

# What characterizes Credence Goods?

## A critical look at the literature.\*

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### Abstract

Credence goods like health care, financial advice, food labelling or journalism are at the centre of political discussions. The research on credence goods has expanded over the last years. There are now different isolated lines of literature referring to “credence goods”. I present a brief overview of the examples for credence goods used in different lines of literature. I categorize the examples into markets with expert providers, expert advisors, information experts and no expertise. I discuss the classic characterization by [Darby and Karni \(1973\)](#) (DK73) and how different modelling approaches used in the literature relate to it. I show that recently, authors have characterized credence goods in different ways, some of which are inconsistent with the characterization in DK73. I discuss the associated problems. The aim of the paper is to raise awareness for the interconnectedness of different subfields of the economic literature and to promote a common characterization of credence goods based on the original characterization by DK73.

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# 1 Introduction

When making purchase decisions in credence goods markets, consumers have to rely on information provided by experts. Credence goods markets can be found all over the economy: health care, repair services, legal and financial advice and management consulting are among the most significant examples. All of these markets have in common that – in many situations – consumers are not able to evaluate whether information provided by the expert is accurate or not, even after purchase. In health care, patients may not be able to judge whether a hip replacement was necessary or not. Likewise firms who engage management consultants may be unable to evaluate whether a consulting project was necessary or not. When purchasing investment products, consumers may not be able to evaluate whether the bad performance of a product has to be attributed to bad luck or to a wrong recommendation. Likewise, professional investors may find it hard to judge whether a credit rating provided by a rating agency reflected the true default risk of a company. Last, consumers often cannot judge whether information provided on consumer products – for instance fair-trade labels on food – convey the truth or not. Credence goods markets are of high economic importance. Health care markets alone produce more than 10% percent of GDP in most industrialized countries (OECD, 2016). Their share of GDP has been growing for decades and is likely to continue to grow (Chernew and Newhouse, 2012). The fraction of GDP produced by financial markets in the US has increased from around 3% in 1945 to 9% in the 2000s (Philippon, 2015), an observation that holds for most industrialized countries (Kerschbamer and Sutter, 2017).

The general problem in credence goods markets through all sectors is that experts may face incentives to reveal information which is not in the best interest of the consumer, leading to consumer harm and to reduced welfare through misallocation of resources. Such provider fraud is widely recognized. The financial crisis 2007/08 serves as a recent example. With respect to health care, it is estimated for the US that up to 10% of all health care expenditures – a sum of about \$180B per year – are due to supplier fraud (FBI, 2011). Not surprisingly, credence goods markets like health care and financial advice markets are frequently subject to discussions about appropriate regulation. Yet, despite problems in credence goods markets are recognized, it is not easy to solve them, because research on credence goods markets faces severe methodological challenges.

This paper seeks first, to categorize the different lines of literature concerned with credence goods and the associated problems, and second, to clarify the characterization of credence goods, which seems to be important given the vast growth of the literature.

## 2 The classic characterization of Credence Goods

Every good has diverse characteristics – also called aspects or qualities – which may be important to a consumer. Characteristics of a bottle of wine are its design, its taste and its processing attributes. Characteristics of a dental tooth filling are the location of the practice, the kindness of the staff, the comfort during the surgery and the quality of both the diagnosis and the filling. The characteristics of goods can be categorized with respect to the time when consumers can evaluate them. Search characteristics are evaluable before the purchase and experience characteristics are evaluable after purchase - this distinction dates back to Nelson (1970). Credence characteristics – added by Darby and Karni (1973) (DK73) – are not evaluable even after purchase. The original characterization by DK73 states:

*Search qualities are those that can be ascertained in the search process prior to purchase and experience qualities are those that can be discovered only after purchase as the product is used ... Credence qualities are those which, although worthwhile, cannot be evaluated in normal use.*

(Darby and Karni, 1973) (pp.68-69)

Some remarks are in place:

- The characterization simply demands that the consumer is not able to evaluate credence *qualities*.
- “Qualities” refers to characteristics, elements or aspects of a good which are of interest to the consumer. This interest stems from a consumer’s “want” (DK73, p.67) rooted in a preference or in a need to maintain a condition (e.g., a healthy condition).
- I use the term *characteristics* instead of *qualities* in order to separate the term from what is used to describe how well a good is crafted.
- DK73 speak of credence *characteristics* rather than credence *goods*. The term *credence good* appears for the first time only on the fifteenth page of DK73 (p.81). The term *credence good* is used as an illustrative reference to goods with *credence characteristics* when these characteristics are central to our analytical interest in the good.<sup>1</sup>
- The characterization provides a clear-cut good categorization of characteristics into either search, experience or credence characteristics.

