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**THE DETERMINANTS OF STREET LEVEL RETAIL SHOP PRICES
IN HONG KONG**

**K W Chau
F. Pretorius*
C.K. Yu**

Department of Real Estate and Construction
The University of Hong Kong

ABSTRACT

There has been little research on the location factors that influence small retailers' revealed location preferences within shopping centres, planned or unplanned. This may be explained partly as a consequence of a lack of reliable cross-sectional data at this low level of economic aggregation, and a consequent inability to control for higher level aggregate economic variables such as national or regional economic and demographic development. In high-density Asian cities such as Hong Kong, with limited land, very high population densities, intensive mixed land use, and very limited reliance on personal transportation generally, an opportunity exists to conduct research into low-level retail location decisions while controlling for the influence of high level aggregate economic variables. This allows research efforts to be concentrated on specifically micro-locational and physical property characteristics and their influence on retail property choice. A Hedonic Pricing Model is constructed to test the significance of such factors on retail property unit prices in Hong Kong, as a proxy for expected retail property performance potential. In order to minimize the problem of data heterogeneity, empirical data is drawn from transaction records collected from a single district in Hong Kong, Mong Kok, an unplanned shopping area in Hong Kong. Only street level retail property records are used. The results indicate that most, but not all, locational and physical characteristics are statistically significant. The results suggest that locational characteristics are comparatively more significant than physical characteristics. In particular, the study suggests that pedestrian flows is the key factor affecting retail unit prices, and that retailers are willing to pay high implicit prices for locational characteristics that are associated with high levels of pedestrian flows.

Keywords: retail, location, hedonic price model, urban economics

***Contact Author:** HKU, Pokfulam Rd, HK. Email: fredpre@hkucc.hku.hk

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A: INTRODUCTION AND OBJECTIVE

Despite dramatic recent developments in retailing, there is little doubt that to many retailers physical location remains critical for success, in the same way as it remains critical for success at an aggregated level for retail centres (see Jones and Simmons, 1990; Davies and Harris, 1990; Ghosh, 1990). There remains however substantial grey areas in research into retail location generally, in particular retail property characteristics that influence small retailers' location decisions. Whereas retail location research at an aggregate level has advanced rapidly particularly in recent years (see Brown, 1992 for a chronology and analysis; and Vandell and Carter, 1993, for a more limited review); the purpose of much recent empirical research beyond technical analysis is frequently unclear. In many instances this may be observed as confusion when there are attempts to assess how the field as an area of research is progressing, and how new research results contribute to particular areas within the field. Further, in the conception of new research, how to categorise such research so that there then evolves a progressive development within a particular research area is an additional problem.

To be sure, data does not always allow clear research agendas with retail location research, as sufficient and reliable data is simply not always available to allow finely demarcated studies at all levels of the retail hierarchy. Whereas regional and district-level economic data is increasingly complete and useful in store location and store location allocation decisions, the same cannot be suggested for the availability of data that support location decisions made at a very low level in the retail hierarchy, such as by an independent, small scale retailer selecting a property with micro-location and physical characteristics to suit its business. For such retailers the choice of centre to locate in may depend on individual properties' physical design or location within the centre relative to other shops and pedestrian/traffic flow, because such decisions may well provide a crucial marketing advantage (Jain and Manhajan, 1979). It would also matter to such retailers if these micro-location variables suggest different retail outlet performance in planned or unplanned shopping centres, such as a shopping mall location or main street locations. Academically it of course matters also if such results vary between regions, cities and between different countries. Data problems at this low level of location decision-making may be presented as a characteristic of the level of density of economic activity within urban areas, in that sufficient cross-sectional data frequently may not be generated at a particular retailing centre to support low-level location research while controlling for high-order cyclical variables.

In city-state type economies such as Hong Kong,¹ with limited land, very high population densities, intensive mixed land use, and very limited reliance on personal transportation generally, an opportunity exists to conduct research into low-level retail location decisions while controlling for the influence of high level aggregate economic variables. Highly concentrated economic activity tends to eliminate the clearest visible evidence of uneven spatial economic activity; but while it may complicate the abstraction of larger scale spatial economic constructs it in turn also provides excellent opportunities to test retail location theory at its lowest level. Whereas cities with suburban populations dependent on personal transportation have generated substantial research on urban and regional economic concepts and applications, such as the location of regional shopping malls; very dense population and mixed land use provides sufficient localised economic intensity to conduct cross-sectional analyses of economic behaviour at very low levels of the urban hierarchy, for example main street-level retailing in unplanned shopping centres. In an experimental way, therefore, high density in many Asian cities creates large samples of economic data at low levels of the urban hierarchy which had been generated over very short periods of time. This allows assumptions about stability in economic structures or economic cycles, and further allows research to concentrate with some confidence on micro-economic variables, urban characteristics, and specific property characteristics. Such data may not be observable at low levels of the urban hierarchy in cities with low population densities and high dependency on personal transport, as is typical in North American, Australasian and some European cities.

Arguably there are few better city than Hong Kong to conduct research of economic phenomena at low levels of the urban hierarchy. For example, retail activities are highly concentrated in four areas (the "retail core"), namely Mong Kok, Tsim Sha Tsui, Causeway Bay and Central, accounting for 42% of total 1995 retail sales in Hong Kong, while the two districts along Nathan Road (Tsim Sha Tsui and Mong Kok) alone accounted for 23% of the total sales of Hong Kong in 1995.² Although all four these districts are practically equally accessible as a consequence of access to and intensive use of excellent urban public transport networks, there is some nodal differentiation. While Central and Tsim Sha Tsui have more luxurious shops and tend to attract many tourists (due to the large amount of hotels within the districts), Causeway Bay attracts tourists but mostly serves local custom. Mong Kok, a dense area covering 190 street blocks with intensive street level retailing, however, mainly attracts local retailing custom and will form the source of the data employed in this study. Despite this nodal differentiation in retailing, demographic and social characteristics do not differ substantially across districts in Hong Kong. High population densities in all four areas generate massive pedestrian flows, consequently retail space in all four these districts is keenly sought after by retailers.

