

Let the Buyer or Seller Beware:
Measuring Lemons in the Housing Market under Different
Doctrines of Law Governing Transactions and Information¹

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Abstract

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Under information asymmetry, lemons tend to be overpriced. Yet, how much overpricing premium the lemons can command is contingent on the underlying legal institutions. A set of transaction data from Hong Kong's housing market reveals that durable lemons are overpriced by 6.7% and 9.9% under the rules of "let the seller beware" (caveat venditor) and "let the buyer beware" (caveat emptor) respectively. By switching the legal regime from the former to the latter, this represents a 32.3% increase of the overpricing premium. However, it does not suggest that let the seller beware is necessarily a more efficient legal doctrine. New institutions with regard to information disclosure are emerging to deal with the lemon problem.

1. Introduction

Akerlof's (1970) paper on information asymmetry has expounded the Lemon Principle which suggests that bad products tend to drive out the good. Taking advantage of information asymmetry, a more informed seller is apt to conceal the adverse attributes of an inferior product² and sell it at a price exceeding its intrinsic value (Shavell 2004). This is a lingering problem particularly when the legal institution neither assigns the property right in information to the buyers nor makes the sellers liable for the defects. The traditional common law doctrine governing sales, that is let the buyer beware or caveat emptor, assumes no duty of information

² In this study, inferior products refer to those heterogeneous products with below average quality attributes or latent defects which are difficult to discern. They are different to inferior goods, which are goods to be consumed less when real income increases.

disclosure and no liability for products sold³ to the sellers. Under a single shot game, a seller is tempted to capture all the price difference between lemons and non-lemons, or what we call the “lemons spread”. On the other hand, under the doctrine of let the seller beware or caveat venditor⁴, sellers are liable for non-disclosure and the defects sold. Under this rule, the buyer may have less incentive to inspect the product and hence may give rise to an opportunity to the seller to stay silent on the adverse attributes if he expects that full damages may not be demanded eventually (De Alessi 1994). While the doctrine of caveat emptor has been made the underlying principle governing sales in the common law system, institutional changes have been taking place gradually to give way to the doctrine of caveat venditor⁵ (Posner 1983).

³ However, statutes and legal principles governing fraud and misrepresentation and the like prevail this doctrine.

⁴ Jurisprudents may not agree with the dichotomy of the two legal doctrines. From their perspective, the doctrine of caveat emptor is the underlying principle of the common law system. To remedy the deficiencies, some caveat venditor rules such as implied warranties of contracts have evolved over time. Hence, the two doctrines are complementary rather than contradictory in nature. With a primary aim to explain the economic system at work, this study boldly adopts the dichotomy view.

While focusing on contract law primarily, following other studies on law and economics such as Posner (1983) and Friedman (1987), parts of the discussion in this paper will broadly cover the liability rules of the two common law doctrines under contract law and tort law. Posner (2007) and Friedman (2000) suggested that tort problems can be seen as contract problems and vice versa since the demarcation of the problems is vague.

⁵ See Posner (1983 p.184). For instances, the claims of product liability such as strict liability, implied warranties of merchantability, fitness for purpose, the Lemon Laws and Property Condition Disclosure Laws in the US are examples of this doctrine.

With the freedom of contract and costless negotiations, Friedman (1987) argued that the two doctrines can be symmetric. Sellers can give guarantees and buyers can grant waivers under the caveat emptor and caveat venditor principles respectively. This is literally a corollary of Coase's (1960) arguments on social cost. However, in a world of positive transaction costs, the two doctrines never converge. The underlying legal doctrines governing transactions and information will affect not only the overpricing premium of the lemons but also the general prices of products in a society (McKean 1970, Buchanan 1970).

A natural experiment in Hong Kong's housing market has enabled us to measure the overpricing premium of lemons under different legal institutions. In this experiment, the government had planned to construct a public highway running straight through a housing estate and the housing developers were fully aware of this when they carried out the development project. They knew that a few years after the development was completed, the highway would turn some of the housing units into durable lemons. In Hong Kong, some caveat venditor rules are imposed to govern the sales of uncompleted units, while caveat emptor is strictly applied to the transactions of completed units. During the construction period, the housing developers sold all the uncompleted units without fully disclosing the highway information. More than half of the completed units, lemons and non-lemons alike, were then resold in the market before the highway project became public information. A hedonic price analysis reveals that the lemons were less overpriced when they were sold under the caveat venditor than the caveat emptor rules.

Following Coase (1975 and 2009), this paper aims to facilitate a better understanding of the economic system at work in relation to the law. The structure of the paper is as follows. Part 1

will give an introduction, and Part 2 a literature review. The empirical test will be illustrated in Part 3. The choice of the legal doctrines and the new institutions that arise to tackle the lemon problem are discussed in Part 4. Finally, a conclusion will be given in Part 5.

