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PERCEPTION OF THE FAIRNESS OF PRICING.

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Abstract

Regulation by means of price in order to remove excess demand is generally perceived as being unfair. This paper empirically tests different principles of regulation including lotteries, rationing, a moral rule and compensation.

We start from the postulate that the perception of the fairness of TGV and car park is important for a successful implementation. This perception is analysed through the results of an attitudinal survey held in Lyons area in 2003 (N ≈ 400). We confirm that peak-period pricing as a means of limiting demand is overwhelmingly rejected. Administrative allocation and lotteries are also rejected. The reference transaction can also lead to rejection of waiting line. Price compensation is overwhelmingly considered to be fair and the right to this is demanded both from public or private sector monopoly: it is possible therefore to reinstate pricing in the form of compensation.

Those surveyed express rather definite preferences for some principles of regulation (moral rule, compensation) to the detriment of pricing or even the administrative or traditional regulation (queuing). Ways of unfreezing the situation are identified, who could be exploited in order to form coalitions likely to support this kind of policy. Finally, certain dimensions of the equity are revealed through the analysis of the survey.

1. INTRODUCTION

Since the seminal work of Pareto (1927), Pigou (1920, 1947) and Samuelson (1947), standard economic theory has established that regulation by means of price is an efficient means of allocating a scarce resource. As Glazer and Lave (1996) and Brueckner (2002) have shown, this applies in all but very rare circumstances.

The issue of regulating access to scarce resources by prices is crucial for public goods which are subjected to congestion, for example in the transport sector where pricing is the accepted means of regulating congestion (Dupuit (1849), Pigou (1920), Vickrey (1963)).

This use of prices to eliminate excess demand can however be perceived as unfair when the exchange fails to take account of the reference transaction defined by Kahneman, Knetsch, and Thaler (KKT, 1986). Slightly provocatively, Frey and Pommerehne (1993), and Oberholzer-Gee and Weck-Hannemann (2002), hold that economists lay too much emphasis on the role of pricing as a means of regulation and argue that ethical considerations should be taken into account when attempting to gain acceptance for policies involving regulation by prices. Resistance to the introduction of new pricing measures is also observed in the transport sector (Raux and Souche, 2004).

This resistance has prompted us to test whether, in a context of scarce resources, regulation by prices is actually rejected by the population, and if so, to what extent. We shall attempt to test empirically different principles of regulation including lotteries, rationing, a moral rule and compensation in order to see if these receive more support than regulation by prices.

Our results partially invalidate the above findings from the literature. They confirm the role of the reference transaction and also show that other regulation principles may be considered to be less unfair, or even fairer, than pricing on its own.

Based on a survey of the empirical and theoretical literature we have formulated questions which we shall go on to test empirically. We shall then present the methodology used in the study which relates to situations in which the supply of rail transport and parking supply is scarce. Last, we shall set out our principal findings showing whether or not they validate our hypotheses.

2. LITERATURE SURVEY AND TESTED HYPOTHESES

In a seminal paper on this topic, Kahneman, Knetsch, and Thaler (KKT, 1986) established, with empirical backing, the existence of a dual entitlement by which “transactors” have a right over the terms of the reference transaction while the firm also has a right over the reference profits.

Slightly provocatively, Frey and Pommerehne (FP, 1993) asked the following question: how can the regulation of excess demand by prices be considered to be unfair when economists recommend it as a principle? In the face of a situation where water is scarce, these authors identified and tested several procedures for allocating resources each of which implemented a different principle of justice. For the rationing of excess demand they found that a classical “first come, first served” procedure or an administrative procedure are considered fairer than a pricing procedure which consists of paying more for resources which have become scarce. On this basis, they conclude that economists should include moral or ethical aspects in their analysis if they wish to increase their ability to guide policy. In connection with a public good, Frey and Oberholzer-Gee (1996) have also shown that when it is necessary to decide on the

siting of a public good which is not welcome locally, compensation is insufficient and procedures which are perceived as fair should play an essential role.

