WZB

Wissenschaftszentrum Berlin
für Sozialforschung

Steffen Huck
Gabriele K. Lünser
Jean-Robert Tyran

Price competition and reputation in markets for experience goods: An Experimental Study

Discussion Paper

SP II 2013–312r

September 2013 (revised March 2015)

Research Area
Markets and Choice

Research Unit
Economics of Change

Wissenschaftszentrum Berlin für Sozialforschung gGmbH
Reichpietschufer 50
10785 Berlin
Germany
www.wzb.eu

Affiliation of the authors:

Steffen Huck, WZB and University College London
Jean-Robert Tyran, University of Vienna and University of Copenhagen

Abstract

Price Competition and Reputation in Markets for Experience Goods: An Experimental Study*

We experimentally examine the effects of price competition in markets for experience goods where sellers can build up reputations for quality. We compare price competition to monopolistic markets and markets where prices are exogenously fixed (somewhere between the endogenous oligopoly and monopoly prices). While oligopolies benefit consumers regardless of whether prices are fixed or endogenously chosen, we find that price competition lowers efficiency as consumers pay too little attention to reputation for quality. This provides empirical support to recent models in behavioral industrial organization that assume that consumers may with increasing complexity of the market place focus on selected dimensions of products. We also find that consumers' attention to quality and, hence, provided quality drops when regulated prices are set at levels that are too low.

Keywords: Markets; Price competition; Behavioral IO; Price regulation; Reputation; Trust; Moral hazard; Experience goods

JEL classification: C72, C90, D40, D80, L10

---

* Corresponding author: Steffen Huck, WZB Berlin, Reichpietschufer 50, 10117 Berlin, Germany; steffen.huck@wzb.eu. Huck and Lünser acknowledge financial support from the Economic and Social Research Council (UK) via ELSE and an additional grant on "Trust and competition." Huck is also grateful for additional funding by the Leverhulme Trust. An earlier version of this paper was circulated under the title "Pricing and trust".

1. Introduction

The last decade has seen a flourishing theoretical literature in behavioral industrial organization (for a survey, see Huck and Zhou 2011, for a textbook treatment Spiegler 2011). While this literature has received widespread attention among policymakers, there is still only scant empirical evidence on the interaction between boundedly rational consumer behavior and competition. A notable exception is a recent experimental study by Kalayci and Potters (2011) who examine duopolies where sellers can increase the complexity of their pricing strategies. In line with theoretical predictions, they find that sellers make use of complex pricing and successfully create confusion among consumers, thus, increasing their profits.

Our study adds to this evidence by documenting how consumers who face two dimensions of offers, a seller's reputation for quality and price, start to focus on one of these, price. This mirrors assumptions made in a number of theoretical behavioral industrial organization (IO) papers, notably Spiegler (2006). Consumers' focus on price drives down prices to the Bertrand level but at the same time lowers quality when compared to exogenously fixed prices. As a consequence total welfare is reduced.

We implement our investigation in the context of a market for experience goods. Buyers of an experience good are uncertain about its quality before they buy, but learn (or experience) the good's quality after having bought and consumed it. Experience goods cover the broad middle ground between the extremes of goods involving no quality uncertainty at all (so-called inspection or search goods) and goods for which quality is not fully revealed even after the consumption (credence goods). Whenever contracts for the exchange of a good are incomplete and sellers have leeway to shade its quality about which the consumer finds out only if it is too late, the good in question is an experience good. Hence, many are.

A key role in markets for such goods is assumed by *trust*. Buyers may buy an experience good if they trust sellers to provide high quality, and will abstain if they do not. In other words, trust induces the demand for experience goods. In contrast, lack of trust impedes mutually advantageous transactions and results in low market efficiency.

We experimentally examine the effects of flexible and fixed prices in markets for experience goods. To the best of our knowledge, ours is the first study to investigate the role of price competition and reputations in markets for experience goods. We study two types of markets, monopolies and four-firm oligopolies. In both cases, buyers can observe previous

histories of sellers (their reputations) and the chosen or exogenously set price before they make their decisions.

With flexible prices, we observe low prices and high quality in competitive (oligopolistic) markets and high prices coupled with low quality in non-competitive (monopolistic) markets. We then introduce a regulated intermediate price roughly halfway between the observed oligopoly and monopoly prices. The effect in monopolies is pretty much as standard intuition would predict. As price falls, volume increases and so does the quality of traded goods. Both effects imply a rise in efficiency of around 50%. Surprisingly, the same effects occur when we introduce the regulated intermediate price in oligopolies. In contrast to standard intuition, demand does not fall in reaction to the price increase and quality rises even further, rendering the regulated oligopoly the most efficient market by far.

This counterintuitive effect of price regulation can be explained as follows. Under unregulated Bertrand competition consumers start to ignore reputations and focus on price when choosing a seller. Consequently, prices fall to a very low level where buyers' damage from buying a "lemon" is getting small which adds to consumers' "careless" focus on price. If, on the other hand, higher prices are exogenously imposed, buyers are forced to pay more attention to reputations – after all reputations are now the only attribute that differs between sellers – and buying from a low-quality firm does hurt them now much more substantially. With regulated prices firms lose one of their two "marketing instruments". The only dimension they can now compete on is quality. Thus, there are, both, demand- and supply-induced forces that push up quality. In unregulated oligopolies almost 20% of all traded goods are lemons (despite an accurate eBay-style feedback mechanism that allows all buyers to track the entire history of all sellers). With price regulation the lemon share falls to just 6%. This increase in quality also more than offsets the increase in price such that also the trade volume is higher despite the higher price. [1]

The causal chain in monopolies has only two simple steps. There, a lower regulated price increases demand as textbooks would have it. The increase in demand is such that it becomes more costly for monopolists to lose the trust buyers place in them and, consequently, they supply higher average quality.

---

[1] This complex relation between price, quality and trust is at the core of an interesting book in the management literature (Sako 1992) comparing inter-firm relations in Britain (low price, low trust, low quality) and Japan (high price, high trust, high quality).

In two control treatments we also examine markets where the prices that emerge endogenously under price competition are exogenously enforced. This has a stark effect in monopolies that mirrors findings in the literature on reciprocity. If sellers cannot be blamed for high prices buyers reject offers less often which increases turnover and disciplines sellers. In our oligopoly control treatment (with the regulated price now set at the low level that emerges under competition), market efficiency is similar to the unregulated market despite consumers paying more attention to quality.

Our finding shows how standard textbook intuition about price and demand can go wrong in markets that suffer from informational deficiencies. In the markets we implement, these deficiencies induce moral hazard but a similar mechanism may operate in case of adverse selection. Regulation may directly aim at removing such deficiencies (for example by introducing standardization, certification, or watch dogs) but in many cases such direct regulation may be very costly. Price regulation is much cheaper to implement, administer and enforce than most other alternatives. Yet, as we see here, it can be very effective.

Our study experimentally investigates the relation of trust, competition, and the role of prices. While there is a sizeable literature on trust games investigating how different institutional features (such as feedback or enforcement mechanisms[2]) impact on levels of trust, our previous paper (Huck, Lünser, and Tyran 2012) examines the impact of choice of trading partners on trust in a market for experience goods. The present paper can be seen as introducing the second element of competition into the trust game framework, that of price choice. A close match to our paper is Dulleck, Kerschbamer and Sutter (2011) who have investigated endogenous pricing in markets for credence goods. In such markets consumers cannot be sure what quality they got even after experiencing the product. The focus in Dulleck et al. is somewhat different from ours as they focus on the effectiveness of institutional remedies for market failures such as liability and verifiability.

There is a small experimental literature on price controls in other types of markets. ISAAC and Plott (1981) study double oral auctions and find that the standard partial equilibrium model predicts the effects of price controls remarkably well if the price control (ceiling or floor) is binding. For non-binding controls (which according to the model should be neutral) they do, however, find some unpredicted effects: price ceilings slightly above the competitive equilibrium price lower the actual market price, price floors slightly below the competitive

[2] See, e.g., Keser (2002), Bolton, Katok, and Ockenfels (2004), Bohnet and Huck (2004), Bohnet, Harmgart, Huck, and Tyran (2005) and Fehr and Zehnder (2009).

equilibrium price increase the actual market price. Similar findings are reported by SMITH and Williams (1981) who also study the dynamic response to the removal of price controls, and for posted-offer markets by Coursey and Smith (1983). Dufwenberg, Gneezy, Goeree, and Nagel (2007) report how the introduction of a binding price floor in a Bertrand duopoly, somewhat perversely, decreases actual prices. All of these studies examine, however, markets for inspection goods of known quality such that there are no informational asymmetries that would hinder market performance.

