as well as the pollutants emitted).

It is more likely that the number of car users will not reduce significantly, with the number of cars entering the city, estimated between 400,000 and 500,000[5], with an increasing number actually cruising around searching for parking.

2.3.3 Velo'v: an apparent success with few impacts

Another system developed in Lyon, to promote "active modes" known as Velo'v, is also designed to discourage car use. It was introduced in 2005 by Lyon municipality as a scheme to lend or rent bicycles to individuals travelling in the central area. Using the bicycle requires a season ticket (one year to one week) at very low cost (respectively 5 euros and one euro) and the client can pick up a bicycle at any of the 180 plus stations in the core of the city. Renting is free for the first half hour and cost 0.5 euro (for the one year season ticket) for the subsequent hour and then 1 euro per hour (up to 24 hours). A bond is required when registering for the season ticket. Theoretically a GPS system and a set of trucks make sure that every bicycle station will always have a sufficient number of bicycles available. Figure 2 shows the locations of bicycle stations in Lyon.

[5] Carrying 600,000 commuters.

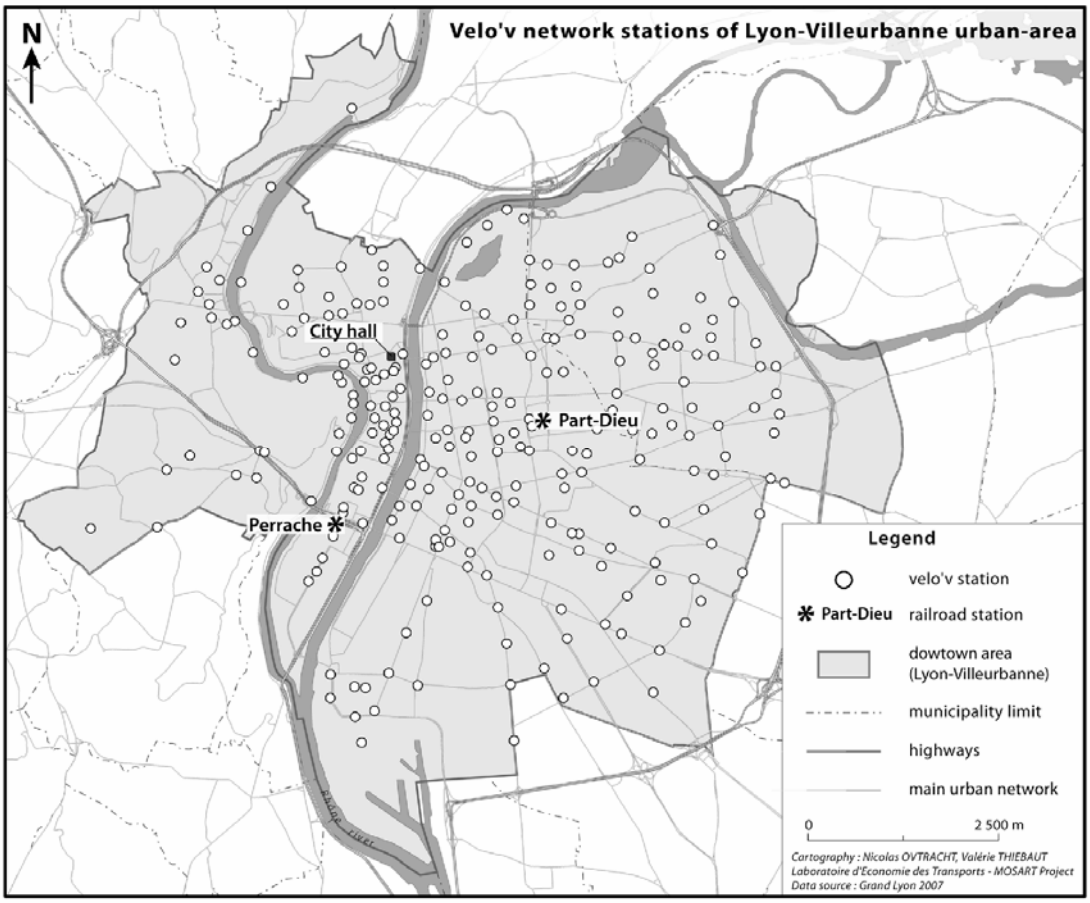

Fig. 2. Location of Bicycle Stations in 2006

As of June 2006, one year after the introduction of the scheme, 50,000 people registered. This corresponds to approximately 20,000 trips per day. A recent survey found that about 7 percent of those trips would have been made by car. Thus, a maximum of 1,400 car trips are avoided out of a total of 1.7 millions car trips within Lyon PTU.