Simmons and Chan (1991) suggest that the most impressive aspect of Hong Kong retailing is its productivity, with respect to use of both labour and floor space. At the time of their research, the average retail sales per unit across Hong Kong was double that of the figure for the United States. They suggest that this high level of retail sales per unit is due to firstly the very high level of pedestrian traffic, and secondly the

¹ For technical purposes only, we view Hong Kong as a *functional* economic city-state, without reference to its political status as a Special Administrative Region of the People's Republic of China.

² This date coincides approximately with the date end-point of the dataset.

limited supply of retail space. The high level of pedestrian traffic is derived from high residential density, the concentration of economic activity in a small space generally and the excellent accessibility of the core retail areas. On the supply side, the low figure of retail/restaurant space per capita in the core areas, planning restrictions which function to control supply, and intense competition from other land uses combine to exert upward pressure on retail rents and prices. High rents also reflect in typically small shop unit sizes, which follows from the necessity to segment markets very finely in order to compete effectively virtually at any micro-location within the core areas.

Yet, interestingly, the purchase price range of retail space in these districts is quite large (See Table 5). As all retail properties in the core generally may be viewed as subject to the same aggregate economic, demographic and social characteristics, the great variation in prices must be caused by other factors which influence property performance at lower levels of the retail hierarchy. As discussed above, these are the micro-locational variables of interest to small retailers in location decisions, and which are generally not observable in high level retail location research. The effect of these micro-locational and physical property factors on expected retail property performance, reflected in the form of property prices, form the subject of present interest. The objective of this study is to conduct an analysis of the determinants of prices for street level retail properties in Hong Kong. Focusing on main street-type properties in unplanned shopping centres, this study investigates the relationships between the various micro-locational and physical characteristics prices. Physical property characteristics include size, age, and frontage (as proxy for visibility) of properties, while micro-locational characteristics include the property's proximity to the nearest mass transit rail exit, proximity to the nearest shopping mall (as intermediate pedestrian destination), and the position of the property relative to other retail properties in its immediate vicinity. The paper is ordered as follows: after this introduction, we review selected retail location research relevant to the objective; thirdly, we present our methodological approach, variables and expected results; fourthly, data and sources are presented; followed by the empirical results and its discussion. We then conclude. We hope that an understanding of the relationships between the various physical and locational retail property characteristics with retail property unit prices will contribute to realistically demarcated levels for locating future research into retail location decisions.

B: RETAIL LOCATION DECISIONS

Brown's (1992) suggestion that research on the retail location problem can be ordered into a "practical" and a "theoretical" school of research into retail location questions, provides a useful premise to explain the nature of this study. The practical approach, where the questions that we attempt to address in this research would categorise, dates from the early post-war period with Applebaum (1954), and later with Cohen (1961) and Kornblau (1968). Research in this early tradition concentrated on supporting the practical locational decisions of individual retail firms, mostly through the development of checklists and heuristics. Other practical research focused on issues such as trade area delimitation, customer profiles, site selection procedures, impact assessments and most importantly, the formulation of appropriate decision-making methodology (Kivell and Shaw, 1980; Warnes and Daniels, 1980). Later research in this tradition adopted theoretical models to assist retailers in location decision-

making, including applied regression analysis techniques (Davies and Rogers, 1984), and further development of multiplicative competitive interaction (MCI) techniques, multinomial logit (MNL) techniques and location-allocation models which address the problem of locating multiple stores in a single area.

The theoretical school of research into retail location problems is less concerned with the immediate profitability problems of retailing firms and location decisions in support of profitability. Instead, the focus is on the spatial structure and functioning of the retail system in aggregate, and its constituent sub-systems including the retail space economy (see Brown, 1992). The difference in approach between the two approaches is fundamental. While the practical approach is predicated primarily upon inductive reasoning, the theoretical perspective is largely deductive. The theoretical approach employs as principal conceptual constructs central place theory and retail hierarchy models; retail gravity models and its modern developments; bid-rent theory and spatial interaction theory and principles of minimum differentiation, and more (see Craig, Gosh and McLafferty, 1984, Brown, 1992, and also Vandell and Carter, 1993). Potter (1982) pointed out that the distinction between the applied and theoretical approaches has never been completely clear, and it has also been suggested that the two approaches are converging. For example, Jones and Simmons (1990) comment that the assumptions of the theorists have become more and more realistic, while the practitioners have come to recognise the value of general models and frameworks in seeking answers to the complex location decisions that confront large retail chains. However, despite convergence and although the theoretical approach and research progress in this tradition is sufficiently powerful to explain much of what we observe in the aggregate retail space economy, it nevertheless still does not provide robust frameworks to guide small, independent retailers' location decisions.

This conclusion provides the general impetus for our study, and we draw on Craig, Cosh & McLafferty's (1984) characterisation of typical retail location decisions as further typological mechanism for our study. According to them, the practical store location decision facing a retailer may be viewed as consisting of four interdependent decisions. The first decision concerns the choice of region/district to locate the store, in effect a "*choice of market*" decision. A market choice is typically followed by the identification of a number of potential store locations within the region, given physical, institutional and other constraints. The third consideration, which, according to Vandell and Carter (1993), is where the most interesting research challenges lie, is the choice of site(s) that is most likely to optimise the retailer's performance. The fourth decision concerns the choice of particular physical and design characteristics (such as size, visibility) at the specific location, also to optimise store performance. In all, however, a retailer's location choice set is constrained by bid-rent principles, or simply its ability to outbid the next competitor for a location with high retail sales potential. From a retailing perspective the trade-off between cost of a sought-after location and potential custom derived from the location is ruthless - a retail property may have a low price simply because it is not locationally attractive to retailers, and attracts low rent bids (see Davies and Harries, 1990). Consequently there is a direct relationship between expected retail sales performance at a location, rent bids, and the property's sale price. The highest rent, and thus the highest expected selling price of retail units, could thus be expected to be achieved at that location where the best sales performance can be achieved. Given this familiar logic, it is however unfortunate that research on the locational and physical

characteristics that affect retail sales potential at individual street level retail units, as observed through property rents and prices, is limited.