The paper that is perhaps most closely related to ours is Brown, Falk, and Fehr (2004) who study endogenous relational contracts in markets that rely on gift-exchange and, thus, suffer from moral hazard.[3] They observe the endogenous emergence of long-term relations with generous rent sharing and high effort. There are, however, a number of crucial differences between their study and ours. First, in their study prices are always endogenous which prevents them from identifying the separate effects of the two elements of competition, freedom of choice and endogenous prices. Second, there is no random matching benchmark as agents' matching is *always* endogenous. This would correspond to having only oligopoly treatments in our study. Third, agents from both market sides have to form *pairs* which removes an important aspect of competition in many markets, namely competition for market shares.

2. Experimental design, procedures and a little bit of theory

Figure 1 shows the basic game used in all treatments of the experiment, a binary trust game[4] with a price *p*. This game is a stylized representation of a situation in which a buyer has to decide whether or not to buy an experience good of the quality which is chosen by the seller after the buyer's choice. In case the buyer decides not to buy the good (move "X" in Figure 1) we assume that he buys a simple item of known quality (an inspection good) that all sellers carry in their shops, just so that he does not leave empty-handed. This results in payoffs of 20 for the buyer and 15 for the seller. This simply captures the idea that for a seller it is always good to attract a buyer to his shop even if the buyer does not choose the more expensive experience good. As we will see this is particularly important in the competition case where a seller's worst nightmare is an empty store which gives a zero payoff. While the inspection

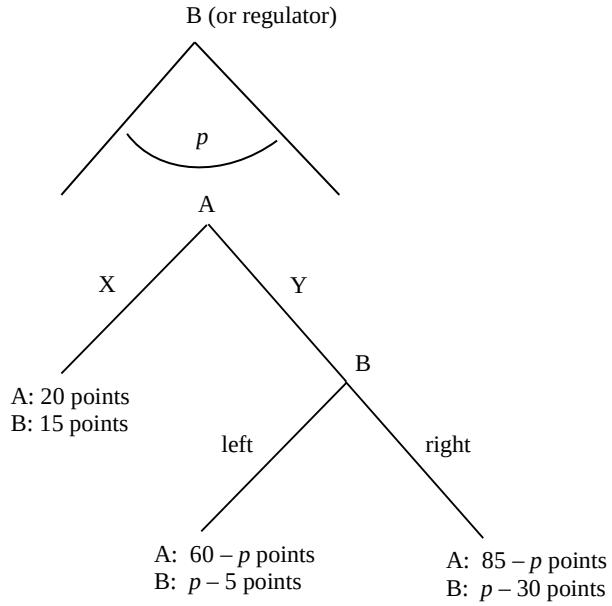
[3] A similar study for search goods can be found in Kirchsteiger, Niederle, and Potters (2005).

[4] Adding the price choice to the binary trust game makes it akin to the "lost wallet game" Dufwenberg and Gneezy (2000). However, the focus of this paper is on measuring beliefs in a non-competitive environment, and is thus rather different from ours.

good provides a low but certain payoff, the payoff from the experience good can be high but is uncertain because it depends on the seller's choice of quality. While we effectively assume that the price of the inspection good is fixed (say, due to perfect competition in that market) the price, *p*, of the experience good is, in principle, flexible but will be regulated in some treatments.

In Figure 1, if the buyer decides to trust the seller (move "Y"), the seller can choose between low quality (move "left") and high quality (move "right"). Delivering low quality is more profitable for the seller (due to lower costs) but harms the buyer. The buyer in fact prefers not to buy the experience good at all over buying a low-quality good as long as the price is not below 40 (which we rule out in our experiment).

Figure 1: A trust game with a variable price *p*



In all our treatments there are four sellers and four buyers who interact over 30 periods. To implement monopolistic markets we randomly assign buyers to sellers. Each buyer is assigned with probability ¼ to each seller which implies that sellers can have multiple (or no) buyers in any given period. In oligopolistic markets buyers choose sellers, knowing each seller's price. In markets with endogenous prices, prices are chosen by sellers at the very beginning of each period. In treatments with a regulated price this price-setting stage is simply omitted.

Table 1: Treatments in the 2x2 design

		partner choice	
		no	*yes*
price choice	*no ($p = 55$)*	*MON-REG*	*OLI-REG*
	yes ($40 \leq p \leq 85$)	*MON-FREE*	*OLI-FREE*

We implement a 2x2 design. Table 1 gives an overview of the treatments. In MON-FREE there is random matching and (monopolistic) sellers freely choose a price from a range between 40 and 85. In OLI-FREE matching is endogenous, i.e., buyers choose sellers once sellers have chosen their prices, again with $40 \leq p \leq 85$. In MON-REG matching is random again but now the price is exogenously fixed to $p = 55$. Finally, in OLI-REG matching is endogenous but the price is again fixed to $p = 55$.

We recruited 288 participants, mostly students from various fields, via the internet.[5] In addition, 144 subjects participated in two control treatments such that we have a grand total of 432 participants. Upon arrival subjects were provided with written instructions and randomly assigned to cubicles in the laboratory.[6] Each subject only participated in one session and we made sure that no subject had participated in other related trust studies. The instructions employed neutral language, avoiding terms like "trust", "trustworthiness", "buyer", "seller" and "price". Buyers and sellers were simply called "A"-participants and "B"-participants, respectively.[7] Decisions were labeled as in Figure 1. In treatments with endogenous price choice "B"-participants decided upon a "number p" at the beginning of each round. Several control questions were included at the end of the instructions to ensure that the participants understood the game. The experiment started after all participants had answered all the control questions correctly and there were no further questions regarding the game. Subjects were randomly and anonymously matched to groups of eight and were randomly assigned one of two roles: four participants took the role of buyers and four participants the role of sellers. Additionally, to identify participants over rounds, buyers and sellers were randomly assigned

---

5 We used Greiner's (2004) ORSEE.

6 A translation of the instructions is given in Appendix A. The original text was written in German and is available from the authors on request. The experimental software was programmed in Fischbacher's (2007) z-Tree and the experiment was run in the experimental laboratory at the University of Erfurt.

7 Using neutral instructions is standard procedure in experimental IO to focus subjects on the actual economic incentives that are implemented and to avoid confounds from any preconceptions on how one ought to behave in certain environments. Economic frames are more commonly used when they help to improve subjects's understanding of the environment, for example, in oligopoly experiments with quantity competition, it is easier to explain profit functions by describing downward sloping demand instead of some abstract functions, see Huck, Normann, and Oechssler (2004).

a number between one and four. The role and the number were communicated to subjects via the first computer screen. Matching groups of eight, roles, as well as assigned numbers stayed constant throughout the entire experiment.

For each treatment we have nine independent matching groups with eight subjects each. Sessions lasted on average between 60 and 90 minutes including instruction time. Participants received a lump sum depending on their role in the experiment.[8] During the experiment payoffs were given in points which in the end were changed into Euro by a previously known exchange rate of 1 point per 0.015 Euro. All subjects were paid anonymously.

As mentioned before, in the FREE treatments sellers chose a price *p* at the beginning of each period. Prices were displayed to all buyers and sellers.[9] Following this, depending on the matching procedure, buyers were either randomly assigned to a seller or chose one. After that they chose between "X" or "Y". Then sellers learned how many buyers were matched with them as well as how many of those also decided to buy the experience good. Note that the outside option of 15 is paid to a seller if he is first matched with a buyer who then decides not to buy the experience good, while the seller's payoff is zero if no buyer is matched with him.[10] Then finally, given a seller had at least one buyer of the experience good, the seller had to decide between "left" and "right" – and this decision determined the quality sold to all his buyers, i.e., sellers could not discriminate between different buyers (who they could not identify anyway).

At the end of each period, buyers who decided to buy the experience good were reminded of the respective price *p* and informed about the choice their seller had made as well as about the resulting payoff. Sellers were simply reminded of their price *p* and of the number of buyers who bought the experience good from them, their own choice and the resulting payoff.[11] The sequence of the game with price competition is displayed in Figure 2; without price competition, of course, the first stage is missing, i.e. sellers did not get to choose the price *p* at the beginning of the game.

---

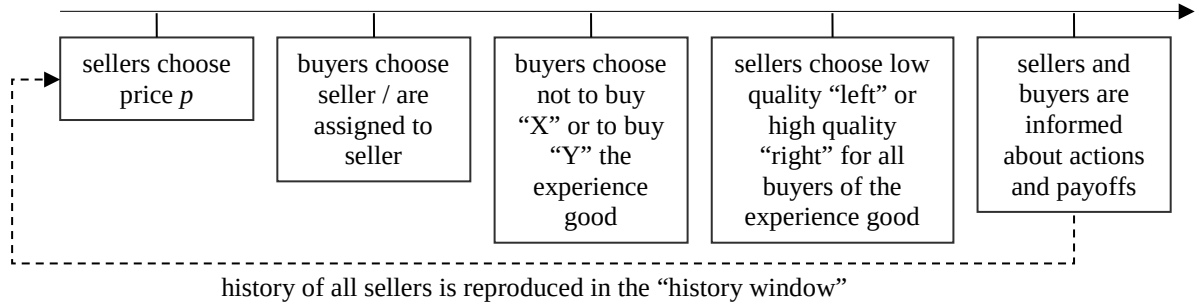
[8] While buyers received 150 points, sellers received 330 points. A higher lump sum fee for sellers was paid in order to provide a suitable payoff for sellers who did not very often interact with buyers.

