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Keywords: *credence services; health care; eye-care; board certification; optometrists.*

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Keywords: credence services; health care; eye-care; board certification; optometrists.

JEL Classification Codes: I [Health]; M [Business Administration]

I. Introduction

In 1973 Darby and Karni identified a distinction between experience, search, and credence goods and services. According to Darby and Karni (1973), credence goods are goods and services "sold within relationships characterized by high levels of information asymmetry between buyers and sellers, with buyers having to trust the sellers as to claims made, i.e., in situations where the seller determines the customers' requirements." Moreover, in the case of some services, such as health care, not only do consumers have almost no ability to assess what service is needed or the quality of the service to be performed, they may have difficulty evaluating the quality of the service even after it is received. In addition, in most cases involving health care, consumers don't have the ability to determine how the quality of the service received compares to other health care providers of the same service. This is because, as noted by Parasuraman, Zeithami and Berry (1985), service experiences are systematically different because services are heterogeneous and, as a result, less predictable.

The question then becomes what kind of information is important to consumers as they seek to reduce the risks inherent in the purchase of these credence services? In other words, what sources of information can a consumer use as "cues" as to the competence and expertise of a health-care provider? One such "cue" is whether the health-care provider is "board certified" and, then the questions are whether the certification is important to consumers in their selection of a health-care professional and whether board certification is effective as a cue to the providers' expertise and competence.

This study focuses on one type of health-related service, eye care, and consumers' purchase of eye-care services from optometrists, who are state-licensed eye-care professionals but different from ophthalmologists, who are medical doctors specializing in eye care. Eye care was selected because eye care is a service with both a credence and an experience attribute, i.e., the consumers know if they see better after an eye exam but must rely on the expertise of the eye care provider to determine the need for treatment, i.e., a new or changed prescription, and because the consumer has no way of knowing whether the quality of the service received would be different if a different eye care provider had been selected.

Specifically, the research questions are:

1. What factors are important in the selection of an eye-care provider?
2. How important was board certified in a consumer's decision to see their particular eye care provider?

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3. What message is being communicated by an eye care provider who is board certified?
4. Is there a difference in perception of optometrists who are board certified eye-care providers and ophthalmologists, all of whom are board certified medical doctors specializing in eye care?
5. Are there differences in perception of an optometrist who is board certified and an optometrist who is not board certified?

The data for this analysis is a nationwide on-line survey of 500 consumers age 21 or older who had seen an eye-care professional (optometrist or ophthalmologist) in the prior three years. Board certification of optometrists or ophthalmologists was selected as a subject matter since ophthalmologists, who are medical doctors specializing in eye care, have board certification as a requirement to practice while board certification of optometrists is a relatively new phenomenon and is voluntary. Thus, consumers' perceptions of the certification of ophthalmologists serve as a control to account for pre-existing beliefs regarding board certification in general and as it relates to board certification of optometrists.

II. Prior Research

The seminal article on credence goods and services is Darby and Karni (1973) who introduced the concept of a credence good to Nelson's (1970) earlier classification of search and experience goods. Other authors have expanded on the Darby and Karni continuum of credence goods to include services based, for example, on the level of risk associated with services (Zeithamal & Bitner 2000; and Mitchell 1994); the level of information search with credence services (Mortimer and Pressey, 2013); and whether the services were provided in a professional-consumer or professional-business relationship (Ostrom & Iacobucci 1995). Additionally, authors have noted that professional services have characteristics similar to credence goods in that they are often customized for the individual (Lapierre, 1997), and frequently require interaction between the service provider and the consumer to create value (Hirvonen & Helander 2001).