The questions addressed in this study do not categorise without ambiguity in the abovementioned typology, and need some elaboration. We are concerned with both the specific locational and physical attributes of a particular retail property within a retailing centre (planned or unplanned), and how these attributes may be valued by a retailer separately and collectively. Our principal concern is thus with the commercial perspective of a retailer, and the particular attributes of a specific retail property that it may seek when making its specific location decision. Within the Craig, et. al. typology our study is aimed at informing decision three, namely identification of the choice of location that is most likely to optimise the retailer's performance; and four, choice of particular store characteristics that may contribute to the retailer's performance. In addressing micro-locational circumstances surrounding type three decisions, we seek to provide empirical insight into the relative influence of selected micro-locational variables particular to a property's location in relation to other properties around it, and retail centre characteristics and infrastructure. In addressing type four decisions we hope to provide insight into the influence that selected physical characteristics of existing retail properties may have on retail performance at a particular location. In a general sense, our study aims to confirm the influence and structure of influence of selected micro-locational and store characteristics on expected retail store performance.

Previous research provides limited suggestions for directing the focus of this study. At the micro-scale of any particular location, a number of property characteristics are considered to be important. Firstly, any retail property in itself has attributes of economic importance based on its physical location, such as general accessibility and a micro-location within a retail centre that is favourable (or less so) relative to pedestrian and/or transport flows (and information flows), transport nodes, and to other retail outlets. We view these as "gravity" related individual property characteristics, following Multiplicative Competitive Interaction models (see Carter and Vandell, 1993). An individual property's location and accessibility relative to pedestrian- and/or vehicular traffic *flows* replaces the uniform, static distribution of consumers in a space economy with uniform access to a particular site which characterises the Huff model and its derivatives. For present purposes these property location characteristics may be viewed as the property's linkages to the external space economy, and these may of course be stronger at some locations than at others. As these are exogenously influenced by urban structure, physical infrastructure and the retail hierarchy within a space economy, it may be argued for present purposes that in a well-functioning retailing environment individual small retailers would generally have limited ability to manipulate exogenous factors and select locations to maximise the linkages subject to their constraints. Secondly, and independently of a property's micro-locational attributes and the relative strength of external linkages, different properties may have certain physical attributes including attributes such as age, size, and more, that may allow a retailer to capture comparatively more or less of the potential of a property's external linkages at any time. We view these physical attributes as a property's marketing linkages, in recognition of the relevance of store size, appearance, frontage, and more in retail marketing (see for example Stanley and Sewall, 1976; Jain and Mahajan, 1979). Although these physical (or marketing) attributes may be manipulated to some degree as part of a retailer's marketing mix,

retailers are nevertheless constrained by the fixed nature of the property asset and costs associated with altering fixed attributes. Short of purpose-designing and constructing a new retail property, any individual property's physical attributes will thus remain relevant to retailers' micro-location decisions for their marketing potential.

In addition to attempting to provide insight into the effect of a property's (micro-locational and physical) attributes on retail performance, we also are concerned with the level of aggregation that is relevant to retailers' decision-making. A large food retailing chain may be concerned mostly with market decisions, for example because it may be essential to the viability of a planned retail centre (as anchor or magnet). Under these conditions it may have the strategic ability to manipulate marketing linkages; but under circumstances where it enters an unplanned shopping centre such as a main street it may not control such linkages. Small retailers, however, generally may not have the resources to manipulate a property's external linkages or marketing attributes under either circumstances, and therefore are expected to be much more discerning in selecting a property with attributes appropriate to the nature of its activities. Although it may be argued that the theoretical constructs are no different at the level of disaggregation of the individual property compared to higher levels of aggregation in the spatial hierarchy, more formal empirical research has been less successful in unravelling the influence of external and marketing linkages in retail location decisions, as may be seen from the literature sampled hereunder.

To date, attempts to unravel the influence of particular property attributes on property performance have largely depended on hedonic price analysis (see for example Rosen, 1974, Linnemans, 1980; Mok, Chan and Cho, 1995). Such studies generally proceed from the premise that each property has a bundle of characteristics associated with it, each with an implicit associated value. Hedonic pricing models reveal the implicit price paid by the market for each individual characteristic of the property, using multiple regression techniques. In general, however, it appears if research into retail location using regression methodology often utilises simultaneously variables appropriate to all four types of retail location decisions in the Craig, et al typology, with limited concern for the level of aggregation at which decision-making may have to be made in practice. In an example of such a mixture of decision variables, Davies (1973) used step-wise regression in research on retail store attributes, with the dependent variable sales volume at a location. Drawing on data from 72 stores, he identified the three most influential property characteristics as gross selling area, rent and rates and store accessibility. In considering the sales volume of only intermediate site shops, he identified the most influential variables as total urban retail expenditure, store accessibility and gross selling area. In considering only corner site shops, he identified the three most influential variables as gross floor area, rate of economic growth and store accessibility. Whereas accessibility and gross selling area are extremely important type three and four location decision variables, the influence of total urban retail expenditure and general economic growth are not very helpful at this level.