[9] We kindly asked subjects to note the respective number *p* on a provided blank for all buyers in all rounds.

[10] Remember that even if a buyer might not trust the seller with the experience good, the seller has also an inspection good to sell which the buyer buys.

[11] Note that sellers who interacted with more than one buyer received a payoff from each interaction.

Figure 2: Sequence of the game with price competition



In all treatments the same feedback information is provided: all subjects (buyers and sellers) have access to the entire history of the population game, i.e. there is a "history window" which visualizes past decisions of sellers with respect to quality levels. This simple graphical tool contains four columns of different colored hash (#) signs, each column representing one seller and each row representing one period. Originally, each column consists of thirty *white* hash signs, white representing the not-yet-reached future. Then, following a given color code hash signs changed their color according to what happened in the game: a hash turned *black* if a seller did not have a buyer; a hash turned *red* if a seller had at least one buyer and chose low quality; finally, a hash turned *green* if a seller had at least one buyer and chose high quality.[12] Additionally, in case of the colors red or green, hash signs were followed by a number showing how many buyers had bought the experience good from this seller. A sample screen shot for buyers and sellers respectively is shown in Appendix B.

For the one-shot game, theoretical predictions do not depend on whether or not there is competition. With a fixed price all sellers will choose "left" if the subgame is actually reached. This will be anticipated by buyers who will choose the outside option "X". With a flexible price a monopolist would, of course, try to extract as much rent as possible but he cannot raise the price above 40 without losing the custom of the buyer. The subgame perfect equilibrium prediction is, hence, that the seller will choose $p = 40$, the buyer will choose "Y," and the seller will, finally, pick low quality by playing "left." With Bertrand competition the price would be driven down to $p = 5$ but in order to ensure better comparability between the treatments we cut the possible price range at the monopoly level. This makes also sure that the nature of the subgame, after the price is determined, is identical in all games: With a price (weakly) above 40 the subgame remains a trust game where the buyer has to think about whether or not he really wants to purchase the good. With prices below 40 the nature of the

[12] Of course, our color coding is arbitrary. It serves the purpose of making the complex history window easy to read. Of course, there might have been problems with color-blind subjects but fortunately there were none.

subgame would crucially change since buyers would then prefer to buy the good regardless of its quality. The bottom line is that the theoretical predictions for the one-shot game are identical for both, monopoly and oligopoly. And this is true under both price setting mechanisms. The one-shot theory predicts that it only matters whether the price is exogenous or endogenous – whether there is competition via endogenous matching or not is irrelevant.

In the finitely repeated games that we implement, repetition of the stage-game outcomes remain (subgame perfect) equilibria and in the monopoly version there are no other subgame perfect equilibria. In the oligopoly version, however, other equilibria can arise where some sellers offer high quality in early rounds and are rewarded for that by buyers who pick them rather than others at the end of the game and buy at a price of $p = 40$ (see Dulleck *et al.* 2011, p. 538 for a similar construction).

Of course, these predictions are extremely naïve in that they assume that all subjects are fully rational selfish money maximizers and have common knowledge of this fact. As such they just provide a simple benchmark helping to organize some basic facts. More realistic models would allow for incomplete information and reputation building or for the presence of some behavioral types. In such environments competition would, of course, make a bigger difference as sellers would compete for custom not only via price but also via their reputations (in the REG treatments *only* via their reputations). From this perspective, one would expect competition to matter in the usual way: Since endogenous matching creates incentives for having a good reputation sellers should provide more high quality. This effect should be unambiguous in treatments with fixed prices. Modeling the FREE treatments would be trickier. In essence, sellers with identical reputations would again drive down the price to the bottom. But sellers with better reputations might now not only attract more buyers but could also be able to charge higher prices. In symmetric equilibria this would only be relevant off the equilibrium path but would basically induce even stronger incentives for the provision of high quality.

3. Experimental Results

Aggregate data

Table 2 summarizes the data from our experiment. The upper part of the table reports average posted prices, trust rates (the average share of trade), quality (the average share of high-quality among traded goods) and efficiency (the average share of buyer-seller pairings that resulted in high quality trade).[13] The lower part of the table reports tests for significance of price regulation and competition. These MWU tests use market-level averages over 30 periods (i.e. 9 observations per treatment) as a unit of observation.

Notice first the highly significant and substantial effect of endogenous matching. Both oligopoly treatments vastly outperform the monopolies, roughly tripling efficiency rates. This boost is driven by, both, higher average quantity and quality. In addition, average prices are much lower with competition (47.06) than without (59.60).

Table 2: Aggregated results and treatment effects

	Price	Trust / Quantity	Quality[14]	Efficiency
MON-FREE	59.60 (2.50)	0.36 (0.19)	0.60 (0.27)	0.22 (0.20)
MON-REG	55.00 [n.a.]	0.51 (0.16)	0.73 (0.16)	0.37 (0.19)
OLI-FREE	47.06 (5.99)	0.85 (0.16)	0.80 (0.23)	0.68 (0.26)
OLI-REG	55.00 [n.a.]	0.90 (0.07)	0.94 (0.03)	0.85 (0.07)
		effect of price regulation		
MON-FREE – MON-REG	*n.a.*	$p = 0.039$	$p = 0.081$	$p = 0.047$
OLI-FREE – OLI-REG	*n.a.*	$p = 0.423$	$p = 0.031$	$p = 0.083$
		effect of competition		
OLI-REG – MON-REG	*n.a.*	$p = 0.000$	$p = 0.000$	$p = 0.000$
OLI-FREE – MON-FREE	$p = 0.000$	$p = 0.000$	$p = 0.016$	$p = 0.001$

Standard deviations are given in parentheses. Treatment effects are tested by one-tailed Mann-Whitney U-tests.

[13] Note that, as long as the buyer trusts, the sum of payoffs is maximal. Only the distribution of payoffs depends on the sellers' quality choice. But, crucially, the outcome after (Y, left) is not *individually rational* as the buyer would prefer X. Hence, we shall in what follows refer to (Y, right), the outcome with successful trade, as "the efficient outcome" (short for "the individually rational efficient outcome").

[14] The reported quality corrects for the number of interactions a seller had in a period. Thus, if a seller had $n \leq 4$ buyers his quality choice enters the average *n*-times. If one considers each seller's decision only once following average qualities are obtained: MON-FREE 0.58, MON-REG 0.73, OLI-FREE 0.78, and OLI-REG 0.94.

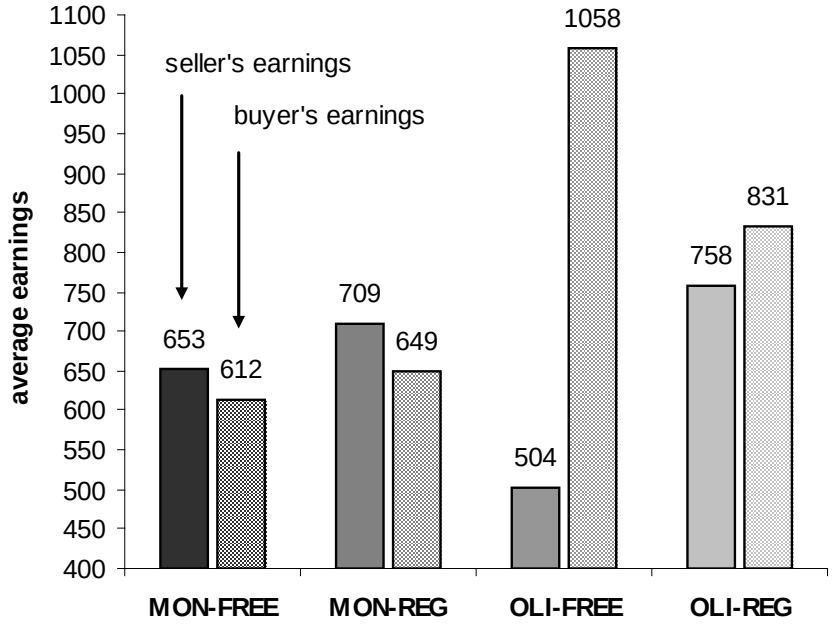
Similarly clear effects are observed with respect to regulation. In both market forms price regulation improves market performance. In MON, price regulation boosts trust from 36% to 51%, quality from 60% to 73% and efficiency from 22% to 37%. In OLI, a similar picture arises. Trust increases from 85% to 90%, quality from 80% to 94%, and efficiency from 68% to 85%. As can be seen in the bottom part of the table, all these effects are statistically significant with the exception of the demand effect in the oligopoly treatments.