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<sup>1</sup>A related thought was expressed by Andersen and Philipsen (1998): “Credence goods are goods for which the buyer’s decision-making is dominated by concerns about credence characteristics.”

**TABLE 1**  
A categorization of credence goods.

GROUP	PROVIDER SELLS	SELECTED EXAMPLES
(1) <b>Expert providers</b>	Diagnosis and service	<ul style="list-style-type: none"> <li>· Repair services</li> <li>· Health services</li> <li>· Management consulting</li> </ul>
(2) <b>Expert advisors</b>	Diagnosis and 3 <sup>rd</sup> -party products	<ul style="list-style-type: none"> <li>· Advice (financial, health)</li> <li>· Rating agencies</li> </ul>
(1) & (2): Consumers cannot evaluate the seller’s representation of the consumers need.		
(3) <b>Information experts</b>	Information and product	<ul style="list-style-type: none"> <li>· Products with fair-trade labels</li> <li>· Organic food</li> <li>· Journalism</li> </ul>
(3): Consumers cannot evaluate the seller’s representation of product characteristics.		
(4) <b>No expertise</b>	Products/services only	<ul style="list-style-type: none"> <li>· Preventive care</li> <li>· Medication during pregnancy</li> </ul>
(3): product performance cannot be evaluated.		

In the decades following DK73, different lines of literature referring to credence goods have evolved. In this short article, I will categorize them and discuss recent modelling approaches in light of the characterization by DK73.

## 2.1 The diversity of credence goods

**Four categories of credence goods.** I classify credence goods into four categories as presented in table 1. The first three categories are markets in which expert sellers typically possess an informational advantage over consumers. These three categories have in common that the consumer may not be able to verify information provided by the seller and hence has to believe that the provided information is true. In the fourth category both sellers and consumers are not able to evaluate certain product benefits and hence both have to believe in a presumption about these benefits. The term “credence” originates from these observations – credence: “belief in or acceptance of something as true” (Oxford Living Dictionaries).

First, there are goods provided by *expert providers* who combine the diagnosis of the consumer's need with the provision of services which can satisfy this need.<sup>2</sup> The two major examples in this category are repair services and health services. As noted by [Mimra et al. \(2016a\)](#), many of the goods in the first category involve the so-called “professional services’ (or ‘liberal professions’). These markets have been the focus of a number of important theoretical contributions ([Pitchik and Schotter, 1987](#); [Wolinsky, 1993](#); [Taylor, 1995](#); [Emons, 1997](#); [Pesendorfer and Wolinsky, 2003](#); [Fong, 2005](#)). [Dulleck and Kerschbamer \(2006\)](#) provide a survey and a unifying modelling framework for market settings with expert providers to that date.<sup>3</sup> More recently, the literature was expanded by a number of experimental contributions ([Dulleck et al., 2011](#); [Currie et al., 2011](#); [Schneider, 2012](#); [Balafoutas et al., 2013](#); [Mimra et al., 2016a,b](#); [Kerschbamer et al., 2016](#); [Balafoutas et al., 2017](#); [Rasch and Waibel, 2017, forthcoming](#); [Gottschalk et al., 2017](#)).

Second, there are services of *expert advisors* who only advice a consumer about which product or service best fits his or her need, whereas the products or services traded in these markets are provided by third-parties.<sup>4</sup> This literature has evolved more recently in the wake of the financial crisis 2007/08 and focusses on financial investment advisors who advice consumers about which third-party investment product(s) they should purchase ([Inderst and Ottaviani, 2012a,b,c](#); [Inderst, 2015](#)). Another example are rating agencies (see, for instance, [Becker and Milbourn \(2011\)](#)), which have received considerable attention since the financial crisis. The category also applies to many health care markets in which physicians and pharmacists advice patients about which pharmaceutical product best fits their needs.

The credence characteristic in markets with *expert providers* and *expert advisors* is that consumers do not know whether the expert correctly stated their needs or not, i.e., consumers may not be able to evaluate the “seller’s representation of the buyers condition” ([Hubbard, 1998](#)), even after purchase. This in turn can have several sources. For instance, when a patient has an aching stomach and his appendix gets removed: after the surgery, a patient may not be able to tell if the appendix needed removal or not, because this need does not influence his or her experience (DK73). Another source is a stochastic outcome. For instance, a consumer may not be able to distinguish whether the bad performance of an investment product is due to bad advice or bad market developments.

