

How diamond retailers behave in the market to maximize profit under asymmetric information?

Abstract

The purpose of this research is to analyze how asymmetric information affect the behavior of retailers and consumers in diamond industry. Certification act as a medium of trust between retailer and consumer, but after all did not solve the problem. Hence, certification create further asymmetric information by few of the certified institution which are overly lenient in their grading. The problematic issue create asymmetric information which deviate the information from consumer, hence deteriorate social welfare. Therefore this paper exist to help consumer and retailer realize how asymmetric information can affect welfare of both.

Introduction

Every industry has its own players, and each player has to compete in order to survive. Competition holds an important key in profitability and innovation to the company. Diamonds are certified to help eliminate asymmetric information, but did the certification of diamond institutions help eliminate asymmetric information. Certified diamond institutions are making huge amounts of money and traders are willing to wait over months for their diamonds to be certified. The diamond industry has accumulated over 73 billion USD in 2013 and is increasing rapidly throughout the year. There are 4 dominant certified institutions which are Gemological Institute of America (GIA), HRD Antwerp, International Gemologist Institute (IGI), and European Gemologist Laboratory (EGL USA, ISRAEL, and HK). These 4 certified institutions are ethically to be consistent, strict, and ethical, but after all if the institutions are unreasonably strict, traders wouldn't purchase the service and if the institutions are loose on their grading criterion, traders wouldn't purchase the service either.

These 4 certified institutions have affected the price in the diamond market differently, since each has its own standards of grading. These different standards will put an effect on the premium or discount on the price tag of the diamond industry. Asymmetric information also exists where consumers do not know about the differences in grading standards of these certified institutions. This problem exists between retailers and consumers, where the retailer has a hard time explaining the premium and discount in the price of different certified institutions. Some of the traders use the lab based on their ability to sell the diamond. With this action it causes volatile pricing in the diamond market, where the same quality of diamond, but with different grading institutions fluctuates over 15% spread in price.

Thus this paper aims to examine the grading institutions' consistency, strictness, and ethicality, and how different institutions affect the diamond pricing. Moreover, it aims to foresee

how the certification difference in result, affect retailers and consumers behavior. Retailers may foresee the opportunity in selling overly graded product to consumers with a higher discount, which has zero knowledge about the faulty of this industry. Consumer, on the other hand may be a type 1 or type 2 consumer who are price sensitive or quality sensitive. Relationship between how retailer behave base consumer preferences pay a significant role in retailer's profitability

Literature Review

Diamond laboratory serve as a third party to eliminate asymmetric information from trader, such the topic is emphasized on the public confidence of the laboratory, since many of these institution are being respect for their accuracy while some earn reputation for overly generous in their evaluation (Bate 2013). Moreover, some laboratory institution (EGL) is being criticized for their inaccuracy of examination, such that results of the same gem may vary between branches. Rapnet, world leading diamond trading network has decide to delist EGL from the trading network due to the lack of public confidence toward diamond laboratory. Krawaitz (2013) also added about the inconsistency of EGL laboratory. Investigation of the inconsistency from each laboratory has been ignited, by delivering 10 stones with different characteristic to the 4 laboratories which include GIA, HRD, IGI, and EGL. Among the 4 institution, EGL are overly lenient in their grading. Table 1 and 2 provided the laboratory result, examine by the 6 institution on a round diamond: Weight 1.62 carats and 1.06 carats consecutively. Grading comparison between GIA and EGL Israel would present a large price fluctuation between 10 to 15 percent. Since EGL is overly lenient in their grading, their pricing is usually lower than the diamonds to attract consumers. GIA on the other hand has a very strict pricing on their product as their price goes by the quality they are producing.

Bate (2013) further discuss about the solution to the problems. Graders within the same labs may disagree about the result from the experimental test. Some factor attribute to the errors, may come from human errors, since statistically show human are only right eight out of ten when it comes to colors grading. Company such IGI and GIA has invested in machine that yield the reliable and consistency result for color grading. The technology would standardize the institution sub branches. As a result of quality index shown by table 3, GIA rank the highest on the grading quality whereas, EGL rank the lowest on the grading quality. Since diamond industry has a very high asymmetry information, where certification is needed to step in but after all the certification did not solve the problem. Different grading standard of certified institution was the root of the problem. Actions from diamond committee has been initiated to delist EGL Israel and EGL Hong Kong certified diamond from their trading network. With this action, they believe will reduce the asymmetry in the market and hence create an inform market to consumer.