These unambiguous results are surprising. In one case, we observe that a lower price improves market performance, in the other that a higher price also improves performance. Taken together this suggests a non-monotonic relation between prices and efficiency in markets for experience goods. With very low prices markets suffer because neither are consumers particularly careful when selecting a good, nor are there good incentives for firms to provide high quality: both, because consumers are less discerning *and* because the profit margin of high-quality goods becomes too small. On the other hand, with very high prices demand drops to such low levels that the incentives for reputation building are severely reduced. Thus, market efficiency is maximal with a regulated intermediate price that is high enough to ensure that high-quality products are profitable but at the same time not too high in order to keep demand at levels where the incentives for high quality provision and reputation building are maintained.

How do all these effects translate into payoffs for buyers and sellers? Figure 3 shows buyers' and sellers' earnings averaged over all periods in the four treatments. In line with standard intuition, forcing up prices by regulation in a competitive market harms buyers (their average incomes fall by 21%, from 1058 to 831), but benefits sellers (their average incomes increase by 50%, from 504 to 758). In contrast, forcing prices down by regulation benefits both buyers and sellers in non-competitive markets (MON). Buyer incomes increase by 6%, and, surprisingly, seller incomes also increase by 9%.[15] Figure 7 also shows that, quite remarkably, the regulated oligopoly is the most profitable market institution for sellers, while it is, of course less surprising that Bertrand competition is best for buyers.

[15] The increase for buyers and sellers is, however, not significant in a monopolistic market (Mann-Whitney U-tests: for buyers 0.340 and for sellers 0.113, two-tailed). The change in buyer and seller payoffs in an oligopolistic market, on the other hand, is (Mann-Whitney U-tests: for buyers 0.001 and sellers 0.002, two-tailed).

Figure 3: Average earnings over all periods



Market measures over time

Figures 4a and 5 to 7 show how the measures of Table 2 behave over time. Additionally, Figure 4b shows the distribution of posted prices in treatments with FREE price choice.

Figure 4a shows posted prices averaged over all 9 markets in the two treatments with FREE price choice along with the regulated price of 55 as a benchmark. Competition unfolds its effect in OLI-FREE only over time. Over the first 12 periods, posted prices continuously fall from 57.67 to around 45, and then remain close to this value for the rest of the periods. While prices start out at the same level in MON-FREE as in OLI-FREE, they remain at high levels. The average price in MON-FREE is 59.60 and in OLI-FREE it is 47.06 over all periods. Therefore, the regulated price is about 8% below the average posted price in MON-FREE, and about 22% above the convergence price of 45 in OLI-FREE.

Figure 4a: Average posted price in treatments with FREE prices

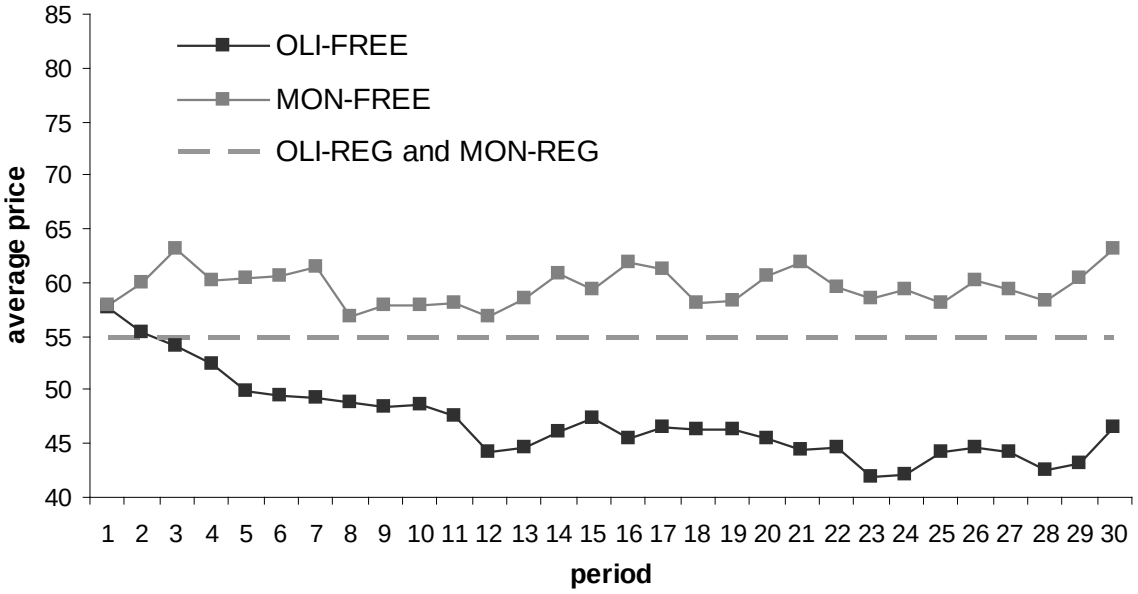
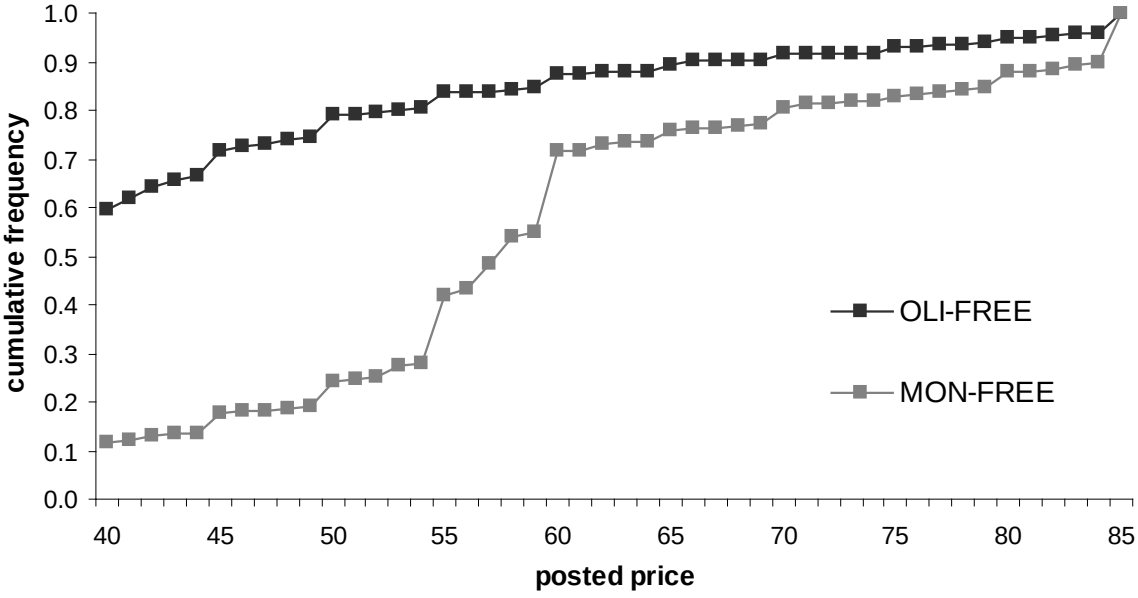


Figure 4b: Cumulative distribution of posted prices in treatments with FREE prices



On average, buyers were more likely to buy from sellers who posted low prices in both treatments with FREE prices. In fact, the average transaction price was 54.18 in MON-FREE and 42.85 in OLI-FREE over all periods. In the second half of the game, the average transaction price in OLI-FREE falls to 40.76 with a small standard deviation of 1.35. This illustrates how intense price competition was in OLI-FREE.

Evidence of the intensity of price competition in OLI-FREE also comes from a comparison of the cumulative distribution of posted prices with MON-FREE (see Figure 4b). For example, 66.57% of all posted prices are below 45 in OLI-FREE, but only 13.61% are in MON-FREE. Prices in MON-FREE are highly concentrated between 54 and 60 (more than 40% of all prices), while only few sellers (about 7%) choose prices in this range in OLI-FREE.