In Lyon, according to deputy mayor Touraine, the city's 3,000 rental bikes have logged about 10 million miles since the program started in May 2005, saving an estimated 3,000 tons of carbon dioxide from being spewed into the air. Overall, vehicle traffic in the city is down 4 percent, he said, and bicycle use has tripled, not just on account of Cyclocity, but also because the program has prompted a boom in private bicycle use and sales.
(see http://www.dailykos.com/story/2007/3/24/154327/860).

Despite the success of the scheme in increasing the use of bicycles, its influence on car use has been miniscule. But by stimulating other people to use bicycles, it has increased the modal share of bicycle from 0.6 percent (1995) to 1.7 percent (2006). The city is not very suited to bicycle traffic, resulting in increased fatalities of bicycle users. It was reported in May 2006 that Vélo'v had led to a 33% increase in the amount of bicycle traffic in a year, while the number of bicycle accidents had remained stable, with about 90 injuries and one fatality. The number of pedestrian

accidents caused by bicycles had also remained stable, with about 10 injuries and one fatality.

(see http://bonjourlafrance.net/france-city/lyon-france/lyon-transportation.htm)

The bicycle stations are concentrated in the centre of the metropolitan area. Given the low speed of the bicycle and the low density of suburbs, and that many car trips are between low density suburbs, it is likely that this kind of experiment while promoting a “green” image of the city, is not likely to alter significantly the modal share in the metropolitan area. Although technicians and politicians are very proud of the photos of streets with many bicycles, the impact of modal share is extremely limited.

3 Consequences of these policies

3.1 Modal share

Modal share is estimated through periodic surveys conducted in the main cities, generally within an area corresponding to the urban area (or more or less the urban area which are smaller than the metropolitan area). The results are summarised in table 3.

Table 3: Modal share of car (walking and cycling excluded) for some French urban areas.

Urban area	date	Modal share of the car (%)
Paris	76	55
	83	61
	91	66
	02	65
Marseille	76	69
	88	77
	97	81
Lyon	76	69
	85	74
	95	77
	06	73
Lille	76	68
	87	82
	98	86
	06	82
Toulouse	78	70
	90	79
	96	81
	03	82
Bordeaux	78	69
	90	79
	98	84
Nantes	80	63
	90	76
Toulon	85	72
	98	84
Strasbourg	88	73
	97	77
Grenoble	78	65
	85	75
	92	74
	02	83

The selected urban areas are the largest one for which we have at least two surveys.

Globally, we observe an increasing modal share of the car. However, some recent surveys (Lille, Lyon) seem to exhibit a decrease. But this decrease might be attributable to various causes: increasing gasoline prices or more importantly the continuation of suburbanization. For example, if we take the metropolitan area of Lyon (for which we have no comparison) in 2006, the modal share of car was 81 %. Thus, it is possible that in the centre of the metropolitan area, the modal share of car is declining, but in the whole metropolitan area the reverse is true. Moreover it is likely that the modal share of cars, calculated in passenger-kilometre has grown substantially.

The reasons for the progressive growth in car use are clear. Using the example of Paris, urban sprawl continues to accelerate (Table 4) and non-work related travel is increasing its share of trip activity. As in much of the developed world, French metropolitan areas are affected by urban sprawl. The policy to favour urban transit has not deeply altered this trend.

