FAIRNESS AND SHORT RUN PRICE ADJUSTMENT IN POSTED OFFER MARKETS *

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Abstract

Questionnaire studies show that perceptions of fairness cause people to resist price increases following abrupt changes in conditions with no cost justification. We examine this hypothesis in posted-offer markets extending previous work. Consistent with the hypothesis, in the profit disclosure (fairness) treatment prices are initially below those in the cost and the no disclosure treatments. Over time prices converge in all treatments to the competitive surplus maximizing equilibrium. Fairness is thus interpreted as being a result of expectations that are not sustainable. Expectations adapt as the market converges to the predicted competitive equilibrium.

Keywords: Fairness, price convergence, posted-offer.

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Introduction

In the context of pricing in retail markets, using questionnaire survey studies, Kahneman et. al. (1986a, hereafter KKT; 1986b) indicate that fairness norms imply that any change in price in the short run that is not justified by a cost increase is unfair. Moreover, they argue that many people would follow fair policies in the absence of enforcement through punishment. They further argue that this kind of (fair) behavior may imply that markets may not clear if excess demand is not justified by an increase in supply costs (KKT, p. 213). This is due to the "principle of dual entitlements" where customers have a right to the terms of a reference transaction, while the firm has a right to a reference profit (Zajac, 1985, pp. 139-141), implying that recent posted prices may serve to define the reference transaction.

Fairness in KKT can be interpreted as an adaptation; i.e. any persistent state of affairs over some period of time may be accepted as fair. Thus a given state may come to be accepted as a reference transaction that may form the benchmark in evaluating any future changes. An implication of these considerations could be the following: the short-run price response to situations of excess demand may be sluggish if a price increase is not justified by an increase in unit supply cost. However, if excess demand persists, only higher new prices would be sustainable, and people will adapt by redefining the reference transaction. As we interpret it, the equilibrium may still be what is predicted from economic theory in the absence of a utility payoff from fairness.

In this paper we hypothesize that any short-run failure of markets to clear depends upon buyers knowing that increased profits result from higher prices. In the absence of this knowledge buyers may give in quickly to the equilibrating tendencies of the market.

Market Experiments

Kachelmeier et. al. (1991a, hereafter KLS) report laboratory experiments designed to measure the effect of fairness considerations on actual price responses and convergence behavior in experimental markets using buyer posted bid pricing. In their experiments five buyers and five sellers trade for 10 periods under stationary value/cost conditions. Buyers independently post bid prices and sellers respond with individual sales by accepting bids. Then a change is introduced for a new ten period sequence. In the first sequence the sellers are subject to a 50% profit tax such that, at the competitive equilibrium price and volume, the seller's share of total surplus is exactly 50%. In the second stage (10 periods), the profit tax is replaced by a 20% sales tax on each seller's revenue. The effect of this is to raise the previous marginal cost, $MC(q)$, to $1.25*MC(q)$. This raises the competitive equilibrium price, lowers the volume, and increases the seller's share of the total profit with respect to the earlier design. They replicate each of the different information treatment three times with different subjects (90 subjects total):

(1) <u>seller marginal cost information is disclosed to all the subjects</u>: with the sales tax buyers are informed that prices must increase to cover the new seller costs.

(2) <u>seller's share of aggregate profit is disclosed to all the subjects</u>: with profit disclosure buyers are fully informed, compared with the previous ten reference transaction periods, that the change to a sales tax regime has shifted net surplus from buyers to sellers.

(3) <u>no marginal cost or profit information is disclosed</u>.

Information revelation in those treatments corresponds to the KKT conjectures that:

(a) under profit revelation as sellers are only entitled to their previous reference profit it would be 'unfair' for the sellers to profit from the tax and,

(b) with the marginal cost disclosure any price increase would be justified by a unit cost increase. Treatment (1) with no marginal cost or profit disclosure provides experimental control. These experiments generate the following prediction hypotheses (based on KKT and KLS , p. 697).

H1:   price response to changing from an income to a sales tax will be greater under marginal cost disclosure than under profit disclosure.

H2:   faster under marginal cost disclosure.

H3:   slower under profit disclosure.

KLS report statistical support for all three hypothesis.