2. Literature Review

Drawing a “not quite complete” analogy⁶ to Gresham’s law⁷, Akerlof (1970) coined the term “Lemon Principle” with reference to the used car market, such that “(t)he “bad” cars tend to drive out the good”. The Lemon Principle suggests that buyers tend to pay less for a used car because they are unable to tell whether a used car is good or bad. As a consequence, the sellers only sell off their lemons and the market may collapse eventually because of this adverse selection process. Nevertheless, Akerlof (1970) suggested that two “counteracting institutions”, namely guarantees and brand names, may be developed such that good products can find their ways to compete with the bad. Subsequent discussions on the counteracting institutions include signalling investment by Spence (1973) and Akerlof (1976a), and screening process by Rothschild and Stiglitz (1976). Numerous studies had attempted to refine Akerlof’s (1970) theoretical model, such as Wilson (1980) and Kim (1985). Also quite a number of empirical studies had been carried out to test the Lemon Principle. For examples, Bond (1982) studied the

⁶ Akerlof (1970, p.490) points out that Gresham’s law is based on the assumption of symmetric information among the seller and buyer. It is contrary to the underlying assumption of information asymmetry in his study.

⁷ The law was introduced by MacLeod (1858) which refers to a letter written by Sir Thomas Gresham to Queen Elizabeth I on the reform of currency (see Harris 1987, vol.2, p.565). The law states that “bad money drives out good”.

used pickup truck market in the US in 1977 and found no significant difference in terms of quality between the traded and non-traded trucks produced between 1972 and 1976. Having studied a survey of the wholesale used car market in the US in 1989, Genesove (1993) also found the adverse selection problem weakly evidenced. Similar results were also found by Rosenman and Wilson (1991) in the cherry market.

Nevertheless, some studies have found evidence to support the Lemon Principle. Pratt and Hoffer (1984) showed significant evidence of adverse selection in their model which took into account those then recently transacted lemons and also the repair costs information. A rejoinder of Bond (1984) conceded that the adverse selection problem could be observed after incorporating transactions of over-10-year-old trucks into his original model (Bond 1982). Hendel and Lizzeri (1999) also found that more American brand cars were traded than Japanese brand cars in the US in 1997, while most people conceived that the average quality of the former was lower than the latter. More recent empirical tests affirming the Lemon Principle include Offer (2007) and Enger, Hartmann and Stern (2009) in the automobile market; Lambert and Wilson (2003) in the wheat market; Downing, Jaffee and Wallace (2009) in the mortgage-backed securities market; and Mocan (2007) in the child-care market.

Empirical studies on the Lemon Principle have largely been dominated by the investigation of the sales volumes among lemons and non-lemons while assuming their prices are identical. This is based on the assumption that the buyers are unable to differentiate the intrinsic qualities and thus have to pay the same price. Studies that found lemons could be sold at lower prices mainly argue that it is the consequence of various mandatory information disclosure programmes.

For instance, Pope (2008) showed that housing prices in the flood zones of Wake County, North Carolina dropped 4% after the disclosure of flood hazard information became mandatory. In another study, Pope (2007) investigated the impact of airport noise on housing prices after the Raleigh-Durham International Airport in North Carolina doubled the number of flights. He found that housing prices dropped 7.8% after the increase of flights and a further 2.9% decline was observed when the disclosure of airport noise information was made mandatory. In this case, it appears that the sellers had not fully captured the lemons spread when they disposed of the housing units before the implementation of the mandatory disclosure requirements. Other studies on information asymmetry in the housing market mainly investigate whether more informed parties can profit from the possession of informational advantage. After studying 100,000 transactions in 34 suburbs in the Cook County, Illinois during 1992-2002, Levitt and Syverson (2008) found that on average estate agents sold their own houses at prices 3.7% more, though 9.5 days longer, than their clients' houses. Firoozi et. al. (2006) revealed that state-licensed property tax consultants cum house owners in Texas saved more tax during 2000 and 2001 because the assessed values of their houses were 2.5%-6.2% lower than the others. These studies, however, do not attempt to address the lemon problem.

An extensive literature search shows that empirical studies on the pricing of lemons are far from adequate. This study attempts to measure the overpricing premium under different common law doctrines governing transaction and information. To our limited understanding, it is the first of its kind.

3. Empirical Test

The housing development identified for empirical tests is located in a high-density area northwest of the Kowloon Peninsula. The development comprises 12 blocks of 40-storey apartment buildings erected upon a podium garden. In total, there are 3,360 apartment units. Underneath the podium garden is a shopping mall serving the whole community. The subject premises of this study are the 980 apartment units under the second phase of development. Unit sizes range from 610 to 808 sq. ft. All units either possess a greenery view or a garden view. The development was completed in 1998 and a presale campaign of the uncompleted units was conducted in March 1997. Almost all units were sold out within a short period of time. To dampen rampant speculation, the regulations governing the presale market⁸ had imposed restrictions to ban the resale of the subject premises before completion⁹.

