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Testing for Fairness in Regulation: Application to the Delhi Transportation Market

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ABSTRACT *I report a remarkable finding, that regulatory authorities, who have no a priori knowledge of Rabin's 1993 fairness axioms (associated with a very specific utility function), have always proposed legal fares in the auto-rickshaw (three-wheeler) market in New Delhi that satisfy them. Regulated fares are ignored by auto–rickshaw drivers and customers. They bargain on prices among themselves. Newly announced fare hikes are effective enough to ensure the prevalence of legal uniform (non-negotiated) prices for a considerable amount of time. I suggest that the two of the most recent hikes have satisfied Rabin's fairness axioms. The results, I report, are robust to different cooperative games of bargaining.*

1. Introduction

When a regulatory authority steps in to take a decision on any issue raised by two or more conflicting groups of individuals, fairness considerations often crop up. For instance, if the government decides that construction workers in New Delhi deserve a minimum of just over rupees (INR) 200 per day for all the labour they supply, such a decision is often a result of recommendations of task forces or working groups who address several questions which revolve around fairness considerations. Questions like – 'will it be *fair* to offer just INR200 to an average labourer who runs a family of six under the present inflationary conditions?' are often addressed. Assessing the existence of (implicit) fairness considerations in (observed) regulatory decisions involve value judgments and renders their econometric testing an open question.

This article evaluates real-life transactions in the auto-rickshaw (auto hereafter) market characterised by regulated prices that are hardly taken seriously. Auto drivers and customers choose instead to bargain on the prices among themselves. This is possibly because auto drivers do not perceive regulated prices as 'fair' and costumers, on recognising this, are willing to pay higher than legally prescribed rates without complaining, thus adding to enforcement-related problems. The idea of 'fairness' itself is open to subjective interpretation. I formalise the same using Rabin's (1993) approach. I examine the historically observed regulatory fare hikes in this market and conclude that they are consistent with (theoretical) fairness prices that would prevail if each auto driver had some market power but valued fairness considerations held by customers. Since the nature of bargaining remains unobserved (I do not know what axioms actually characterise the real life negotiations and thus make no assumption on the same), I do a robustness check with different models of cooperative bargaining to conclusively establish

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the results. The interested reader could look into (experimental) evidence on the validity of such axioms (Nydegger & Owen, 1975).[1] Finally, I make a case for metro rail (metro hereafter) network extension as a direct substitute for autos (among other forms of transportation) for increased compliance with legally announced fares. While I am not aware of any previous study aimed at empirically evaluating regulatory decisions on the grounds of fairness, this work adds to the contributions of Chaudhuri and Gangadharan (2007) and Kahneman, Knetsch, and Thaler (1986), among others, that largely study the nature of fairness considerations in games of trust and those in varied market situations.[2] This work also relates to the works of Uchida, (2006), Andreoni and Vesterlund (2001) and Comay, Melnik, and Subotnik (1974), among others, that focus on the significant determinants of bargaining. The point that focuses on the effects of (metro) railway construction can be closely related to the works of Banister and Berechman (2001) and Blum, Haynes, and Karlsson (1997).

To offer an introductory note to the organisation of our article, let us think of two periods, 1 and 2, each divided into sub-periods, (a) and (b). Then, the auto-market story can be summarised as follows.

Period 1(a): Drivers charge price $P(1a) > L(1a)$, the prevailing legal fare.
Regulation hikes (to prevent bargaining) the legal fare to $L(1b) > L(1a)$.
Period 1(b): Drivers go by the legal fare $L(1b)$ throughout this sub-period.
Period 2(a): Drivers charge price $P(2a) > L(2a) = L(1b)$, the prevailing legal fare.
Regulation hikes (again, to prevent bargaining) the legal fare to $L(2b) > L\ (2a)$.
Period 2(b): Drivers go by the legal fare $L(2b)$ throughout this sub-period.

Using prices $P(1a)$, which are related to $L(1a)$ above, I use different bargaining rules to infer valuations $W(1a)$. Using information on $W(1a)$, I calculate Rabin's (1993) 'fair prices' $Z_U(1a)$ and $Z_L(1a)$, which are respectively the upper and lower bounds for all prices comprising fairness equilibria. I argue that the *next* regulatory hike $L(1b)$, which is not considered in calculating $W(1a)$ (and hence the fair prices) above, remarkably lies in the Rabin's range of fair prices – or, more specifically, that $Z_U(1a) > L(1b) > Z_L(1a)$. Similarly, I do the same exercise for Period 2 and argue that $Z_U(2a) > L(2b) > Z_L(2a)$. In other words, the regulatory authority does raise fares, but only (and always) subject to fairness considerations held by the customers (in the immediate or a recent past).

The structure of this article is organised as follows: Section 2 introduces the auto market. Section 3 briefly discusses Rabin's (1993) approach in incorporating fairness into players' utility specifications. Section 4 presents the data and descriptive statistics. Section 5 covers the empirical strategy involving structural equations. Section 6 presents the results and Section 7 concludes.

2. The Auto-Rickshaw Market

The market for auto (three-wheeler) services in Delhi, India, presents itself as a prominent case of regulation failure. Auto drivers are supposed to charge consumers based on a regulated fare, which depends on the distance travelled, luggage and time of the day (night rates are higher than day rates). This fare is displayed on a taximeter (meter hereafter) attached to the autos. The meter also shows the distance travelled and is supposed to be reset individually for every customer; since different customers have different starting points and destinations and accordingly travel different lengths of distance, they therefore must pay different fares. These meters, however, are hardly used by auto drivers, and instead the resultant fares paid by customers are pre-negotiated or bargained with these auto drivers before any journey. While customers prefer travelling by the meter, they generally give in to the auto drivers' desire for a mark-up over the publicly known legal fare. It is this mark-up (and hence, effectively the total price) that the customers and drivers bargain over.

In a nutshell, although there exists a regulated legal fare, we observe bargaining in this market. The customers' preference to travel on a pre-negotiated basis over filing complaints signals their belief that legal fare rates are perhaps not 'fair' to auto drivers (in fact, whatever little evidence there is of such complaints only confirms the fact of poor enforcement). It is interesting that although there are over

55,000 autos[3] on Delhi roads every day, auto drivers hardly compete for customers. They are, in fact, known to charge two customers differently for exactly the same journey;[4] – a given customer may also end up paying different amounts for the same journey on two different days because, say, on one of the days he may have to reach the given destination urgently.[5,6] The evidence given by Kahneman et al. (1986) that highlights a strong preference for equity, even if it is costly in terms of personal material utility, suggests that customers may be willing to pay higher but uniform amounts rather than different amounts, even if they could be possibly lower.[7]

The caps on the maximum number of operational auto licences during the last 10 years have acted as entry barriers. They have been justified on the grounds of *increased road congestion* owing to the rapidly growing population (and hence private vehicles) in Delhi and the work-in-progress metro constructions (that prohibited driving on certain areas in Delhi) that added to the same for the period of focus in this article.[8,9] We expect people's impatience to be strictly increasing and convex in elapsed time (Comay et al., 1974), since congestion is an economic bad.

My (elementary) findings suggest that customers, on average, paid amounts as high as nearly 20 per cent more than the legally accepted fare. In fact, between August 2007 and August 2008, auto drivers managed to earn well over INR180.00 crores (approximately $46.31 million) more than they could have legally earned (that is, if they had only travelled by the meter). Auto drivers largely come from low-income family groups primarily based in Uttar Pradesh and Bihar. Not many can afford to buy autos and thus take them on rent on a daily basis from their owners. Before March 2001, however, most of the autos were owner-driven. A regulation favouring a cleaner fuel (from motor spirit/petrol to compressed natural gas [CNG]) during that time required these owners to spend INR30,000 for retrofitting of their vehicles with CNG kits.[10] The auto owners could not afford these expenses on such short notice. Formal credit markets traditionally did not advance loans to the auto drivers. Drivers therefore resorted to private financiers who charged high interest rates. On the non-payment of debt, the drivers were forced to sell their vehicles to private financiers, who retrofitted the vehicles with CNG kits. These vehicles were then rented back to the original owners at exorbitant daily rents in the range of INR200.00 to INR250.00, amounting to roughly INR7,000 per month.[11] Finally, even as late as in March 2007, although the marginal fuel cost of every kilometre travelled (CNG expenses not even exceeding INR0.70 per kilometre travelled even after accounting for waiting time, or travel undertaken in search for customers)[12] was significantly less than the legally prescribed marginal earnings (INR3.50), the daily rents they paid to auto owners amounted to over 40 per cent of their total daily earnings.[13] Regulated fares could not keep up with rising costs for long. An upward revision of *regulated* auto fares was put into effect from 6 June 2007 (see Section 5). This led drivers and customers to go by the legal fare for just over six months. Auto drivers again largely resorted to bargaining by 2009, and thus, on 1 July 2010, legal fares were raised yet again (see Section 5).