<div align="center">Extension: Posted Bid vs. Posted Offer</div>

The institution used by KLS is posted bid pricing. They defend this on the ground that as the preliminary interest is to look at fairness perceptions and responses of buyers an institution where buyer responses are directly measurable is suitable (KLS, p. 700).

We examined the robustness of the KLS results using the Posted Offer retail institution (Ketcham, Smith and Williams, 1984). Primarily this is the institution that KKT have in mind in their consumer market examples (although they do discuss implications for labor markets where wage bids are made by the firm). KKT talk of retail incentives to behave fairly (KKT, p.212) if consumer response to 'unfair' pricing would be to switch firms. If the firms anticipate this, they will have an incentive to price fairly. As a result, in the Posted-Offer market institution we can study the tendency of firms to price fairly and of buyers to punish firms that depart from fair pricing.

In our experiments sellers could not see each others prices. This was done so as to reduce seller undercutting and thus separate lower prices due to competition from lower prices due to fairness. This was intended to give the KKT hypothesis its best shot.

Our Experiments:

We used essentially the same parameter configurations and information disclosure treatments as did KLS. Our design differed in the following respects.

1. We used six buyers and sellers rather than five each.

2. Each treatment was replicated four times instead of three times.

3. Our experiment length varied. In stage 1 the control experiment was run for twelve periods while the marginal cost and profit disclosure experiments were run for ten periods each. In stage 2 the profit disclosure experiments were run for twenty periods while the others were run for ten periods each. The longer profit disclosure experiment enables us to determine whether equilibrating tendencies continued after the first ten periods.

4. Between stage 1 and stage 2, KLS scheduled a break allowing buyers and sellers to be separated (ostensibly to pay them privately) and given the required separate instructions for stage 2, sales tax (no disclosure), regime. We simply chose to pass out different instruction forms to buyers than to sellers in the control experiment; since everyone received handouts this disguised the different treatment of sellers. The instructions to buyers informed them that their redemption value in stage 2 were the same as in stage 1, while it explained to the sellers that starting in the next period they would pay a sales rather than a profits tax.

The subjects earned non-trivial amounts of money. Payoffs for the experiments ranged from $8.75 to $62.50.

<div align="center">Hypothesis and Experimental Results</div>

We examine the following hypothesis (see Franciosi, et al., 1995 for formal hypothesis tests):

H1: In stage 2, the first period of trading under the sales tax regime, the KKT fairness argument will yield prices ordered as follows:

Prices (marginal cost disclosure)>Prices (no disclosure)>Prices (profit disclosure).

H2: By period 10, stage 2, the prices under the various treatment conditions will be indistinguishable.

H3: Under the profit disclosure treatment, the two experiments that continue for twenty periods in stage 2 will show convergence to the competitive equilibrium.

<figure-1 here>

Looking at figure 1, it is clear that in stage 2 initially there is a clear separation of mean observed prices in accordance with H1. Under the marginal cost disclosure treatment, plotted in green, the mean price jumps immediately to the competitive equilibrium, while under profit disclosure, plotted in red, the price does not change from its earlier 'reference' transaction level. With no disclosure, plotted in blue, the mean price is above that for profit disclosure, and below the mean for marginal cost disclosure. By period ten mean prices under all three information conditions have converged to near the competitive equilibrium ($2.90). Finally, the two profit disclosure treatments that were run for twenty periods yield mean prices that stabilize near the competitive equilibrium.

It is clear that the profit disclosure treatment has slower price convergence than the other treatments. Further, in the early parts of stage 2, profit disclosure softens the profit seeking behavior of the sellers relative to the other experiments. However, prices under the control and the marginal cost disclosure treatments are indistinguishable after the first three periods in stage 2.

Another consequence of the KKT hypothesis was that buyers, upon seeing unfair prices, may choose punishing strategies. In our experiments this, would be manifest by buyer withholding. Withholding occurs if a buyer fails to purchase a unit of a good that is offered for sale at a price less than the buyer redemption value. The incidence of withholding in the profit disclosure treatment (23 units) was much greater than in the sales tax treatment (4 units), however, 22 of the cases were from one experiment in the profit disclosure treatment! Note that this observed withholding was an uncontrolled treatment variable and that mean prices in the experiment with the high withholding were not higher than in the other experiments with the sales tax. In our experiments withholding did not manifest itself in the form of lower efficiencies as mostly marginal units were withheld.