More recent research shows more specific concerns with type three and four location decision variables, however, and provides useful insights for present purposes. Sirmans and Guidry (1993) may be credited with the first empirical examination of the determinants of inter-centre variations in shopping centre rents, although the

influence of some type one and two decision variables is not excluded. They hypothesised that rent, the dependent variable, was a function of drawing power, design, location and market conditions. Also using regression analysis, they found that size, type of anchor tenant and mall design had positive effects on rents, in other words that in addition to market area factors, shopping centre rents are sensitive to both micro-location within a mall (external linkages) and physical property characteristics (marketing attributes, including size of shop, age of mall. Age and location were found to contribute to rents negatively. Population and income however were also found to have positive effects on rents. In research on the importance of locational factors for a shopping centre, Forgey and Goebel (1995) concentrated primarily on the relationship between the "value" of a shopping centre, and site-specific physical and geographically linked locational characteristics. The five locational factors included in the study were accessibility, traffic count, tenant mix, visibility, and demographics as the only decision variable not categorising as type three or four. Their analysis showed that locational factors alone accounted for 38.7% of the change in the dependent variable.

C: METHODOLOGY, VARIABLES AND DATA

Although all the above studies provide useful insight into various different aspects of retail location decisions, none address exclusively type three and/or four decisions. In developing an appropriate approach to analysing the influence of these on expected retail property performance, we commence by following Craig, *et. al.*'s (1984) proposition that the sales performance of a store (Y) may be expressed as a function of five characteristics namely Location (L), Store-Attributes (S), Market-Attributes (M), Price (P), and Competition (C), so that $Y = f(L, S, M, P, C)$. Following the locus of this research explained above, and assuming that competition is a constant; we concentrate on the effect of locational (*external linkages*) and physical characteristics (*marketing attributes*) on retail property prices. The use of price is preferred over rent in extracting implicit prices, because the rent as dependent variable would introduce extra price-affecting variables through heterogeneous lease conditions and complex agency problems inherent in lease contracts. We thus focus on retail property prices as a proxy for a retail property's potential sales performance, and thus have $P = f(L, S)$. The nature of the study area eliminates the necessity to consider type-one and -two location decisions for present purposes, and allows control for the effects of other factors, such as the heterogeneity of retail properties through use of data extracted from actual retail property sale transactions from a narrowly defined retailing district in Hong Kong drawing on perceived homogeneous custom.

THE VARIABLES AND EXPECTED RESULTS

The dependent variable of the model is real price per unit area for individually owned retail properties within larger mixed-use buildings within a narrowly defined retailing area in Hong Kong. We identified eleven characteristics which are seen to influence price for inclusion in the model. Because many retail practitioners' approaches to store choice is possibly best described as based on heuristics, usually in the form of checklists and/or analogue methods,³ we drew quite extensively on checklist literature

³ It may be argued that what is known as the "analogue model" is in principle a form of checklist

to help identify practically useful type three and four variables based on micro-location and physical property characteristics (see Jones and Mock, 1980; Davies and Harris, 1990; Jones and Simmons, 1990).

Locational Characteristics

MTR

The first locational characteristic we deal with is accessibility.⁴ The underground Mass Transit Railway (MTR) provides the principal means of access into and out of our study area; and covers the most densely populated areas of Hong Kong namely the Kowloon Peninsula and Hong Kong Island. The intensively used MTR provides wide access to the core areas of Hong Kong at low cost, and within Hong Kong generally the presence of the MTR in any district exerts considerable influence on real estate prices. For our purposes we do not include accessibility as a specific independent variable, as the nature of the study area is small and dense enough to assume that all retailing in the area is equally accessible from the MTR. MTR exits generate extensive pedestrian flows, and proximate locations thus are expected to have high retail drawing power.⁵ Retail units close to such outlets visibly benefit from such pedestrian flows, while it is then also expected that with an increase in distance from the exits that there will be a dissipation in the volume of pedestrian flow and thus a reduction in drawing power and consequently also in price.

Table 1: Average weekday passenger flow of Mong Kok, Prince Edward and Yau Ma Tei MTR Stations, 1998.

Station	Incoming	Outgoing	Exits
Yau Ma Tei	55635	56844	5
Mong Kok	118804	134735	13
Prince Edward	66362	66533	6

Source: Unpublished data obtained from MTRC.

Table 1 presents the magnitude of passenger flows through the three MTR stations in the study area. The Mong Kok MTR station has about two hundred and forty thousand passengers coming in and out of its various exits daily, and we therefore expect that proximity to this flow has a positive impact on the prices of retail units nearby. This variable thus tests how significant proximity to an MTR exit and the pedestrian flows it generates is on retail unit prices. MTR is measured as the distance in feet of a retail unit to the closest MTR exit.

MALL

which includes sophisticated empirical evaluation of analogue stores (see Craig, et al ,1984).

⁴ We include for present purposes "parking availability", a frequently encountered checklist item as an accessibility characteristic.

⁵ We also view "traffic flow" (with reference to road traffic), as in principal comparable to pedestrian flow (for example Jones and Mock, 1984).

Street-level retailing is ubiquitous throughout Hong Kong, generally with densely packed small main street-type retail units in high-rise mixed-use buildings throughout (typically office and/or residential at upper levels, with street-level retailing). Ownership of retail space in Hong Kong is also highly fragmented. Shopping malls have become more popular, however, although the concept of a "shopping mall" in Hong Kong cannot be compared to the normal regional/district/neighbourhood categorisation popularly accepted in North American literature. Often located in renovated older mixed-use buildings, ownership of the units within malls more frequently than not remains highly fragmented. In practice, a "mall" frequently indicates merely a second row of shops separated by an arcade leading off the same street in the same mixed-use building, and/or a second and infrequently a third level of podium-style shops in the same mixed-use building, with access also frequently off the same street. Malls are however generally well managed with facilities that are well maintained, and with regularly held promotional activities. Malls have consequently been successful both in providing a wide variety of retail goods, or in providing clusters of similar goods (as with theme malls).

Malls have nevertheless not managed to threaten street-level retailing systematically in Hong Kong. Physically integrated into the dense high street-type small shop environments, they also provide a minor proportion of total retail space. By providing a nice shopping environment, however, malls do however provide retail drawing power and have become minor retailing end-destinations of their own, particularly theme malls.⁶ We thus view shopping malls within an unplanned shopping centre as having similar drawing power as anchor stores in planned shopping centres (see for example Brown, 1992: 95-103). Street-facing ground floor units of shopping malls should thus benefit from the attractions of malls, on the one hand, and the advantages of the traditional main street on the other hand. This variable is thus introduced to test the significance of being part of a shopping mall for a street level retail unit. MALL thus is included to test if a street facing ground floor mall retail unit commands a price premium.