I now classify the possible substitutes to the auto (such as public buses, metro, taxis and cycle rickshaws) in terms of distance travelled.

- *Short distances (less than five kilometres)*: the closest substitutes would be buses and cycle rickshaws. Both are cheaper than autos. Autos, however, offer more comfort in terms of space (not crowded, compared with a bus), speed (faster than cycle rickshaws and do not have stops as buses do), luggage carrying and even customer image.[14]
- *Medium to long distances (five to twenty kilometres)*: the closest substitutes would be public buses and taxis. Even though buses are less costly, the questions of image, space and speed remain. Further, there may not be a direct bus route from one destination to another, in which case a customer may need to switch busses. This is quite uncomfortable, and more so when one carries luggage. An auto, on the other hand, is flexible with routes. Finally, compared with taxis, autos are much cheaper.

Although metro rails are cheaper, faster, maintain customer image and are comfortable enough, and thus can be called close substitutes, as of 2009 metros were not developed enough to cover even half of Delhi.

3. Fairness Pricing and Bounded Rationality

We adopt Rabin's (1993) approach to formalising ideas of 'fairness' in player utilities which depends on the 'following three stylised facts:

(1) People are willing to sacrifice their own material well-being to help those who are being kind.
(2) People are willing to sacrifice their own material well-being to punish those who are being unkind.
(3) Both motivations 1 and 2 above have a greater effect as the material cost of sacrificing becomes smaller.' (Rabin 1993, p. 1282)

Payoffs are therefore defined not just over players' actions but also their beliefs. Whether an action is preferred to an alternative action depends upon

(a) the direct material payoff;
(b) the belief about whether rival players are being harmful or helpful;
(c) whether chosen action helps or hurts rival players.

For example, let us suppose that a customer finds an auto driver who is more than willing to travel to a destination where there are narrow lanes, making it inconvenient and time consuming for an auto to get in and out. The customer being aware of the auto driver's option to wait (for not so long) for another customer wanting to travel to a more convenient destination (and possibly offering a higher payment) forms a belief that the auto driver is being kind to him and accordingly finds satisfaction in paying him higher than the legal fare. On the other hand, if an auto driver asks for a very high amount for an extremely convenient location, then even if it hurts the customer to say no to him, he would (revenge is sweet). Rabin's utility function has two additively separable components – the direct material payoff and a fairness function. Online Appendix A provides an introduction to Rabin's utility specifications, but I provide an intuition here.

We recognise that auto drivers would want to act as dictators (monopolists) in this market. Customers would also not want to trade on prices perceived as unfair. Thus, I look at two pricing rules that treat the auto driver as a dictator, but also require that he values fairness considerations held by even the most difficult customer (whom we will later designate as our 'critical customer').

3.1 Determination of Fairness Prices

Let L denote the legal fare for the journey and θ be the mark-up on the same. Let W denote the valuation of the customer, and F denote the total fuel cost of the travel. I define 'desired price' p as a strategy of the auto-driver and 'reservation price' r of the customer as follows:

$$p = (1 + \theta)L; \quad p \in [L, W]; \quad r \in [L, W]$$

The game involves the simultaneous determination of p and r. I simply state the pricing rules here; the derivations can be found in Online Appendix A. The first rule is in the customer's interest that maximises the utility gained by him from deviating from a 'no travel' strategy to a 'travel' strategy. This is given by:

$$Z_L = L + \sqrt{\frac{2(W-L)(L-F)}{[2(W-L)+1]}} \tag{1}$$

Apart from this, Rabin himself proposed a solution given by:

$$Z_U = \left[\frac{2W^2-2WF+F}{2(W-F)+1}\right] = W - \frac{1}{2} + \frac{1}{2}\left[\frac{1}{2(W-F)+1}\right] \tag{2}$$

which is the maximum price chargeable to the customer that is consistent with the notion of fairness. We call the former in Equation (1) the *optimal fairness fare* and the latter in Equation (2) the *maximal fairness fare*. Note that both L and F (and even W) above are functions of the distance travelled. Therefore, both Z_L and Z_U, above are functions of distance travelled, too.

Intuitively speaking, we model a customer, who decides between taking and not taking the trip for each possible price. Thus, one can define a 'net benefit curve' or a 'differential utility curve' (shown in Online Appendix A) that plots the customer's utility gain from taking the trip (over not taking the trip) for each price. At prices just above the legal fare, the customer gains more (Rabin's) utility by offering higher prices. This is because as per Rabin's framework, he is willing to give up some material utility (cash lost) to the auto driver who is being kind to the customer (by agreeing to take the customer for only a limited mark-up over the legal fare – this is Rabin's stylised fact 1 noted above). But this kindness has a limit (Rabin's stylised fact 3), since the material cost of rewarding the driver's kindness eventually increases. Thus, the customer prefers to pay an amount that balances the material and the kindness considerations. This is the optimal fairness fare – the minimum amount the customer is willing to pay to the driver (at lower prices, the customer's utility will actually fall in Rabin's framework, due to stylised fact 1, because the kindness considerations dominate the monetary considerations). At prices higher than the optimal fairness fare, material considerations dominate kindness considerations; thus, the customer's utility (from agreeing to travel) diminishes. At the maximal fairness fare, the customer is indifferent between travelling and not travelling (net benefit is zero). A customer with fairness considerations does not pay anything over this price if he travels (so this is the upper bound on the fairness prices).

We expect the *maximal fairness fare* to exceed the *optimal fairness fare*, and hence reject the solutions that imply otherwise. (We will see later that defining fairness utilities in a dictatorial regime that is by definition, not fair, leads to such problems.)[15]

Now, although we have data on L and F, we do not have information on W. To calculate the fair prices in Equations (1) and (2), one must have information on all the three. In the two sections that follow, I first describe the data, then discuss the process of estimating W.

4. Data

4.1 NGO Data

Customers have heterogeneous payoffs (and hence, reservation prices) based on several characteristics. Since rental and fuel costs are identical for all drivers, I assume homogeneity in their payoff specifications. A study was done by Prabodh (an NGO based in Delhi), for purposes not central to this article. The output was a documentary video of about an hour's length titled 'Third Wheel'.[16] Data were collected on people who had (active and non-active) membership with Prabodh, living in Delhi and had been travelling (frequently or infrequently) by autos. These members were not involved with this project in particular. The information was collected in two waves, the first of which happened in March 2007 and the second happened in March 2008. There was an upward revision in auto fares in between (June 2007).

A total of 126 respondents – 63 men and 63 women in the age group 21 to 36 years were personally interviewed in each wave. Out of these 126 people from different backgrounds and varied personal characteristics, 94 participated in both the waves.[17] There were no foreigners.

4.2 Information Details

During the interviews, while information on gender, availability of personal vehicle and location of metro stations in the vicinity of residence were easily obtainable, information on the frequency of meter travel and excesses paid when not travelling by the meter were difficult to obtain. All respondents were thus asked to take notes for their next 10 auto journeys from close to their places of residence. They were asked to note the number of meter travels (in which case they knew the exact legal fare) and the amounts charged when they were not travelling by the meter in these 10 journeys.

The excess over the legal fare in the latter case a priori seems very difficult to obtain since, in the first place, if a person does not travel by the meter, he will not know what the legal fare should be (let alone the magnitude of the 'excess' over the same). Here, three factors had been exploited that led to the accurate collection of data on this variable:[18]

- First, and most often, when prices are negotiated before any journey, the meter is not used and auto drivers do not care to reset the meter and leave it running. The customer can, therefore, read the 'distance travelled' displayed on the meter, at the start of the journey and compare it with the reading at the end of the journey. The exact legal fare is always based on the difference between the two.[19]
- This concerns people who take the same route several times (same starting and destination points) – travelling even once by the meter lets them know the legal fare and draw comparisons with the amounts they end up paying when not travelling by the meter.
- Third (and probably not needed, given the two above), the official website for fare calculation gives a fairly accurate idea of the legal fare before one decides to travel.[20]

The successful generation of data, on amounts 'illegally' paid by the customers over what is required by regulation, is the key merit of this dataset that makes it most suited to our purpose. It is noteworthy that it would be practically impossible to generate data on 'illegal' amounts paid over the legal fares were it not for this study undertaken by Prabodh.