The land sales conditions of the development required the developers to reserve a massive space inside the shopping mall for the construction of a highway running straight through the housing development¹⁰. The space was also required to be re-delivered to the government at the

⁸ The regulations governing the presale of the premises were spelt out in the Land Office Circular Memorandum No.101 (LCOM, see HKLO 1991). It was superseded by the Legal Advisory Conveyancing Office Circular Memorandum No.40 (LACOCM, see HKLD 1999a) on 28 May 1999. The latest regulations governing the housing presale market in Hong Kong are stipulated under the LACOCM No.40A (HKLD 1999b).

⁹ Based on the recommendations made by the Interdepartmental Task Force on Land Supply and Property Prices, the restrictions on resale were imposed on 8 June 1994 and relaxed later on 29 May 1998 (see LACOCM No.40A Appendix I and V, HKLD 1999b).

¹⁰ The land sale conditions stipulate that *“(i)t is hereby excepted and reserved to the Government for the purpose of a future road.....hereof the layer of the airspace above the surface of the lot which airspace transverses over the areas shown.....annexed hereto between the levels 13.0 meters and 35.0 metres respectively above Hong*

time deemed appropriate¹¹. Furthermore, it was explicitly spelt out that the government would not be liable for any compensation requested by the developers or the general public for the adverse environmental impacts of the highway project¹².

In addition, the housing developers had pursued 4 planning applications for the development since January 1991. Two planning applications¹³ were approved in June 1991 and February 1993 along with some conditions. The master layout plan approved under the planning applications requested the housing developers to provide direct¹⁴ and indirect¹⁵ measures to mitigate the traffic noise created by the highway project, which would exceed the environmental

Kong Principal Datum....The Grantee shall have no right, title, ownership, possession or use of the Reserved Area except as provided for in these conditions.”

¹¹ The land sale conditions stipulated that *“the Grantee shall remain responsible at his own cost and expense for the upkeep, maintenance and repair of the Reserved Area and the Government Works as specified herein until such time as the Director shall confirm in writing of the Government’s acceptance of re-delivery of the Reserved Areas and the Government Works or any part or parts thereof.”*

¹² The land sale conditions stipulated that *“(n)either the Grantee nor any other person shall have any right or claim to compensation against the Government whatsoever whether under any enactment or otherwise in respect of the rights hereby reserved.....or in respect of or as a consequence of the use of the Reserved Area as a public road for vehicular traffic.”*

¹³ The applications were made under s16 of the Town Planning Ordinance Cap.131 in pursuance of development under the Comprehensive Development Area zoning. A master layout plan, hence, was required to be approved by the Town Planning Board.

¹⁴ The direct measure is to cover the highway by the podium garden.

¹⁵ The indirect measures include the provisions of good quality windows and air-conditioners.

limit¹⁶. In short, the developers were fully aware that those units with a greenery view would be affected by the serious traffic noise upon completion of the highway in 2007. We assume that this the major piece of asymmetric information that would significantly affect prices of the units in the development.

At the time the presale was held, the regulations governing sales of uncompleted units had spelt out the minimum requirements of information disclosure in the sales brochure with respect to the unit sizes, unit prices, fittings and finishes, time of completion, liability under defaults and the like¹⁷. The regulations also demanded a location plan to be incorporated in the sales brochure on which the prominent environmental features in the vicinity should be displayed. In addition, the salient points of the government lease, including the onerous lease conditions which would restrict the purchasers' usual legal rights, should have been listed in the sales brochure. For some unknown reasons, however, the highway project was not shown in most of the plans in the sales literature as well as the miniature of the development. Although it was only shown on a sketchy location plan with dotted yellow lines, the highway was interpreted as a feature of transportation convenience instead. Besides, the re-delivery clause of the massive space was not mentioned in the sales brochure at all. The regulations never required the developers to disclose traffic noise information, though some attempts were pursued by the Consumer Council (2006).

¹⁶ The units would suffer from constant traffic noise level beyond 70dB(A)L₁₀ (1 hour), the statutory road traffic noise limit adopted in the Environmental Impact Assessment Ordinance Cap. 499 and the Hong Kong Planning Standards and Guidelines for residential developments.

¹⁷ Full list of minimum information is stated under Appendix I of LOCM No.101 (see HKLO 1991)

The subject premises had attracted the attention of the lawmakers and the matters were discussed several times in the Legislative Council. The discussions showed that before the public works authority sought funding from the Legislative Council in 2001, most of the buyers were ignorant about the serious traffic noise to be generated by the highway. According to the Council, the money was granted based on the information¹⁸ that the housing developers and the government would jointly redress the traffic noise (*Hansard* 2001). The project was then publicized and subsequently a Legislative Councillor addressed the residents' grievance to the government in February 2003 (*Hansard* 2003a). Nonetheless, the government¹⁹ refused to rectify and reiterated that some measures had been taken by the housing developers that were compliant with the conditions set out in the planning approvals granted in 1991. In a subsequent panel meeting²⁰ held in February 2003 (*Hansard* 2003b), another Councillor requested the installation of noise barriers on the subject premises. A similar request was made in February 2004 (*Hansard* 2004a). Later on, a separate debate was held for the subject premises in the Legislative Council in March 2004 (*Hansard* 2004b). Four Councillors spoke in support of the residents and demanded measures from the government. Perhaps the most succinct representation of the owners' views was raised by a Councillor as follows:

¹⁸ The information was given by the Transport Bureau in May 2000 to the Public Works Subcommittee of Finance Committee of the Legislative Council.