Figure 5: Average trust rates (average quantity) over time

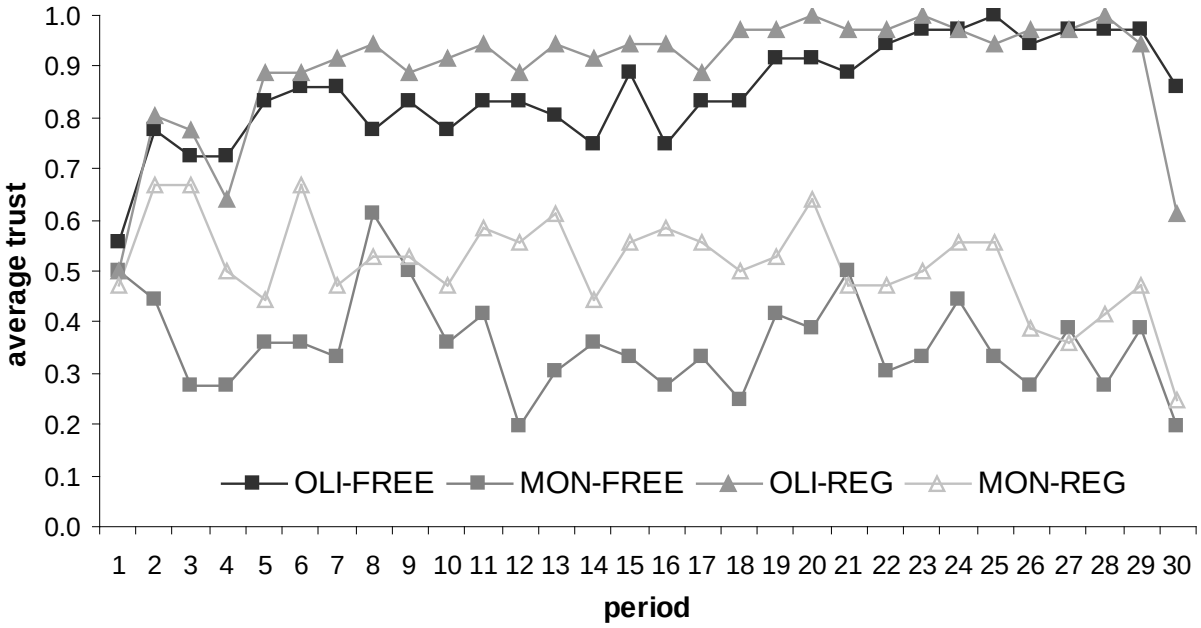


Figure 5 shows that trust rates (i.e. the average share of experience goods traded) start out at similar levels of around 50% in all treatments. While, as with prices, there are no initial differences between the treatments already after 5 periods, demand is clearly higher in the treatments where sellers compete for the business of buyers (i.e. in OLI) than in those without competition, and the difference becomes more pronounced over time. In the two treatments with oligopolistic competition, trust rates approach 100% in the last third of the experiment while they hover around 30-40% in treatments without competition. Clearly, competition via reputation induces trust in the sellers.

***Figure 6*:** Average quality over time

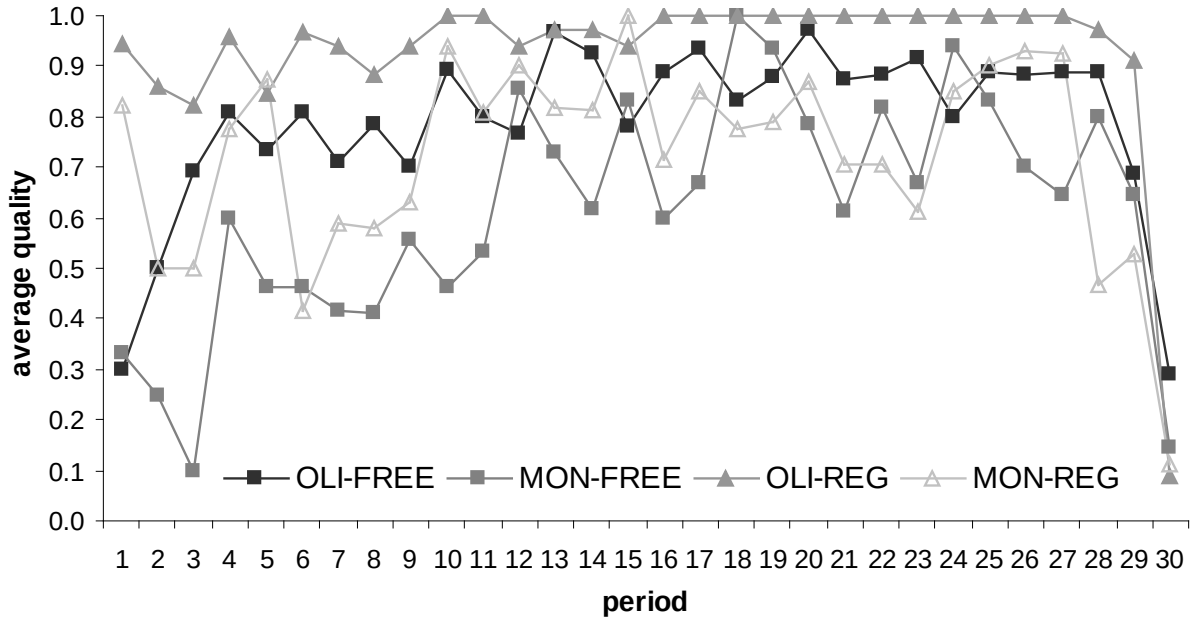


Figure 6 plots average quality over time. In contrast to what we have seen with regard to prices and demand, there are huge initial differences between treatments. Both treatments with regulation exhibit far higher initial quality than the unregulated treatments (despite similar initial prices). How can this difference be explained? We conjecture that having just one "marketing instrument", namely quality, makes firms much more aware of its importance. Perhaps sellers in the unregulated treatments believe that they can always compensate for a damaged reputation by lowering prices later on (which is, of course, true as in particular the unregulated oligopoly treatment shows where prices fall to very low levels). Average quality increases in all markets over time and is higher in the second half of the experiment (up to period 28) than in the first half.[16] Apparently, it takes some time for sellers to understand the value of a good reputation.[17] Yet, treatment effects on the levels of quality are substantial even if we average over all 30 periods (see Table 2). The most stable treatment is OLI-REG. Remarkably the nine regulated oligopolies have average qualities of exactly 100% over almost all periods in the second half of the experiment.

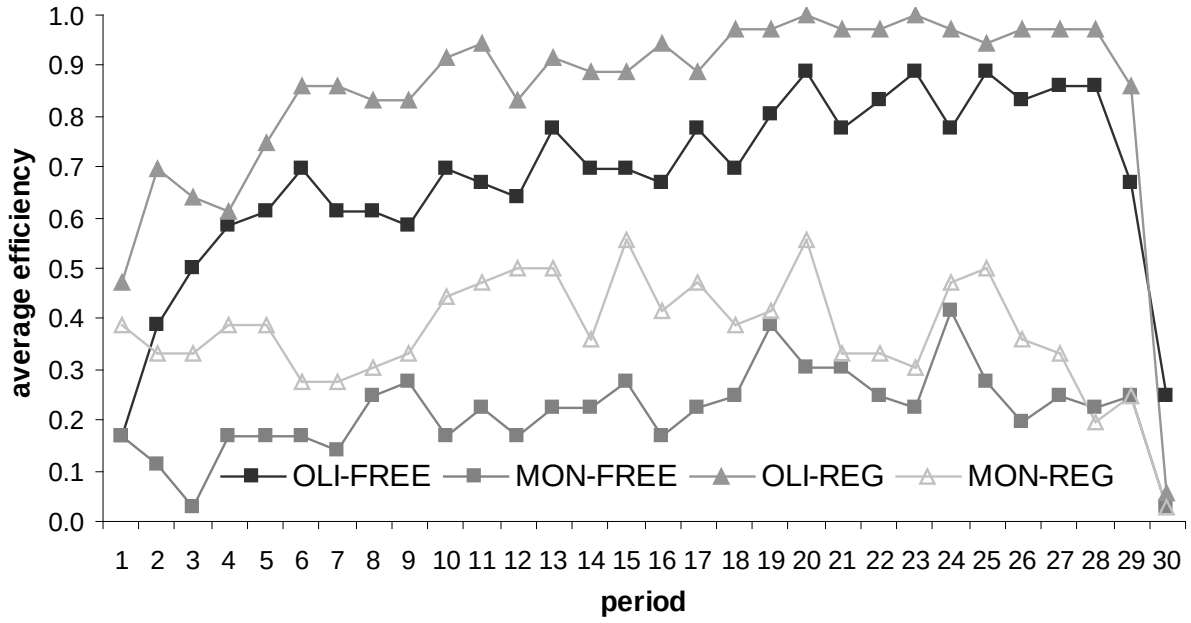
End-game effects are pronounced in all treatments which is in line with previous findings in finitely repeated games. The significance of these end-game effects is twofold. First, we see

[16] In OLI-REG the average quality for periods 1-15 is 0.75 and rises to 1.00 for periods 16-28. The respective values for the other treatments are: MON-FREE 0.49 / 0.77; MON-REG 0.72 / 0.78 and OLI-FREE 0.75 / 0.89.

[17] Bohnet, Harmgart, Huck, and Tyran (2005) show that many traders who initially do not understand the mechanics of reputation building benefit from observing others who do.

that markets do not make people more trustworthy or more trusting in general. Competition simply induces incentives for strategic behavior.[18] Second, the end-game effect illustrates that participants do have a proper understanding of the strategic nature of the stage game. Sellers simply stop providing high quality when it ceases to have a beneficial effect on their reputation. Remarkably, this only happens in the very last (and to some extent in the next-to-last) period.

Figure 7: Average efficiency over time



Finally, Figure 7 shows the compound effects of demand and quality on market efficiency over time. There is a clear and consistent ranking of average market efficiency in the four treatments. Competitive markets outperform monopolies and price regulation improves efficiency in both types of markets for experience goods.