4.3 Descriptive Statistics

These have been summarised in Tables 3–5. The average proportion of meter travel and the average excess paid over the legal fare largely remained constant during the two periods. Employment status and metro availability strongly influenced both the excess paid over the legal fare when not travelling by the meter and the probability of meter travel for both the years. While gender does not seem to be an important factor in 2007, women did end up travelling by the meter 7 per cent more than men in 2008. Whether or not a vehicle is owned by an individual hardly matters in any negotiation.[21]

5. Empirical Strategy

5.1 The Framework

In what follows, I index auto drivers with the letter a and customers with the letter c. The market is characterised by one time transactions – a given customer will, with high probability, not meet the same auto driver again. An auto driver a is supposed to charge a customer c based on regulated (legal) fare depending on the total distance travelled k (in kilometres) displayed on the meter as follows:

$$L(k) = sq + t(k - q) \tag{3}$$

where, s is the down-payment for the first q kilometres and t is the amount paid for every subsequent kilometre travelled by the customer.

Table 1. Past revisions in regulated fare

Period	Down-payment applicability 'q' (km)	Down-payment 's' (INR)	Rate per kilometre subsequently travelled 't' (INR)
Before June 2007	First kilometre	8.00	3.50
June 2007 to July 2010	First kilometre	10.00	4.50
After July 2010	First two kilometres	19.00	6.50

Source: Prabodh (2009a).

We are interested in the period before July 2010. Although fuel costs f per kilometre ($f = F/k$) were very low, even after accounting for waiting/search time (about INR0.60 according to the in-house research by Prabodh [2009a]), the daily rents (for a 12 hour period) auto drivers paid to auto owners were very high. Suppose that customer c manages to travel by the meter only a fraction ρ times, and pays a mark-up θ over the legal fare in the remaining $(1–\rho)$ fraction of total auto travels. An auto driver's expected earnings on any given travel with this customer is:

$$\Pi_a = \rho[L(k) - fk] + (1-\rho)[(1+\theta)L(k) - fk] = [1 + (1-\rho)\theta]L(k) - fk \tag{4}$$

Let $\theta_{ac} = (1–\rho)\theta$ be the expected mark-up, so that:

$$\Pi_a = (1+\theta_{ac})L(k) - fk \tag{5}$$

where θ_{ac}[22] is the bargaining solution we observe (on an average) that is the mutually agreed upon (average) mark-up over the legal fare $L(k)$. Clearly, auto drivers do not want to travel by the meter, since, otherwise, θ_{ac} equals zero. The earnings, by an auto driver from any given customer monotonically increases in θ_{ac}, but only up to a point where the product $(1 + \theta_{ac})L(k)$ equals W_c, the customer's valuation. I now state assumptions.

Assumption 1: I assume that θ (and hence θ_{ac}) is independent of k for two reasons. First, the decision on the final amount a customer pays (which ultimately comes down to deciding θ_{ac}) is only taken after the distance to be travelled is exogenously given, so it is fixed. Thus θ_{ac} can vary, although k is fixed (the customer obviously knows where he wants to go and the driver takes that as given). Second, it maintains the possibility that a customer who travels a lesser distance than another customer with a given auto driver can actually end up paying substantially more. The only restriction on θ_{ac} is that it be non-negative.

In order to determine fairness prices Equations (1) and (2) we need information on the legal fare, costs and valuation. While there are data available on costs, valuation remains unobserved. I make the following assumption based on the works cited in the introduction to add to the existing body of research.

Assumption 2: I take W_c to depend on factors such as one's gender (from experimental evidence, women tend to trust less and hence bargain more than men);[23] employment status (those unemployed have a greater incentive to bargain); and so forth. This is summarised in $\boldsymbol{X_c}$. W_c increases in the distance travelled (Table 2 presents a summary of the explanatory variables). I further assume that the determinants of valuation assume the following form:[24]

$$W_c = \alpha_k + \boldsymbol{X_c}\boldsymbol{\alpha} + v_c \tag{6}$$

where α_k is a representative constant for a given distance k for *every* customer. The valuations of different customers hover around this representative constant, depending on their characteristics summarised by the components of the vector $\boldsymbol{X_c}$ (which does not include the constant of regression). $\boldsymbol{\alpha}$ is the vector of parameters and v_c is a customer (or a transaction) specific error term.

In order to know the important determinants of valuation in Equation (6), we must know which components of $\boldsymbol{\alpha}$ are significant. We cannot, however, directly estimate $\boldsymbol{\alpha}$ since the left hand side of Equation (6) is unobserved. I use theoretical bargaining solutions, as in Thomson (1994), that lead to structural equations from which $\boldsymbol{\alpha}$ can be recovered. In what follows, I specifically use the Nash (1950) solution to explain the process of calculating costumer valuation.

Firstly, we discuss the role of outside options. To ease our formulation, I normalise any given auto driver's disagreement payoff to zero. The customer's disagreement payoff equation can be defined as follows (see Note 21):

Table 2. Description of variables

	Description of variables
Outcome variables	
1. Proportion of meter travel (ρ)	Represented as the fraction of times an individual would travel by the meter in an auto[35]
2. Excess over legal fare when not travelling by meter *(θ)*	Represented as the amount (proportion) an individual will end up paying in excess of the legal fare when not travelling by the meter
3. Overall bargaining power *(θ_{ac})*	The amount that a customer pays on an average when he is legally supposed to pay INR1.00
Explanatory variables (components of X_c and the disagreement matrix)	
4. $Unemp_c$	A dummy taking value 1 if the individual is unemployed and 0 otherwise
5. $Metro_c$	The presence of a metro station, coded as 2 if the nearest metro station falls within 1 kilometre of residence; 1 if the nearest metro station falls within 2 kilometres of residence; and 0 otherwise
6. $VecOwn_c$	A dummy taking value 1 if the individual has a vehicle at his/her disposal and 0 otherwise
7. $Gender_c$	A dummy taking value 1 if the individual is male and 0 if female

Table 3. Descriptive statistics

	2007 (1)	2008 (2)
1. Total number of respondents	126	126
2. Number of male respondents (% of total)	60 (47.6%)	60 (47.6%)
3. Number of unemployed people (% of total)	62 (49.2%)	41 (32.5%)
4. People living in residences with metro stations < 1 km away (% of total)	10 (0.08%)	15 (11.9%)
5. People living in residences with metro stations < 2 km away (% of total)	46 (36.5%)	55 (43.6%)
6. People with vehicle at disposal (% of total)	32 (25.4%)	53 (42.1%)
7. Average proportion of meter travel	32.55%	32.47%
8. Average excess over legal fare when not travelling by the meter	24.09%	23.96%
9. Average overall excess paid by customers *($\bar{\theta}_{ac}$)*	18.78%	18.39%
10. Number of women with vehicle at disposal (% of total)	20 (15.9%)	27 (21.42%)

$$D_c = \gamma_s S_c = max[\gamma_v VecOwn_c; \gamma_m Metro_c] \quad (7)$$

where $Metro_c$ denotes the presence of a metro station in a nearby area and $VecOwn_c$ denotes ownership of a vehicle (as in Table 2).[25] To offer an explanation, if a person has no substitutes available nearby, then both $VecOwn_c$ and $Metro_c$ are equal to zero – hence his disagreement payoff will also be zero. On the other hand, if a customer has both the options, then he would settle for that which gives him the higher payoff (on choosing not to transact with the auto driver in question). The (material) payoff to the customer is given by the difference between his valuation and what he actually ends up paying:

$$\Pi_c = W_c - (1 + \theta_{ac})L(k) \quad (8)$$

The payoff specifications in Equations (5) and (8) justify the idea of treating auto drivers as homogenous and customers as heterogeneous.[26]

5.2 Estimation of Valuation Using the Nash solution

Figure 1 illustrates the payoff frontier assuming (at the moment just to keep the discussion simple) zero disagreement payoffs for both the customer and the auto driver. The vertical axis measures the (material) payoff to the customer (Π_c) and the horizontal axis measures that of the auto driver (Π_a).

Table 4. Determinants of meter travel and negotiated fare in 2007

2007	Dependent variable: proportion of meter travel = ρ (least squares) (1)	Dependent variable: proportion of meter travel = ρ (probit) (2)	Dependent variable: excess over legal fare when not travelling by meter = θ (least squares) (3)
Unemp	0.1150**	1.2003***	−0.0346*
	(0.0470)	(0.3335)	(0.0188)
Gender	−0.0480	−0.1495	0.0184
	(0.0432)	(0.2946)	(0.0166)
VecOwn	0.02391	0.2655	−0.0016
	(0.0514)	(0.3162)	(0.0213)
Metro	0.2149***	0.5809**	−0.0741***
	(0.0385)	(0.2483)	(0.0152)
Constant	0.1901***	0.3314	0.2826***
	(0.0474)	(0.2663)	(0.0210)
R-squared	0.3300	–	0.2737
Pseudo R-squared	–	0.1686	–
P value for joint significance	0.0000	0.0001	0.0000
N	126	126	126

Source: Prabodh (2009a).
Notes: ***, **, * mark out coefficients that are significant at 1, 5 and 10 per cent levels of significance respectively.
Robust standard errors reported in parentheses.