Stock Num.	Test 2					
Shape	Round					
Weight	1.62 carats					
Measurements	7.59*7.56*4.64					
Lab	<u>GIA</u>	<u>IGI</u>	<u>EGL USA</u>	<u>EGL HK</u>	<u>EGL Israel</u>	<u>HRD</u>
Color	E	E	E	D	D	E
Clarity	SI1	SI1	VS2	VS2	VS1	VS2
Cut	EX	I	I	EX	EX	VG
Polish	EX	EX	VG	EX	EX	EX
Symmetry	EX	EX	VG	EX	EX	VG
Fluorescence	Faint	Faint	None	None	None	None

Table 1

Stock Num.	Test 7					
Shape	Round					
Weight	1.06 carats					
Measurements	6.54*6.44*4					
Lab	<u>GIA</u>	<u>IGI</u>	<u>EGL USA</u>	<u>EGL HK</u>	<u>EGL Israel</u>	<u>HRD</u>
Color	G	F	F	E	D	F
Clarity	VS2	VS2	VS2	VS1	VS1	VS1
Cut	VG	VG		EX	EX	VG
Polish	VG	VG	G	EX	EX	EX
Symmetry	G	G	VG	EX	EX	G
Fluorescence	None	None	None	None	None	None

Table 2

Ct	GIA	IGI	EGL USA	HRD	EGL HK	EGL Israel
1.00	12	12	12	12	15	16
1.62	18	18	19	20	22	23
1.04	9	9	8	10	14	14
0.33	20	20	18	20	21	22
1.01	9	9	13	12	18	18
1.08	18	18	19	19	21	21
1.06	16	17	17	19	22	23
0.77	18	18	17	19	22	22
0.90	19	19	19	20	23	22
1.01	9	9	12	12	17	17
AVG Quality Index	14.8	14.9	15.4	16.3	19.5	19.8

Table 3

Consumer behavior has play a huge role in their purchasing decision (Scott and Yelowitz 2009). Consumer are willing to pay for diamond which has no functions nor intrinsic value. Conversely, they pay for gain in marginal utility of consumption in diamond, jewelry, and gems. Under the assumption, types of consumers play roles in dictating the type of diamond and their gain in marginal utility. Such differences in grading result will put effects on to consumer and retailers behavior. Consumer could be separated into 2 types based on their quality and price preference, 1st consumer with price sensitivity and 2nd consumer with quality sensitivity (Shugan 1984). Consumer who are price sensitive will mostly engage in buying product which are loosely graded by institution such EGL, whereby consumer with quality sensitivity will choose product like GIA, which yield highest performance index comparing to other 3 grading institution.

With asymmetric information in this industry, the question has arose whether what signal diamond quality aside from certification. Quality can be signal through advertisement as long as the advertisement yield the unbiased results for the product (Nelson 1974). It is unlikely that advertisement will reveal all information, since producers will eventually lie about the product and moreover it is costly to review all information (Lewis 2009). Price on the other hand can signal quality since higher price may reflect goods which has superior quality (Gabor and Granger 1966). The 2 assumption mention above can be true if and only if seller do not find it profitable to cheat and convey wrong message to consumer, hence there are reasons why

seller on the other hand would refrain from cheating. Cheating as a matter of fact will eventually deteriorate seller's repeat sale, trust, and profitability (Farell 1980). As of all, consumers with brand loyalty who are impress with the quality and price of the product they purchase, may continue to purchase the product since it is costly to acquire new information of experience product.

Deception in pricing and quality of the product can occurred in any market where seller seek to gain profit (Gneezy 2005). As sellers know the deception in the quality of the product, it will deteriorate consumer's repurchase and trust, sellers might want to compensate by offering the product at a lower price. The action above could be called as moral price signaling. As a seller, product being offer to consumer or stranger indicate a correlation between price and quality, hence price is higher when quality is good. On the other hand product being offer to friend indicate a no correlation between quality and price, hence price being offered to friend do not depend on quality (Eriksson and Simpson 2007). Eriksson has further conducted a test with over 384 samples, where out of 384, 52 are classified as offers to friends and 332 are offers to strangers. When the friend offers' price are among the third lowest, 48% of the participant accept the offers. However only 21% participants accept the third lowest price when all offers are from strangers. As of all, quality signaling depend critically on social factor, social factor in others word is define as trust.