Vaidyanathan and Aggarwal (2003) reconsidered the dual entitlement in the reference transaction and showed that a price rise, even one which is justified on the grounds of costs, can be considered to be less fair when it is the result of a deliberate choice on the part of the vendor. Bolton et al. (2003) demonstrated that consumers are sensitive to certain reference points (past prices, competitors' prices, cost of the goods sold) but underestimate the effects of inflation: they overestimated the extent to which price differences are the result of vendor's profits and fail to take account of all the latter's costs.

On the basis of the persisting resistance to wider use of pricing for regulating excess demand in the case of transport for example, we firstly wished to test the current validity of the foregoing empirical results and secondly to explore further attitudes to certain principles of allocation. A number of questions emerged from our survey of the theoretical and empirical literature and we shall investigate these empirically.

The first question relates to the constancy of the rejection, highlighted by the literature survey, of the use of prices to allocate scarce resources. *Question 1: is the principle of allocating scarce resources by prices always rejected?*

Next, we attempted to explore more fully the terms of this rejection by investigating different situations in which the principle is implemented.

The first situation relates to whether the situation of excess demand is foreseeable or not. Frey and Pommerehne have shown that people are less averse to pricing in a recurring situation where they expect supply to be increased than in an exceptional situation where pricing serves to ration demand. For this reason it is important systematically to explore variations in attitudes according to whether the regulation measures are applied in a recurring or an exceptional situation.

Second, FP have shown that the regulation of excess demand by pricing, for example in the case of water sales at a tourist site, was more strongly rejected in the case of a public sector supplier than a private supplier. This question is important when a private operator is used to produce a public good, as is the case today with many public services and the increasing interest in public-private partnerships, for example for water or transport. *Question 2: is there a difference between a rejection of the principle of regulation by prices depending on whether the supplier belongs to the public or the private sector?*

If rejection occurs, we can wonder if other procedures, whose underlying principles are easier to explain, would gain better acceptance. FP have shown, for example, that the rule of allocation by pricing was perceived as being less fair than a bureaucratic procedure in which the administration made allocations on the basis of its own judgment; on the other hand this rule was considered to be fairer than a random allocation procedure. Taylor et al. (2003) found that in the absence of a system of pricing, the lottery is generally more socially acceptable than queues. According to the economic theory of bureaucracy (Niskanen, 1971) the bureaucratic procedure is considered to be intrinsically particularly unfair. We can therefore assess the degree of acceptance of these procedures in order to use them as reference values for calibrating the other procedures. *Question 3: are lotteries or administrative allocation better accepted than regulation by prices as a means of dealing with excess demand?*

Another factor which may influence the perception of regulation by prices relates to the possibility of controlling the use of revenue. This is a principle of economic justice set forth by Zajac, in the context of the improper power of a monopoly: "The fewer the substitutes for a regulated or monopoly firm's output, and the more the

output is considered an economic right, the more the public expects to exert control over the firm. Denial of control is considered unjust.” (Zajac, 1995, p. 127). *Question 4: does the possibility of controlling the use of revenue derived from pricing moderate the rejection of regulation by prices?*

With regard to the control of the use of revenue from pricing, given the results of Vaidyanathan and Aggarwal (2003) and Bolton et al (2003), it therefore seemed interesting to see whether the proposal of additional supply which justifies the price increase can modify negative attitudes to regulation by prices. *Question 5: can providing additional supply which is related to the price increase make this increase more acceptable?*

The question of compensation naturally arises. It has been established since the work of Hicks (1939) and Kaldor (1939) that in the context of a standard cost-benefit analysis, hypothetical compensation can justify a policy as long as the benefits accruing to the winners exceed the losses sustained by the losers. So, in principle, effective compensation could counterbalance the rejection of the mechanism of allocation by pricing. Lastly, Zajac’s principles of economic justice include the right to insurance: “Society is expected to insure individuals against economic loss because of economic changes. Failure to insure is considered unfair.” (Zajac, 1995, p. 123).