Table 5. Determinants of meter travel and negotiated fare in 2008

2008	Dependent variable: proportion of meter travel = ρ (least squares) (1)	Dependent variable: proportion of meter travel = ρ (probit) (2)	Dependent variable: excess over legal fare when not travelling by meter = θ (least squares) (3)
Unemp	0.0793*	0.5406*	0.0002
	(0.0454)	(0.3277)	(0.0187)
Gender	−0.0701*	−0.2193	0.0178
	(0.0423)	(0.2820)	(0.0172)
VecOwn	0.0043	−0.0729	−0.0002
	(0.0459)	(0.2742)	(0.0186)
Metro	0.1439***	0.1875	−0.0585***
	(0.0309)	(0.1837)	(0.0132)
Constant	0.2504***	0.9725***	0.2636***
	(0.0477)	(0.2979)	(0.0198)
R-Squared	0.1844	–	0.1654
Pseudo-R squared	–	0.0402	–
P value for joint significance	0.0000	0.2817	0.0005
N	126	126	126

Source: Prabodh (2009a).
Notes: ***, **, * mark out coefficients that are significant at 1, 5 and 10 per cent levels of significance respectively.
Robust standard errors reported in parentheses.

The total surplus (the difference between the valuation of the customer and the fuel costs incurred by the auto driver) is to be distributed among them with the constraint that the auto driver earns a minimum of *L(k)* from the transaction. Formally, the boundary of the utility frontier has the following equation:

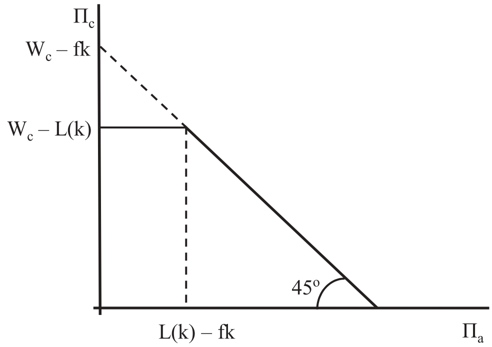

Figure 1. For a given distance, the customer and the auto driver distribute a surplus equivalent to the difference between the customer's valuation and the fuel costs incurred by the auto driver. The auto driver is guaranteed a minimum legal payoff defined by regulation (which also puts a cap on the customer's payoff).

$$\Pi_a + \Pi_c = W_c - fk; \quad \Pi_a \geq L(k) - fk \tag{9}$$

The Nash (1950) bargaining solution can be characterised by the following formulation:

$$\text{Maximize} : \Pi_a(\Pi_c - D_c) \quad \text{with respect to } \theta_{ac} \tag{10}$$

Using Equations (5) and (8), we calculate the first order condition of Equation (10)above as follows:

$$(1 + \theta_{ac}) = \frac{W_c - D_c + fk}{2L(k)} \tag{11}$$

Using Equation (6) to replace W_c above by $\alpha_k + \boldsymbol{X_c\alpha} + v_c$ along with the disagreement equation in the above expression and rearranging the terms, gives us)[27]:

$$(1 + \theta_{ac}) = \underbrace{\left(\frac{\alpha_k + fk}{2L(k)}\right)}_{\beta_0} + \boldsymbol{X_c} \underbrace{\left(\frac{\boldsymbol{\alpha}}{2L(k)}\right)}_{\boldsymbol{\beta}} - \underbrace{\left(\frac{\gamma_s}{2L(k)}\right)}_{\mu_S} S_c + \underbrace{\left(\frac{v_c}{2L(k)}\right)}_{\eta_c} \tag{12}$$

This leads us to the following structural equation depicting the average mark-up as a function of determinants of valuation and the availability of substitutes:

$$(1 + \theta_{ac}) = \beta_0 + \boldsymbol{X_c\beta} + \mu_s S_c + \eta_c \tag{13}$$

Note that Equation (13) is estimable, since both the left- and the right-hand sides are observable. After observing $\hat{\beta}_0$, $\hat{\boldsymbol{\beta}}$ and $\hat{\mu}_s$, we invert the explicitly stated relations in Equation (12) above to arrive at $\hat{\alpha}_k$, $\hat{\gamma}_s$, and the $\hat{\alpha}$ vector as follows:

$$\hat{\alpha}_k = 2\hat{\beta}_0 L(k) - fk; \quad \hat{\gamma}_s = -2\hat{\mu}_s L(k); \quad \text{and} \quad \hat{\boldsymbol{\alpha}} = 2L(k)\hat{\boldsymbol{\beta}} \tag{14}$$

We finally write customer valuation – using Equation (6) – explicitly as a function of distance k:

$$\hat{W}_c = \hat{\alpha}_k + \boldsymbol{X_c}\hat{\boldsymbol{\alpha}} \tag{15}$$

We repeat the above process for the Kalai and Smorodinsky (1975) (KS hereafter); Egalitarian; Dictatorial (either player could become a dictator); Raiffa (1953); Equal Area (EA hereafter); and the Yu (1973) solutions. Each gives us a specific functional form of W_c. Clearly, focusing only on the Nash (1950) solution is not enough for the purposes of this article, since we do not know the axioms that actually govern negotiation in this market. In the words of Thomson (1994), for example:

> the crucial axiom on which Nash (1950, p. 1238) had based his characterisation requires that the solution outcome be unaffected by certain contractions of the feasible set, corresponding to the elimination of some of the options initially available ... but this independence is often not fully justified.

The non-binding legal constraint $(\Pi_a \geq L(k) - fk)$ acts as such a contraction, the very existence of which may influence bargaining solutions. We also need to look at theoretical models that explicitly take this into account for robustness in our results.[28],[29] In general, I arrive at three classes (types) of reduced-form equations (based on the transformations of the mark-up – our left-hand side) that encompass all the above mentioned solutions. Specifically, apart from the KS (Type 2, shown in Online Appendix B) and the EA (Type 3) solutions, all the remaining solutions are structurally indistinguishable from that implied by the Nash solution (Type 1) above – shown in Equation (13). The results of these regressions are presented in Tables 6 and 7.

We get a distribution of $\widehat{W}_c$ functions (of distance travelled) for different individuals based on observed characteristics. I thus formally define the *critical customer* as the person whose willingness to pay is the least when compared with that of individuals with characteristics different from his (or her). Thus, the critical customer is the most difficult customer with the maximum incentive to bargain. I denote his valuation by $W_c^*(= W(\boldsymbol{X}_c^*))$. The prices considered as 'fair' by the critical customer will suit all the other individuals who (by definition) have higher valuations. This is in line with the objective that any new fairness pricing rule will not exclude any of the existing customers from the market – or on a less ambitious note, the number of customers who exit the market (because their valuation will be lower than the newly announced fare) will be a bare minimum.

6. Results and Discussion

I now use the regression results (the coefficient signs) to identify the critical customer and instead of calculating valuation, I work out his maximum willingness to pay (as a function of distance) for each year.[30] I then discuss the idea of fair prices based on them. Before we step further, it is important to note that the hypothesis of a dictatorship regime where the customer is the dictator (say Type 4) can simply be ignored by rejecting the null $\theta_{ac} = 0$, for both the years ($\bar{\theta}_{ac} = 0.188$ for 2007, and $\bar{\theta}_{ac} = 0.184$ for 2008).

6.1 Maximum Willingness to Pay and Fair Prices in 2007

Based on the regression results in Table 6, it is easy to identify that our critical customer is an unemployed female citizen (*Unemp** = 1 and *Gender** = 0) with a metro station nearby (*Metro** = 2). I use a conservative (10%) significance rule to specify the $\hat{\alpha}$ vector and using Equation (15) I estimate maximum willingness to pay for the critical customer for different solutions and plot the same in Figures 2 and 3 (for type 1 and types 2 and 3 respectively).[31] Legal Fare (2007) in the figures refers to the regulatory fares prevalent during March 2007 (the first wave), that is before the hike of June 2007.