XMALL

Beavon (1970) and Brous (1981) describe how retailing organisations' real world micro-locational decisions are often made with reference to propinquitous outlets, especially major magnet stores. From anecdotal evidence, McDonalds' location strategy is possibly the most closely watched retail location leading indicator wherever it is active in a market. While department stores seem to have declined generally in recent years and have lost appeal as desired locational neighbours, in Hong Kong shopping malls have substituted to a large extent as such desired neighbours for retailers that operate in street level retail units. Therefore, and as an extension of the analysis supporting the relevance of MALL as an influential variable in retail unit price formation, it is assumed that the proximity of a shopping mall has the ability to induce pedestrian flows in an area. Retail units close to but not part of a shopping mall are thus expected to benefit from pedestrian flows induced by the presence of a shopping mall. We operationalise this notion by classifying those retail units which have a shopping mall within 50 meters as having proximity to a shopping

⁶ Computer malls are possibly the best-known theme malls in Hong Kong, but there are many others including factory outlets and small-scale start-up clothes fashion house retail outlets.

mall, and so include XMALL to test if proximity to shopping malls influence the prices of nearby retail units. XMALL units are also identified with a dummy variable.

CORNER

A retail unit on a corner exhibits both location and physical characteristics. It has two sides of shopfrontage, and so a typically higher perimeter of exposure to pedestrians than immediately adjacent sites. It typically also has additional access on the extra frontage (cf. also Jain and Mahajan, 1979, as a checklist variable). Corner locations also frequently benefit from increased pedestrian flows. Lusht (1997) thus argues that for commercial uses, particularly retail services, frontage and access on two sides may be valued quite highly; while Guntermann (1979) found that on average corner lots are sold at a small (2%) premium over comparable intermediate lots. CORNER units are also identified with a dummy variable.

MK and YMT

Within the Mong Kok district, there are three MTR stations within relatively close proximity. They are Mong Kok (MK) station itself, and then Yau Ma Tei station (YMT) around 500m to the south of MK and Prince Edward (PE) station around 500m to the north of MK station. Although Mong Kok is closest and Yau Ma Tei second closest to the spatial centre of gravity of the study area and sample of transactions, all three stations nevertheless allow relatively easy access to the study area. The three stations have different numbers of exits; but Mong Kok has a significantly higher number of exits (13 vs. 5 (YMT) and 6 for Prince Edward) and significantly higher pedestrian traffic than both stations (see Table 1).

Closer proximity to MK thus is assumed to cause retail unit prices to be higher than with relatively closer proximity to YMT or Prince Edward, due to relatively higher pedestrian traffic at MK. The relative proximity to the closest of the two stations for each observation will be represented by a dummy variable indicating 1 or 0 for either ***MK*** or ***YMT***, thus leaving close proximity to PE to be identified by 0 for both MK and YMT.

Physical Characteristics

SIZE

Size of the retail property is obviously an important characteristic to consider (see Jones and Simmons, 1990; Kinny, 1969). Previous research on shopping malls generally conclude that the larger the mall, the higher the rent per unit area for individual shops; mainly caused by positive external economies emanating from the wider range of goods offered and increased mall custom in larger shopping malls. Our study considers shops in an "intra-centre" locality, and following Lusht (1997), we assume that the relationship between shop size and price tends to be non linear, with price increasing at a decreasing rate with size; thus resulting potentially in a lower price per unit area as the scale at which the purchase of single space floor areas increases. It is common in the leasing market that the larger the area leased, the lower

the rent per unit area. This variable tests similar expectations, i.e. how price reacts to size. *SIZE* is measured in gross square feet.

AGE

Buildings generally deteriorate over time, consequently the age of a property is expected to have a direct influence on its condition. Factors like appearance and availability of services generally have an inverse relationship with age, while older retail units may also suffer from building defects such as water leakage and condensation. Lusht (1997) argues that the common-sense assumption is that the better the condition of the building, the greater should be the utility and the higher the value. Previous research suggests that rents normally do go down with the age of the shopping centre (Sirmans and Guidry, 1993). While shopping centre rents may go down with age, the value of the shopping mall nevertheless may be maintained by periodic renovations and constant maintenance. *AGE* thus represents a test of how price per unit area of a unit is affected by age. *AGE* is measured in years.

FRONTAGE

Research has long suggested that shop frontage is an important factor in marketing a business (for example Claus and Hardwick, 1972; Davies and Harris 1990). Frontage may be viewed in similar fashion as visibility. Shopfronts are important for marketing purposes. A wide frontage means more space for display, and as such it conveys information generally and assists in shoppers' search activities. This variable is thus included to test the effect of frontage on retail unit prices. *FRONTAGE* is measured in feet.

Expected Signs

In sum, we expect the variables to behave as follows. We expect the older the building, the lower the price per unit area and therefore that *AGE* will be negative. The larger the retail unit, the lower the price per unit area is expected to be, and the further away the unit is from an MTR exit, the less convenience it is and therefore the lower the unit price expected. The two other characteristics which we expect to have negative signs are thus *SIZE* and *MTR*. The wider the frontage, the more display space or the bigger the entrance is. *FRONTAGE* is thus expected to relate positively to retail unit prices. Further, retail units on corner lots (*CORNER*) are exposed to two streets, and therefore have more exposure than retail unit on immediately adjacent sites. This feature is expected to be positively related to unit price. *MALL* and *XMALL* are included to measure the effects of the nearby presence of shopping malls on retail unit prices. They are both expected to contribute to unit prices positively.