However, it seems that this principle of compensation will be rejected because the “compensated losers” feel that their votes are being “bought” (the so-called “bribe effect”) in order for the wealthy to be able to benefit from the goods which are thereby made available (Frey et al., 1996; Kunreuther and Easterling, 1996). This is why Oberholzer-Gee and Weck-Hannemann (2002) suggest that compensation should take a form which is like the purchase of votes as little as possible and attempt to reward those who are willing to reduce their consumption of the scarce good in the same “dimension” as the loss because they make a contribution to improving collective welfare. We have therefore attempted to test explicitly whether a compensation mechanism might change the attitude to the mechanism of allocation by pricing. *Question 6: does offering compensation which belongs to the same “dimension” to those whose demand has been removed improve acceptance of regulation by prices?*

A last set of regulation principles represents what can be considered as the classical basis of the “reference transaction”. These principles of regulation are widely used in all administrative or commercial departments: queueing (or the “first come, first served” procedure) is a form of rationing. Barzel (1974) shows that the redistribution of a good which is limited in quantity through queueing can be costly and does not systematically benefit the poor. Application of a moral rule, for example giving priority to persons with reduced mobility, may be based on Rawls’ (1971) two principles of equality of chances and difference. *Question 7: are the principles which form the classical basis of the reference transaction such as queues and a moral rule, universally perceived as fair?*

Last, in relation to these principles of allocation, in particular allocation by pricing, it is important to establish whether an individual’s economic situation influences his/her attitude. Weitzman (1977) has shown that the relative efficiency of pricing or rationing for allocating a scarce resource to those who need it most depends on how the need in question and incomes are distributed. According to Sah (1987) the poor would gain more from rationing and the rich from the market. It is therefore legitimate to raise the issue of the relative extent to which attitudes are influenced by income and pricing. *Question 8: do attitudes vary according to the economic and social situation of individuals?*

The above questions have been the subject of an empirical investigation using the questionnaire and survey which we shall now describe.

3. METHODOLOGY

The survey was conducted in January 2003 and involved face-to-face interviews of a sample of 400 persons who were representativeⁱ of the inhabitants of the Lyon conurbation (population 1.2 million). The respondents were told four different “stories”. Although fictional, these stories described situations which were grounded in reality (the Paris-Lyon train or urban parking). Various solutions were proposed for solving excess demand and respondents were asked if they found each of the solutions essentially fair or essentially unfairⁱⁱ.

Two of the stories involved the allocation of seats in the situations of excess demand in the case of the high speed train (TGV) between Paris and Lyon (450 km), which is operated by a public sector company, French National Railways (SNCF). As a general rule, only passengers with reservations can use this train. The first story describes an exceptional situation on a Friday evening: as a result of very bad weather (e.g. a snow storm), only one of the three scheduled trains was able to run. The second story describes a recurring situation of excess demand, in which rising demand has led to intolerable saturation of the service.

Two other stories dealt with the problem of assigning parking spaces at the car park of a firm with premises in the centre of a major city in which it is very difficult to find parking in the surrounding area. In one case, the situation was exceptional: construction work lasting several months was necessary in the car park which made two-thirds of the parking spaces temporarily unavailable. In the other case, the situation of excess demand was recurring, the firm was extending its premises by building over part of the existing car park.

Each respondent was only told two stories, one about the TGV and the other about parking; in addition, each was told only about the exceptional or the recurring situations. Consequently, each of the four stories was told to half the sampleⁱⁱⁱ. The same regulation principles were proposed for each of the four stories.

The regulation principles we tested are based on the questions listed in the previous section. In addition, the scenarios proposed allowed us to test any differences in attitude between the public sector operator (SNCF in the case of the train) and the private sector operator (a company in the case of parking).