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<sup>2</sup> “Diagnosis and treatment” in the wording [Dulleck and Kerschbamer \(2006\)](#).

<sup>3</sup>Newer theoretical contributions include [Liu \(2011\)](#); [Fong et al. \(2014\)](#); [Bester and Dahm \(2017\)](#) and applied work as referenced in table 2.

<sup>4</sup>The line between expert providers and expert advisors may not always be sharp in reality. For instance, physicians may be both expert providers and expert advisors depending on the case.

The third category consists of goods which are produced by *information experts* who provide non-verifiable information to consumers, often in the form of labels.<sup>5</sup> This category includes consumer products for which consumers have certain desires about the hidden processing characteristics, for instance with respect to truthful reporting (journalism, science), environmental balance, worker compensation (fair-trade labels) or animal breeding conditions. This literature has grown in the last two decades (Andersen, 1994; Feddersen and Gilligan, 2001; Grolleau and BenAbid, 2001; Vetter and Karantininis, 2002; Baksi and Bose, 2007; Roe and Sheldon, 2007; Bonroy and Constantatos, 2008; Gabszewicz and Resende, 2012; Bonroy et al., 2013; Baksi et al., 2016). In this category, consumers know what they need, but cannot evaluate whether they received the (hidden) characteristics they desire.<sup>6</sup>

The fourth category presented in table 1 has very few references: goods for which neither sellers nor consumers can evaluate certain characteristics. There is no expertise for goods in this category. Such goods may exist when consumers and sellers have (unproven) positive expectations about the performance of a product, e.g., new medications in health care. Crow et al. (2002) state with respect to credence goods that “their characteristics may not be fully or reliably apparent” and refer to preventive care. While the authors do not go into further detail, I may carry their example on by thinking of preventive care or medical procedures with suspected long-term benefits which (as yet) lack scientific evidence. Another example is pregnancy, where scientific evidence on the effects of medication is lacking, because ethical reasons prohibit research. In the words of Eddy (1984): “there is no way to shorten the time needed to observe ten-year survival rates, and there is no way to increase the frequency of rare diseases”. Certainly there is a broad middle-ground between the two extremes of no evidence and the other extreme of full evidence on the other side<sup>7</sup>. The credence characteristic in the forth category is simply that the benefits of such goods are not known. Goods in this group are not traded with information asymmetries between sellers and buyers - typical credence goods problems are therefore presumably not as important as in the other categories. Further research in the area is needed to test this presumption.

The four categories of credence goods are handled by distinct lines of literature, although all these goods are correctly termed credence goods in the sense of DK73 as they involve characteristics which cannot be evaluated after purchase.

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<sup>5</sup>Depending on the integration of the market, seller and producer can be the same or two distinct identities.

<sup>6</sup>Also in markets with *expert providers*, consumers may not be able to verify whether they have received a product or service with certain characteristics (Dulleck and Kerschbamer (2006) call this “no verifiability”). Such goods thus involve multiple credence characteristics.

<sup>7</sup>This is reflected in the discussion on evidence-based medicine; see for instance Smith (1991).

In table 2, I present a detailed list of examples for goods with important credence characteristics, *credence goods*, which have appeared in the literature.

**TABLE 2**  
Examples of credence goods in the literature.

GROUP	EXAMPLES
<b>Expert providers</b>	<p><i>Repair services:</i> car repairs<sup>1</sup>, computer repairs<sup>2</sup>, plumbing, roofing work, appliance services, home improvement contractors, television replacements</p> <p><i>Health services:</i> dentistry<sup>3</sup>, veterinary services<sup>4</sup>, the removal of an appendix<sup>5</sup></p> <p><i>Other services:</i> management consulting; legal advice auditing<sup>7</sup>; funeral services<sup>8</sup>, taxi rides in unknown cities<sup>11</sup>, budget allocation by politicians<sup>9</sup>, infrastructure projects<sup>9</sup></p>
<b>Expert advisors</b>	Financial advice markets <sup>6</sup> , financial rating agencies <sup>6b</sup> , pharmaceutical advice by physicians and pharmacists <sup>6</sup> , scientific consulting, real estate agency, computer equipment consulting
<b>Information experts</b>	<p><i>Process-attributes of food products:</i> (organically produced food, dolphin-safe tuna, free-range poultry, genetically modified organism (GMO)-free food, irradiated food, organic products, fair trade products, types of goods, use of pesticides)<sup>12,13</sup>, possibility of recycling<sup>14</sup>, restaurant hygiene<sup>18</sup></p> <p><i>Process-attributes of non-food products:</i> journalism<sup>15</sup>, clothes produced by well-compensated workers<sup>16</sup>, products claiming better environmental performance (e.g., low-emissions electricity)</p>
<b>No expertise</b>	<i>Products with unknown benefits:</i> Long-term preventive care <sup>17</sup> ; new medication for rare diseases