¹⁹ The Secretary for Environment, Transport and Works took responses to the question.

²⁰ The meeting of the Panel on Transport discussed the removal of noise barriers in other highways due to the complaints of obstruction of drivers' views.

*“ does the Secretary know that **most of the owners were unaware of the fact that the noise level of their units would exceed the limit of 70 dB when they purchased their units, despite that insulated windows and air-conditioners are subsequently installed in these units? Does the Secretary consider that **these owners had been misled or deceived because they bought the units without knowledge of the problem** and thought that as the Government had required that the noise level should be kept within the limit of 70 dB under the Town Planning Ordinance, the noise level of their units should not exceed this limit?”*** [Bold emphasis added]

The Secretary for Environment, Transport and Works then gave a rather negative response:

“As for the planning and design of 1991, and whether the sales description and the overall planning have been announced and made clear to the public, these are the responsibilities of the developer; and as it also involves other provisions relating to land and the sales of properties, I am not in a position to make comments here.”

Physically, one end of the massive space reserved for the highway project was covered²¹ by the similar finishes of the external walls of the shopping mall. Although one could barely notice the highway because of the exposure of the columns, they were somehow decorated in a way that looked like a typical entrance of a shopping mall. At the other end, a bridge structure was

²¹ One may argue that the massive space was covered because of the upkeep requirement under the government lease. Yet, the housing developers could have enclosed the space with other materials, say a painting of the highway, if they wish to disclose the information.

extended from the development for 30m, which was fully enclosed with sunlight windows on the top. One may get confused whether this was a footbridge for pedestrians or a highway for vehicles particularly if he looked at the structure from the inside of a housing unit.

Hong Kong's legal framework is based upon the common law system. In principle, no compensation is given by the government for planning blight. Warranty of building defects is given by the housing developers, but usually only limited to one year after the completion of the units. The principle of privity of contract limits the developers' contractual liability to the first hand buyers only. Since the uncompleted units were not available for inspection during the presale exercise, some caveat venditor rules in terms of information disclosure requirements and implied warranty have been superimposed (Sihombing and Wilkinson 2002). The Law Reform Commission of Hong Kong (HKLRC 2002) also recognized that a purchaser may have an action for breach of contract on the accuracy of information given by the vendors because the latter are obliged to warrant the former in the presale market.

It must be made clear that the case under study is not concerning a breach of warranty but non-disclosure of certain information that affects the property values. Similar to the situations in other common law countries like the US and the UK, housing developers in Hong Kong typically give expressed and implied warranties to uncompleted units within a prescribed period of time. In this case, the construction of the highway project was beyond the warranty period; hence it is hard to claim for a breach. Besides, in such a vibrant city people tend to accept no warranty of changes in the surrounding environment. Thus generally speaking if no misrepresentation is proven, to no avail can the buyers sue the sellers for a breach of warranty if they find the view,

air, sunlight and the like of the premises are being blocked by an adjacent new building after the purchase. The main purpose of this study is to examine whether a change of the liability rules of non-disclosure would have an impact to the prices of lemons.

Resale of the subject premises took place since the first quarter of 1998. Although we do not intend to show that all the sellers were well aware and all the buyers were ignorant of the highway project in the secondary market, it appears that the former were much better informed of the situation than the latter. As revealed by the discussions in the Legislative Council (*Hansard 2004b*), some of the first hand buyers were alerted about the highway project when the housing developers had subsequently installed insulated windows and air-conditioners in their units. In addition, since the establishment of the Owners Corporation of the premises in 1998, a Legislative Councilor had attended a few internal meetings concerning the impacts of the highway project on the housing estate. On the contrary, the highway project had caught little public attention until it was funded by the Legislative Council in the third quarter of 2001. Although we could not exclude the possibility that some prospective buyers in the secondary market might be aware of the highway project before 2001, the empirical results suggest that a self-selection process may have taken place - there is no compelling reason to believe that a well-informed buyer would have paid for the overpricing premium.

In Hong Kong, the doctrine of caveat emptor is strictly applied in the secondary property market generally. A standard clause of no warranty is commonly expressed under an agreement for sale and purchase (HKLRC 2002). It is noteworthy that in some common law countries, caveat emptor is not entirely a complete defense for non-disclosure in the secondary housing

market. For instance in the US, the courts tend to rule that the sellers should inform the buyers of problems such as termite infestation. In addition, concealing defects such as painting over water damages may amount to misrepresentation (Fransworth 2004). In Hong Kong, nevertheless, it is a common practice that sellers do not provide property information to the buyers²² and they even need not disclose the patent defects of the legal titles. Though what constitutes a patent defect is not entirely clear due to the lack of authority on this subject, it is conceived that the sellers are not required to provide government lease conditions, zoning information and the like (Goo and Lee 2003). Besides, government leases and zoning plans would have already been made public information in Hong Kong. Even in a world of mandatory disclosure, sellers may not be liable for non-disclosure if the information is easily discoverable by the buyers²³.