- “Peak period pricing with constant supply”: for both the TGV and parking, the proposal to cope with excess demand was to pay an additional charge. In the case of parking, two alternative proposals were also made with regard to the allocation of revenue, in one case it was possible to exert control over its use: in one of the alternatives, the revenue was handed over to the firm, and in the other to the firm Works Council^{iv}.
- The “unknown administrative rule”: in the case of the TGV this consisted of letting the ticket inspectors allocate the available seats, and in the case of parking of letting either the firm management or the Works Council allocate the available seats. These last two alternatives enabled us also to test the impact of the ability to monitor the allocation of demand.
- A “lottery”: this consisted of distributing the available seats on a random basis in the case of both the TGV and parking.
- “Peak period pricing with additional supply”: in the case of the TGV, the operator was assumed to have run additional trains which were paid for by the increased

price, while in the case of parking, the company rented additional parking spaces in a nearby car park.

- “Peak period pricing with compensation” in the case of the TGV, in the exceptional situation, the proposal was to compensate those who were willing to take the train the next day. In the case of recurring excess demand, we suggested reducing the price of the ticket below the normal price for those who were willing to leave earlier or later. In both situations for company parking, we proposed compensating those who were willing not to park in the firm’s car park.
- “Queues”: in the case of the TGV, the train was allowed to fill, and in the case of parking the car park was allowed to fill.
- A “moral rule”: this consisted in both cases of giving priority to persons with reduced mobility (pregnant women, elderly and handicapped persons).

4. RESULTS

The rejection of peak period pricing

Peak period pricing with constant supply was overwhelmingly perceived to be unfair in all the situations. For example, for the TGV (10% fair, see v2 in Table 1 in the Appendix) and for parking when revenue adds to the firm’s takings both in the exceptional situation (7% fair, see Table 2, v11) and the recurring situation (10% fair).

The situations described here all involve excess demand. However, this excess demand occurs in circumstances in which it is reasonable to assume that individuals consider to be outside their control. This view is supported by the fact that constant supply peak period pricing is significantly perceived as a little less unfair in the recurring situation (see Table 3, v2, in Appendix): it is as though, when faced by a reoccurrence of excess demand, individuals consider that the introduction of peak period pricing is less unacceptable because it would have been possible to take measures beforehand to avoid the peak.

Exceptional administrative regulation

For both the TGV and parking, exceptional administrative solutions in the form of an unknown administrative rule or a lottery are overwhelmingly rejected and considered to be barely less unfair than pricing (see Table 1, v4 and v5). This finding concurs with those of FP for the lottery, but is quite different for the unknown administrative rule as FP found the unknown administrative rule to be better accepted than pricing.

In the case of parking, we wished to test whether there was a difference in attitudes according to the administration in charge of allocating available spaces. To do this, we made a distinction between the Management of the Firm (MF) and the Works Committee (WC). The decisions taken by the works committee could be influenced by members of the workforce who are elected to it by virtue of periodic elections and this can help create some hope of compensation which is absent when it is just the management of the firm that distributes parking spaces. However, contrary to our expectations, our findings indicate that there is no significant difference depending on whether the available spaces are allocated at the discretion of the firm or works committee (see Table 2, confidence intervals for the medians of the variables v16 and v17).

To summarize, neither the activities of the inspector on the train, nor those of the management of the firm, nor those of the works committee find favour with the respondents. This rejection can be explained by the dominant position of the administrative authorities which are perceived as holding a monopoly of power. Individuals have no, or almost no, margin for manoeuvre. As Zajac has explained (1995), use of a monopoly of power is perceived as being extremely unfair (see above).

Last, in the case of both TGV and parking, the lottery was widely rejected: we can interpret this as expressing strong risk aversion among individuals or as defiance in the face of an unusual procedure.

The role of the allocation of revenue from pricing

Do attitudes towards the pricing instrument vary according to how the revenue from it is allocated? We have attempted to establish this first of all by considering pricing with constant supply where revenue can be allocated in different ways. In the case of peak period pricing with constant supply the two alternatives for parking were allocation of revenue to the firm and allocation of revenue to the works committee.