<sup>1</sup>Schneider (2012), <sup>2</sup>Kerschbamer et al. (2016), <sup>3</sup>Gottschalk et al. (2017), <sup>4</sup>Hilger (2016), <sup>5</sup>Darby and Karni (1973), <sup>6</sup>Inderst and Ottaviani (2012a), <sup>6b</sup>Becker and Milbourn (2011), <sup>7</sup>Causholli et al. (2013), <sup>8</sup>Hilger (2016), <sup>9</sup>Dulleck and Wigger (2015), <sup>10</sup>Dulleck et al. (2015), <sup>11</sup>Balafoutas et al. (2013, 2017), <sup>12</sup>Roe and Sheldon (2007), <sup>13</sup>Bonroy and Constantatos (2008); Bonroy et al. (2013), <sup>14</sup>Baksi et al. (2016), <sup>15</sup>Gabszewicz and Resende (2012), <sup>16</sup>Baron (2011), <sup>17</sup>Crow et al. (2002), <sup>18</sup>Jin and Leslie (2003).

## 2.2 Credence characteristics versus credence goods

The characterization by DK73 refers to *characteristics* instead of *goods*. Yet most authors – including DK73 and me in this article – use the illustrative term “credence good” to refer

to goods with credence characteristics when these characteristics are at the centre of our analytical interest. Yet most, if not all goods in the world exhibit search, experience and credence characteristics simultaneously. Furthermore, the category of a particular characteristic can change over time and over situations. This section illustrates these points by examples.

**Goods have search, experience and credence characteristics.** Goods typically combine search, experience and credence characteristics. A bottle of wine has a design, a taste and several processing-attributes. The design of a bottle can be evaluated before purchase and therefore represents a search characteristic. The taste of the wine is an experience characteristic, because it can only be evaluated after consumption. The information on the label stating that the wine has been processed organically is, however, not easily verifiable and therefore constitutes a credence characteristic. Therefore a statement like “*Experience goods (like wine)*” (Dulleck et al. (2011), p.530) is possibly misleading when a reader associates search or credence characteristics with “wine”.

Another example is a dental tooth filling (Gottschalk et al., 2017). The location of the practice and the politeness of the staff are search characteristics. The fit and comfort of the filling is an experience characteristic. Finally, whether the filling was necessary at all or not typically remains unknown and therefore is a credence characteristic. A researcher who cares about whether patients are treated appropriately, or possibly overtreated, focusses on the credence characteristic of dental tooth fillings. Nevertheless, people may care about the non-credence characteristics of the service (“the doctor was so polite”) and it hence would be misleading to make the general statement that dental care is a pure credence good.

**Characteristics may differ with consumer information.** Take the ordinary consumer Peter who brings his car to a repair shop, because it makes an unfamiliar noise. When Peter picks up his car a day later, the mechanic tells him that some parts (which Peter has never heard of) had to be replaced. The noise is gone, but Peter cannot be sure whether it was necessary to replace all the parts, and the repair therefore has credence characteristics. Now imagine the retired car mechanic Katie brings her car into the same shop, because he has heard the same noise as Peter. But Katie knows that the noise indicates that a specific part needs to be replaced. Not credence but experience characteristics shape this case, as Katie will be able to evaluate whether the repair was according to his needs nor not. Peter may be the standard consumer in the car repair market, but depending on the market there may be more or less Katies around.



**Characteristics may change over time.** Credence characteristics may become experience characteristics when these characteristics become evaluable after some time (DK73, Zweifel and Eichenberger (1992)). An example for this is given by an auditing case described in Causholli et al. (2013): a firm is uncertain about his/her auditing needs. The auditor subtracts substantial rents by underauditing the client. As long as there are no contrary indications, stock owners cannot tell whether the firm was appropriately audited or not. Underauditing can remain undetected for years – until it is discovered, for instance by unexpected bankruptcy. With the bankruptcy of the firm, the former credence characteristics of auditing have become experience characteristics. Another possible channel through which credence characteristics can become experience characteristics exists when a stochastic process is the reason why consumers cannot evaluate a service. For instance in financial advice consumers cannot tell whether a bad outcome is due to biased advice or bad luck. Sampling from repeated purchases may enable consumers to evaluate advice after some time. The possibilities for such sampling on the individual level are limited in many real-world situations, however, as many products, e.g., retirement saving plans, are purchased infrequently (Zweifel and Eichenberger, 1992) .