Unemployment seems to be a significant variable as far as type 1 solutions are concerned, while it is not significant as far as the KS and the EA solutions go (Table 6). With the evidence we have, those employed paid on an average 5.5 per cent more than those unemployed. Gender did not seem to be an important determinant of bargaining power. Vehicle ownership is not important either. This makes sense, for while a person is negotiating with an auto driver, he does not really think much about the

Table 6. Estimation of structural equations (2007)

2007	Type 1: Nash-Egalitarian, dictatorial, Raiffa and Yu solutions (1)	Type 2: Kalai −Smorodinsky solution (2)	Type 3: Equal area solution (3)
Unemp	−0.0557*	−0.1268	−0.1421
	(0.0306)	(0.0767)	(0.0894)
Gender	0.0164	0.0494	0.0606
	(0.0302)	(0.0764)	(0.0892)
VecOwn	0.0369	0.1009	0.1212
	(0.0352)	(0.0866)	(0.1002)
Metro	−0.0779**	−0.2108**	−0.2500**
	(0.0393)	(0.1023)	(0.1203)
Constant	1.2396***	1.7307***	1.8893***
	(0.0325)	(0.0805)	(0.0933)
R-squared	0.3334	0.3418	0.3438
Implied RMSE in Online Appendix C	0.2622 (against type 2)	0.2597	
	0.3085 (against type 3)		0.3045
Implied RMSE in Online Appendix D	0.1019	0.1017 (implied)	0.0991 (implied)
P-value for joint significance	0.0000	0.0000	0.0000
N	126	126	126

Source: Prabodh (2009a).
Notes: ***, **, * mark out coefficients that are significant at 1, 5 and 10 per cent levels of significance respectively.
Robust standard errors reported in parentheses.
Constant *(fk/L(k))* is taken at the limiting value of 0.143. Regression coefficients are largely insensitive to changes in this constant (for Kalai−Smorodinsky and equal area solutions).
To ensure robustness in regression results, the regressions shown above account for all possible interaction terms among the variables represented by the ***X*** vector in Online Appendices C and D.

vehicle he has left home. Finally, metro seems to play an important role in determining negotiated fares (hence *Metro* [and not *VecOwn*] in Table 2 represents our disagreement point). Those with metros in the vicinity of a kilometre paid on an average over 15 per cent less than those who did not have metro nearby. While Figures 2 and 3 represent the maximum willingness to pay of the critical customer, I have intentionally presented the overall average observed negotiation for different distances ($\bar{\theta}_{ac}$=0.188 for 2007, but $\bar{\theta}^* = 0.027$ for the critical customer in 2007).

This is because if the critical customer's maximum willingness to pay is exceeded by the (average) observed transactions (in March 2007), any upward revision in auto fares based on the latter would necessarily leave the critical customer out of the market after the hike (in June 2007). Models that predict a maximum willingness to pay very close to (albeit higher than) the legal fare run the risk of a contradiction – that the (current) legal fare might exceed the *maximal fairness fare*, in which case the very critical customer we have identified from existing data should not have been observed in the market at the first place.[32] Even if a solution escapes this contradiction (when the maximal fairness fare marginally exceeds the legal fare), it may fall into yet another trap – the *optimal fairness fare* in Equation (1) is notably higher than the legal fare, and may thus exceed the *maximal fairness fare*. We reject such solutions (the likely candidates are the dictatorial and the Yu [1973] solutions).

We now look into the optimal fairness and the maximal fairness pricing rules and compare them with the related revised regulatory fare (the hike in June 2007), which we call as Legal Fare (2008), since these fares lasted throughout 2008 (and even 2009 – the next revision was in 2010) for each bargaining solution (Figure 4 for type 1 solutions and Figure 5 for type 2 and 3 solutions). We see in Figure 4 that optimal fairness fares do exceed the maximal fairness fares implied by the dictatorial and the Yu (1973) solutions. I therefore reject those solutions and focus on the Nash (1950), Raiffa (1953), KS and the EA solutions. We arrive at the interesting result that although these solutions differ

Table 7. Estimation of structural equations (2008)

2008	Type 1: Nash-Egalitarian, dictatorial, Raiffa and Yu solutions (1)	Type 2: Kalai −Smorodinsky solution (2)	Type 3: Equal area solution (3)
Unemp	0.0135	0.0434	0.0546
	(0.0352)	(0.0893)	(0.1044)
Gender	0.0168	0.0602	0.0769
	(0.0372)	(0.0935)	(0.1090)
VecOwn	0.0171	0.0614	0.0785
	(0.0349)	(0.0870)	(0.1012)
Metro	−0.0762***	−0.2052***	−0. 2434***
	(0.0284)	(0.0747)	(0.0882)
*Gender*Metro*	0.0514*	0.1420**	0.1699**
	(0.0276)	(0.0711)	(0.0836)
Constant	1.2131***	1.6676***	1.8175***
	(0.0318)	(0.0800)	(0.09323)
R-squared	0.2072	0.2243	0.2290
implied RMSE in Online Appendix C	0.2743 (against type 2)	0.2724	
	0.3227 (against type 3)		0.3193
Implied RMSE in Online Appendix D	0.1066	0.1067 (implied)	0.1069 (implied)
P-value for joint significance	0.0000	0.0000	0.0000
N	126	126	126

Source: Prabodh (2009a).
Notes: ***, **, * mark out coefficients that are significant at 1, 5 and 10 per cent levels of significance respectively.
Robust standard errors reported in parentheses.
Constant *(fk/L(k))* is taken at the limiting value of 0.133. Regression coefficients are largely insensitive to changes in this constant (for Kalai−Smorodinsky and equal area solutions).
To ensure robustness in regression results, the regressions shown above account for all possible interaction terms among the variables represented by the ***X*** vector in Online Appendices C and D.

substantially in their prediction of maximum willingness to pay, all of them individually generate fairness zones bounded by Equations (1) and (2) such that the newly announced fare hike lies within these zones.

Testing for Fairness: I test the null hypothesis, that the regulatory hike was fair, against the alternative that it was not, using the following rule:

Accept Null if: Optimal Fairness Fare ≤ Legal Fare (2008) ≤ Maximal Fairness Fare
Do Not Accept Otherwise.

I infer that the actual legal fare raised by regulation can be deemed 'fair', since it lies in the region bounded by the optimal and the maximal fairness prices (the fairness zone). The rise in the legal fare is closer to the maximal fair pricing rule, suggesting a greater weight (68%) put on the needs of the auto drivers (customers would prefer optimal fairness pricing).

We cannot directly employ the RMSE[33] rule for robustness here, since the dependent variables are different for all the types (1, 2 and 3) of structural equations. In Online Appendices C and D, I explain the methods involving appropriate inversions to arrive at comparable residuals for the three types. The EA solution that (although very marginally) seems to best explain the customer–driver bargaining story gives us some insight on certain aspects of negotiation. The customer perhaps thinks in terms of the surplus he would be willing to give up rather than his maximum gain from a negotiation. Based on this, the maximal fairness fare rule suggests INR10.50 as a down-payment for the first kilometre and

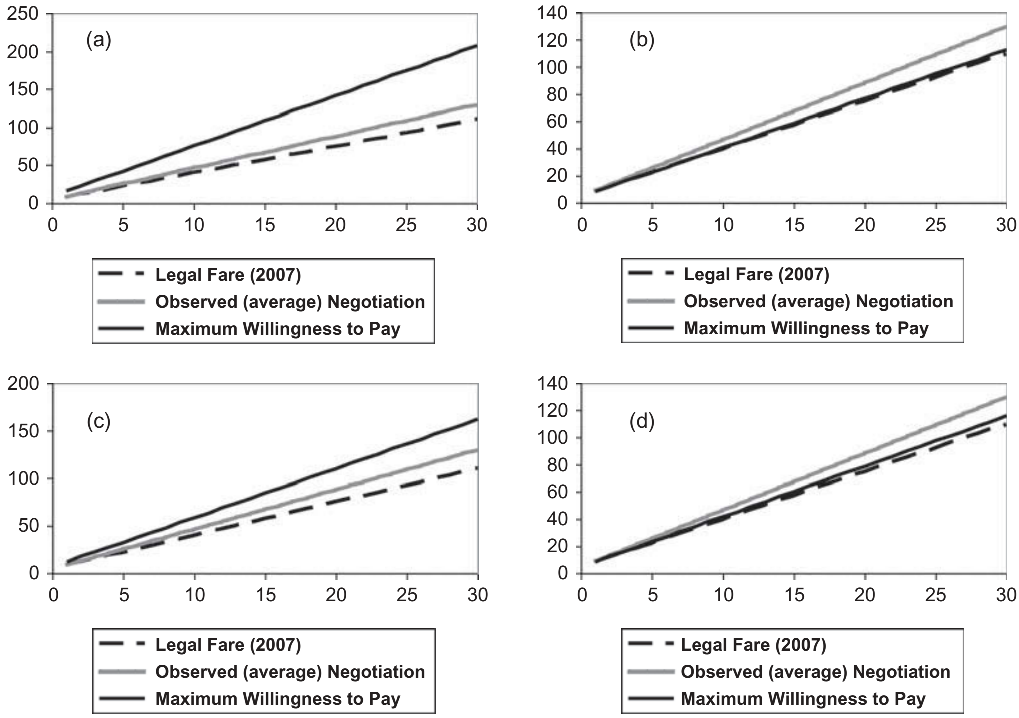

Figure 2. Type 1 solutions: (a) Nash; (b) dictatorial; (c) Raiffa (discrete); and (d) Yu solutions – horizontal axis is measured in kilometres and vertical axis in INR.