Peak period pricing with constant supply is perceived as being significantly fairer when the revenue derived from pricing is handed over to the works committee (28% in the case of recurring scarcity, 37% in the case of exceptional scarcity, see Table 2, v12) than when this revenue goes into the firm's coffers (10% in the case of recurring scarcity, 7% in the case of exceptional scarcity, v11)^y.

The first lesson we can draw from these results is that the rejection of peak period pricing with constant supply is not intractable. Negative attitudes can be significantly moderated by how the revenue is allocated, as shown by the example of parking.

As our starting point we can interpret these findings with reference to Zajac's principle of economic justice, in connection with the improper power of a monopoly (see above). In this case we have two types of monopoly, a public sector monopoly consisting of the railway company (SNCF), and a private sector monopoly consisting of the company that owns the car park. We can nevertheless see what the problem is with the monopoly. We should bear in mind that our results have shown that attitudes to peak period pricing are intensely negative whether the supplier belongs to the public sector (train) or the private sector (parking). These findings tend to show that negative attitudes to peak period pricing are not influenced by the public or private nature of the entity offering the good or service, as suggested by Frey and Pommerehne (1993), but more by where the revenue goes, as we have seen in the case of parking.

The increase in supply and the acceptability of pricing

We also tested attitudes towards the pricing instrument in a second context in which the provision of additional supply, either in the form of extra trains or additional parking spaces, incurs additional costs, which may provide a rational justification for price increases. It should not be forgotten that in the case of the parking scenario, the firm was assumed to have rented the lacking parking spaces in a nearby private car park and made those of its employees who used their cars cover the cost of this (v20). In the case of the TGV, the railway company (the SNCF) was assumed to have paid for extra trains which were funded by charging extra for tickets (v8).

Peak period pricing with additional supply is nevertheless perceived as being unfair: only 29% of respondents consider it to be fair for the TGV in the case of recurring congestion (Table 1, v8), 38% consider it fair for recurring parking congestion and 51% consider it fair in the case of exceptional parking congestion (Table 2, v20)^{vi}. However, these solutions were not as strongly rejected as peak period pricing with constant supply (see above).

The first lesson is that additional supply which accompanies a price rise can, like the way revenue is allocated, reduce opposition among respondents, or even divide those for and those against into two approximately equal groups. Our results are to some extent consistent with those of FP who noted less price aversion in the recurring situation when respondents *expect* supply to be increased. However, our survey differs from that of the above authors as the solutions proposed to respondents explicitly mention the additional supply which accompanies the price rise. We have observed that this information changes very little in the attitudes of respondents which remained generally unfavourable.

Does this mean it would be advisable to provide additional explanations to gain the approval of consumers? This is not what is suggested by the work of Bolton et al. (2003) and Vaidyanathan and Aggarwal (2003): however, our results do not prompt the same conclusion as, in the case of the TGV, attitudes towards peak period pricing with additional supply are less negative than towards peak period pricing with constant supply (compare v8 with v2 in Table 1).

Moreover, for parking, the provision of additional supply (v20), in both exceptional and recurring congestion situations gives an unexpected result. Peak period pricing with additional supply is considered to be significantly fairer (see Table 4 in the Appendix, v20, test U) in the case of exceptional congestion (51%, see Table 2, v20) than in the recurring situation (38%). It therefore does not seem to be the recurring nature of the situation which makes pricing more acceptable, because in this case people *would expect* additional supply. It is the very fact of providing additional supply which makes pricing more acceptable, and potentially the recurring nature of the situation in which this solution is applied could even make it less acceptable.

The right to compensation

If negative attitudes to the use of peak period pricing to solve problems of excess demand were to be confirmed, is there any alternative means of pricing which might gain approval?

Unlike peak period pricing with constant supply, compensation is overwhelmingly considered to be fair in the case of the TGV in the recurring situation (80%, see Table 1, v7), parking in the recurring situation (89%, see Table 2; v19), parking in the exceptional situation (93%, v19) and the TGV in the exceptional situation (95%, Table 1, v7).