Information had become symmetric between the sellers and buyers in the secondary market after the highway project was funded and widely publicized since the third quarter of 2001. The prices of the lemons fell noticeably till one year later a joint task force between the Owners Corporation, the housing developers and some Legislative Councilors was formed to bargain

²² Under the Estate Agents Ordinance (Cap. 511 Laws of Hong Kong), estate agents are required to furnish a property information form on which some key property information such as building age, size, government rent and remaining government lease term and the like. will be spelt out. The sellers are required to disclose only voluntarily other property related information, such as the encumbrances entitled by the premises and the like. There are no items on the form inviting the sellers to disclose government lease conditions, zoning information and the like.

²³ We are indebted to the anonymous reviewer's comments for shaping these arguments.

with the government for the noise mitigation measures. Table 1 summarizes the underlying factors that affected the property transactions during the study period.

[Insert Table 1]

The dataset contains 1,626 entries of data²⁴, which covers 980 transactions in the presale market in 1997 and 646 transactions in the secondary market between the first quarter of 1998 and the third quarter of 2006 (35 quarters). Table 2 is a summary of the descriptive statistics of the dataset.

[Insert Table 2]

Hedonic price models (Rosen 1974) are commonly used to reveal the implicit prices of product attributes. To track the price changes of the durable lemons across the different sets of information and legal regimes, we estimated a hedonic price model using the data set described above and control for variation in price levels over time using time dummies. With reference to Table 1, we have divided the transactions into four distinct periods, namely i) *T0* - presale in 1997 among the housing developers and the first hand buyers, ii) *T1* – resale from Q1 1998 to Q3 2001 among the first hand and subsequent buyers before the adverse information became public, iii) *T2* – resale from Q4 2001 to Q4 2002 after the adverse information became public, and iv) *T3* – resale from Q1 2003 to Q3 2006 after the owners began to lobby the government for remediation measures. The prevailing principle governing sales in *T0* is caveat venditor while it

²⁴ Outliners are excluded, including units with a roof.

is caveat emptor in $T1$, $T2$ and $T3$. The empirical model designed for this study is depicted in Equation (1).

$$LN_price = \alpha + \beta \cdot floor + \chi \cdot gfa + \delta \cdot v_green + \phi \cdot T1_v_green + \varphi \cdot T2_v_green + \gamma \cdot T3_v_green + \eta \cdot M_floor + \iota \cdot M_gfa + time + \varepsilon \quad (1)$$

In Equation (1), α is the constant and ε is the residual. In order to control the time factor, 35 quarterly dummies ($time$) have been added. As the completion date of all the housing units in the development is the same, the time dummies will also take care of the building age effect. Since the housing units are rather standardized in Hong Kong, housing prices are mainly affected by a few key attributes, such as floor area, floor level and the view. In Equation (1), the variables of $floor$ and gfa are included to control for the effects of floor level and floor area on housing prices. The dummy variable v_green carries a value of 1 if a housing unit faces a greenery view and 0 otherwise (garden view). Basically v_green represents the preference of people on a unit with greenery view over one with a garden view. There is no plausible reason to believe a structural change of preference on housing attributes in Hong Kong over the study period. So the coefficients of $floor$, gfa and v_green were expected to be constant over the whole study period. However, since the greenery view units were also the subject of this study – the durable lemons, a few interactive terms, namely $T1_v_green$, $T2_v_green$ and $T3_v_green$ ($T0_v_green$ was omitted to avoid perfect collinearity) were introduced so as to track the changes of lemon prices transacted across different legal institutions and information sets. Furthermore, two interactive terms, namely M_gfa and M_floor where $M=T1+T2+T3$, were introduced to test the hypothesis

that the coefficients of the housing attributes (besides v_green) are the same whether the units are sold in the presale or spot market. We anticipated that the coefficients of these two interactive terms are statistically insignificant.

Since the residuals show significant heteroskedasticity when Equation (1) was estimated using ordinary least squares technique, the Newey-West estimator (Newey and West, 1987) was used. The results are summarized in Table 3.

[Insert Table 3]

All the time dummies are significant at the 1% level except Q1 1998. In addition, most of the time dummy coefficients are significantly different from each other at the 1% level, which suggests that they are essential to control for variation in price levels over the period of observation. The coefficients of the key housing attributes are significant at the 1% level and of the expected signs. The result shows that buyers pay 0.28% more for every floor level increment and 0.16% for every increase in square footage of space. A unit with a greenery view is about 5.9% less than a unit facing a garden view. This negative value simply reflects a preference of garden view over the greenery view, which is consistent over the whole study period and has nothing to do with the highway project. There is also no statistical evidence showing that floor level and unit size have undergone structural change of value across time. The coefficients of both M_floor and M_gfa are statistically insignificant. Whereas, the coefficients of the three interaction terms of v_green , namely $T1_vgreen$, $T2_v_green$, $T3_v_green$, tell a rather different story.

