

**Pricing on the Market with Imperfect Information:  
the Lemon market example reconsidered**

**By**

**Katarina BUJDAKOVA**

**THESIS**

Submitted to  
KDI School of Public Policy and Management  
in partial fulfillment of the requirements  
for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

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Professor Sang-moon HAHM

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Approval as of September 12, 2006

Supervisor *Sang-moon HAHM* \_\_\_\_\_

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**To my parents Alicia & Milan**

## **ACKNOWLEDGEMENTS**

I would like to thank to professor Sang-moon Hahm for his time and support. Our discussions on imperfect information problem and its consequences motivated my research from its very beginning and made it possible to finish this paper.

Also I would like to thank to professors Kim Jae-cheol and Sung Taeyoon, and to Vandana Ramachandran for helpful comments.

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# Pricing on the Market with Asymmetric Information: the Lemon market example reconsidered.

By Katarina Bujdakova

## Abstract

Akerlof (1970) describes the consequences the information asymmetry has on the quality and quantity traded using a used car market example. He finds that price and quality of the cars traded is on average lower than in the case of perfect information and that in extreme case only bad cars are traded and market eventually collapses. This paper reconsiders Akerlof's lemon market example in slightly different context, and it attempts to answer questions: "Why buyers prefer to buy used cars from large scale sellers? How does company size relate to the sellers' cheating under imperfect information?" This paper investigates the impact of the scale of trade and the cost structure on seller's honesty. It is found that with decreasing unit costs of fixing a car, large-scale sellers tend to behave honestly at lower price levels than small-scale ones do. This finding is compatible with usual explanations offered by CEOs that large companies sell at lower prices due

to their scale-related cost savings. This paper also finds that even if the sellers have constant unit costs, so that there are no economies of scale, the larger-scale sellers would behave honestly at lower price levels. In the case of the sellers with increasing unit costs, the scale of trade is found to have ambiguous effect on price necessary to prevent cheating.

## 1. Introduction

This paper shows how information, or more likely its absence, can distort pricing mechanism and how is the extent of this distortion influenced by the scale of trade and the cost structure. A simple model of the pricing on the lemon market is used, similar to the one described in the automobile market example by Akerlof (1970). This model considers only used cars and the seller can improve a car's quality by fixing it at some cost before sale.<sup>1</sup> All the cars are assumed to have same (low) quality initially and the fixing decision by seller determines whether a car becomes a peach or a lemon. The buyer cannot tell the difference in a car's quality at the time of purchase. Thus peaches and lemons sell at the same price. With time the buyer improves his knowledge about the car's quality as the lemons can break down more often than peaches. This relatively high break down frequency can be looked at as the alternative to the imperfect screening technique.

Previous research on pricing on the lemon market focuses mostly on welfare effects. Heinkel (1981) examines the policy implications of administering an ex post imperfect quality test with potential seller liability. He finds that the effec-

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<sup>1</sup>The idea of fixing a car was also used by Heinkel (1981), however in his paper average car quality among sellers differ, so that they incur different fixing cost.

tiveness of this test is contingent on three basic variables: the size of the liability, the confidence level of the test and the degree of test imperfection (noise) and that an imperfect test technology can improve total surplus.

Levin (2001) focuses on gains from trade on lemon market and finds that greater information asymmetry does not necessarily reduce gains from trade. The measure of trade used in his paper is not a price at which the cars are traded but rather the maximum probability with which they are traded. Buyers observe signalling and then adjust their beliefs about the quality distribution of cars traded. Levin (2001) finds that an increase in information can increase or decrease trade, depending on the initial trade levels. Other authors observe that in models with signalling (Crocker and Snow, 1992) or screening (Kessler, 1998), private information can have ambiguous impact on welfare.

Some authors tested the Lemon market pricing directly using empirical data. Bond (1982) uses data from TIU Survey on pickup trucks to compare maintenance cost of trucks acquired new and trucks acquired used (potential lemon market). He finds no significant difference in maintenance of new and used trucks. However, as pointed out by Pratt and Hoffer (1984), this finding might be caused by problems in measurement technique. Reexamining same data they find a significant

difference in maintenance. Chezum and Wimmer (1997) examine thoroughbred yearlings auction market data to compare prices at which breeders and racers sell horses. They find that breeders receive on average higher prices for similar yearlings since breeders sell all their horses and racers tend to keep potentially successful horses out of auction (adverse selection).

The current paper does not implement any active monitoring technique administered neither by buyer nor by an authority. Buyers only passively observe the quality of a car they bought and adjust their behavior in the future. This paper focuses on the price level rather than welfare surplus. This paper aims to contribute to the discussion of the lemon market problem by reconsidering it in slightly different context, and to answer questions: "Why used car buyers prefer to buy from large scale sellers? How does company size relate to the sellers' cheating under imperfect information?" This paper investigates the impact of the scale of trade and the cost structure on seller's honesty. It is found that with decreasing unit costs of fixing a car, large-scale sellers tend to behave honestly even at relatively low used car prices. This paper also finds that even if the sellers do not experience cost savings, and have constant unit costs, and thus there are no economies of scale, the larger-scale sellers would be honest at lower price levels.

In the case of the sellers with increasing unit costs, the scale of trade is found to have ambiguous effect on price necessary to prevent cheating.

The paper is organized as follows: Section 2: Simple model is introduced, Section 3: The incentive compatibility condition is derived and its implications in the market equilibrium are considered. Section 4: concludes.

## 2. The Model

The economy consists of a large number of buyers and a large number of sellers. Sellers maximize present value of current and future profits and buyers maximize utility. Both behave competitively and discount future at rate  $r$ . Model is set in discrete time.

### 2.1 Seller

There are  $n$  identical sellers on the market. Each seller sells  $m$  cars per period. Thus total supply of cars per period in the economy is  $N = mn$ . Each seller fixes used cars and sells them to buyers. Any car eventually breaks down. If a seller sells a car after fixing it, the car breaks down with probability  $q_1$ . If he sells car without fixing it, the car breaks down with probability  $q_2$  (where  $q_1 < q_2$ ). If cars he is selling break down, a buyer is reluctant to buy cars from him and the seller is forced to leave the market. The buyer cannot distinguish whether his car broke down because it was not fixed by the seller or because of some other reason. A seller previously out of business comes back to business at some rate  $a$ , and sells cars again, regardless of his past performance.