Importantly, as noted by Mitra and Capella (1999), there is reason to believe that consumers engage in different decision-making processes while evaluating credence services because the intangibility of services makes it difficult to assess the quality of the service. Thus, services in general and medical-related services in particular are perceived as associated with greater uncertainty and higher risks and, as a result, must be taken on faith. For example, as noted by Sun, et al (2012), a higher level of uncertainty leads consumers of credence services such as health-care to rely on non-alignable attributes, i.e., those that are unique to the particular provider of the service, as opposed to alignable attributes, which are discernable across service providers. Similarly, Hsieh and Hiang (2004) found that, among consumers who had had a hospital visit, that "interaction quality," defined as the trust between consumers and the health-care providers, and "functional quality," defined as the attitudes, behaviors, and expertise of the health-care provider, were important criteria in assessing the value of credence services.

Other authors have examined the role of third-party certification for credence services, including certification of health care professionals. For example, Baldwin et al (2011) found that credentialing, including certification programs, are developed by third-party health-related organizations to "…protect the public by establishing and ensuring a minimum acceptable standard of quality and performance for professionals working in population health …"Also, Babakus et al (1991) found that "…physicians have found that consumers value certification as an indicator of achievement, competence, and quality." Similarly, Adams et al (2002) suggests that, in the case of midwife and nurse midwifes, being "certified" is an indication of competence that will forestall consumers' "drift to low-price, low-quality alternatives" when selecting a health-care (midwife) provider. On the other hand, Grosch (2006) found "no credible link between specialty board certification and outcomes or quality of clinical care among medical doctors."

Applying these findings to eye-care professionals, while consumers may, in varying degree, have the skill, knowledge, experience, and technical expertise to form expectations and performance assessments about some services they receive, no such skill or knowledge is likely to exist in the case of eye care. Thus, while consumers may engage in more involvement and more information search with credence services, there is limited opportunity for such search in the case of eye-care providers. This is called "asymmetry of information" (Zeithaml and Bitner 2000) because sources don't exist to enable a consumer to determine if optometrist A is more competent, or better trained than optometrist B. Hence, the role of a cue such as board certification as a measure of credence factors such as expertise, training, and quality of care is likely to be an important factor in a consumers' decision as to who to choose as his/her eye-care professional.

III. Methodology

The data were collected from a nationwide sample of 500 consumers drawn from an internet panel of individuals who have agreed to participate in internet surveys on a periodic basis. The universe for this study is adults age 21 or older who have seen an eye care provider (optometrist or ophthalmologist) within the prior three years. Respondents who agreed to participate in

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the on-line survey were first asked a series of qualifying questions related to whether they wore contact lenses or glasses prescribed by an eye care provider and whether they had received their eye care from either an optometrist or an ophthalmologist. Respondents were then asked what factors were important in their selection of an eye-care provider, whether they believe the eye care provider they had seen, i.e., an optometrist or ophthalmologist, was "board certified," and the importance of their eye care provider being board certified. They were also asked what it meant to be "board certified" (in general) and what a claim of being board certified says about that eye care provider and whether there are any differences in training, competence, or expertise between an optometrist who is board certified and one who is not board certified.

IV. Findings

a) *Demographic Profile*

As noted in Table 1, 71% of respondents were female, almost half (47%) had either a 4-Year college or graduate degree, and 58% had seen an optometrist in the past three years while a third (42%) had seen an ophthalmologist.

Table 1 : Demographic Profile

Gender	Male	135 (29%)
	Female	333 (71%)
N		468
Age	Under 21	2
	21-30	50 (1%)
	31-40	76 (16%)
	41-50	105 (22%)
	51-60	122 (26%)
	Over 60	113 (24%)
N		468
Education	High School or less	74 (16%)
	Some College	111 (24%)
	2-Yr College Grad	62 (13%)
	4-Yr College Grad	155 (33%)
	Grad School/Degree	66 (14%)
N		468
Eye Care Professional Seen	Optometrist	306 (58%)
	Ophthalmologist	224 (42%)
	Not Sure an Optometrist or Ophthalmologist	--
N		530*

**Includes those who only completed part of survey*

b) *Importance of Board Certification*

The first research question asks what factors are important in a consumer's decision to see an eye-care provider. As noted in Table 2, the provider's professional qualifications was seen as the most important, rated as "very important" or "extremely important" by 75.8% of respondents, followed by his/her reputation (71.9%), his/her personal qualities (69.9%), and board certification (68.1%). What is particularly noteworthy is that 68.1% of respondents viewed board certification as "very important" or "extremely important," even though there was no mention of board certification in any prior question.