The right to compensation is therefore strongly reaffirmed. However, our results go further than this, as compensation is expected not only from society via a public monopoly (the public sector railway company) but also from a private monopoly (the private company that owns the car park). The principle of compensation stands out among our results as it is the principle which is considered to be the fairest, with the principle of a moral rule, in all the situations.

Another lesson we can draw relates to the additional supply mentioned above: providing additional supply in the context of peak period pricing can also be regarded as a form of compensation. Our results show that it is perceived as being extremely

indirect and hypothetical: support for this type of solution is much lower than support for direct compensation as we can see if we compare the pricing solutions with additional supply with the solutions with direct compensation (compare V8 and V7 in Table 1 and V20 and V19 in Table 2).

It is of course the case that pricing is overwhelmingly rejected as a means of limiting excess demand. But this does not mean that pricing must be rejected as an instrument in all cases: our results show that its use in the form of compensation may be considered fair by the vast majority of people.

The reference transaction, moral rule and queueing

For KKT (1986), the feeling of unfairness appears when the exchange no longer takes account of the reference transaction. The concept of reference transaction allows us to understand the perception of justice linked to the principles of the moral rule and queueing.

For both the TGV and parking scenarios, the principle by which seats and spaces are allocated on the basis of a moral rule is considered to be very fair (between 70% and 90% in the case of the TGV, more than 90% in the two parking situations; see respectively Table 1, v3 and Table 2, v14). In both cases, the reference transaction involved application and compliance with this moral rule.

In the case of queueing, our findings are slightly different. According to our results, queueing is not always considered to be the fairest means of allocation in the case of a problem of scarcity: this runs counter to the conclusions reached by FP, for whom the traditional “first come, first served” procedure is greatly preferred to pricing.

While the principle of queueing is considered to be fair in the case of parking (68% in the exceptional situation, 69% in the recurring situation, see Table 2, v18), it is in contrast considered to be essentially unfair in the case of the TGV where the difference between the different types of situation is significant (only 37% considered queueing fair in the exceptional situation, and 33% in the recurring situation, see Table 1 and Table 3 in the Appendix, v6).

In the case of parking, management by means of queueing seems to be well accepted and has therefore been incorporated into the reference transaction. In contrast, in the case of the TGV, the reference transaction is based on a system of seat reservation which means that the management of scarcity by means of queueing is negatively perceived.

To sum up, the management of scarcity in the case of company parking shows that the reference transaction is constructed on the basis of the combined application of the moral rule and queueing. In the case of the TGV, the reference transaction is based on a moral rule and a system of reservation.

Our results show that the reference transaction modifies the way in which a principle of justice which is commonly considered to be “fair”, such as queueing, is perceived.

Do these attitudes vary according to the social and economic situation of individuals?

We have conducted systematic (Kruskall-Wallis) tests to see whether attitudes towards these principles of regulation vary as a function of the personal socioeconomic characteristics of the respondents, namely gender, age and educational level (we have used the latter as an approximate guide to an individual’s income). Apart from in two situations, the influence of socioeconomic characteristics is statistically not significant.

These findings therefore do not invalidate the hypothesis that the attitudes expressed here by respondents are of a generic nature and independent of their personal situation. It is as though our respondents had placed themselves behind Rawls' veil of ignorance (1971).

5. CONCLUSION

Our results confirm the overwhelming rejection of peak period pricing as a means of regulating excess demand. However, the results give the impression that confronted by a repeated situation of excess demand, people find peak period pricing slightly more acceptable because it is possible to take steps beforehand in order to avoid the peak.

The use of administrative procedures or lotteries to allocate seats or parking spaces is also rejected. Our results to some extent invalidate previous work which found that administrative allocation was perceived to be fairer than the pricing solution. It would seem that attitudes towards this principle of allocation depend on how much confidence people have in those managing it.