Understanding the benefits of price regulation

The most striking finding in our experiment is the detrimental effect of price competition. Price competition is fierce in OLI-FREE and quality is significantly lower in OLI-FREE than in OLI-REG. We have discussed the consequences of this price differential before. With very low prices consumers are less sensitive to reputations and for firms the profit margin of high-

[18] Bohnet, Frey, and Huck (2001) report data from a finite-horizon trust experiment where trustworthiness reaches its maximum in the very last period. A conjecture is that this is driven by the public *aggregate* feedback they provide.

quality goods becomes dangerously low. But why is price competition so fierce in OLI-FREE? In other words, why is there not more competition via quality? The reason is that sellers had no other choice than cutting their prices to the bottom. When sellers compete both via prices and via reputations, buyers start to pay more attention to prices than to reputations. Buyers are apparently reluctant to trade-off higher prices against higher reputations.

From whom did buyers buy? The answer is simple: from the firm with the lowest price. This holds in 85.34% of all purchases in OLI-FREE, while only 57.55% of all goods were bought from the seller with the best reputation.[19] (As the numbers indicate, it happened quite often that the seller with the lowest price also had the best reputation, namely in 65.46% of all cases in which buyers bought the cheapest good.)

Buyers' obsession with low prices forces sellers to engage in cut-throat Bertrand competition. While sellers could reap some price premium of higher quality in MON, this was not the case in OLI. For example, in MON, sellers who provided high quality charged prices of 55.35 on average, while sellers who sold low quality could only charge a price of 52.55. In contrast, the high-quality sellers in OLI charged lower prices (42.42) than the low-quality sellers (44.35).

Fierce price competition in OLI-FREE is not only explained by the sale of relatively unprofitable experience goods (recall from Figure 1 that at the convergence price of 45, selling a high-quality experience goods only yields a profit of 15). Posting low prices was attractive for sellers in OLI-FREE because it also helped to attract non-trusting buyers who instead of choosing a good of unknown quality preferred to buy the low-value inspection good. The profit from these buyers is also 15 (see Figure 1). Hence, at prices of 45 which are typical in much of OLI-FREE, a seller is indifferent between selling a high-quality experience good or an inspection good. In fact, we find that even buyers who decide not to buy the experience good typically buy the inspection good from the seller who posts the lowest price. It appears, thus, that buyers like the idea of fierce price competition as such. Perhaps they want to reward low-price sellers hoping that one day these sellers will also offer high quality (which would be along the alternative equilibrium prediction). Alas, this hope is in vain. Of course, all this happens in an environment where average quality is with 80% pretty high. Yet, for the 20% disappointments buyers have to endure, they have nobody to blame but their own carelessness.

---

[19] For our purpose, we define the seller who most frequently choose high quality for the experience good as the seller with the best reputation. Of course, one can think of several ways to match this characteristic.

4. Two control treatments

Our above analysis shows the superiority of intermediate fixed prices compared to treatments with endogenous price choice that in monopolies generate higher and in oligopolies lower prices. For a better understanding of the pure effect of price regulation we are missing though two counterfactuals. How would markets develop with fixed prices that are identical to those that emerge endogenously?

It is, of course, one of the advantages of experimental industrial organization (IO) that we can create these counterfactuals and this is what we do: we simply run two additional treatments, OLI-REG 45 and MON-REG 60 with 9 markets each. The two control conditions are identical to the earlier treatments with fixed price but replace the intermediate price of 55 with the average prices that we observe in OLI-FREE and MON-FREE.

Table 3 shows summary statistics for these two new treatments, repeating those from Table 2 for ease of comparison. The bottom half of the table contains significance levels for the relevant new treatment comparisons, that is, on the one hand comparisons of treatments with identical prices that either endogenously emerge or are exogenously fixed and on the other comparisons of different regulated price levels.

Let us first turn to the monopoly results. In MON-REG 60 we observe an average trust rate of 57% up from 36% in MON-FREE and average quality of 78% up from 60%. Both differences are highly significant ($p = 0.01$ and $p = 0.02$ respectively). Given the literature's robust findings on reciprocity, these results are unsurprising. As high prices that generate unequal divisions of the surplus are no longer attributed to the sellers' ill-will buyers reject offers less often.[20] Consequently, monopolistic sellers have now more to lose from providing low quality. Increased turnover disciplines sellers and enhances their average profits which go up from 21.8 per round in MON-FREE to 26.6 in MON-REG 60 which is highly significant ($p = 0.003$). Of course, the question arises whether monopolists in MON-FREE could have made more money had they chosen lower prices. This is a counterfactual question that we cannot fully answer as it remains unclear how buyers would have behaved had monopolists chosen the intermediate price on their own. Given the overall flatness in monopolists' profits across treatments it remains, however, doubtful that they could have done much better.

[20] For early evidence on the role of reciprocity in bargaining games, see Blount (1995).

Table 3: The control treatments in comparison

	Price	Trust / Quantity	Quality[21]	Efficiency
MON-FREE	59.60 (2.50)	0.36 (0.19)	0.60 (0.27)	0.22 (0.20)
MON-REG	55.00 [n.a.]	0.51 (0.16)	0.73 (0.16)	0.37 (0.19)
MON-REG 60	60.00 [n.a.]	0.57 (0.16)	0.78 (0.15)	0.45 (0.20)
OLI-FREE	47.06 (5.99)	0.85 (0.16)	0.80 (0.23)	0.68 (0.26)
OLI-REG	55.00 [n.a.]	0.90 (0.07)	0.94 (0.03)	0.85 (0.07)
OLI-REG 45	45.00 [n.a.]	0.91 (0.08)	0.76 (0.18)	0.69 (0.21)
	effect of endogenous vs exogenous prices			
MON-FREE – MON-REG 60	*n.a.*	$p = 0.011$	$p = 0.020$	$p = 0.017$
OLI-FREE – OLI-REG 45	*n.a.*	$p = 0.251$	$p = 0.333$	$p = 0.423$
	effect of different regulated price levels			
MON-REG – MON-REG 60	*n.a.*	$p = 0.248$	$p = 0.248$	$p = 0.285$
OLI-REG – OLI-REG 45	*n.a.*	$p = 0.424$	$p = 0.004$	$p = 0.031$

Standard deviations are given in parentheses. Treatment effects are tested by one-tailed Mann-Whitney U-tests.

Comparing the two different regulatory regimes, MON-REG and MON-REG 60 we do not find significant effects on traded quantity and/or quality and, consequently, there are no significant changes to efficiency either.

In contrast to the stark effect of making the endogenous monopoly price exogenous, we observe little change when we compare OLI-FREE to OLI-REG 45. With a regulated price of 45, both key measures, trust and quality, remain virtually unchanged when compared to the environment with price choice. While average trust increases from 85% to 91%, average quality falls from 80% to 76%. Both differences are not anywhere near statistical significance. Efficiency remains virtually unchanged.

Comparing the new OLI-REG 45 to the earlier OLI-REG with a price of 55 the benefits of a higher exogenously fixed price become apparent. While OLI-REG had an average quality

[21] The reported quality corrects for the number of interactions a seller had in a period. Thus, if a seller had $n \leq 4$ buyers his quality choice enters the average *n*-times. If one considers each seller's decision only once following average qualities are obtained: MON-FREE 0.58, MON-REG 0.73, OLI-FREE 0.78, and OLI-REG 0.94.

of 94% and 85% efficiency, these numbers fall dramatically to said 76% quality and 69% efficiency.

In line with our conjecture that buyers might focus more on reputations when reputations are the only variable relevant to them, we also observe a significant change in buyers' choice behavior. Specifically, we construct a measure of *reputation ignorance* for buyers in oligopolies. For each choice of a seller, we take the absolute difference between the chosen seller's average past quality and the highest average past quality of all sellers the buyer could have chosen from. We then average these differences across periods, buyers und sessions. For OLI-FREE we obtain an average reputation ignorance of .23, that is, the past quality of the chosen seller is 23 percentage points lower than that of the seller with the highest past quality. For OLI-REG 45 we obtain .17 and for OLI-REG we obtain .11. All these differences are statistically significant, (one-sided $p = 0.04$ for OLI-REG vs OLI-REG 45, $p = 0.10$ for OLI-REG 45 vs OLI-FREE, and $p = 0.004$ for OLI-REG vs OLI-FREE).

In other words, consumers pay more attention to reputations (a) if there is nothing else to look at and (b) if there is more to lose. Both these findings square well with approaches in the recent theoretical literature on bounded rationality and industrial organization.

5. Conclusion

Competition has generally two elements: choice of trading partners and choice of price. In this paper we show that while the former is unambiguously good, the latter can be problematic in markets that suffer from informational deficiencies. In particular, we show that in markets with experience goods (suffering from moral hazard) regulated fixed prices can outperform endogenous prices in both, monopolistic *and* oligopolistic markets. This is surprising but has, as we argued above, an intuitive reason that has been advocated in the theoretical behavioral industrial organization (IO) literature. Once there are multiple attributes of a product, consumers might simply base their decisions on one of them (as, for example, in Spiegler 2006). In our case, buyers tend to focus on price when sellers have two attributes (their chosen price and the past quality they offered) and this renders price competition so fierce that sellers' incentives to build up pristine reputations are diminished, simply because profits from

high-quality goods become too small.[22] In other words, if consumers do not reward high quality with a willingness to pay higher prices, they should not be surprised if quality is less than perfect. In addition, we find that the attention that consumers pay to reputation is also a function of how much they have to lose. As regulated prices fall, consumers become less choosy and quality also drops.