Discussion

Experimental work such as ours and that of KLS has studied the effect of alternative information disclosures on the prices posted by a seller subsequent to an exogenous shift in seller marginal costs (a sales tax). If buyers will resist any price increase that is not cost justified then, recognizing this, sellers will post lower prices under profit disclosure than under marginal cost disclosure. However, these lower prices need not persist over time if fair prices result in situations of excess demand. That is, equilibrium behavior may allow the establishment of new reference transactions that will prevail in the long run. Our results support this interpretation of fairness. Consequently, the prediction that equilibrium outcomes will reflect the rational behavior of standard economic models is supported. However, the transition path to a new equilibrium is be affected by 'fairness' considerations.

What is Fairness?

In the context in which we study fairness it is clear that self-interested maximizing behavior dominates disequilibrium fair prices in the long run. This implies that fairness considerations do not belong in the utility function as an externality that alters equilibrium behavior in a sustainable way as predicted by the own utility maximizing model.

We suggest that 'fairness' in our context is best characterized as affecting agent expectations and not their utility functions. (Also see Binmore et al., 1992). That is, buyers feel that price increases resulting from cost increases 'should not' produce higher profits for sellers. Sellers, accepting this norm of fair treatment do not, initially, attempt to raise prices and extract higher profit. In the absence of obtaining utility from being 'fair,' over time sellers gradually raise prices and reap higher profits. This adaptation to a higher price takes place due to the competitive behavior of both buyers and sellers. Some buyers realize that there are gains (higher consumer surplus) from trade from buying at slightly higher prices. Sellers on the other hand are able to subsequently charge higher prices as buyers battle for gains in surplus from the marginal units. Thus, what alters over time, and adapts as a social norm, are the expectations of the buyers and sellers as to what is fair. This also explains why fairness dominates the KKT questionnaire response of subjects. Their answers are based upon their expectations, not on the unanticipated adjustments that can occur along a convergence path. This happens because the market participants do not know, and can not anticipate the new equilibrium and its possible effect on what is fair.

Finally, questionnaire data summarizes average and not marginal opinion, while competitive outcomes are driven by marginal analysis. In markets like ours, as was reflected in buyer behavior, the gains from trade on the marginal units determined the eventual transition to

the market equilibrium. Eventually, self maximizing behavior dominates, overcoming the initial

resistance based on what is thought to be fair prices.

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Figure 1: The experiments use 6 buyers and 6 sellers in the posted-offer trading institution. Each of the two treatments, Stage 1 and Stage 2, were replicated 4 times. In stage 1 two control experiments with no cost or profit disclosure, were run for 12 price/purchase periods; the others, marginal cost and profit disclosure, were run for 10 periods. In stage 2 two profit disclosure experiments were run for 20; the others, marginal cost and control, for 10 periods.

In the profit disclosure experiments all subjects were informed about the aggregate profits of the sellers. Further, after the imposition of the sales tax they were informed that sellers' share of total surplus has now increased. In the marginal cost disclosure treatment seller marginal cost was disclosed to all the subjects. In stage 2 buyers were also informed that prices will have to increase to cover the new (increased) seller costs.

In stage 1 Sellers pay a 50% profit tax such that, at the competitive equilibrium they have exactly 50% of the net surplus. In stage 2 Sellers pay a 20% sales tax that raises their marginal cost schedule. The sales tax increases the competitive equilibrium price, lowers the volume and increases the sellers' share of the total profits. In the no disclosure treatment, sellers were informed privately that in stage 2 they will pay a sales tax rather than a profit tax. The buyers were simply informed that their redemption values will stay the same.

Mean prices for no disclosure are plotted in blue, for marginal cost disclosure in green, and for profit disclosure in red. In stage 2, as hypothesized, the mean price is highest under marginal cost disclosure, next highest under no disclosure and lowest under profit disclosure. But over time, we observe convergence to the competitive equilibrium in all treatments, by period 10. Moreover, under profit disclosure the price hovers near the competitive equilibrium in periods 11-20. Conclusion: fairness considerations effect initial prices as expected, but over time prices reflect the underlying supply and demand conditions.

Figure 1