The logic of these credence-to-experience transformation carries on to experience-to-search transformations, for instance, when the taste of a particular wine has become familiar to consumers after repeated purchases of the same wine.

## 2.3 Credence goods problems

**What are credence goods problems?** Problems associated with the credence characteristics of a good are called *credence goods problems*. Likewise, problems based on the experience characteristics of a good are *experience goods problems*.

When a seller of wines makes a false claim about the wine’s taste, the consumer will find out shortly after the purchase and we hence have an experience goods problem. When the seller makes a false claim about the processing of the wine (fair-trade), this is a credence goods problem as the consumer cannot verify the information provided. Similarly, a bad quality dental filling is an experience goods problem as the patient will detect it breaks when chewing on hard food. Placing a filling when no filling is needed, however, is a credence goods problem as the patient possibly will never know whether the filling was necessary or not.

The pre-condition for different credence goods problems which have been analysed in the literature is the information asymmetry between seller and consumer.<sup>8</sup> When the interests of sellers and consumers are not aligned, sellers may misrepresent the consumers’ needs (in markets with *expert providers* and *expert advisors* in table 1) or the true attributes of purchased products (in markets with *information experts* in table 1), because credence characteristics prevent the consumer from noticing such fraud<sup>9</sup>.

**Credence goods problems and their modelling.** The main categories of problems described in the literature are presented in table 3. My categorization is based on [Dulleck and Kerschbamer \(2006\)](#), but adds some elements.

**TABLE 3**  
Problems associated to credence characteristics

Problem	Description	Examples
Overtreatment	Consumer receives more or more expensive products or services than needed, but enough to solve a potential problem	Repair services, health services, management consulting, legal advice
Overcharging	Consumer is charged more than he/she would be willing to pay could he/she verify which service or product he/she received	Repair services, health services, goods with hidden characteristics
Undertreatment/ Biased advice	Consumer receives products or services which are insufficient given his/her need.	Financial advice, auditing, rating agencies, health advice

These problems are not necessarily limited to goods with credence characteristics. But for them to be problems stemming from credence characteristics, i.e., “credence goods problems”, the consumer must not be able to evaluate product characteristics, for instance the seller’s representation of the consumer’s need or the underlying attributes of a product.

*Overtreatment:* When consumers are overtreated, i.e., purchase more or more expensive goods than needed, they notice that a potential problem (for instance, being sick) is absent, but cannot evaluate whether the service or product they received was necessary or whether

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<sup>8</sup>Sometimes it is argued that the causality is that information asymmetries lead to credence characteristics. I argue that the causality is rather reversed. As already noted by DK73, credence characteristics are the reason why consumers have a willingness to pay for expertise in the first place. In principle, consumers could decide to become experts as well (e.g., by studying), but the costs associated with this are often too high.

<sup>9</sup>The term “fraud” was already used by DK73 and is used widely in the literature.

a cheaper service or product would have sufficed. Experts have incentives to overtreat, when overtreating is associated with greater marginal profits than providing an appropriate treatment.<sup>10</sup> Overtreatment is typically modelled such that the consumer receives the same utility (ignoring prices) from overtreatment as from the more efficient appropriate treatment.

*Overcharging:* Consumers may sometimes be charged more than they would be willing to pay if they knew which service or product they have actually purchased. A pre-requisite for overcharging is that consumers are not able to verify what product or service they have received. As an example from car repair, consumers may not be able to verify whether the parts the mechanic claims to have changed really have been changed. Also false product labelling of products (goods in the second category in table 1) is a variant of overcharging: Consumers have a higher willingness to pay for products with a fair-trade label and may be charged more than they would be willing to pay if they knew that the label was a fake. As in the case with overtreatment, the inability to evaluate overcharging is typically modelled such that consumers receive the same utility (ignoring prices) from consumption, with or without overcharging.