In Equation (1), $T1_v_green$, $T2_v_green$ and $T3_v_green$ capture the changes in transaction prices of the durable lemons in $T1$, $T2$ and $T3$ respectively. Referring to Table 1, since the transactions in $T0$ and $T1$ do not reflect the highway project information, the price differentials are mainly attributed to the different underlying legal institutions governing sales in the two periods of time. Therefore, the coefficient of $T1_v_green$ can be interpreted as the change of the lemon price when the legal regime is switched from caveat venditor to caveat emptor. Table 3 shows that the price level of the lemons in $T1$ is 3.2% higher than that in $T0$.

Further elaboration is needed for the transaction prices in $T2$. These prices reflect both the information of the highway project as well as the caveat emptor rule governing sales. Logically speaking, if information is made symmetric, these prices should be indifferent to the ones under the caveat venditor principle. Hence, $T2_v_green$ can be interpreted as the change of property prices when the information asymmetry is eliminated under the caveat venditor rule. Table 3 shows that the prices dropped by 6.7% between $T0$ and $T2$. It also suggests that the housing developers could have priced the durable lemons 6.7% less in $T0$ if the highway project was made known to the buyers. In other words, this is the overpricing premium of the lemons under the caveat venditor legal regime in $T0$.

With regard to the change of property prices when the lemon effect is removed under the caveat emptor principle, it can be shown by the difference between the coefficients of $T1_v_green$ and $T2_v_green$. The total effect in this case amounts to 9.9% (3.2% minus -6.7%, Wald test: $p=0.0169$). This suggests that the first hand purchasers could have priced the lemon

9.9% less in *TI* if the subsequent buyers were well aware of the highway project. From another perspective, it is the overpricing premium of the lemons under the caveat emptor rule²⁵.

The results of the empirical study suggest that the durable lemons were overpriced by 6.7% under the caveat venditor rule and 9.9% under the caveat emptor principle respectively. This represents an increase of 32.3% of the overpricing premium by switching the liability rules from let the seller to let the buyer beware. One plausible reason why the housing developers did not fully take away the lemons spread at the outset is the consideration of potential lawsuits arising from the non-disclosure of information. Although the general rules mandate that the damages recoverable are based on the difference between what is promised and what is delivered (Farnworth 2004) hence the contract price is irrelevant, the housing developers may take account of the following factors into their ex ante calculations. First, the first hand buyers in *TI* are essentially facing a decision of taking a 3.2% profit if they resell the units versus at a chance granting of the full damage if they retain the units and sue the developers. It means that the lower the overpricing premium levied by the developers in *T0* the higher the inducements will be given to the first hand buyers to flip the lemons in *TI*. By flipping the lemons, the housing developers' duties under privity of contracts will be discharged. So notwithstanding that the

²⁵ One may argue that the interaction effects over the study period would change due to the time value of money. However, Chau (1997) showed that in Hong Kong's real estate market, housing prices would reflect the ex post adverse attributes completely once the information became public. Besides, the values of the adverse attributes tend to be constant over time. We have also attempted interacting the number of quarters to completion of the highway with the *v_green* parameters and found that all the coefficients are insignificant. It appears that the effect of time value of money was overshadowed by other factors.

contract price represents a sunk cost to the first hand buyers, it does affect the probability of reselling the lemons and hence the propensity of initiating lawsuits. Second, even if a breach is ascertained by the court, there are practical limitations in proving the damages. In the general measure of damage for total breach, the loss in value, loss avoided and other incidental loss are taken into consideration (Farnworths 2004). Usually, the loss in value is assessed at the time of the wrong, but the monetary loss in this case in *T1* was, nevertheless, non-existent. Even if the buyers claim for expectation damage, which is the price difference between a property facing a hill and a highway, the court may question the possible measures taken by the first hand buyers for avoiding loss. The net loss could have been mitigated or eliminated if the units are resold in *T1* after deducting the incidental costs of transaction. So lowering the overpricing premium in *T0* may reduce the chance of litigation. Third, although in theory a rescission can be requested by the first hand buyer, the chances are getting slimmer when a smaller overpricing premium was charged by the housing developers in *T0* since it means that a higher profit can be recouped by the buyers in *T1*. All in all, the housing developers may perceive a lower probability adjusted damages payable to the first hand buyers by leaving more money on the table at the beginning²⁶.

It is noted that the interactive term of *T3_v_green* does not carry a statistical significant value, which means that the prices of the durable lemon a year's time after the highway project became public information were not significantly different from the prices in the presale market. It may be due to the attempt by the housing developers, in collaboration with the residents, to lobby the government for the measures of mitigating the impacts of the traffic noise.

²⁶ We are thankful to the questions and comments raised by the anonymous reviewer in shaping these arguments.