The rejection of peak period pricing with constant supply is not intractable: people's opposition can be reduced if they can influence how the monopoly uses the revenue. However, whether monopoly in question belongs to the public or private sectors does not affect the intensity of opposition to peak period pricing.

Accompanying a price rise with an additional service or infrastructure reduces opposition in the same way as the right to influence the use of revenue, but the negative attitudes nevertheless subsist. It is the additional supply which makes pricing more acceptable and not the context of recurring congestion in which this solution is applied, rather the contrary.

The moral rule is judged to be very fair in all cases. However, we have shown that managing scarcity with queues, although generally considered to be one of the fairest tools, is not universally considered to be so. The reference transaction may lead to a rejection of the management of scarcity by means of queueing, for example in the case of a service which is generally accessed by means of a reservation system.

Last, our results allow us to moderate conclusions which are on first view rather pessimistic from the economic standpoint by showing that compensation, which is overwhelmingly considered to be fair, can radically modify attitudes of rejection with regard to the pricing instrument. The right to compensation is overwhelmingly demanded from the monopoly holder, whether it belongs to the public or private sector: it could therefore be possible to rehabilitate pricing in the form of compensation.

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APPENDIX: STATISTICAL TESTS

Table 1: The case of the TGV. Median values with their confidence intervals, % fair

		Context	Median	Lower	Upper	% essentially or very fair
v2	<i>Peak period pricing with constant supply</i>	exceptional	2.0	2.0	2.0	10 %
v4	<i>Lottery</i>	recurring	2.0	2.0	2.5	4 %
v5	<i>Unknown administrative rule</i>	exceptional	2.0	2.0	2.5	13 %
v4	<i>Lottery</i>	exceptional	2.5	2.0	2.5	17 %
v5	<i>Unknown administrative rule</i>	recurring	2.5	2.5	3.0	21 %
v2	<i>Peak period pricing with constant supply</i>	recurring	3.0	2.5	3.0	10 %
v6	<i>Queueing</i>	exceptional	3.5	3.0	3.5	37 %
v8	<i>Peak period pricing with additional supply</i>	recurring	3.75	3.5	4.0	29 %
v6	<i>Queueing</i>	recurring	4.0	3.5	4.0	33 %
v3	<i>Moral rule</i>	exceptional	5.5	5.5	5.5	90 %
v7	<i>Compensation</i>	exceptional	5.5	5.5	5.5	95 %
v3	<i>Moral rule</i>	recurring	6.0	6.0	6.5	70 %
v7	<i>Compensation</i>	recurring	6.0	6.0	6.0	80 %

Table 2: The case of parking, median values with their confidence intervals, % fair

	<i>Our coding:</i>	Context	Median	Lower	Upper	% essentially or very fair
v16	<i>Unknown administrative rule (MF*)</i>	exceptional	3.0	3.0	3.5	8 %
v11	<i>Peak period pricing with constant supply (MF)</i>	exceptional	3.5	3.0	3.5	7 %
v11	<i>Peak period pricing with constant supply (MF)</i>	recurring	3.5	3.0	3.5	10 %
v16	<i>Unknown administrative rule (MF)</i>	recurring	3.5	3.0	3.5	10 %
v17	<i>Unknown administrative rule (WC**)</i>	exceptional	3.5	3.5	3.5	13 %
v15	<i>Lottery</i>	recurring	3.5	3.5	4.0	12 %
v15	<i>Lottery</i>	exceptional	3.5	3.5	4.0	17 %
v17	<i>Unknown administrative rule (WC)</i>	recurring	4.0	3.5	4.0	14 %
v12	<i>Peak period pricing with constant supply (WC)</i>	recurring	5.0	4.5	5.5	28 %
v12	<i>Peak period pricing with constant supply (WC)</i>	exceptional	5.5	5.0	6.0	37 %
v20	<i>Peak period pricing with additional supply</i>	recurring	6.0	5.0	6.5	38 %
v20	<i>Peak period pricing with additional supply</i>	exceptional	6.5	6.0	7.0	51 %
v18	<i>Queueing</i>	exceptional	7.5	7.5	8.0	68 %
v18	<i>Queueing</i>	recurring	8.0	7.5	8.0	69 %
v19	<i>Compensation</i>	exceptional	8.5	8.5	9.0	93 %
v14	<i>Moral rule</i>	recurring	9.0	9.0	9.0	91 %
v19	<i>Compensation</i>	recurring	9.0	9.0	9.0	89 %
v14	<i>Moral rule</i>	exceptional	9.0	9.0	9.5	96 %