*Undertreatment/ biased advice:* Being undertreated means that the consumer obtains a service or product which is insufficient to satisfy his/her need. Incentives for undertreatment may occur, for instance, when the capacities of an expert are constrained (Emons, 1997) or when third-party commission payments lead to incentives for biased advice (Inderst and Ottaviani, 2012a). Undertreatment is a problem of credence characteristics in accordance with the characterization by DK73 only if the consumers' is not able to notice seller fraud. Hence a different modelling approach than with overtreatment is needed. In the literature, this is for instance implemented by assuming that the success of the outcome is a stochastic function of the seller's recommendation or service (Emons, 1997; Becker and Milbourn, 2011; Inderst and Ottaviani, 2012a). In these models, the consumer may realize that he was undertreated, but cannot evaluate the accurateness of advice, because the bad outcome can be due to both (bad) luck or seller fraud. If consumers could sample a large number of recommendations they could infer that seller's defrauded on average, but arguably many services with credence characteristics are purchased too infrequently to allow for such statistical identifiability at least on the personal level (Zweifel and Eichenberger, 1992). Hence, the stochastic element prohibits that the consumer could prove expert fraud in court and hold experts liable. A related way to ensure that undertreatment can be called a credence goods problem could be provided by assuming that the expert's (unobservable) diagnosis

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<sup>10</sup>These incentives can have exogenous or endogenous sources.

effort determines the probability that the expert can make the correct decision. Thereby it is necessary that even with the greatest effort, the expert does not obtain a perfect signal about the consumer's need. In the credence goods literature, however, it is usually assumed that the highest diagnosis effort leads to a perfect signal (Dulleck and Kerschbamer, 2009; Bester and Dahm, 2017), allowing consumers to infer that undertreatment is due to low diagnostic effort of the expert.

### 3 Different characterizations of credence goods

In this section, I survey and categorize the characterizations of credence goods which authors have provided over the years. I will describe the problems associated with different characterizations.

#### 3.1 A classification of characterizations in the literature

In table 4, I present a (not mutually exclusive) categorization of how authors have characterized credence goods since Darby and Karni (1973).<sup>11</sup> It shows that many authors have followed the characterization by DK73 (category (1)). Since the 2000s, some authors have characterized credence goods less strictly than DK73 (category (2)). Further, some authors have begun to characterize credence goods with a focus on markets with *expert providers*, i.e., the traditional repair services (category (3)).

The first category (1) assembles papers that follow the characterization by DK73 as they require for a good to be a credence good, that consumers are not able to evaluate product characteristics even after purchase. An example is:

*“Since from ex post observations the buyer can never be certain of the quality of the services he has purchased, such services have been termed credence goods (Darby and Karni, 1973).”*

(Emons, 1997) (p.107)

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<sup>11</sup>I also include some papers who do not directly analyse credence goods, but refer to them in a direct way like Zweifel and Eichenberger (1992); Bolton et al. (2007); Huck et al. (2016b) and some who do not even refer to the term like Jin and Leslie (2003) and Becker and Milbourn (2011).

While Emons writes “can never be certain”, other authors in this line use similar formulations like “never able” (Bolton et al., 2007) or “is ex-post nonverifiable” (Dulleck et al., 2015). Other characterizations are less general, but nevertheless much in the spirit of DK73:

*“We assume that the consumer can detect only whether the problem still exists. If the problem no longer exists, the type of repair actually performed is unknown. Thus, the repair is a credence good (see Michael Darby and Edi Karni, 1973).”*  
(Pitchik and Schotter, 1987) (p.1033)

Although Pitchik and Schotter focus on a repair problem, they attribute the credence characteristic in the repair to the fact that the consumer cannot evaluate whether the seller correctly represented the consumers’ condition.

The second category (2) assembles papers with less strict characterizations of credence goods. These characterizations depart from DK73 by not strictly requiring that consumers be unable to evaluate characteristics of a good. The authors typically only demand that this holds “often” (Fong, 2005), “typically” (Balafoutas et al., 2013) or “in many cases” (Beck et al., 2014).<sup>12</sup>

In the third category (3) in table 4, I collect works which share the feature that, for a good the a credence good, they require an information asymmetry between seller and consumers with respect to the consumers’ needs. In the characterization of DK73, information asymmetries between seller and consumer may occur, but it holds with or without it. Characterizations in (3) therefore refer to a subset of credence goods, mostly repair services for which this kind of information asymmetry prevails. Two examples from category (3):

*“The key feature of credence goods is that consumers do not know which quality of a good or service they need.”*  
(Dulleck and Kerschbamer, 2006) (p.7)

*“In the case of taxi rides in an unknown city, the service traded on the market is a credence good (Darby and Karni, 1973), meaning that an expert seller possesses superior information about the needs of the consumer.”<sup>13</sup>*

(Balafoutas et al., 2017) (p.2)

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<sup>12</sup>Formulations which refer to the costs of a possible evaluation – like “not easily” and “difficult” (Mattila and Wirtz, 2002) – are categorized into (1), because they express that any consumer could theoretically decide to become an expert herself. However, the costs associated with acquiring expert knowledge are usually high.