The dynamics that we observe in unregulated oligopoly is reminiscent of other "race to the bottom" phenomena, for example, in competition between countries for mobile foreign business. It has been argued that regulation in the guise of international standards is required to prevent inefficient cut-throat competition in a particularly salient dimension. Examples are labor safety standards in the textile industry or environmental regulation for pollution-intensive industries. A case has also been made for tax "harmonization" in corporate taxation. However, providing compelling evidence on the causal drivers of the race to the bottom is fraught with difficulties (see e.g. Davies and Vadlamannati 2013 labor safety standards, Leibrecht and Hochgatterer 2012 for a survey of the empirical literature on corporate taxation).

An industry in which similar mechanisms might apply is the passenger airline industry. Before the US Airline Deregulation Act in 1978, airlines competed only via quality for customers also on short hauls. After deregulation, customers focused mainly on price, forcing airlines to engage in cut-throat competition. Robert Crandall, a former chairman of American Airlines and thus not entirely impartial observer noted (McGee 2008): "The consequences of deregulation have been very adverse. Our airlines, once world leaders, are now laggards in every category, including fleet age, service quality and international reputation. Fewer and fewer flights are on time … bags are lost or misplaced … passenger complaints have skyrocketed. Airline service, by any standard, has become unacceptable. … Three decades of deregulation have demonstrated … that market forces alone cannot and will not produce a satisfactory airline industry … Modest price regulation … would have a dramatic and favorable impact on the financial health of our airlines, the usefulness of our airline system, service levels in the airline business and the welfare of airline employees."

Of course, the fact remains that consumers are best off when prices are low (be it through competition or regulation) and antitrust policy tends to focus more often than not on consumer

[22] Kranton (2003) studies a related theoretical model with price competition for experience goods where high-quality equilibria may fail to exist because prices that could sustain high-quality production would be undercut.

welfare rather than total welfare which has also been normatively justified by some authors (see, for example, Salop 2009). There are two important remarks to be made in this context. First, our main goal is simply to provide evidence of the potentially adverse effects of low prices, and our finding strikes us as noteworthy. Second, in our setup consumers are homogenous, they all value quality equally. In the presence of heterogeneity, the focus of some consumers on price alone could trigger adverse effects for other consumers for whom quality is more important and this could potentially change the impact of low prices on aggregate consumer welfare.[23] We should also note that in our experiment, in line with industry standards in experimental IO, quality is directly translated into monetary payoff. In an experiment with real goods, quality might not only be more salient, it would also naturally generate heterogeneity. Exploring such a "real good" environment might be promising for future research.[24]

Anecdotally, our finding seems to resemble a string of recent scandals in the German meat market that was plagued by huge amounts of extremely low-quality meat (well past its sell-by date, in fact, in some cases biologically hazardous). An interesting discussion ensued with two main lines of arguments: calls for more regulation were as abundant as fierce criticism of German consumers' obsession with everything that is cheap. (In particular, when it comes to non-durables Germans tend to have a low willingness to pay. For food, for example, they spend, in relative terms, only around three quarters of what Italian consumers spend, see Seale, Regmi, and Bernstein 2003.) In the context of our stylized study both arguments appear to be valid. Clearly, we find that it is consumers' choice behavior that diminishes sellers' incentives to provide high quality. Yet, regulation can also overcome the problem.

One of the most intriguing aspects of our findings is that regulation concerned with quality needs not target quality. Of course, quality regulation constitutes one way to improve market outcomes but it is notoriously complicated and costly. Again, this is anecdotally reflected in the example of the German meat market where quality controls differ hugely between different states and there is no sign of reaching a consensus on how monitoring

---

[23] For a recent behavioral IO model that shows how inattentive consumers can generate negative externalities for fully rational consumers, see Zhou (2008).

[24] Notice though that the implementation of such an experiment that parallels our design with real goods would come with several challenges. Buyers would have to be able to consume the product or, at least, find out about its quality reasonably fast in order to enable a sufficient number of rounds. Moreover, marginal utility from consumption should be approximately linear in order to make later rounds comparable to earlier ones. For a recent study on behavioral biases in one-shot consumer choice that does examine real goods (chocolate bars in this case), see Wenner (2014).

should be improved. Our study suggests that there might be an inexpensive yet very efficient short-cut: price regulation. The caveat is, of course, that the regulated price has to be chosen carefully. Our experiments show that the regulated price has to be sufficiently high as with higher enforced prices consumers become more careful in choosing sellers. They pay more attention to reputations and, consequently, sellers face much steeper incentives to provide high quality.

Closer to orthodox beliefs are our findings on the first aspect of competition, endogenous choice of trading partners. In our earlier paper (Huck, Lünser, and Tyran 2012) we have shown that such choice on its own can improve market outcomes enormously. In that study we show that these improvements occur under different feedback institutions. In particular, the study shows that for choice to work it is not necessary that consumers have access to full feedback, i.e., to the entire history of all sellers. Rather, it is sufficient that buyers simply remember their own experience with sellers. That is, as long as sellers are not perfectly anonymous and are identified via labels, endogenous choice of trading partners is shown to have substantial positive effects.[25] From the perspective of this earlier paper, the current one establishes that the same beneficial effects of choice hold in the presence of the second element of competition: endogenously chosen prices.

[25] It is worth noting that this result hinges on the nature of the good. As Dulleck, Kerschbamer, and Sutter (2011) show markets for credence goods do not only benefit much less from reputation building but also have less clear-cut effects of competition. See their conclusions, for a more detailed comparison.

References

BLOUNT, S. "When Social Outcomes Aren't Fair: The Effect of Causal Attributions on Preferences." *Organizational Behavior and Human Decision Processes,* Vol. 63(2) (1995), pp. 131–144.

BOHNET, I., FREY, B.S. AND HUCK, S. "More Order with Less Law: On Contract Enforcement, Trust, and Crowding." *American Political Science Review*, Vol. 95(1) (2001), pp. 131–144.

BOHNET, I., HARMGART, H., HUCK, S. AND TYRAN, J.-R. "Learning Trust." *Journal of the European Economic Association*, Vol. 3(3) (2005), pp. 322–329.

BOHNET, I. AND HUCK, S. "Repetition and Reputation: Implications for Trust and Trustworthiness When Institutions Change." *American Economic Review*, Vol. 94(2) (2004), pp. 362–366.

BOLTON, G., KATOK, E., AND OCKENFELS, A. "How Effective are Electronic Reputation Mechanisms? An Experimental Investigation." *Management Science*, Vol. 50(11) (2004), pp. 1587–1602.

BROWN, M., FALK, A. AND FEHR, E. "Relational Contracts and the Nature of Market Interactions." *Econometrica,* Vol. 72 (2004), pp. 747–780.

COURSEY, D.L. AND SMITH, V.L. "Price Controls in a Posted Offer Market." *American Economic Review*, Vol. 73(1) (1983), pp. 218–221.

DAVIES, R.B. AND VADLAMANNATI, K.C. "A Race to the Bottom in Labour Standards? An Empirical Investigation." *Journal of Development Economics*, Vol. 103 (2013), pp. 1-14.

DUFWENBERG, M. AND GNEEZY, U. "Measuring Beliefs in an Experimental Lost Wallet Game." *Games and Economic Behavior*, Vol. 30 (2000), pp. 163–182.

DUFWENBERG, M., GNEEZY, U., GOEREE, J.K. AND NAGEL, R. "Price Floors and Competition." *Economic Theory*, Vol. 33 (2007), pp. 211–224.

DULLECK, U., KERSCHBAMER, R. AND SUTTER, M. "The Economics of Credence Goods: An Experiment on the Role of Liability, Verifiability, Reputation, and Competition." *American Economic Review*, Vol. 101(2) (2011), pp. 526–555.

FEHR, E. AND ZEHNDER, C. "Reputation and Credit Market Formation: How Relational Incentives and Legal Contract Enforcement Interact." Working Paper, University of Lausanne, 2009.

FISCHBACHER, U. "z-Tree: Zurich Toolbox for Readymade Economic Experiments." *Experimental Economics*, Vol. 10(2) (2007), pp. 171–178.

GREINER, B. "The Online Recruitment System ORSEE 2.0 – A Guide for the Organization of Experiments in Economics." Working Paper Series in Economics 10, University of Cologne, 2004.

HUCK, S., LÜNSER, G.K. AND TYRAN, J.-R. "Competition Fosters Trust." *Games and Economic Behavior*, Vol. 76 (2012), pp. 195–209.