Table 2 : Importance of Factors in Eye Care Provider Decision

Factor	Very/Extremely Important
His/her experience/years in practice	389 (58.5%)*
Professional school attended	235 (35.3%)
His/her past performance, including information on success/failure	431 (64.8%)
Information of complaints/lawsuits	340 (51.1%)
Personal qualities/communication skills	465 (69.9%)

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Recommendation of others	300 (45.1%)
His/her reputation	478 (71.9%)
His/her age	97 (14.6%)
His/her board certification	453 (68.1%)
Type of eye care provider (optometrist/ ophthalmologist)	333 (50.0%)
Location of his/her office	401 (60.3%)
His/her hospital affiliation	203 (30.5%)
His/her professional qualifications	504 (75.9%)
MULTIPLE RESPONSES ACCEPTED	---

**Combines "very important" and "extremely important" responses*

c) *Importance of Board Certification in Particular Eye-Care Provider Decision.*

The second research question examines the specific importance of board certification in a consumer's decision to see a particular eye-care provider. Respondents were first asked whether the eye care provider they saw was board certified. As noted in Table 3, significantly more respondents (α=.05) who had seen an ophthalmologist said they believed he/she was board certified, compared to 73% of those respondents who had seen an optometrist. This latter result is noteworthy since it is estimated that less than five percent of optometrists are board certified by either of the optometric associations (American Optometric Society, Inc. vs American Board of Optometry, Inc. 2011).

Table 3 : Was Your Eye Care Provider Seen Board Certified?

	Optometrist	Ophthalmologist
Yes	213 (73%)**	183 (86%)
No	0	1
Don't know/Not sure	78 (27%)	29 (14%)
N*	291	213

**Limited to those who said they had seen specific provider; Margin of error = +/- 5.9%*[1]

All respondents were next asked how important, if at all, it is that their eye care provider be board certified. As noted in Table 4, 62.5% of respondents who had seen an optometrist said it was "very important" or "extremely important" that their eye care provider be board certified while 70.8% of respondents who had seen an ophthalmologist indicated it was "very important" or "extremely important" that they be board certified.

Table 4 : Importance of Eye Care Provider Being Board Certified

	Optometrist	Ophthalmologist
Not at all/very unimportant	9 (3.1%)	9 (4.2%)
Somewhat unimportant	8 (2.7%)	3 (1.4%)
Neither important or unimportant	23 (7.9%)	14 (6.6%)
Somewhat important	62 (21.3%)	31 (14.6%)
Very/Extremely important	182 (62.5%)	150 (70.8%)*
Don't know/Not sure	7 (2.4%)	5 (2.4%)
N	291	212

**Margin of error = +/- 5.9%; α=ns*

Respondents were then asked their reason for a belief that it was important or unimportant that their eye care provider be board certified, with their verbatim responses recorded. Among the reasons as to why being board certified was important across all respondents were such statements as "I only have one pair of eyes, I want them taken care of by a professional," "it certifies that he has the qualifications I needed," "I feel more assured of his/her competence if he/she is board certified,""it gives comfort that he has the required skills to perform job," and "it means he or she has passed a series of qualification tests from peers representing the industry." Among, those who said board certification was unimportant, the primary reason was that being "licensed" is seen as the same as being "board certified."

[1]Computation of traditional estimates of statistical precision technically require a probability (random) sample. However, statistical estimates using non-probability samples can be used to provide some estimate of likely sampling error. Under appropriate statistical assumptions, a total sample size of 504 will produce confidence intervals for statistical estimates that are no greater than +/- 5.9% 95% of the time.