The population of Paris grew by 1.3 % between 1999 and 2005 which is less than the suburbs (inner suburb +4.7 % outer suburb +4.3% for the same period. The number of jobs in Paris city is still growing but it is less than in the metropolitan area (0.1 % per year between 1995 and 2003 against 1.3%).
(see: http://www.insee.fr/fr/insee_regions/idf/zoom/zones_emploi/doc/paris.pdf).

The ville de Paris lost more than 600,000 people from 1962 to 1999, while its suburbs added nearly three million, nearly as many as lived in Paris at its peak. If you venture outside the Boulevard Peripherique which encircles Paris, you find an urban landscape similar in many ways to that of an American suburb (Cox 2002). Approximately 80 percent of Parisians live outside Paris, and about the same percentage work outside Paris. The same is true throughout Western Europe. The suburbs of Copenhagen and high-tech Arlanda Corridor in Stockholm are at least as sprawling and public transport unfriendly as similar corridors in Austin or Seattle in the USA.

Table 4: Population of Paris metropolitan area[6] (000)

	1975	1982	1990	1999
Paris municipality	2300	2180	2150	2120
C1 (inner suburb)	3980	3900	3990	4040
C2 (outer suburb)	3600	3990	4520	4790

Although the figures might vary between metropolitan and regional jurisdictions throughout France, the outer suburbs are increasing more than the old centres. This gives rise to an increase in the number of trips between suburbs, which are

[6] The French definition does not correspond exactly to the US definition of a metropolitan area. In this paper the departements belonging to the Region Ile de France (RIF) are taken into account. This definition applies to all subsequent tables.

predominantly by car (Figures 4 and 5). Despite the extensive use of private cars, traffic levels on public transport in Paris, which were flat or declining in the early 1990s, have started to rise in recent years, post 2000. RATP traffic, including Metro, RATP RER lines, trams, and RATP city and suburban buses is now in excess of 2,500m passenger journeys, a number that it had declined from after 1990.A similar trend has been seen on SNCF RER and Ile de France rail services, with passenger numbers rising from 490 million in 1998 to 541 million in 2000.

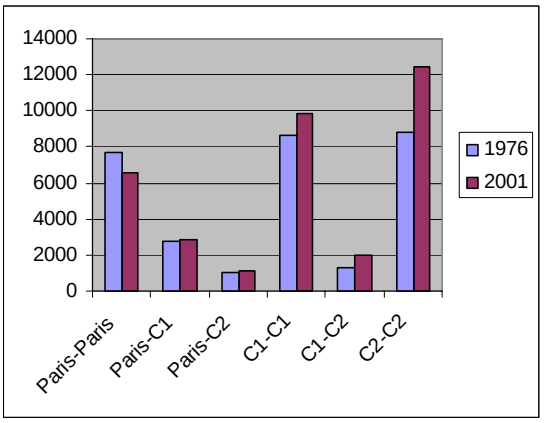

Figure 3: number of trips in Paris metropolitan area (RIF) according to the sub area implied in origin or destination.

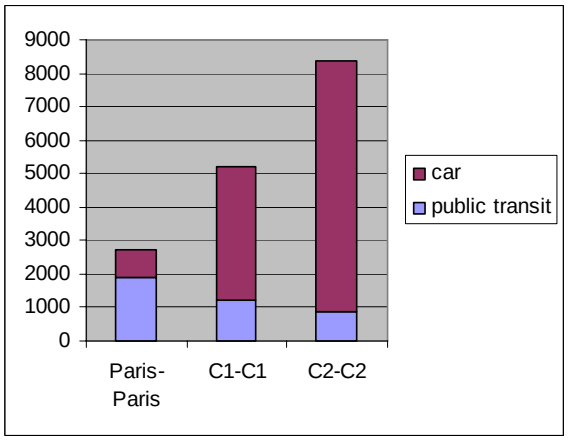

Figure 4: Modal share of traffic flows (motorised trips) according to the direction of the trips.

The increasing proportion of trips for purposes other than commuting, going to and from school and travel as part of work, tends to increase the modal share of car as shown in Table 5 for the Paris metropolitan area.