4. Let the Buyer or Seller Beware?

The empirical findings of this study suggest that sellers tend to less overprice the lemons under a legal institution where certain caveat venditor rules are applied. It is thus tempting to conclude that as far as the society is concerned, let the seller beware is a more preferred principle than let the buyer beware. A number of studies have discussed the comparative efficiency of the two legal doctrines, yet a verdict is far from conclusive. The main crux of the problem lies in two questions; i) who is the cheaper information provider among the transacting parties? and ii) which legal institution would reduce more information cost in a society?

The right of possessing private information despite of the possible harmful effects to other transacting parties has not been denied since the classic case *Laidlaw vs. Organ (1817)* (see Kronman 1978 and Posner 2007). The general rule proposed by Kronman (1978) suggests that information through deliberate search can be withheld, whereas casually obtained one cannot. By so doing, harmful information which is costless to gather can be revealed while the incentive of obtaining costly information, irrespectively useful or harmful, will not be curtailed. Though usually more informed of the product than the buyers, the sellers are not necessarily the cheaper cost information providers. Posner (1983) pointed out that caveat venditor was made the prevailing doctrine governing trading in primitive societies. It is because products were simple and static, trading was infrequent and sellers were more cost effective to provide insurance in those societies. In modern societies, however, sellers are not necessarily more cost effective to ascertain product characteristics, especially the temporal ones (Posner 2007). In the property market, it is not rare that buyers are in better positions to ascertain the product features than the

sellers (Lefcoe 2004). To illustrate, excessive costs will be incurred if the ground floor shop sellers are liable to certify the fitness for purposes to the prospective buyers who have a wide variety of needs. Obviously the sellers are the less-cost-effective information providers in similar circumstances.

Grossman (1981) argued that if the information set is too broad to describe, the sellers may have no idea what specific pieces of information to disclose and hence tend to overproduce them. The duty for disclosure may lead to an overinvestment on producer insurance and the general prices may increase as a consequence. A number of studies such as Mckean (1970), Buchanan (1970) and Goldberg (1974) also contend with the notion that due to the tie-in insurance arrangement, general prices under product liability tend to be higher. For instance, Nanda and Ross (2009) showed that after some states in the US had enacted property condition disclosure laws, house prices increased by 3-4%. In stark contrast, buyers would need to “bribe themselves” (Mckean 1970) to exercise care under the caveat emptor principle, which is essentially a hidden self-insurance cost to them.

Supplemented by the empirical findings of this study, a clearer silhouette of the information costs pertaining to the two legal doctrines can now be seen. There are three major components of the information cost borne by the parties, namely the tie-in insurance, self-insurance and the overpricing premium of lemons. Under the caveat venditor rules, general price levels could be higher because of the higher tie-in insurance cost whereas consumers in general exert fewer efforts to insure themselves through searching, and pay a lower overpricing premium in case of buying a lemon. The opposite way round will be under the doctrine of caveat emptor, that is the

general price levels would be lower while the overall search cost and the overpricing premium of lemons would be higher. The question – let the buyer or seller beware – has become a normative one; it depends on people’s preferences and value judgements on the three major components of the information costs.

Calabresi and Bass (1970) claimed that while the buyers are free to choose sellers under customer liability, the sellers are also free to discriminate among the buyers under producer liability. With the freedom of contract and costless negotiations, Friedman (1983) suggested that the outcomes of caveat venditor and caveat emptor can be symmetric. Seller can give guarantees under the former rules and buyers can grant waivers under the latter. In the US, for instance, while information disclosure is made mandatory in some states under the property condition disclosure laws, some states allow voluntary disclosure or seek waiver from the buyers (Lefcoe 2004). This is in fact a corollary of Coase’s (1960) argument which suggests that so long as property right is well delineated, costless negotiations will bring about the same social optimum outcome. However, underpinning this concept is zero transaction cost, which is non-existent in the real world. Besides, if transaction cost is truly zero, information will no longer be asymmetric and the lemon problem will be eliminated by definition. Nonetheless, as Coase (1998) put in his own words, it is the world of positive transaction cost that interests him. He said,

“(t)he reason why economists went wrong was that their theoretical system did not take into account a factor which is essential if one wishes to analyse the effect of a

change in the law on the allocation of resources. This missing factor is the existence of transaction costs.”

It is envisaged that the associated transaction costs in relation to this discussion are twofold; the costs of delineating property right in information and the costs of bringing about an optimum outcome. The arrangements of these costs vary across different products and markets. Depending on the structures of the transaction costs, a change of the default contract terms may affect the outcome. Under the caveat emptor principle, the default contract terms assign property right in information to the sellers. It appears that the “ink cost” related to the delineation of right is rather nominal, which is literally just a matter of a few typed words like “as is”, “I know of no material defects in the property that I have not disclosed” and alike. However, the transaction cost in terms of search cost and risk facing to the prospective buyers could be substantial in some circumstances. In contrast, under the caveat venditor rules the default contract terms assigns property right in information to the buyers. Notwithstanding that the search cost and risk to the buyers could be reduced, the costs of right delineation could be much higher, which are borne by the sellers in terms of product description and insurance costs. Whether a change of the default contract terms will reduce the transaction cost and hence achieve a more efficient outcome is case specific, and requires detailed investigations.