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d) Perception of Board Certification

The third research question asks what message is being communicated by an eye-care provider who is board certified. In order to address this question, respondents where shown a series of statements regarding board certification of eye care providers and asked whether they believed each statement was "Definitely/Probably Correct" or not. As noted in Table 5, consistent with prior research regarding the perception of providers of credence services like health care providers, two-thirds of the respondents (64% - 68%) believe that eye-care providers who are board certified: a) are more competent than eye care providers who are not board certified, b) have completed residency training, and c) have more formal training than an eye care provider who is not board certified. Importantly, however, less than half of all eye care consumers (45.7%) believe that being board certified is necessary to provide eye care.

Table 5 : Perception Regarding Board Certification of Eye Care Providers

	Definitely Not Correct/ Probably not correct	Might/ Might Not	Definitely Correct/ Probably Correct	Don't know/Not sure	
An eye care provider must be board certified to legally provide eye care*	83 (17.1%)	56 (11.6%)	222 (45.7%)	111 (22.9%)	484**
Board certification is a voluntary process	74 (15.3%)	67 (13.8%)	188 (38.8%)	135 (27.9%)	484
Board certified eye care providers are likely to be **more competent** than eye care providers who are not board certified	20 (4.3%)	71 (14.7%)	331 (68.4%)	62 (12.8%)	484
Board certification requires completion of **residency training** after obtaining a license	13 (2.7%)	46 (9.5%)	316 (65.3%)	109 (22.5%)	484
Board certified eye care providers have **more formal training** than eye care providers who are not board certified	22 (4.5%)	68 (14.0%)	314 (64.9%)	80 (16.6%)	484

***Limited to those who saw either optometrist or ophthalmologist and knew if he/she was board certified.*

e) Differences between Perceptions of Optometrists and Ophthalmologists Regarding Board Certification.

The fourth research question sought to determine if consumers' perceptions of eye-care providers who had seen an optometrist are different from perceptions of consumers who had seen an ophthalmologist. In order to answer this question respondents were asked whether there was a difference in the nature of the certification requirements for an optometrist to become board certified and the requirements for a medical doctor to become board certified in ophthalmology. As noted in Table 6, in all credence-factor categories raised, significantly more respondents see ophthalmologists as having higher requirements for board certification than optometrists, including 80% of respondents believing that a medical doctor must "pass a qualifying exam/test" to become board certified in ophthalmology, compared to 66% who believe an optometrist must pass a qualify exam to be board certified.

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Table 6 : Perception of Requirements for Board Certification

	Ophthalmologist Board Certification	Optometrist Board Certification
Additional formal training in a field of eye medicine/optometry	94 (65%)	84 (43%)*
Additional course/clinical work in a field of eye medicine/optometry	93 (65%)	87 (44%)*
Additional experience in practice	66 (46%)	60 (30%)*
Periodic assessment of his/her work	67 (47%)	72 (37%)*
Being an expert in a particular field of eye medicine/optometry	68 (47%)	63 (32%)*
Being a specialist in a particular field of eye medicine/optometry	77 (53%)	61* 31%)
Pass a qualifying exam/test	115 (80%)	130* (66%)
Don't know/Not sure	10 (7%)	44 (22%)
Other (specify)	0	0
N	144	197*

**Different α = .05 or greater; ** Includes those who said no difference*

f) Perceived Differences Between Optometrists Who Are Board Certified and Optometrists Who Are Not Board Certified.

All respondents, regardless of who their eye care provider was, were asked about the fifth research question, i.e., their perceptions of optometrists who are board certified and those who are not board certified. Specifically, they were shown a series of statements and asked whether the statement was "definitely or probably true" or "definitely or probably not true." As noted in Table 7, some of the noteworthy results are that significantly more respondents believe an optometrist who is board certified: a) is more competent than one who is not, b) has more training than one who is not, and c) is more of a specialist than one who is not. Also, over a third of respondents don't believe that an optometrist who is board certified just paid a fee to be certified. On the other hand, being board certified is not seen as necessary to treat particular types of diseases or to write prescriptions. Moreover, when the data in Table 7 were analyzed by sub-group (i.e., optometrist v. ophthalmologist) the results show similar perceptions of board certification for optometrists and ophthalmologists, suggesting that at least some of the basis for perceptions of board certification for optometrists comes from respondents' pre-existing beliefs regarding board certification of ophthalmologists.