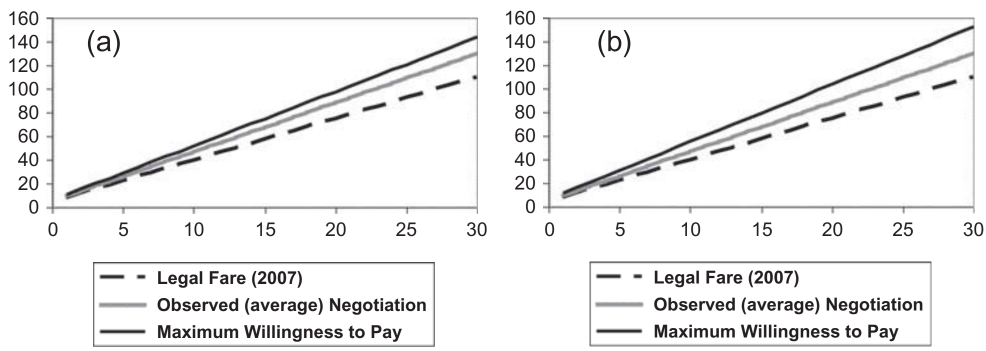

Figure 3. Type 2 and 3 solutions: (a) Kalai–Smorodinski (type 2); and (b) equal area (type 3) solutions – horizontal axis is measured in kilometres and vertical axis in INR.

INR4.80 for every subsequent kilometre travelled. The actual legal fare was raised to INR10.00 for the first kilometre and INR4.50 for every subsequent kilometre travelled (Legal Fare 2008). The maximal fairness pricing rule implied by the KS solution (INR10.00 for the first kilometre and INR4.60 for every successive kilometre) seems to best fit the actual (next) legal fare raise.[34]

6.2 Maximum Willingness to Pay and Fair Prices in 2008

Again, the critical customer is a female with a metro nearby (Table 7). The maximum willingness to pay is plotted using Equation (15) in Figures 6 and 7 (for type 1 and types 2 and 3 respectively).

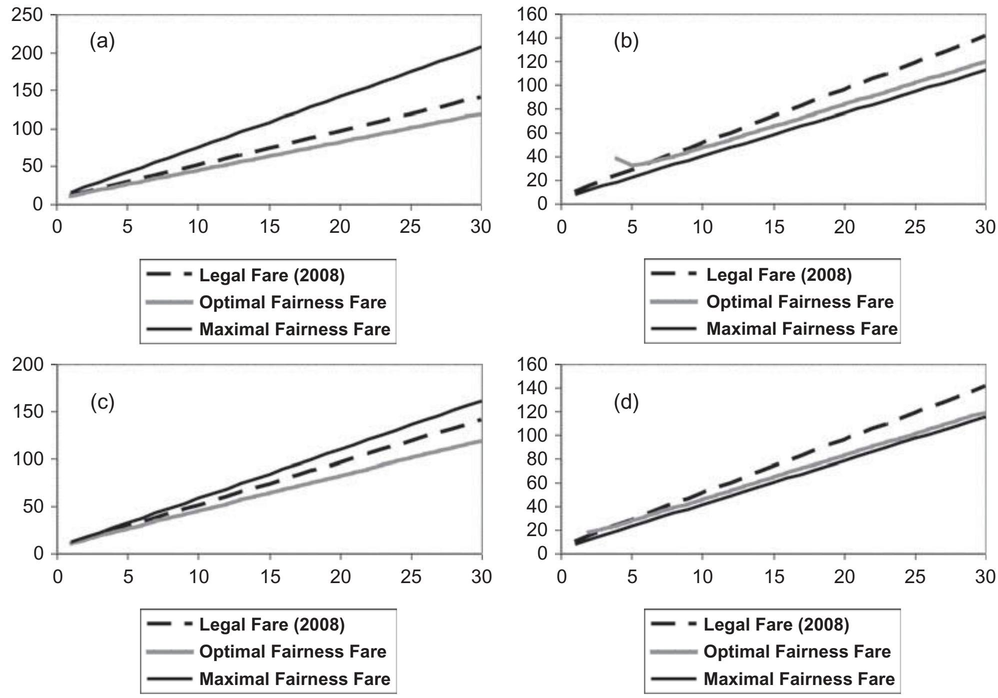

Figure 4. Type 1 pricing rules: (a) Nash; (b) dictatorial; (c) Raiffa (discrete); and (d) Yu solutions – horizontal axis is measured in kilometres and vertical axis in INR.

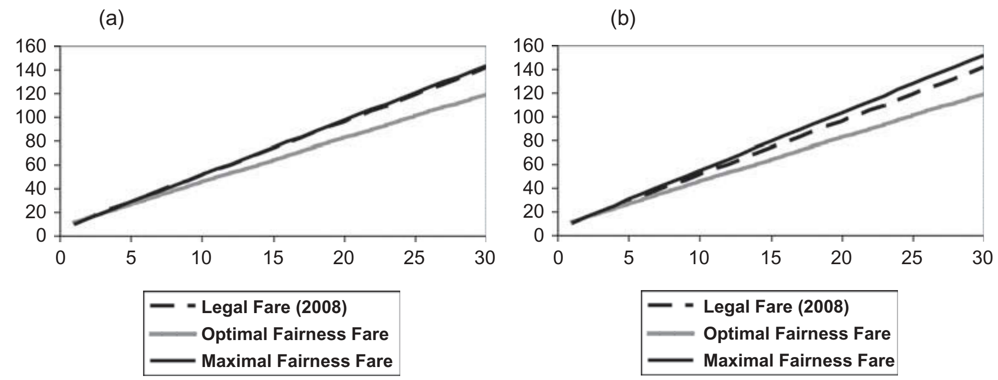

Figure 5. Type 2 and 3 pricing rules: (a) Kalai–Smorodinsky (type 2); and (b) equal area (type 3) solutions – horizontal axis is measured in kilometres and vertical axis in INR.

Unemployment is no longer significant. Gender and vehicle ownership continue to remain unimportant determinants of negotiated prices, although females seem to capitalise on the presence of metros more than males (the interaction term is significant). Those with metros in the vicinity of a kilometre again paid on an average over 15 per cent less than those who did not have a metro station nearby. The dictatorial and the Yu (1973) solutions remain problematic for the reasons mentioned above. Figures 8 and 9 represent the maximal and the optimal pricing rules implied by each bargaining regime. None of the types significantly explains the customer–driver bargaining story better than the others (Table 7 reports mixed results based on the methods in Online Appendices C and D). Using the same testing rule as in the previous sub-section, one would infer that the fare hike cannot be considered fair, since it even exceeds the maximal pricing rule for most bargaining solutions (Nash [1950] and Raiffa [1953]

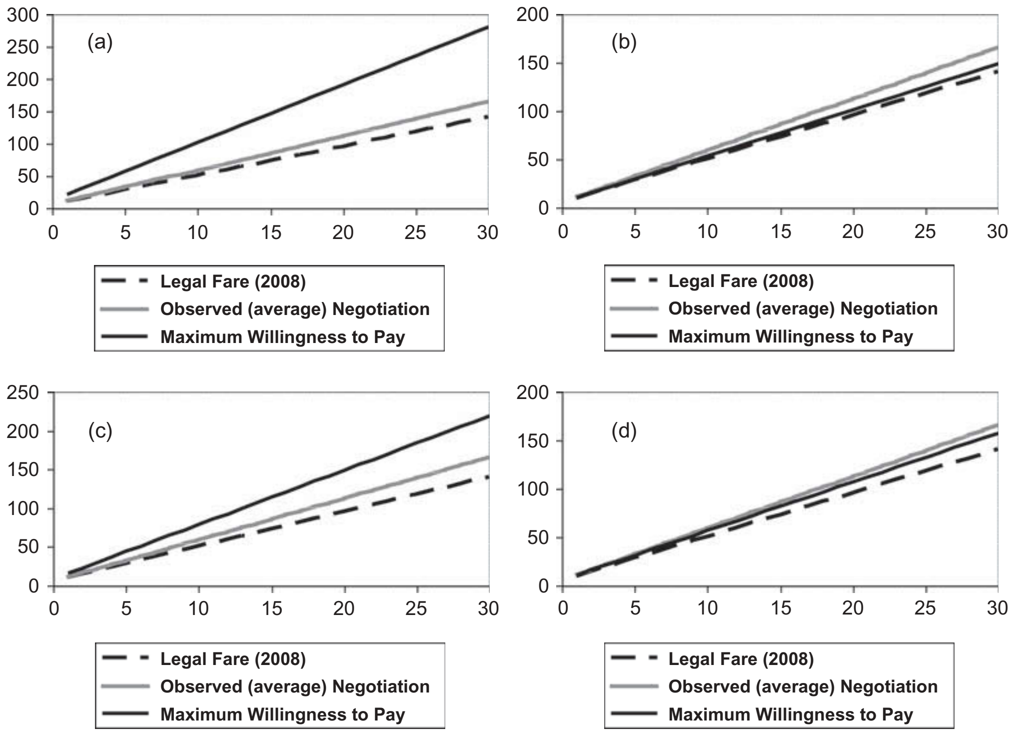

Figure 6. Type 1 solutions: (a) Nash; (b) dictatorial; (c) Raiffa (discrete); and (d) Yu Solutions – horizontal axis is measured in kilometres and vertical axis in INR.