Disclosure of information in the market share a high cost, hence is a success factor of diamond industry (Lewis 2009). Disclosure of information create welfare gain to the society, but burden of cost are bare by sellers. Moreover, sellers has no incentive to reveal their true characteristic of diamond, unless it yield higher profitability. Whereas revealing the product characteristic is less likely to gain higher profitability. The issue is hard to compromise between the sellers and buyers. Sellers' utility depend on profitability, while buyer's utility depend on the quality and price of the product. Lower price with higher quality of the product

is always preferable to buyers. Diamonds can be classified as product which are hard to observe even after use, since it is not distinguishable by non-professional. When the product is not distinguishable by buyers, this creates asymmetric information which could deteriorate social welfare (Shapiro 1980). Under imperfect information, firm can reap off extra profit by reducing the quality as well as firm gain trust from consumer. Moreover reputation of firm will enhance the firm profitability over time.

Search cost is a determinant of diamond's sale, since consumer may hold symmetric belief. Whereas symmetric belief could result from consumer deviation. If the information transmitted to consumer deviates, symmetric belief might occur (Janssen and Shelegia 2014). Such information could be quality or price deviated, where consumer believes that other firm also deviates the same way. Information deviation could harm the industry directly, where diamond's sale are heavily affected by this deviation. As of all, consumer's belief holds an important key to success for every industry since as being said business profitability is dependent on consumer's desire of the product.

Empirical Analysis

Diamond industry discussed above has high transaction cost, either in acquiring information and/or information disclosure. This empirical analysis will discuss the factors determining diamond retailer's behavior in profit maximizing under asymmetric information. Furthermore each consumer behaves differently according to their preferences which will maximize their utility of consuming. Market condition in diamond business does reflect how consumer's behavior. Diamond will be the mean of trade in this analysis.

Characteristic of diamond can be differentiated through color, clarity, cut grade, symmetry grade, finish grade, and etc. Color quality index is shown in figure 1, where D color has the best color characteristic, followed by E to Z which has the lower quality. Fancy color are

exceptional, since it is a rare and collectible. Diamond trader value fancy diamond as if the diamond has the D color characteristic.

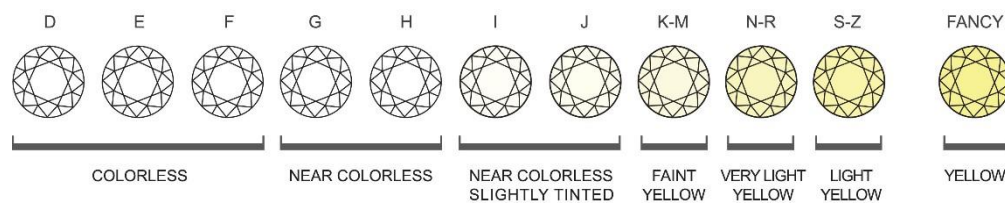


Figure 1

The assumption of this empirical analysis is stated below:

- 1.) *Retailer give out information which may be true or not true about the quality of the diamond*
- 2.) *The information given about the quality if the certified or non-certified diamond is fixed*
Color: F (all other constant)
- 3.) *Retailer cost of the diamond = Diamond world price + cost of certification or trust*
- 4.) *Retailer price of the diamond = Cost of the diamond + premium*

The analysis will contain 4 different diamond, where transaction will be between retailers and buyers. Price of diamond can be determine through Rapaport, which is a jewelry industry standard for the pricing of diamonds. The report is published weekly and given to jewelers and diamond merchants to set prices for consumers. Moreover, the quality of diamond will either be examine by certified institution or retailer. Retailer may lies about quality given from the above assumption, since retailer want to maximize profit. Diamond is a product which quality is not easy to observe by non-professional, therefore a median of trade is needed as an instrument such as certificate either from GIA, EGL, and HRD or trust. Trust can be developed through time and tight interaction between buyers and sellers. As stated, retailer may have incentive to lies about the quality of diamond, therefore 4 different diamond will be acquire for different cost with different quality to serve different type of consumer.