* MF = Management of the Firm, ** WC = Works Council.

Table 3: for the TGV, tests of the differences between a situation of temporary and recurring congestion

		Median: exceptional recurring	Transf.	Similar distributions ?	KS Test * p***	U Test ** p***
v4	<i>Lottery</i>	2.5 2.0	no	yes	0.078	0.03
v5	<i>Unknown administrative rule</i>	2.0 2.5	Log	yes	0.0001	< 0.0001
v2	<i>Peak period pricing with constant supply</i>	2.0 3.0	Log	yes	< 0.0001	< 0.0001
v6	<i>Queueing</i>	3.5 4.0	Log	yes	< 0.0001	< 0.0001
v3	<i>Moral rule</i>	5.5 6.0	Log	approx.	< 0.0001	< 0.0001
v7	<i>Compensation</i>	5.5 6.0	Log	approx.	< 0.0001	< 0.0001

Table 4: case of parking, tests of the differences between the temporary and recurring situations of congestion.

	<i>Our coding:</i>	Median: exceptional recurring	Transf.	Similar distributions ?	Test KS* p***	Test U** p***
v1 1	<i>Peak period pricing with constant supply (MF)</i>	3.5 3.5	no	yes	0.515	0.264
v1 2	<i>Peak period pricing with constant supply (WC)</i>	5.5 5.0	Log	approx.	0.194	0.052
v1 4	<i>Moral rule</i>	9.0 9.0	Log	approx.	0.884	0.253
v1 5	<i>Lottery</i>	3.5 3.5	Log	approx.	0.406	0.143
v1 6	<i>Unknown administrative rule (MF)</i>	3.0 3.5	Log	approx.	0.523	0.038
v1 7	<i>Unknown administrative rule (WC)</i>	3.5 4.0	no	yes	0.385	0.018
v1 8	<i>Queueing</i>	7.5 8.0	no	yes	0.975	0.270
v1 9	<i>Compensation</i>	8.5 9.0	no	yes	0.031	0.009
v2 0	<i>Peak period pricing with additional supply</i>	6.5 6.0	no	yes	0.031	0.005

* Kolmogorov-Smirnov test

** Mann-Whitney test

*** bilateral test, the value of p is compared to the significance threshold $\alpha/2=0.025$

ⁱ Random selection on the basis of quotas (residential location, age groups, gender, economically active/inactive).

ⁱⁱ The initial four possible responses (very unfair, essentially unfair, essentially fair, very fair) were reclassified into two categories (unfair, fair) when presenting the results. For each story, each solution was presented independently of the others. Moreover, the order in which the solutions were presented was systematically varied for each respondent in order to avoid the bias that might arise if the solutions were always presented in the same order.

ⁱⁱⁱ The full questionnaire (in French) can be obtained from the authors. The survey was conducted by the Lyon-based consultancy firm Tremplin.

^{iv} This body is elected by the workforce of the firm and therefore assumed to represent its interests.

^v It is nevertheless noteworthy that the difference between the exceptional situation and the recurring situation is not significant in the case of the two types of revenue allocation (see Table 4, v11 and v12).

^{vi} Although the difference between the median values of the last two solutions is not significant, as seen in Table 2, the result of the Mann-Whitney test is significant and indicates that the distributions differ, see **Table 4** (v20).