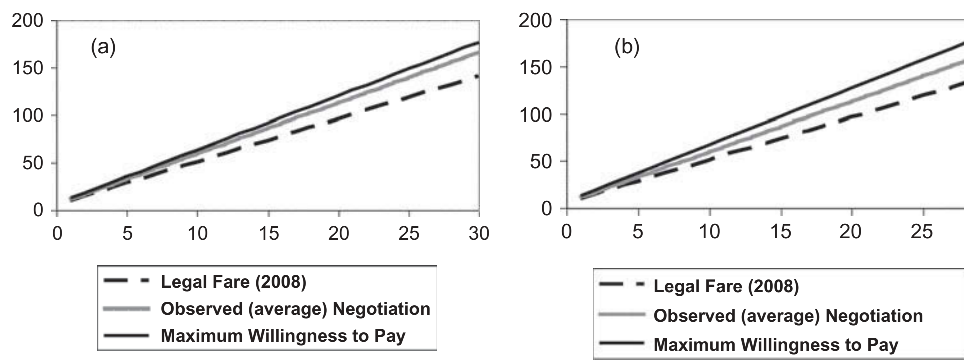

Figure 7. Type 2 and 3 solutions: (a) Kalai–Smorodinsky (type 2); and (b) equal area (type 3) solutions – horizontal axis is measured in kilometres and vertical axis in INR.

are exceptions) suggesting a more than 100 per cent weight (about 142%) put on the needs of the auto drivers. There is, however, a caveat that comes with such an inference.

We need to recognise that while the survey period March 2007 was closer to the next hike (three months from then), March 2008 (our next wave) is distant from the next hike (in 2010, over two years from then). Rents have risen, and so have fuel costs, before and during 2010. The maximum willingness to pay curve (and hence the fairness pricing curves) may have shifted upwards during the two years before the next hike was announced. Thus, we may actually consider the newly revised prices to be 'fair'. 'Current legal fare' refers to the hike announced in July 2010. The EA solution

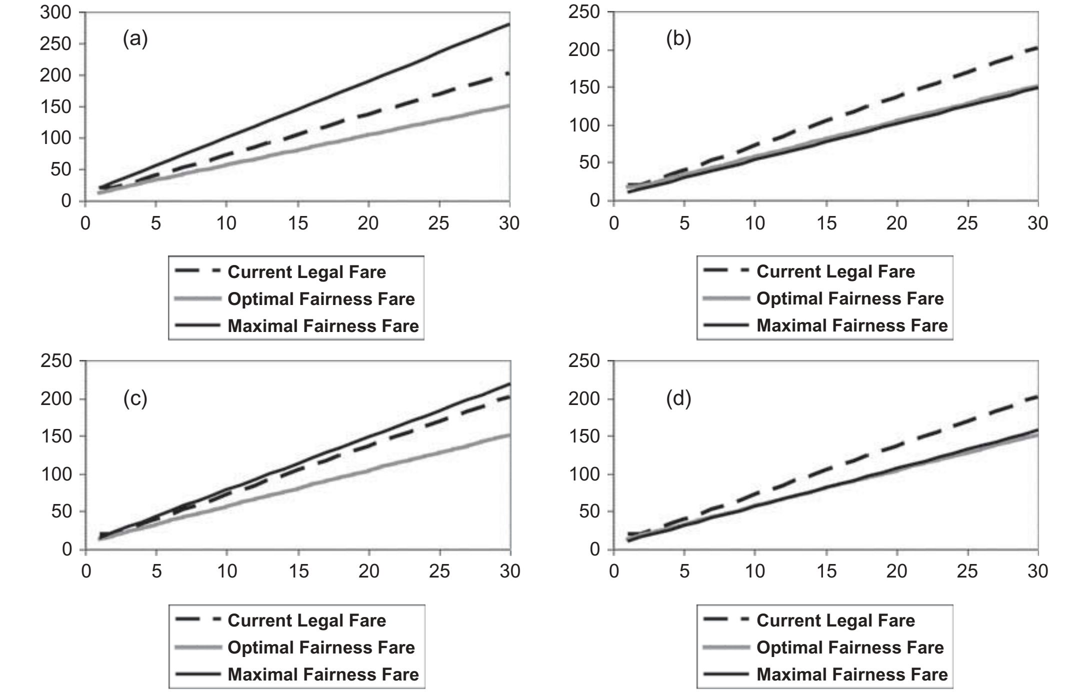

Figure 8. Type 1 pricing rules: (a) Nash; (b) dictatorial; (c) Raiffa (discrete); and (d) Yu solutions – horizontal axis is measured in kilometres and vertical axis in INR.

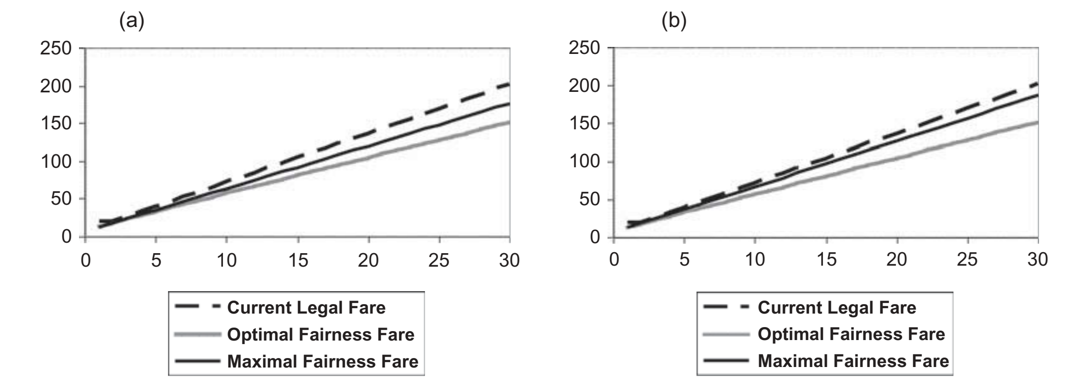

Figure 9. Type 2 and 3 pricing rules: (a) Kalai–Smorodinsky (type 2); and (b) equal area (type 3) solutions – horizontal axis is measured in kilometres and vertical axis in INR.

suggests INR19.00 as a down-payment for the first two kilometres and INR6.00 for every subsequent kilometre travelled. The actual legal fare has been raised to INR19.00 for the first two kilometres and INR6.50 for every subsequent kilometre travelled. The additional INR0.50 may very well be attributable to the additional changes in rent and fuel costs mentioned previously.

7. Conclusion

This article focuses on the possibility that fairness considerations could influence regulatory decisions. In the implicit discussion on the determinants of bargaining power, there is some evidence that those unemployed perhaps tend to haggle more and hence end up with better deals. This article also makes a case for better connectivity enhanced by metro rail construction by providing evidence that it acts as a strong substitute to auto rickshaws. The effect of metro construction has been significant in bringing down negotiated auto prices closer to existing regulated fares.

I have abstracted away from driver heterogeneity and have capitalised on the theoretical setting based on identical material utilities. This is because the unit of observation in the available data is the customer. However, the observed behaviour of the drivers in this market – that everyone prefers to haggle for a mark-up over the legal fare, is explained and justified well by our theoretical setting. The only source of heterogeneity on the customers' side is their individual characteristics. Although this is not a central point, the results may be better interpreted with the additional assumption that each customer takes the same route 10 times and the excesses he pays over the legal fare when not travelling by the meter is averaged out. In general, this may not be true, since two different places of destination from the same origin (the individual's residence here) will involve travelling different distances and hence different legal fares (and possibly different bargaining positions). Fortunately, as I have demonstrated, it is sufficient to deal with data on just the mark-up levels as proportions of the legal fare (rather than the absolute values of the mark-ups) for the purposes central to this research. While some people did report these figures (on actual distances covered, time of the day, destination and so forth) for each travel, information on them remained scanty (since they were not required for the original purpose). Some element of heterogeneity in the factors mentioned above would have given us more flexibility in terms of modelling individual transactions – more data are obviously better, for they lead to more information (for example, data on income level, time of transaction among other details, although such determinants of bargaining outcomes were not the key focus areas of this article). One must, however, acknowledge the merit in the available data that, in my belief, overcomes the loss of heterogeneity – this is the only data source I am aware of that documents illegal (or, more aptly, 'not-legal') payments to a great degree of accuracy stemming from the information and the data collection strategy.