Diamond	Price/carats	Color	Weight	Cost
"1" (GIA)	\$31,500	F	2 carats	\$63,000
"2" (EGL)	\$25,400	G	2 carats	\$50,800
"3" (non-cert)	\$25,400	G	2 carats	\$ 50,800
"4" (non-cert)	\$ 18,600	H	2 carats	\$ 37,200

Table 4

Diamond	Color	Cost of Diamond	Cert. Cost	Trust Cost	Total Cost
"1" (GIA)	F	\$63,000	\$169	-	\$63,169
"2" (EGL)	G	\$50,800	\$130	-	\$50,980
"3" (non-cert)	G	\$ 50,800	-	\$128+50	\$50,928
"4" (non-cert)	H	\$ 37,200	-	\$114+50	\$37,314

Table 5

Cost of diamond is dependent on their quality, where good quality will yield a higher price, on the other hand low quality will yield a lower price. Table 4 show the actual result based on GIA strictest standard. Diamond 1 which is certified from GIA has the highest quality whereas diamond 2 which is certified from EGL has the lower quality. Even though in paper or EGL certification report show a quality of "F" color, but the actual result base on GIA standard is listed as "G" color, which show a lower quality. The certification cost of both certified institution are differently place, GIA which has the number one revenue among other institution charge higher price, where EGL which has the least revenue among other institution charge a lower price. On the other hand diamond 3 and 4 are both non certified diamond, whereas diamond 3 has a higher quality than diamond 4. Cost of trust on both diamond is calculated by the opportunity forgone, in which result from the process in building trust to consumers. The process of trust duration for consumer to buy the diamond is assume to be 1 months hence the opportunity forgone can be listed as depositing money into bank account. The formula for the calculation is listed below, whereas 1.025 is the rate of deposit. Moreover, cost of trust could come from gift which allow sellers and buyers to bond tight relationship.

$$(P_{\text{diamond}} \times \frac{1.025}{12}) - P_{\text{diamond}}$$

Cost of diamond can fluctuate by huge percentage depending on their quality. Seller can reap off profit by giving false information about the product they are selling, hence asymmetric information can deteriorate the welfare of consumer. Cost of selling good quality diamond and bad quality diamond can fluctuate over 69%. Moreover, seller who are selling good quality diamond will have to bear the burden of those who are selling low quality diamond, since those who are selling low quality uncertified or over lenient certified diamond will tend to lie about the diamond true characteristic

When diamonds are being sold to consumer, retailers will usually show the consumer the Rapaport, which is a jewelry industry standard for the pricing of diamonds. This is the first step to show the sincerity of the retailers on the approach to customer. Retailer further give out price which they stated to be the characteristic of the diamond, whereas in this case the quality of diamond is assume to be “F” color which is price at \$31,500 per carat. Moreover premium and discount are applied to each type of diamond depending on their true characteristic as shown below in Table 6. Diamond 1 which has the highest quality among the others are priced at 10% premium. Discount or listed price are applied to the lower quality diamond to induce buyers with price constrain or price sensitive.

Diamond	Discount / Premium	Price
“1” (GIA)	+10%	\$69,300
“2” (EGL)	0	\$63,000
“3” (non-cert) a.)	-10%	\$56,700
“4” (non-cert) b.)	-20%	\$50,400

Table 6

Diamond	Price	Cost	Profit
“1” (GIA)	\$69,300	\$63,169	\$6,131
“2” (EGL)	\$63,000	\$50,980	\$12,020
“3” (non-cert)	\$56,700	\$50,928	\$5,772
“4” (non-cert)	\$50,400	\$37,314	\$13,006

Table 7

As stated, lying about the quality of the product will generate excess profit for sellers in any industry which can be proven true in Table 7, where diamond 2 and 4, EGL certified and overstated uncertified diamond, yield the highest profit among the others. Retailers can either choose to sell only diamond 2 and 4 which offered higher profit or sell all the 4 diamonds since there are different types of consumers, hence each types of consumer has their own product preferences and price constrain.