Table 5: Trip purpose in 1976 and 2001 for Paris Metropolitan Area

	1976	2001
journey to work	5540	5890
business	3600	3790
education	1680	2490
leisure	2060	3600
other	4830	7390

The trip purposes grouped under “other” increased by more than 50 percent, in contrast to commuter trips that increased only by 6 percent. Public transit accounts for 36 percent of journey to work trips and only 9.5 percent of trips with the purpose “other”. So the share of trips carried out for “other purposes” favour the use of cars. The origins and destinations of these kinds of trips are scattered everywhere in the metropolitan area and not especially well served by public transit.

Two other interrelated factors are detrimental to the use of public transit in France, particularly in Paris; the core of the cities are subject to gentrification and, partly linked to this, reverse commuting is progressing. The evidence for Paris (Aguilera 2006) is given below.

Between the 1982 census and the 1999 census, the number of skilled professionals increased by 57 percent in Paris city as the number of intermediate professions increased by 14 percent and the number of clerical workers decreased by 28 percent and finally the number of blue collar workers decreased by 50 percent. This gentrification of the centre is not unique to the Paris metropolitan area but this has here important transport consequences. Skilled professionals tend to reverse commute more, only 62 percent of them living in Paris work in Paris, as compared to 82 percent for clerical workers and 71 percent for blue collar workers. So, together, about 30 percent of Parisians (i.e., living in Paris city) reverse commute. This could be detrimental to the modal share of public transit but also the low income workers are more and more living in the outer suburbs and tend to use their cars.

The same trend can be observed in other cities. For example in Lyon between 1990 and 1999, the share of workers living in the centre (Lyon and Villeurbanne) and working in the centre decreased from 75 percent to 66 percent. Meanwhile the commuting distance increased by 7 percent in the metropolitan area (Sytral 2007).

The conclusion from this brief overview is that whatever the obstacles you create for the use of cars, if individuals really need it, they will use their cars. The trends previously mentioned (urban sprawl, evolution of trips purpose) constitute strong factors to favour the use of cars, in spite of the various disincentives created.

3.2 Other consequences

3.2.1 Pollution

Although there is no precise data, there appears to be a reduction in the amount of car traffic in the city centre (notably Paris Metropolitan Area). However, it is difficult to evaluate how much of this diminution is caused by a specific transport policy and how much is due to other causes (urban sprawl, and more recently the surge of oil prices). However, in spite of the reduction in car traffic, the pollution emitted by cars has increased, in part due to speed reduction; despite improvements in vehicle emissions technology average emissions per vehicle have increased as a consequence of changed traffic conditions due to growth in car use throughout the Paris metropolitan area. Prud’homme *et al.* (2005) have calculated for Paris, with a traffic decrease of 9 percent and a speed decrease of 12 percent that pollutant emissions have increased from 32 percent (hydrocarbons) to 99 percent (NO), and fine particulates which are

very dangerous, increasing by 59 percent. All those results are obtained with the hypothesis that the cars do not evolve technologically. Those results are crude estimates, but it is likely that decreasing the speed of the cars increased the pollution in spite of the traffic decrease.

The preliminary results of another study, by Airparif (2006), concerning NO_x indicate that pollution in the Paris city decreased by 32 percent between 2002 and 2007. Of this, 26 percent were due to vehicle improvement and only 6 percent were due to traffic reduction. They do not provide the effects of speed reduction; instead assuming in their analysis a constant speed. However we can appreciate that the reduction of pollution due to traffic "management" is not very strong compared to the improvement due to technology evolution: New cars with "Euro IV" engines specifications are between 10 to 20 times less polluting than the oldest cars on the roads (Airparif 2006). We wonder if it is worth creating problems for many people if the result is only to achieve a fraction of what can be obtain by the car fleet renewal. The aggregated data in Table 6 for broad global contexts support this tendency.

Table 6: CO emissions due to urban transport 2000-02

Zones	Density (persons per hectare)	Pollution (Kg) per person	Pollution (Kg) per urban ha.
US and Canada	18.7 (7.5)	183 (75)	1.22 (0.7)
Northern Europe	46 (13)	57 (20)	1.7 (1.5)
Southern Europe	73 (43)	101.8 (54)	2.89(1.6)
China	146 (43)	57.5 (20)	2.46 (0.9)
Developed Asia	134.3 (104)	18.1 (15)	1.17 (1.4)

Standard deviations are in brackets. Data years vary
Source: UITP millennium data base.