Acknowledgements

Firstly, I thank my adviser Prof. Bharat Ramaswami and Prof. Abhiroop Mukhopadhyay for their guidance and support throughout my research. I thank members of Prabodh for allowing me to use their research. I also thank Kensuke Kubo, visiting scientist at the Indian Statistical Institute and Prof. Parikshit Ghosh from the Delhi School of Economics for their valuable inputs on my paper. I am also grateful for the valuable comments of the anonymous referees who helped me refine my paper into its final draft. Finally, I would like to extend many thanks to Prof. Sangeeta Bansal, Prof. Kaivan Munshi, Prof. Alex Dickson and Prof. Andrea Galeotti for their valuable feedback and inputs on this paper. All errors are mine. Researchers interested in additional material are requested to contact the author.

Notes

1. See Moulin (1988), Roth (1979), and Thomson (1994) for more detailed discussions.
2. More work on fairness is cited in Chaudhuri (2009) and Moulin (2003).
3. This is a number good enough to qualify for perfect competition.
4. Same journey refers to the same starting point and the same destination (hence the same distance) and during the same time interval of the day.
5. Comay et al. (1974) argues that one's bargaining ability can be affected by his or her level of impatience.
6. Babcock, Wang, and Loewenstein (1996) and Frank (1985) provide similar examples that highlight this issue of comparison broadly. In the words of Bohnet and Zeckhauser (2004, p. 495), 'prospective employees typically do not compare their wage (or wage less reservation price) with the surplus the employer reaps from their employ, but rather with the wages of similarly suited employees'. We expect customers to do the same.
7. Bohnet and Zeckhauser (2004) show that both social comparison and pie-size information substantially increase subsequent offers made by proposers in an ultimatum game – the implicit revelation of willingness to pay by a customer by agreeing to pay higher than the legal fare generates a subsequent 'norm' of higher prices. Rejection rates of settling on a transaction,

however, also get higher, since a higher proportion of offers are now perceived to be low (by the drivers), even if they are actually higher than prescribed by existing regulation.

8. 'Despite increase in road length, the average speed of vehicles is expected to drop from the existing 15 kilometres per hour to 10 kilometres per hour in the national capital by the end of 2011.' – Rajesh Kumar, 'Average speed of vehicles to drop to 10 km/hr: Report', 7 June 2010, *The Pinoeer*, retrieved from http://www.dailypioneer.com/260874/Average-speed-of-vehicles-to-drop-to-10-km/hr-Report.html.
9. Having more auto-rickshaws operating on Delhi roads could only worsen the problem and possibly even increase the time an auto driver spends travelling with a particular customer, which means that more time would be lost at earning the same amount from the given customer. More time per customer directly translates to a smaller number of customers per day, and hence lower daily earnings.
10. After vacillating for almost two years, the government went about implementing this decision in a haphazard and hasty manner.
11. These rates persisted until mid-2009. Today drivers pay over INR300.00 daily.
12. 'Project Third Wheel: Deregulation of Intermediate Public Transport of Delhi (2009)'; Prabodh, Delhi-based Liberal youth group working on governance and livelihood related public policy reforms.
13. This excludes the initial costs that were already covered (both legal and illegal) in order to obtain licenses.
14. A person travelling by an auto may be considered superior to someone else travelling in a bus. Image really matters in North India.
15. Algebraically there is no reason why maximal fairness fare should always exceed the optimal fairness fare (on directly comparing Equations (1) and (2) – just by looking at the equations one can possibly say that it may well be the other way round for solutions that predict a maximum willingness to pay extremely close to the legal fare.
16. A shorter version of this documentary called 'Third Wheel' (see Prabodh, 2009b) can be retrieved from http://www.youtube.com/watch?v = TVWjuH8p1_Q. The documentary firstly focuses on the troubles faced by the general public due to non-compliance with legal fares on the part of the auto drivers, and then suggests that auto drivers have to resort to surplus extraction under the existing situation. For the former part, I had informally suggested to them that looking into the fraction of times customers manage to travel by the meter would help. For this study overall, my contribution was insignificant.
17. People were asked to report figures for their next 10 journeys, and did so on the basis of their auto journeys starting from their residence. The metro availability variable (explained in Table 2) therefore remained constant for these individuals (0, 1 or 2 throughout the 10 observations) for any given wave.
18. This was suggested to all the respondents before they participated.
19. For instance, if the meter is not reset to zero distance and is left running, any new customer can see the distance reading at the start of the journey – suppose this is 11.5 kilometres. Now, if the customer's destination is 5.1 kilometres apart (this is not known to him a priori), the final reading on the meter (after he travels) will be 16.6 kilometres. The customer can calculate his legal fare based on the difference in these two readings. For example, with INR10.00 for the first kilometre and INR4.50 for every subsequent kilometre travelled, the legal fare works out to be INR28.45.
20. The official URL when the data was collected was http://delhigovt.nic.in/autofares/Transport.asp. Now it is http://www.taxiautofare.com/.
21. This will be explained in the notation of what follows. Although our theoretical specification allows for just one substitute, I have included both availability of metros nearby and vehicle ownership to ensure robustness in the regressions. The insignificance of vehicle ownership ($VecOwn_c$) means that its coefficient $\gamma_v = 0$ and hence $\gamma_v VecOwn_c = 0$, and disagreement, $D_c = \max\{0, \gamma_m Metro_c\}$ where $Metro_c$ represents the existence of a metro station nearby. Thus, the closest substitute $S_c = Metro_c$ and $\gamma_s S_c = \gamma_m Metro_c$ (meaning that metro is the stronger substitute).
22. This term is subscripted by '*ac*' to denote that it is a result of (average) bargaining between both the auto driver and the customer.
23. See Chaudhuri and Gangadharan (2007) and Andreoni and Vesterlund (2001).
24. This is different from the idea of Karni and Safra (2002), who look into a 'hexagon condition', implying the additive seperability of components of utility. We have already used this condition at the stage in the construction of Rabin utilities, where the material and the moral value components are additively separable.
25. $S_c = VecOwn_c$ if s = v (so that $\gamma_s S_c = \gamma_v VecOwn_c$) and $S_c = Metro_c$ if s = m (so that $\gamma_s S_c = \gamma_m Metro_c$); the letter S denotes substitute.
26. This is a fairly reasonable assumption, even if one takes into account that there are auto drivers (very few of them) who own their autos and do not take them on a daily rent basis. It is, in fact, in their interest to overcharge their customers at rates charged by those who do not own autos. Overcharged rates act as 'focal points' (Knittel & Stango, 2003) for those who drive self-owned autos.
27. Note that $\boldsymbol{\alpha}$ is a vector. The expression $(\frac{\alpha}{L(k)})$ only means that each component of the $\boldsymbol{\alpha}$ vector is getting divided by *L(k)*.
28. The KS solution, for instance, points out that the existence of a legal constraint, although non-binding, may lead to a change in the optimal solution. People may not go by the legal fare but acknowledge its presence and hence form their expectations accordingly.
29. The derivations for other solutions can be made available upon request.
30. Although the existence of metro stations nearby shouldn't affect valuation, it does affect maximum willingness to pay. The process of arriving at the willingness to pay function is discussed in Note 33. I define our critical customer accordingly.

31. Here, keeping in mind that our critical customer is the person who has the maximum incentive to bargain, we also put *Metro** = *2*, and augment it in our valuation function (that is, we use $[\boldsymbol{X_c} \vdots D_c]$ instead of $\boldsymbol{X_c}$) and call it the willingness to pay function. This willingness to pay function is the one plotted in the figures.
32. Remember that the maximal fairness fare here is that of the critical customer. So, if the legal fare exceeds the maximum fare that our critical customer feels is fair, then our critical customer would not avail auto services in the first place.
33. Kadiyali (1996), for example, in her paper looking into market characteristics as determinants of entry and exit in the photographic film industry, uses the criterion of the lowest minimised sum of squared errors to identify the market regime (among various market structures) in the post-entry period.
34. It suggests an almost 90 per cent weight on the auto driver's preferences and only 10 per cent weight on customers' preferences.
35. For example, if a person reported that he managed to travel by the meter six times out of ten, then $\rho = 0.6$ for him.

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