This empirical analysis will be dealing with 4 types of consumers, consumers who are price sensitive with and without asymmetric information and consumers who are quality sensitive with and without asymmetric information. Consumers with asymmetric information are those who are unable to identify the quality of the product, hence consumers without asymmetric information are those are able to identify the quality of the product.

Thus consumer who are quality sensitive with asymmetric information will choose EGL, since they cannot distinguish the differences between GIA and EGL. Further consumer who are quality sensitive with asymmetric information view certification as high quality product, hence will refuse to buy other diamond with different characteristic. Thus, diamond without certification will be rejected by this type of buyer, since he or she view non-certified diamond as a low quality product, which does not complied to his/her preferences. Consumer will be less beneficial with asymmetric information, since he/she is not able to foresee the overly lenient in EGL grading, which resulted in a higher quality index of the diamond.

Furthermore, consumer who are price sensitive with asymmetric information will choose diamond with the lowest price due to their price constrain and inability to observe the quality of diamond. Consumer will be less attracted to the quality of the product, and only take price of the product into account of their consideration. Therefore, diamond 1, 2, and 3 will be rejected from consumer who are price sensitive with asymmetric information. Consumer will

be less beneficial with asymmetric information, since he/she is not able to foresee the overly stated quality of the product. Retailers are reaping off huge amount of profit by selling diamond 2 and 4 to consumer with asymmetric information, hence repurchase may not occur in the future since consumer may realize the quality of product after usage for a period of time. Comparison between good and bad quality of diamond may occur in the future.

On the other hand, consumer without asymmetric information who are quality sensitive will choose GIA certified diamond which has the highest quality. Since consumer without asymmetric information is able to identify the quality of the diamond. This type of consumer will not choose EGL, since he/she is able to differentiate the difference in quality of the 2 diamonds even though both are certified diamonds. Moreover, since he/she is able to identify the quality, uncertified diamond which has the lower quality will be rejected as well. As of all, consumer without asymmetric information are more beneficial than those with asymmetric information.

Moreover, consumer without asymmetric information who are price sensitive will choose uncertified diamond 3, since he/she is able to differentiate the quality of non-certified diamond whereas diamond 3 and diamond 4 are the lower price available in the market. Hence, by choosing uncertified diamond 3, he/she is able to find the best diamond quality that suit his/her price constrain. The type of consumer will deviate from consuming both diamond 1 and 2 due to the budget constrain, whereas quality of diamond 2 and 3 are identical. As stated above, consumer with asymmetric information who are quality sensitive will choose diamond 2, whereas consumer without asymmetric information who are price sensitive will choose diamond 3. This result has shown that asymmetric information can deteriorate the welfare of diamond's consumer.

Conclusion

As of all, does offering diamond 2 and 4 which maximize retailer overall profit, hence the answer will be no. Since different types of consumers has different preferences as stated from the above. Each demand different characteristic of diamond and are under different income constrain. Therefore, retailers offering all types of diamond will maximize their overall profit and welfare. On the other hand, consumer without asymmetric information will benefit more than consumer with asymmetric information since they will be able to identify the product before purchase and examine actual quality to price ratio. Hence, consumer with asymmetric information will not be able to identify the product before purchase. Consumer with asymmetric information will be more likely to be overly advised about the quality of the diamond. Furthermore, retailer will be able to gain more profit to those who has asymmetric information than those without asymmetric information. There are limitations to this empirical analysis due to the restricted consumer type and diamond characteristic. This analysis focus on the simplicity of the model to easily convey the message of how different quality of diamond can affect consumer purchasing decision and retailer's profit. Due to the simplicity of the model, there are 4 types of consumers, whereas consumer who are neither quality nor price sensitive and etc. are left out. Moreover, the model restricted the diamond characteristic by assuming color as a key to change in quality, whereby assuming other constant. As stated, diamond quality can be examine through color, clarity, proportion grade, polish grade, cut grade, fluorescence, and etc. The study will allow consumer to understand the behavior of retailer, and vice versa. Understanding the behavior of retailer will help consumer to know how asymmetric information affect the quality of the product. On the other hand, consumer will not reveal their willingness to pay for the product they are purchasing. Furthermore, adverse selection can happen even though there are certification. Hence, the further study of

this analysis is recommend on the topic of repurchase. Such repurchase will not occur if the retailer lies about the quality, and what will be the cost to be taken into the account.

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