Irrespective of the underlying legal institutions, new institutions have emerged to tackle the lemon problem. Brand names and guarantees are two counteracting institutions illustrated by Akerlof (1970) to deal with the lemons. Voluntarily information disclosure programme is another example. For instance the house sellers in the UK can choose to take part in the

TransAction National Protocol 2000 programme, which serves to signal that their houses are not lemons. Furthermore, following Kronman's (1978) idea, some specific mandatory disclosure requirements on the information that is costless to obtain by the sellers may improve social welfare if this could avoid incurring an overpricing premium to the buyers. Disclosure of termite infestations and natural hazard and the like are examples of this kind. Moreover, third parties also have a role to play if the provision of information can on the one hand benefit themselves and on the other hand curtail the lemon problem. For example, in the automobile industry, some service providers such as carfax.com provide useful historical information of secondary cars at a reasonable fee. Governments and the media can also provide systematic and useful information to consumers. For instance, the overpricing premium in this empirical study would vanish if the government proactively supplied the highway project information before the lemons were disposed in the market. In addition, a clear delineation of right (or liability) to a third party may also fix some of the problems. In Pope's (2007) study on the impact of aircraft noise on housing prices, in fear of subsequent lawsuits, it was in fact the Airport Authority in North Carolina that disseminated the noise information, in lieu of the sellers, buyers or the estate agents.

5. Conclusion

This study shows that the levels of overpricing of a lemon are contingent on the underlying legal principles. In the empirical case, the durable lemon had been overpriced by 6.7% under the caveat venditor rules and 9.9% under caveat emptor principle respectively. This represents a 32% increase of the overpricing premium by switching the legal regimes from the former to the latter.

Notwithstanding that a lower level of overpricing of lemons is associated with the doctrine of caveat venditor, this does not suggest that it is necessarily a more efficient doctrine. Previous studies have shown that the general price levels will be higher under the caveat venditor principle because a tie-in insurance cost is bundled. On the contrary, search costs will be higher under the caveat emptor principle since the buyers will need to insure themselves. Adding up the findings of this study, buyers may pay more in general under the caveat venditor principle but pay less for self-insurance and overpricing premium to the lemons. In contrast, buyers may pay less in general under the caveat emptor principle but pay more for self-insurance and overpricing premium to the lemons. All in all, there are different implications to the total information cost under the two distinct legal regimes governing sales and information.

Fifty years ago in his study of the problem of social cost, Coase (1960) called for detailed investigation of the actual outcomes of different social arrangements. He made reference to the real estate development industry and said,

“(e)conomists need to study the work of the broker in bringing parties together, the effectiveness of restrictive covenants, the problems of the large-scale real-estate development company, the operation of governmental zoning, and other regulating activities.”

This paper simply echoes his view.

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Table 1

Underlying Factors Affecting Transactions

Time	Abbreviation	Asymmetric Information	Legal Regime	Highway Project Related Information
Q1 1997	<i>T0</i>	Yes	Caveat Venditor	Semi-private information to housing developers
Q1 1998 to Q3 2001	<i>T1</i>	Yes	Caveat Emptor	Semi-private information to first hand purchasers
Q4 2001 to Q4 2001	<i>T2</i>	No	Caveat Emptor	Public information
Q1 2002 to Q3 2006	<i>T3</i>	No	Caveat Emptor	Public information with anticipation of remediation measures

Table 2

Descriptive Statistics

	Housing Prices per unit (HK\$)	Gross Floor Area (sq ft)	Floor Level (Nos.)	Greenery View (1=yes, 0=no)
Mean	3,873,416	710	19.64	0.49
Median	3,837,000	756	20	0
Maximum	6,360,000	835	39	1
Minimum	1,000,000	593	1	0
Standard Deviation	1,149,373	95.18	11.25	0.5
Skewness	-0.07	-0.12	0.04	0.05
Kurtosis	2.21	1.21	1.77	1
No. of Observations	1,626	1,626	1,626	1,626
-No. of Greenery View Units				792

Source. - EPRC Ltd.

Table 3

Results of Estimating Equation (1)

Dependent Variable: LN_PRICE		
Included observations: 1626		
Method: Newey-West estimator		
Variable	Coefficient	Std. Error
FLOOR	0.002776**	0.000221
GFA	0.001593**	3.13E-05
V_GREEN	-0.05967**	0.005831
T1_V_GREEN	0.032263**	0.011732
T2_V_GREEN	-0.06723*	0.041173
T3_V_GREEN	0.005302	0.011034
M_FLOOR	-0.00055	0.000461
M_GFA	-3.87E-05	5.78E-05
C	14.16424**	0.023433

Note. – The adjusted R^2 of the model is 0.95 and the F-Statistic is 721.82.
 35 time dummies from Q1 1998 to Q3 2006 are suppressed. ** significant
 at 1% level and *significant at 10% level.