Table 7 : Perceptions of Board Certified Optometrists

	Definitely not true/ Probably not true	Might/ Might Not be true	Probably true/ Definitely true	Don't know/ Not sure	N
An optometrist who is board certified is **more of a specialist** than one who is not.*	51 (10.9%)	78 (16.7%)	**229*(48.9%)**	110 (23.5%)	468
An optometrist who is board certified is likely to be **more competent** than one who is not	25 (5.3%)	106 (34.2%)	**228 (48.7%)**	89 (19.0%)	468
An optometrist who is board certified is likely to have **more training** than one who is not	22 (4.7%)	69 (14.7%)	**299 (63.9%)**	78 (16.7%)	468
An optometrist who is board certified just paid a fee to become certified	178 (38.0%)	74 (15.8%)	86 (18.4%)	134 (27.8%)	468
An optometrist who is board certified is likely to be **more expensive** than one who is not	55 (11.8%)	126 (26.9%)	176 (37.6%)	111 (23.7%)	468

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An optometrist who is board certified is **more likely to accept insurance plan**s for payment	78 (16.7%)	81 (17.3%)	170 (36.3%)	139 (29.7%)	468
An optometrist who is board certified has the **same license** as one who is not board certified	**115 (24.6%)**	**77 (16.4%)**	**145 (31.0%)**	131 (28.0%)	468
An optometrist who is board certified can **treat more diseases** than one who is not	**60 (12.8%)**	**82 (17.5%)**	**179 (38.2%)**	127 (27.1%)	468
An optometrist who is board certified **can write prescriptions** whereas one who is not board certified cannot	**107 (22.9%)**	**66 (14.1%)**	**139 (29.7%)**	156 (33.3%)	468

**Margin of error +/- 4.5%*

V. Conclusions

Four conclusions flow from this study of consumers who have seen either an optometrist or an ophthalmologist for eye care. First, credence factors such as personal qualifications and reputation are the most important factors consumers use when selecting an eye-care provider, with "board certification" being the fourth most important factor in their decision. Second, the importance of board certification is not significantly different when the consumers' eye-care provider was an optometrist and when he/she was an ophthalmologist. Third, board certification provides a cue as to competence and training of a credence service provider such as eye-care providers and, theoretically, can be used to distinguish between the competence and training of optometrists based on whether they are board certified or not Also, board certification can be used, at least theoretically, to distinguish between optometrists and ophthalmologists, particularly since ophthalmologists are seen as more competent and more of an eye care specialist, based on the perception that the requirements for board certification for an ophthalmologist are higher than for an optometrist. Fourth, and most importantly, while board certification serves as a cue as to competence, it is not an effective cue that consumers can use in deciding what type of eye care provider to use, given that 73% of respondents who saw an optometrist (as opposed to an ophthalmologist) believe their eye care provider was board certified when estimates are that less than 5% of optometrists are board certified. Apparently, simply because the optometrist was licensed by the State as an eye care provider leads consumers to believe he/she is board certified.

VI. Policy Implications

First, public entities at the Federal and State level, working with professionals and academics in the field of optometry, need to establish uniform standards for board certification in order to provide an environment of trust such that the consuming public can be assured that board certification connotes competence and expertise in eye care. Second, third-party certifying organizations must establish and maintain rigorous standards for certification that include additional training and coursework, and periodic assessment of optometrists' performance to assure that, consistent with consumer perceptions, "board certification" of an optometrist can be used by a consumer as a "cue" to an eye-care provider with the highest level of expertise, competence, and training. Finally, the results of this study clearly show the need for optometrists to distinguish themselves from ophthalmologists and articulate the benefits of board certification.

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