Southern Europe appears more polluted if we consider the pollution per surface unit. The global effect of density results from two conflicting factors: as density increases, public transit tends to be more attractive and the pollution due to transport tends to decrease; but as density increases the pollution per urban hectare tends to increase as well, because there are more vehicle kilometres per surface unit. Southern Europe does not appear to benefit sufficiently from the first effect to counterbalance the second effect.

Many French policy analysts tend to favour some policy toward more dense cities. Given the evidence above, we question whether a policy tending to increase the density of the urban areas could be beneficial to pollution, given the threat to health. We question whether various measures taken in favour of public transit are consistent with this policy. Setting up a payroll tax in the city centres or in Paris that is higher in the city centre has contributed to the migration of jobs toward the urban fringes. If obstacles are created for car movements, a decrease in speed and a pollution increase are likely to occur.

3.2.2 Congestion and travel time

It is generally agreed in France that the travel time in US cities is greater than the travel time in French cities, because of congestion. The data shows exactly the opposite, if we consider the journey to work (see Table 7).

Table 7: Travel time for the journey to work 2000

Cities	Travel time (minutes)
Paris	36 (2001)
Los Angeles	29.1
Chicago	31
Boston	27.8

Sources: Census for US cities and EGT for Paris.

This higher travel time for Paris is not solely the result of transport planning and policies; it is also linked historically to location practises. If we jointly assess urban planning and the transport policy, we conclude than French cities are surpassed by more extensive cities like the American ones, as a result of travel time for the journey to work and pollution per urban hectare.

Congestion is not limited to car traffic. Congestion within public transit, commonly referred to as overcrowding, exists often in public transit, especially if it is under priced. Although we do not have a quantitative indicator of overcrowding, an indicator of satisfaction is available (Table 8). A marked decrease is observed in the Paris metropolitan area since the mid 1990s. Two other factors having an influence are personal security and reliability of service.

Delinquency is declining, at least in Paris, from 2002 to 2005 (prefecture de police, la délinquance à Paris en 2005, janvier 2006). That does not mean that travellers feel less insecure. A survey in 2004 (Ifop pour la prefecture de police, 2004) found that 46 percent of Parisians feel insecure in the RER and 48 percent in the metro. In terms of *reliability* we found some indicators for the RER from 2000 to 2004. The results are conflicting: some lines or group of lines have seen *reliability* increasing and others have suffered from a decline (STIF 2005). Overall we cannot exclude the possibility that feeling more insecure and experiencing greater unreliability are among the factors that contributed to the growing dissatisfaction of the RER and metro.

Table 8: satisfaction index of the public transit users in Paris metropolitan area 1996-2004.

Network	Satisfaction index 1996	Satisfaction index 2004
Bus Paris city	90.4	84.2
Bus RATP suburbs	88	79.8
Bus suburbs other than RATP	84.2	81.3
Metro	90	87.2
RER	86.3	69.4
Suburban trains	80.6	71.7

Source: STIF (2005)

Given that the regularity, frequency and cleanliness did not deteriorate, we hypothesise that overcrowding is a significant but not only influence on the decline in the satisfaction index from 1996 to 2004.

3.2.3 Financial issues

Turning to the economic impact of those policies, the evaluation is not very favourable. The financing of the investments by loans places severe pressure on the finances of the local governments. Taxing wages with the VT, added to existing substantial fringe benefits taxes, increases the cost of labour, which is especially

detrimental to low skilled workers. Within OECD countries, France has the highest minimum cost of labour[7], measured as a percentage of the cost of average workers.

Another aspect of the French policy that leads to a contradiction is the yield of the TIPP (tax on the petroleum products), which amounts to 40 percent of personal income tax.
(see http://ashta.free.fr/Working%20Papers/french_budget_proposals_for_2004.htm)
This revenue stream highlights government reluctance to see car traffic significantly decrease.