DATA AND SOURCES

Conduct of the empirical analysis draws on data extracted from transacted records of street level retail properties and their locational and physical characteristics. All data used for this study is drawn from retail property sales within the Mong Kok district of Hong Kong during 1993-1996 (to end 3rd quarter). The intensity of street-level retail

activity in Mong Kok generates a large number of retail property sales of assets with similar characteristics, and consequently sufficient cross-sectional data from within a well-defined study area with clearly identifiable characteristics to conduct a hedonic price analysis. Furthermore, as Mong Kok attracts mostly local shoppers, exogenous influences such as cyclical behaviour in tourism on sales performance, and hence prices, of shops can be ignored for present purposes. In addition, Mong Kok has a higher concentration of street level retail units than other shopping areas in Hong Kong, with many potentially useful transaction records during a single time period (see Table 2). This is an important advantage, given the substantial data requirements of hedonic pricing models, because it allows the testing of relationships in the absence of cyclical or structural influences. A further advantage is that the stock of street level retail space has been very stable during 1993-1996, the period from which the sample of transaction records are collected for analysis (see Table 3). Additional descriptive details to convey an impression of the Mong Kok district are presented in Appendix A.

Table 2: Number of Transactions of Street-level Retail Units in Mong Kok during 1993-1996 (until end-September)

	1993	1994	1995	1996 (up to Sept.)	Total
All transaction records	351	409	244	282	1286
Records with all necessary data	122	136	78	61	397
Useable data	83	95	50	46	274

Source: EPRC Database

Table 3: Stock of Street-level Retail Space (m²) in Mong Kok.

Year	TPU 221	TPU 222	TPU 227	TPU 229	TOTAL
1991	1357396	500800	395540	401447	2655183
1992	1343265	503803	398453	396396	2641917
1993	1358500	511443	399506	395728	2665177
1994	1375684	501464	395082	394579	2666809
1995	1382732	499979	385944	395060	2663715
1996	1392319	494943	383468	395364	2666094

Notes: TPU stands for Territory Planning Unit. All shop units included in this research are within the four TPU that comprises Mong Kok.

Source: Unpublished Data, Rating and Valuation Department of the Hong Kong Government.

Data

The three main sources of data transactions registered with the Hong Kong Government's Land Registry⁷; small scale 1:1000 maps published by the Survey and Mapping Office of the Lands Department of the Hong Kong Government; and site visits. Transaction records were analysed over three years and nine months, from the beginning of 1993 until the end of the third quarter of 1996. Two hundred and seventy-five useable records were identified.

In order to develop a real price dataset, we adjusted transacted prices to a common base before manipulation. The Rating and Valuation Department of the Hong Kong Government constructs and publishes quality-adjusted rental and price indices for various kinds of real estate; including a quarterly retail property price index which was used for present purposes. The data for the independent variables were obtained from a variety of sources, some secondary and some from on-site measurement of property characteristics. The age and size of the retail units were obtained from the Economic Property Research Centre (EPRC) database records. The age of a retail units was assumed to be the difference between the issue date of the original Occupation Permit and the date of the sale transaction. The transaction date is taken as the date when the agreement was made rather than the day when the deed was registered, thereby allowing for any lags between the two dates. Unit sizes were also drawn from EPRC records, using gross floor area measured in square feet. Only ground level, street facing retail units with own entrances are included in the analysis. The distance from the nearest MTR exit of a retail unit is measured from small-scale 1:1000 survey maps following the street layout. The three MTR stations, namely Mong Kok, Yau Ma Tei and Prince Edward, are represented by dummy variables, as

⁷ Records were drawn from the Database of the Economic Property Research Centre (EPRC), a consultancy that collates and categorises real estate transaction records Hong Kong.

explained above. From the maps and site visits it was also determined whether a retail unit has a shopping mall within of 50 meters from it. Frontage provided a practical problem, as there is no readily available secondary source from which this data could be drawn. We therefore visited all the units and measured the frontage *in loco*, interpreting the full length facing the street as the frontage of a unit. Frontage of corner units were also measured on-site as the combination of the two fronts.

The variables, together with their expected signs are summarised in Table 4.

Table 4: Summary of Variables and Expected Results

<u>Physical Variables</u>		
Independent Variable	Meaning	Expected Sign
Age	Age of the unit, calculated from the date of occupation permit.(yrs)	-
SIZE	Size of the unit. (ft ²)	-
FRONTAGE	Length of the shop front. (ft)	+
<u>Locational Variables</u>		
Independent Variable	Meaning	Expected Sign
MALL	Ground floor, street facing retail units of a shopping mall, with own street entrance. (Dummy)	+
XMALL	Street level retail units with a shopping mall located within a distance of fifty meters. (Dummy)	+
MTR	Distance from the nearest MTR exit. (m)	-
CORNER	Retail units located on corner lots. (Dummy)	+
MK	Mong Kok is the nearest MTR station. (Dummy)	+
YMT	Yau Ma Tei is the nearest MTR station. (Dummy)	+

Summary descriptive statistics for the sample is presented in Table 5.

Table 5: Descriptive Statistics of Continuous Variables

	Price* (HK\$/ft ²)	Size (ft ²)	Age** (Years)	MTR (m)	Frontage (ft)
MEAN	16,977.92	690.82	10.53	65.40	13.13
Median	12,629.41	534.00	8.44	64.63	11.50
Maximum	69,544.09	6,748.00	38.02	137.80	52.00
Minimum	1,632.29	72.00	-0.24	11.48	3.50
Std. Dev.	13,050.01	725.14	10.65	28.15	7.61

*prices are at 1992 constant price levels

** Negative values indicate presale of the unit

E: EMPIRICAL ANALYSIS AND DISCUSSION

We conducted a number of tests, with outcomes providing sequential information to develop the hedonic model. The initial tests generated some counterintuitive results worthy of reporting for discussion, as these tests prompted us to consider with far more attention the *detail* of Mong Kok as a study area in further development of the research, and also confirmed the complexity of this type of research as the micro-location level. Of note at this stage is that a linear specification initially performed

poorly compared to a model where logs were taken of the dependent variable, unit prices, thus confirming an early suspicion that property prices per unit area may decrease with property size.⁸ The equation estimated for present purposes is thus

$$\text{Log (P)} = \alpha_0 + \beta_1\text{AGE} + \beta_2\text{SIZE} + \beta_3\text{FRONTAGE} + \beta_4\text{MALL} + \beta_5\text{XMALL} + \beta_6\text{MTR} + \beta_7\text{CORNER} + \beta_8\text{MK} + \beta_9\text{YMT} + e.$$

[1]

The results are summarised in Table 6.