<sup>13</sup>The quote by Balafoutas et al. also supports my notion that the conflicts between new characterizations and DK73 went largely unnoticed in the literature, as Balafoutas et al. refer to DK73 in the same sentence in which they require asymmetric information, although this is not required by DK73.

**TABLE 4**  
Categorization of characterization/definitions of credence goods.  
(categories are not mutually exclusive)

<p><b>(1) Characterisations stressing consumers’ inability of evaluation</b></p> <p><i>Pitchik and Schotter (1987); Zweifel and Eichenberger (1992); Ekelund et al. (1995); Taylor (1995); Emons (1997); Richardson (1999); Emons (2001); Crow et al. (2002); Mattila and Wirtz (2002); Alger and Salanie (2006); Baksi and Bose (2007); Bolton et al. (2007); Iizuka (2007); Baron (2011); Dulleck et al. (2011); Liu (2011); Inderst and Ottaviani (2012a); Causholli et al. (2013); Emons (2013); Dulleck et al. (2015); Dulleck and Wigger (2015); Baksi et al. (2016); Huck et al. (2016a,b); Kerschbamer et al. (2016); Schneider et al. (2016); Bester and Dahm (2017)</i></p>
<p><b>(2) Characterisations not requiring the inability of evaluation</b></p> <p><i>Fong (2005); Suelzle and Wambach (2005); Dulleck and Kerschbamer (2006); Balafoutas et al. (2013); Beck et al. (2013); Fong et al. (2014); Mimra et al. (2016a,b); Hilger (2016); Bester and Dahm (2017)</i></p>
<p><b>(3) Characterisations with focus on expert providers</b>  (Requiring asymmetric information wrt. the consumer’s <i>needs</i>)</p> <p><i>Fong (2005); Alger and Salanie (2006); Dulleck and Kerschbamer (2009); Dulleck et al. (2012); Beck et al. (2014); Balafoutas et al. (2017)</i></p>
<p>No category: <i>Wolinsky (1993); Pesendorfer and Wolinsky (2003); Hyndman and Ozerturk (2011); Brown and Minor (2012); Balafoutas et al. (2013); Bonroy et al. (2013); Das et al. (2016); Kerschbamer et al. (2017); Rasch and Waibel (2017, forthcoming)</i></p>

### 3.2 Consequences of different credence goods characterizations

Due to its great influence, I use [Dulleck and Kerschbamer \(2006\)](#) (DK06) to illustrate how some credence goods characterizations can lead to conflicts with the original characterization by DK73. DK06 provide a widely-cited survey of the credence goods literature and a unifying model for markets with *expert providers* which has been adopted by other authors since. [Bester and Dahm \(2017\)](#) call the setup by DK06 “the now standard credence goods problem”. There is a considerable overlap of the characterization by DK73 and the characterization by DK06. Nevertheless, the characterization by DK06, and those by authors influenced by their work, excludes several of the examples for credence goods presented in table 1; and it includes some examples not included in table 2, because these examples would be termed *experience* goods rather than *credence* goods, when judging by DK73.

**Experience goods problems vs. credence goods problems** In the setup of DK06, a seller of credence goods has two treatment options: a “cheap” and an “expensive” one, where the latter is associated with higher costs. The consumer is in one of two states and either requires the cheap or the expensive treatment in order to avoid a loss. As long as the loss is avoided his utility from the treatment is  $v > 0$  and zero if the loss occurs. In this setup the consumer is overtreated if he/she requires the cheap, but receives the expensive treatment and is overcharged if he/she is charged the expensive treatment, but (secretly) only receives the cheap treatment. Both cases are characterized by the inability of the consumer to evaluate his/her state, i.e., whether he/she needed the cheap or the expensive treatment – his/her utility is always  $v$ . Hence, these situations are in line with the credence goods characterization of DK73.

Undertreatment is the third possible problem in DK06. A consumer is undertreated when she requires the expensive treatment, but only receives the cheap treatment. Yet, when undertreated, the consumer directly learns that she was undertreated by observing his utility of 0. Because the expert can diagnose the consumer’s need without error, the consumer can directly infer that the expert must have misrepresented his needs. The information provided by the expert therefore has *experience* characteristics rather than *credence* characteristics. The consumer could prove his case in court or contract on the fulfilment of his need in the first place. Undertreatment in DK06 is therefore only possible by assuming the absence of liability. It is, however, not clear why the absence of liability should not lead to undertreatment in markets for experience goods as well.<sup>14</sup> When an experience characteristic is at the centre of our analytical interest, the analysed problem would better be called a an experience, and not a credence goods problem. Other authors (Hilger, 2016; Mimra et al., 2016a; Bester and Dahm, 2017) have recently followed this approach and study goods with both credence and experience characteristics under the term credence goods.