Instead of the "versement transport" (VT) or a reduced tax level, we can think of other ways to finance public transit. It has been a long tradition, particularly in the US, to finance railroads with land grants. It has been effective (Heckelman and Wallis 1997). The same idea underlies the use of property taxes to finance public transit. This is theoretically justified (Sheppard and Stover 1993, Batt 2001) and some empirical studies have identified the presence of rent increases around the places well served by light rail or metro (e.g., Cervero and Landis 1993) although some studies found weak (Gatzlaff and Smith 1993) or null effects (McDonald and Osuji 1994) Given the perverse side effect of the VT, it is probably better to resort to a kind of property tax or if possible, a tax on land value.

3.2.4 Transportation issues

When we look closely at transportation issues, we note that one very popular measure consists of creating a very affordable travel pass (as in Paris), for which, by definition, the marginal cost of a travel is zero. This induces mobility and a number of those trips are undertaken during peak hours, with nil monetary private cost and a huge collective cost.

Benefiting from abundant resources, transport planners tend to oversize some projects, especially urban rail infrastructures (see Flyvbjerg 2000); for the same reason, some systems are unnecessarily sophisticated, such as the automatic line D of the Lyon metro which cumulated innovations, delays and high costs. For example, line D is an automatic line without gates on the platforms. This necessitates an electronic control device which is particularly difficult to fine tune. There is also a mobile variable block-system (cantonnement), which was not necessary.

Finally, "competing" against the use of the car with some naive tools (e.g., reducing the space allocated to cars for running or parking) might be less efficient than congestion charging (Vickrey 1963). Although there is a strong rationale in favour of transport pricing (Hensher and Puckett 2007), there are, in France two main hurdles s to overcome. First, making transport pricing acceptable (Raux and Souche 2004), which is difficult given the gentrification of the core of many metropolitan areas; and second, modifying the French law so that it is possible to have congestion charging on existing infrastructure. The current law limits congestion charging to new

[7] See *http://stats.oecd.org/WBOS/default.aspx?DatasetCode=ULC_QUA*

infrastructure. A cordon charging scheme such as exists in London and Stockholm would not be lawful under existing legislation in France.

3.2.5 Distributive issues.

The policy to create some obstacles for the car and to subsidize heavily public transit benefits more people living in the dense core of the cities. They enjoy better transport services and their environment is improving contrary to the inhabitants of most of the suburbs, who are facing delays to come to the centre. Yet the inhabitants of the centre tend to be richer and to have less children.

Part of the subsidy to public transit is capitalized in the rent of the most accessible dwellings. To a certain extent, people are buying their transport when they are buying their home. So you can benefit fully from the good transit network only if you can afford to pay for this. It follows that generally the best transit improvement are not for the poor (although there are some exceptions).

3.2.6 Some benefits

On other dimensions, the assessment of French transport policies is less dark. Particularly, the protection of old city centres has proven, on the whole, to be successful. However, we wonder about the future of these city centres, as they are well preserved but as economic activity is moving away.

In terms of health impacts, the evaluation of the results is more complex. An operation such as velo'v is largely symbolic and potentially benefits only the residents of the centre of the metropolitan area. It remains to be seen if it can trigger a more general behaviour modification. For the walk to the public transit, which is indubitably favourable, we can observe that there are other ways to do exercise. The will to concentrate the population in the dense areas of the metropolitan areas tends to result in an increase in the proportion of the population living in the most polluted areas.

4. Conclusions

This paper has presented the French perspective on the provision of public transit and the challenges that are being faced in attempts to discourage car use in metropolitan areas of France where gentrification and increasing wealth only support the resistance against public transit. Despite France having a reputation as a 'success' story in the provision of public transit, the story is not so rosy when considered against the facts.

The story line however is remarkably similar to that of almost all modern societies that grapple with the challenges surrounding the increasing popularity of the car, the consequent environmental impacts of this trend and the extent to which the air quality and global warming impacts can best be attacked through vehicle technology enhancements and regulatory reforms on standards of automobile design and manufacture. We speculate that the demands on the public transit system consequent on even a small percentage reduction in car use (e.g., 2-5 percent) would be horrendous without massive investment in public transport capacity of a systemwide

nature (in contrast to a corridor focus which often fails to satisfy the needs of seamless origin-destination trip making) (Hensher 2007).