HUCK, S., NORMANN, H.-T., AND OECHSSLER, J. "When Two are Few and Four are Many: Number Effects in Experimental Oligopolies." *Journal of Economic Behavior & Organization*, Vol. 53(4) (2004), pp. 435–446.

HUCK, S. and ZHOU, J. "Consumer Behavioural Biases in Competition: A Survey." *OFT Report* No. 1324, 2011.

ISAAC, R.M. AND PLOTT, C.R. "Price Controls and the Behavior of Auction Markets: An Experimental Examination." *American Economic Review*, Vol. 71(3) (1981), pp. 448–459.

KALAYCI, K. AND POTTERS, J. "Buyer Confusion and Market Prices." *International Journal of Industrial Organization*, Vol. 29 (2011), pp. 14–22.

KESER, C. "Trust and Reputation Building in E-Commerce." CIRANO Working Paper 2002s–75, 2002.

KIRCHSTEIGER, G., NIEDERLE, M. AND POTTERS, J. "Endogenizing Market Institutions: An Experimental Approach." *European Economic Review*, Vol. 49 (2005), pp. 1827–1853.

KRANTON, R. "Competition and the Incentive to Produce High Quality." *Economica*, Vol. 70, (2003), pp. 385–404.

LEIBRECHT, M. AND HOCHGATTERER, C. "Tax Competition as a Cause of Falling Corporate Income Tax Rates: A Survey of Empirical Literature" *Journal of Economic Surveys*, Vol. 26(4) (2012), pp. 616-648.

MCGEE, B. "Why Airline Reregulation is no Longer Taboo." *USA Today*, 9/2/2008.

SAKO, M. *Price, Quality and Trust: Inter-firm Relations in Britain and Japan*. Cambridge University Press, Cambridge, 1992.

SALOP, S.C. "Question: What is the Real and Proper Antitrust Welfare Standard? Answer: The true Consumer Welfare Standard." *Loyola Consumer Law Review*, Vol. 22(3) (2010), pp. 336–353.

SEALE, J., REGMI, A. AND BERNSTEIN, J. "International Evidence on Food Consumption Patterns." *Technical Bulletin Number 1904*, Electronic Report from the Economic Research Service, United States Department of Agriculture, 2003.

SMITH, V.L. AND WILLIAMS, A.W. "On Nonbinding Price Controls in a Competitive Market." *American Economic Review*, Vol. 71(3) (1981), pp. 467–474.

SPIEGLER, R. "Competition over Agents with Boundedly Rational Expectations." *Theoretical Economics*, Vol. 1 (2006), pp. 207–231.

SPIEGLER, R. *Bounded Rationality and Industrial Organization*, Oxford: OUP, 2011.

WENNER, L. "Expected Prices as Reference Points: Theory and Experiments." mimeo, 2014.

ZHOU, J. "Advertising, Misperceived Preferences, and Product Design." mimeo, 2008.

Appendix A: Instructions (Treatment OLI-FREE)

(Original instructions were in German. They are available from the authors upon request. In treatments without choice of sellers A-participants were randomly assigned to one of the four B-participants. In the ones without price choice, i.e. with a regulated price, B-participants didn't have to choose a number p. There, the figure in the instructions already displayed the unambiguous resulting payoffs.)

Welcome to the experiment!

Please read these instructions carefully! Do not speak to your neighbors and keep quiet during the entire experiment! In case you have a question raise your hand! We will then come to you.

At the beginning of the experiment you are randomly separated into **subpopulations of 8 participants**. During the experiment you solely interact with the participants of your subpopulation.

In this experiment you will repeatedly make decisions. Doing this you can earn points. Your total sum of points plus a show-up fee, which is dependent on your role in the experiment, will be converted into Euros at the end of the experiment and paid to you in cash. The show-up fee amounts to 150 points for A-participants and 330 points for B-participants. Following rule applies to the conversion of points into Euros:

1 point = 0.015 €

How much you earn depends on your decisions and on the decisions of other participants in your subpopulation. All participants receive the same instructions. All decisions are made anonymously. No other participant will get to know your name and your payoff.

Altogether there are (in your subpopulation) eight participants. At the beginning of the experiment all participants are randomly assigned one of two roles (**A** or **B**) which is displayed on the computer screen. There are four A-participants (*A1, A2, A3 and A4*) and four B-participants (*B1, B2, B3 and B4*). All participants keep their role and the number assigned to them throughout the experiment.

At the beginning of each round each B-participant **chooses** a **number *p* from 40 to 85** which is after that revealed to all A- and B-participants. This number *p* has an impact, as will be explained later on, on the payoffs for A- and B-participants (see also figure). Thereafter each A-participant **chooses** one of the four B-participants with whom he interacts in this period, this means that A-participants decide whether they want to interact with B1, B2, B3 or B4. Therefore, a B-participant can interact with zero to four A-participants in one round. This process is repeated in the next round.

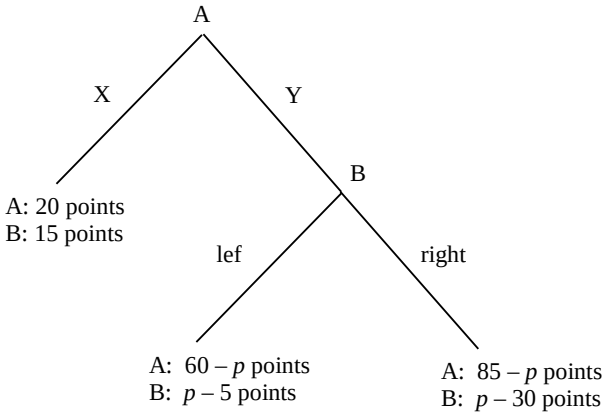
B-participants only learn the number of A-participants who chose them, but not who has chosen them.

After the A-participants have chosen the B-participants, it is each A-participants turn to make a decision. More specifically, each A-participant has to choose between option **X** and **Y** (see figure). If he picks option X, the A-participant will earn 20 points and the B-participant chosen by him will earn 15 points from this interaction. If he picks option Y, the payoffs depend on the choice of the B-participant chosen by him who has to decide whether he wants

to go "**left**" of "**right**". If he decides to pick "left", the A-participant will earn 60 – *p* points and the B-participant will earn *p* – 5 points from this interaction. If he decides to pick "right", the A-participant will earn 85 – *p* points and the B-participant will earn *p* – 30 points.

If a B-participant is not chosen by at least one A-participant or if all A-participants who have chosen him picked X, he does not have to make a decision. Otherwise the B-participant additionally learns the number of A-participants who have chosen him and picked Y and has to make the **same** decision for all these A-participants, that is whether he wants to go "left" or "right" for all A-participants. A B-participant who has not been chosen by at least one A-participant earns 0 points.

Payoffs for an A-participant and a B-participant from <u>one</u> interaction.



(B-participants can receive payoffs from several interactions in one round.)

The experiment consists of **30 rounds**. After each round you will be informed about what has happened and you will be reminded of your payoff and your total sum of points so far.

Moreover, **all** (A- and B-) **participants can keep track of the entire history of B-participants**. For all participants there will be a screen depicting the history of all B-participants. For each round and each B-participant there will be a colored little **#** (hash) with a number behind.

- A **black** # indicates that the B-participant had nothing to decide because either no A-participant chose him or *all* A-participants who chose him picked X.
- A **red** # indicates that the B-participant picked "left".
- A **green** # indicates that the B-participant picked "right".
- The integer behind the # shows the number of A-participants who picked Y after choosing this B-participant.

Please note on the additionally distributed blank the respective number *p* of each B-participant which is displayed to you above the relevant column on the screen.

These are the rules. Your can trust us that everything will happen exactly according to these rules. Take your time going over these instructions again and feel free to ask questions. But don't shout! Simply raise your hand.

Appendix B: Screenshot (Example: OLI-FREE)

A-participant's screen

B-participant's screen

Discussion Papers of the Research Area Markets and Choice 2015

Research Unit: **Market Behavior**

Sebastian Kodritsch SP II 2015-201
A note on the welfare of a sophisticated
time-inconsistent decision-maker

John Duffy, Dietmar Fehr SPII 2015-202
Equilibrium selection in similar repeated games:
Experimental evidence on the role of precedents

Onur Kesten, Morimitsu Kurino, Alexander Nesterov SPII 2015-203
Efficient lottery design

Dietmar Fehr, Rustamdjan Hakimov, Dorothea Kübler SPII 2015-204
The willingness to pay-willingness to accept gap:
A failed replication of Plott and Zeiler

Dorothea Kübler, Julia Schmid SPII 2015-205
Take your time to grow: A field experiment on hiring youths in Germany

WZB Junior Research Group: **Risk and Development**

Ferdinand M. Vieider, Clara Villegas-Palacio, Peter Martinsson, Milagros Mejía SP II 2015-401
Risk taking for oneself and others: A structural model approach

All discussion papers are downloadable:
http://www.wzb.eu/en/publications/discussion-papers/markets-and-choice