Table 6: Regression Results

Variable	Coefficient	Std. Error	t-Statistic
Constant	9.413113	0.111649	84.30952*
SIZE	-0.000243	5.39E-05	-4.505514*
AGE	0.001799	0.003016	0.596639
MALL	0.867438	0.093337	9.293631*
XMALL	0.688448	0.086432	7.965203*
MTR	-0.001497	0.001198	-1.249168
CORNER	0.211204	0.120643	1.750646
MK	0.129773	0.068001	1.908411
YMT	0.050386	0.108101	0.466107
FRONTAGE	0.001187	0.005288	0.224405
R-squared	0.520187	*Significant at the 1% level.	
Adjusted R-squared	0.503829		
Number of observations:	274		

The adjusted R² is 0.503829 with six out of nine t-values not significant; with AGE also exhibiting the opposite sign to expectations. These results on first appearance seem disappointing, but, as is explained below, upon closer examination, the results are explicable through an analysis of the study area at a finer level of analysis than offered by the regression. For the sake of brevity, we comment only on the problem variable in some depth.

AGE

The age of the property was shown to be positively correlated with price, contrary to expectations, but statistically insignificant. We propose that this is not difficult to explain, but possibly more complex to adjust for in revising the approach. AGE is a summary variable of the state and appearance of the unit, and these two have a direct and inverse relationship with building age. However, the appearance and the state of the unit can be preserved and improved by regular refurbishment and proper maintenance, thus rendering the building's age itself largely irrelevant as long as the

⁸ Evidence from the rental market led us to suspect that larger absolute spaces may command lower unit area prices than smaller spaces.

soundness of its structure and services (its "state") continues to facilitate the necessary upgrading. However, once we started questioning the sign with respect to location principles and followed up with a site visit, we found that what could be described as the "core" of Mong Kok where most long-established businesses were and prices were highest, actually hosted generally the oldest structures – and were thus more attractive properties age notwithstanding. It is also the location where most pedestrian traffic flows. In refining the model, this calls for the introduction of an additional indicator, namely proximity to the core and which includes for the influence of pedestrian flows. Prices are high where the location is attractive, thus overcoming the negative effects of building age.

MTR

The coefficient sign for MTR is negative, as expected, but is not significant. It indicates that the further away a unit is located from the MTR exits, the lower the price, but essentially it is not a useful conclusion. Again, some careful questions and in loco research revealed very interesting finer details not considered in our apparently increasingly blunt analysis reported above. We already reported on the retailing "core" that may have influenced the sign of AGE, and similar influences apparently may have influenced MTR. Whereas the "core" considered above is two-three streetblocks away from the nearest MTR exit, in Prince Edward there were additional micro-locational factors at play. For example, the more expensive units in Prince Edward were located near to an area which is famous for flower retailing, the so-called "Flower Street" - an agglomeration of flower retailers that draws custom from over the whole city as an end-destination in itself. Although the area is comparatively distant from the Prince Edward MTR station on the periphery of the study area, agglomeration effects at this location apparently have overridden the benefit from being close to MTR exits. This also calls for the inclusion of additional variables to extract the marginal effects of localised (but very strong) specialised retailing clusters. At least three additional clusters with sufficient gravity to have similar effects were identified, namely a cluster dealing with after-market motorcar customisation, a specialist pet-shop (mostly aquariums) cluster, and a pub-restaurant precinct. The Jade market is also in this proximity.

CORNER and FRONTAGE

Corner units were found to be positively related to price as expected, but not significant. Upon reflection, we suspect that there may be additional factors to be considered with this variable. In particular, the t-value of FRONTAGE is also low at 0.22, whereas we expected it to be highly significant. Upon inspection we suspected that the low t-value for FRONTAGE may be caused by double-counting; in particular between the variables FRONTAGE and CORNER, as CORNER also has a low t-value and corner retail units normally have a wider frontage than shops on immediately adjacent sites. It was suspected that these two variables share the effect. To test this assumption, we consider that exclusion of FRONTAGE should altogether improve the results. We also consider that a ratio variable FRONTAGE/SIZE may improve the results (recognising that the depth of a store is also a potential price characteristic).

MK and YMT

MK, representing retail units closest to Mong Kok MTR station, was found to be positively related to price, as expected, but not significant. Retail units near to Mong Kok were also found to command higher prices than those in Yau Ma Tei, confirming a priori information and expectation generally. YMT, i.e. retail units closest to Yau Ma Tei MTR station, were found to be positively related to price, but also not significant.

Upon further inspection of the sample, we are of the opinion that the influence of both MK and YMT have to be considered in respect of the retailing “core” concept floated earlier. We expect that after allowing for additional influences of the core, Flower Street and testing for the influence of other clusters, the influence of the MTR stations themselves may in fact be less influential than these agglomerations.

SIZE

SIZE was found to be negatively related to price and significant at the 1% level. As expected, the larger the size of the unit, the lower the price is per unit area, comparable to unit price behaviour in the rental market. A further reason is that small units are in higher demand in Hong Kong generally, and in Mong Kok particularly, because population density and the pervasiveness of retailing clusters generate substantial efficiencies in narrow-range (and thus small shop) retailing.