**Credence goods and asymmetric information** Authors who require the informational asymmetry between seller and consumer with respect to the consumer’s need (category (3) in table 4) tend to exclude many examples of credence goods listed in table 1 from their characterization. Such a characterization excludes markets with *information experts*: goods for which consumers know what they need, but not what they get. This exclusion contrasts the fact that these goods are credence goods in the sense of DK73. Furthermore, they are concerned with a very similar problem as the model by DK06, namely the problem of

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<sup>14</sup>The lemons-problem in Akerlof (1970) may be interpreted in this way.



overcharging which occurs in DK06 when consumers cannot verify what service or treatment they have received.

The setup of DK06 does also not consider markets with expert advisers in which the seller recommends products provided by third parties to consumers (Inderst and Ottaviani, 2012a). A consumer may realize that he/she has purchased a non-optimal good, but he/she is unable to judge the quality of advice received, because diagnosis and outcome involve a stochastic element.<sup>15</sup> Last, markets without expertise (the last category in table 1), where the true benefits are unknown, are not considered by credence goods characterizations which require information asymmetries. For these goods, expertise does not exist per definition.

**The distinction between experience goods and credence goods** It is simple to distinguish between search, experience and credence *characteristics*, this distinction cannot simply be carried on to distinguish search, experience and credence *goods*.

Recently, the focus on credence *goods* instead of credence *characteristics* has led to greater divergence from the categorization of DK73. A possible reason is that when authors do not require that good characteristics are non-evaluable after purchase, they naturally break with the goods categorization of DK73.<sup>16</sup> One of the few comments on the difference between credence and experience goods reflecting this problem is provided by Dulleck et al. (2011):

*“Experience goods differ from credence goods in several important dimensions. For example, (i) 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; (ii) for given prices a consumer can tell exactly which quality he prefers in the case of experience goods, but he does not know it with credence goods; (iii) whereas 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.”*

(Dulleck et al., 2011) (p.533, footnote)

Arguably, this characterization is not straight-forward. With respect to (i) I may counter that it is not generally the case that valuation increases with quantity with experience goods.

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<sup>15</sup>Inderst and Ottaviani (2009) comment that the credence goods literature puts much focus on what I call expert providers. Already DK73 stated that “much of our discussion focuses on the key problem of the joint provision of diagnosis and services – such as the choice and execution of an automobile repair or taxicab route.” (p.67), where they used the word “much” instead of “all”.

<sup>16</sup>The literature has not yet noted this as only a few authors who conflict with DK73’s characterization have commented on the difference between experience goods and credence goods in the first place.



Take the example of a beer drinker with who despises wine, i.e., whose utility is independent of the sort (quality) of wine she consumes, although wine has experience characteristics (the authors themselves call wine an experience good (p.530)). (ii) seems to state a natural consequence of the credence goods problems of overtreatment and overcharging, but it does not hold when undertreatment occurs in the model of [Dulleck et al. \(2011\)](#), because then the consumer knows he would have needed the expensive treatment/quality. Finally, (iii) may be interpreted as a consequence of the authors reference to goods instead of characteristics.

## 4 Conclusion

Goods as diverse as health care, financial advice, food labels and journalism have frequently been termed *credence goods*, because important characteristics of these products cannot be evaluated by consumers. I have categorized the different lines of research which refer to credence goods into markets with *expert providers*, *expert advisors*, *information experts* and *no expertise*. The focus of the literature has been on expert providers for a long time, but the two other categories have developed more recently, particularly the literature on markets for advice in the wake of the financial crisis. I have shown that, mostly in the literature focussing on expert providers, the characterization of credence goods has diverged from the classic characterization by DK73. I argued that this should be avoid to make sure that first, authors only refer to credence goods when they analyse credence characteristics of a good; and second, that authors do not formulate general characterizations of credence goods when they actually only give a characterization for a subgroup of credence goods, e.g., those sold in markets with expert providers. I propose to use the classic characterization by DK73 as it is clear and can successfully combine closely related subfields under one roof.

Clarity with respect to the characterization of credence goods is important, because it raises awareness for similar problems in differently appearing markets. This may serve to improve research within the field, the communication of research findings to researchers from other fields, to the public and to politics.

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