Congestion charging, or more broadly based efficient variable user charging (Hensher and Puckett 2007), can contribute to the outcome by making the car less attractive, but it is relative to what is on offer by public transit systems. However, if the charging regime, assuming it can be sanctioned through legislative reform, is spatially specific to congested contexts, there is a high likelihood that it will incentivise urban sprawl even more with the de-centralization of jobs and probable increase in the cost of labour.

References

Aguilera A. S. Wenglenski and Proulhac, L. (2006), *Job suburbanisation, reverse commuting and daily mobility in the Paris metropolitan area*, presentation at the NARSC conference, Toronto, nov. 2006.

Airparif (2006) *évaluation de la qualité de l'air des évolutions de circulation mises en œuvre par la mairie de Paris entre 2002 et 2007. Point d'avancement de l'étude au 13 décembre.* Available at : http://www.airparif.asso.fr/pages/actualites/pdp

Batt, W. (2001) Value capture as a policy tool in transportation economics: An, exploration in public finance in the tradition of Henry George, *American Journal of Economics and Sociology,* 195-228.

Cervero, R. and Landis, J. (1993) Assessing the impact of urban rail transit on local real estate markets using quasi-experimental comparisons, *Transportation research part A*, 27 (1) 13-22.

CITEPA (2004) Inventaire des emissions de pollutants.

Cox, W. (2002) Property, prosperity and poverty: trends and choices in land use policy, *Current Controversies Paper No. 12*, Institute of Economic Affairs and www.demographia.com --- Wendell Cox Consultancy, Illinois,.

Flyvbjerg, B., Bruzelius, N. and Rothengatter, W. (2000) *Mega Projects*, Cambridge University Press, Cambridge.

Groupement des Autorites Responsables de Transport (GART) (1999) ,Les politiques de transport collectif dans les collectivités, La Lettre du Cadre Territorial

Gatzlaff, T. and Smith, M. (1993) The impact of the Miami Metrorail on the value of residences near station locations, *Land Economics*, 69 (1), 54-46.

Gerondeau, C. (2003). *La Saga du RER et le maillon manquant*, Paris: Presse de l'École nationale des ponts et chaussées. ISBN 2-85978-368-7. (*French*)

Greater Lyon (2007) http://www.grandlyon.com/Le-stationnement-sur-la-rive-gauche.1486.0.html.

Heckelman, J. and Wallis, S. (1997) Railroads and property taxes, *Exploration in Economics History*, 34, 77-99.

Hensher, D.A. (2007) Sustainable Public Transport Systems: Movimg towards a Value for money and network-based approach and away from blind commitment, *Transport Policy*, 14 (1), 98-102.

Hensher, D.A. and Puckett, S.M. (2007) Congestion Charging as an Effective Travel Demand Management Instrument, *Transportation Research A*, 41, 615-626 Herreboudt, X. (1999) Pollution automobile, *AGTM Revue*, 48

McDonald, J. and Osuji, C. (1995) the effect of anticipated transportation improvment on residential land value, *Regional Science and Urban Economics*, 291-278.

Prud'homme, R., Kopp, P. and Bocajero, J.P (2005) Evaluation économique de la politique parisienne des transports, *Transport*, 2003, 346-359.

Raux, C. and S. Souche, (2004) The acceptability of urban road pricing : a theoretical analysis applied to experience in Lyon, *Journal of Transport Economics and Policy*, 38 191-216.

Sheppard, J. and Stover, D. (1995), The benefits of transport improvements in a city with efficient development control, *Regional Science and Urban Economics*, 211-222.

Sytral (2007) *petits enseignements sur les déplacements urbains*, available at : http://www.sytral.fr

STIF (2005) *Les transport en commun en chiffres en Ile de France.*

Vickrey, W. (1963) Pricing in urban and suburban transport, *American Economic Review*, 53 452-465.