

# **Credence goods markets: An Experimental Analysis**

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## Extended Abstract

Credence goods<sup>1</sup> have the characteristic that customers do not know which type or quality of treatment or good they need, while an expert seller is able to observe and provide the needed treatment. Credence goods are very common in day-to-day life, as all types of repair services, the medical sector as well as specialized dealers of complex goods and even taxi rides exhibit such characteristics. Though customers can observe the utility they derive from such goods *ex post*, they cannot judge whether the quality they have received is the *ex ante* needed one. Moreover, consumers may also be unable to observe which quality they actually received *ex post*. An expert seller, however, is able to identify the quality that fits a customer's needs by performing a diagnosis. He can then provide the right quality and charge for it, or he can exploit the information asymmetry by defrauding the customer. For instance, when a car mechanic repairs your car, he might have an incentive to cheat on you in two dimensions: First, the repair itself might be inefficient. This happens if the mechanic replaces more parts (and charges for the time and material needed to do so) than are actually necessary to bring the car back on the road. This problem is known as *overtreatment* which does not add extra value to the customer. Inefficient treatment also prevails if the mechanic's repair is insufficient, thus leaving you with a bill, but with a car that is not working. This problem is known as *undertreatment*. Second, the repair might be appropriate, but the mechanic might charge you for more than he has actually done (e.g. by claiming to have changed a filter without having done so). This kind of problem is known as *overcharging* and it can lead to inefficiencies in the future if the fear of getting overcharged deters customers from trading on credence goods markets, thereby creating an Akerlof (1970)-type failure of markets.

This paper presents a large experimental study with 936 participants which investigates which factors can cure the inefficiencies arising from the information asymmetries prevalent in credence goods markets. Although credence goods have

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<sup>1</sup> Darby and Karni (1973) introduced the term *credence goods* and added this type of goods to Nelson's (1970) classification of ordinary, search and experience goods. Ordinary goods (such as milk) have well-known characteristics, and subjects know where to get them. Search goods (like clothes) need to be inspected before buying in order to observe their characteristics. Experience goods (like wine) have unknown characteristics, but they are revealed and found out after buying or using them.

received quite some attention in the theoretical and empirical literature in recent years (see Dulleck and Kerschbamer 2006 for a recent survey) we are not aware of any experimental study on credence goods, even though controlled laboratory experiments provide ample opportunities to vary in a systematic way the conditions under which credence goods are provided. Our paper shows that a seller's liability (to provide a good of sufficient quality) and competition among sellers are the most important factors to increase trade on credence goods markets. Observability of a seller's actions (i.e., the customer knows which kind of good has been provided by the seller), although theoretically powerful, has only a minor impact. Similarly, the possibility of reputation building (observability of a seller's past actions) is of negligible importance. Though full efficiency is not reached in the experiment, our results suggest that competition and legal liability-clauses in credence goods markets are most suitable to cure most of the inefficiencies associated with the provision of credence goods.

A vast body of empirical evidence documents very clearly the problems with credence goods. Wolinsky (1993, 1995) refers to a survey conducted by the Department of Transportation estimating that more than half of auto repairs are unnecessary. Hubbard (1998) shows that auto repairers conduct vehicle inspections differently depending on whether the vehicles are on warranty or not. In a medical context, Emons (1997) cites a Swiss study reporting that the average person's probability of receiving one of seven major surgical interventions is one third above that of a physician or a member of a physician's family, indicating that customers' (presumed) education affects the quality of treatment they receive. He also mentions a study by the Federal Trade Commission that documents the tendency of optometrists to prescribe unnecessary treatment. Iizuka (2007) finds that doctors respond to markup differences in the Japanese drug prescription market where doctors often both prescribe and dispense drugs. Gruber et al. (1999) show that the relative frequency of Cesarean deliveries compared to normal child births reacts to the fee differentials of health insurance programs, as does the frequency of Cesarean section delivery negatively in relation to birth rates (Gruber and Owings, 1996). Hughes and Yule (1992) find that the number of cervical cytology treatments is positively correlated with the fee for this treatment. Jürges (2007) or Fuchs (1978) show that a large part of patients' demand for health care services is supply-driven, because physician density,

for instance, has a significantly positive effect on the number of doctor visits or operations.

Though empirical studies on credence goods markets provide compelling evidence for inefficiencies, they generally suffer from the lack of a controlled variation of factors that influence the efficient provision of credence goods. Either these papers provide evidence that overtreatment is happening, without systematically exploring the conditions leading to it (see, e.g., the case studies mentioned in Wolinsky 1993 and 1995, or Emons 1997). Or they vary only one particular aspect that influences the provision of credence goods – for example the price differential between Cesarean section deliveries and normal child births (Gruber et al., 1999) – without controlling for and varying other important factors (like liability or observability or the degree of competition in the market). By running a controlled laboratory experiment we are able to systematically vary the main factors that may affect the provision of credence goods. Since studies using field data are naturally limited in the number of conditions that can be varied, our experiment complements the empirical literature on credence goods.

So far, there have been no experimental studies on credence goods markets. However, a binary version of the well-known experimental trust game (by Berg et al., 1995) has recently been interpreted as modeling a market for experience goods.<sup>2</sup> Huck et al. (2006, 2007) have shown that experience goods are more efficiently provided when sellers can build up reputation than if this is not the case. Market efficiency increases to about 30% with reputation, but it does not make a difference whether buyers can only observe how a particular seller has served them in the past or whether they know all past quality choices of all sellers. Introducing competition (as compared to bilateral matching of seller and customer) then raises efficiency levels to about

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<sup>2</sup> Experience goods differ from credence goods in several dimensions: While the valuation of a consumer is strictly increasing in quality with experience goods, it is constant whenever the quality is sufficient with credence goods. While for given prices a consumer can tell you exactly which quality he wants with experience goods, he does not know it with credence goods. While the quality of the good is unobservable *ex ante* but perfectly observable *ex post* with experience goods, it may be observable either *ex ante*, or *ex post*, or neither *ex ante* nor *ex post* with credence goods.

80%, because it induces sellers to compete for customers by providing high quality to them.

Taking a trust game as an example for an experience goods market limits the analysis to *undertreatment* (low quality for a given price) and no market interaction. The framework of credence goods is a much richer one as it adds possibilities for *overtreatment* and *overcharging*. By varying the conditions for the provision of credence goods we are then able to examine which conditions foster the efficient provision of credence goods.

The paper is organized as follows. We first describe the strategic interaction between customer and seller on a market for credence goods and introduce the various conditions under which customers and seller interact. We then describe the experimental design and our hypotheses. We proceed by presenting experimental results before providing alternative (behavioral) explanations that are tested on the data. We close by a discussion of several policy implications.