MALL

Street facing ground level retail units in shopping malls, were found to be positively related to price and significant at the 1% level. Units of this kind thus benefit substantially from the advantages of traditional main street location on one hand, and from the advantages of being in a shopping mall on the other.

XMALL

Retail units which have a shopping mall within a distance of fifty meters were found to be positively related to price and significant at the 1% level. Our expectation that shops located close to shopping malls in exhibit a price premium over those located with less proximity to such malls is therefore confirmed.

In our final analysis the adjusted R^2 is 50.3%. Altogether, although the results appear somewhat disappointing, we are excited about the learning it engendered about the study area itself. In our opinion these results are thus most informative, particularly when considering the extreme complexity of the street-level micro-economy in Mong Kok.

G: IMPLICATIONS OF RESULTS AND CONCLUSION

Hong Kong’s characteristics as a high-density urban economy with relatively homogeneous demographic and social characteristics between districts, provided an excellent opportunity to test the relationship between the locational and physical characteristics of retail properties and the prices investors are willing to pay for such properties. After reviewing relevant literature on high-street retailing, nine physical

and locational characteristics were identified that were believed to have a significant impact on retail unit prices. A Hedonic Pricing Model was used to identify the implicit price and significance of each of these characteristics. On face value the results were disappointing, and in some respects not predictable. Only three out of the nine independent variables were found to be significant at the 1% level, and the rest were not significant. The adjusted R^2 was 0.5038. Although no firm statements can be made given the generally weak test statistics, we can suggest that locational variables appear to have a higher influence on price than physical characteristics. Our expectation that street facing, ground floor shopping mall units benefit from the advantages of the traditional main street environment on one hand, and from the advantages of being in a shopping mall on the other was confirmed. Retail properties in close proximity to shopping malls were also shown to benefit from the pedestrian flows generated by the malls, as expected. The influence of the Mass Transit Railway was inconclusive. However, in attempting to interpret the results, we were forced to conduct a deeper analysis of both the data and the nature of the study area itself, which provided strong indicators to explain the poor results. It appears if there may be a number of additional urban structures that overlay the thinking that led to this first-level analysis, not least that we have clearly overlooked a number of centres of gravity within the study area that do not take predictable form (such as specialist retail clusters).

To conclude, we wish to offer two observations. In general, the density and particular nature of population, the high spatial concentration of the Hong Kong urban economy, and the very active retail property market allowed for the first time the deconstruction of the effect of factors that affect at a micro-locational level the prices of retail properties of a high-street nature. And secondly, although the results were mixed (at best), and perhaps disappointing, it did indicate particular avenues to pursue in refining the analysis. It allowed us to establish a research agenda which may allow more subtle retail property price factors to be isolated and quantified.

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APPENDIX A

Characteristics of the Study Area: MONG KOK

Mong Kok began to develop into a commercial and residential centre as early as the beginning of the 20th century, and presently is one of the major shopping districts in Hong Kong.⁹ It has an area of 147.6 hectares, a total of 190 street blocks and in 1993, there were about 1900 buildings and 42000 residential apartments. Its resident population was around 165,000 in 1995 with a density of about 1100 per ha, of the highest residential densities in the world. The local economy can be characterised as being dominated completely by retailing, supplemented by light manufacturing industry and construction material outlets concentrated in the adjacent Tai Kok Tsui and Sycamore areas, to the west. At Mong Kok Nathan Road, the main thoroughfare, is lined by high-rise commercial buildings, with wholesaling, financial services, import/export services and professional services predominating; but with retailing at street level throughout. These buildings generate substantial additional daytime pedestrian traffic. However, land use is generally dominated by mixed commercial / residential developments with a minimum of land for planned community purpose. Mong Kok is well served by a range of urban transportation systems. It is accessible from other parts of Hong Kong by two MTR lines, as well as by the Kowloon and Canton Railway Corporation, the suburban and regional rail system in Hong Kong. Apart from the mass transit rail systems, there are a large number of bus routes and public light bus routes to, from and through Mong Kok, and connects Mong Kok with districts which the two mass transit systems do not serve.

The single most important characteristic of Mong Kok is population density, with housing in high-rise, mixed-use developments with large number of predominantly small street-level shops. Nearly one third of the total number of buildings in the district have mixed commercial and residential uses. Most of these buildings have at least one, and some have up to three floors devoted to retailing, generally following podium-type plans. The dense population generates intense street-level pedestrian activity throughout the day, and the retailing economies associated with this pedestrian traffic are eclipsed in very few places. In general, the retail activity draws mostly on Mong Kok, and thereafter Hong Kong custom, although particular shopping destinations, such as the famous “Woman Street”, have become popular tourist shopping attractions. High numbers of clustered shops trade in an extensive range of comparison goods, for which shoppers are willing to travel long distances. Active street markets and hawking cover a substantial number of street blocks on a daily basis. Drawing on the density, the entertainment sector includes clusters of cinemas, pubs and amusement arcade/game centres; and includes billiard saloons and Mah-jong and Tin Kau houses. Mong Kok serves as a major dining destination for Hong Kong residents. Large restaurants and food courts frequently anchor shopping malls. An indication of the level of retail activity achieved in some shops is reflected in the current Hong Kong retail space price record set in September 1996, when a 49 sq.ft street level retail unit sold for around HK\$26million - around US\$3.3m (approximately US\$680,000/m²).

⁹ This description of Mong Kok is abstracted from various editions of the Mong Kok District Strategy, published by the Mong Kok District Board.

Despite its economic vibrancy, Mong Kok is one of the oldest developed districts in Hong Kong, and Hong Kong's hostile sub-tropical climate dictates that much of the building stock is old and often ready for redevelopment. According to Yeung and Lau (1988), Mong Kok has the second most old buildings in Hong Kong, after Western District on Hong Kong Island, but highly fragmented property rights in old buildings mitigates against rapid redevelopment of old and possibly obsolete building stock. Consequently individual retail properties are frequently renovated but not redeveloped, and also frequently traded.